

Ontario Energy Board
P.O. Box 2319
27th. Floor
2300 Yonge Street
Toronto ON M4P 1E4
Telephone: 416- 481-1967
Facsimile: 416- 440-7656
Toll free: 1-888-632-6273

Commission de l'Énergie de l'Ontario
C.P. 2319
27e étage
2300, rue Yonge
Toronto ON M4P 1E4
Téléphone; 416- 481-1967
Télécopieur: 416- 440-7656
Numéro sans frais: 1-888-632-6273



July 13, 2007

Pacific Economics Group, LLC
22 E. Mifflin Street, Suite 302
Madison, WI 53703

Attn: Mark Newton Lowry:

Dear Mr. Lowry:

Re: Contract No. 9186 – Generic Incentive Regulation Framework for Natural Gas Utilities

This letter of variation will confirm and authorize the amendment of our agreement dated May 11, 2006 relative to deliverables and fees.

Accordingly, the total ceiling price of the original contract is hereby increased by \$45,000.00 extending the overall contract from \$[REDACTED] to \$[REDACTED].

Additionally, the following deliverables and rates have been added to Schedule A and Schedule B respectively, of the original contract:

Deliverables – Included in Schedule ‘A’:

Deliverables – Total Factor Productivity Study for Natural Gas Utilities in Ontario

1. At stakeholder request, Pacific Economics Group, LLC to conduct Revenue Cap Index research.
2. At stakeholder request, Pacific Economics Group, LLC to conduct further analysis on the ADJ factors – calculations and data used needs to be clarified.
3. Review and assess stakeholder comments regarding March 30, 2007 version of report. If appropriate, revise report.

Additional hours to be included in Schedule B

Consultant	Additional Hours Required	Hourly Rate
Mark Lowry	99.5	[REDACTED]
David Hovde / Lullit Getachew	60	[REDACTED]
Steve Fenrick/Kyle Haemig	40	[REDACTED]
Matt Makos	10	[REDACTED]
Others	9.9	[REDACTED]

It is understood that all other terms and conditions of our original agreement dated May 11, 2006 continue to apply.

Please execute this letter to indicate your concurrence and return to the Board to the attention of Renata Davidson. Once fully executed, an original copy will be returned to your for your records. The executed amendment letter shall be attached to and will form part of the original agreement.

Should you have any questions, please contact me at 416.440.7728.

Yours truly,

Renata Davidson
Procurement Coordinator
Ontario Energy Board

cc Laurie Klein

I hereby acknowledge receipt of this addendum and confirm our agreement with all terms and conditions contained therein:

Mark Newton Lowry
Pacific Economics Group, LLC

Date

Marika Hare
Managing Director,
Regulatory Policy Development

Date

IGUA #21

INTERROGATORY

Reference: PEG Report

Issue Nos.: 1.1 and 1.2

Issue: 1.1 What are the implications associated with a revenue cap, a price cap and other alternative multi-year incentive ratemaking frameworks?

Issue 1.2 What is the method for incentive regulation that the Board should approved for each utility?

PEG states that Board Staff initially directed PEG to undertake index research that would support the design of PCIs for EGD and Union, and subsequently, Board Staff requested the development of RCIs and PCIs for particular search groups. Please provide a copy of all written directions and correspondence between Board Staff and PEG.

RESPONSE

Staff's written directions to PEG were provided in the contract attached (see IGUA #21 - PEG Contractnsion July 13-07.doc). The contract has been redacted so as to not reveal information not relevant to the question (i.e., the fees).

**Ontario Energy
Board**

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de l'Ontario**

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July 13, 2007

Pacific Economics Group, LLC
22 E. Mifflin Street, Suite 302
Madison, WI 53703

Attn: Mark Newton Lowry:

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Deliverables – Included in Schedule 'A':

Deliverables – Total Factor Productivity Study for Natural Gas Utilities in Ontario

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2. At stakeholder request, Pacific Economics Group, LLC to conduct further analysis on the ADJ factors – calculations and data used needs to be

clarified.

3. Review and assess stakeholder comments regarding March 30, 2007 version of report. If appropriate, revise report.

Additional hours to be included in Schedule B

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David Hovde / Lullit Getachew	60	
Steve Fenrick/Kyle Haemig	40	
Matt Makos	10	
Others	9.9	

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Should you have any questions, please contact me at 416.440.7728.

Yours truly,

Renata Davidson
Procurement Coordinator
Ontario Energy Board

cc Laurie Klein

I hereby acknowledge receipt of this addendum and confirm our agreement with all terms and conditions contained therein:

Mark Newton Lowry
Pacific Economics Group, LLC

Date

Marika Hare
Managing Director,
Regulatory Policy Development

Date

IGUA #22

INTERROGATORY

Ref: PEG Report
Issue Nos.: 1.1 and 1.2
Issue: 1.1 What are the implications associated with a revenue cap, a price cap and other alternative multi-year incentive ratemaking frameworks?
1.2 What is the method for incentive regulation that the Board should approve for each utility?

Throughout its report, PEG refers to information provided by EGD and Union. Please provide all correspondence between PEG and EGD or Union, including any correspondence between EGD and Union to and from Board Staff that relates to the work undertaken by PEG.

RESPONSE

Please see IGUA Q22 Attachment A for correspondence regarding Enbridge. Attachments to correspondence primarily contained data that can be found in the working papers provided in response to Enbridge Question 2. The other Enbridge email attachments can be found in IGUA Q22 Attachment B.

Please see IGUA Q22 Attachment C for correspondence regarding Union. The data contained in the attachments are provided in the working papers. The other Union email attachments can be found in IGUA Q22 Attachment D. The CGA paper referenced in one of the Union emails can be found in the response to IGUA Question 17.

All other correspondence to or from Board staff is covered by privilege, which privilege has not been waived by Board staff.

Witness: Mark Lowry

Matthew Makos

From: Richard Campbell [Richard.Campbell@enbridge.com]
Sent: Monday, November 27, 2006 10:59 AM
To: Laurie.Klein@oeb.gov.on.ca
Cc: mnlowry@earthlink.net; cburns@uniongas.com
Subject: PEG Data Request for TFP Analysis (EB-2006-0209)

Laurie:

Please forward the data request from PEG to me & I'll work here to get it done as quickly as possible.

To the extent that we (and perhaps Union Gas) need to discuss specifics of PEG's request (definition of terms), or our response (limitations or qualifications) with Mark Lowry, I propose that we have those discussions directly with Mark by telephone and that the conclusions be documented by email, with a copy to Board Staff (you).

R. J. Campbell
Manager, Regulatory Policy & Research
phone: 416-495-5173
email: richard.campbell@enbridge.com

9/21/2007

Matthew Makos

From: Richard Campbell [Richard.Campbell@enbridge.com]
Sent: Wednesday, December 20, 2006 3:40 PM
To: Mark Lowry
Subject: Re: FW: Cost Data Request

Hi Mark:

I trust you received my note from last week, with plant data attached. We'll do our best to get as much as possible together for this Friday as promised. I'm in Vancouver at the moment but will be back in the office on Friday morning.

R. J. Campbell
Manager, Regulatory Policy & Research
phone: 416-495-5173
email: richard.campbell@enbridge.com

Matthew Makos

From: Richard Campbell [Richard.Campbell@enbridge.com]
Sent: Friday, December 22, 2006 11:21 AM
To: mnlowry@earthlink.net
Cc: Laurie.Klein@oeb.gov.on.ca
Subject: Data Requirements for Total Factor Productivity Study (EB-2006-0209)
Importance: High

Mark:

Further to my note of December 12 (attached below) I have some additional data, as promised. Unfortunately, we are not complete just yet but we will get the missing O&M and customer data to you before January 5.

Best wishes for a happy holiday Mark to you and the family.

R. J. Campbell
 Manager, Regulatory Policy & Research
 phone: 416-495-5173
 email: richard.campbell@enbridge.com

----- Forwarded by Richard Campbell/GAS/Enbridge on 12/22/2006 11:56 AM -----

Richard Campbell/GAS/Enbridge

To "Laurie Klein" <Laurie.Klein@oeb.gov.on.ca>

CC <mpacker@uniongas.com>, <smillar@nrgas.on.ca>, <mnlowry@earthlink.net>

12/12/2006 03:19 PM

Subject Data Requirements for Total Factor Productivity Study (EB-2006-0209)[Link](#)

Dear Laurie:

I'm writing in response to your request on this topic dated December 5, 2005. Information that we believe is available but not provided herein (including responses to the "Miscellaneous Questions") will be provided on a best efforts basis by the end of day, Friday December 22, 2006. Due to the 2007 Rate Case, now in ADR, we expect that some material may not be prepared until early in the New Year. We will target Friday January 5 for a complete response.

1. Enbridge Gas Distribution does not have any costs associated with "Exploration and Development, Natural Gas Production or Gathering".
2. Total O&M cost data will be provided for the years 2000-2005. O&M data prior to 2000, for the bundled industry including retail, is not comparable, nor do we believe that we could separate comparable cost and revenue data.
3. Total FTEs are not available. Total headcount, with qualification, can be provided for the period 2000-2005. Again, comparability of headcount data between this period and that of the pre 2000 bundled utility is an issue.
4. Net plant values for each year, 1996 - 2005, is attached below. Separate files for each year include opening &

9/21/2007

closing balances, additions, retirements, adjustments, and depreciation; by category and the totals for:
Underground Storage Plant, Distribution Plant, and General Plant.

R. J. Campbell
Manager, Regulatory Policy & Research
phone: 416-495-5173
email: richard.campbell@enbridge.com

Matthew Makos

From: Richard Campbell [Richard.Campbell@enbridge.com]
Sent: Monday, January 15, 2007 5:25 PM
To: Mark Lowry
Subject: Re: More Questions

Hi Mark:

I have your 2 notes of today and I'm giving them my full attention. I understand the urgency. No promises yet, and if we can't deliver on Wednesday we'll explain why.

Rick

R. J. Campbell
Manager, Regulatory Policy & Research
phone: 416-495-5173
email: richard.campbell@enbridge.com

9/21/2007

Matthew Makos

From: Richard Campbell [Richard.Campbell@enbridge.com]
Sent: Thursday, January 18, 2007 7:14 AM
To: Mark Lowry
Subject: Re: FW: Cost Data Request

Mark, I have a note in prep for you...on its way in the next couple of hours...

R. J. Campbell
Manager, Regulatory Policy & Research
phone: 416-495-5173
email: richard.campbell@enbridge.com

Matthew Makos

From: Mark Lowry [mnlowry@earthlink.net]
Sent: Thursday, January 18, 2007 2:15 PM
To: 'Diana Crapp'
Subject: FW: More Questions

Please print out these materials for MNL. Bill your time to OEB Gas Empirical.

From: Richard Campbell [mailto:Richard.Campbell@enbridge.com]
Sent: Thursday, January 18, 2007 2:00 PM
To: Mark Lowry
Subject: Re: More Questions

Mark:

My note and attachments below. Still more to come but the best we can do for today.

R. J. Campbell
Manager, Regulatory Policy & Research
phone: 416-495-5173
email: richard.campbell@enbridge.com

Matthew Makos

From: Richard Campbell [Richard.Campbell@enbridge.com]
Sent: Monday, January 22, 2007 3:26 PM
To: Mark Lowry
Subject: O&M Data

Finally, although the percentages of O&M being capitalized in each year is still being calculated.

R. J. Campbell
Manager, Regulatory Policy & Research
phone: 416-495-5173
email: richard.campbell@enbridge.com

Matthew Makos

From: Richard Campbell [Richard.Campbell@enbridge.com]
Sent: Thursday, January 25, 2007 10:46 AM
To: mnlowry@earthlink.net
Subject: Fw: TFP Study
Importance: High

from January 5th

R. J. Campbell
 Manager, Regulatory Policy & Research
 phone: 416-495-5173
 email: richard.campbell@enbridge.com

----- Forwarded by Richard Campbell/GAS/Enbridge on 01/25/2007 11:47 AM -----

Richard Campbell/GAS/Enbridge

To "Mark Lowry" <mnlowry@earthlink.net>

cc

01/05/2007 04:29 PM

Subject TFP Study [Link](#)

Hi Mark:

Well I'm struggling here to complete the data set for you. Between year-end and the rate case settlement negotiations that have going on the past three weeks, finance & regulatory accounting have too much on their plate. On Monday, they are back in the building and I'm told they will get the O&M, DSM, salaries and employment costs together in quick order.

Here is what I've been able to get together this week.

1. Revenues by rate class, 2000-06
2. Head count, not exactly FTE, but our best proxy, 1999-2006
3. You asked for our previous productivity analysis. For the targetted O&M plan 2000-02, a multi-factor study concluded the average productivity for the period 1987-98 was 0.63%. That was accepted by the Board and a stretch factor was added. The supporting evidence is in two parts, attached. A short direct evidence piece (sorry, it is marked-up) and more detail in an interrogatory response.
4. More interesting, I think, is some work we did on a TFP basis, for the decade ending in 2000. This was not introduced in evidence, but I did provide it to stakeholders during the consultatiuons I conducted for a potential PBR application for the 2003 rate year (it didn't happen). It shows average annual EGD TFP productivity growth of -0.33% for the period 1989-2000. The three documents attached describe the methodology, the inputs and a summary of results.

9/21/2007

Hope to get you anything else outstanding on Monday. If you wish, we could schedule a conference call latter in the week to reiew your questions/issues etc.

R. J. Campbell
Manager, Regulatory Policy & Research
phone: 416-495-5173
email: richard.campbell@enbridge.com

Matthew Makos

From: Richard Campbell [Richard.Campbell@enbridge.com]
Sent: Thursday, January 25, 2007 9:26 AM
To: Mark Lowry
Cc: Tom Ladanyi; Kevin Culbert
Subject: TFP Data
Importance: High

Mark:

OK, I'm reviewing your questions now. I'd like to plan a conference call with you ASAP. At my end I'll have the Manager Budgets, Tom Ladanyi and the Manager Regulatory Accounting, Kevin Culbert. What ever more we can do for you has to get done before Monday when our Rate Hearing testimony begins. We may have to agree on some proxies or assumptions where data is not available.

Can we call you at 11:30 a.m. eastern?

R. J. Campbell
 Manager, Regulatory Policy & Research
 phone: 416-495-5173
 email: richard.campbell@enbridge.com

Mark Lowry <mnlowry@earthlink.net>

To: Richard Campbell <Richard.Campbell@enbridge.com>

CC: mnlowry@earthlink.net

Subject: Re: Fw: O&M Data

01/25/2007 10:09 AM

Please respond to Mark Lowry <mnlowry@earthlink.net>

Yes I did. But the big ticket item missing is S&W exclusive of capitalizations.

-----Original Message-----

From: Richard Campbell
 Sent: Jan 25, 2007 6:56 AM
 To: Mark Lowry
 Subject: Fw: O&M Data

just confirming that your recieved the attached...

R. J. Campbell
 Manager, Regulatory Policy & Research
 phone: 416-495-5173
 email: richard.campbell@enbridge.com

----- Forwarded by Richard Campbell/GAS/Enbridge on 01/25/2007 09:57 AM -----

9/21/2007

Richard Campbell/GAS/Enbridge

01/22/2007 04:25 PM

To Mark Lowry <mnlowry@earthlink.net>
cc
Subject O&M Data [Link](#)

Finally, although the percentages of O&M being capitalized in each year is still being calculated.

R. J. Campbell
Manager, Regulatory Policy & Research
phone: 416-495-5173
email: richard.campbell@enbridge.com

9/21/2007

Matthew Makos

From: Mark Lowry [mnlowry2@earthlink.net]
Sent: Sunday, January 28, 2007 8:31 PM
To: Richard Campbell
Cc: mnlowry@earthlink.net
Subject: Re: More Questions

Hi Rick,

Attached please find my followup to your data request. There are still a few issues to work out. Your prompt attention is greatly appreciated. Please address all responses to my office address. Thanks.

----- Original Message -----

From: [Richard Campbell](#)
To: [Mark Lowry](#)
Sent: Friday, January 26, 2007 12:59 PM
Subject: More Questions

Mark:

Some more for you to work with. Work is underway on yr 2000 revenues & output by rate class, should have it by Tuesday and the O&M capitalization figure as best we can. Some intrpretations per your questions still being pursued.

Hope you have some time to wind down on the weekend. Best regards to Ann.

R. J. Campbell
Manager, Regulatory Policy & Research
phone: 416-495-5173
email: richard.campbell@enbridge.com

Matthew Makos

From: Richard Campbell [Richard.Campbell@enbridge.com]
Sent: Monday, January 29, 2007 4:30 PM
To: mnlowry@earthlink.net
Subject: Responses

Mark:

Customer numbers data attached, starting in 1954 and with gaps for '64 and '65.

Our Manager, Regulatory Accounting provides some additional responses below. More to come asap.

R. J. Campbell
 Manager, Regulatory Policy & Research
 phone: 416-495-5173
 email: richard.campbell@enbridge.com

----- Forwarded by Richard Campbell/GAS/Enbridge on 01/29/2007 05:28 PM -----

Kevin Culbert/GAS/Enbridge

To Richard Campbell/GAS/Enbridge@Enbridge

cc Doreen Cho/GAS/Enbridge@Enbridge, Ryan Small/GAS/Enbridge@Enbridge

01/29/2007 04:31 PM

Subject Lowry info

We have collected more plant data for the fiscal years 1990, 1991, 1993, 1994 and 1995. We are still looking for 1989 and 1992 and hope to have that info for Wednesday. Can you alert Lowry and inform him that this is as far back as we can provide.

With respect to further page 4 questions. The general plant category "SIM" was a variety of System Information Management projects, mostly of a software nature, separate and distinct from the CIS system. These projects were essentially depreciated or amortized by the end of fiscal 2003 or 2004. The computer equipment asset category now contains any software type applications or capital amounts incurred.

In the year 2000, when certain other A&G services were transferred to EI there was no appreciable amount of general plant transferred (other than the rental program and services businesses I mean). For other services, an elimination of non-utility assets has occurred each year for rate setting purposes from that time on for any assets which non-utility services are utilizing.

With respect to the page 5 question about itemizing plant additions for leave to constructs - we (reg. acctg) do not have any more detail than what we have been able to provide.

For the question on page 6 about CIS cwip amount. No it was never part of gross plant additions as the rate base schedules we have provided only include amounts closed into service within rate base. The CIS system was never part of additions into rate base.

We will provide you with hard copies of the remaining plant information we have by Wed sometime (hopefully - if storage boxes arrive by then).

9/21/2007

Matthew Makos

From: Richard Campbell [Richard.Campbell@enbridge.com]
Sent: Thursday, February 01, 2007 8:18 AM
To: mnlowry@earthlink.net
Subject: Request from Jan. 26 letter

R. J. Campbell
 Manager, Regulatory Policy & Research
 phone: 416-495-5173
 email: richard.campbell@enbridge.com

----- Forwarded by Richard Campbell/GAS/Enbridge on 02/01/2007 09:19 AM -----

Jackie Collier/GAS/Enbridge

To Richard Campbell/GAS/Enbridge@Enbridge

cc Malini Giridhar/GAS/Enbridge@Enbridge

02/01/2007 09:11 AM

Subject Fw: Lowry Request from Jan. 26 letter

Rick , here is a draft response to question #4 under Other Topics from the January 26,2007 Lowry request.

#4. The volumetric share of the volumes revenue is recovered from a declining block structure for each of the rate classes. However, the block differentials particularly amongst the general service Rates 1 and 6 is small and therefore they do not act like a fixed customer charge. As can be seen in the rate structure for Rate 1, the differentials between the first three blocks of Rate 1 is only 25 m3 to 30 m3.

Rate 1

	<u>Blocks</u>	<u>Rates (cents)</u>
Delivery Charge	first 30 m3	9.7382
	next 55 m3	9.1109
	next 85 m3	8.6194
	over 170 m3	8.2534

Jackie Collier
 Manager Rate Design
 Enbridge Gas Distribution
 (416) 753-7322

----- Forwarded by Jackie Collier/GAS/Enbridge on 02/01/2007 08:47 AM -----

Malini Giridhar/GAS/Enbridge

To Jackie Collier/GAS/Enbridge@Enbridge

cc

9/21/2007

01/31/2007 05:02 PM

Richard Campbell/GAS/Enbridge@Enbridge

Subject Re: Lowry Request from Jan. 26 letter [Link](#)

Jackie, there was an additional question from Lowry regarding intramarginal block revenue and whether they should be treated as fixed. I think you should respond saying that the block rate differential is very small, quote what it is and state that the block differentials do not achieve their intended purpose.

Malini Giridhar
Manager Rate Research and Design
Enbridge Gas Distribution
416 495 5255

Jackie Collier/GAS/Enbridge

To Richard Campbell/GAS/Enbridge@Enbridge

01/31/2007 04:48 PM

cc Malini Giridhar/GAS/Enbridge@Enbridge

Subject Lowry Request from Jan. 26 letter

Hi Rick,

Attached is an updated schedule which provides forecast customer numbers, contract demands and volumes by rate class from 2000 to 2006. Also updated are the revenue by customer, demand and volumetric charges by rate class for 2000 to 2006. I have included two new columns which includes our Rates 300/305 which have been used to bill curtailed delivered supply and Rate 325 our ex-franchise storage. The total revenue and volumes match what was presented to response #10 from our original response to Dr. Lowry for "Board Order Distribution Revenue Requirement.". These numbers represent the gross margin for EGD and therefore they do not match the "Distribution Revenues" which I sent to you on December 22. The distribution revenues include some non utility costs such as storage and lost and unaccounted for gas and therefore do not represent the "gross margin" for the utility.

Please let me now if you need anything else.

[attachment "lowry follow up #10 revised Jan 31.xls" deleted by Malini Giridhar/GAS/Enbridge]

Jackie Collier
Manager Rate Design
Enbridge Gas Distribution
(416) 753-7322

9/21/2007

Matthew Makos

From: Richard Campbell [Richard.Campbell@enbridge.com]
Sent: Thursday, February 01, 2007 8:16 AM
To: mnlowry@earthlink.net
Subject: Request from Jan. 26 letter

R. J. Campbell
Manager, Regulatory Policy & Research
phone: 416-495-5173
email: richard.campbell@enbridge.com

----- Forwarded by Richard Campbell/GAS/Enbridge on 02/01/2007 09:16 AM -----

Jackie Collier/GAS/Enbridge

To Richard Campbell/GAS/Enbridge@Enbridge

cc Malini Giridhar/GAS/Enbridge@Enbridge

01/31/2007 04:48 PM

Subject Lowry Request from Jan. 26 letter

Hi Rick,

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Please let me now if you need anything else.

Jackie Collier
Manager Rate Design
Enbridge Gas Distribution
(416) 753-7322

9/21/2007

Matthew Makos

From: Richard Campbell [Richard.Campbell@enbridge.com]
Sent: Friday, February 02, 2007 10:51 AM
To: mnlowry@earthlink.net
Subject: Capital Plant Data

for 1995, 1994, 1993, 1992, 1991, 1990, and 1989.

R. J. Campbell
Manager, Regulatory Policy & Research
phone: 416-495-5173
email: richard.campbell@enbridge.com

----- Forwarded by Richard Campbell/GAS/Enbridge on 02/02/2007 11:47 AM -----

Bonnie Adams/GAS/Enbridge

To Richard Campbell/GAS/Enbridge@Enbridge

cc

02/02/2007 09:39 AM

Subject Scanned Exhibits

As you requested, here are the exhibits you requested...

Sincerely,

Bonnie Jean Adams
Assistant Regulatory Coordinator
Regulatory Affairs
VPC 5, Post C 12
Phone: (416)495-6409
Fax: (416)495-6072
bonnie.adams@enbridge.com

9/21/2007

Matthew Makos

From: Richard Campbell [Richard.Campbell@enbridge.com]
Sent: Friday, February 02, 2007 11:23 AM
To: Mark Lowry
Cc: Laurie.Klein@oeb.gov.on.ca
Subject: Re: TFP Data
Importance: High

Hi Mark:

Responses noted in red below.

Rick

R. J. Campbell
 Manager, Regulatory Policy & Research
 phone: 416-495-5173
 email: richard.campbell@enbridge.com

Hi Rick,

I know that you are busy this week but I would appreciate it if you could provide me with an appraisal of the status of our outstanding interrogatories. Board Staff are anxious to wrap the study up. The data that we have obtained from Enbridge are deficient in several respects.

Here are the issues, discussed in previous correspondence, where a status report is most urgently needed.

1. Are you going to provide older plant value data? If so, when? The Union data go back to 1985. Please note that we can make do without the highly detailed data. Union has provided data only for "transmission", "distribution", etc.

I sent the capital data 1989-1995 this morning and reproduced here for completeness. Going back to 1985 is a problem as records are remotely stored...it would take additional weeks.

2. Are you going to provide data on net (O&M) salaries and wages? If so, when? Union has done so. If you are not, we at least need estimates of the percentage of O&M expenses capitalized?

Staff completing this work are on the witness stand this morning and have more to do at the hearing with respect to undertakings. We'll get to it asap next week.

3. Are you going to provide the requested tax data? If so, when? I believe that it was provided, but a quick look at emails sent to you doesn't show it..spreadsheet attached below.

3. Is there a difference over the 2000-2006 period in how other revenues are handled? I'll investigate, but our Manager, Regulatory Accounting is testifying at the OEB as I write.

4. May I assume that the (nicely detailed) output and revenue data you have provided are fiscal through 2004, then calendar? I believe the answer is yes. I'll confirm.

One new question: Do you perchance have any weather normalized volume data that are readily available for the full sample period? If not, we will attempt a crude weather adjustment ourselves. I'll respond later today.

Another new question: At your leisure, I would like to hear more about the capex needs occasioned by gas-fired generation and cast iron replacement. To help make your case, it would be helpful to know the magnitudes of your capital spending in these areas over the sample period. Breakdowns of your line miles might also be helpful so we can assess the progress over time in replacing cast iron. I can do this next week,

9/21/2007

Matthew Makos

From: Mark Lowry [mnlowry2@earthlink.net]
Sent: Monday, February 05, 2007 5:32 PM
To: Richard Campbell
Cc: Mark Lowry
Subject: Output and Revenue Data

Hi Rick,

It has come to my attention today that the revenue and output data that you sent last week pertain to forecasts and not to actuals. These forecasts are useful but we will also need some fairly detailed actual output and revenue data. Here is what Union Gas is providing.

General Service	Number of Customers
	Delivery Volume

Contract and Wholesale	Delivery Volume and perhaps also the corresponding contract demands
------------------------	---

Ex franchise transmission	Maximum Daily Quabtity
---------------------------	------------------------

Ex Franchise storage	Contract demand
----------------------	-----------------

I am wondering what kind of breakdown of actual output quantities and the corresponding revenues you have available.

Please have some one get back to me on this as soon as possible. Thanks.

P.S. Please direct all correspondence to my office address: mnlowry@earthlink.net.

|

Matthew Makos

From: Mark Lowry [mnlowry@earthlink.net]
Sent: Thursday, February 08, 2007 2:33 PM
To: 'Richard Campbell'
Subject: RE: Enbridge Rate Trend

Hi Rick,

I went back and checked your numbers and found that you were dividing the total revenue requirement by the total volume involved in the calculation of your volumetric rates (isn't that right?). This volume grew only 0.5% per annum 2000-2005, whereas the number of customers grew by 3.1% per annum. Since the number of customers accounts for a substantial 0.25% of revenue, your billing determinants grew by a (revenue share weighted) average of 1.122% annually. So your rates grew by $2.8 - 1.1 = 1.7\%$. The numbers below reflect an even more refined calculation that considers individually each and every billing determinant.

Any comment on this commentary?

From: Richard Campbell [mailto:Richard.Campbell@enbridge.com]
Sent: Thursday, February 08, 2007 1:12 PM
To: Mark Lowry
Subject: Re: Enbridge Rate Trend
Importance: High

Mark:

In my note to you of Dec 22, which responded to your questions of Dec 5, our answer to Q10 provided 2000-06 approved gross distribution margin and compared it to inflation. It concluded that the annualized increase in inflation (Ontario CPI) for the period was 2.4% while the increase in rates was 2.9%.

Reproduced below, for your convenience...

R. J. Campbell
 Manager, Regulatory Policy & Research
 phone: 416-495-5173
 email: richard.campbell@enbridge.com

"Mark Lowry" <mnlowry@earthlink.net>

To "Richard Campbell \Richard Campbell)" <Richard.Campbell@enbridge.com>
 cc

02/08/2007 11:38 AM

Subject Enbridge Rate Trend

Hi Rick,

9/21/2007

Thanks for your call this morning.

When you say that your rates have been growing faster than inflation, I'm curious to know exactly what you mean.

Here are some facts

		PEG Rate Index Based on Enbridge Forecasts			
		GDP-IPI	Residential	General Service	All Service Classes
Average Annual Growth Rate	2000-2005	1.68%	1.27%	0.98%	1.12%
	2003-2005	1.60%	0.2%	0.3%	0.4%

Mark Newton Lowry, Partner
Pacific Economics Group, LLC
22 E. Mifflin Street, Suite 302
Madison, WI 53703
608.257.1522 ext. 23

Matthew Makos

From: Mark Lowry [mnlowry@earthlink.net]
Sent: Thursday, February 08, 2007 2:59 PM
To: 'Richard Campbell'
Subject: RE: Net O&M

So, 17% capitalized in 2004 and 19% in 2005. FYI, the corresponding numbers for Union were 14% and 14%.

From: Richard Campbell [mailto:Richard.Campbell@enbridge.com]
Sent: Thursday, February 08, 2007 2:45 PM
To: Mark Lowry
Subject: Net O&M

Mark:

Just received this schedule which I think you will find helpful. In spite of best attempts to compile for 2003 & earlier, a change in financial systems at that time appears to be a barrier. Note that it is all on a calendar year basis. No luck yet in attributing capitalization accounts to labour costs.

R. J. Campbell
Manager, Regulatory Policy & Research
phone: 416-495-5173
email: richard.campbell@enbridge.com

Matthew Makos

From: Richard Campbell [Richard.Campbell@enbridge.com]
Sent: Thursday, February 08, 2007 1:12 PM
To: Mark Lowry
Subject: Re: Enbridge Rate Trend
Importance: High

Mark:

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Reproduced below, for your convenience...

R. J. Campbell
 Manager, Regulatory Policy & Research
 phone: 416-495-5173
 email: richard.campbell@enbridge.com

"Mark Lowry" <mnlowry@earthlink.net>

02/08/2007 11:38 AM

To "Richard Campbell \Richard Campbell)" <Richard.Campbell@enbridge.com>

cc

Subject Enbridge Rate Trend

Hi Rick,

Thanks for your call this morning.

When you say that your rates have been growing faster than inflation, I'm curious to know exactly what you mean.

Here are some facts

PEG Rate Index Based on Enbridge Forecasts

		GDP-IPI	Residential	General Service All Service Classes	
Average Annual Growth Rate	2000-2005	1.68%	1.27%	0.98%	1.12%

9/21/2007

2003-2005	1.60%	0.2%	0.3%	0.4%
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Pacific Economics Group, LLC
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Madison, WI 53703
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Matthew Makos

From: Richard Campbell [Richard.Campbell@enbridge.com]
Sent: Thursday, February 08, 2007 2:45 PM
To: Mark Lowry
Subject: Net O&M

Mark:

Just received this schedule which I think you will find helpful. In spite of best attempts to compile for 2003 & earlier, a change in financial systems at that time appears to be a barrier. Note that it is all on a calendar year basis. No luck yet in attributing capitalization accounts to labour costs.

R. J. Campbell
Manager, Regulatory Policy & Research
phone: 416-495-5173
email: richard.campbell@enbridge.com

9/21/2007

Matthew Makos

From: Richard Campbell [Richard.Campbell@enbridge.com]
Sent: Friday, February 09, 2007 10:27 AM
To: Mark Lowry
Subject: Normalized Volumes

R. J. Campbell
Manager, Regulatory Policy & Research
phone: 416-495-5173
email: richard.campbell@enbridge.com

----- Forwarded by Richard Campbell/GAS/Enbridge on 02/09/2007 11:17 AM -----

Irene Chan/GAS/Enbridge

To Richard Campbell/GAS/Enbridge@Enbridge

cc Tom Ladanyi/GAS/Enbridge@Enbridge

02/09/2007 09:20 AM

Subject TFP request - Fiscal 1992-2005 historical normalized volume

Good morning Richard,

As requested, please see below for historical normalized actual volume. Please note that each year's normalized volume is generated by normalizing actual volume its corresponding test year board approved budget meter reading degree days. For years prior to 1995, degree days data are not readily available.

Thanks,
Irene.



Matthew Makos

From: Richard Campbell [Richard.Campbell@enbridge.com]
Sent: Tuesday, February 13, 2007 7:49 AM
To: mnlowry@earthlink.net
Subject: Volumes by Rateclass 94-99
Importance: High

Mark:

Here is the actual volume & customers by rate class back to 94. One note as compared to the series 2000-05, we were not able to identify the volumes associated with Rate 200 (one customer).

R. J. Campbell
Manager, Regulatory Policy & Research
phone: 416-495-5173
email: richard.campbell@enbridge.com

Matthew Makos

From: Richard Campbell [Richard.Campbell@enbridge.com]
Sent: Thursday, February 15, 2007 3:10 PM
To: Mark Lowry
Cc: 'Laurie Klein'
Subject: Oustanding Queries

The best we can do as an estimate for O&M capitalization rates...

R. J. Campbell
Manager, Regulatory Policy & Research
phone: 416-495-5173
email: richard.campbell@enbridge.com
Debbie Kelly/GAS/Enbridge

To Richard Campbell/GAS/Enbridge@Enbridge

cc Tom Ladanyi/GAS/Enbridge@Enbridge

Subject O&M 1999-2003

02/15/2007 03:30 PM

Please see the first tab for 1999-2003, as a proxy for the O&M Capitalization, as requested by Mr. Lowry for the TFP data requests. I do not have the data prior to 1999, as I do not have the Other Revenue regroupings for those years. Looking at the data, we are \$5.8M different in 2005; pulling data out under current extracts in EnSight vs short and dirty method used for 1999-2003.

9/21/2007

Matthew Makos

From: Richard Campbell [Richard.Campbell@enbridge.com]
Sent: Thursday, February 15, 2007 10:58 AM
To: Mark Lowry
Cc: 'Laurie Klein'
Subject: Normalized Volume by Rate Class

R. J. Campbell
Manager, Regulatory Policy & Research
phone: 416-495-5173
email: richard.campbell@enbridge.com

----- Forwarded by Richard Campbell/GAS/Enbridge on 02/15/2007 11:58 AM -----

Irene Chan/GAS/Enbridge

To Richard Campbell/GAS/Enbridge@Enbridge

cc

02/15/2007 11:48 AM

Subject TFP request

Hi Rick,

As requested, please see attached for the historical normalized actual by rate. As mentioned, General Service Customers by rate class is the readily available for historical normalized actual volume information. In fact, General Service Customers are much more weather sensitive than Large Volume anyway. I have also attached un-normalized actual volume and unlock again to facilitate the consultant's review. Please note that all of this information is on a fiscal year basis.

Irene.

9/21/2007

Matthew Makos

From: Richard Campbell [Richard.Campbell@enbridge.com]
Sent: Thursday, February 15, 2007 10:53 AM
To: Mark Lowry
Cc: 'Laurie Klein'
Subject: Re: Deadlines

Mark:

I will send you the information as it becomes available through the day today and tomorrow.

Here is more info on net O&M. Re your Question 1, the schedule in Attachment 1 includes the regroupings of O&M credits from O&M into Other Revenue. Prior to 2003, these O&M credits were included in O&M, they now reside in Other Revenue. It yeilds numbers for the series above of \$8.6, \$9.3 and \$10.4 respectively for 2000, 2001, 2002.

Initail answers to some of your questions are in PINK in Attachment 2.

I expect answers today on estimates of O&M capitalization, normalized volumes by rate class, and a review of our rate trend analysis which you questioned.

Everything else that we can answer will be answered tomorrow.

R. J. Campbell
 Manager, Regulatory Policy & Research
 phone: 416-495-5173
 email: richard.campbell@enbridge.com

"Mark Lowry" <mnlowry@earthlink.net>

To "Richard Campbell" <Richard.Campbell@enbridge.com>

cc "Laurie Klein" <Laurie.Klein@oeb.gov.on.ca>

02/15/2007 11:21 AM

Subject Deadlines

Hi Rick,

Due to a combination of events it will be necessary for us to suspend our gas research today, and next Monday, and Tuesday. This is likely to push the deadline for finalizing the study to the end of next week. We will need 1-3 days after we receive your data to finalize the study. In light of these developments, Laurie would like a candid assessment from you as to when the requested data will be sent. For example, if we give you until COB Tuesday, can you get it done? Or do you need still additional time and, if so, why? Will any pieces be available today?

9/21/2007

Mark Newton Lowry, Partner
Pacific Economics Group, LLC
22 E. Mifflin Street, Suite 302
Madison, WI 53703
608.257.1522 ext. 23

Matthew Makos

From: Richard Campbell [Richard.Campbell@enbridge.com]
Sent: Wednesday, February 21, 2007 8:44 AM
To: Mark Lowry
Subject: Re: Outstanding Data Requests

Mark:

You are clear on what you need, so I'm now chasing it down. I'll send it as I round it up with the hope it is all done by the time you are back in Madison.

R. J. Campbell
 Manager, Regulatory Policy & Research
 phone: 416-495-5173
 email: richard.campbell@enbridge.com

Mark Lowry <mnlowry@earthlink.net>

To: Richard Campbell <Richard.Campbell@enbridge.com>

cc

Subject: Re: Outstanding Data Requests

02/21/2007 09:11 AM

Please respond to Mark Lowry <mnlowry@earthlink.net>

Hi Rick,

Greetings from Toronto, where I am holed up at a downtown hotel. Attached please find responses to your recent message. They are highlighted in pink, and include some of the older questions to which we still need answers. I am available to talk this morning but am leaving for the airport around 10:30. Give me a call if you can pull the key people together.

-----Original Message-----

From: Richard Campbell
 Sent: Feb 20, 2007 4:34 PM
 To: Mark Lowry
 Cc: 'Laurie Klein'
 Subject: Re: Outstanding Data Requests

Mark:

I've marked up your letter in "pink" with responses to your new questions where I could. I've reviewed all we've sent and think you are OK on:

- the capital data 1989-2005
- actual & normalized volumes by rate class 1994-2005
- customer numbers by rate class 1994-2005 and total customers back to 1954

9/21/2007

- and misc other...taxes, rate class descriptions etc.

We've fallen short of your expectations on O&M data, headcounts & O&M related salaries & wages. We have sent

- headcounts 1999-2006
- O&M 2000-2006
- O&M capitalized 2004 - 2006 and estimates of O&M capitalized 1999-2003

For O&M data prior to 1999, we've relied on the productivity study compiled for the period 1990 - 2000 by Kerry Lakaytos-Hayward. You have questions about the study but she has not been available due to settlement negotiations and hearing testimony. Her testimony concluded yesterday and I suggest that we all try to talk sometime tomorrow, if you can suggest a time that works for you.

At the same time I'll try to get Tom Landanyi & Kevin Culbert involved to help with assumptions you may need to make to close the gaps.

R. J. Campbell
Manager, Regulatory Policy & Research
phone: 416-495-5173
email: richard.campbell@enbridge.com

"Mark Lowry" <mnlowry@earthlink.net>

02/19/2007 01:40 PM

To "Richard Campbell" <Richard.Campbell@enbridge.com>

CC "Laurie Klein" <Laurie.Klein@oeb.gov.on.ca>

Subject Outstanding Data Requests

Hi Rick,

As of Monday, it is my impression that there are still quite a lot of data requests outstanding. Can you give me a progress report today on when and if you will be responding to these requests? I am particularly interested in what can be sent by COB Tuesday as we were hoping to begin report finalization Wednesday.

Mark Newton Lowry, Partner
Pacific Economics Group, LLC
22 E. Mifflin Street, Suite 302
Madison, WI 53703
608.257.1522 ext. 23

9/21/2007

Matthew Makos

From: Richard Campbell [Richard.Campbell@enbridge.com]
Sent: Thursday, February 22, 2007 2:19 PM
To: Mark Lowry
Subject: Re: Call

R. J. Campbell
Manager, Regulatory Policy & Research
phone: 416-495-5173
email: richard.campbell@enbridge.com

Mark Lowry <mnlowry@earthlink.net>

02/22/2007 02:58 PM

Please respond to Mark Lowry <mnlowry@earthlink.net>

To Richard Campbell <Richard.Campbell@enbridge.com>
cc
Subject Re: Call

OK, If I can get free it would probably be in the next hour. Can you e mail me the latest draft of our correspondence letter?

-----Original Message-----

From: Richard Campbell
Sent: Feb 22, 2007 1:24 PM
To: Mark Lowry
Subject: Re: Call

Tomorrow is a problem as I am out of the office. If it is your only option then I can make arrangements to be at a phone at a scheduled time. Otherwise, any time today at your convenience.

R. J. Campbell
Manager, Regulatory Policy & Research
phone: 416-495-5173
email: richard.campbell@enbridge.com

Mark Lowry <mnlowry@earthlink.net>

02/22/2007 01:22 PM

Please respond to Mark Lowry <mnlowry@earthlink.net>

To Richard Campbell <Richard.Campbell@enbridge.com>
cc
Subject Re: Call

9/21/2007

Hi Rick,

Greetings from FABULOUS LAS VEGAS NEVADA. The day isn't work out just as I had hoped so let me ask you: are you free to do this tomorrow?

-----Original Message-----

From: Richard Campbell

Sent: Feb 22, 2007 12:10 PM

To: Mark Lowry

Subject: Call

Hi Mark:

Just a little past 1 p.m. in Toronto and I'm available any time this afternoon to talk. It seems I'll be alone however since a number of other things are going on. I'll make a point of being at my desk at the top of each hour for the rest of the afternoon if you could call.

R. J. Campbell
Manager, Regulatory Policy & Research
phone: 416-495-5173
email: richard.campbell@enbridge.com

Matthew Makos

From: Richard Campbell [Richard.Campbell@enbridge.com]
Sent: Friday, March 09, 2007 4:09 PM
To: Mark Lowry
Cc: 'Steve Fenrick'
Subject: DSM Volumes
Importance: High

R. J. Campbell
 Manager, Regulatory Policy & Research
 phone: 416-495-5173
 email: richard.campbell@enbridge.com

"Mark Lowry" <mnlowry@earthlink.net>

03/09/2007 05:01 PM

To "Richard Campbell" <Richard.Campbell@enbridge.com>
 CC "Steve Fenrick" <stevefenrick@earthlink.net>
 Subject RE: Conversation

Please copy Steve Fenrick with the detailed DSM data. Thanks

From: Richard Campbell [mailto:Richard.Campbell@enbridge.com]
Sent: Friday, March 09, 2007 3:27 PM
To: Mark Lowry
Subject: Re: Conversation
Importance: High

Mark:

I'm pleased to hear Ann is stable. I was very concerned about the two of you when you gave me news of the rush to the hospital.

I hope you connected with Malini. Re DSM volumes, I'm beginning to think it fell through the cracks, as there was an issue, explained below about the rate class break-outs. Nevertheless, I overlooked advising you of the status. Here are the totals.

The preliminary actual values for 2005 are close to the budget values stated; we will be releasing the Year End Report with the actual values by the end of this month.

2000 - 58.9Mm3 (post audit)

9/21/2007

2001 - 79.6Mm3 (post audit)
2002 - 78.8Mm3 (post audit)
2003 - 77.5Mm3 (post audit)
2004 - 70.9Mm3 (pre audit)
2005 - 76.9Mm3 (budget)

DSM actual volumes by rate class

We only began providing information on DSM volumes by rate class in 2002. Prior to 2002 we do not have the means of extracting the rate allocation information. Much of our DSM actual data lags by a number of years since the preliminary data is audited by a stakeholder group before it is official and used for credit purposes.

This is what we do have:

2002 - preliminary actual volumes by rate class. We could adjust this to reflect the volumes as reported in the M&E Report or post audit.

2003 - actual volumes by rate class as per the M&E Report. Again, we could use the relative weighting to reflect the post audit volumes.

2004 - preliminary actual volumes by rate class. We could adjust this to reflect the volumes as reported in the M&E Report.

2005 - post ADR budget volumes by rate class.

This will take some time next week and we will chase it if you need it. Please advise.

I'll give you a call in the next 30 minutes or so.

R. J. Campbell
Manager, Regulatory Policy & Research
phone: 416-495-5173
email: richard.campbell@enbridge.com

Matthew Makos

From: Irene Chan [Irene.Chan@enbridge.com]
Sent: Tuesday, April 03, 2007 1:50 PM
To: Lullit Getachew
Cc: Angela.Pachon@oeb.gov.on.ca; Laurie.Klein@oeb.gov.on.ca; Mark Newton Lowry; Richard.Campbell@enbridge.com; Steve Fenrick
Subject: Re:
Importance: High

Hi Lullit,

As requested, please see attached for the quoted document. Page 17-18 of the document provides the description of the weather normalization methodology. A simple description of the Company's methodology is the normalized average use is obtained by multiplying actual usage (use per customer) per actual degree days by the budget degree days. In order to assess year over year change or percentage change in the historical actual average use, all historical actuals are normalized or adjusted to the test year budget degree days such that one can examine the trend on a comparable basis.

Hope this answers your questions,

Best regards,
 Irene.

"Lullit Getachew" <lgetachew@earthlink.net>

04/03/2007 01:45 PM

To <Irene.Chan@enbridge.com>

cc <Richard.Campbell@enbridge.com>, <Laurie.Klein@oeb.gov.on.ca>, <Angela.Pachon@oeb.gov.on.ca>, "Mark Newton Lowry"

<mnlowry@earthlink.net>, "Steve Fenrick" <SteveFenrick@earthlink.net>

Subject

Hi Irene,

I am the person at PEG who did the weather normalization of Enbridge's and Union's deliveries, and also the other econometric related tasks. Mark wanted me to get in touch with you to find out the actual weather normalization method you use to adjust your throughputs. In particular, I wanted to know if your weather adjusted data are throughput projections based on budget HDDs or if you are using budget HDDs to adjust actual throughputs. In your email to Mark you mentioned that Enbridge's methodology is described in the 2007 Volume Budget Evidence, Exhibit C1, Tab 3, Schedule 1, Page 17-18. Would it be possible for you to email this to me? I was also what the trend in volume per customer would be if actual HDDs had been used instead of budget HDDs?

Lullit

9/21/2007

Lullit Getachew, Ph.D.
Senior Economist
Pacific Economics Group, LLC
22 E. Mifflin Street
Madison, WI 53703
(608) 257-1522
(608) 257-1540 F

Matthew Makos

From: Richard Campbell [Richard.Campbell@enbridge.com]
Sent: Monday, May 14, 2007 3:08 PM
To: Mark Lowry
Cc: 'Angela Pachon'; 'Laurie Klein'; 'Connie Burns'
Subject: Re: Forecasting Data

Mark:

We subscribe to the **Conference Board of Canada** and **Consensus Economics** forecasting services. Both services produce long term economic forecasts. The Conference Board forecasting service will cover most of the variables that you list. The Consensus Economics forecasts will cover only a couple of the variables.

We are looking at the purchase agreements for the restrictions on third party access. Let you know shortly. Alternatively, you can purchase the specific data series of your interest from the Conference Board via its website; I don't think it is expensive.

R. J. Campbell
 Manager, Regulatory Policy & Research
 phone: 416-495-5173
 email: richard.campbell@enbridge.com

"Mark Lowry" <mnlowry@earthlink.net>

05/14/2007 12:58 PM

To "Connie Burns" <mcburns1@spectraenergy.com>, "Richard Campbell"
 <Richard.Campbell@enbridge.com>
 cc "Laurie Klein" <Laurie.Klein@oeb.gov.on.ca>, "Angela Pachon"
 <Angela.Pachon@oeb.gov.on.ca>

Subject Forecasting Data

Hi Guys,

In revisiting our indexing research for Board staff, we are considering how we might use price forecasts to inform the choice of input price differentials for Enbridge and Union. In this regard, we were wondering if either company subscribes to a reputable forecasting service such as Global Insight or the Conference Board of Canada.

Variables of interest include...

- GDPIPI
- Salaries and wages
- Construction costs
- Intermediate and long term bond yields
- ROE

We would like to get forecasts for the expected term of the proposed IR plans (e.g. 2007-2014).

Please let us know whether you subscribe to such a service and whether you would consider sharing the data

9/21/2007

with us on a trial basis.

Mark Newton Lowry, Partner
Pacific Economics Group, LLC
22 E. Mifflin Street, Suite 302
Madison, WI 53703
608.257.1522 ext. 23

IGUA Q 22 Attachment B

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Q1. DESCRIPTION OF EGD'S RATE CLASSES

EGD has approximately 1.6 million Residential, 21,000 Apartment, 142,000 Commercial and 17,000 Industrial customers. They are served under the following rate classes:

- Rate 1: Residential rate
- Rate 6: General Service rate
- Rate 9: Container Service rate (NGV)
- Rates 100, 110, 115, 135: Large volume firm rates
- Rates 145, 170: Large volume interruptible rates
- Rate 200: Wholesale
- Rates 125, 300, 305, 310, 315: Unbundled rates

Revenue is generated from these customer classes by means of a Customer charge, Demand charge, Load Balancing charge and Commodity charge. The Customer charge, Delivery charge, Load Balancing and Gas Supply charge are applicable for all customer groups. The Demand Charge is applied to contracted maximum daily volume and only applies to Rates 110, 115, 170 and 200.

The Gas Supply and Load Balancing charges predominantly recover gas costs. The Customer, Delivery & Demand Charges predominantly recover distribution related fixed costs.

Q. 2 PROPORTION OF REVENUE FROM VARIOUS CHARGES

The table below depicts the percentage recovery of fixed distribution costs (ie. excluding gas costs) from each of the rate components from 2001 to 2006. The rate for the delivery demand charges has not changed for each of the last 6 years however, the level of forecast contract demand does vary each year. The Company has typically kept Demand and Customer Charges static, relying instead on adjustment to the Delivery Charges

Historical Forecast Level of Total Distribution Revenue Recovery

<u>Type of Charges</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>
Customer Charge	25.30%	26.39%	26.62%	26.03%	28.65%	28.26%
Demand Charge	2.47%	2.52%	2.40%	2.35%	1.90%	1.88%
Volumetric Charge	72.23%	71.09%	70.98%	71.63%	69.45%	69.86%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Q. 10 HISTORICAL TREND IN DISTRIBUTION RATES

The chart below depicts the distribution volumes and distribution revenue requirement used for rate setting purposes (total revenues less gas costs to operations) from 2000 to 2006. The numbers reflect Ontario Energy Board approved levels of revenue requirement and volumes for each of the forecast test years. The annual average increase in revenue requirement less annual average increase in volume indicates the annual average change in rates.

BOARD ORDER DISTRIBUTION REVENUE REQUIREMENT "Approved Gross Margin"

	<u>YEAR</u>	<u>VOLUMES</u> 10 ³ m ³	<u>REVENUES</u> \$000	<u>PRICE</u> <u>INDEX</u>	<u>INFLATION</u> %
EB-2005-0001 FINAL	2006	12,320,906	941,000	115.2908	2.30%
RP-2003-0203 FINAL	2005	12,298,030	884,500	112.6987	2.16%
RP-2003-0048 FINAL	2004	11,774,686	839,682	110.3159	1.89%
RP-2002-0133 FINAL	2003	11,774,686	825,800	108.2696	2.90%
RP-2001-0032 FINAL	2002	11,776,222	783,300	105.2183	1.67%
RP-2000-0040 FINAL	2001	11,847,444	789,400	103.4900	3.49%
RP-1999-0001 FINAL	2000	11,994,940	770,982	100.0000	2.73%
Increase over 7 years		2.72%	22.05%		15.29%
Annualized increase		0.45%	3.38%		2.40%
Annualized Rate increase:		2.9%			

Q. 11 UNBUNDLING

The power point slides provided should be helpful in terms of the functions and labour transfers involved in industry unbundling in the period 1999- 2002.

Q. 16 RIDER G

Rider G charges recover the cost of providing services that are driven by specific customer requests (rather than being incurred on a rate class basis) such as:

new account activation;

statement of account;

red lock charge;

meter unlock charge;

safety inspection;

meter test;

street service alteration.

The forecast of Rider G related revenues is reported at Exhibit C3 / Tab 1 / Schedule 1 / Page 2 / Line 8. In the 2007 Test Year the actual revenues are reported at Exhibit C5 / Tab 1 / Schedule 1 / Page 3. Previously, the actual revenues were reported at Exhibit C3 / Tab 1 / Schedule 1 / Page 3.

The associated costs of providing these services are scattered throughout the reported costs. Rider G charges have been static for a number of years. To the extent that costs

have changed over the years, the difference has been picked through adjustment to distribution charges. The revenues have been as follows over the past five years:

2007 = \$10.3 M (forecast)

2006 = \$11.1 M (estimate)

2005 = \$12.5 M (actual)

2004 = \$12.7 M (actual)

2003 = \$10.6 M (actual)

Q. 20 PRODUCTIVITY STUDIES

I previously forwarded to you a recent TFP study for our Quebec affiliate Gazifere. The Decision of the Regie de l'Energy accepted the conclusions of the study, resulting in the productivity challenge being expressed as a discount coefficient against the forecast CPI for the Province of Quebec, or $.78 * CPI$. For this utility, an O&M productivity study was conducted in the 1990s as evidence in the targeted PBR proceeding. I hope to find a copy of that for you early in the New Year.

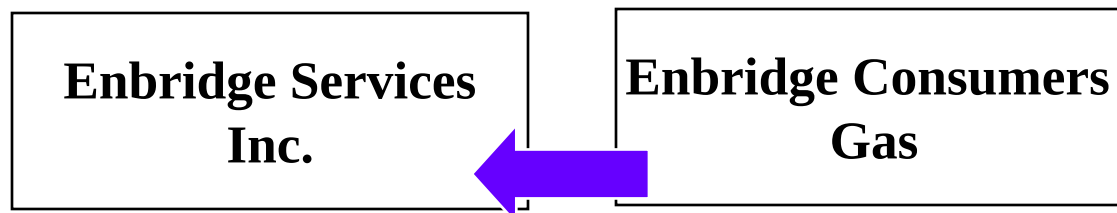
Integrated Distribution Utility 1998

**Enbridge Consumers
Gas**

3750 employees

- **distribution system**
- **storage**
- **commodity sales**
- **appliance sales & rentals**
- **customer care**

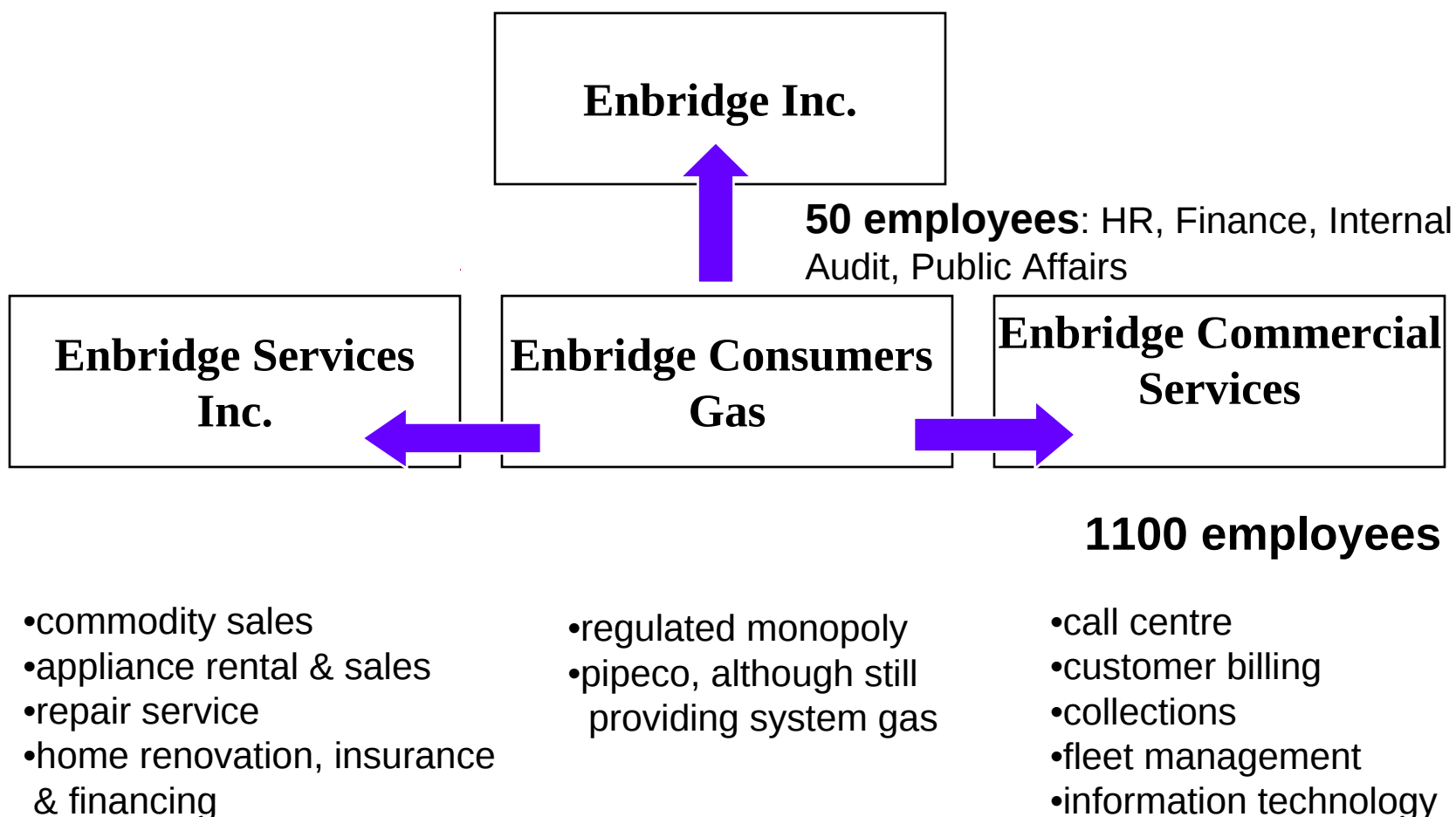
Unbundling: Retail Affiliate Established 1999



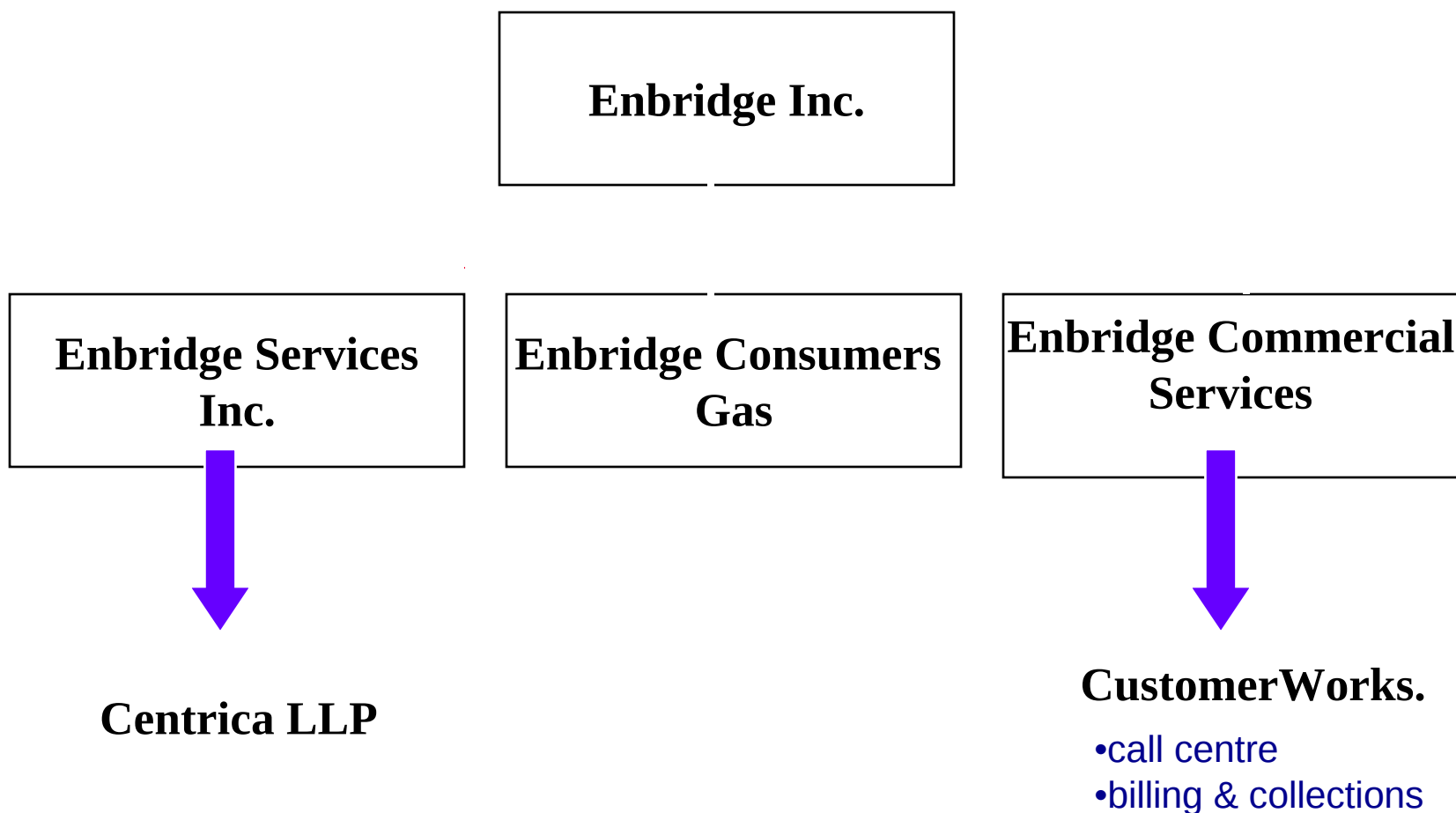
570 employees

- customer care
- commodity sales
- appliance rental & sales
- repair service
- home renovation, insurance & financing

Commercial Services Affiliate Established, 2000



Establishment of CustomerWorks and Sale of ESI, 2002



May 1999



Enbridge Consumers Gas

- Gas Distribution
- Safety Calls
- Gas Supply
- Rentals
- HIP/HIP Plus
- Home Improvement
- Appliance Sales and Service
- Merchandise Financing
- Heating, Water Heating and Air Conditioning Service
- Storage

May 2002

Enbridge Consumers Gas

- Gas Distribution
- Safety Calls
- Gas Supply
- Storage

Enbridge Commercial Services

- Information Technology
- Facilities Management
- Fleet & Equipment Services
- Human Resources

Enbridge Services Inc.

- Water Heater Rentals
- Appliance Sales & Services
- Merchandise Financing
- Heating, Water Heating & Air Conditioning Service
- Heating and Cooling Protection Plans
- Home Improvement
- Commodity Sales

CustomerWorks

- Billing
- Call Centre
- Credit Services
- Meter Reading
- e-commerce
- Customer Support

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January 17 2007

Mark Lowry
Pacific Economics Group, LLC
22 East Mifflin Street
Madison, WI
53703

By Email

Re: Your Requests of January 15 2007

Dear Mark:

Before responding to your questions of January 15, here is a summary of what we have been able to send so far:

December 12 2005 Capital Plant Data, 1996-2005

December 22 2005 Revenues by source and by rate class, 2000-06
Responses to your questions of December 5 2006
Slide deck demonstrating impact of unbundling

January 5 2007 Head count data, 1999-2006
Multi-Factor Productivity Study, 1987-1998
Total Factor Productivity Study, 1989-2000

The TFP study referenced above was not introduced in evidence but was shared with stakeholders during consultations on PBR parameters for a potential PBR application. That study demonstrated an average total productivity factor of -0.33% for the decade ending in 2000. Attached is a slide deck which provides a commentary on the methodology used for that study. Utility staff conducted the study. Navigant Consultants Inc. prepared the commentary.

In addition, I also attach the recent TFP study prepared for Gazifere Inc, our subsidiary in Quebec. It demonstrates a declining productivity trend for the utility, averaging 0.2 per cent over the past 5 years. The Regie de l'Energie recently accepted this evidence (Decision D-2006-158, R-3587-2005, December 4 2006) and set an x factor for a 5 year revenue cap at 0.4%, that being the established trend plus a stretch factor of 0.2%. In addition, the Regie agreed to express the productivity challenge as a discount coefficient against the forecast rate of inflation (Quebec CPI). The coefficient was set at .78.

I apologize for our inability to complete the data collection but the normal pressures of this time of year (accounting for year end) are compounded in our case by rate settlement negotiations that have just concluded and preparation for upcoming rate hearing testimony.

Plant Value Data

1. Costs associated with NGV continue to be utility program costs. "Rental Equipment" represents the water heater rental program that was transferred out of the utility in 1999 as part of OEB directed unbundling of the competitive aspects of the industry.
2. As above
3. Mains and Services under construction are Work in Progress. Mains and Services that are "gassed-up" and are in the process of being placed into service fit into the "In Service Project" category. That is, a project that may be partially in-service, or recently fully in-service but the transfer in the accounts has not taken place.
4. We've provided plant data to 1996. In addition, you have the TFP study 1989 to 2000. Going back to 1985 is possible, but not within the time available for your study.

Other Topics

1. Data is on a fiscal year basis (Oct 1-Sept 30) through 2004 and on a calendar year basis for 2005 and subsequent years.
2. DSM data (O&M, volumes, rate class) 2000-2005 has been compiled and is being reviewed. Expect to have it to you by Friday January 19. DSM program activity prior to 2000 was not significant.
3. As above
4. Yes
5. I am advised that to collect the information and provide a bridge between the utility bundled data (costs, assets, volumes) and the unbundled utility data would be a "huge effort" and one that cannot be accomplished in the time available for your study.
6. We are not able to assign physical labour counts between capital and O&M programs.
7. This answer and the O&M data for the sample period will hopefully be provided tomorrow, January 19.
8. No.
9. The answer to this question will take some time to prepare.

10. The spreadsheet attached (PEG#10) provides the requested data by rate class.

11. Heating degree days and normalized volumes are provided in the table below

10^6m^3	Norm Vol		Actual Degree Days	Budget Degree Days
2000	12,162.3		3526	3929
2001	11,590.9		3766	3808
2002	11,786.9		3362	3700
2003	11,726.2		4029	3565
2004	11,733.9		3774	3565
2005	12,022.0		3728	3752

12. Residential and commercial customers account for 96% of the Distribution Revenue Requirement, therefore the overall rate escalation is indicative of escalations to these rate classes. We do not have information on a consistent basis for all seven years at the rate class level. Over the period 2000 to 2006, the Company did not have major leave to constructs on an ongoing basis. EGD concludes that a price escalation of 2.5% would probably cover routine replacement, reinforcement and addition of subdivision customers. The ability to finance system expansion to new communities and/or power generation projects within this envelope would depend on the specifics of these projects and the effect of other capex and opex cost pressures in any given year.

Also, in your request of December 5, Question 19, you asked about StatsCan indices reflecting costs of plant for the natural gas industry. One of our worries about the use of GDP IPI FDD is that it will not adequately reflect our cost pressures. One example are the contracts (about \$100 million, mostly capital) with designated contractors which have been at a fixed price since 2004 and which are due to expire in 2008. Going to market at that time, we believe, will result in a very significant escalation of the cost. I've attached a table of StatsCan indices that leads us to expect that increases in the cost of labour, vehicles and fuel may lead to significant cost escalation in a large cost component of the capital program beginning in 2009.

More to come tomorrow.

Sincerely,

Richard J. Campbell
Manager, Regulatory Policy and Research
Enbridge Gas Distribution Inc.

Attachments:

1. Navigant Consultants commentary on EGD TFP Study
2. TFP Study for Gazifere
3. PEG#10
4. StatsCan Indices



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Gazifère Total Factor Productivity Estimate



May 2006

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An Estimate of Total Factor Productivity for Gazifère

Executive Summary

Gazifère is proposing the implementation of a mechanism to determine rates for future rate years. Components of the mechanism include consideration for growth in the system, for increases in general price levels (and hence costs) and for future productivity. This report considers estimates of the historical productivity of the company which provides information into the ultimate plan proposed by the Company.

Productivity is generally measured in such plans using Total Factor Productivity, or TFP. This measure relates changes in the output of company to changes in the inputs used to provide the services. TFP measures of productivity are common in other utility incentive plans in North America and Europe.

For Gazifère, the historical estimate of TFP involves calculating output and input indices and measuring the changes over time. Output is generally measured either through sales (or in the case of a distribution utility, volumes) or in number of customers. Input variables consider all factors of production which go into the delivery of the firms output. Generally, these are comprised of labour, materials, and capital.

Data on the output and input variables for the period 1987 through 2005 is analyzed for Gazifère. The historical period is relatively recent, so as to be reflective of what might be expected in future years, yet long enough so that year to year variances in the data can be smoothed out. Generally, productivity is a longer term concept as opposed to short term.

The data for Gazifère, depending on the specific data chosen for the output and input components of the estimate, shows a fair degree of variation. However, when number of customers is the output measure, a fairly consistent estimate of productivity can be established over a reasonable time period. This estimate ranges from about 0.1% to 2.6%.

It should be noted that the historical estimates of productivity should not be applied directly in any incentive mechanism without some consideration of both the other components of any mechanism, or without regard for the degree of certainty in the values themselves. Evaluating the empirical results in light of the intended use, the expectations for the future, and the overall reasonableness of the incentive mechanism is an extremely important element of any successful incentive plan.

Total Factor Productivity Estimates for Gazifère

Background

Gazifère is proposing the implementation of a mechanism to determine revenue requirement for future test years. The chosen mechanism is intended to provide a mechanistic determination of total revenue requirement (adjusted for certain items deemed as being outside the revenue cap mechanism) in place of the more traditional annual cost of service rate filings.

The mechanism is designed to allow for growth in revenue requirement due to general inflationary increases as well as customer growth. It is accepted that both of these drivers impact on the total revenue requirement for the company. In addition, it is expected that the company will continue to seek productivity improvements which will work to offset some of the increases due to these other factors.

The form of the mechanism therefore takes these three components (inflation, customer growth, and productivity) explicitly into account.

The productivity estimate to be used in the mechanism needs to reflect the overall productivity of the company. The company utilizes both capital and labour in the delivery of its distribution services, and therefore productivity of both of these components need to be reflected in the productivity component of the mechanism.

In Gazifère's previous O&M mechanism, productivity of labour and materials was reflected in the formula. For the currently proposed mechanism, productivity of capital must be included in the mechanism to account for productivity in this component of the overall revenue requirement.

The remainder of this report details the development of an estimate of Total Factor Productivity for Gazifère.

Total Factor Productivity

The generally accepted methodology of measuring overall productivity is Total Factor Productivity, more often known by its acronym, TFP. TFP measures the relationship over time between the outputs of a company (or industry, or economy) relative to all of the inputs to production. In the case of Gazifère, TFP measures the change over time of the relationship between an output measure (either customers or volumes, as discussed in more detail later) and the inputs in providing gas distribution services – namely labour, materials and capital inputs.

Formulaically, TFP can be written as follows:

$$TFP = \Delta_i^{i+x} \frac{Q}{\left(\sum_j X_j e_j \right)}$$

where Q is the output measure, X_j are the input measures, and e_j are the input weights. TFP is measured as the change in this index over the period i to i+x.

The preferred approach to measuring outputs and inputs is to measure them in physical units. This avoids the need to account for price inflation when measuring in dollar units¹.

Total Factor Productivity has been used as a measure of productivity in other utility incentive mechanisms in North America and in Europe. Union Gas employed a TFP estimate in their initial PBR plan (RP-1999-0017) and Enbridge employed a modified TFP estimate (encompassing only the labour and materials components) in their previous incentive plan. TFP concepts have also been applied in Ontario's electricity sector, in Canada's telephone sector, and in the energy sector in Great Britain.

Estimating TFP for Gazifère

Estimating historical TFP for Gazifère entailed gathering detailed information on outputs and inputs for all factors of production.

¹ Measuring in physical units is not without its own problems however. For example labour input as measured by number of employees might not account for the difference in effort required by different employees. However, where possible, physical units are preferred.

One of the key determinations in developing TFP estimates involves choosing the appropriate time period over which to measure productivity. The time frame needs to be sufficiently long in order to remove year-to-year “noise” in the data (which refers to annual fluctuations inherent in data which may cause productivity estimates in a particular year to be skewed. For example, a large capital project in one year may lead to a decrease in estimated productivity in that one year, but is not reflective of overall productivity trends). However, the time period should not be so long that it incorporates productivity from the distant past. Since the objective is to use the productivity estimate in a forward looking incentive plan, productivity which may have occurred 20 or 30 years ago may not be especially indicative of productivity expected to occur over the life of the incentive plan.

The time period is also dictated to some degree by the availability of data. More recent records of input data are easier to obtain than more distant information.

In the case of the analysis of Gazifère’s productivity, the period of analysis covers the fiscal years 1987 through 2005. This data provides a sufficiently long, yet relevant, time frame over which to estimate productivity trends. Sub-periods within this 19 year time frame are also analyzed.

Output Measures

Output can be measured in two ways – volumes or customers.

Gazifère provides distribution services to the residential, commercial and industrial markets. Volumes to these markets are shown in the following tables (both non weather normalized and weather normalized).

Table 1

Gazifère Volumes - Not Weather Normalized						
Fiscal Year	Residential	Commercial	Industrial	T-Service	Total	Annual Growth
2005	57,984	62,737	4,555	24,938	150,214	-4.7%
2004	57,518	62,964	5,392	31,770	157,644	-5.0%
2003	57,592	65,200	5,089	38,138	166,019	1.7%
2002	47,584	55,579	5,520	54,540	163,223	-0.7%
2001	50,771	58,267	12,566	42,795	164,399	-28.8%
2000	49,280	54,594	11,599	115,316	230,789	19.2%
1999	44,709	52,118	10,473	86,316	193,616	-6.0%
1998	43,458	50,990	14,808	96,645	205,901	8.7%
1997	45,870	54,565	66,611	22,448	189,494	5.8%
1996	45,723	53,131	62,279	17,943	179,076	29.1%
1995	38,905	46,081	47,973	5,767	138,726	7.8%
1994	42,187	51,399	28,302	6,829	128,717	-5.5%
1993	36,853	45,466	53,880	0	136,199	-38.9%
1992	34,647	44,606	143,754	0	223,007	4.5%
1991	27,698	40,046	145,575	0	213,319	-13.1%
1990	28,616	40,490	176,502	0	245,608	6.9%
1989	27,809	38,460	163,473	0	229,742	27.3%
1988	26,536	36,828	117,048	0	180,412	48.0%
1987	24,884	35,090	61,895	0	121,869	-

Table 2

Gazifère Volumes - Weather Normalized						
Fiscal Year	Residential	Commercial	Industrial	T-Service	Total	Annual Growth
2005	56,748	61,386	4,522	24,938	147,594	-5.1%
2004	56,491	61,939	5,339	31,770	155,539	-0.9%
2003	53,275	60,630	4,974	38,138	157,017	-9.0%
2002	51,971	60,426	5,625	54,540	172,562	5.3%
2001	50,493	58,019	12,557	42,795	163,864	-31.3%
2000	53,102	58,477	11,715	115,316	238,610	18.7%
1999	48,106	55,946	10,661	86,316	201,029	-5.3%
1998	46,538	54,295	14,858	96,645	212,336	12.2%
1997	45,679	54,429	66,624	22,448	189,180	8.0%
1996	43,843	51,125	62,219	17,943	175,130	22.1%
1995	41,132	48,542	48,040	5,767	143,481	17.6%
1994	39,058	47,813	28,285	6,829	121,985	-9.2%
1993	35,931	44,558	53,864	0	134,353	-39.2%
1992	33,702	43,493	143,718	0	220,913	1.9%
1991	29,275	41,993	145,621	0	216,889	-11.1%
1990	27,892	39,570	176,493	0	243,955	6.8%
1989	27,184	37,691	163,462	0	228,337	26.2%
1988	26,786	37,115	117,063	0	180,964	45.3%
1987	26,072	36,513	61,948	0	124,533	-

As can be seen, volumetric growth in Gazifère's distribution franchise has not been constant or stable over the 1987-2005 time frame. Part of the reason for changes in year-over-year growth are attributable to weather as changes in annual degree days from year to year can have significant impacts on heat sensitive demand. The large user classes also contribute to the variances as Gazifère's industrial demand has been impacted by variations in industrial output and plant closures.

The number of customers for Gazifère (by customer class) are shown in the following table.

Table 3

Gazifère Customers						
Fiscal Year	Residential	Commercial	Industrial	T-Service	Total	Annual Growth
2005	26,951	2,731	6	7	29,695	5.3%
2004	25,509	2,681	6	7	28,203	6.2%
2003	23,934	2,614	6	8	26,562	5.4%
2002	22,633	2,562	4	10	25,209	3.6%
2001	21,797	2,533	7	6	24,343	4.5%
2000	20,834	2,447	8	6	23,295	5.3%
1999	19,748	2,359	8	6	22,121	5.9%
1998	18,579	2,293	8	5	20,885	6.4%
1997	17,413	2,196	11	1	19,621	5.7%
1996	16,453	2,100	10	1	18,564	4.9%
1995	15,643	2,042	10	1	17,696	8.3%
1994	14,368	1,964	10	1	16,343	10.5%
1993	12,918	1,862	12	0	14,792	10.9%
1992	11,591	1,735	12	0	13,338	13.2%
1991	10,092	1,679	12	0	11,783	5.8%
1990	9,507	1,621	12	0	11,140	2.2%
1989	9,333	1,551	14	0	10,898	2.2%
1988	9,192	1,461	15	0	10,668	2.0%
1987	9,080	1,366	16	0	10,462	

Customer growth has been much more stable (though not constant) than volumetric growth, as is evident comparing annual growth rates with those for non-normalized and normalized volumes. For this reason, and the fact that much of Gazifère's incremental resources are related to the customer growth (as opposed to volumetric growth, where incremental volumes do not have as large an impact on resources), customers is the preferred output measure for the TFP analysis.

Input Measures

As described earlier, the inputs into the TFP measure for Gazifère include labour, materials and capital.

Labour

Labour data for Gazifère is measured by the number of employees in each year. Employees are separated into supervisory and non-supervisory employees and weighted by labour costs (salaries plus benefits) to determine the labour input index.

Materials

Materials include all non-capital and non-labour costs for Gazifère. They are estimated as the difference between total O&M costs and the labour component. Materials costs are originally provided in nominal dollar terms, and so are converted to real (or constant) dollars using the Quebec CPI index.

Capital

The capital input is often the most difficult input variable to construct for TFP estimates. For the purposes of TFP analysis for Gazifère, two different approaches were applied.

The first method using accounting data for each asset class together with accumulated and annual depreciation, price escalation estimates, and cost of capital, to develop a financial measure of capital employed. The second method uses a physical count of assets employed in each year (for example, the total number of meters is one asset category).

Data on asset values for the following categories was employed for the accounting measurement: Land, Right-of-Way, Structures & Improvements, Services, House Regulators, Mains, Stations, Meters, Leasehold Improvement, Equipment and Furniture, Transportation Equipment, Heavy Work Equipment, Tools & Work Equipment, Communication Equipment, Computer Equipment, and Other Capital.

For each asset category, an opening balance for 1987 was determined from records for net book value. For each subsequent year, assets were increased by additions, decreased for retirements, and adjusted for annual depreciation. These asset values were converted to real dollars using estimates of price inflation for each category². Each asset class was then weighted by a cost share comprised of data on taxes, depreciation and weighted average cost of capital, to determine the capital input index. The data appendices provide further detail on the data used.

The alternative to using accounting data for the capital measure is using physical plant data. For Gazifère, physical plant data is readily available for

² Price deflators used were Canadian Gross Domestic Produce Price Index, Industrial Product Price Indices specific to certain asset categories, and price indices constructed based on the company's own cost data.

services, mains and meters. These assets account for more than 90% of the total assets employed.

Similar to the accounting estimate of capital, the physical measure uses a base of installed services, mains and meters in 1987 and adjusts annually for additions and retirements. Weighting of these asset classes is based on the costs associated with each class, similar to the financial capital index.

It should be noted that the accounting data for the various asset categories obtained from the company contained some anomalous values (such as negative depreciation values and negative retirement values) which was beyond the scope of this report to review and evaluate in detail. For that reason, the TFP results using the accounting data for the capital input are perhaps less reliable than those obtained using the physical plant data.

Creation of Output and Input Indices

The calculation of TFP requires inputs and outputs to be grouped into indices for each.

The output index used for Gazifère's TFP calculation is either customers (the preferred measure) or volumes. The data for each of the customer classes is weighted by a two year moving average of customers (or volumes) in the class to smooth annual changes. Annual growth is calculated as the difference in natural logs for each year³. From this growth, the index is constructed, with the base year, 1987, set at 100.

The calculated output indices using customers is shown in Data Appendix 1. The calculated output indices using volumes – both non-normalized and weather normalized are shown in Data Appendix 2.

The input index is calculated using the indices for labour, materials and capital. As indicated previously, the labour index is constructed from employment data on full time and part time staff. The employee numbers are weighted by total costs (salaries plus benefits) for each category of employment, summed, and growth rate calculated. Data Appendix 3 shows the labour data calculations.

³ Eg: Annual growth in Output_(t) = $\ln(\text{customers}_{(t)}) - \ln(\text{customers}_{(t-1)})$.

The materials index, also described previously, is the total O&M less the labour costs. Data Appendix 4 shows the materials cost index.

The capital index is calculated using both the accounting data and the physical data. Data Appendix 5 shows the calculation using the accounting data, while Data Appendix 6 shows the calculation using the physical data.

Finally, the input index is constructed by combining the three input indices. The indices are each weighted by their respective cost contribution. The calculations are shown in Data Appendix 7.

Summary of Results

The results of estimating TFP for Gazifère are summarized in the following table. The table shows the annual productivity change and averages for various sub-periods, first using Customers as the output index and also using Volumes (non-normalized and normalized) as the output index. Additionally, the results are shown using both the accounting data and the physical data for the capital index.

Table 4

Total Factor Productivity Indices												
Fiscal Year	Output Index: Customer				Output Index: Non-Normalized Volumes				Output Index: Normalized Volumes			
	Accounting Capital		Physical Capital		Accounting Capital		Physical Capital		Accounting Capital		Physical Capital	
2005	151.0	7.2%	124.5	-0.1%	114.9	-2.8%	94.8	-10.1%	112.9	-3.2%	93.1	-10.5%
2004	140.4	1.8%	124.7	2.3%	118.1	-9.3%	104.9	-8.9%	116.5	-5.1%	103.5	-4.7%
2003	137.9	2.2%	121.9	-0.8%	129.7	-1.3%	114.6	-4.3%	122.7	-12.4%	108.4	-15.4%
2002	134.8	1.6%	122.8	-1.1%	131.3	-2.9%	119.6	-5.7%	138.9	3.0%	126.5	0.2%
2001	132.7	-12.2%	124.2	0.8%	135.2	-53.2%	126.6	-40.1%	134.8	-56.7%	126.2	-43.6%
2000	149.9	13.1%	123.2	0.0%	230.1	25.5%	189.1	12.5%	237.5	25.1%	195.2	12.1%
1999	131.6	10.3%	123.1	5.8%	178.3	-1.6%	166.9	-6.1%	184.9	-1.0%	173.0	-5.4%
1998	118.7	1.2%	116.2	-0.5%	181.3	4.9%	177.4	3.2%	186.6	8.2%	182.6	6.4%
1997	117.3	1.2%	116.8	2.2%	172.6	1.4%	171.8	2.4%	172.0	3.4%	171.3	4.4%
1996	115.8	-0.1%	114.2	0.6%	170.2	21.4%	167.8	22.0%	166.2	15.9%	163.9	16.5%
1995	115.9	4.5%	113.6	4.8%	137.4	4.3%	134.6	4.7%	141.8	13.0%	138.9	13.4%
1994	110.8	0.9%	108.2	2.4%	131.6	43.7%	128.5	45.2%	124.5	41.7%	121.5	43.2%
1993	109.8	3.5%	105.7	3.0%	85.0	-59.1%	81.7	-59.6%	82.0	-59.5%	78.9	-60.0%
1992	106.0	-13.2%	102.5	4.5%	153.4	-21.2%	148.3	-3.4%	148.8	-23.8%	143.9	-6.1%
1991	121.0	7.3%	98.0	-1.9%	189.6	-12.4%	153.5	-21.6%	188.7	-10.1%	152.8	-19.3%
1990	112.4	6.3%	99.9	-1.8%	214.6	10.8%	190.6	2.7%	208.7	10.7%	185.3	2.6%
1989	105.6	5.5%	101.7	3.0%	192.6	27.6%	185.5	25.1%	187.5	26.7%	180.5	24.2%
1988	99.9	-0.1%	98.7	-1.3%	146.2	37.9%	144.3	36.7%	143.5	36.1%	141.7	34.9%
1987	100.0		100.0		100.0		100.0		100.0		100.0	
Averages												
2005-2001		0.1%		0.2%		-13.9%		-13.8%		-14.9%		-14.8%
2005-1996		2.6%		0.9%		-1.8%		-3.5%		-2.3%		-4.0%
2005-1991		2.0%		1.5%		-4.2%		-4.7%		-4.1%		-4.6%
2005-1988		2.3%		1.2%		0.8%		-0.3%		0.7%		-0.4%

It is evident from the results that the TFP estimates using volumes as the output index are problematic. As indicated previously, the impact of weather and changes in industrial volumes cause the annual estimates to vary significantly resulting in less robust estimates. Additionally, the averages over most of the time frames suggest a negative productivity factor.

The TFP estimates using customers as the output index are more robust. Depending on the capital input index used in the calculations, the range of TFP estimate using customers ranges from a low of 0.1% or 0.2% to a high of 2.6%. As indicated previously, due to the nature of some of the data used for the construction of the accounting estimate of the capital index, the productivity values produced using this method are somewhat less robust than the physical capital methodology.

Interpretation of Gazifère TFP Estimate

The TFP estimates provided for Gazifère above are “raw” estimates of productivity of Gazifère over a recent time period. The results, when used in any incentive mechanism, need to be evaluated in the context of that mechanism.

For example, one must remember that these estimates are for historical productivity, whereas incentive mechanisms are forward looking. While the historical performance should provide a good guide for an appropriate estimate to use in any incentive mechanism, they do not necessarily reflect productivity to be expected going forward.

One must also be cautious of placing too high a reliance on the specific numbers. As shown in the Table 4, the estimated productivity can vary significantly from year to year. The values are also highly dependent on input assumptions (such as the appropriate output measure, or the appropriate input measures) as well as on the time frame over which they are evaluated.

Overall, empirical analysis such as this are an important input into the development of a good incentive plan, but are only one of the necessary inputs into its development.

Data Appendix

List of Data Tables

- Customer Output Index
- Volumes Output Index
- Labour Input Index
- Materials Input Index
- Capital Input Index (Accounting Data)
- Capital Input Index (Physical Data)
- Combined Input Index

Data Appendix 1

Customer Index										
Fiscal Year	Customers				Weights ¹				Weighted Growth ²	Customers Index (1987=100)
	Res (#)	Com (#)	Ind (#)	T-Service (#)	Res	Com	Ind	T-Service		
2005	26,951	2,731	6	7	90.6%	9.3%	0.0%	0.0%	5.2%	284.0
2004	25,509	2,681	6	7	90.3%	9.7%	0.0%	0.0%	6.0%	269.7
2003	23,934	2,614	6	8	90.0%	10.0%	0.0%	0.0%	5.1%	254.0
2002	22,663	2,562	4	10	89.7%	10.3%	0.0%	0.0%	3.6%	241.4
2001	21,797	2,533	7	6	89.5%	10.5%	0.0%	0.0%	4.4%	232.8
2000	20,834	2,447	8	6	89.4%	10.6%	0.0%	0.0%	5.2%	222.8
1999	19,748	2,359	8	6	89.1%	10.8%	0.0%	0.0%	5.7%	211.6
1998	18,579	2,293	8	5	88.9%	11.1%	0.0%	0.0%	6.2%	199.8
1997	17,413	2,196	11	1	88.7%	11.3%	0.1%	0.0%	5.5%	187.7
1996	16,453	2,100	10	1	88.5%	11.4%	0.1%	0.0%	4.8%	177.5
1995	15,643	2,042	10	1	88.2%	11.8%	0.1%	0.0%	8.0%	169.2
1994	14,368	1,964	10	1	87.6%	12.3%	0.1%	0.0%	10.0%	156.3
1993	12,918	1,862	12	0	87.1%	12.8%	0.1%	0.0%	10.3%	141.4
1992	11,591	1,735	12	0	86.3%	13.6%	0.1%	0.0%	12.4%	127.5
1991	10,092	1,679	12	0	85.5%	14.4%	0.1%	0.0%	5.6%	112.6
1990	9,507	1,621	12	0	85.5%	14.4%	0.1%	0.0%	2.2%	106.5
1989	9,333	1,551	14	0	85.9%	14.0%	0.1%	0.0%	2.1%	104.2
1988	9,192	1,461	15	0	86.5%	13.4%	0.1%	0.0%	2.0%	102.0
1987	9,080	1,366	16	0	-	-	-	-		100.0

Notes:

1. Weights are calculated as moving two year average for each class.
2. Weighted growth is calculated as the log difference of the weighted customers.

Data Appendix 2

Gazifère Volumes Index - Not Weather Normalized											
Fiscal Year	Volumes					Weights				Weighted Growth ²	Normalized Volumes Index (1987=100)
	Residential (103m3)	Commercial (103m3)	Industrial (103m3)	T-Service (103m3)	Total (103m3)	Res	Com	Ind	T-Service		
2005	57,984	62,737	4,555	24,938	150,214	37.5%	40.8%	3.2%	18.4%	-4.8%	216.2
2004	57,518	62,964	5,392	31,770	157,644	35.6%	39.6%	3.2%	21.6%	-5.2%	226.9
2003	57,592	65,200	5,089	38,138	166,019	31.9%	36.7%	3.2%	28.1%	1.6%	239.0
2002	47,584	55,579	5,520	54,540	163,223	30.0%	34.7%	5.5%	29.7%	-0.9%	235.1
2001	50,771	58,267	12,566	42,795	164,399	25.3%	28.6%	6.1%	40.0%	-36.6%	237.3
2000	49,280	54,594	11,599	115,316	230,789	22.1%	25.1%	5.2%	47.5%	17.6%	342.1
1999	44,709	52,118	10,473	86,316	193,616	22.1%	25.8%	6.3%	45.8%	-6.2%	286.8
1998	43,458	50,990	14,808	96,645	205,901	22.6%	26.7%	20.6%	30.1%	10.0%	305.1
1997	45,870	54,565	66,611	22,448	189,494	24.9%	29.2%	35.0%	11.0%	5.7%	276.1
1996	45,723	53,131	62,279	17,943	179,076	26.6%	31.2%	34.7%	7.5%	26.3%	260.9
1995	38,905	46,081	47,973	5,767	138,726	30.3%	36.4%	28.5%	4.7%	7.8%	200.6
1994	42,187	51,399	28,302	6,829	128,717	29.8%	36.6%	31.0%	2.6%	52.9%	185.5
1993	36,853	45,466	53,880	0	136,199	19.9%	25.1%	55.0%	0.0%	-52.3%	109.4
1992	34,647	44,606	143,754	0	223,007	14.3%	19.4%	66.3%	0.0%	4.5%	184.5
1991	27,698	40,046	145,575	0	213,319	12.3%	17.5%	70.2%	0.0%	-14.1%	176.5
1990	28,616	40,490	176,502	0	245,608	11.9%	16.6%	71.5%	0.0%	6.7%	203.2
1989	27,809	38,460	163,473	0	229,742	13.2%	18.4%	68.4%	0.0%	24.3%	190.1
1988	26,536	36,828	117,048	0	180,412	17.0%	23.8%	59.2%	0.0%	40.0%	149.1
1987	24,884	35,090	61,895	0	121,869						100.0

Notes:

1. Weights are calculated as moving two year average for each class.
2. Weighted growth is calculated as the log difference of the weighted volumes.

Gazifère Volumes Index - Weather Normalized											
Fiscal Year	Volumes					Weights ¹				Weighted Growth ²	Normalized Volumes Index (1987=100)
	Residential (103m3)	Commercial (103m3)	Industrial (103m3)	T-Service (103m3)	Total (103m3)	Res	Com	Ind	T-Service		
2005	56,748	61,386	4,522	24,938	147,594	37.4%	40.7%	3.3%	18.7%	-5.3%	212.4
2004	56,491	61,939	5,339	31,770	155,539	35.1%	39.2%	3.3%	22.4%	-1.0%	223.9
2003	53,275	60,630	4,974	38,138	157,017	31.9%	36.7%	3.2%	28.1%	-9.5%	226.0
2002	51,971	60,426	5,625	54,540	172,562	30.5%	35.2%	5.4%	28.9%	5.0%	248.7
2001	50,493	58,019	12,557	42,795	163,864	25.7%	28.9%	6.0%	39.3%	-40.0%	236.6
2000	53,102	58,477	11,715	115,316	238,610	23.0%	26.0%	5.1%	45.9%	17.2%	353.1
1999	48,106	55,946	10,661	86,316	201,029	22.9%	26.7%	6.2%	44.3%	-5.5%	297.3
1998	46,538	54,295	14,858	96,645	212,336	23.0%	27.1%	20.3%	29.7%	13.2%	314.1
1997	45,679	54,429	66,624	22,448	189,180	24.6%	29.0%	35.4%	11.1%	7.7%	275.2
1996	43,843	51,125	62,219	17,943	175,130	26.7%	31.3%	34.6%	7.4%	20.7%	254.8
1995	41,132	48,542	48,040	5,767	143,481	30.2%	36.3%	28.8%	4.7%	16.5%	207.1
1994	39,058	47,813	28,285	6,829	121,985	29.3%	36.0%	32.0%	2.7%	50.8%	175.5
1993	35,931	44,558	53,864	0	134,353	19.6%	24.8%	55.6%	0.0%	-52.7%	105.6
1992	33,702	43,493	143,718	0	220,913	14.4%	19.5%	66.1%	0.0%	1.8%	178.9
1991	29,275	41,993	145,621	0	216,889	12.4%	17.7%	69.9%	0.0%	-11.8%	175.7
1990	27,892	39,570	176,493	0	243,955	11.7%	16.4%	72.0%	0.0%	6.6%	197.6
1989	27,184	37,691	163,462	0	228,337	13.2%	18.3%	68.5%	0.0%	23.4%	185.0
1988	26,786	37,115	117,063	0	180,964	17.3%	24.1%	58.6%	0.0%	38.2%	146.5
1987	26,072	36,513	61,948	0	124,533	-	-	-	-	-	100.0

Notes:

1. Weights are calculated as moving two year average for each class.
2. Weighted growth is calculated as the log difference of the weighted volumes.

Data Appendix 3

Labour Index									
Fiscal Year	Total Supervisory Employees (FTE's)	Total Non-Supervisory Employees (FTE's)	Supervisory Costs (\$)	Non-Supervisory Costs (\$)	Weights ¹		Weighted Growth ²	Labour Index (1987=100)	
					Supervisory	Non-Supervisory			
2005	16.0	27.1	1311294	1725438	43.2%	56.8%	12.6%	127.3	
2004	14.1	23.9	1093255	1438537	43.2%	56.8%	2.1%	112.3	
2003	13.8	23.4	1045569	1375791	43.2%	56.8%	7.0%	109.9	
2002	12.9	21.8	923217	1214796	43.2%	56.8%	3.5%	102.5	
2001	11.9	21.8	837504	1102011	47.3%	52.7%	-2.9%	99.0	
2000	14.0	19.9	1020379	971914	53.3%	46.7%	-3.7%	101.9	
1999	15.0	19.9	1146099	928701	50.8%	49.2%	-14.8%	105.7	
1998	15.0	26.9	1062026	1212563	47.4%	52.6%	-2.9%	122.6	
1997	16.0	26.8	1097111	1182261	46.9%	53.1%	-1.9%	126.2	
1996	16.0	27.8	997283	1192536	45.1%	54.9%	0.6%	128.7	
1995	15.5	28.2	969051	1201000	43.4%	56.6%	1.9%	127.8	
1994	14.3	29.0	883682	1210717	44.6%	55.4%	6.1%	125.4	
1993	14.5	25.7	928397	1039952	45.8%	54.2%	0.8%	118.0	
1992	14.0	26.1	795449	1001732	45.2%	54.8%	5.7%	117.1	
1991	14.0	23.5	722189	834970	46.2%	53.8%	4.6%	110.6	
1990	13.0	23.0	664967	783575	44.2%	55.8%	9.9%	105.6	
1989	11.0	22.0	526440	722512	41.4%	58.6%	-2.4%	95.7	
1988	11.0	22.9	491573	719414	40.6%	59.4%	-2.0%	98.0	
1987	11.0	23.7	485234	708504				100.0	

Notes:

1. Weights are calculated as moving two year average for each class.
2. Weighted growth is calculated as the log difference of the weighted employees.

Data Appendix 4

Materials Index							
Fiscal Year	Total Regulated O&M Costs (\$)	Total Labour Costs (\$)	Total Materials Cost (\$)	Quebec CPI	Total Real Materials Cost (\$1992)	Materials Index Growth (1987=100)	
2005	6,604,117	3,036,732	3,567,385	122.8	2,904,445	4.5%	307.6
2004	5,862,944	2,531,791	3,331,153	119.9	2,777,890	-0.8%	294.2
2003	5,726,563	2,421,360	3,305,203	118.1	2,799,833	6.3%	296.5
2002	5,150,624	2,138,013	3,012,611	114.6	2,629,762	9.8%	278.5
2001	4,631,494	1,939,515	2,691,979	112.9	2,384,568	10.2%	252.5
2000	4,359,265	1,992,293	2,366,972	109.9	2,153,261	4.8%	228.0
1999	4,279,951	2,074,800	2,205,151	107.4	2,052,417	3.1%	217.3
1998	4,383,845	2,274,589	2,109,256	106.0	1,989,551	8.1%	210.7
1997	4,199,598	2,279,372	1,920,226	104.6	1,835,049	6.5%	194.3
1996	3,958,925	2,189,819	1,769,106	102.9	1,718,830	5.0%	182.0
1995	3,825,572	2,170,051	1,655,521	101.3	1,634,679	0.7%	173.1
1994	3,723,477	2,094,399	1,629,078	100.4	1,622,588	13.6%	171.8
1993	3,400,625	1,968,349	1,432,276	101.1	1,416,459	15.5%	150.0
1992	3,004,889	1,797,181	1,207,708	99.6	1,213,167	7.0%	128.5
1991	2,652,169	1,557,159	1,095,010	96.8	1,131,014	7.8%	119.8
1990	2,393,690	1,448,542	945,148	90.4	1,046,000	1.8%	110.8
1989	2,140,681	1,248,952	891,729	86.8	1,027,140	-7.7%	108.8
1988	2,136,466	1,210,987	925,479	83.4	1,109,576	16.1%	117.5
1987	1,952,049	1,193,738	758,311	80.3	944,347		100.0

Data Appendix 5

Capital Index (Accounting Data)

Fiscal Year	Real Capital Plant (after depreciation)													Weighted Change in Capital Index	Capital Index
	Other Gas Inst	Land, Right-of-Way, Structures & Improvements	Services	House Regulators	Mains	Station Ind.	Meters	Leasehold Imp.	Equipment and Furniture	Transportation Equip	Heavy Work Equip	Tools & Work Equip	Computer & Communication Equip		
	401	470	473	474	475	477	478	482	483	484	485	486	488 & 490		
2005	15304	21648	10961116	2012527	13334750	836622	1971248	16119	70321	0	13538	33878	229883	-8.0%	185.48
2004	19247	22286	10874651	2071797	13307623	902442	1961638	18725	84942	11045	17632	42464	194627	6.2%	200.90
2003	23360	22894	10397363	2128399	12829375	971203	1916513	4956	92908	24101	21275	40257	238837	0.9%	188.81
2002	27963	23758	10139750	2208687	12323770	1004602	1840416	8873	82006	35912	24631	40056	285624	-0.5%	187.03
2001	31560	23664	10006019	2141063	12339995	1043933	1800622	11386	76023	49908	34598	53866	325524	22.4%	188.06
2000	36205	24293	9946094	2024271	12289593	1040999	1754224	1	88677	64799	40545	56662	369072	-12.1%	150.27
1999	39218	25224	9665843	1781037	11457597	1033249	1724315	1699	81996	80645	13068	60349	382022	-3.8%	169.57
1998	43473	6661	9460235	1631851	11446977	1003225	1688809	11437	92475	102559	15478	37670	410505	6.5%	176.22
1997	47429	6658	9118946	1436608	10179635	881310	1596655	20472	95599	67528	18278	37350	435975	5.6%	165.16
1996	52191	6759	8829502	1304772	9904077	850019	1510707	9506	67899	10667	18830	41017	190178	6.3%	156.11
1995	57189	6875	8602949	1196791	8997822	565084	1502955	12714	78287	17576	21588	48422	188118	5.1%	146.55
1994	62574	7018	8332305	1081696	8604466	601787	1456581	3613	88362	24778	25033	45748	200306	8.9%	139.31
1993	67516	7097	7552552	862022	8224886	581519	1315687	1594	97846	31349	26738	30626	118674	6.8%	127.39
1992	72825	7202	6752249	674478	7681822	561295	1176487	2911	106919	40150	28185	12460	89190	40.9%	119.05
1991	78230	7305	5948467	431804	7037552	535516	1046396	1	115802	48005	22603	15824	96253	-8.0%	79.09
1990	85217	7537	5287269	275490	6372725	449851	926037	58	110707	4046	0	28242	104875	-12.5%	85.72
1989	92797	12240	5071578	166011	6176005	404561	876149	3157	101379	8708	0	13017	81333	-2.4%	97.14
1988	102094	12992	4969985	93547	5971829	378671	805082	12977	43710	13226	0	13098	67406	-0.5%	99.48
1987	111744	13747	4914938	43935	5811787	364022	754954	23722	50250	17124	0	14853	62128		100.00

Fiscal Year	Capital Weights													Weighted Change in Capital Index	Capital Index
	Other Gas Inst	Land, Right-of-Way, Structures & Improvements	Services	House Regulators	Mains	Station Ind.	Meters	Leasehold Imp.	Equipment and Furniture	Transportation Equip	Heavy Work Equip	Tools & Work Equip	Computer & Communication Equip		
	401	470	473	474	475	477	478	482	483	484	485	486	488		
2005	0.002	0.008	0.345	0.029	0.499	0.029	0.038	0.032	0.004	0.003	0.001	0.000	0.009		
2004	0.002	0.008	0.340	0.031	0.503	0.030	0.037	0.028	0.004	0.003	0.001	0.001	0.011		
2003	0.002	0.008	0.329	0.033	0.510	0.031	0.041	0.026	0.004	0.004	0.001	0.002	0.008		
2002	0.003	0.009	0.321	0.034	0.514	0.032	0.044	0.027	0.004	0.004	0.001	0.002	0.007		
2001	0.003	0.008	0.321	0.034	0.517	0.032	0.043	0.023	0.004	0.004	0.001	0.002	0.006		
2000	0.003	0.007	0.314	0.032	0.527	0.032	0.044	0.022	0.004	0.005	0.001	0.002	0.006		
1999	0.003	0.004	0.308	0.031	0.527	0.032	0.045	0.029	0.005	0.002	0.001	0.002	0.011		
1998	0.004	0.003	0.316	0.032	0.518	0.032	0.047	0.030	0.005	0.001	0.001	0.002	0.009		
1997	0.004	0.003	0.331	0.034	0.508	0.032	0.054	0.022	0.004	0.002	0.001	0.002	0.003		
1996	0.005	0.002	0.350	0.036	0.481	0.030	0.061	0.016	0.004	0.002	0.001	0.003	0.008		
1995	0.006	0.002	0.345	0.037	0.467	0.032	0.065	0.015	0.007	0.003	0.000	0.003	0.018		
1994	0.007	0.003	0.321	0.035	0.483	0.039	0.069	0.018	0.009	0.003	0.000	0.002	0.013		
1993	0.008	0.005	0.321	0.029	0.478	0.037	0.071	0.029	0.009	0.003	0.002	0.000	0.008		
1992	0.009	0.007	0.317	0.023	0.478	0.037	0.065	0.038	0.010	0.001	0.001	0.001	0.012		
1991	0.010	0.009	0.317	0.016	0.485	0.038	0.062	0.041	0.011	0.000	0.000	0.002	0.009		
1990	0.012	0.011	0.332	0.011	0.486	0.032	0.059	0.041	0.008	0.002	0.000	0.002	0.007		
1989	0.012	0.012	0.339	0.006	0.484	0.029	0.056	0.042	0.005	0.002	0.001	0.002	0.008		
1988	0.013	0.013	0.336	0.003	0.482	0.029	0.062	0.044	0.006	0.003	0.001	0.002	0.008		
1987	-	-	-	-	-	-	-	-	-	-	-	-	-		

Data Appendix 6

Capital Index (Physical Data)											
Fiscal Year				Capital Cost			Weights ¹			Weighted Growth ²	Capital Index (1987=100)
	Services (#)	Mains (meters)	Meters (#)	Services (\$)	Mains (\$)	Meters (\$)	Services	Mains	Meters		
2005	28,398	718,788	26,075	3,792,305	5,389,090	408,022	39.1%	56.6%	4.3%	3.6%	250.8
2004	26,933	700,393	25,498	3,640,082	5,357,844	401,437	38.6%	57.2%	4.2%	5.5%	241.8
2003	25,141	667,822	24,708	3,471,644	5,174,345	381,233	37.3%	58.0%	4.7%	5.5%	228.8
2002	23,701	632,686	23,691	3,318,122	5,360,911	472,716	36.5%	58.5%	5.0%	3.6%	216.5
2001	22,600	615,171	22,880	3,076,607	4,883,720	405,872	36.4%	58.7%	4.9%	3.1%	209.0
2000	21,669	600,339	22,150	2,952,477	4,836,592	406,227	35.5%	59.5%	5.0%	7.2%	202.5
1999	20,424	551,951	21,549	2,655,134	4,560,454	387,295	35.0%	59.8%	5.1%	2.9%	188.4
1998	19,411	543,358	20,843	2,585,309	4,389,287	382,284	35.9%	58.8%	5.4%	9.1%	183.0
1997	18,232	485,640	19,729	2,615,284	4,129,373	396,401	37.1%	56.9%	6.0%	4.1%	167.0
1996	17,090	474,821	18,452	2,230,934	3,310,040	386,867	39.2%	54.0%	6.8%	5.3%	160.4
1995	16,223	448,210	18,125	2,034,860	2,556,751	352,389	39.4%	53.2%	7.4%	4.5%	152.1
1994	15,274	433,002	17,523	1,415,264	2,109,025	295,521	36.8%	55.4%	7.9%	6.2%	145.5
1993	13,942	416,676	16,049	1,222,759	1,861,801	268,275	36.9%	55.0%	8.1%	7.7%	136.8
1992	12,580	394,364	14,388	1,311,633	1,915,606	291,174	36.9%	55.6%	7.6%	9.2%	126.6
1991	11,087	369,568	12,720	962,107	1,512,086	176,566	36.7%	56.2%	7.2%	8.8%	115.5
1990	9,979	342,148	11,642	956,817	1,428,723	197,906	37.9%	55.4%	6.7%	2.0%	105.7
1989	9,622	340,166	11,202	966,196	1,387,407	143,048	38.5%	55.1%	6.4%	1.9%	103.7
1988	9,381	334,886	11,010	992,552	1,410,540	182,034	38.2%	54.8%	7.0%	1.7%	101.7
1987	9,164	331,086	10,766	861,499	1,248,775	158,695	-	-	-		100.0

Notes:

1. Weights are calculated as moving two year average for each cost category.
2. Weighted growth is calculated as the log difference of the weighted capital costs.

Data Appendix 7

Combined Input Index											
Fiscal Year	Input Indices				Input Weights			Weighted Input Index (Capital Accounting Data)		Weighted Input Index (Capital Physical Data)	
	Labour	Materials	Capital (Accounting Data)	Capital (Physical Data)	Labour	Materials	Capital	Weighted Input Growth	Weighted Input Index	Weighted Input Growth	Weighted Input Index
2005	127.3	307.6	185.5	250.8	0.16	0.20	0.63	-2.1%	188.1	5.3%	228.1
2004	112.3	294.2	200.9	241.8	0.15	0.20	0.64	4.2%	192.1	3.7%	216.4
2003	109.9	296.5	188.8	228.8	0.14	0.20	0.65	2.9%	184.3	5.9%	208.5
2002	102.5	278.5	187.0	216.5	0.14	0.19	0.67	2.0%	179.0	4.7%	196.6
2001	99.0	252.5	188.1	209.0	0.14	0.18	0.68	16.6%	175.5	3.6%	187.5
2000	101.9	228.0	150.3	202.5	0.15	0.17	0.67	-7.9%	148.6	5.1%	180.9
1999	105.7	217.3	169.6	188.4	0.17	0.17	0.66	-4.5%	160.8	-0.1%	171.8
1998	122.6	210.7	176.2	183.0	0.18	0.16	0.66	5.0%	168.3	6.8%	172.0
1997	126.2	194.3	165.2	167.0	0.20	0.16	0.64	4.3%	160.0	3.3%	160.7
1996	128.7	182.0	156.1	160.4	0.22	0.17	0.61	4.9%	153.3	4.2%	155.5
1995	127.8	173.1	146.5	152.1	0.24	0.19	0.57	3.5%	146.0	3.1%	149.0
1994	125.4	171.8	139.3	145.5	0.26	0.20	0.54	9.1%	141.0	7.6%	144.4
1993	118.0	150.0	127.4	136.8	0.26	0.18	0.55	6.8%	128.7	7.3%	133.8
1992	117.1	128.5	119.1	126.6	0.26	0.18	0.56	25.6%	120.3	7.9%	124.4
1991	110.6	119.8	79.1	115.5	0.27	0.18	0.55	-1.7%	93.1	7.5%	114.9
1990	105.6	110.8	85.7	105.7	0.26	0.18	0.56	-4.1%	94.7	4.0%	106.6
1989	95.7	108.8	97.1	103.7	0.24	0.18	0.57	-3.3%	98.7	-0.8%	102.5
1988	98.0	117.5	99.5	101.7	0.25	0.18	0.57	2.0%	102.0	3.3%	103.3
1987	100.0	100.0	100.0	100.0					100.0		100.0

Evaluation of TFP Methodology and Results

**Prepared for
Enbridge Consumers Gas**

**Navigant Consulting, Ltd
180 Bloor Street West, Suite 1400
Toronto, Ontario
M5S 2V6**

April 17, 2002

Discussion Topics

- ❑ Introduction to Navigant Consulting
- ❑ Introduction to Total Factor Productivity
- ❑ Analysis of Enbridge Consumers Gas' Overall Approach
- ❑ Review of Methodology Used
 - ❑ TFP Methods
 - ❑ Index Number Methods
- ❑ Review of Data Used
- ❑ Analysis of Results Obtained
- ❑ Conclusions

NCI's Relevant Areas of Expertise

Industry and Market Restructuring

- Exiting the merchant function
- Stranded cost studies
- Rate unbundling
- Service disaggregation
- Transition programs
- Access/affiliate rules
- Customer aggregation
- New products and services
- De-contracting
- Organizational studies
- Outsourcing

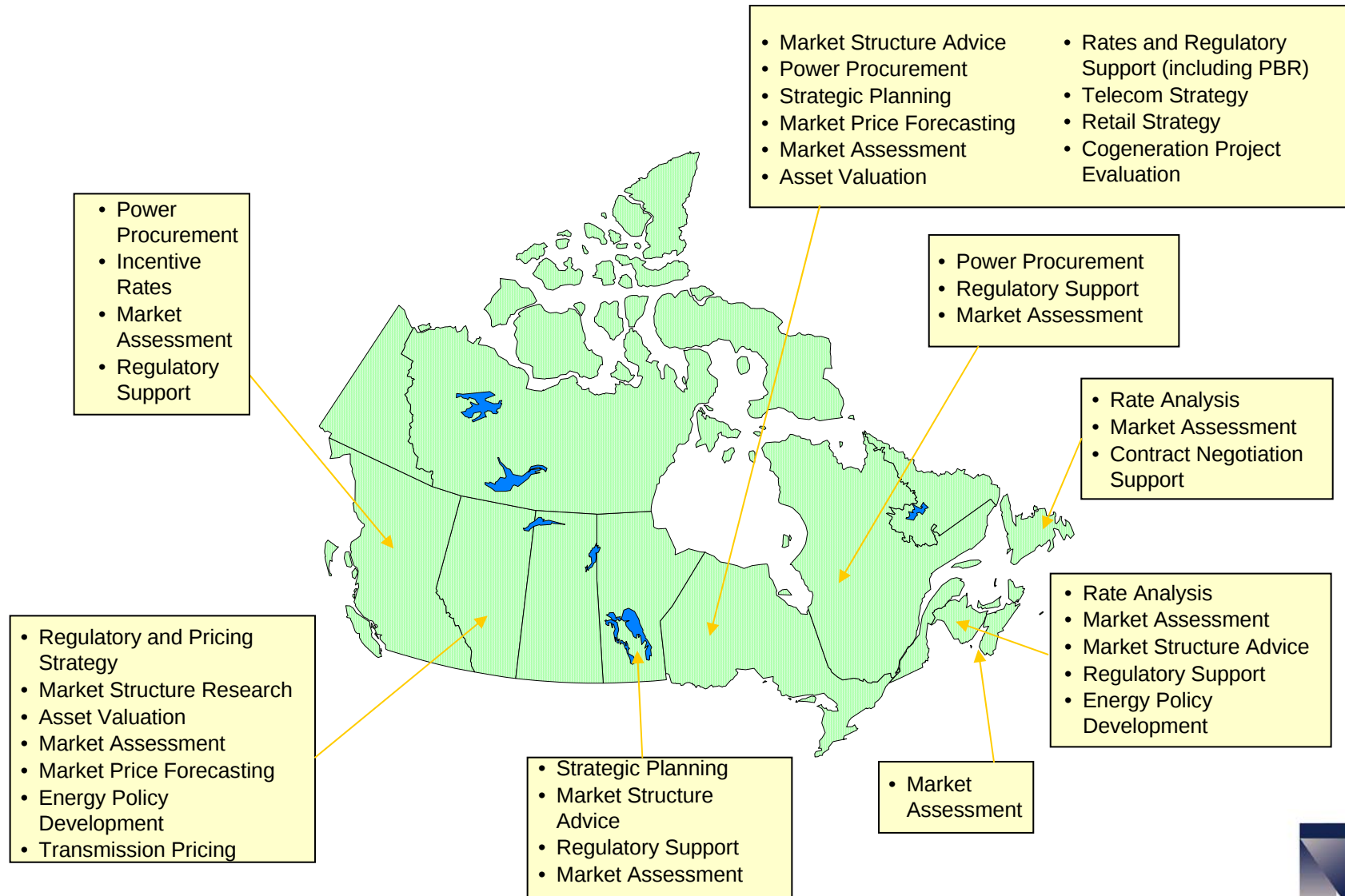
Market Pricing

- Market price forecasting
- Negotiated and discounted rates
- Pricing strategies
- Retail marketing strategies
- Cost-of-service
- Cost allocation
- Transmission congestion pricing
- Market-based rates
- Contracting techniques
- Products and services

Regulatory Services and Litigation

- | | |
|---|--|
| <ul style="list-style-type: none">• Performance-based ratemaking• Cost of service studies• Regulated rate design• Eminent domain• Asset and damages valuation• Regulatory accounting principles• Management prudence audits | <ul style="list-style-type: none">• Affiliate standards of conduct• Rate unbundling• Corporate restructuring• De-contracting• Stranded cost studies• Assessment of need & necessity• Contract disputes |
|---|--|

Navigant Consulting's Experience in Canada



Total Factor Productivity Concept

- ❑ Total Factor Productivity (TFP) is a concept used to estimate a firm's efficiency over a fixed interval of time
 - ❑ It measures growth in addition to that caused by growth in the factors of production
 - ❑ It represents the combined effects of all the changes in inputs and their interaction
 - ❑ For example, if labour and capital are the only inputs, and each grows 2% while output grows 2.5%, then TFP growth is 0.5%
- ❑ TFP can be applied to a whole economy as a measure of productivity growth
- ❑ TFP is also applied as a measure of efficiency gains in an industry or firm; a TFP Index is the ratio of an output quantity index to an input quantity index
- ❑ Difficult to provide a meaningful analysis of real input / output due to heterogeneous relationship between the two
- ❑ But, by using index number theory, it is possible to analyze input / output growth

Enbridge TFP Index Model

- ❑ Enbridge calculation of TFP index is straightforward:
 - ❑ Calculate output index
 - ❑ Calculate chain-weighted index of total inputs
 - ❑ Divide the output index by the total input index
 - ❑ Result is TFP index. Growth in TFP index is growth in TFP
- ❑ Enbridge used a two-factor model, with capital and total O&M (labour and materials) being the inputs
 - ❑ The cost share of each input is used in calculation of an overall input index
- ❑ The base year of the indices is 1988
 - ❑ This timeframe allows for the inclusion of a whole business cycle

Enbridge TFP Index Model (continued)

- ❑ Total number of customers was taken as the output measure
 - ❑ Not affected by annual changes in weather and has a close relationship with costs
- ❑ Capital Input Index calculated using Chain-weighted Fisher's Ideal Indexing method
- ❑ Capital Items are depreciated using accounting depreciation rates
 - ❑ This is an adequate estimation of economic depreciation (depreciation rates provided by Capital Accounting System)
- ❑ Cost of Capital is calculated to determine appropriate weights for each capital asset
 - ❑ Defined as total taxes + opportunity cost of capital + depreciation expense

Evaluation of Enbridge Approach

- ❑ Methodological questions:
 - ❑ Did Enbridge consider other methodologies?
 - ❑ Would another TFP index methodology have been better?
 - ❑ Would another choice of model within the same methodology have been better?
 - ❑ Would another index number methodology have been better?
- ❑ Data questions:
 - ❑ Was the data available the most appropriate for the model chosen?
 - ❑ Did the data suffer from any glaring errors or outliers?
- ❑ Results questions:
 - ❑ Are the results reasonable?
 - ❑ Are the results comparable to those obtained elsewhere?
 - ❑ Do the results suggest further work?

**Overall: Are these results a reasonable basis for
TFP index for Enbridge?**

Alternative TFP Methodologies

- ❑ Data Envelopment Analysis
 - ❑ Evaluates efficiency of multiple parties
 - ❑ Efficiency frontier constructed from “best” virtual producers
 - ❑ Strict DEA not an econometric technique
 - ❑ Requires data on multiple firms
- ❑ Industry-wide TFP index
 - ❑ Estimate productivity and input factor growth for the Ontario gas distribution industry
 - ❑ Requires data on a number of firms

Neither of above possible due to lack of sufficient data

Alternative TFP Index Models

❑ Three-factor Model

- ❑ Methodology often used for utilities; the three factors used are labour, materials and capital.
- ❑ Not truly valid for this period for Enbridge. A major organizational change in 1999 put much of O&M under a single contract, so labour and materials could not be accurately separated after that year.

❑ Gas volume as output measure

- ❑ Considered using total volumes by rate class weighted by associated revenues
- ❑ Was not chosen because too weather sensitive and declining average uses per customer create a downward bias on the results

Alternative Index Number Methods

- ❑ Fixed-weighted Price Index
 - ❑ Bias becomes more problematic as length of time period of data used increases
 - ❑ Base year must be updated periodically, otherwise price weights become obsolete
 - ❑ Laspeyres
 - Uses weights based on fixed point in the past
 - Produces biased results due to overestimating of technological equipment and services
 - ❑ Paasche
 - Uses weights based on current prices
 - Has a tendency of understating growth in Information and Communication Technology industries

Alternative Index Number Methods (continued)

- ❑ Chain-weighted Price Index (Superlative Index)
 - ❑ Allows for relationship between indexes in intervening years to be incorporated into weights
 - ❑ Reduces the gap between the Laspeyres and Paasche Indices
 - ❑ Tornqvist Chain-weighted Price Index
 - Allows for product substitution
 - Logarithmically defined index based on average of weights for two periods considered
 - Large shifts in annual indices may cause potential bias from use of log growth rates

Optimal Index Number Method

- ❑ Fisher Chain-weighted Price Index
 - ❑ Data chained annually, minimizes bias introduced by dispersion
 - ❑ Allows for product substitution
 - ❑ Index formula of choice in the US, StatsCan and System of National Accounts
 - ❑ Middle ground between Laspeyres and Paasche
 - ❑ Dynamic – weights change annually
 - ❑ “Dual” property – product of Fisher Ideal price index between two periods and product of Fisher Ideal quantity index between same two periods is equal to change in value between two periods¹
 - ❑ Disadvantages: comparisons between non-adjacent periods difficult to interpret, loss of additivity in series (aggregate not sum of its parts)

¹ Triplett, Jack. Economic Theory and BEA's Alternative Quantity and Price Indexes, 51.

Data Quality Review

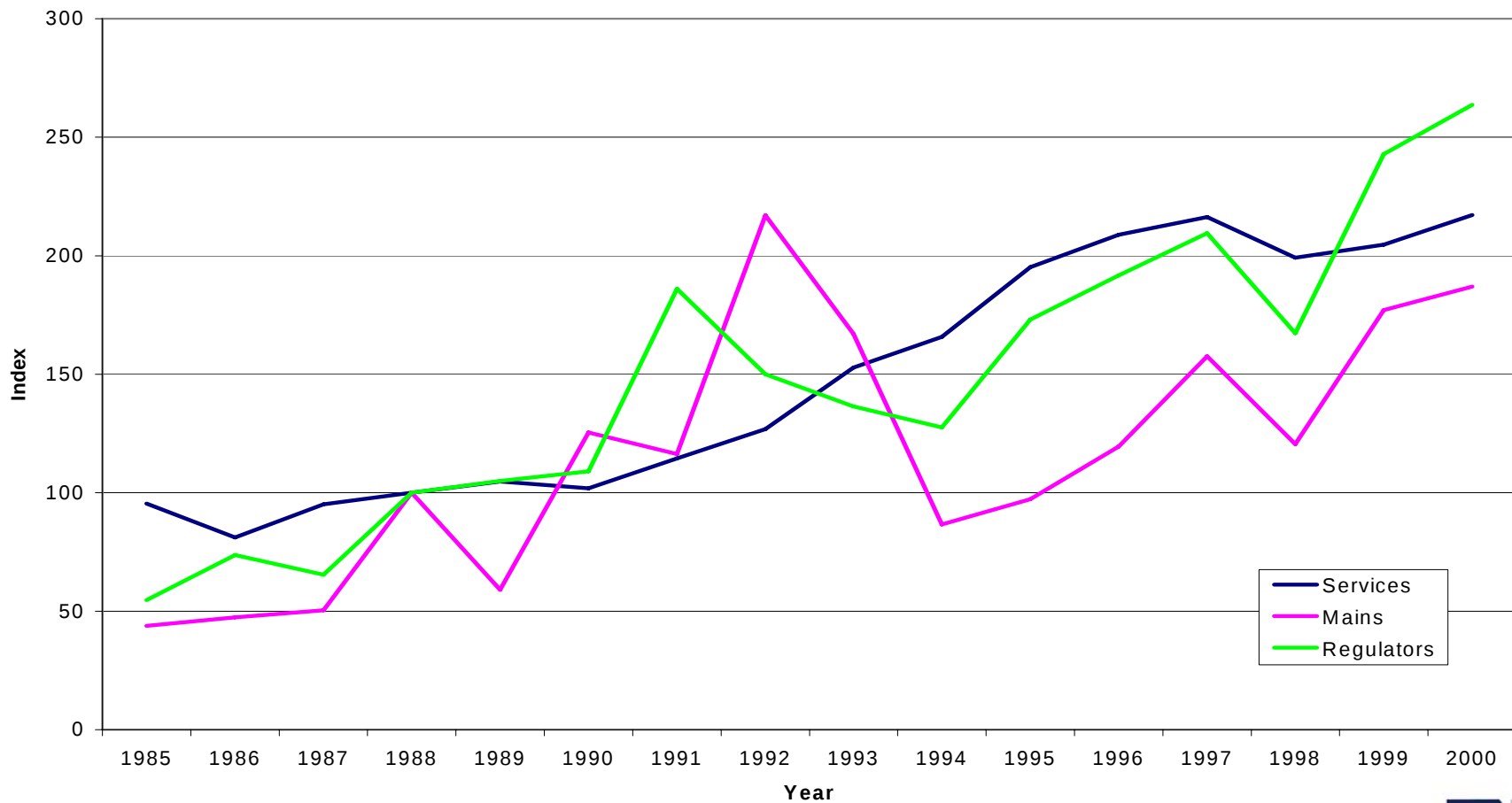
- ❑ Navigant Consulting reviewed the data for consistency and errors
- ❑ Capital data obtained from Capital Knowledge Centre
- ❑ The data shows the result of the organizational restructuring in 1999
 - ❑ Labour index reduced by 50% as a result of outsourcing of certain functions and services
- ❑ Post 1998, wages were determined through internal reports and were approximated as labour to total O&M
- ❑ No serious errors or outliers found

Review of Data – Additions to Capital Series

- ❑ Recent increasing annual additions to the following capital accounts:
 - ❑ Services
 - ❑ Mains
 - ❑ Regulators
 - ❑ Computer Software
- ❑ Recent decreasing annual additions:
 - ❑ Office furniture & equipment (1997 – 2000)
 - ❑ Tools & work equipment (1998 – 2000)
 - ❑ Communications Equipment (1996 – 2000)
- ❑ Heavy concentration of additions to Computer Equipment (1996 – 98), Communications Equipment (1994 – 97) and Computer Software (1999 – 2000)

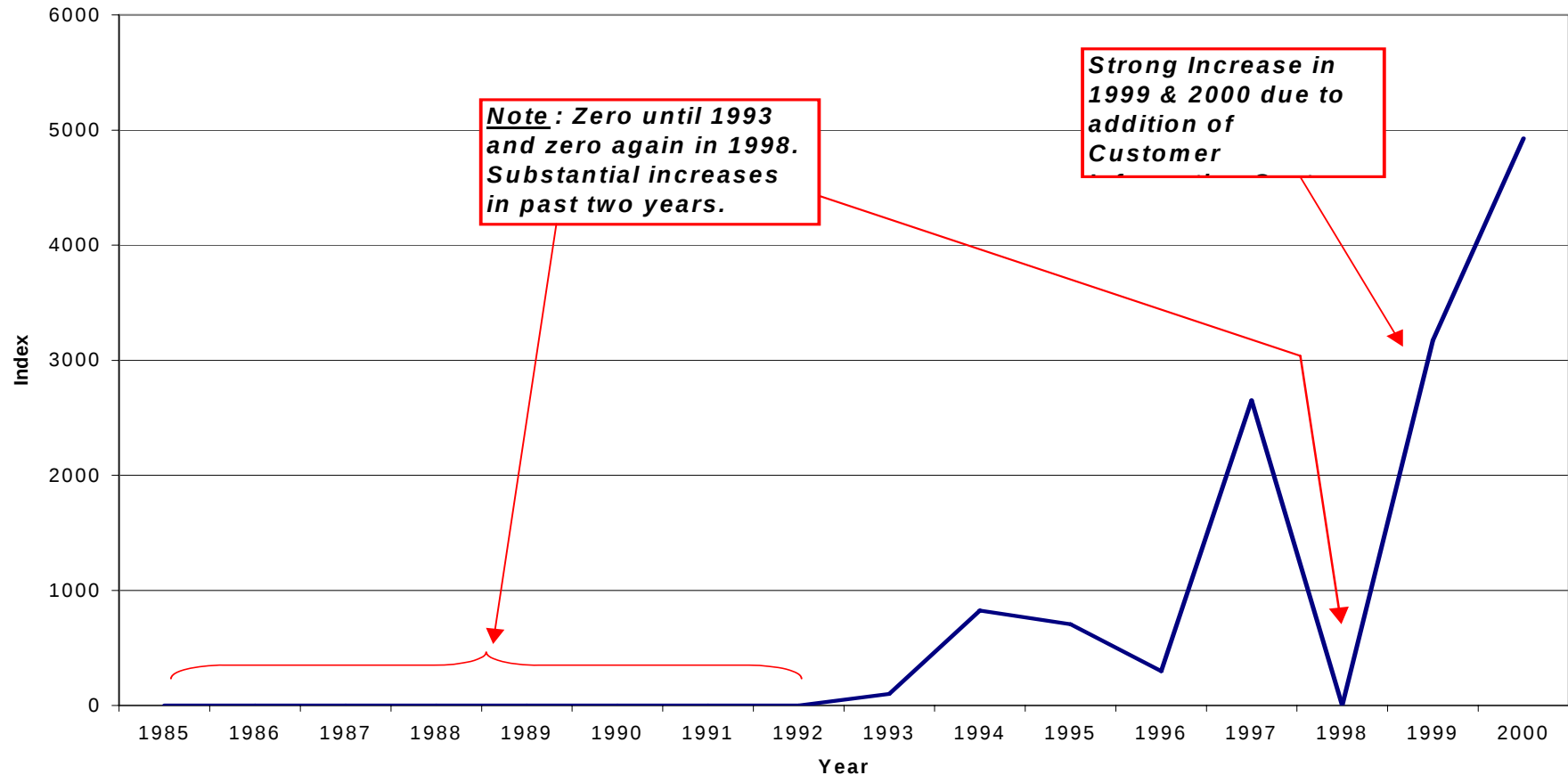
Increasing Additions to Capital Series

Annual additions (reference year 1988 = 100)



Increasing Additions to Capital Series

Increasing Annual Additions - Computer Software

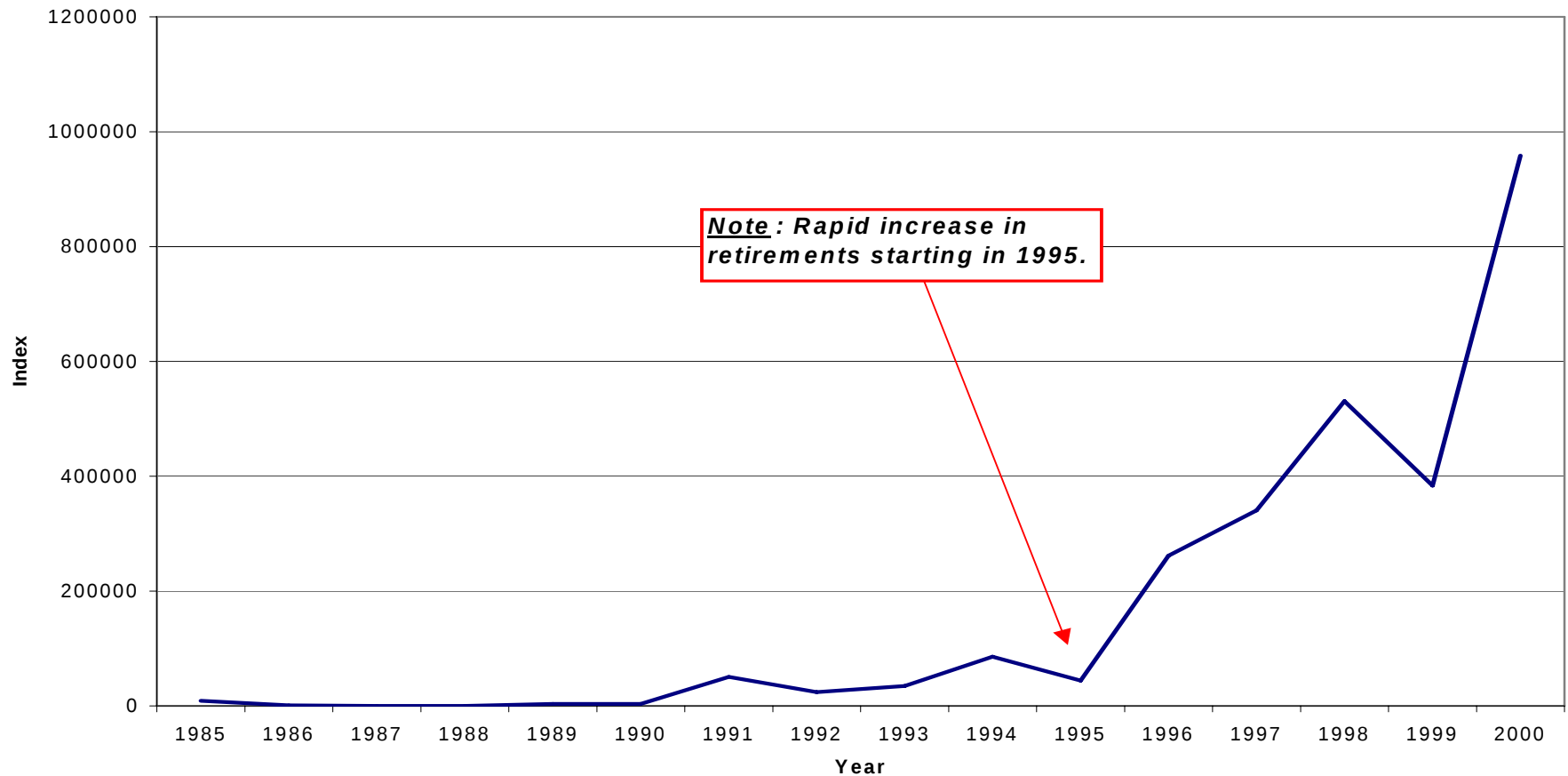


Review of Data – Retirements to Capital Series

- ❑ Recent increasing annual retirements to the following capital accounts:
 - ❑ Land, structure & improvements
 - ❑ Services
 - ❑ Computer equipment
 - ❑ Communications equipment
- ❑ Recent decreasing retirements to:
 - ❑ Tools & work equipment (1998 – 2000)
 - ❑ Meters (1997 – 2000)
- ❑ No retirements of computer software
- ❑ No retirements of heavy work equipment in 2000

Increasing Retirements to Capital Series

Increasing Annual Retirements - Computer Equipment

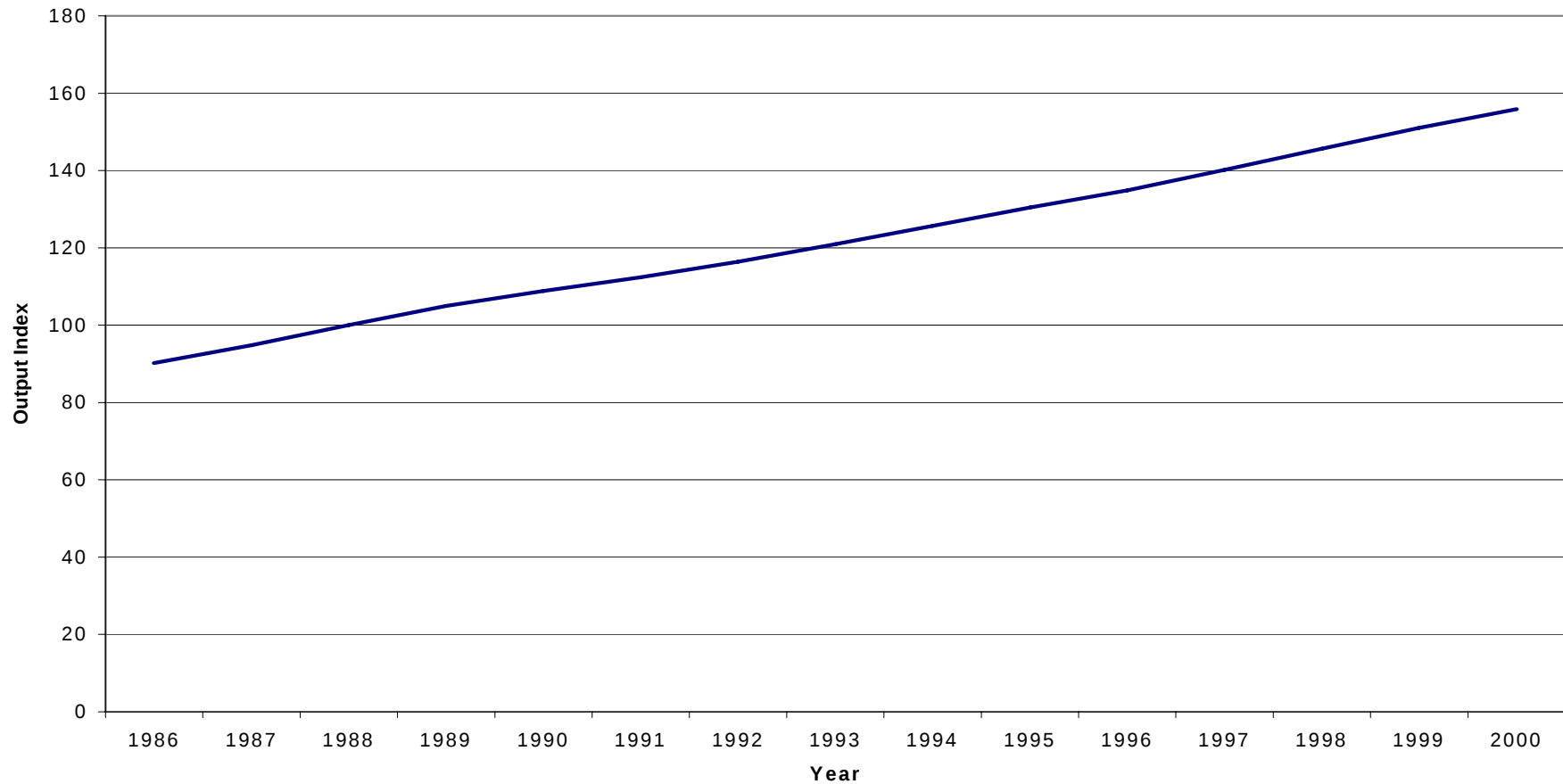


Review of Data (continued)

- ❑ Dramatic decrease in labour index in 1999 due to outsourcing of functions and contracting of services to an unregulated affiliate
- ❑ Subsequent increase in Material Costs as a result of above
- ❑ Consistent increase in number of residential customers
- ❑ Consistent decrease in number of industrial customers
- ❑ Percent rate of customer growth is decreasing; absolute level of customer growth is roughly constant
- ❑ Chained capital index growing at over 10% for the past two years (averaged 10.9% since 1995)
- ❑ Significant infusion of capital since 1995

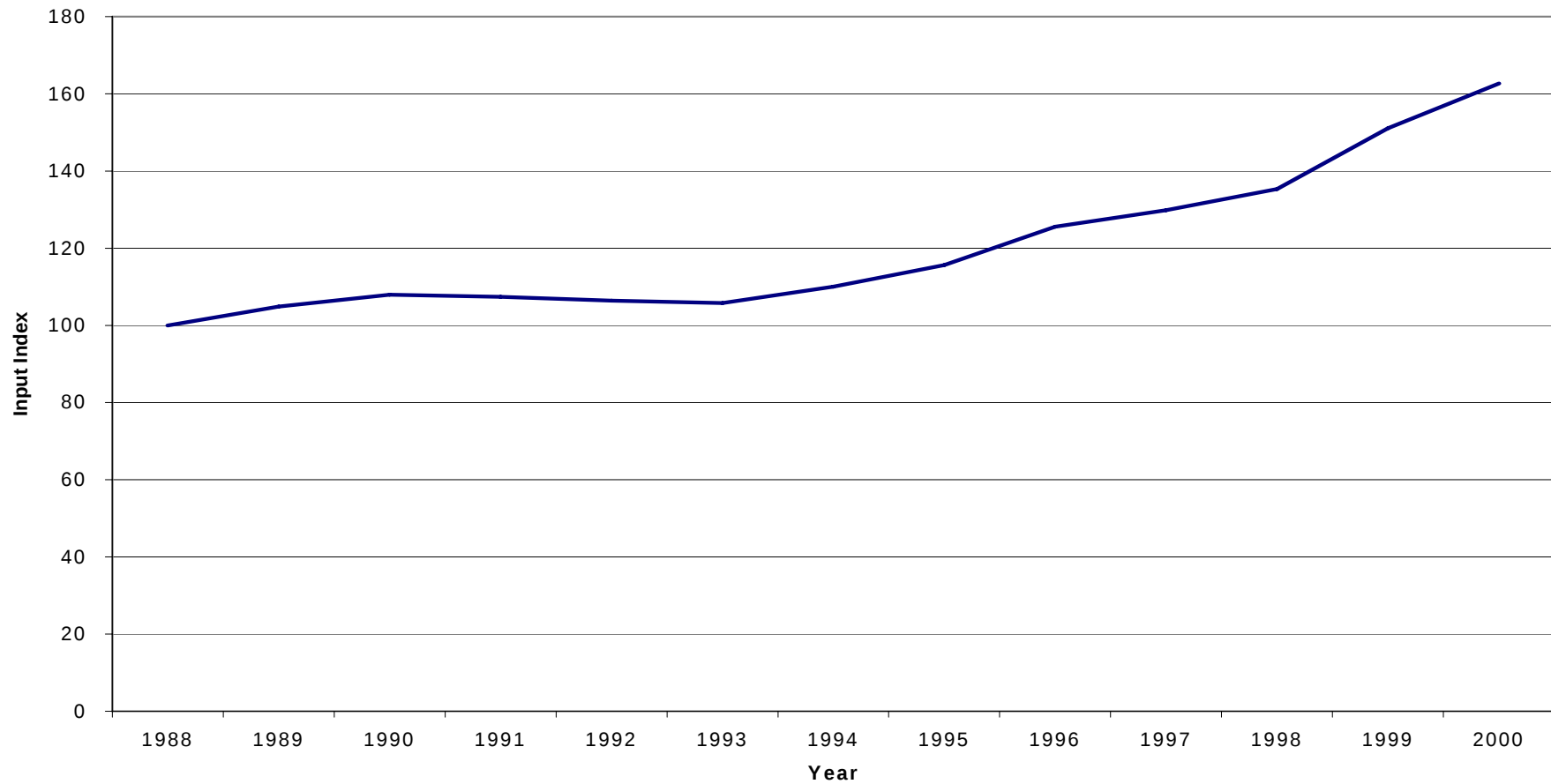
Output Index

Output Index (Base Year 1988 = 100)



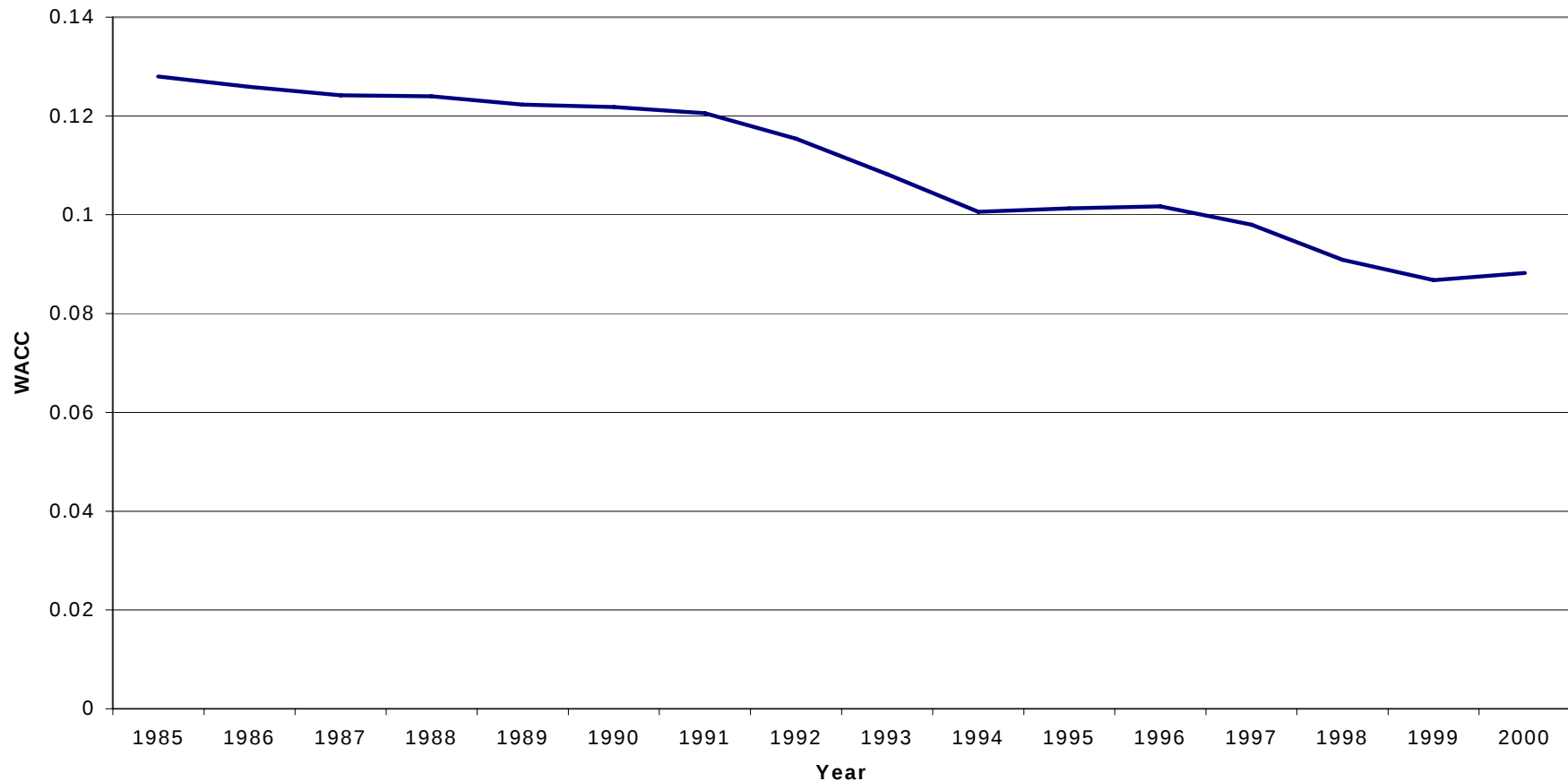
Total Input Index

Total Chain-weighted Input Index (Base Year 1988 = 100)



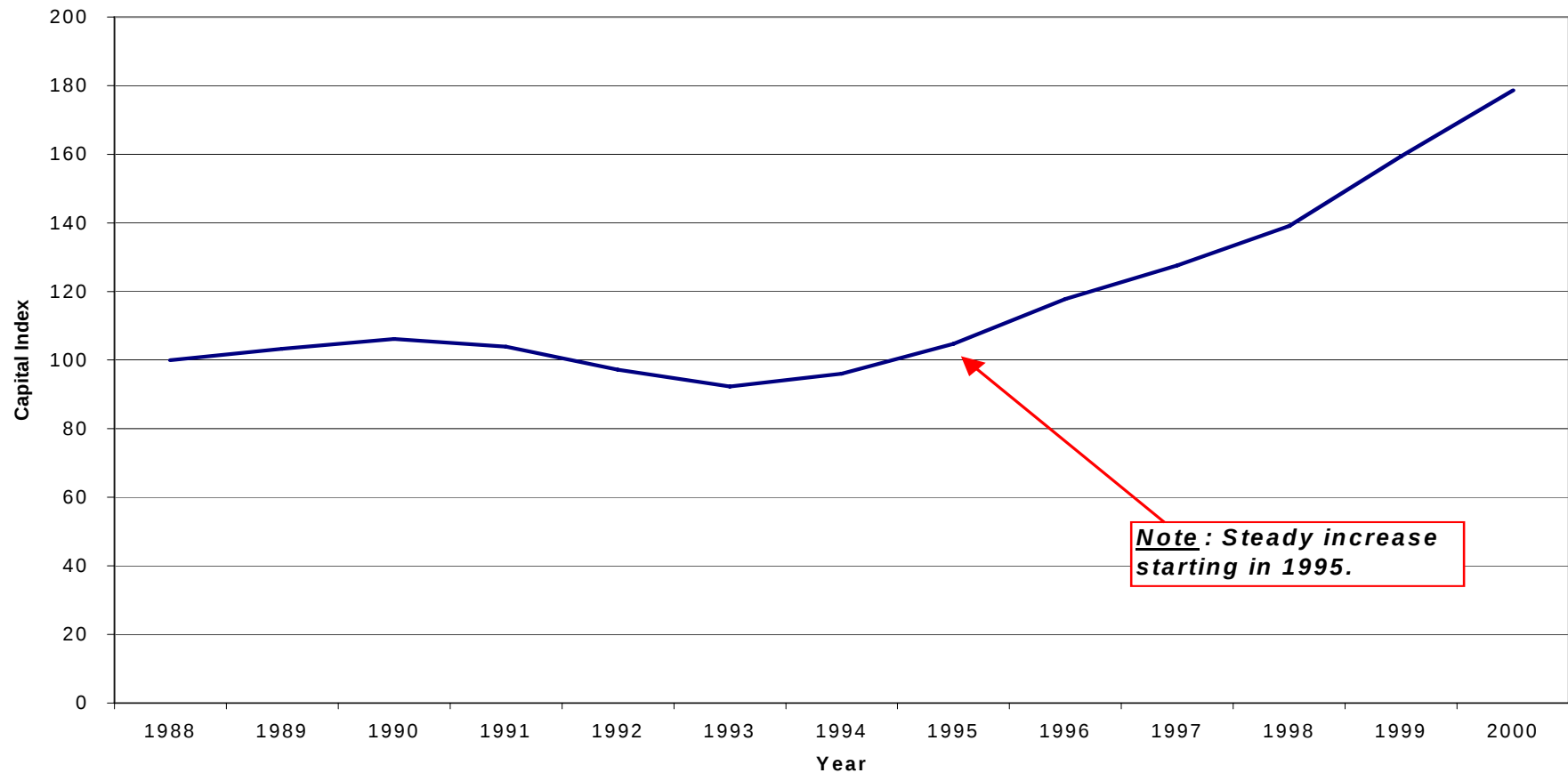
Weighted Average Cost of Capital

Weighted Average Cost of Capital
(used to calculate the opportunity cost of capital)



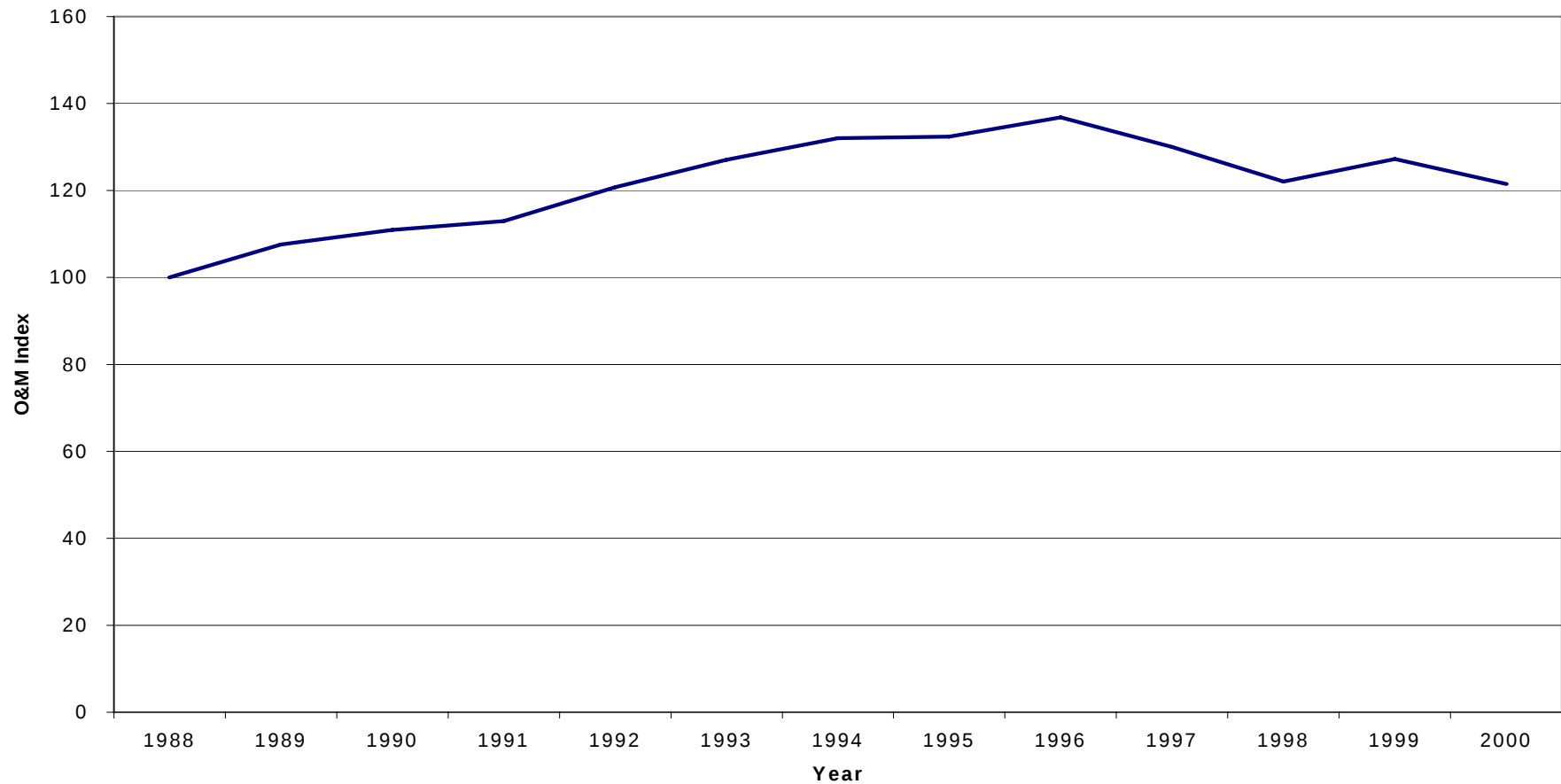
Capital Sub-Index

Total Chain-weighted Capital Index (Base Year 1988 = 100)



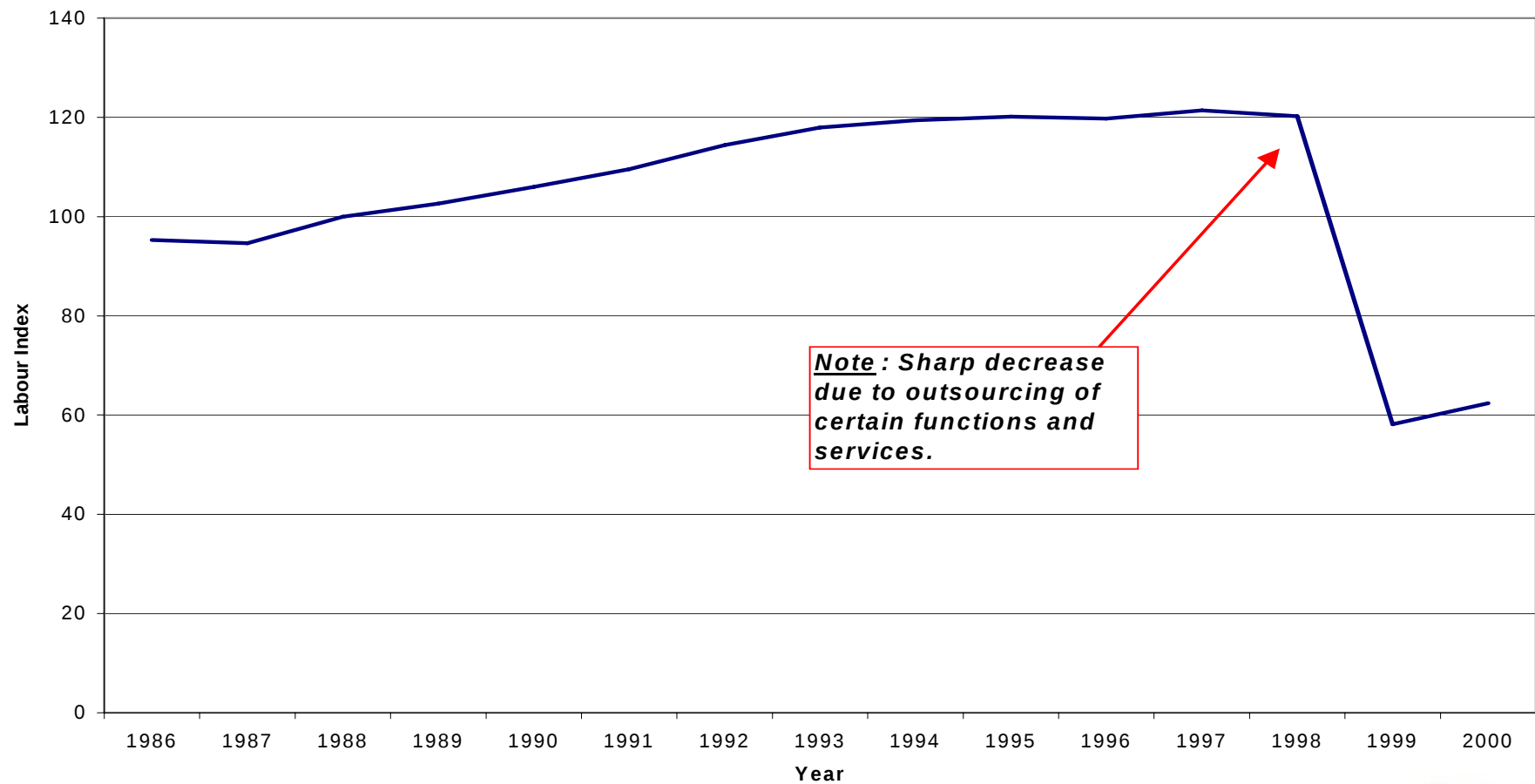
Total O&M Sub-Index

Total O&M Index (Base Year 1988 = 100)



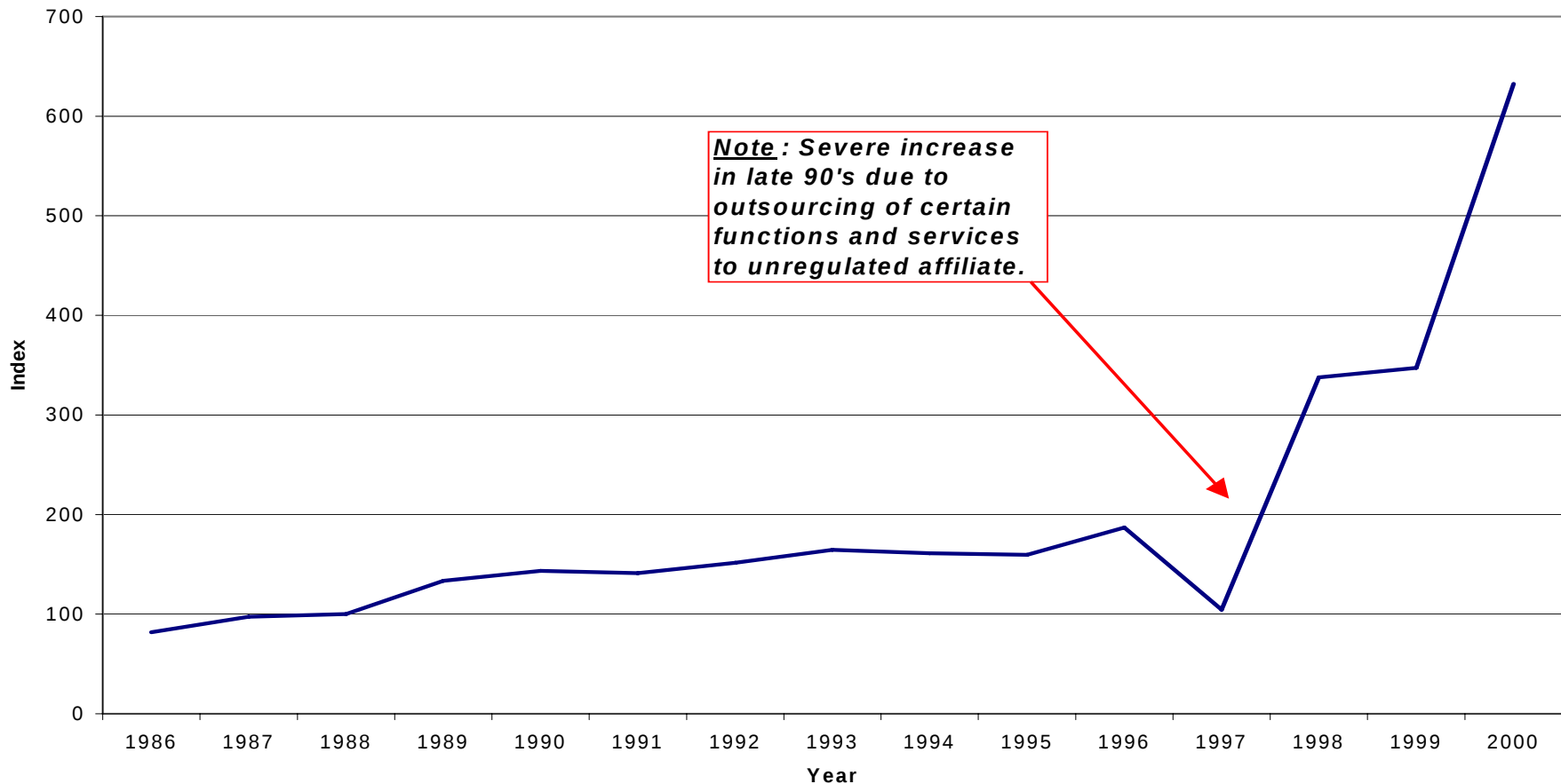
Labour Sub-Index

Labour Index (Base Year 1988 = 100)



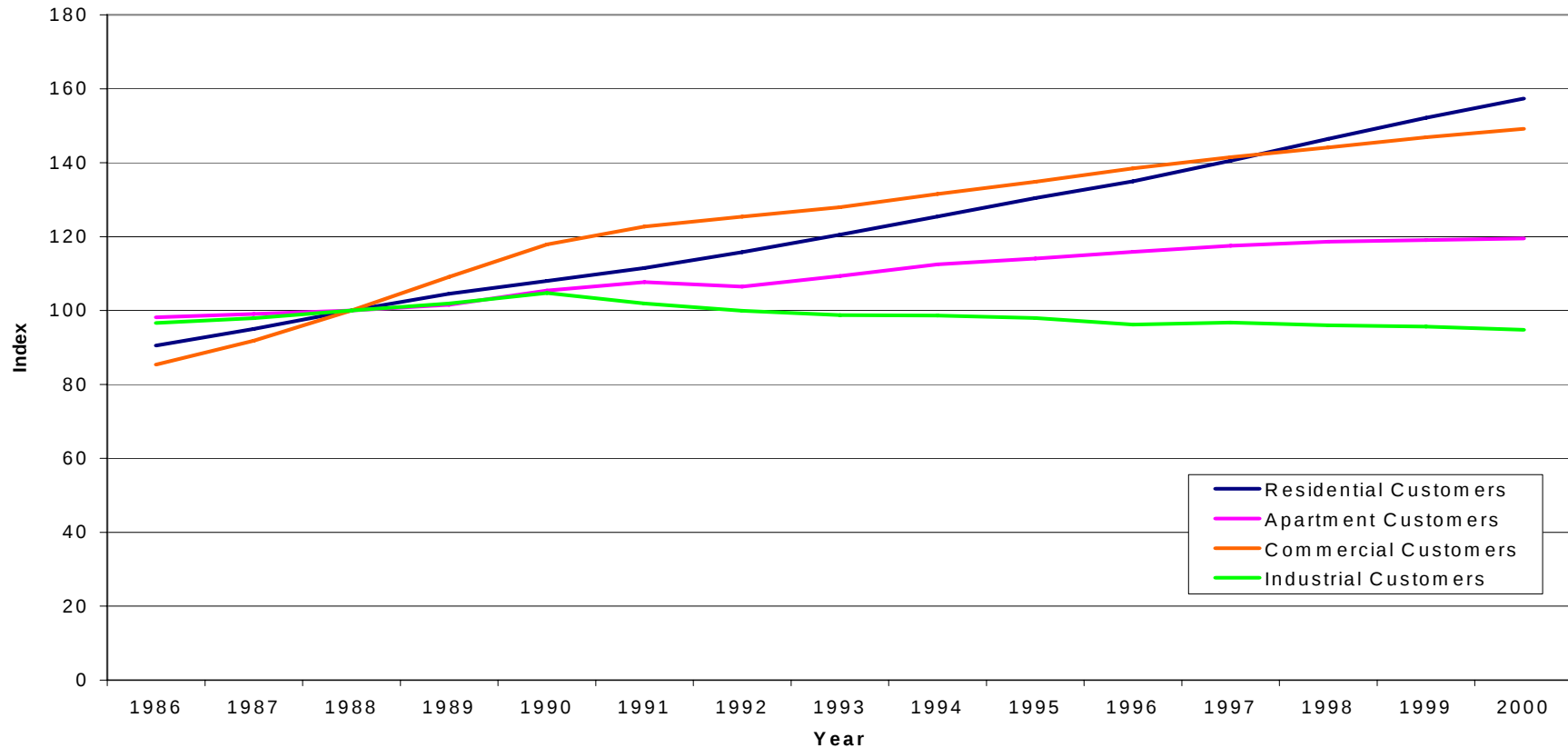
Material Costs Sub-Index

Material Cost Index (Base Year 1988 = 100)



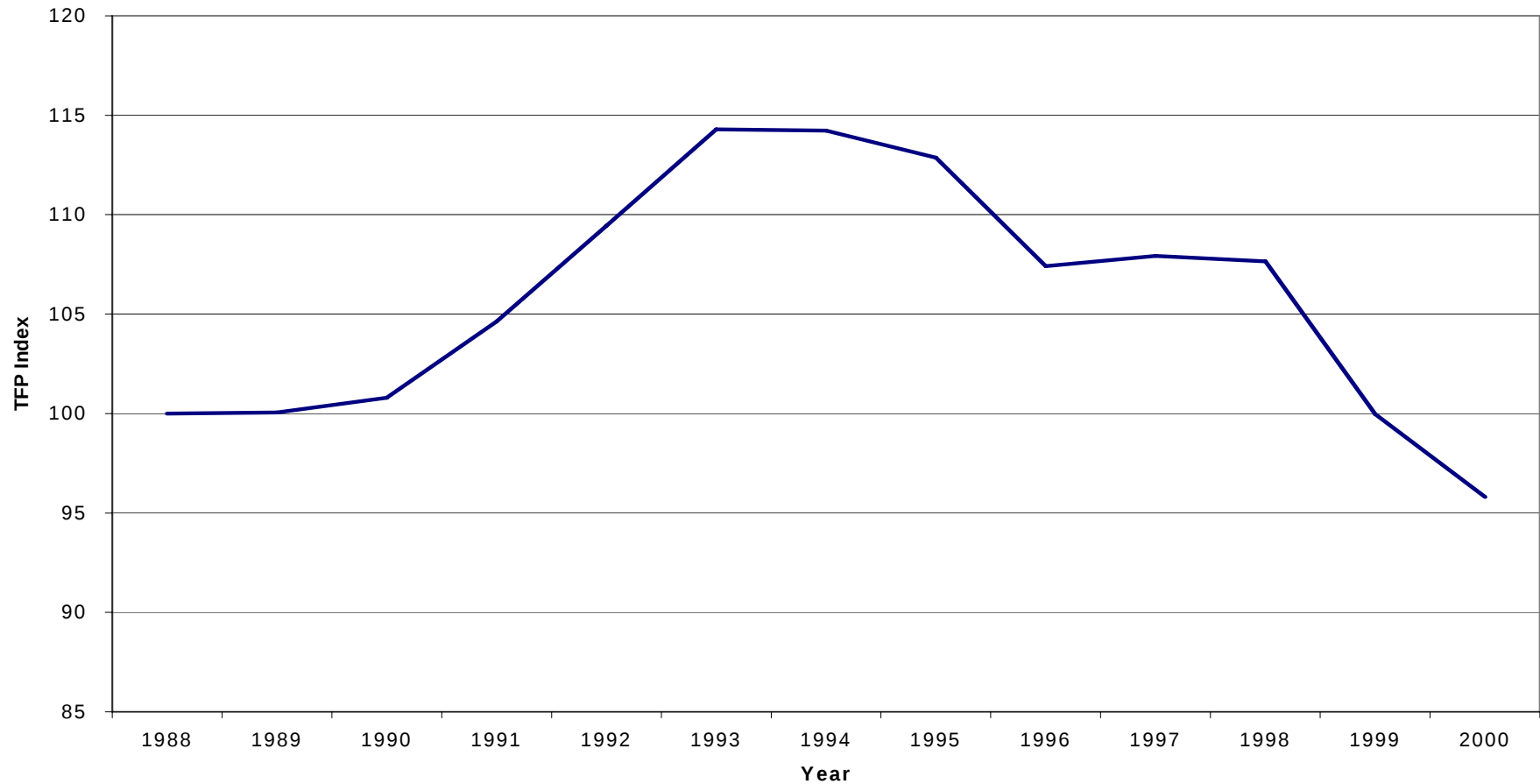
Customer Growth by Sector

Customer Growth Index by Type



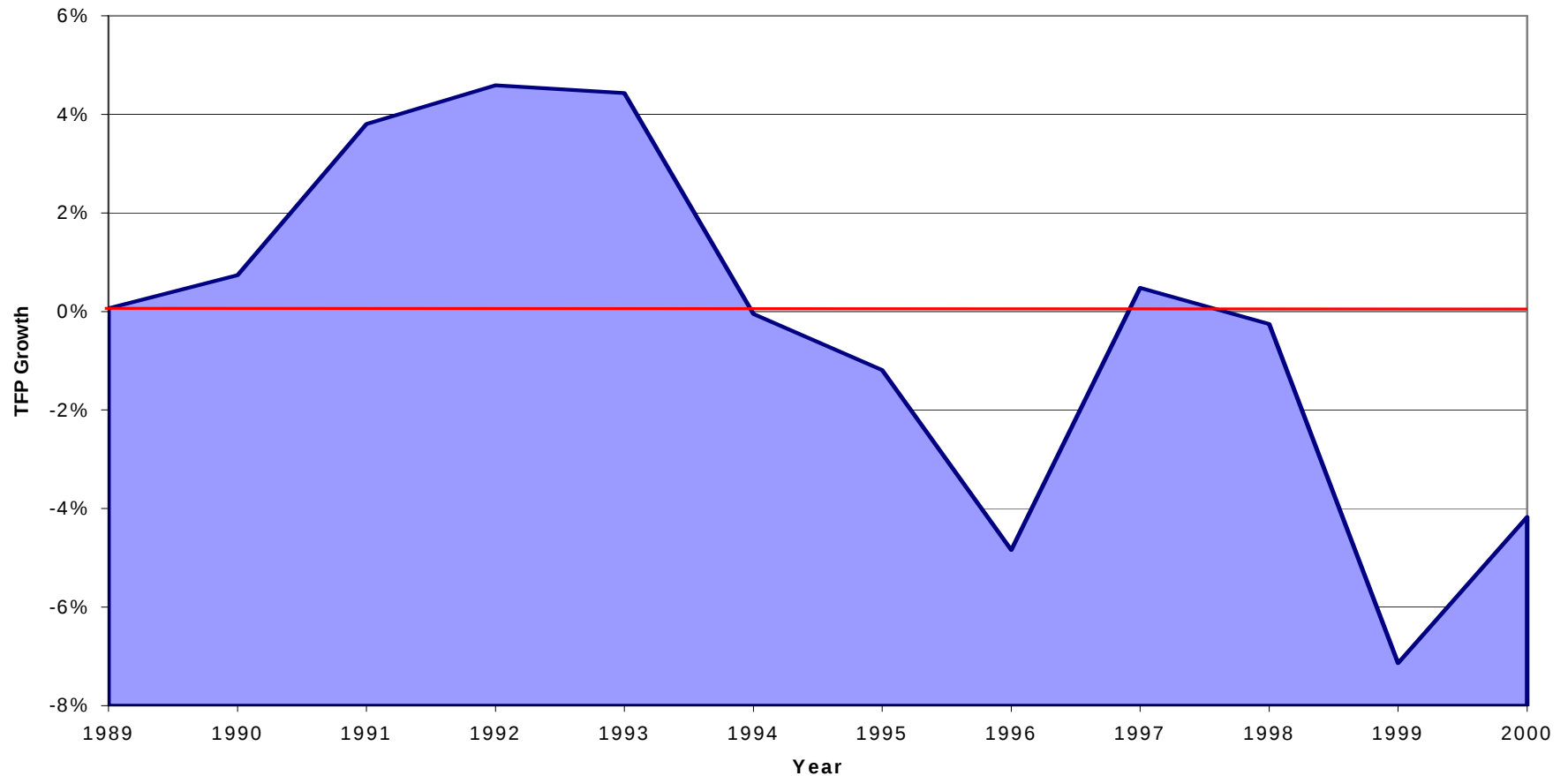
Total Factor Productivity Index

Total Factor Productivity (Base Year 1988 = 100)



Total Factor Productivity Growth

Total Factor Productivity Growth (year-on-year)



TFP Index Results

- ▣ O&M Productivity growth averaged 2.6% per year ('90-'00)
- ▣ TFP growth negative for last 3 years of data
- ▣ TFP growth averaged -0.33% over the period 1990 – 2000
- ▣ TFP growth ranged from a low of -7.14% in 1999 to a high of $+4.59\%$ in 1992

Analysis of Results

- ❑ Time period for analysis
 - ❑ Note growth in TFP in early 90's
 - ❑ Strong decline in TFP in last two years
 - ❑ Could reflect organizational change, or could reflect break in data series
- ❑ Causes of results
 - ❑ Negative growth clearly a result of rapid increase in capital series
 - ❑ For constant capital series, total capital input index would fall because WACC fell
 - ❑ Negative growth implies very fast capital growth in period
 - ❑ Does that mean capital deceleration is possible in coming years?

TFP Index Estimates in Other Jurisdictions

- ❑ Union Gas: -0.4%
- ❑ Boston Gas: -0.4% (base productivity component)
 - ❑ Base productivity factor increased by regulator to 0%
 - ❑ Result accepted by other gas distribution utilities in New England
- ❑ Electricity distribution utilities: +0.2 to +1.0% (base productivity component)
 - ❑ Convergence between electricity and gas distribution utility activity (especially if wires are underground)
- ❑ Comparative range for base productivity: -0.5% to +0.5%
- ❑ Enbridge current results are in that range

Conclusions

- In jurisdictions using (RPI-X) price caps, an X-factor, or productivity offset to an external inflation index (such as CPI) is normally calculated as follows:

$$X = (TFP_i - TFP_c) - (IP_i - IP_c) + \text{stretch factor},$$

where

X = Productivity Offset

TFP_i = Total factor productivity for Industry (or firm)

TFP_c = Total factor productivity for Country

IP_i = Input Price Growth for Industry (or firm)

IP_c = Input Price Growth for Country

This approach allows a valid comparison of historical differences in productivity and input prices between a firm or an industry and the general economy.

Conclusions *(continued)*

- ❑ In this case, attempts to construct a valid TFP index for Enbridge contain unexplained results and variances.
- ❑ Development of a broader Ontario gas distribution industry index was not attempted due to the lack of relevant data.
- ❑ Development of an index for the general Canadian economy, or an index representing the growth of input price factors for the general economy, was also not attempted.
- ❑ Therefore, any productivity offset cannot rely on the traditional approach used in other price caps.

Conclusions *(continued)*

- ❑ The results raise questions, but do seem reasonable
 - ❑ Declines in TFP relate to faster capital growth than output growth
 - ❑ TFP declines despite falling WACC, which is the cost factor applied to the capital input
- ❑ TFP only measures growth and does not provide any reasoning; further analysis should be performed to find reasoning behind growth data
- ❑ TFP does not take safety upgrades or quality of service improvements into account

These results are a reasonable estimate of TFP for Enbridge, given the data limitations

Consultant Bios

▣ Mitch Rothman, Principal

- ▣ Mr. Rothman is a Principal in Navigant Consulting's Toronto office. He has been active in the energy industry for over 20 years, in Canada and internationally. Mr. Rothman has managed or participated in several projects related to regulatory issues, including cost of capital considerations and the role of regulation in market design. Mr. Rothman helped advise the Ontario Energy Board in its development of the initial PBR regime for electricity distribution utilities. A former Chief Economist of Ontario Hydro, Mr. Rothman has also taught statistics and quantitative methods at York University. Mr. Rothman has a BA in Economics from Harvard University and an MS in Industrial Administration (Economics) from Carnegie-Mellon University, where he has also completed the course work for a doctorate.

▣ Jack Winter, Principal

- ▣ Mr. Winter is a Principal Consultant with Navigant Consulting Inc. and has over 27 years of utility management, operations, and consulting experience. He has a strong background in electric and gas distribution management and operations, as well as a financial and planning background. Mr. Winter has extensive experience in developing, supporting, and defending innovative regulatory practices, including performance-based regulation in a number of U.S. and Canadian jurisdictions, and has delivered expert testimony before the Public Utility Commission of Ohio, the Ohio Powerplant Siting Commission, and the Ontario Energy Board, and has developed and supported testimony in various other jurisdictions.

▣ Brian Loy, Associate

- ▣ Mr. Loy is an Associate in Navigant Consulting's Toronto office. He has a strong background in forecasting and quantitative analysis, having previously worked with a leading energy marketing and trading company. Mr. Loy holds a BSc (Honours) in Industrial Engineering, specializing in Operations Research, from the University of Toronto.

26 January 2007

Rick Campbell
Enbridge Gas Distribution
North York, ON
Canada M2J 1P8

Hi Rick,

Thanks for your e mail message of Friday 26 January in which you sent requested data concerning Enbridge taxes and benefits.¹ In this letter I would like to memorialize some of your answers to the questions that we discussed in our conference call last week, pose additional questions, and make a few some comments. **My rendition of your answers appear in a red font.** **My further responses appear in green.** **For our convenience, please insert your answers in this text in a different color.**

Data for TFP Calculations

I have reviewed the data that you have sent thus far and find that there are some data that we have still not received. Some of these are essential to the accuracy of our study.

1. **Salaries and wages corresponding to net utility O&M (corresponding pension & benefit expenses also desired if readily available).** **We just don't have this. We don't do this breakout.** I have perused the three productivity studies that you sent and find that, in all three studies, the cost of "materials" was computed as a residual: O&M expenses – total labour expenses.² This residual was then computed into a materials quantity index using a formula like $C^{\text{Materials}}/\text{CPI}$. Do you mean to say that in all three cases they were using *total* labour expenses and not just the portion attributable to net O&M? If so, that means that these indexes and the resultant productivity indexes were miscalculated in all three Enbridge productivity filings.

You will recall that I did some O&M benchmarking work for Enbridge several years ago. In that work, I was provided with what I believed to be estimates of O&M salaries and

¹ This message seems to have been sent only to my home computer. Please remember to send correspondence to my office address: mnlowry@earthlink.net.

² Fuss, for example, states in his 1998 response to an interrogatory that "the materials index...is derived from subtracting total labour costs from utility O&M, deflating by the Ontario CPI to put into real terms." He goes on to say that the weights for the labour and materials subindexes in his input quantity index are "based on their relative shares of total O&M costs." Kerry Lakatos Hayward states on p. 4 of her 2002 report that "materials cost is calculated as a residual after removing labour cost from total [which, in her case, meant *net*] O&M cost." Darryl Seal states on p. 8 of his 2006 Gazifere report that "Materials [expenses] ... are estimated as the difference between total O&M costs and the labour component".

wages. I believe that these estimates were provided by Sagar Kancharla. Here is a comparison of these estimates to the numbers you have sent.

	S&W net	S&W Gross [Provided 07]	Net/Gross
2000	60.5	105.3	.57
2001	62.4	102.9	.61
2002	54.5	79.0	.69
2003	68.5 (Est)	109.8	.55

Are these ratios of net to gross “in the ballpark?” They seem low to me.

Since at least three of the numbers needed are already calculated and, additionally, Union has provided these itemizations, can I prevail upon you to provide the itemizations for 2003 (final), 2004, and 2005? If not, how might we use the available net/gross ratios to estimate the O&M salaries and wages. Please also comment further on how did the capitalization of labour expenses changed 2002-2005?

In reviewing my files from our previous work for Enbridge I also discovered that the net O&M expenses that I was initially give for 99-02 were *net* of other revenues, whereas the figures for 2003 were *gross* of other revenues. I was given the following data (in CD 1,000) on other revenues to rectify this situation.

2000	7,028
2001	7,471
2002	8,060

Am I right that this was a problem? Since the O&M numbers are the same for 2002 and 2003 as those that I previously worked with, is it reasonable to conclude that the numbers you have provided contain this same problem? If so, should we then make this adjustment for 2000-2002, as we did in our 04 benchmarking testimony? P.S. If it is easy to provide the rest of the other revenues data, I would appreciate it.

2. 2000 revenue and output data This came out of the “QRAM” adjustment. Would take two full days of an analyst’s time to get the analogous 2000 number. Please go ahead with this ASAP. Please note also that the numbers you have provided for 2004 are the same as 2003. This needs to be rectified.

Regarding the revenue and output data, you mentioned that the data series you recently sent might not be available for the year 2000. This would shorten a sample period that is already short. Accordingly, I am wondering what output time series might be available for the full 2000-2005 sample period. For example, you have provided me with revenue share data for the 2001-2005 period that appear to cover most base rate revenues. These shares are fairly stable. Could we get the corresponding aggregate customer, volume, and maximum demand data back to 2000? See above.

The Table with the detailed revenue and output data has no heading. What exactly are these data? Actuals, forecasts, weather normalized? Fiscal year or calendar year?

Answer is important. You have also sent tables for the 2000-2006 period entitled “Revenue Data – Revenue Corresponding to Each Rate Element by Rate Class. The “Distribution” revenue totals from this table differ modestly from those in table with rate class detail. Please explain. In December, you provided me with a Table entitled “Historical Forecast Level of Total Distribution Revenue Recovery”. The revenue shares for billing determinants that are computed from this table differ a little from the shares that I was able to compute from the new table. The shares differ particularly (if only modestly) in the later years. Please provide a brief, high level explanation for this discrepancy. Which revenue shares are the most reliable? Will respond. By the way, these data sent indicate no change in revenue or output in 2004 – an obvious mistake. Can this be rectified ASAP?

3. Employee head count corresponding to total labour expenses. This was part of the Jan. 5 package. I did not receive that package We will send it again. How accurate is the headcount? No breakout for part time employees. Does it include part time employees? Please characterize your use of part time employees. Not many part time employees generally. A lot of them are summer students. A lot of temps in the IT area. Not sure how part timers are treated for purposes of this calculation. Will check into this and get back. I am not able to reconcile these with the numbers in the 2002 Lakatos study. She reports the following for 2000:

	Lakatos 2002	07 Submission
Supervisory:	922	NA
Weekly:	877	NA
Part Time:	47.5	NA
Total	1,846.5	1,570

Can you please provide an explanation for the discrepancy?

4. Taxes (please explain how calculated). We weren’t sure what you wanted here. Will send with a clear explanation.
5. % of gross OM&A expenses capitalized Before TPBR we capitalized a normal amount. Capitalization surged during TPBR (2000-2002) and has subsequently tended to stay at the higher level. Spinning off the water heater business also caused the capitalization percentage to rise. Why?
6. DSM data by rate class (not essential; high level characterization may suffice). Exact breakout unavailable. Will, however, send a high level characterization of the allocation.
7. You sent some data for the 2003-2006 period on trends in some variables labeled “labourers”, “operators”, and “welders/fitters”. What are these data? We can’t tell absent headings.
8. We would also like to have plant value data analogous to those you have already sent for earlier years if possible. In your January 17 response you stated that “We’ve provided

plant data to 1996. In addition, you have the TFP study 1989 to 2000”. Unless a document has slipped through my fingers, though, I haven’t seen any plant value data back to 1989, just a Navigant power point presentation on the study.³ Are the data available? If so, please provide them. More generally, can you provide all of the data from this study? Details of the Lakatos study were provided in the January 5 package. We will send these again. Please check to see if these are in order and get back to us ASAP. I have examined these data and find that they are inadequate to run the series that we need back in time. One problem is the lack of data on storage plant additions. Another is the lack of net plant value data for the benchmark year. Since, additionally, Union is providing the requisite data, can you please provide these? What we need are only gross plant additions plus the net plant value in the benchmark year.

The accuracy of the TFP study will be quite sensitive to our estimate of the replacement cost of the company’s plant in that year. This is especially true if 1996 is the benchmark year. Accuracy would be enhanced if we had several decades of data on the trend in the number of customers that the company served. Is that available with a reasonable expenditure of effort? Might have this but would take some time. As for the high level story, natural Gas came into Toronto in 1954 from the Tennessee system via Buffalo. Fancy new accounting started in 1955 as COSR commenced in earnest. Other Ontario towns had manufactured gas. TransCanada brought natural gas to Ottawa and Montreal in 1957, originally from Buffalo. System linked to Alberta in 1958. Thus, Enbridge customer growth was rapid after 1954. What I need more than anything then is the number of customers that Consumers served in 1953, just before natural gas arrived. A rough estimate would do e.g. 10% of today’s customer totals?

In the plant value data, there is a general plant category entitled “SIM” but no software category. Please explain.

In the year 2000, certain A&G services were transferred to Enbridge Inc. Was an appreciable amount of general plant transferred at that time?

Other Topics

1. The data you have sent us apparently pertain to a fiscal year (2000-2004) and to a calendar year in 2005. Are fiscal year data for 2005 readily available? If so, I may ask you to provide this. We have changed to calendar year reporting. Don’t have the fiscal year data. In any event. Data for 2004 and 2005 both pertain to 12 month periods in any event. When did the fiscal year begin?
2. Regarding the availability of data for years prior to 2000, I am still unclear why you cannot present them the way Union Gas did in the Christensen study with the costs of appliance programs etc. included but corresponding output data as well. Note that this would not require any *stripping out* of these costs, just adding measures of the corresponding output. This would take a lot of work (2 man weeks) but not impossible. There were breakouts of these costs for rate cases. Could get for 10 years. Had a rental program (the biggest), a service program, heating insurance (most profitable), and a sales program. In her 2002 report Lakatos states (p. 3) that “in

³ In this regard, I might note that I never received any info on January 5 but you make references to a communication on that date.

measuring inputs, all historical costs associated with ancillary activities (*i.e.* rentals, appliance stores) has been removed as they are not part of the distribution business currently under consideration for incentive regulation”. Her working papers include an O&M time series dating back to 1985 that does not exhibit a sharp drop in 1999. During my work for Enbridge, I received a time series dating back to 1993. These two data sources are pretty much in agreement with the numbers you have provided on net O&M expenses in 2000 (about \$ 230 million). So, isn’t the Lakatos series a decent approximation of what I need?

3. Staff proposes in its recent report that the capital cost (at least) of extensions to new communities that require explicit Board leave to construct be exempted from indexing. Please provide a succinct discussion of the nature of these extensions in the case of Enbridge. Are they required, for example, every time a new township is served, even if it is on the periphery of Ottawa or Toronto? Or is it a matter only of communities that are quite far from the current system? Leave to construct process was intended for bigger system extensions. A big goal was to facilitate land purchases and address environmental concerns. The process has included extensions to power generators as well as to new communities. Power generation spurs can be costly. They can strain existing capacity. Please identify the communities that were subject to such proceedings during the sample period. Extensions to new communities are rare and constitute a “miniscule portion of the total”. How it happens: As the GTA grows, towns at some distance from the area become more economical to connect. *e.g.* Cremore, which is up by Barrie. You state in your January 17 response that “over the period 2000 to 2006 the company did not have major leave to constructs on an ongoing basis”. Please explain what you mean by this. See above. Is there any reason to think that there would be more leave to constructs in the future than in the past and, if so, why? Probably not. Come up every once in a while. However, the proposed policy provides a perverse incentive to bundle projects so that they qualify for the passthrough. Might also encourage excessive system expansions. Anyways, the proposed policy doesn’t offer the company much benefit. Would prefer Y factoring of all customers or help with cast iron or extensions to generators. Is it possible for you to itemize the plant additions corresponding to leaves to construct for the sample period? If so, how long would it take to do this? Please answer these questions.
4. With regard to your submission regarding the “proportion of [base rate] revenue from various” charges, does the volumetric share reflect revenues from a lot of inframarginal rate blocks that act more like customer charges? Please answer this question.
5. In your January 17 letter, you provided “Actual degree days” and “Budget degree days” for the 2000-2005 period. Please explain these data. Are they consistent with the fiscal year/calendar year transition in the cost data? With regard to the companion “Norm Vol” variable, can you explain what volumes these correspond to (it seems to be total throughput) and briefly explain the methodology for weather normalization? Do the numbers for 2005 reflect a calendar year? Still working on a fiscal year. Will check into this and get back. This is important.
6. You have provided some time series concerning escalation in the prices of certain inputs in Ontario. Have you done any work to aggregate (*i.e.* summarize) these? For example, have you calculated summary indexes pertaining to overall construction costs or non-labour OM&A expenses? Do you have any thoughts concerning the

weights for such summary indexes? Don't think that we have. We gathered these data to use in our discussions with contractors. Will check into this and get back. This is important.

7. Please provide some supplemental but succinct commentary concerning the construction contracts that must be renewed.
8. Enbridge has an understandable incentive to emphasize rising cost pressures in a PBR proceeding. Please discuss the three biggest ways in which cost pressures are expected to attenuate in the next six years. No. Can't think of a one!
9. You have not responded to the December 5 question concerning the restructuring of the gas supply business. My basic question is: did this cause you to do any more or less customer care work during the sample period? What does the future hold? Had a surge in customer care costs during the spinoff of water heaters. In 2002 we started showing gas cost as a separate line on the bill. That caused a surge in inquiries. Who provides customer care services to customers that purchase gas from third parties?
10. Please discuss how the outsourcing of your customer services affected your capital accounts. With regard to the water heater program, we got rid of a lot of vehicles, and some warehousing and real estate. The computer system was moved to ESI and the cost of it then turned up in other O&M expenses. However, some of this system had already been fully expensed and was no longer on the books. Also, a big chunk was in CWIP at the time of restructuring and never hit the rate base. [Reported distribution CWIP includes only the "gassed up" portion of new plant]. So it never showed up in gross plant additions?
11. Please provide a brief description of your original customer care contract. As previously requested, what's new with the outsourced customer service arrangement? For example, did the original contract expire? How have the successor arrangements differ from those under the contract? What does the future hold? Contract is being renegotiated now. An RFP is out for tender. Service could in the future be provided by Accenture or a new vendor. Is there no chance that you will suspend outsourcing and do the work yourselves? A new CIS system is needed and will likely will be owned by EGD.
12. The data you have provided on the number of customers served suggests customer growth of more than 3% annually. The growth in Gasifere's customer base is around 5% over the same period. Is that right? What is the cause of this brisk growth growth? How much of this is due to growth in Toronto and Ottawa and how much to the extension of service to newer communities? Toronto and Ottawa are the chief drivers. Ottawa growing at least as fast as Toronto: "Silicon Valley North". Metro area of Ottawa around 700,000-800,000.
13. The Navigant presentation suggests that the company's capital stock started growing in 1995 after years of stability despite a fairly stable pace of customer growth. This resulted in a fairly substantial productivity decline. Please provide a high level explanation. Don't recall. A certain amount of spare capacity sometimes exists on the mains. Then, a costly upgrade is needed. Also, big stations like Parkway must occasionally be rebuilt. Any further thoughts?

Concluding Remarks

Thanks in advance for your prompt attention to these questions. I look forward to your responses.

Sincerely,

Mark Newton Lowry, PhD
Partner

ECG Productivity Growth 1989-2000			
Year	O &M Productivity	Capital Productivity	Total Factor Productivity
1990	0.53%	0.87%	0.74%
1991	1.42%	5.52%	3.80%
1992	-3.07%	10.84%	4.59%
1993	-1.27%	9.34%	4.43%
1994	0.04%	-0.12%	-0.05%
1995	3.47%	-4.84%	-1.19%
1996	0.04%	-8.11%	-4.84%
1997	9.37%	-4.02%	0.48%
1998	10.73%	-4.69%	-0.25%
1999	-0.57%	-9.53%	-7.14%
2000	8.09%	-7.87%	-4.17%
Average	2.61%	-1.15%	-0.33%

Isabel Table sent to Rick Campbell- May 15, 2002

**HISTORICAL TOTAL FACTOR PRODUCTIVITY AND INFLATION
ANALYSIS FOR ENBRIDGE CONSUMERS GAS**

KERRY LAKATOS-HAYWARD
ISABEL LOUIS
VOLUMETRIC & MARKET ANALYSIS
ENBRIDGE CONSUMERS GAS

MARCH 2002

Total Factor Productivity

A Note on Methodology, Assumptions and Results

Total Factor Productivity attempts to estimate a firm's operating efficiency over a fixed interval of time. As opposed to traditional financial measures, productivity strives to eliminate dollar impacts to isolate the firm's ability to transform inputs (labour, materials and capital) into output (goods or services). Therefore, whenever possible, productivity studies are based on unit information as opposed to dollars. If unavailable, financial information is used, with dollar or inflation impacts removed through the use of published price indices.

Measuring productivity requires quantification of inputs and outputs, with the difference their growth rates representing productivity. Typically, inputs are comprised of three components: labour, capital and other, often referred to as materials. Materials are usually a residual calculation based on total O&M costs less labour costs. In aggregating each category into an overall input index the cost share of each is used. The cost of capital in a particular year is calculated as the product of the real (inflation adjusted) capital stock and the company's cost of capital (in this case the weighted average cost of capital).

Output is measured by the units of goods or services produced by the firm. In this case the **number of customers** is taken as the measure of output. An index was calculated with base year at 1988.

In order to remove the impact of the business cycle, productivity should be measured over a timeframe that incorporates fairly all phases of a business cycle. The productivity estimate presented here is calculated over the ten year period from 1990-2000. This essentially covers a full cycle with the contraction of the early nineties and subsequent economic recovery.

In all cases, the indices are calculated to represent the percent growth in the associated units, or units proxy. All indices have been calculated using the Fischer Chain method of indexing which is a geometric mean of Paasche and Laspeyres quantity indices. Growth rates are calculated in non-log form, due to potential bias of using log growth rates with large shifts in annual indices.

DISCUSSION OF INPUTS USED

Productivity measurement is based on a well-established methodology. However, productivity estimation requires detailed information and some important assumptions on the appropriate information to use. This is especially true for the measurement of Capital input. These assumptions can have a significant impact on the resulting productivity figures. It should be noted that the results here are based on assumptions that could be changed.

Measuring Company Outputs

Gas Delivery

In quantifying the output of the core business of gas delivery there are two options available, both of which have been used in other LDC productivity studies.

1. Volumes

With this method the output index measure is based on total volumes by rate class weighted by the associated revenues (excluding gas costs). This avoids aggregation bias of services with different values (i.e. residential vs industrial) as pointed out by Lowry and Kaufmann (1994). The problem with this measure is that weather can play a dominant role in the resulting output (and therefore productivity) metric. Further complicating the issue is the fact that costs are not as much driven by volumes as by customers. Finally, even if volumes are weather normalized, declining average uses (use per customer) may be a significant factor in the analysis.

2. Customers

Number of customers is an alternative output measure. This measure of output will not be affected by yearly weather and should be more closely related with costs (although weather also affects costs to a certain degree). Recent studies in other jurisdictions (e.g. B.C. Gas) have begun to prefer this methodology for a couple of reasons. The first is its closer relationship to costs. For capital especially (and labour and materials to a lesser extent) the predominant cost-driver is the addition of customers to the system. Additionally, the entire concept of natural monopoly is based on the fact that the marginal cost of volumes or throughput is close to zero. The second stems from energy efficiency and declining 'average use'. As energy efficiency improves, demand falls, which drives down consumption. The effect is that an output measure (and therefore productivity measure as well) based on volumes is biased downwards by declining average use.

For these reasons, total number of customers is the preferred measure of output for this analysis. One potential problem with using customers is if the mix of customer type (e.g. residential or industrial) has changed over the period productivity is being measured. As costs are different for different customer classes, such a shift would effect the estimation. In the case of ECG, the share of residential customers has been rising. Although distribution margin per m3 is highest for this rate class, declining average uses decrease the annual margin potential/customer compared with other customer classes. **As a result, we have defined output using total number of customers. The output index is calculated as growth in customers in relation to 1988.**

Measuring Inputs

In measuring inputs, all historical costs associated with ancillary activities (i.e., rentals, appliance stores) have been removed as they are not part of the distribution business currently under consideration for incentive regulation.

A decision was made to remove expenses related to DSM activities as the output would

not recognize SSM revenues. Certainly, DSM is considered part of the distribution business and inclusion of their costs would increase overall costs to the utility.

Labour

Labour input is measured in units by the number of employees in the organization. A more detailed measure would be hours worked, in order to account for overtime (i.e. extra input) during a particularly busy time, but unfortunately detailed information such as this is not available. The company reports the number of full-time positions in the organization split into supervisory and weekly categories. The final category is part-time workers. In order to include part-time workers in the labour input they must be converted into **full-time equivalents**. Full-time equivalents are calculated by dividing total wages for part-time workers by a representative annual wage (Range 8 Clerical). The resulting total represents the number of full-time equivalent, part-time positions. This total is included with the full-time weekly position count. The labour index is a weighted average of supervisory and weekly employee positions with the respective wage totals for each category being the weights.

Materials

Materials cost is calculated as a residual after removing labour cost from total O & M cost. Given the wide range of inputs in materials component, unit data is impossible to collect. The materials measure is calculated as total operations and maintenance expenses (after excluding ancillary costs) less wages, salaries and benefits i.e. those expenses associated with the labour input in non ancillary operations. The unit measure for materials is proxied by deflating this non-labour O&M by the Ontario CPI. This methodology is common to other studies.

As mentioned earlier, ancillary inputs are excluded as per the yearly totals provided in Rob Bourke's initial O&M productivity analysis. These costs are removed from the Materials total although some may be associated with Labour. However, in aggregating total inputs the impact of this will be limited to the degree that wage changes for the labour component are different from that of the Ontario CPI. In all cases DSM costs are also removed.

Capital:

Capital input is the most difficult to measure in the productivity study. In order to properly measure capital input we must first convert the book values in the capital accounts into market values. This requires an adjustment for inflation so that all capital vintages are measured on equal terms. Using information from the Company's latest depreciation study we have vintage information for each capital type back to 1955. These types are based on the company's capital account groupings (see the end of report).

Assumptions:

1. Investments in a particular asset from different years are perfect substitutes for each other. This assumption leads to our using Perpetual Inventory Method for measuring capital items of different vintages, after appropriately depreciating them.
2. Neoclassical assumption of equating the marginal cost of capital to the marginal product is used in our calculation of cost of capital.
3. Price deflators used are assumed to reflect the value of the bundle of the productive characteristics of the assets. In other words, the price indices ensure “constant quality” of capital assets of different vintages.

Base year Values: The year 1985 is taken as the base year and balances of the accounts that are available only in dollar terms were taken from EBRO 414.

Step1: Their subsequent values are calculated using yearly additions and retirements using the formula:

$$\text{Balance}_t = \text{Balance}_{t-1} + \text{Additions}_t - \text{Retirements}_t$$

For items, 473, 475, and 478 for which annual additions were available in physical units, the base year values were calculated as the cumulative balance since 1955, using number of units added and units retired annually. (the latter was derived by dividing the retirement balances by the average price per unit of that year's additions)

Step 2: Calculation of Depreciation:

For capital measurement, depreciation should represent the decline in productive efficiency of the corresponding asset otherwise known as economic depreciation. In some cases this may differ from the accounting depreciation rate. However, the calculated accounting depreciation rates are taken as adequate estimation of economic depreciation.

For every individual capital item, the initial balance for the year (i.e. closing balance of last year) was depreciated with full depreciation rate provided by the Capital Accounting System, and the additions and retirements of the current year were depreciated at half the rate, using the formula:

$$\text{Depreciation}_t = \text{Balance}_{t-1} * d + (\text{additions}_{t-1} - \text{Retirements}_t) * d/2$$

where d is the depreciation rate.

Hence the post depreciation balance is = $\text{Balance}_t - \text{Depreciation}_t$
thus conforming to the Perpetual Inventory Model formula.

Step 3: Balances in **real value**:

For every capital item, the post-depreciation balance was divided by the appropriate price index to arrive at their real values. Table I at the end lists the price indices used.

Cost of Capital Calculations

Calculating the cost of capital is required to determine weights for each capital asset type. Cost of capital is also an important determinant in the final inflation analysis. Total cost of capital is defined as total taxes + opportunity cost of capital + depreciation expense.

Step 4: Tax Calculations:

Taxes are split into two components-Property tax and other taxes. Property tax is applied only for two capital items, 472 and 482 (Land, structures & Improvements, Structures and Improvements) while other taxes are applied for all capital items. Taxes are apportioned on the basis of shares on average un-depreciated balances. Therefore average book values of balances (before depreciation) were calculated for every capital item, summed up and percentage shares were calculated for individual items. The taxes were then apportioned based on these shares.

Step 5: Opportunity Cost of Capital:

This measures the earning power of the capital invested if used in alternative investments. Opportunity cost is measured as the product of average book value (less average depreciation) and the weighted average cost of capital.

Step 6: Total Cost of Capital:

Sum of depreciation, taxes and opportunity cost for every capital item is calculated for the total cost of capital. Cost share of each capital item is also calculated for aggregating the capital input as described in Step 7 below.

Step 7: Capital Input Index:

The capital accounts are aggregated into an overall capital index based on their shares in total cost of capital. The real value balances (post-depreciation) from Step 3 and cost shares from Step 6 are utilized to calculate Capital Input Index using **Chain-weighted Fisher's Ideal Indexing** method. The formula used is:

$$\sqrt{\left[\frac{(\sum RealBalance(t) * Share(t-1)) / (\sum RealBalance(t-1) * Share(t-1))}{(\sum RealBalance(t) * Share(t)) / (\sum RealBalance(t-1) * Share(t))} \right]}$$

Note: $\sum$ is carried out on all capital items.

Step 8: O&M Productivity Estimation

This productivity estimate includes only two of the three factors of production, labour and materials. As such it reflects an estimate of productivity related to the company's O&M expenses. To calculate O&M productivity, total real O&M costs are converted into an index with 1988=100). Productivity is then calculated as the difference in growth rates between output (increase in the number of customers) and growth rate in inputs (O&M costs). ¹

¹ Note: that outsourcing has been a major trend in ECG as well as other utilities, leading to the substitution of one input factor for another. The magnitude of the substitutions

The company has improved its operating efficiency (with respect to O&M expenses) on average by 2.6% per year over the eleven year period 1990-2000. The easiest way to interpret this estimate is to say that the company's output has risen by 2.6% per year while labour and material inputs have stayed constant.²

Step 8: Estimating Total Factor Productivity

In order to estimate Total Factor Productivity we require an overall input index comprising all of the factors of production: O&M and capital. The individual indices for each factor are again aggregated based on their respective shares in the total cost of production. As in the case of capital aggregation, Here too we use chain-weighted Fisher's Ideal Indexing method to add the three inputs.

Similar to O&M productivity estimates, Total Factor Productivity is measured as the ratio of Total Output and Total Input indices. The change in this represents productivity growth/loss.

Company's average total factor productivity is a marginally negative number –0.33%, mainly because of huge infusion of capital since 1996. Such low TFP can be attributed to the capital intensive nature of gas distribution business.

Inflation Analysis

Company-specific inflation is defined as the growth in total nominal costs (O&M costs plus capital costs) minus cost pressures associated with growth in output, and also factoring in productivity growth.

$\text{Inflation} = \text{Total Input Costs} - \text{Output Growth} - \text{Productivity}.$

Another way to calculate company inflation is to normalize costs per customer

$\text{Inflation} = \text{cost per customer} - \text{productivity growth}.$

and their potential impact on indices have not been addressed in the literature from a mathematical or technical perspective. As an example, one would expect an equal substitution of material (i.e., \$ in contracting service) for labour services (i.e., \$ wages & benefits) to impact productivity by the same amount. However, this is not the case, as the indexing methodology will overweight the change in the smaller output and underweight the change in the larger output). This is a major source of bias with calculating O&M treating labour and material as separate inputs.

1. Obviously this is not what the company has experienced as both inputs and outputs have risen with the relative difference being 0.77 %.

Over the eleven year period, ECG's inflation has averaged 2.4%. Regression analysis was used to find an economy-wide inflation benchmark that best explained the Company's inflation. A number of well-known and transparent indices were tried including

- Canadian GDP deflator
- Industrial Producer Price Index
- Canadian CPI
- Canadian CPI (excluding the most volatile 8 measures)
- Ontario CPI
- Weighted indices

The best fit was obtained using a constructed index using GDP deflators and Canadian CPI (excluding the 8 most volatile measures). The index was constructed by multiplying GDP deflator by the share of capital costs to total costs and adding it to Canadian core CPI * share of O&M costs to total costs. Over the period in the study, this index increased by 2%. The implicit price differential measures the difference in the Company's inflation experience to the economy-wide experience in order to make adjustments to any price cap formula being proposed. From this analysis, then, **ECG's costs are on average 0.4% higher than the rest of the economy's after taking into account productivity gains.**

TABLE 1: Regression Analysis of Company Analysis to Weighted Index

Dependent Variable: CCUS				
Method: Least Squares				
Date: 03/25/02 Time: 13:21				
Sample(adjusted): 1987 2000				
Included observations: 14 after adjusting endpoints				
Convergence achieved after 11 iterations				
Backcast: 1986				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-63.42061	93.72743	-0.676649	0.5126
INDEX2	4.835704	0.850167	5.687945	0.0001
MA(1)	0.592819	0.258215	2.295832	0.0423
R-squared	0.884323	Mean dependent var	467.1411	
Adjusted R-squared	0.863290	S.D. dependent var	51.73508	
S.E. of regression	19.12866	Akaike info criterion	8.927662	
Sum squared resid	4024.963	Schwarz criterion	9.064603	
Log likelihood	-59.49364	F-statistic	42.04605	
Durbin-Watson stat	2.101716	Prob(F-statistic)	0.000007	
Inverted MA Roots	-			
			-0.59	

Over the eleven year period,

APPENDIX TWO EViews PROGRAM USED³

'ENBRIDGE CONSUMERS GAS TOTAL FACTOR PRODUCTIVITY PROGRAM

,

'MARCH 2002

'PRIMARY AUTHORS: KERRY LAKATOS-HAYWARD, VOLUMETRIC & MARKET ANALYSIS 416 495-5028

,

ISABEL LOUIS, VOLUMETRIC & MARKET ANALYSIS 416 495 5392

'This program calculates TFP for ECG, using Chain Indexing methodology with all indices rebased to 1988

'Part-I

,

" Program to calculate Capital input for TFP study, using DEPRECIATED capital values-but tax on undeprc.balance

'change workfile and read commands to current director

WORKFILE c:\work\tfp a 1985 2000

READ c:\work\input.xls 69

'set price index for accounts without specific prices

genr ip472=gdppi

genr ip482=gdppi

genr ip489=gdppi

'we need to find the year-end values using Perpetual Inventory Model. For this we use the base year nominal value i.e. for 1985 from 'EBRO documents as indicated below

'set initial balance for each capital account for the year 1985. All values except for 482 are taken from EBRO 414. For 482 balance as it appears in capital accounts is taken to avoid negative values in view of substantial retirement during the sample period.

smpl 1985 1985

genr bal472=28600000

genr bal473=324200000

genr bal475=370500000

genr bal477=23700000

genr bal478=61500000

genr bal482=2702081

genr bal483=5200000

genr bal484=1900000

genr bal485=2000000

genr bal486=3400000

genr bal488=2437420

genr bal490=2262580

'genr bal489=0

³ The program requires Eviews to run. This is *Econometric Views for Windows Version 3 or higher* contact Quantitative Micro Software QMS for more details.

```
'set depreciation rates for accounts
smpl 1985 2000
scalar d472=0.017
scalar d473=0.043
scalar d475=0.03
scalar d477=0.044
scalar d478=0.029
scalar d482=0.026
scalar d483=0.044
scalar d484=0.118
scalar d485=0.067
scalar d486=0.053
scalar d488=0.055
scalar d490=0.250
```

'calculate yearly book value balance (applying full depreciation on balances and half depreciation on additions and retirements)
 ' eunit stands for year end nominal values (after depreciation) and runit is its real value (after deflating with the relevant price index)
 'for 482 the balance is taken without depreciation to avoid negative values.

'NOTE {%-} VARIABLE IS A STRING VARIABLE. COMPUTER WILL REPLACE {%-} WITH STATED VALUE TO EVALUATE

```
for %x 472 473 475 477 478 482 483 484 485 486 488 490
  smpl 1986 2000
  genr bal{%x}=bal{%x}(-1)+add{%x}-ret{%x}
next
  smpl 1986 2000
  genr bal482=bal482(-1)+add482
  genr dep482=bal482(-1)*d482
  genr eunit482=bal482-dep482
  genr runit482=eunit482/ip482*100
```

```
for %x 472 473 475 477 478 483 484 485 486 488 490
  genr dep{%x}=bal{%x}(-1)*d{%x}+((add{%x}-ret{%x})*d{%x})/2
  genr eunit{%x}=bal{%x}-dep{%x}
  genr runit{%x}=eunit{%x}/ip{%x}*100
next
```

'Item No.s 473,475,478 are treated differently as data on physical units is available for them
 smpl 1985 1985
 'for meters base year figure is taken from Plant Accounting System multiplied by avg price/meter for 1983-1987
 ' the number of meters as at Sept 1985 as per Plant Accounting Syetem is 853, 741
 genr eunit478= 853741*122.3929

'for mains base years is total meters of mains * avg price/meter of main for 1983-1987
 'the number of mains as at Sept 1985 as per Plant Accounting System is 17,617,610
 genr eunit475= 17617610*38.92458

'for services base year is # of services * avg price/service for 1983-1987
 'the number of services asat Sept 1985 as per Plant Accounting System is 843,383
 genr eunit473=843383*644.991733
 smpl 1985 1985
 for %x 478 475 473

```

    genr bal{%x}=eunit{%x}
    smpl 1986 2000
    genr bal{%x}=bal{%x}*(-1)+add{%x}-ret{%x}
    genr dep{%x}=bal{%x}*(-1)*d{%x}+((add{%x}-ret{%x})*d{%x})/2
    genr eunit{%x}=bal{%x}-dep{%x}
    genr runit{%x}=eunit{%x}/ip{%x}*100
next

'capital units in service in t are an average of beginning and ending values
    smpl 1986 2000
    for %x 472 473 475 477 478 482 483 484 485 486 488 490
    genr aunit{%x}=(bal{%x}+bal{%x}*(-1))/2
    genr adep{%x}=(dep{%x}+dep{%x}*(-1))/2
next

'calculate unit total
    smpl 1986 2000
    genr aunits=aunit472+aunit473+aunit475+aunit477+aunit478+aunit482+aunit483+
aunit484+aunit485+aunit486+aunit488+aunit490

'calculate Cost of Capital for each component

'apportion the taxes to the different accounts on unit share basis, ON UNDEPRECIATED BALANCES

'all property taxes to accounts 472 and 482
    genr ptax472=(aunit472/(aunit472+aunit482))*ptax
    genr ptax482=ptax-ptax472

'income and other non-payroll taxes are allotted on a unit share basis
    for %x 472 473 475 477 478 482 483 484 485 486 488 490
    genr ttax{%x}=(aunit{%x}/aunits) * ttax
next

'for accounts 472 and 482 total tax is ptax+ttax
    smpl 1986 2000
    for %x 472 482
    genr tax{%x}=ptax{%x}+ttax{%x}
next

' rename other accounts for consistency
    for %x 473 475 477 478 483 484 485 486 488 490
    genr tax{%x}=ttax{%x}
next

'calculate opportunity cost of capital and depreciation cost for each account
    smpl 1986 2000
    for %x 472 473 475 477 478 482 483 484 485 486 488 490

'opportunity cost is calculated with average balance less AVERAGE DEPRECIATION
    genr opc{%x}=wacc*(aunit{%x}-adepr{%x})
next

'calculate total cost of capital(ON NOMINAL TERMS) for each account (=tax share+ opportunity cost +
depreciation)
    for %x 472 473 475 477 478 482 483 484 485 486 488 490

```

```

    genr cost{%x}=opc{%x}+dep{%x}+tax{%x}
next

```

```

'calculate total cost of capital

```

```

    genr costcap=cost472+cost473+cost475+cost477+cost478+cost482+cost483+
cost484+cost485+cost486+cost488+cost490

```

```

    genr opc=opc472+opc473+opc475+opc477+opc478+opc482+opc483+
opc484+opc485+opc486+opc488+opc490

```

```

    genr
dep=dep472+dep473+dep475+dep477+dep478+dep482+dep483+dep484+dep485+dep486+dep488+de
p490

```

```

    genr tax=tax472+tax473+tax475+tax477+tax478+tax482+tax483+
tax484+tax485+tax486+tax488+tax490

```

```

'calculate cost shares

```

```

    for %x 472 473 475 477 478 482 483 484 485 486 488 490

```

```

        smpl 1986 2000

```

```

        genr share{%x}=cost{%x}/costcap

```

```

    next

```

'aggregate non log form using Chain Index Method. We calculate the four terms involved in Chain indexing separately: i.e. Sum of (a) share(-1)*runit, (b) share(-1)*runit(-1), (c) share*runit and (d) share*runit(-1). And then we calculate the square root of (a/b)*(c/d): note capital index is calculated using real units

```

smpl 1987 2000

```

```

    genr runits_a=share472(-1)*runit472+share473(-1)*runit473+share475(-1)*runit475+ share477(-
1)*runit477+ share478(-1)*runit478+share482(-1)*runit482+ share483(-1)*runit483+share484(-
1)*runit484+share485(-1)*runit485+ share486(-1)*runit486+share488(-1)*runit488+share490(-1)*runit490

```

```

    genr runits_b=share472(-1)*runit472(-1)+share473(-1)*runit473(-1)+share475(-1)*runit475(-1)+
share477(-1)*runit477(-1)+ share478(-1)*runit478(-1)+share482(-1)*runit482(-1)+ share483(-
1)*runit483(-1)+share484(-1)*runit484(-1)+share485(-1)*runit485(-1)+share486(-1)*runit486(-
1)+share488(-1)*runit488(-1)+share490(-1)*runit490(-1)

```

```

    genr runits_c=share472*runit472+share473*runit473+share475*runit475+
share477*runit477+share478*runit478+share482*runit482+
share483*runit483+share484*runit484+share485*runit485+
share486*runit486+share488*runit488+share490*runit490

```

```

    genr runits_d=share472*runit472(-1)+share473*runit473(-1)+share475*runit475(-1)+
share477*runit477(-1)+ share478*runit478(-1)+share482*runit482(-1)+ share483*runit483(-
1)+share484*runit484(-1)+share485*runit485(-1)+share486*runit486(-1)+share488*runit488(-
1)+share490*runit490(-1)

```

```

    genr runits_r=((runits_a/runits_b)*(runits_c/runits_d))^(1/2)

```

```

smpl 1988 1988

```

```

    genr chaincapindex=100

```

```

smpl 1989 2000

```

```

    genr chaincapindex=chaincapindex(-1)*runits_r

```

```

"*****

```

```

'Part-II

```

```

'calculate O&M component of TFP

```

```

smpl 1986 2000

```

```

smpl 1986 2000
'generate real wages
for %var wagesup wageweek wageben matcost
genr {%var}r={%var}/ontcpi*100
next

smpl 1986 2000

'calculate total index for O&M costs
genr omcostr=wagebenr+matcostr
genr omcost=wageben+matcost

smpl 1988 1988
genr indexin=100
smpl 1989 2000
genr indexin=(omcostr/ombase)*100

smpl 1988 2000
'make O&M productivity calculations
genr omprod=indexout/indexin*100
smpl 1989 2000
genr omprodgrow=(omprod/omprod(-1))-1

"*****
'Part-III
'Combine all inputs of TFP estimation and Productivity Growth

smpl 1987 2000
'calculate total cost of production, using aggregated O &M cost
genr prodcost=costcap+omcost

'calculate shares of capital and o &m
genr scap=costcap/prodcost
genr som=omcost/prodcost

smpl 1987 2000

'aggregate the two inputs using chain index method

genr chginput_a=chaincapindex*scap(-1)+indexin*som(-1)
genr chginput_b=chaincapindex(-1)*scap(-1)+indexin(-1)*som(-1)
genr chginput_c=chaincapindex*scap+indexin*som
genr chginput_d=chaincapindex(-1)*scap+indexin(-1)*som

genr chginput_r=((chginput_a/chginput_b)*(chginput_c/chginput_d))^(1/2)

smpl 1988 1988
genr indexinp=100
smpl 1989 2000
genr indexinp=indexinp(-1)*chginput_r

smpl 1989 2000
'calculate TFP
genr tfp=indexout/indexinp*100
smpl 1990 2000

```

```
genr tfpgrow=(tfp/tp(-1))-1
```

```
'part 4 inflation calculation
```

```
'-----
```

```
smpl 1986 2000
```

```
'generate growth rate in utility costs (O&M and capital costs)
```

```
genr dprodcost=prodcost/prodcost(-1)-1
```

```
'company inflation is defined as residual difference in nominal cost minus productivity minus customer growth
```

```
genr inflation=dprodcost-tfpgrow-custgrow
```

```
'generate weighted inflation index weighting ippi by capital share of total costs and ontcp by O&M share
```

```
genr infindex=scap*ippi+som*ontcpi
```

```
'define cost per customer factoring productivity
```

```
genr ccus=prodcost/totcust
```

```
genr ecginflat=(ccus/ccus(-1)-1)-tfpgrow
```

```
genr infindex=scap*ippi+som*ontcpi
```

```
genr index2=scap*gdppi+som*cancore
```

```
genr index3=scap*ippi+som*cancore
```

```
'regressions to determine statistical significance of various inflation benchmarks against growth in costs per customer
```

```
equation eqontcpi.ls ccus c ontcpi
```

```
equation eqippi.ls ccus c ippi MA(1)
```

```
equation eqinfindex.ls ccus c infindex MA(1)
```

```
equation eqgdppi.ls ccus c gdppi MA(1)
```

```
equation eqindex2.ls ccus c index2 MA(1)
```

```
equation eqindex3.ls ccus c index3 MA(1)
```

```
'RESULTS SHOW THAT EQINDEX2 IS THE BEST FIT
```

```
'generate company inflation estimate using weighted index using o&M/totcost*canadiancore+capsot/total cost*gdp deflator
```

```
genr indexg=index2/index2(-1)-1
```

```
genr infldiff=(ecginflat*100)-indexg
```

```
smpl 1986 2000
```

```
write(e) c:\work\output.xls wageben wagebenr matcostr omcost omcostr costcap opc dep tax prodcost  
indexin indexout chaincapindex indexinp omprod omprodgrow tfp tfpgrow INDEX2 ECGINFLAT  
INFLDIFF
```

```
'VARIABLE DEFINITION
```

```
'
```

```
'wageben are total wages and benefits
```

```
'wagebenr are inflation adjusted total wages and benefits
```

```
'matcost are total material costs (residual of O&M after taking out wabeben)
```

```
'matcostr are inflation adjusted material costs
```

```
'omcost is total O&M
```

```
'omcostr is inflation adjusted O&M
```

```
'costcap represents the nominal cost of capital defined as tax plus depreciation plus opportunity cost of capital (interest expense)
```

```
'opc represents the opportunity cost of capital
```

'dep represents depreciation

'tax represents total tax

'prodcost represents total nominal costs to the utility equal to costcap+omcost

'indexin represents O&M input index calculated in real terms

'indexout represents the fisher chain index of output (customers)

'chaincapindex represents the fisher chain index of real capital inputs (adjusted for inflation)

'indexinp represents fisher chain index of total inputs (capital and O&M) in real terms

'omprod represents O&M productivity

'omproducgrow represents O&M productivity growth

'tfp represents total factor productivity for enbridge consumers gas

'tfpgrow represents tfp growth for enbridge consumers gas

'INDEX2 IS COMPANY INFLATION DEFINED AS $O\&M\ COST / TOTAL\ COST * CANADIAN\ CORE\ CPI + CAPITAL\ COST / TOTAL\ COST * GDP\ DEFLATOR$

'ECGINFLAT IS ECG INFLATION WHICH REPRESENTS GROWTH IN COST/CUSTOMER - PRODUCTIVITY GROWTH

'INFLDIFF IS THE INPUT PRICE DIFFERENTIAL BETWEEN THE ECONOMY AND COMPANY INFLATION WHICH IS EQUAL TO COMPANY INFLATION (ECGINFLAT) - 'INDEX (CONSTRUCTED BENCHMARK AS ABOVE)

APPENDIX TWO

All data is contained in the excel spreadsheet input.xls. All O&M costs are taken from regulatory exhibits. Internal financial statement information on retail services was used as a proxy for ancillary costs. Data backup is available in an attached documentation memo entitled CPBR data documentation from Samar Mansour.

Information on capital asset balances, additions and retirements are taken from a Plant study which was calculated by our Capital Knowledge Group. Depreciation rates were taken from the latest depreciation study conducted for the Company. Tax information was obtained from the Tax Department and WACC calculations from annual rate cases.

Table 1

Price Indices used for Capital items in CPBR calculations

Acct. No.	Description	Price Index
472	Land, Structure & Improvements	GDPPI
473	Services	Per Unit Index ¹
475	Mains	Per Unit Index ¹
477	Regulators	Per Unit Index ¹
478	Meters	Per Unit Index ¹
482	Structures & Improvements	GDPPI
483	Office Furniture & Equipment	Tel.PI.Index-Furniture ²
484	Transportation Equipment	Tel.PI.Index-Transportation Eqmt. ²
485	Heavy work Equipment	IPPI-Constrn, Mining Eqpmt.
486	Tools & work equipment	IPPI-Hardware, Tool & Cutlery.
488	Communications Equipment	IPPI-Telecommunication Eqmt.
489	Computer Software	GDPPI
490	Computer Equipment	IPPI-Electronic & Computing Eqmt.

Note: 1.Per unit Index was calculated from three year average of (\$ value/ No. of units), and indexed to the base year 1988.

2.Telephone Plant Index was provided by Prof. Mel fuss.

BIBLIOGRAPHY

I. Christensen, P. Schoech and M. Meitzen (May 1994). Productivity of the Local Operating Telephone Companies Subject to Price Cap Regulation.

M. Lowry and L. Kaufmann (1995), Forecasting the Productivity Growth of Natural Gas Distributors. AGA Forecasting Review, Vol. 5, pp. 59-73.

B. Roberts (Jan 1995). Performance-Based Regulation: Efficiency and the Measurement of Productivity Offset Electric Utility Analysis Report, pp. 1-6.

P. Schoech, M. Baladi and R. Hemphill (July 1999). Union Gas Price Index Study. Pp. 1-11

21 February 2007

Rick Campbell
Enbridge Gas Distribution
North York, ON
Canada M2J 1P8

Hi Rick,

In this letter I would like to restate our outstanding data requests and add a few additional requests. My original questions appear in a black font. My rendition of your answers appear in a red font. My further response and queries appear in green. Outstanding queries that are especially urgent are highlighted. Especially urgent queries are highlighted in green. My Feb. 21 responses are highlighted in pink. For our convenience, please insert your answers in this text in a different color.

EGD ANSWERS IN FULL CAPS IN PINK. RJC FEB 20 3 P.M.

Data for TFP Calculations

I have reviewed the data that you have sent thus far and find that there are still some data needed for an accurate TFP study that we have not received.

1. Salaries and wages corresponding to (net) utility O&M (corresponding pension & benefit expenses also desired if readily available). We don't have this information. We don't do this kind of a breakout.

I am hopeful that you will be able to provide this data series, for several reasons.

- I have perused the three productivity studies that you sent and find that, in all three studies, the cost of "materials" was computed as a residual: O&M expenses – total labour expenses.¹ This residual was then computed into a materials quantity index using a formula like $C^{\text{Materials}}/\text{CPI}$. Do you mean to say that in all three cases they were using *total* labour expenses and not just the portion attributable to net O&M? If so, that means that these indexes and the resultant productivity indexes were miscalculated in all three Enbridge productivity filings.

¹ Fuss, for example, states in his 1998 response to an interrogatory that "the materials index...is derived from subtracting total labour costs from utility O&M, deflating by the Ontario CPI to put into real terms." He goes on to say that the weights for the labour and materials subindexes in his input quantity index are "based on their relative shares of total O&M costs." Kerry Lakatos Hayward states on p. 4 of her 2002 report that "materials cost is calculated as a residual after removing labour cost from total [which, in her case, meant *net*] O&M cost." Darryl Seal states on p. 8 of his 2006 Gazifere report that "Materials [expenses] ... are estimated as the difference between total O&M costs and the labour component".

- You will recall that I did some O&M benchmarking work for Enbridge several years ago. In that work, I was provided with what I believed to be estimates of net O&M salaries and wages. I believe that these estimates were provided by Sagar Kancharla. Here is a comparison of these estimates to the numbers you have sent, together with the estimated growth rates over the 2000-2002 period.

	S&W net	S&W Gross [Provided 07]	Net/Gross
2000	60.5	105.3	.57
2001	62.4	102.9	.61
2002	54.5	79.0	.69
2003	68.5 (Est)	109.8	.55
Ave. GR 00-02	-5.2%	-14.4%	

It can be seen that the growth rates of the two series are quite different.

Since at least three of the numbers seem to have been calculated already and, additionally, Union has provided analogous itemizations, can I prevail upon you to provide the itemizations for 2003 (final), 2004, and 2005?

Feb. 2 response: Staff completing this work are on the witness stand this morning and have more to do at the hearing with respect to undertakings. We'll get to it asap next week. These data are still urgently needed. Is it possible now that Kerry is back that you can provide net O&M salaries and wages for the 2000-2005 period in a day or two? Or are you now effectively saying that they can't be provided in any reasonable time frame? The problem I am having is that you have had more than two months to provide the three outstanding numbers (03-05), which we routinely use in our cost research.

NEW DATA REQUEST: In reviewing my files from our previous work for Enbridge I also discovered that the net O&M expenses that I was initially given for 99-02 were *net* of other revenues, whereas the figures for 2003 were *gross* of other revenues. I was given the following data (in CD 1,000) on other revenues to rectify this situation.

2000	7,028
2001	7,471
2002	8,060

Am I right that this was a problem? Since the O&M numbers are the same for 2002 and 2003 as those that I previously worked with, is it reasonable to conclude that the numbers you have provided contain this same problem? If so, should we then make this adjustment for 2000-2002, as we did in our 04 benchmarking testimony? P.S. If it is easy to provide the rest of the other revenues data, I would appreciate it.

Feb. 2 response: I'll investigate but our Manager, Regulatory Accounting is testifying at the OEB as I write.

THE SCHEDULE IN ATTACHMENT 1 SENT TO YOU ON FRIDAY FEB 15, INCLUDES THE REGROUPINGS OF O&M CREDITS FROM O&M INTO OTHER REVENUE. PRIOR TO 2003, THESE O&M CREDITS WERE INCLUDED IN O&M,

THEY NOW RESIDE IN OTHER REVENUE. IT YIELDS NUMBERS FOR THE SERIES ABOVE OF \$8.6, \$9.3 AND \$10.4 RESPECTIVELY FOR 2000, 2001, 2002.

2. The table with the detailed revenue and billing determinant data that you sent on January 18 has no heading and no explanation of the table was provided in your covering letter. What exactly are these data? Actuals, forecasts, weather normalized? Fiscal year or calendar year?

Thursday February 1 package contained an update to this table that had a heading indicating that these are *forecasts*.

Please explain further how these tables were constructed. Are the data effectively weather normalized because they are forecasts? Are the figures for fiscal years, calendar years, or a mix?

We are, in any event, going to need some supplementary output data to finalize our TFP research for Enbridge. At the barest minimum, we need the delivery volumes that correspond to the rate classes that feature demand charges as well as volumetric charges. What we strongly prefer, though, are the ACTUAL output data that correspond to those that Union has provided.

Delivery Volumes Residential & Commercial (ideally by rate class)²
Other (e.g. industrial, generation, ex franchise).

Number of Customers

Maximum Demand (e.g. industrial, generation, ex franchise) [recognize overlap]

These would, preferably, be accompanied by the corresponding revenues. Weather normalized residential and commercial volumes would be a plus. PLEASE CALL IF YOU NEED TO DISCUSS WHAT DATA YOU HAVE AVAILABLE TO MEET THESE NEEDS.

Customer and volume data (including weather normalized volumes) were provided on Friday Feb. 9.

I notice in looking at the forecasted revenue and output data that very little revenue is gathered via demand charges? Does that make sense?

Can you provide the corresponding actual contract demands for "other" customers?

Do the 2005 data pertain to the calendar year in 2005?

FISCAL YEAR

Do the weather normalized volumes pertain to total throughput? Can you easily provide weather normalized volumes for each of the three major residential and commercial service classes?

²You may already have sent this. If so, please confirm.

We have used these tables to try to calculate the average rate trend of Enbridge over the 2000-2005 period. The results of this work can be found in the attached table. In these calculations, customer, demand, and volumetric charges were calculated as the ratio of the revenue to the corresponding quantity. The growth rate in the rate index is a revenue-weighted average of the growth in the three individual charges. We find that

- Rate growth was achieved chiefly by raising the customer charges of residential and commercial customers. The volumetric charges for these customers declined slightly.
- The average annual growth in your revenue requirement was only 1.12%, despite average annual revenue requirement growth of 2.8%. The difference was made up by the brisk growth in the number of customers, which had increased importance as a revenue driver.

Do these findings sound right to you? You state in your January 17 letter, for instance, that “price escalation of 2.5% would probably cover routine replacement, reinforcement, and addition of subdivision customers.” Were you assuming no redesign of rates during the PBR period?

You have also sent tables for the 2000-2006 period entitled “Revenue Data – Revenue Corresponding to Each Rate Element by Rate Class. Each table pertains to an individual test year. Can you please provide a brief, high level explanation of where these tables come from and how there origination differs from the tables above just discussed?

3. Employee head count corresponding to total labour expenses. This was part of the Jan. 5 package. I did not receive that package. We will send it again. I am not able to reconcile these with the numbers in the 2002 Lakatos study. She reports the following for 2000:

	Lakatos	07 Submission
Supervisory:	922	NA
Weekly:	877	NA
Part Time:	47.5	NA
Total	1,846.5	1,570

Can you please provide an explanation for the discrepancy?

4. % of gross OM&A expenses capitalized Before TPBR we capitalized a normal amount. Capitalization surged during TPBR (2000-2002) and has subsequently tended to stay at the higher level. Spinning off the water heater business also caused the capitalization percentage to rise. Why? We would still like to see these data. WE PROVIDED RATES FOR 2004-05. RATES PRIOR TO 2004 ARE NOT AVAILABLE ON AN ACTUAL BASIS DUE TO A FINANCIAL SYSTEM CHANGE IN 2003. Are the gross/net comparisons that I provided above sensible?
5. DSM data by rate class (not essential; high level characterization may suffice).

Exact breakout unavailable. Will, however, send a high level characterization of the allocation. Please do but this is not a top priority.

6. On January 18th you sent us a table entitled “StatsCan Indices”. Included is a page with data for the 2003-2006 period on trends in some variables (seemingly price data) labeled “labourers”, “operators”, and “welders/fitters”. What are these data? The label on the tab is a somewhat cryptic “Labor LL & RBS” What does this mean? Also, where did the weights come from for the “weighted average?”

Other Topics

1. The data you have sent us apparently pertain to a fiscal year (2000-2004) and to a calendar year in 2005. Are fiscal year data for 2005 readily available? If so, I may ask you to provide this. We have changed to calendar year reporting. Don't have the fiscal year data. Data for 2004 and 2005 both pertain to 12 month periods in any event. When did the fiscal year begin? FISCAL YEAR WAS OCT 1 - SEPT 30.
2. Regarding the availability of data for years prior to 2000, I am still unclear why you cannot present them the way Union Gas did in the Christensen study with the costs of appliance programs etc. included but corresponding output data as well. Note that this would not require any *stripping out* of these costs, just adding measures of the corresponding output. This would take a lot of work (2 man weeks) but not impossible. There were breakouts of these costs for rate cases. Could get for 10 years. Had a rental program (the biggest), a service program, heating insurance (most profitable), and a sales program. In her 2002 report Lakatos states (p. 3) that “in measuring inputs, all historical costs associated with ancillary activities (i.e. rentals, appliance stores) has been removed as they are not part of the distribution business currently under consideration for incentive regulation”. Her working papers include an O&M time series dating back to 1985 that does not exhibit a sharp drop in 1999. During my work for Enbridge, I received a time series on O&M expenses dating back to 1993. These two data sources are pretty much in agreement with the numbers you have provided on net O&M expenses in 2000 (about \$ 230 million). So, isn't the Lakatos series a decent approximation of what we would need?
3. You have provided some time series concerning escalation in the prices of certain inputs in Ontario. Have you done any work to aggregate (i.e. summarize) these? For example, have you calculated summary indexes pertaining to overall construction costs or non-labour OM&A expenses? Do you have any thoughts concerning the weights for such summary indexes? Don't think that we have. We gathered these data to use in our discussions with contractors. Will check into this and get back. Please do.
4. Please provide some supplemental but succinct commentary concerning the construction contracts that must be renewed. This is not a top priority but we are interested in your answer.
5. You have not responded to the December 5 question concerning the restructuring of the gas supply business. My basic question is: did this cause you to do any more or less customer care work during the sample period? What does the future hold? Had a surge in customer care costs during the spinoff of water heaters. In 2002 we started showing gas cost as a separate line on the bill. That caused a surge in inquiries. Who provides customer care services to customers that purchase gas from third parties?

6. The Navigant presentation suggests that the company's capital stock started growing in 1995 after years of stability despite a fairly stable pace of customer growth. This resulted in a fairly substantial productivity decline. Please provide a high level explanation. Don't recall. A certain amount of spare capacity sometimes exists on the mains. Then, a costly upgrade is needed. Also, big stations like Parkway must occasionally be rebuilt. Any further thoughts?
7. NEW QUESTION: On Friday, Jan. 2 you provided us with data on the "Board Approved Annual Rate of Return". Is this just the ROE or is it a more comprehensive ROR? IT IS ROE ONLY. Is the indexation of ROE to the Canada long bond expected to continue?
8. NEW QUESTION: Is the Company's construction cost driven more by inflation in the prices for steel or plastic pipe? GENERALLY PLASTIC IS THE GREATER DRIVER BUT DEPENDS UPON THE YEAR. Have you witnessed a big runup in construction costs recently due to higher commodity prices? If so, which has run up more, steel pipe or PVC?
9. NEW QUESTION: Are your capital costs net of contributions in aid of construction? If not, why does Union have these but not Enbridge? If yes, are these substantial for Enbridge, as they are for Union? YES, THEY ARE NET. NO, THEY ARE NOT SUBSTANTIAL
10. NEW QUESTION: Here is the salaries & wages per employee trend over the sample period.

2000	67,070
2001	67,036
2002	51,100
2003	63,912
2004	72,000
2005	74,684

Does the resultant 2.15% average annual growth trend seem reasonable? Any idea why the salary and wage trend for Ontario utilities as a whole might be much lower over this sample period?

IT SEEMS LOW BUT IN THE BALLPARK. ACCORDING TO HR, OUR S&W GROWTH OVER THE PERIOD IS 2.5%

Concluding Remarks

Thanks in advance for your prompt attention to these questions. I look forward to your responses.

Sincerely,

Mark Newton Lowry, PhD
Partner

21 February 2007

Rick Campbell
Enbridge Gas Distribution
North York, ON
Canada M2J 1P8

Hi Rick,

In this letter I would like to restate our outstanding data requests and add a few additional requests. My original questions appear in a black font. My rendition of your answers appear in a red font. My further response and queries appear in green. Outstanding queries that are especially urgent are highlighted. Especially urgent queries are highlighted in green. My Feb. 21 responses are highlighted in pink. For our convenience, please insert your answers in this text in a different color.

My 22 Feb comments in text boxes below. RJC.

Data for TFP Calculations

I have reviewed the data that you have sent thus far and find that there are still some data needed for an accurate TFP study that we have not received.

1. Salaries and wages corresponding to (net) utility O&M (corresponding pension & benefit expenses also desired if readily available). We don't have this information. We don't do this kind of a breakout.

Salaries & wages associated with net O&M is not available. Two months of asking for it, even on an estimated basis, has had the same result "we haven't done it, we don't do it, we can't do it". If you have a reasonable basis to estimate it, perhaps we can confirm.

I am hopeful that you will be able to provide this data series, for several reasons.

- I have perused the three productivity studies that you sent and find that, in all three studies, the cost of "materials" was computed as a residual: O&M expenses – total labour expenses.¹ This residual was then computed into a materials

¹ Fuss, for example, states in his 1998 response to an interrogatory that "the materials index...is derived from subtracting total labour costs from utility O&M, deflating by the Ontario CPI to put into real terms." He goes on to say that the weights for the labour and materials subindexes in his input quantity index are "based on their relative shares of total O&M costs." Kerry Lakatos Hayward states on p. 4 of her 2002 report that "materials cost is calculated as a residual after removing labour cost from total [which, in her

- quantity index using a formula like $C^{\text{Materials}}/\text{CPI}$. Do you mean to say that in all three cases they were using *total* labour expenses and not just the portion attributable to net O&M? If so, that means that these indexes and the resultant productivity indexes were miscalculated in all three Enbridge productivity filings.
- You will recall that I did some O&M benchmarking work for Enbridge several years ago. In that work, I was provided with what I believed to be estimates of net O&M salaries and wages. I believe that these estimates were provided by Sagar Kancharla. Here is a comparison of these estimates to the numbers you have sent, together with the estimated growth rates over the 2000-2002 period.

	S&W net	S&W Gross [Provided 07]	Net/Gross
2000	60.5	105.3	.57
2001	62.4	102.9	.61
2002	54.5	79.0	.69
2003	68.5 (Est)	109.8	.55
Ave. GR 00-02	-5.2%	-14.4%	

It can be seen that the growth rates of the two series are quite different.

Since at least three of the numbers seem to have been calculated already and, additionally, Union has provided analogous itemizations, can I prevail upon you to provide the itemizations for 2003 (final), 2004, and 2005?

Feb. 2 response: Staff completing this work are on the witness stand this morning and have more to do at the hearing with respect to undertakings. We'll get to it asap next week. These data are still urgently needed. Is it possible now that Kerry is back that you can provide net O&M salaries and wages for the 2000-2005 period in a day or two? Or are you now effectively saying that they can't be provided in any reasonable time frame? The problem I am having is that you have had more than two months to provide the three outstanding numbers (03-05), which we routinely use in our cost research.

We've provided total salaries and wages 2000-05. Per my comment above, I'm told we can't provide S&W associated with net O&M.

NEW DATA REQUEST: In reviewing my files from our previous work for Enbridge I also discovered that the net O&M expenses that I was initially given for 99-02 were *net* of other revenues, whereas the figures for 2003 were *gross* of other revenues. I was given the following data (in CD 1,000) on other revenues to rectify this situation.

2000	7,028
2001	7,471
2002	8,060

Am I right that this was a problem? Since the O&M numbers are the same for 2002 and 2003 as those that I previously worked with, is it reasonable to conclude that the numbers you have provided contain this same problem? If so, should we then make this

case, meant *net*] O&M cost." Darryl Seal states on p. 8 of his 2006 Gazifere report that "Materials [expenses] ... are estimated as the difference between total O&M costs and the labour component".

adjustment for 2000-2002, as we did in our 04 benchmarking testimony? P.S. If it is easy to provide the rest of the other revenues data, I would appreciate it.

We provided a table, “Table 1: Operation and Maintenance Expenses by Department”, 2000 Board Approved and Actuals through 2006 Budget. It provides a netting out of other revenues for each year.

Feb. 2 response: I’ll investigate but our Manager, Regulatory Accounting is testifying at the OEB as I write.

THE SCHEDULE IN ATTACHMENT 1 SENT TO YOU ON FRIDAY FEB 15, INCLUDES THE REGROUPINGS OF O&M CREDITS FROM O&M INTO OTHER REVENUE. PRIOR TO 2003, THESE O&M CREDITS WERE INCLUDED IN O&M, THEY NOW RESIDE IN OTHER REVENUE. IT YIELDS NUMBERS FOR THE SERIES ABOVE OF \$8.6, \$9.3 AND \$10.4 RESPECTIVELY FOR 2000, 2001, 2002.

2. The table with the detailed revenue and billing determinant data that you sent on January 18 has no heading and no explanation of the table was provided in your covering letter. What exactly are these data? Actuals, forecasts, weather normalized? Fiscal year or calendar year?

Thursday February 1 package contained an update to this table that had a heading indicating that these are *forecasts*.

Please explain further how these tables were constructed. Are the data effectively weather normalized because they are forecasts? Are the figures for fiscal years, calendar years, or a mix?

We are, in any event, going to need some supplementary output data to finalize our TFP research for Enbridge. At the barest minimum, we need the delivery volumes that correspond to the rate classes that feature demand charges as well as volumetric charges. What we strongly prefer, though, are the ACTUAL output data that correspond to those that Union has provided.

Delivery Volumes Residential & Commercial (ideally by rate class)²
Other (e.g. industrial, generation, ex franchise).

Number of Customers

Maximum Demand (e.g. industrial, generation, ex franchise) [recognize overlap]

These would, preferably, be accompanied by the corresponding revenues. Weather normalized residential and commercial volumes would be a plus. PLEASE CALL IF YOU NEED TO DISCUSS WHAT DATA YOU HAVE AVAILABLE TO MEET THESE NEEDS.

²You may already have sent this. If so, please confirm.

Customer and volume data (including weather normalized volumes) were provided on Friday Feb. 9.

I notice in looking at the forecasted revenue and output data that very little revenue is gathered via demand charges? Does that make sense?

In the document "PEG Data Request" sent to you on December 22, we provided the proportion of revenue from various charges, 2001-2006, which put the revenues from demand charges during the period in the range of 1.88% to 2.52%.

Can you provide the corresponding actual contract demands for "other" customers?

Do the 2005 data pertain to the calendar year in 2005?

FISCAL YEAR

Do the weather normalized volumes pertain to total throughput? Can you easily provide weather normalized volumes for each of the three major residential and commercial service classes?

Weather normalized volumes by rate class, 19994-2005, were provided to you on Feb 15.

We have used these tables to try to calculate the average rate trend of Enbridge over the 2000-2005 period. The results of this work can be found in the attached table. In these calculations, customer, demand, and volumetric charges were calculated as the ratio of the revenue to the corresponding quantity. The growth rate in the rate index is a revenue-weighted average of the growth in the three individual charges. We find that

- Rate growth was achieved chiefly by raising the customer charges of residential and commercial customers. The volumetric charges for these customers declined slightly.
- The average annual growth in your revenue requirement was only 1.12%, despite average annual revenue requirement growth of 2.8%. The difference was made up by the brisk growth in the number of customers, which had increased importance as a revenue driver.

Do these findings sound right to you? You state in your January 17 letter, for instance, that "price escalation of 2.5% would probably cover routine replacement, reinforcement, and addition of subdivision customers." Were you assuming no redesign of rates during the PBR period?

You have also sent tables for the 2000-2006 period entitled "Revenue Data – Revenue Corresponding to Each Rate Element by Rate Class. Each table pertains to an individual test year. Can you please provide a brief, high level explanation of where these tables come from and how there origination differs from the tables above just discussed?

3. Employee head count corresponding to total labour expenses. This was part of the Jan. 5 package. I did not receive that package. We will send it again. I am not able to reconcile these with the numbers in the 2002 Lakatos study. She reports the following for 2000:

Supervisory:	922	NA
Weekly:	877	NA
Part Time:	47.5	NA
Total	1,846.5	1,570

Can you please provide an explanation for the discrepancy?

We are confident in the 2000 fiscal year number, 1570, that we recently provided in the Table Enbridge Gas Distribution Headcount, 1999-2006. 2000 was year of transition due to unbundling...note that 4 of the 10 footnotes to the table refer to the unbundling impacts in 2000 with resultant transfers in/out of EGD.

4. % of gross OM&A expenses capitalized Before TPBR we capitalized a normal amount. Capitalization surged during TPBR (2000-2002) and has subsequently tended to stay at the higher level. Spinning off the water heater business also caused the capitalization percentage to rise. Why? We would still like to see these data. WE PROVIDED RATES FOR 2004-05. RATES PRIOR TO 2004 ARE NOT AVAILABLE ON AN ACTUAL BASIS DUE TO A FINANCIAL SYSTEM CHANGE IN 2003. Are the gross/net comparisons that I provided above sensible?
5. DSM data by rate class (not essential; high level characterization may suffice). Exact breakout unavailable. Will, however, send a high level characterization of the allocation. Please do but this is not a top priority.
6. On January 18th you sent us a table entitled "StatsCan Indices". Included is a page with data for the 2003-2006 period on trends in some variables (seemingly price data) labeled "labourers", "operators", and "welders/fitters". What are these data? The label on the tab is a somewhat cryptic "Labor LL & RBS" What does this mean? Also, where did the weights come from for the "weighted average?"

Other Topics

1. The data you have sent us apparently pertain to a fiscal year (2000-2004) and to a calendar year in 2005. Are fiscal year data for 2005 readily available? If so, I may ask you to provide this. We have changed to calendar year reporting. Don't have the fiscal year data. Data for 2004 and 2005 both pertain to 12 month periods in any event. When did the fiscal year begin? FISCAL YEAR WAS OCT 1 - SEPT 30.
2. Regarding the availability of data for years prior to 2000, I am still unclear why you cannot present them the way Union Gas did in the Christensen study with the costs of appliance programs etc. included but corresponding output data as well. Note that this would not require any *stripping out* of these costs, just adding measures of the corresponding output. This would take a lot of work (2 man weeks) but not impossible. There were breakouts of these costs for rate cases. Could get for 10 years. Had a rental program (the biggest), a service program, heating insurance (most profitable), and a sales program. In her 2002 report Lakatos states (p. 3) that "in

measuring inputs, all historical costs associated with ancillary activities (*i.e.* rentals, appliance stores) has been removed as they are not part of the distribution business currently under consideration for incentive regulation”. Her working papers include an O&M time series dating back to 1985 that does not exhibit a sharp drop in 1999. During my work for Enbridge, I received a time series on O&M expenses dating back to 1993. These two data sources are pretty much in agreement with the numbers you have provided on net O&M expenses in 2000 (about \$ 230 million). So, isn’t the Lakatos series a decent approximation of what we would need?

Yes, that is why we provided the study. We need to get the two of you together to discuss her methodology, which I understand was based on the methods developed by Lowry & Kaufman...she cites your article in AGA Forecasting Review Volume 5, 1995.

3. You have provided some time series concerning escalation in the prices of certain inputs in Ontario. Have you done any work to aggregate (*i.e.* summarize) these? For example, have you calculated summary indexes pertaining to overall construction costs or non-labour OM&A expenses? Do you have any thoughts concerning the weights for such summary indexes? **Don’t think that we have. We gathered these data to use in our discussions with contractors. Will check into this and get back. Please do.**
4. Please provide some supplemental but succinct commentary concerning the construction contracts that must be renewed. **This is not a top priority but we are interested in your answer.**
5. You have not responded to the December 5 question concerning the restructuring of the gas supply business. My basic question is: did this cause you to do any more or less customer care work during the sample period? What does the future hold? **Had a surge in customer care costs during the spinoff of water heaters. In 2002 we started showing gas cost as a separate line on the bill. That caused a surge in inquiries. Who provides customer care services to customers that purchase gas from third parties?**

As the provider of the regulated distribution service, EGD provides customer care services to all of its customers. Of course, customers raising issues with respect to third party commodity contracts would be directed to the service provider.

6. The Navigant presentation suggests that the company’s capital stock started growing in 1995 after years of stability despite a fairly stable pace of customer growth. This resulted in a fairly substantial productivity decline. Please provide a high level explanation. **Don’t recall. A certain amount of spare capacity sometimes exists on the mains. Then, a costly upgrade is needed. Also, big stations like Parkway must occasionally be rebuilt. Any further thoughts?**

Yes, system expansion to new communities increased post 1995 (EBO188 Guidelines), the replacement of cast iron mains began, and increases in IT and customer related capital.

7. **NEW QUESTION: On Friday, Jan. 2 you provided us with data on the “Board Approved Annual Rate of Return”. Is this just the ROE or is it a more comprehensive**

ROR? IT IS ROE ONLY. Is the indexation of ROE to the Canada long bond expected to continue?

No, as you know & with your support, Board Staff are recommending that there not be an annual adjustment ROE to reflect the OEB's Adjustment Guidelines within the IR Plan. They recommend that the 2007 ROE rate of 8.39% be locked-in during the IR Plan, although the quantum would be adjusted by the annual revenue or rate cap adjustment mechanism.

8. NEW QUESTION: Is the Company's construction cost driven more by inflation in the prices for steel or plastic pipe? GENERALLY PLASTIC IS THE GREATER DRIVER BUT DEPENDS UPON THE YEAR. Have you witnessed a big runup in construction costs recently due to higher commodity prices? If so, which has run up more, steel pipe or PVC?

Steel prices were stagnant 1992-2002 due to competition from Asian mills...dumping in North America. Steel prices have escalated some 40% since 2002.

9. NEW QUESTION: Are your capital costs net of contributions in aid of construction? If not, why does Union have these but not Enbridge? If yes, are these substantial for Enbridge, as they are for Union? YES, THEY ARE NET. NO, THEY ARE NOT SUBSTANTIAL

10. NEW QUESTION: Here is the salaries & wages per employee trend over the sample period.

2000	67,070
2001	67,036
2002	51,100
2003	63,912
2004	72,000
2005	74,684

Does the resultant 2.15% average annual growth trend seem reasonable? Any idea why the salary and wage trend for Ontario utilities as a whole might be much lower over this sample period?

IT SEEMS LOW BUT IN THE BALLPARK. ACCORDING TO HR, OUR S&W GROWTH OVER THE PERIOD IS 2.5%

Concluding Remarks

Thanks in advance for your prompt attention to these questions. I look forward to your responses.

Sincerely,

Mark Newton Lowry, PhD
Partner

GAS VOLUME BUDGET

1. The purpose of this evidence is to present the 2007 Test Year volume budget and request the Board's approval of the volumes as summarized in Table 1. The information shown in this evidence is on a calendar-year basis (i.e., on a December 31 year end) excluding the Historical Actual vs. Board Approved section. The Test Year Budget includes calendar 2005 actual consumption information up to and including December 2005.
2. A summary of the volumes, customers, and revenues is provided below in Table 1. Further detail is provided at Exhibit C3, Tab 2, Schedule 1; Exhibit C4, Tab 2, Schedule 1; Exhibit C4, Tab 2, Schedule 5; and Exhibit C5, Tab 2, Schedule 1.

Table 1
Summary of Gas Sales and Transportation
Volumes, Customers and Revenues
(Volumes in 10⁶m³)

	Calendar 2005 <u>Actual</u>	Calendar 2006 Board Approved <u>Budget</u>	Calendar 2006 Bridge Year <u>Estimate</u>	Calendar 2007 <u>Budget</u>
General Service Volumes	8 019.5	7 932.8	7 758.6	7 625.8
Contract Volumes	<u>4 190.3</u>	<u>4 387.9</u>	<u>4 116.5</u>	<u>4 131.7</u>
Total Volumes, Gas Sales and Transportation	<u><u>12 209.8</u></u>	<u><u>12 320.7</u></u>	<u><u>11 875.1</u></u>	<u><u>11 757.5</u></u>
Customers, Gas Sales and Transportation (Average)	1 735 907	1 792 615	1 780 459	1 823 258
Revenues, Gas Sales and Transportation (\$ Millions)	3 064.4	3 091.3	3 348.8	3 072.3

Witnesses: I. Chan
T. Ladanyi

3. This evidence has divided into the following sections:

- Comparison of 2007 Budget and 2006 Estimate
- Evaluation of Forecast Accuracy – Historical Normalized Actual vs. Board Approved Budget
- Demand Forecast Methodology
- Comparison of 2006 Estimate and 2005 Actual
- Comparison of 2006 Estimate and 2006 Board Approved
- Weather Normalization Methodology

Comparison of 2007 Budget and 2006 Estimate

4. The 2007 volume budget reflects the meter reading heating degree day forecast of 3,617, a decrease of 128 degree days compared to the 2006 Bridge Year Estimate of 3,745. Meter reading heating degree days are acquired by amalgamating Gas Supply heating degree days with the billing schedules. Evidence related to the forecast of Gas Supply heating degree days is presented at Exhibit C2, Tab 4, Schedule 1. The test year degree day forecast has been developed using the proposed 20 Year Trend methodology as it produces the best fit in the Company's analysis and comprehensive review of competing degree day forecasting methods.
5. The 2007 volumes budget of $11\,757.5\ 10^6\text{m}^3$ are $117.6\ 10^6\text{m}^3$ or 1.0% below the 2006 Bridge Year Estimate of $11\,875.1\ 10^6\text{m}^3$. On a weather-normalized basis, the 2007 Budget volumes are forecast to be $90.3\ 10^6\text{m}^3$ or 0.8% above the 2006 Bridge Year Estimate. The increase on a normalized basis is made up of an increase in general service volumes of $44.7\ 10^6\text{m}^3$ and an increase in the contract market of

Witnesses: I. Chan
T. Ladanyi

45.6 10^6m^3 . Further rate class detail and explanation are provided at Exhibit C3, Tab 2, Schedule 3.

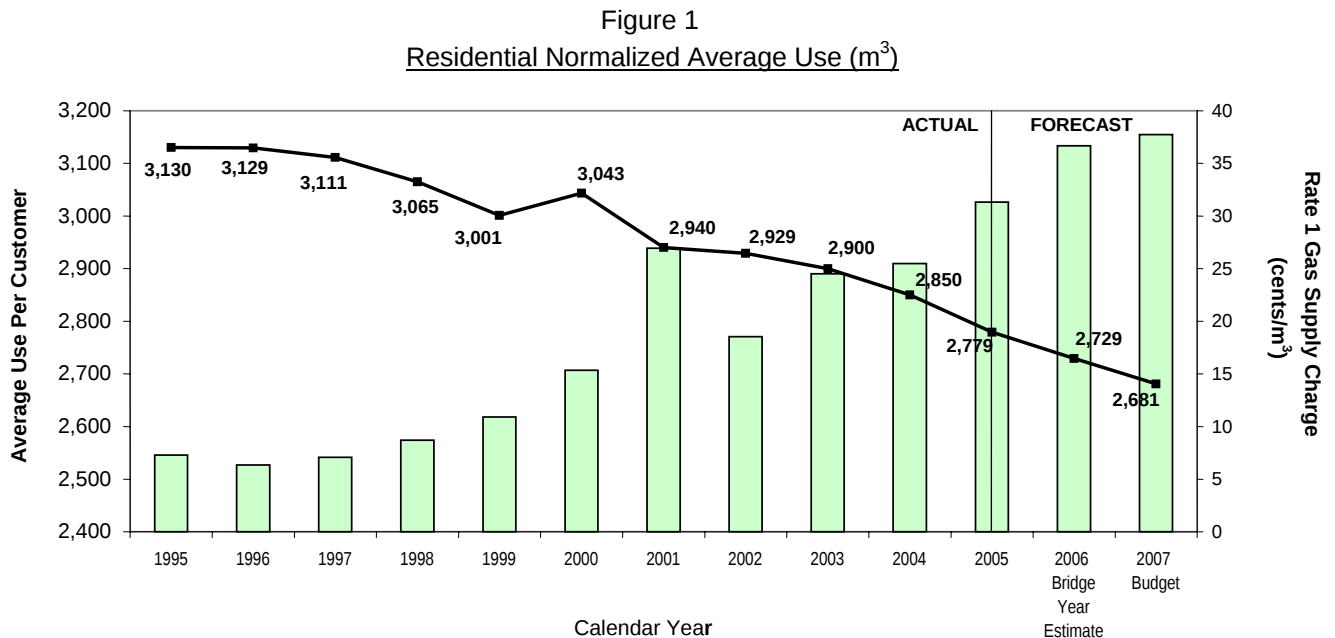
6. The increase in the general service volumes of 44.7 10^6m^3 on a weather-normalized basis is primarily due to customer growth of 140.3 10^6m^3 and incremental added load initiatives of 3.6 10^6m^3 as described in the Opportunity Development evidence at Exhibit D1, Tab 8, Schedule 1. These additional volumes mitigate the lower average use per customer of 99.0 10^6m^3 as a result of the Company's Demand Side Management ("DSM") initiatives, customers' own conservation initiatives and high natural gas prices.¹ Further explanations are provided in the average use section on the next page. Further numerical details are provided at Exhibit C3, Tab 2, Schedule 3. /u
7. The increase of 45.6 10^6m^3 in the contract market on a weather-normalized basis is primarily due the addition of two large customers in 2007, the incremental load of an existing customer, and the full operational capacity of several new large customers added in 2006 and existing customers; partially offset by a loss in load due to two industrial plant closures in the Food and Beverage sector and the loss of the Toronto Transit Commission ("TTC") as a customer due to its discontinued use of Natural Gas Vehicles ("NGV") for buses starting in 2006. Further details are provided at Exhibit C3, Tab 2, Schedule 3. Overall, the 2007 budget represents the forecast that integrates all of the actual experiences and the best known information about contract customers at the time the budget was developed. /u

General Service Average Use: 2007 Budget

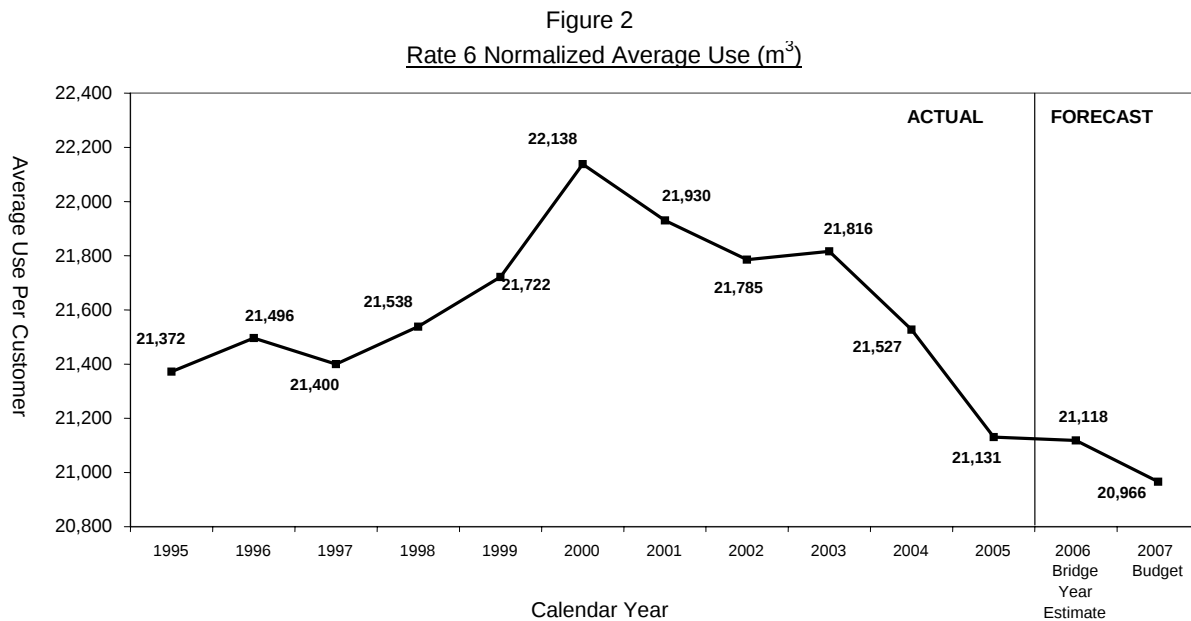
8. From 1995 to 2005, normalized residential average use has declined by an average of 35.0 m^3 or 1.2% per year. However, during the volatile and high natural gas price

¹ Real Residential Natural Gas Price – Table 2- Exhibit C2, Tab 3, Schedule 1.

period between 2001 and 2005, normalized residential average use has decreased by an average of 53 m³ or 1.8% per year. Figure 1 shows the residential average use from 1995 to the 2007 Test Year on a test year weather normalized basis, as filed at Exhibit C5, Tab 2, Schedule 3.



9. Similarly, from 1995 to 2005, normalized Rate 6 average use has decreased by an average of 24.0 m³ or 0.11% per year. During the period between 2001 and 2005, normalized Rate 6 average use has decreased by an average of 201 m³ or 0.9% per year. Figure 2 on the next page shows the Rate 6 average use from 1995 to the 2007 Test Year on a test year weather normalized basis, as filed at Exhibit C5, Tab 2, Schedule 3. Rate 6 is comprised of the apartment, commercial, and industrial sectors.



10. Tables 3 to 6 have been developed in response to previous years' interrogatories by quantifying the impact of the average use's driver variables on the system-wide average use forecast by sector.

11. Compared with the 2006 Bridge Year Estimate, residential average uses is expected to continue to decline in 2007. This decline is due to the expectation of higher gas prices in 2007 than in 2006 based on experience in recent years, the Company's DSM initiatives, new homes with improved thermal envelopes and higher efficiencies on new heating and water heating equipment, and other conservation initiatives; partially offset by the Company's added load initiatives and the penetration of new gas appliances as a result of moderate employment growth in 2007. Other conservation captures the historical reduction in volumes due to the impact of conservation activities on average uses; such as the ongoing gas equipment efficiency effect as a result of the replacement of old equipment with

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Witnesses: I. Chan
 T. Ladanyi

medium or high efficiency furnaces, increased energy efficiency of new gas-fired water heaters effective September 1, 2004, continued home renovation efforts in older building, and conservation initiatives originated by customers themselves or as a result of government programs.

12. Residential average uses are significantly affected by gas prices. Customers respond to a sharp price increase in various ways, such as lowering thermostat controls and adding additional layers of clothing, purchasing more efficient gas furnaces, appliances and/or programmable thermostats, or by renovating their homes to make them more energy efficient. Together with increasing gas prices in 2006 which were higher than the increase that occurred in 2001, forecasts of higher real natural gas prices in 2007 will continue to drive a decrease in the average use in 2007 at a similar trend as experienced in the 2001 to 2005 actuals.
13. Apartment sector average uses is expected to decrease in 2007, primarily due to the Company's DSM initiatives, conservation initiatives originated by customers or a result of government programs, and higher gas prices in 2007; partially offset by moderate employment growth.
14. Commercial sector average uses are expected to continue to decrease in 2007, primarily due to Company's DSM initiatives, other conservation, and higher gas prices in 2007; partially offset by still moderate employment growth and the Company's Utility Growth Plan initiatives. Other conservation captures the historical reduction in volumes due to the impact of conservation activities on average uses; such as continued conservation efforts in older buildings, improved thermal envelopes for newer buildings, higher efficiencies of new heating and water heating

equipment, and self-imposed conservation activities either initiated by customers or as a result of government programs.

15. Industrial sector average uses are expected to increase in 2007, primarily due to moderate economic growth and customer migration from contract rates to general service rates; partially offset by the Company's Utility Growth Plan initiatives, higher gas prices in 2007, and other conservation. Other conservation captures the reduction in volumes due to the impact of conservation activities on average uses; such as a change in production process, improved thermal envelopes for newer buildings, higher efficiencies on new heating and water heating equipments, and self-imposed conservation activities either initiated by the customers or as a result of government programs.
16. Trends in this sector have been variable over time. Economic conditions and rate switching have also played a significant role in recent years' industrial average uses as this sector is affected by the restructuring of large contract customers, fluctuations in product demand and changes in production process. In 2005 and 2006, there were a number of industrial customers that switched from contract rates to general service rates who are not expected to switch back in 2007 as a result of their consumption not meeting the minimum threshold requirement of 340,000 m³ for contract customers. There are a variety of reasons that the customers may not meet the minimum threshold, such as customers embracing DSM or conservation initiatives, winding down industrial plants, changes in production process to enhance efficiency, and plant consolidation.

Table 3
Factors Influencing the Changes in Residential Gas Consumption
Between 2007 Test Year Budget and 2006 Bridge Year Estimate (10⁶ m³)

<u>Factors</u>	<u>Total Volume</u>
	(10 ⁶ m ³)
DSM Initiatives	(11.8)
New Homes (a)	(6.4)
Other Conservation (b)	(14.9)
Gas Prices	(48.6)
Gas Appliances (c)	0.0 *
Growth Initiatives or Added Load (d)	3.4
Total	(78.3)

(a) Measured by vintage variable as explained at Exhibit C2, Tab 3, Schedule 1, reflecting the historical impacts of improved building envelopes for new homes along with more efficient new space heating furnaces and water heaters on average uses.

(b) Other Conservation includes the expected ongoing technology improvements of furnaces for the existing homes, new more energy efficient gas-fired storage water heaters effective September 1, 2004, and conservation initiatives originated by customers or as a result of government programs, such as programmable thermostats, low-flow showerheads, and home renovations.

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(c) Measured by employment variable to reflect the demand for Gas Appliances or Gas Technologies.

(d) Added Load is based on the Company's Utility Growth Plan initiatives developed by the Opportunity Development group. See Exhibit D1, Tab 8, Schedule 1, for detailed information about these added load programs.

* Less than 50,000 m³

Witnesses: I. Chan
T. Ladanyi

Table 4
Factors Influencing the Changes in Apartment Gas Consumption
Between 2007 Test Year Budget and 2006 Bridge Year Estimate (10^6 m^3)

<u>Factors</u>	<u>Total Volume</u> (10^6 m^3)	
DSM Initiatives	(2.7)	
Economics, Gas Appliances (a)	1.4	
Other Conservation (b)	0.0	*
Gas Prices	(2.5)	
Growth Initiatives or Added Load (c)	0.0	
Total	(3.8)	

- (a) Measured by economic variables as explained at Exhibit C2, Tab 3, Schedule 2, to reflect the demand for Gas Appliances or Gas Technologies, to capture the historical actual average trend of the apartment's sector average use, such as transfer gains/losses impact on average uses, vacancy rate, and construction trend.
- (b) Other Conservation includes the expected ongoing technology improvements of furnaces, and conservation initiatives originated by customers or as a result of government programs, such as programmable thermostats, improved building envelopes, low-flow showerheads, and building renovations.
- (c) Added Load is based on the Company's Utility Growth Plan initiatives developed by the Opportunity Development group. See Exhibit D1, Tab 8, Schedule 1, for detailed information about these added load programs.

* Less than $50,000 \text{ m}^3$

Witnesses: I. Chan
T. Ladanyi

Table 5
 Factors Influencing the Changes in Commercial Gas Consumption
Between 2007 Test Year Budget and 2006 Bridge Year Estimate (10^6 m^3)

Factors	Total Volume (10^6 m^3)
DSM Initiatives	(11.7)
Economics, Gas Appliances (a)	4.8
Other Conservation (b)	(6.4)
Gas Prices	(0.6)
Growth Initiatives or Added Load (c)	0.2
Total	(13.7)

- (a) Economics variables are used to measure the demand for Gas Appliances or Gas Technologies, to capture the historical actual average trend of the commercial's sector average use, such as transfer gains/losses impact on average uses, vacancy rate, and construction trend.
- (b) Other Conservation includes the expected ongoing technology improvements of furnaces, and conservation initiatives originated by customers or as a result of government programs, such as programmable thermostats, improved building envelopes, office space requirements, and building renovations.
- (c) Added Load is based on the Company's Utility Growth Plan initiatives developed by the Opportunity Development group. See Exhibit D1, Tab 8, Schedule 1, for detailed information about these added load programs.

Witnesses: I. Chan
 T. Ladanyi

Table 6
 Factors Influencing the Changes in Industrial Gas Consumption
 Between 2007 Test Year Budget and 2006 Bridge Year Estimate (10⁶ m³)

Factors	Total Volume (10 ⁶ m ³)
DSM Initiatives	(1.4)
Economics, Gas Appliances (a)	2.7
Other Conservation (b)	(0.6)
Gas Prices	(0.3)
Growth Initiatives or Added Load (c)	0.0
Total	0.4

- (a) Economics variables are used to measure the demand for Gas Appliances or Gas Technologies, to capture the historical actual average trend of the industrial sector average use, such as transfer gains/losses impact on average uses, vacancy rate, and construction trend.
- (b) Other Conservation includes the technology improvements of furnaces, and self-imposed conservation activities, such as change in process, programmable thermostats, improved building envelopes, and building renovations.
- (c) Added Load is based on the Company's Utility Growth Plan initiatives developed by the Opportunity Development group. See Exhibit D1, Tab 8, Schedule 1, for detailed information about these added load programs.

Witnesses: I. Chan
 T. Ladanyi

Evaluation of Forecast Accuracy – Historical Normalized Actual vs. Board Approved Budget

17. Board Approved volumes for the periods prior to 2006 were developed and approved based upon fiscal year information (i.e. September 30 fiscal year end). The information shown in this section are presented on a fiscal-year basis.
18. Exhibit C5, Tab 2, Schedule 6, illustrates 11 years of Normalized Actual vs. Board Approved volumes to evaluate accuracy of previous forecast. Other than the unexpected, historic high natural gas prices that occurred in 2001 (Table 7 below and Figure 1 on page 4) that increased volumetric variances significantly, the average normalized percentage error variances between 2002 and 2005 were only 0.7% or 21 m³ and 0.6% or 132 m³ for Rate 1 and Rate 6 average use per customer, respectively. Excluding the high and volatile gas prices periods of both 2001 and 2005, average normalized percentage error variances between 2002 and 2004 were merely 0.2% or 6 m³ and 0.4% or 87 m³ for Rate 1 and Rate 6 average use per customer, respectively.

Table 7
Real Natural Gas Price - Residential
Year over Year Percentage Change

<u>Fiscal Year¹</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>Reference</u>
2007 Budget	9.6%	45.6%	-21.2%	15.0%	2.1%	8.5%	13.4%	8.5%	8.5%	Exhibit C2, Tab 3, Schedule 1
2006 Budget	9.6%	45.6%	-21.2%	15.0%	2.1%	6.4%	-3.0%	-1.8%		EB-2005-0001, Exhibit A2, Tab 2, Schedule 2
2005 Budget	9.6%	45.6%	-21.2%	15.0%	-0.3%	-3.9%				RP-2003-0203, Exhibit A2, Tab 2, Schedule 2

Note

1. The information reported here is on a fiscal year basis in order to be consistent with previous years filed rate case information.

Highlighted cells represent forecast numbers that underpin the corresponding Test Year Budget.

Witnesses: I. Chan
T. Ladanyi

19. The principal reasons why Board Approved budget numbers were higher than the actuals in recent years were mainly due to the unexpected increase in gas prices in 2001 and 2005 and unexpected customer migration (back and forth) between contract rates and general service Rate 6 for various business reasons as discussed earlier in this evidence. Table 7 illustrates that 2005's gas prices were under-forecast by 14.8% on a cumulative percentage point basis including 2004's under-forecast numbers.
20. Exhibit C5, Tab 2, Schedule 7, illustrates 5 years of Normalized Actual vs. Board Approved volumes for contract customers to evaluate accuracy of previous forecasts. As contract customer migration between rate classes will fluctuate year over year for various business reasons as indicated earlier in this evidence, the historical accuracy of the volumes and reasonableness has been assessed on the total contract market volume level. Other than the unexpected and historic high natural gas prices that occurred in 2001 that increased volumetric variances significantly, the average normalized percentage error variance between 2002 and 2005 was merely 0.3% or $13 \times 10^6 \text{m}^3$.
21. Other reasons why Board Approved budget numbers were higher than the actuals recent years were unexpected loss of large volume customers and rate switching between General Service and Contract Rates due to various economic factors, such as high gas prices, the strong Canadian Dollar, and stiff global competition; partially offset by new customers and added load initiatives.
22. As some large contract customers in the Company's franchise area are satellite locations or subsidiaries for multi-national corporations, decisions on their viability is being made from corporate headquarters. Consequently, the Company's local

customers have forecast their volumetric needs on their best projections for their own company; they may or may not, however, be able to forecast their continued operation within the overall plan of their parent organization two years in advance of the test year budget.

Demand Forecast Methodology

23. The general service volumes were derived using the Company developed regression models. The regression model methodology was introduced in RP-2000-0040 and has been used and accepted by the Ontario Energy Board since then. Consistent with previous rate cases, developing the forecasting model is an on-going process. This model passes a battery of statistical tests and is valid given the current and historical information. The model continues to be evaluated, tested, and refined as new information becomes available since it has also been estimated over a volatile period in history – recent years of unexpected, volatile and historic high gas prices. The regression models' results were used to forecast the year over year change in residential average uses.
24. Historical in-sample forecast results (Table 4, Exhibit C2, Tab 3, Schedule 1, and Table 5, Exhibit C2, Tab 3, Schedule 2) demonstrate average in-sample forecast error for both Rate 1 and Rate 6 at less than 1 percent on average during 2001 to 2005. This is a strong indication that the regression model continues to be an excellent predictor of general service average use. The evidence for the 2007 average use forecasting methodology and the general service rate classes (Rate Class 1 and 6) are filed at Exhibit C2, Tab 3, Schedule 1 and Exhibit C2, Tab 3, Schedule 2, respectively.

25. Annual econometric models were employed to model and quantify the impact of various driver variables on average residential use per customer. The forecast incorporated economic assumptions from *Economic Outlook, Winter 2006*, as it was the latest information available at the time the forecast was developed.
26. The major driver variables in the Rate 1 models are balance point heating degree days, vintage, employment, and real energy prices. The vintage variable was constructed to reflect the impact of new homes associated with more energy efficient gas equipment over time. Gas equipment includes gas furnaces, water heaters, and stoves, etc. Higher energy prices would encourage customers to conduct more conservation activities. The employment variable impacts average use given that additional gas appliances, like pool heaters, would be more affordable under favourable economic conditions, and in conjunction with the Company's Utility Growth Plan initiatives, would increase average use.
27. It has been difficult to accurately forecast the average uses in Rate 6 due to the heterogeneous mix of customers, recent trends in construction, and an unexpected switching between general service and contract rates due to changes in customers' requirements. In order to address the difficulty in accurately forecasting the average uses in this rate class, the Company developed regression models for each revenue class in Rate 6. The forecasting models address the diverse customer mix and the impacts of the recent construction trends in average use in this rate class based on historical experience. Some of the driver variables influencing average uses include real domestic product, retail sales, employment and conservation.
28. The volumes in the contract market were generated through the traditional grass roots approach. Volumes are forecast on an individual customer basis by account

executives through consultation with customers during the budget process. Specifically, each account executive reviews the contract attributes (e.g., rate and plan type) with each customer in order to ensure that each customer can meet its contracted rate class's minimum volume and load factor requirements on a consistent basis. Then, the account executives incorporate all the customer's current economic or industry condition for the customer's business, predicted economic or industry condition, budgeted degree days, and the best known information about customer's requirements into the budget.

Comparison of 2006 Estimate and 2005 Actual

29. The 2006 Bridge Year volumes of $11\,875.1\ 10^6\text{m}^3$ are $334.7\ 10^6\text{m}^3$ or 2.7% below the 2005 Actual of $12\,209.8\ 10^6\text{m}^3$. The unfavourable variance is primarily due to an unexpectedly warmer winter in 2006 than in 2005. On a weather-normalized basis the 2006 Bridge Year volumes are $8.6\ 10^6\text{m}^3$ or 0.1% below the 2005 Actual. This variance is primarily due to a lower demand in the contract market of $51.8\ 10^6\text{m}^3$ as a result of the historic level of natural gas prices, a strong Canadian dollar, and stiff global competition. This underage is partially offset by an increase in the General Service volume of $43.2\ 10^6\text{m}^3$ driven by customer growth and added volumes based upon the Utility growth plan; partially offset by the continued decline in average use (Figure 1 on page 4). Further rate class detail and explanation are provided at Exhibit C4, Tab 2, Schedule 3.

Comparison of 2006 Estimate and 2006 Board Approved

30. The 2006 Bridge Year volume has incorporated the full year of 2005 actual information. When comparing 2006 Bridge Year estimate developed in March 2006 with the Board Approved budget developed in October 2004, the estimated volumes of $11\,875.1\ 10^6\text{m}^3$ are $445.6\ 10^6\text{m}^3$ or 3.6% below the 2006 Board Approved budget

of $12\,320.7\,10^6\text{m}^3$. The decrease on a normalized basis, is comprised of a decrease in the contract market of $271.4\,10^6\text{m}^3$ and a decrease in general service volumes of $174.2\,10^6\text{m}^3$. Further rate class detail and explanations are provided at Exhibit C4, Tab 2, Schedule 5.

31. Unexpectedly high natural gas prices were the main contributor to the unfavourable general service volumetric variances as demonstrated in Table 7 on page 12. Specifically, real residential gas prices were under-forecast by 18.5% on a cumulative percentage point basis including 2005's under-forecast numbers. The estimated volumetric impact is $106\,10^6\text{m}^3$. Lower customer attachments in the 2006 Estimate have also contributed to the volume decline. Please refer to Exhibit B4, Tab 2, Schedule 3, for a comparison of customer additions.
32. The underage in the contract market is primarily due to historic high natural gas prices, a strong Canadian dollar and stiff global competition. In addition to these driver variables, there are other operational reasons behind the reduction in change in use. Specifically, there is an unexpected reduction in one new large distributed energy customer in commercial sector of $87.4\,10^6\text{m}^3$ as a result of change in usage, a reduction of one transportation equipment customer of $17.7\,10^6\text{m}^3$ due to economic reasons, and two large industrial customers that experienced a disruption in their production facilities or operation of $38.5\,10^6\text{m}^3$.

Weather Normalization Methodology

33. This evidence explains the methodology of normalizing actual consumption for each of the general service rate classes and uses an example to describe the mathematics of the normalization process. General Service normalization is conducted on customers at a group, rather than an individual customer level. The

Company's General Service customers are grouped together into homogenous classes of gas usage within the six regions of the Company's franchise area. Only the heat sensitive portion of consumption is normalized using heat sensitive or balance point degree days.² An example of the methodology is illustrated below.

34. Firstly, the total load per customer of a customer group is calculated by dividing the group's consumption by the total customers within this group. Then, baseload per customer is calculated by taking an average of the two non-weather sensitive summer months' that is, July and August total load. Baseload represents non-weather sensitive load, such as, water heating, cooking and other non-heating uses. For the other ten months of the year, heatload per customer is calculated by subtracting the baseload per customer from the total load per customer. This heatload represents the heat sensitive portion of consumption. By dividing the heatload per customer by actual heating degree days, an actual use per degree day is generated. The actual use per degree day is then adjusted to reflect normal weather by multiplying the budget heating degree days. Consequently, total normalized average use per customer is defined as an aggregate sum of baseload use per customer and normalized heatload per customer.

² Please see the response to VECC Interrogatory # 4 at EB-2005-0001, Exhibit I, Tab 25, Schedule 4, for the definition of the heat sensitive or balance point degree days prepared by Economic and Market Analysis group.

Matthew Makos

From: Connie Burns [mcburns1@duke-energy.com]
Sent: Tuesday, November 28, 2006 8:34 AM
To: mnlowry@earthlink.net
Cc: Laurie Klein; Nancy Santos
Subject: Incentive Regulation - November 24th Meeting Follow Up

Per the request at Friday's meeting, please find attached the miscellaneous non-energy charge schedule.

Thx
Connie

Connie Burns
Manager Regulatory Initiatives
Union Gas Limited (a Duke Energy Company)
Chatham, Ontario
Phone: 519-436-5382

Matthew Makos

From: Nancy Santos [nsantos@duke-energy.com]
Sent: Thursday, December 07, 2006 1:51 PM
To: mnlowry@earthlink.net
Subject: FW: TFP Study

[Here is the email I sent yesterday.](#) Hope to hear from you.

[Nancy](#)

From: Nancy Santos
Sent: December 6, 2006 2:49 PM
To: mnlowry@earthlink.net
Cc: Connie Burns
Subject: TFP Study

Mark

Union would like to have a discussion with you regarding some specific requests identified in Laurie Klein's data request. Based on our group's schedule, the most convenient date would be Monday December 11. Please advise whether this date is convenient for you and I will send a meeting request with a conference call number. If this date does not work, please identify an alternative date which is more accomdating.

Thanks,

Nancy Santos, CMA

Coordinator - Regulatory Initiatives

☎ (519) 436-4600 ext.2719

📠 (519) 436-5353

✉ nsantos@uniongas.com

Matthew Makos

From: Nancy Santos [nsantos@duke-energy.com]
Sent: Friday, December 08, 2006 8:28 AM
To: Mark Lowry
Subject: RE: TFP Study

Mark,

Did you receive the meeting notice I sent out yesterday?

Nancy

From: Mark Lowry [mailto:mnlowry@earthlink.net]
Sent: December 7, 2006 3:54 PM
To: Nancy Santos
Subject: RE: TFP Study

Hi Nancy,

I went back to check and found that I had inadvertently deleted your message.

From: Nancy Santos [mailto:nsantos@duke-energy.com]
Sent: Wednesday, December 06, 2006 1:49 PM
To: mnlowry@earthlink.net
Cc: Connie Burns
Subject: [Norton AntiSpam] TFP Study

Mark

Union would like to have a discussion with you regarding some specific requests identified in Laurie Klein's data request. Based on our group's schedule, the most convenient date would be Monday December 11. Please advise whether this date is convenient for you and I will send a meeting request with a conference call number. If this date does not work, please identify an alternative date which is more accomdating.

Thanks,

Nancy Santos, CMA

Coordinator - Regulatory Initiatives

☎ (519) 436-4600 ext.2719

📠 (519) 436-5353

✉ nsantos@uniongas.com

Matthew Makos

From: Nancy Santos [nsantos@duke-energy.com]
Sent: Thursday, December 14, 2006 12:32 PM
To: Mark Lowry
Cc: Connie Burns; Mike Packer
Subject: RE: Responses and Followup Items from Conference Call

Dr. Lowry,

We will be unable to schedule a call tomorrow afternoon; unfortunately, we will have to continue our communication through email at this time.

We would appreciate your decision on the Revenue and Throughput issue: total customers, throughput and revenue or the same information by rate class? The decision would help our folks start their data search based on the format.

Let me know if you have any questions.

Nancy

From: Mark Lowry [mailto:mnlowry@earthlink.net]
Sent: December 13, 2006 5:26 PM
To: Nancy Santos
Subject: RE: Responses and Followup Items from Conference Call

That's fine, Nancy

From: Nancy Santos [mailto:nsantos@duke-energy.com]
Sent: Wednesday, December 13, 2006 3:03 PM
To: Mark Lowry
Cc: Connie Burns; Mike Packer
Subject: Responses and Followup Items from Conference Call

Dr. Lowry,

We have documented the discussion held on Monday Dec 11 in the attached document. I have identified the data that Union cannot provide and noted the data that Union has committed to supplying. In addition, I have identified follow up items for both Union and yourself.

We would like to hold another call shortly, to discuss the follow-up items and address the miscellaneous questions which were not discussed on Monday. We are proposing Friday afternoon between 2 – 4pm. Please advise whether this time is convenient.

Nancy Santos, CMA

Coordinator - Regulatory Initiatives

☎ (519) 436-4600 ext.2719

📠 (519) 436-5353

✉ nsantos@uniongas.com

Matthew Makos

From: Nancy Santos [nsantos@spectraenergy.com]
Sent: Tuesday, January 09, 2007 12:51 PM
To: Mark Lowry
Cc: Connie Burns
Subject: Data Inputs

Mark

I left you a voice mail this morning regarding the Union's data input sheet that I had sent on December 21. It seems that I sent you my working document which is a detailed version vs the summarized version I intended to send you. Attached is the summarized data sheet, which does not include any revenue info and I have also identified some additional data (ex. DSM volumes saved, O&M expenditures broken out). Please see attached sheet and give me a call if you have any questions regarding the information.

My apologies for the mishap, it seems that the file names were almost identical and I grabbed the wrong one. I was trying to make life easier for you and I obviously did not succeed.

Nancy Santos, CMA

Coordinator - Regulatory Initiatives

☎ (519) 436-4600 ext.2719

📠 (519) 436-5353

✉ nsantos@uniongas.com

9/21/2007

Matthew Makos

From: Nancy Santos [nsantos@spectraenergy.com]
Sent: Friday, January 12, 2007 2:47 PM
To: Mark Lowry
Cc: Connie Burns; Mike Packer; Terry Laframboise; Al McFadden
Subject: Updated - Union Data Inputs & Gross Plant/Accumulated Depreciation Continuity Schedules

Dr. Lowry,

Attached you will find an updated data sheet for Union. I have highlighted new information in yellow.

1. Storage & Transportation Revenues have been added. Please note that the revenue is reported net of customer supplied fuel and that the storage revenue is reported net of margin sharing and rebates. As noted in the NGEIR decision (p.107), after 2007, Union's share of Long Term Storage margin as a result of storage sales to ex-franchise customers will be; 2008 – 25%, 2009 - 50%, 2010 – 75% and 2011 – 100%. The Board concluded that sharing will continue for short term storage deals (90% to customer, 10% to shareholder).
2. We have updated the Gross Distribution Plant for the years 2000 & 2001 due to some minor inconsistencies found in the information.
3. Also, per your request, we are forwarding Gross Plant and Accumulated Depreciation Schedules for the period of Dec 31/96 – Dec 31/05. The continuity schedules are the most current data that have been adjusted for minor inconsistencies from the data input sheets identified above.

We are still working on the following and will forward the information as soon as available.

- Compiling distribution revenues by rate class and by component.
- Total O&M, Total Pension, and Benefits exclusive of DSM and water heater rentals (if we can do this).

Please advise that you have received the information. Let me know if you have any questions with the attached information.

Nancy Santos, CMA

Coordinator - Regulatory Initiatives

☎ (519) 436-4600 ext.2719

📠 (519) 436-5353

✉ nsantos@uniongas.com

9/21/2007

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Wednesday, January 17, 2007 1:44 PM
To: mnlowry@earthlink.net; Laurie Klein
Cc: Mike Packer; Nancy Santos
Subject: EB-2006-0209 Incentive Regualtion TFP Study Data

Dr. Lowry

I have attached our responses to the questions contained in your letter to Nancy Santos dated January 14, 2007; an updated Union Data Input Sheet and transcripts from the RP-1999-0017 PBR proceeding that include the Christensen panel.

If you have any additional questions, please do not hesitate to call.

Connie

Connie Burns
Manager Regulatory Initiatives
Union Gas Limited (a Duke Energy Company)
Chatham, Ontario
Phone: 519-436-5382

9/21/2007

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Monday, January 22, 2007 2:44 PM
To: mnlowry@earthlink.net; Laurie Klein
Cc: Mike Packer; Nancy Santos
Subject: TFP Study - January 14, 2007 Request: January 22, 2007 Responses to Outstanding and New Questions
Follow Up Flag: Follow up
Flag Status: Completed

I have attached an updated Union Data Input Sheet that provides the Distribution New Business for the years 1997 to 2005 (highlighted in yellow). The only outstanding item is the taxes portion of Question #24 which is still being worked on. I have also updated the letter as a means to keep track of outstanding items.

Mark, please confirm that you received the data on Friday and today's data.

Thx
Connie

Connie Burns
Manager Regulatory Initiatives
Union Gas Limited (a Spectra Energy Company)
Chatham, Ontario
Phone: 519-436-5382

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Monday, January 22, 2007 2:44 PM
To: mnlowry@earthlink.net; Laurie Klein
Cc: Mike Packer; Nancy Santos
Subject: TFP Study - January 14, 2007 Request: January 22, 2007 Responses to Outstanding and New Questions
Follow Up Flag: Follow up
Flag Status: Completed

I have attached an updated Union Data Input Sheet that provides the Distribution New Business for the years 1997 to 2005 (highlighted in yellow). The only outstanding item is the taxes portion of Question #24 which is still being worked on. I have also updated the letter as a means to keep track of outstanding items.

Mark, please confirm that you received the data on Friday and today's data.

Thx
Connie

Connie Burns
Manager Regulatory Initiatives
Union Gas Limited (a Spectra Energy Company)
Chatham, Ontario
Phone: 519-436-5382

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Monday, January 22, 2007 2:44 PM
To: mnlowry@earthlink.net; Laurie Klein
Cc: Mike Packer; Nancy Santos
Subject: TFP Study - January 14, 2007 Request: January 22, 2007 Responses to Outstanding and New Questions
Follow Up Flag: Follow up
Flag Status: Completed

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Mark, please confirm that you received the data on Friday and today's data.

Thx
Connie

Connie Burns
Manager Regulatory Initiatives
Union Gas Limited (a Spectra Energy Company)
Chatham, Ontario
Phone: 519-436-5382

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Tuesday, January 30, 2007 10:40 AM
To: Mark Lowry
Cc: Nancy Santos
Subject: RE: TFP Data Outstanding Info
Follow Up Flag: Follow up
Flag Status: Completed

Yes, we can provide that tax expense that would have been reported on the income statement.

Connie Burns
 Manager Regulatory Initiatives
 Union Gas Limited (a Spectra Energy Company)
 Chatham, Ontario
 Phone: 519-436-5382

From: Mark Lowry [mailto:mnlowry@earthlink.net]
Sent: January 30, 2007 11:37 AM
To: Connie Burns
Subject: RE: TFP Data Outstanding Info

Hi Connie,

Tax data are used in our research only to increase the weight assigned to capital. Accordingly, they need not be the subject of a great deal of effort. In our U.S. gas industry research we use the net taxes that would be reported on the income statement. Hopefully this will make things easier for you.

P.S. I hope to follow up on your last letter later today.

From: Connie Burns [mailto:mcburns1@spectraenergy.com]
Sent: Tuesday, January 30, 2007 9:05 AM
To: mnlowry@earthlink.net
Cc: Nancy Santos
Subject: TFP Data Outstanding Info
Importance: High

The one outstanding piece of information is taxes. This was not part of your original request and we need to understand what you are looking for.

The tax information that we had sent to you in error (1997-2002) still had some outstanding issues:

- Was trying to get to a number that reflected cash flow as opposed to the tax expense number that would be reported on the financial statements
- May not be what you are looking for
- Was a fairly complicated calculation to get to this number
- Was very draft and at the time it was put together there was no consensus as to how to provide the tax data

Please note that we are experiencing issues with availability of someone (both the Finance and Tax Department) to work on this as they are under pressure due to year end reporting requirements and auditors.

9/21/2007

Connie

Connie Burns
Manager Regulatory Initiatives
Union Gas Limited (a Spectra Energy Company)
Chatham, Ontario
Phone: 519-436-5382

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Friday, February 02, 2007 9:49 AM
To: Mark Lowry
Subject: RE: Request from Jan. 26 letter
Follow Up Flag: Follow up
Flag Status: Completed

Let's set it up for 3 P.M. today. If you give me your number, we will call you. We have a new conference call system here and I don't want to try it out today in case there are problems.

Connie

Connie Burns
Manager Regulatory Initiatives
Union Gas Limited (a Spectra Energy Company)
Chatham, Ontario
Phone: 519-436-5382

From: Mark Lowry [mailto:mnlowry@earthlink.net]
Sent: February 2, 2007 10:34 AM
To: Connie Burns
Subject: RE: Request from Jan. 26 letter

Hi Connie,

The time that I am unavailable today is 12:00-2:00 Eastern.

One quick question: we were wondering if the numbers for the transmission and contract demand were mislabeled since the storage numbers were much larger than the volume numbers.

From: Connie Burns [mailto:mcburns1@spectraenergy.com]
Sent: Friday, February 02, 2007 7:32 AM
To: Mark Lowry
Subject: RE: Request from Jan. 26 letter

Yesterday I sent you the weather normalized volumes by general service, contract and wholesale. I can also send you the actual volumes which would tie to line item 2.2 on the data input sheet. Is this what you are looking for?

Connie

Connie Burns
Manager Regulatory Initiatives
Union Gas Limited (a Spectra Energy Company)
Chatham, Ontario
Phone: 519-436-5382

From: Mark Lowry [mailto:mnlowry@earthlink.net]
Sent: February 1, 2007 5:22 PM
To: Connie Burns

9/21/2007

Subject: FW: Request from Jan. 26 letter

FYI This is what Union sent, which is just about perfect.

Yours doesn't have to be identical but it now that I know more about the breakdown of your distribution volume it seems that we need at least a breakdown of volumes between general service and contract and wholesale 1999-2005.

From: Richard Campbell [mailto:Richard.Campbell@enbridge.com]
Sent: Thursday, February 01, 2007 8:16 AM
To: mnlowry@earthlink.net
Subject: Request from Jan. 26 letter

R. J. Campbell
 Manager, Regulatory Policy & Research
 phone: 416-495-5173
 email: richard.campbell@enbridge.com

----- Forwarded by Richard Campbell/GAS/Enbridge on 02/01/2007 09:16 AM -----

Jackie Collier/GAS/Enbridge

To Richard Campbell/GAS/Enbridge@Enbridge

cc Malini Giridhar/GAS/Enbridge@Enbridge

01/31/2007 04:48 PM

Subject Lowry Request from Jan. 26 letter

Hi Rick,

Attached is an updated schedule which provides forecast customer numbers, contract demands and volumes by rate class from 2000 to 2006. Also updated are the revenue by customer, demand and volumetric charges by rate class for 2000 to 2006. I have included two new columns which includes our Rates 300/305 which have been used to bill curtailed delivered supply and Rate 325 our ex-franchise storage. The total revenue and volumes match what was presented to response #10 from our original response to Dr. Lowry for "Board Order Distribution Revenue Requirement.". These numbers represent the gross margin for EGD and therefore they do not match the "Distribution Revenues" which I sent to you on December 22. The distribution revenues include some non utility costs such as storage and lost and unaccounted for gas and therefore do not represent the "gross margin" for the utility.

Please let me now if you need anything else.

Jackie Collier
 Manager Rate Design
 Enbridge Gas Distribution
 (416) 753-7322

9/21/2007

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Friday, February 02, 2007 10:11 AM
To: Mark Lowry
Subject: RE: Request from Jan. 26 letter
Follow Up Flag: Follow up
Flag Status: Completed

Storage Demand Volumes – This volume represents the maximum storage quantity that was contracted for by *ex-franchise* customers for the indicated period. In other words the number provided is the maximum that they can put into storage at any given time.

Transmission Demand Volumes – This volume represents the **daily maximum quantity** (“DCQ”) of gas that was contracted for by ex-franchise customers to be transported for the periods indicated.

It really represents two different things.

I hope this helps.

Connie

Connie Burns
Manager Regulatory Initiatives
Union Gas Limited (a Spectra Energy Company)
Chatham, Ontario
Phone: 519-436-5382

From: Mark Lowry [mailto:mnlowry@earthlink.net]
Sent: February 2, 2007 10:34 AM
To: Connie Burns
Subject: RE: Request from Jan. 26 letter

Hi Connie,

The time that I am unavailable today is 12:00-2:00 Eastern.

One quick question: we were wondering if the numbers for the transmission and contract demand were mislabeled since the storage numbers were much larger than the volume numbers.

From: Connie Burns [mailto:mcburns1@spectraenergy.com]
Sent: Friday, February 02, 2007 7:32 AM
To: Mark Lowry
Subject: RE: Request from Jan. 26 letter

Yesterday I sent you the weather normalized volumes by general service, contract and wholesale. I can also send you the actual volumes which would tie to line item 2.2 on the data input sheet. Is this what you are looking for?

Connie

9/21/2007

Connie Burns
 Manager Regulatory Initiatives
 Union Gas Limited (a Spectra Energy Company)
 Chatham, Ontario
 Phone: 519-436-5382

From: Mark Lowry [mailto:mnlowry@earthlink.net]
Sent: February 1, 2007 5:22 PM
To: Connie Burns
Subject: FW: Request from Jan. 26 letter

FYI This is what Union sent, which is just about perfect.

Yours doesn't have to be identical but it now that I know more about the breakdown of your distribution volume it seems that we need at least a breakdown of volumes between general service and contract and wholesale 1999-2005.

From: Richard Campbell [mailto:Richard.Campbell@enbridge.com]
Sent: Thursday, February 01, 2007 8:16 AM
To: mnlowry@earthlink.net
Subject: Request from Jan. 26 letter

R. J. Campbell
 Manager, Regulatory Policy & Research
 phone: 416-495-5173
 email: richard.campbell@enbridge.com

----- Forwarded by Richard Campbell/GAS/Enbridge on 02/01/2007 09:16 AM -----

Jackie Collier/GAS/Enbridge

To Richard Campbell/GAS/Enbridge@Enbridge

CC Malini Giridhar/GAS/Enbridge@Enbridge

01/31/2007 04:48 PM

Subject Lowry Request from Jan. 26 letter

Hi Rick,

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Please let me now if you need anything else.

9/21/2007

Jackie Collier
Manager Rate Design
Enbridge Gas Distribution
(416) 753-7322

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Friday, February 02, 2007 9:27 AM
To: Mark Lowry
Subject: Conference call
Follow Up Flag: Follow up
Flag Status: Completed

I need some clarification concerning some of your additional questions and would like to set up a call. When would be available? I would like to include Mark Kitchen from our rates group in the call as he has a much better understanding of the revenues and rates than I do.

Connie

Connie Burns
Manager Regulatory Initiatives
Union Gas Limited (a Spectra Energy Company)
Chatham, Ontario
Phone: 519-436-5382

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Friday, February 02, 2007 10:14 AM
To: Mark Lowry
Subject: RE: Request from Jan. 26 letter
Follow Up Flag: Follow up
Flag Status: Completed

Thx. We will call at 3 today.

Connie

Connie Burns
Manager Regulatory Initiatives
Union Gas Limited (a Spectra Energy Company)
Chatham, Ontario
Phone: 519-436-5382

From: Mark Lowry [mailto:mnlowry@earthlink.net]
Sent: February 2, 2007 11:02 AM
To: Connie Burns
Subject: RE: Request from Jan. 26 letter

608.257.1522 ext. 23

From: Connie Burns [mailto:mcburns1@spectraenergy.com]
Sent: Friday, February 02, 2007 9:49 AM
To: Mark Lowry
Subject: RE: Request from Jan. 26 letter

Let's set it up for 3 P.M. today. If you give me your number, we will call you. We have a new conference call system here and I don't want to try it out today in case there are problems.

Connie

Connie Burns
Manager Regulatory Initiatives
Union Gas Limited (a Spectra Energy Company)
Chatham, Ontario
Phone: 519-436-5382

From: Mark Lowry [mailto:mnlowry@earthlink.net]
Sent: February 2, 2007 10:34 AM
To: Connie Burns
Subject: RE: Request from Jan. 26 letter

Hi Connie,

The time that I am unavailable today is 12:00-2:00 Eastern.

One quick question: we were wondering if the numbers for the transmission and contract demand were

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misabeled since the storage numbers were much larger than the volume numbers.

From: Connie Burns [mailto:mcburns1@spectraenergy.com]
Sent: Friday, February 02, 2007 7:32 AM
To: Mark Lowry
Subject: RE: Request from Jan. 26 letter

Yesterday I sent you the weather normalized volumes by general service, contract and wholesale. I can also send you the actual volumes which would tie to line item 2.2 on the data input sheet. Is this what you are looking for?

Connie

Connie Burns
 Manager Regulatory Initiatives
 Union Gas Limited (a Spectra Energy Company)
 Chatham, Ontario
 Phone: 519-436-5382

From: Mark Lowry [mailto:mnlowry@earthlink.net]
Sent: February 1, 2007 5:22 PM
To: Connie Burns
Subject: FW: Request from Jan. 26 letter

FYI This is what Union sent, which is just about perfect.

Yours doesn't have to be identical but it now that I know more about the breakdown of your distribution volume it seems that we need at least a breakdown of volumes between general service and contract and wholesale 1999-2005.

From: Richard Campbell [mailto:Richard.Campbell@enbridge.com]
Sent: Thursday, February 01, 2007 8:16 AM
To: mnlowry@earthlink.net
Subject: Request from Jan. 26 letter

R. J. Campbell
 Manager, Regulatory Policy & Research
 phone: 416-495-5173
 email: richard.campbell@enbridge.com

----- Forwarded by Richard Campbell/GAS/Enbridge on 02/01/2007 09:16 AM -----

Jackie Collier/GAS/Enbridge

To Richard Campbell/GAS/Enbridge@Enbridge

cc Malini Giridhar/GAS/Enbridge@Enbridge

01/31/2007 04:48 PM

Subject Lowry Request from Jan. 26 letter

Hi Rick,

Attached is an updated schedule which provides forecast customer numbers, contract demands and volumes by

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rate class from 2000 to 2006. Also updated are the revenue by customer, demand and volumetric charges by rate class for 2000 to 2006. I have included two new columns which includes our Rates 300/305 which have been used to bill curtailed delivered supply and Rate 325 our ex-franchise storage. The total revenue and volumes match what was presented to response #10 from our original response to Dr. Lowry for "Board Order Distribution Revenue Requirement.". These numbers represent the gross margin for EGD and therefore they do not match the "Distribution Revenues" which I sent to you on December 22. The distribution revenues include some non utility costs such as storage and lost and unaccounted for gas and therefore do not represent the "gross margin" for the utility.

Please let me know if you need anything else.

Jackie Collier
Manager Rate Design
Enbridge Gas Distribution
(416) 753-7322

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Friday, February 02, 2007 10:22 AM
To: Mark Lowry
Subject: RE: Responses
Follow Up Flag: Follow up
Flag Status: Completed

Thx Mark. I have someone working on the same for Union. We are starting at 1950 but could go back earlier if necessary.

Connie

Connie Burns
 Manager Regulatory Initiatives
 Union Gas Limited (a Spectra Energy Company)
 Chatham, Ontario
 Phone: 519-436-5382

From: Mark Lowry [mailto:mnlowry@earthlink.net]
Sent: February 2, 2007 11:20 AM
To: Connie Burns
Subject: FW: Responses

This table might also interest you. It reveals that customer additions have been much larger in recent years than in the early natural gas era, even for Enbridge.

From: Richard Campbell [mailto:Richard.Campbell@enbridge.com]
Sent: Monday, January 29, 2007 4:30 PM
To: mnlowry@earthlink.net
Subject: Responses

Mark:

Customer numbers data attached, starting in 1954 and with gaps for '64 and '65.

Our Manager, Regulatory Accounting provides some additional responses below. More to come asap.

R. J. Campbell
 Manager, Regulatory Policy & Research
 phone: 416-495-5173
 email: richard.campbell@enbridge.com

----- Forwarded by Richard Campbell/GAS/Enbridge on 01/29/2007 05:28 PM -----

Kevin Culbert/GAS/Enbridge

To Richard Campbell/GAS/Enbridge@Enbridge

CC Doreen Cho/GAS/Enbridge@Enbridge, Ryan Small/GAS/Enbridge@Enbridge

01/29/2007 04:31 PM

Subject Lowry info

9/21/2007

We have collected more plant data for the fiscal years 1990, 1991, 1993, 1994 and 1995. We are still looking for 1989 and 1992 and hope to have that info for Wednesday. Can you alert Lowry and inform him that this is as far back as we can provide.

With respect to further page 4 questions. The general plant category "SIM" was a variety of System Information Management projects, mostly of a software nature, separate and distinct from the CIS system. These projects were essentially depreciated or amortized by the end of fiscal 2003 or 2004. The computer equipment asset category now contains any software type applications or capital amounts incurred.

In the year 2000, when certain other A&G services were transferred to EI there was no appreciable amount of general plant transferred (other than the rental program and services businesses I mean). For other services, an elimination of non-utility assets has occurred each year for rate setting purposes from that time on for any assets which non-utility services are utilizing.

With respect to the page 5 question about itemizing plant additions for leave to constructs - we (reg. acctg) do not have any more detail than what we have been able to provide.

For the question on page 6 about CIS cwip amount. No it was never part of gross plant additions as the rate base schedules we have provided only include amounts closed into service within rate base. The CIS system was never part of additions into rate base.

We will provide you with hard copies of the remaining plant information we have by Wed sometime (hopefully - if storage boxes arrive by then).

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Monday, February 05, 2007 1:42 PM
To: Mark Lowry
Cc: Nancy Santos
Subject: RE: Request from Jan. 26 letter
Follow Up Flag: Follow up
Flag Status: Completed

Re: the attached document that Enbridge sent to you. We noted that the data from Enbridge are **forecast** numbers and not actual numbers. All of the information (e.g. revenue, volumes, demand) that Union is sending you is **actual** numbers not forecast numbers.

Connie

Connie Burns
 Manager Regulatory Initiatives
 Union Gas Limited (a Spectra Energy Company)
 Chatham, Ontario
 Phone: 519-436-5382

From: Mark Lowry [mailto:mnlowry@earthlink.net]
Sent: February 1, 2007 5:22 PM
To: Connie Burns
Subject: FW: Request from Jan. 26 letter

FYI This is what Union (s/b Enbridge) sent, which is just about perfect.

Yours doesn't have to be identical but it now that I know more about the breakdown of your distribution volume it seems that we need at least a breakdown of volumes between general service and contract and wholesale 1999-2005.

From: Richard Campbell [mailto:Richard.Campbell@enbridge.com]
Sent: Thursday, February 01, 2007 8:16 AM
To: mnlowry@earthlink.net
Subject: Request from Jan. 26 letter

R. J. Campbell
 Manager, Regulatory Policy & Research
 phone: 416-495-5173
 email: richard.campbell@enbridge.com

----- Forwarded by Richard Campbell/GAS/Enbridge on 02/01/2007 09:16 AM -----

Jackie Collier/GAS/Enbridge

To Richard Campbell/GAS/Enbridge@Enbridge

cc Malini Giridhar/GAS/Enbridge@Enbridge

01/31/2007 04:48 PM

Subject Lowry Request from Jan. 26 letter

9/21/2007

Hi Rick,

Attached is an updated schedule which provides forecast customer numbers, contract demands and volumes by rate class from 2000 to 2006. Also updated are the revenue by customer, demand and volumetric charges by rate class for 2000 to 2006. I have included two new columns which includes our Rates 300/305 which have been used to bill curtailed delivered supply and Rate 325 our ex-franchise storage. The total revenue and volumes match what was presented to response #10 from our original response to Dr. Lowry for "Board Order Distribution Revenue Requirement.". These numbers represent the gross margin for EGD and therefore they do not match the "Distribution Revenues" which I sent to you on December 22. The distribution revenues include some non utility costs such as storage and lost and unaccounted for gas and therefore do not represent the "gross margin" for the utility.

Please let me now if you need anything else.

Jackie Collier
Manager Rate Design
Enbridge Gas Distribution
(416) 753-7322

9/21/2007

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Monday, February 12, 2007 3:00 PM
To: Mark Lowry; Laurie Klein
Cc: Mike Packer; Vanessa Innis
Subject: RE: TFP Data February 5, 2007
Follow Up Flag: Follow up
Flag Status: Completed

Mark,
 I have attached responses to all of your questions except for the question concerning the rise in use of compressor fuel.

Connie

Connie Burns
 Manager Regulatory Initiatives
 Union Gas Limited (a Spectra Energy Company)
 Chatham, Ontario
 Phone: 519-436-5382

From: Mark Lowry [mailto:mnlowry@earthlink.net]
Sent: February 12, 2007 10:47 AM
To: Connie Burns
Cc: mnlowry@earthlink.net
Subject: RE: TFP Data February 5, 2007

Yes. The salary and wage table is attached.

P.S. I would appreciate quick answers to the following questions:

1. rates in which years of the 1999-2005 period reflected a "fresh" rate case?
2. Am I right that Union has been raising customer charges more quickly than volumetric charges?

-----Original Message-----

From: Connie Burns
Sent: Feb 12, 2007 6:38 AM
To: Mark Lowry
Subject: RE: TFP Data February 5, 2007

What does WL stand for – the input price trend for labour? Also, you noted that you provided an attached that show some salary and wage trends but there was no additional attachment with the email.

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Connie

Connie Burns
 Manager Regulatory Initiatives
 Union Gas Limited (a Spectra Energy Company)
 Chatham, Ontario
 Phone: 519-436-5382

From: Mark Lowry [mailto:mnlowry@earthlink.net]
Sent: February 8, 2007 4:59 PM
To: Connie Burns
Subject: RE: TFP Data February 5, 2007

Hi Connie,

Attached are a few followup questions.

FYI Enbridge promises to finalize their data by COB tomorrow. we are now shooting to get our report out to the Board on or about next Wednesday. I am not sure whether the date for the technical conference is fixed.

From: Connie Burns [mailto:mcburns1@spectraenergy.com]
Sent: Tuesday, February 06, 2007 2:36 PM
To: Mark Lowry; Laurie Klein
Cc: Mike Packer; Nancy Santos; Vanessa Innis
Subject: TFP Data February 5, 2007
Importance: High

I have attached the updated Union Input Data Sheet that I neglected to send yesterday with the other info.

Connie

Connie Burns
 Manager Regulatory Initiatives
 Union Gas Limited (a Spectra Energy Company)
 Chatham, Ontario
 Phone: 519-436-5382

From: Connie Burns
Sent: February 5, 2007 3:24 PM
To: 'Mark Lowry'; 'Laurie Klein'
Cc: Mike Packer; Nancy Santos; Vanessa Innis
Subject:

Mark,

I have supplied responses to your last batch of questions in our ongoing letter. I have highlighted your questions and our responses in **yellow** so that they are easier to find. I have also attached:

- Actual detailed revenue by rate class 1999 – 2005
- Actual detailed volumes by rate class 1999 – 2005
- Union Data Input Sheet updated to show the actual distribution contract demand 1999 – 2005

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for in-franchise contract and wholesale customers (see line item 2.2(b))

- Interrogatory response (Document named J14 43) that includes actual Distribution Contract Demand by Rate Class for 2004 & 2005 (please note that this is in 10^3m^3 whereas the Union Data Input Sheet provides the number by 10^6m^3).
- A listing of meters/customers by year. You already have the numbers for 1985 to 2005 (in the data input sheet and the data from the previous Union PBR filing).

Connie

Connie Burns
Manager Regulatory Initiatives
Union Gas Limited (a Spectra Energy Company)
Chatham, Ontario
Phone: 519-436-5382

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Tuesday, February 13, 2007 2:47 PM
To: Mark Lowry
Subject: RE: ROE (?)
Follow Up Flag: Follow up
Flag Status: Completed

The effective allowed rate of return is the Canada Bond Rate plus a percentage for the risk factor. I will be in the office tomorrow and get the calculation for 2007 for you as an example.

Connie

Hi Connie,

Sorry to hear that you are under the weather today. Your voice mail response, together with the document you sent, suggest to me that the data series you have sent entitled "Board Approved Rate of Return", is in fact an authorized return on *equity* that is determined using a Board-approved rate of return. In that event, the effective allowed rate of return (including debt) could be calculated as something like $.50 \times \text{ROE} + .50 \times \text{bond yield}$. Is that right?

Mark Newton Lowry, Partner
Pacific Economics Group, LLC
22 E. Mifflin Street, Suite 302
Madison, WI 53703
608.257.1522 ext. 23

Matthew Makos

From: Vanessa Innis [vinnis@spectraenergy.com]
Sent: Wednesday, February 14, 2007 8:41 AM
To: mnlowry@earthlink.net
Cc: Connie Burns
Subject: ROE
Follow Up Flag: Follow up
Flag Status: Completed

Mark,

To follow-up the voice mail that Mike Packer and I just left for you, the attached Excel spreadsheet shows the calculation of Union's ROE for 2007 (8.54%).

Thanks,

Vanessa

Vanessa Innis

Coordinator, Regulatory Applications
phone 519-436-5334 fax 519-436-5353
email vinnis@uniongas.com

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Thursday, February 22, 2007 2:36 PM
To: Mark Lowry
Cc: Vanessa Innis
Subject: RE: Study
Follow Up Flag: Follow up
Flag Status: Completed

Mark,

I need to leave at lunch tomorrow and I am taking an offsite course on Monday and Tuesday of next week. I can leave the course if necessary so send me an email and I will do my best to get you the info. Also CC Vanessa Innis on any request. She is taking over for Nancy while she is on Maternity Leave.

Connie

Connie Burns
 Manager Regulatory Initiatives
 Union Gas Limited (a Spectra Energy Company)
 Chatham, Ontario
 Phone: 519-436-5382

From: Mark Lowry [mailto:mnlowry@earthlink.net]
Sent: February 22, 2007 3:19 PM
To: Connie Burns
Subject: Re: Study

No, Connie. We are now looking at Wednesday of next week.

Will you be around in the next few business days if I have some final questions?

-----Original Message-----

From: Connie Burns
 Sent: Feb 22, 2007 3:13 PM
 To: Mark Lowry
 Subject: Study

You had mentioned that you would likely be sending the results of the study to Board Staff by the end of this week. Are you still able to make that timeline?

Connie

Connie Burns
 Manager Regulatory Initiatives
 Union Gas Limited (a Spectra Energy Company)
 Chatham, Ontario
 Phone: 519-436-5382

9/21/2007

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Wednesday, February 28, 2007 9:16 AM
To: Mark Lowry
Subject: RE: PCI Research
Follow Up Flag: Follow up
Flag Status: Completed

I am available.

Connie

Connie Burns
Manager Regulatory Initiatives
Union Gas Limited (a Spectra Energy Company)
Chatham, Ontario
Phone: 519-436-5382

From: Mark Lowry [mailto:mnlowry@earthlink.net]
Sent: February 28, 2007 9:56 AM
To: 'Richard Campbell'; Connie Burns
Subject: PCI Research

Hi Guys,

I wanted to bring you up to date as to the status of the PCI research. The main outlines of the research methodology are now set and we have solid preliminary results. We are still addressing a number of small issues that are unlikely to change the results very much. We plan to deliver a draft report to Board staff COB Thursday and then will likely continue tinkering with the numbers for a day or two. We will be sending a few additional questions to you today as a part of this finalization process. Can you comment on your availability?

Mark Newton Lowry, Partner
Pacific Economics Group, LLC
22 E. Mifflin Street, Suite 302
Madison, WI 53703
608.257.1522 ext. 23

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Friday, March 02, 2007 3:05 PM
To: Mark Lowry
Subject: M12 history
Follow Up Flag: Follow up
Flag Status: Completed

As per our discussion, here are the M12 transportation rates. Please note the unit of measure change from 103m3 to GJ after 1999.

<<1994-2007 M12 Demand Rate.xls>>

Connie

Matthew Makos

From: Vanessa Innis [vinnis@spectraenergy.com]
Sent: Friday, March 02, 2007 1:56 PM
To: Mark Lowry
Cc: Connie Burns
Subject: TFP - March 2 Response
Follow Up Flag: Follow up
Flag Status: Completed

Mark,

Union's responses to your questions are highlighted in yellow in the attached Word document. The attached pdf document is referred to in the response to the compensation question.

Kindest regards,

Vanessa

Vanessa Innis

Coordinator, Regulatory Applications
phone 519-436-5334 fax 519-436-5353
email vinnis@uniongas.com

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Friday, March 02, 2007 3:02 PM
To: Mark Lowry
Subject: FW: TFP - March 2 Response
Follow Up Flag: Follow up
Flag Status: Completed

Per your question to Vanessa:

Assuming that we are filing for cost of service:

Rate base is determined using the average of the monthly averages. If plant went into service in November, we would include half of November and all of December in the return calculation. So in general the answer to your question is yes but only half in the first month.

If we are not filing for cost of service, we don't update rate base.

From: Mark Lowry [mailto:mnlowry@earthlink.net]
Sent: Friday, March 2, 2007 3:27 PM
To: Vanessa Innis
Subject: RE: TFP - March 2 Response

Hi Vanessa,

Thanks for your prompt response. With regard to the treatment of plant additions, you say that the plant is added to rate base in the month that it comes into service. Does that mean that you start counting a return from that moment? You might want to just amend the letter with your response.

From: Vanessa Innis [mailto:vinnis@spectraenergy.com]
Sent: Friday, March 02, 2007 1:56 PM
To: Mark Lowry
Cc: Connie Burns
Subject: TFP - March 2 Response

Mark,

Union's responses to your questions are highlighted in yellow in the attached Word document. The attached pdf document is referred to in the response to the compensation question.

Kindest regards,

Vanessa

Vanessa Innis

Coordinator, Regulatory Applications
phone 519-436-5334 fax 519-436-5353
email vinnis@uniongas.com

9/21/2007

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Friday, March 02, 2007 12:12 PM
To: Mark Lowry
Subject: RE: Questions
Follow Up Flag: Follow up
Flag Status: Completed

I just spoke with our rate design expert. He is in meetings all afternoon and will not be able to comment on your questions/table by end of day today.

I am working on the other questions.

Connie

Connie Burns
 Manager Regulatory Initiatives
 Union Gas Limited (a Spectra Energy Company)
 Chatham, Ontario
 Phone: 519-436-5382

From: Mark Lowry [mailto:mnlowry@earthlink.net]
Sent: March 2, 2007 1:09 PM
To: Connie Burns
Subject: RE: Questions

A couple of points on this.

1. What I meant by this is should we conclude that it is impossible to accurately measure these trends. That it is not true, for example, that transmission rates have been trending downward.
2. Please bear in mind also that these trends would not get a very heavy weight in a summary index anyways due to revenue shares that are modes (in the case of ex franchise transmission) and small (in the case of storage).

From: Connie Burns [mailto:mcburns1@spectraenergy.com]
Sent: Friday, March 02, 2007 11:59 AM
To: Mark Lowry
Subject: RE: Questions

The question concerning whether the S&T growth rates are meaningless, we will need to understand what you are doing with the information before we can respond.

Connie

Connie Burns
 Manager Regulatory Initiatives
 Union Gas Limited (a Spectra Energy Company)
 Chatham, Ontario
 Phone: 519-436-5382

From: Mark Lowry [mailto:mnlowry@earthlink.net]

9/21/2007

Sent: March 2, 2007 12:05 PM
To: Connie Burns
Subject: Questions

Hi Connie,

To reiterate, I would appreciate getting answers to our questions as you receive them.

Mark Newton Lowry, Partner
Pacific Economics Group, LLC
22 E. Mifflin Street, Suite 302
Madison, WI 53703
608.257.1522 ext. 23

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Saturday, March 17, 2007 8:44 AM
To: Mark Lowry; Steve Fenrick
Subject: RE: Addresses

Has the revised code been sent yet. If yes, I did not receive.

Connie

From: Mark Lowry [mailto:mnlowry@earthlink.net]
Sent: Fri 16/03/2007 11:46 AM
To: 'Steve Fenrick'
Cc: 'Angela Pachon'; 'Richard Campbell'; Connie Burns
Subject: Addresses

Hi Steve,

Please send the revised code to these addresses when it is ready.

Mark Newton Lowry, Partner
Pacific Economics Group, LLC
22 E. Mifflin Street, Suite 302
Madison, WI 53703
608.257.1522 ext. 23

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Monday, March 19, 2007 3:47 PM
To: Mark Lowry
Cc: Pascale Duguay; Steve Fenrick
Subject: RE: Conference Call Follow Up

We are currently drafting the agreement. We won't be able to send it out by express mail today but will fax it to you with the signatures first thing in the morning. The original will be sent by express mail tomorrow as well.

Connie

Connie Burns
 Manager Regulatory Initiatives
 Union Gas Limited (a Spectra Energy Company)
 Chatham, Ontario
 Phone: 519-436-5382

From: Mark Lowry [mailto:mnlowry@earthlink.net]
Sent: March 19, 2007 3:54 PM
To: Connie Burns
Cc: 'Pascale Duguay'; 'Steve Fenrick'
Subject: RE: Conference Call Follow Up

As discussed on the phone, I would like to see a draft confidentiality agreement, and for you to sign the agreement and then send it by express mail today. We will send the requested materials today if you do this.

The confidentiality agreement should state, in effect, that Union Gas and its consultants recognize the proprietary character of PEG's TFP code and general-purpose SST software and agree to use it solely for the purpose of evaluating the filing of the PEG in this proceeding. Furthermore, Union Gas and its consultants will not share this code with other parties and will return all copies of the software in their possession at the conclusion of the proceeding.

From: Connie Burns [mailto:mcburns1@spectraenergy.com]
Sent: Monday, March 19, 2007 2:31 PM
To: Pascale.Duguay@oeb.gov.on.ca; Mark Lowry; Angela.Pachon@oeb.gov.ca; stevefenrick@earthlink.net
Cc: Mike Packer
Subject: Conference Call Follow Up
Importance: High

Mike and I spoke with Mel Fuss after our conference call today. We determined that, to keep the process moving forward as quickly as possible, at a minimum we need the data input files that Steve mentioned. Best case would be for us to have access to the model.

Please let me know how you would like to proceed.

Connie

Connie Burns
 Manager Regulatory Initiatives
 Union Gas Limited (a Spectra Energy Company)
 Chatham, Ontario
 Phone: 519-436-5382

9/21/2007

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Tuesday, March 20, 2007 2:24 PM
To: Steve Fenrick
Subject: RE: Input files

I received the input files.

connie

Connie Burns
Manager Regulatory Initiatives
Union Gas Limited (a Spectra Energy Company)
Chatham, Ontario
Phone: 519-436-5382

From: Steve Fenrick [mailto:stevefenrick@earthlink.net]
Sent: March 20, 2007 4:20 PM
To: Connie Burns
Subject: Input files

Hi Connie,

Here are the input files for our indexing work. I will now attempt to somehow e-mail you the program. E-mail me back with confirmation that you received these 11 input files.

Thanks.

Steven A. Fenrick, Economist
Pacific Economics Group
608-257-1522 ext. 28
stevefenrick@earthlink.net

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Tuesday, March 20, 2007 3:05 PM
To: Steve Fenrick
Subject: RE: Input files

Is there a file called canreturn.dbf? If yes, we did not receive.

Connie

Connie Burns
Manager Regulatory Initiatives
Union Gas Limited (a Spectra Energy Company)
Chatham, Ontario
Phone: 519-436-5382

From: Steve Fenrick [mailto:stevefenrick@earthlink.net]
Sent: March 20, 2007 4:20 PM
To: Connie Burns
Subject: Input files

Hi Connie,

Here are the input files for our indexing work. I will now attempt to somehow e-mail you the program. E-mail me back with confirmation that you received these 11 input files.

Thanks.

Steven A. Fenrick, Economist
Pacific Economics Group
608-257-1522 ext. 28
stevefenrick@earthlink.net

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Wednesday, March 21, 2007 12:17 PM
To: Steve Fenrick
Subject: RE: Data Files

Great – thx Steve.

Connie

Connie Burns
Manager Regulatory Initiatives
Union Gas Limited (a Spectra Energy Company)
Chatham, Ontario
Phone: 519-436-5382

From: Steve Fenrick [mailto:stevefenrick@earthlink.net]
Sent: March 21, 2007 2:13 PM
To: Connie Burns
Cc: Mark Lowry
Subject: RE: Data Files

Connie,

Looking at your below list of variables I believe they are not used in our calculations. The exception to that is "wkagas". This variable is equal to the variable labelled "wka" on the datasheet. It is the Construction Cost Index we constructed for Gas plant as described in the datasheet. As for the other variables they are not being used in our indexing calculations. They are in the input files either because we looked at alternate input price indexes or because when we loaded Union's data it was easier to load everything rather than only those variables we would ultimately use. Besides the "wkagas" being labelled "wka" on the datasheet, the original datasheet should include all the variables that we brought in to perform our indexing calculations.

Let me know if you have further questions.

Steve

-----Original Message-----

From: Connie Burns [mailto:mcburns1@spectraenergy.com]
Sent: Wednesday, March 21, 2007 10:47 AM
To: Steve Fenrick
Subject: FW: Data Files

Have you had a chance to review the questions in my original email below?

Connie

Connie Burns
Manager Regulatory Initiatives
Union Gas Limited (a Spectra Energy Company)
Chatham, Ontario
Phone: 519-436-5382

From: Mark Lowry [mailto:mnlowry@earthlink.net]
Sent: March 21, 2007 10:23 AM
To: Connie Burns; Steve Fenrick
Subject: Re: Data Files

Most or all of these data were not ultimately used in the calculations. Most notably, we gathered data on several alternative input price indexes. Steve please follow up as needed.

-----Original Message-----

From: Connie Burns
Sent: Mar 21, 2007 8:47 AM
To: Mark Lowry , Steve Fenrick
Subject: Data Files

The following data series are inputted into the computer program but are not contained in the data file "datasheet for Union 2.xls". Therefore, we do not know the names of the series or the sources of the data. Could you please review and advise if this data is available or if these series were never used in the calculations.

Thx
Connie

awetcan
aweecan
awegcan
awetont
aweeont
rvolgs
rdelgs
rgasgs
rtotgs
rgascw
rtotcw
rfixtot
rvoltot
rdeltot
rgastot
rtottot
v2_2A
v2_5
v2_6
v2_7
v3_1
v3_2A
v3_4A
v3_4B
v4_9A
v4_9B
v4_9C
v6_0_1
v6_0_2
v6_0_3A

v6_0_3
v6_0_4
v6_0_5
v6_0_5
v6_0_6
v6_0_8
v6_0_9
v6_1A
v6_1B
v7_4D
wkagas
ym2dsm
y01dsm
y10dsm

Connie Burns
Manager Regulatory Initiatives
Union Gas Limited (a Spectra Energy Company)
Chatham, Ontario
Phone: 519-436-5382

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Monday, March 26, 2007 12:25 PM
To: Steve Fenrick; fuss@chass.utoronto.ca; Angela Pachon
Subject: Conference Call Today

The conference call today for Mel to speak to Steve re: the software will be at 2:30 P.M. Please let me know as soon as possible if this time does not work for you.

Call 1-866-826-8611
Conference Code 234012

Connie

Connie Burns
Manager Regulatory Initiatives
Union Gas Limited (a Spectra Energy Company)
Chatham, Ontario
Phone: 519-436-5382

9/21/2007

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Thursday, March 29, 2007 10:05 AM
To: mnlowry@earthlink.net
Cc: Tom Ladanyi; Laurie Klein; Angela Pachon; Irene Chan; Mike Packer; Vanessa Innis
Subject: RE: URGENT: Analysis from Lowry
Follow Up Flag: Follow up
Flag Status: Completed

Union generally agrees with the points that Irene has made in her email below.

I have updated the excel spreadsheet (attached) to show the number underlying Union's stakeholder presentation. Please note that we used a slightly different weather normalization method for this calculation than was used for the weather normalized volumes provided previously.

I have also attached Union's weather normalization methodology as identified it's 2007 rate case.

Connie

Connie Burns
 Manager Regulatory Initiatives
 Union Gas Limited (a Spectra Energy Company)
 Chatham, Ontario
 Phone: 519-436-5382

From: Irene Chan [mailto:Irene.Chan@enbridge.com]
Sent: March 28, 2007 5:03 PM
To: mnlowry@earthlink.net
Cc: Tom Ladanyi; Connie Burns; 'Laurie Klein'; 'Angela Pachon'
Subject: Re: URGENT: Analysis from Lowry

Mark,

Please see below for EGD's comments to your note below.

- All else being equal, EGD's residential (Rate 1) and small business customers (Rate 6) should have a larger decline in average use than Union Gas's. One of the major reasons is EGD has larger General Service Customers base than Union Gas's. During 2000-2005, EGD has added more than 50,000 customers per year and most of them are residential. The rest are rising popularity of luxury condominium apartment buildings during these years and other small commercial and industrial customers. DSM programs can be another factor causing the difference. Consequently, EGD's franchise (e.g. Toronto, Ottawa) should experience a sharper decline in average use during these years of volatile gas prices than the Union Gas's franchise (e.g. Chatham) as a result of having more energy efficient/well-insulated homes or buildings added each year, all else being equal.
- Enbridge uses budget degree days in weather normalization.
- Enbridge's data for 2000-2005 is on a fiscal year basis whereas I presume PEG's American and Union Gas's data is on a calendar year basis. Therefore, applying PEG's calendar year model to Enbridge's fiscal

year data and compare these results with Enbridge's stakeholder data and other franchises may lead to a misleading comparison. EGD has a concern with PEG's benchmark (American) average use data of -1.07%/0.17% vs Enbridge of -1.82%/-0.93% as this benchmark data will not reflect each individual's utility-specific factors, such as natural gas prices, regional "conservation culture/awareness", demographic factors, economy, furnace's pay back rate, specific DSM and added load programs, or building structures, etc. All of these factors will result in different absolute values or year over year percentage changes in average use between Enbridge and other utilities.

- Enbridge's normalization methodology (2007 Volume Budget Evidence, Exhibit C1, Tab 3, Schedule 1, Page 17-18) is conducted on a 12 granular customer groups (or revenue classes) of Rate 1 and Rate 6 customers. In addition, Enbridge's normalization methodology only normalizes heat-sensitive consumption. That means, Enbridge's methodology will not normalize customers' month of July and August (i.e. summer months) consumption as well as if customers only have water heaters or non-heating end-use equipments. On the other hand, Dr. Lowry's report normalizes Rate 1 and Rate 6 consumption by utilizing annual regression models. Henceforth, it is not surprising that this may over-normalize the consumption and causes a sharper decline in average use than Enbridge's numbers, holding other things constant. The reasons are monthly volatilities (winter months vs summer months) of heat sensitive degree days and different usage of different customer groups may not be properly accounted in the annual regression models. Considering that this is not feasible for PEG to collect other franchises' monthly data and conduct a very detailed analysis within a short period of time, these technical differences can be explained as a footnote in the final report. In addition, the technical differences between a comprehensive Enbridge normalization process and a general PEG's regression model process using Enbridge's data mentioned above are not materially different (PEG's calculated Enbridge Data of -2.25%/-1.19% vs Enbridge's -1.82%/-0.93%).

Best Regards,

Irene Chan, Ph.D. (Economics)
Budgets and Financial Analysis
Finance
Enbridge Gas Distribution Inc.

Richard Campbell/GAS/Enbridge

03/28/2007 08:44 AM

To Tom Ladanyi/GAS/Enbridge@Enbridge, Irene Chan/GAS/Enbridge@Enbridge
cc

Subject URGENT: Analysis from Lowry

Could you please examine the attached on a high priority basis. I'll be in touch later in the morning to discuss.

R. J. Campbell
Manager, Regulatory Policy & Research
phone: 416-495-5173
email: richard.campbell@enbridge.com

----- Forwarded by Richard Campbell/GAS/Enbridge on 03/28/2007 08:45 AM -----

"Mark Lowry" <mnlowry@earthlink.net>

To "Richard Campbell" <Richard.Campbell@enbridge.com>, "Connie Burns"
<mcburns1@spectraenergy.com>

9/21/2007

03/27/2007 05:34 PM

cc "'Laurie Klein'" <Laurie.Klein@oeb.gov.on.ca>, "'Angela Pachon'"
<Angela.Pachon@oeb.gov.on.ca>

Subject FW: Volume per customer Revised

Board Staff are concerned about the fact that our preliminary AU factor for Union was more negative (raising rates) than the AU factor for Union. We are also a bit surprised. A review of this potential anomaly has now risen to the top of our priority list. One possible issue is the manner in which we weather normalize heat-sensitive volumes. The attached tables show various calculations of the volume per customer trends for Enbridge and Union. It can be seen that the calculations for Union lie within a fairly narrow band. The calculations by Enbridge, however, are quite divergent from both the actuals trends and the PEG weather normalized trends. We welcome any commentary regarding these differences. For example, does Enbridge use budget degree days in weather normalization whereas Union does not. Obviously one possibility is that PEG has made a mistake in its weather normalizations. However, the numbers provided here reflect a recent double checking and overhaul of our method. [attachment "Volume per customer Union & Enbridge.xls" deleted by Irene Chan/GAS/Enbridge]

9/21/2007

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Monday, May 14, 2007 2:22 PM
To: Mark Lowry
Cc: Laurie Klein; Angela Pachon
Subject: RE: Forecasting Data
Follow Up Flag: Follow up
Flag Status: Completed

We do subscribe to services that provide some of this information (see below). You would need to purchase the information as our contract does not allow us to provide to external parties.

For GDPPI, wages & Salaries, bond yields and construction costs you should contact:

- Global Insight, contact Peter McNabb tel: 1 146 682 7314
- The Centre for Spatial Economics, contact Rob Fairholm tel 1 416 422 3828

Long-term interest rate forecasts are available from Consensus Economics Inc.

I don't know where you would source forecasted ROE's.

Connie

Connie Burns
 Manager Regulatory Initiatives
 Union Gas Limited (a Spectra Energy Company)
 Chatham, Ontario
 Phone: 519-436-5382

From: Mark Lowry [mailto:mnlowry@earthlink.net]
Sent: May 14, 2007 12:58 PM
To: Connie Burns; 'Richard Campbell'
Cc: 'Laurie Klein'; 'Angela Pachon'
Subject: Forecasting Data

Hi Guys,

In revisiting our indexing research for Board staff, we are considering how we might use price forecasts to inform the choice of input price differentials for Enbridge and Union. In this regard, we were wondering if either company subscribes to a reputable forecasting service such as Global Insight or the Conference Board of Canada. Variables of interest include...

- GDPPI
- Salaries and wages
- Construction costs
- Intermediate and long term bond yields
- ROE

We would like to get forecasts for the expected term of the proposed IR plans (e.g. 2007-2014).

Please let us know whether you subscribe to such a service and whether you would consider sharing the data with us on a trial basis.

9/21/2007

Mark Newton Lowry, Partner
Pacific Economics Group, LLC
22 E. Mifflin Street, Suite 302
Madison, WI 53703
608.257.1522 ext. 23

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Wednesday, May 16, 2007 12:31 PM
To: Mark Lowry
Subject: RE: Long Weekend
Follow Up Flag: Follow up
Flag Status: Completed

Our company is very firm on copyright rules. If you were here, I would be able to let you look at them but I cannot photo copy and send to you.

Connie

Connie Burns
Manager Regulatory Initiatives
Union Gas Limited (a Spectra Energy Company)
Chatham, Ontario
Phone: 519-436-5382

From: Mark Lowry [mailto:mnlowry@earthlink.net]
Sent: May 16, 2007 11:55 AM
To: Connie Burns
Subject: RE: Long Weekend

OK Did you have any followup response to my e mail to Rick re forecasts? The upshot is that we just wanted to take a look at them and wouldn't use them without the appropriate compensation.

From: Connie Burns [mailto:mcburns1@spectraenergy.com]
Sent: Wednesday, May 16, 2007 10:23 AM
To: Mark Lowry
Subject: Long Weekend

Just an FYI in case you have questions that you will be sending this week – this weekend is a Canadian long weekend (Monday is a holiday) and I might take this Friday as a vacation day.

Connie

Connie Burns
Manager Regulatory Initiatives
Union Gas Limited (a Spectra Energy Company)
Chatham, Ontario
Phone: 519-436-5382

9/21/2007

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Monday, May 28, 2007 10:16 AM
To: Mark Lowry
Cc: Laurie Klein
Subject: CGA Declining Use Paper
Follow Up Flag: Follow up
Flag Status: Completed

Mark,

You asked that I let you know when the CGA Declining Use paper was made available. It was made public on Friday. I have attached a copy.

Connie

Connie Burns
Manager Regulatory Initiatives
Union Gas Limited (a Spectra Energy Company)
Chatham, Ontario
Phone: 519-436-5382

Matthew Makos

From: Connie Burns [mcburns1@spectraenergy.com]
Sent: Friday, June 01, 2007 7:20 AM
To: Mark Lowry; Laurie Klein
Subject: TFP Study - Responses to May 30 and 31st Questions
Follow Up Flag: Follow up
Flag Status: Completed

Responses to the May 30 and 31 questions are attached. I consolidated both emails into one Word document. The other document attached is an explanation of the econometric demand model.

Connie

Connie Burns
Manager Regulatory Initiatives
Union Gas Limited (a Spectra Energy Company)
Chatham, Ontario
Phone: 519-436-5382

IGUA Q 22 Attachment D

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ONTARIO ENERGY BOARD

FILE NO.: RP-1999-0017

VOLUME: 6

DATE: June 21, 2000

BEFORE:	G.A. Dominy	Vice Chair &
	M. Jackson	Presiding Member
		Member

Les Services StenoTran Services Inc.
613-521-0703

RP-1999-0017

THE ONTARIO ENERGY BOARD

IN THE MATTER OF the Ontario Energy Board Act, 1998,
S.O. 1998, c. 15 (Sched. B);

AND IN THE MATTER OF an Application by Union Gas Limited
for an order or orders approving or fixing just and
reasonable rates and other charges for the sale,
distribution, transmission and storage of gas in
accordance with a performance based rate mechanism
commencing January 1, 2000;

AND IN THE MATTER OF an Application by Union Gas Limited
for an order approving the unbundling of certain rates
charged for the sale, distribution, transmission and
storage of gas.

B E F O R E :

G.A. DOMINY Vice-Chair and Presiding Member

M. JACKSON Member

Hearing held at:

2300 Yonge Street, 25th Floor, Hearing Room No. 1
Toronto, Ontario on Wednesday, June 21, 2000,
commencing at 0914

HEARING

VOLUME 6

1		APPEARANCES
2	JENNIFER LEA/	Board Staff
3	MICHAEL LYLE/	
4	JAMES WIGHTMAN	
5		
6	MICHAEL PENNY/	Union Gas Limited
7	MARCEL REGHELINI	
8		
9	ROBERT B. WARREN	Consumers Association of Canada
10		(CAC)
11		
12	THOMAS BRETT	Ontario Association of School
13		Business Officials
14		
15	PETER THOMPSON	Industrial Gas Users'
16		Association (IGUA)
17		
18	MICHAEL JANIGAN	Vulnerable Energy Consumers
19		Coalition (VECC)
20		
21	MURRAY KLIPPENSTEIN	Pollution Probe
22		
23	IAN MONDROW	Heating, Ventilation and
24		Air Conditioning Contractors
25		Coalition Inc.
26		
27	BETH SYMES	Alliance of Manufacturers
28		and Exporters Canada

1		APPEARANCES (Cont'd)
2	MARK MATTSON/	Energy Probe
3	THOMAS ADAMS	
4		
5	GEORGE VEGH	Duke Energy, Coalition for
6		Efficient Energy Distribution
7		(CEED), TransCanada Gas
8		Services, PanCanadian
9		Petroleum, Dynegy Canada,
10		Suncor/Sunoco, CanEnerco
11		Limited
12		
13	ZIYAAD E. MIA	Coalition for Efficient Energy
14		Distribution (CEED),
15		TransCanada Gas Services,
16		PanCanadian Petroleum, Dynegy
17		Canada, Suncor/Sunoco,
18		CanEnerco Limited
19		
20	DAVID WAQUÉ	COMSATEC INC.
21		
22	STANLEY RUTWIND	TransCanada PipeLines Limited
23		
24	RICHARD KING/	The Wholesale Group and the
25	CHARLES KEIZER/	Major Energy Consumers And
26	PETER BUDD	Producers (MECAP)
27		
28		

1	APPEARANCES (Cont'd)	
2	PETER SCULLY	Association of Municipalities
3		of Ontario
4		
5	TANYA PERSAD	Enbridge Consumers Gas
6		
7	ANDREW DIAMOND/	Enron Capital Corp.
8	JOHN ROOK	
9		
10	DWAYNE QUINN/	City of Kitchener Utilities
11	ALICK RYDER	
12		
13	DAVID POCH	Green Energy Coalition (GEC)
14		
15	MICHAEL M. PETERSON	Nova Chemicals
16		
17	RANDY AIKEN	London Property Management
18		Association
19		
20	VALERIE YOUNG	Ontario Association of Physical
21		Plant Administrators
22		
23	MARY ANNE ALDRED	HYDRO ONE NETWORKS
24		
25		
26		
27		
28		

1 Toronto, Ontario

2 --- Upon resuming on Wednesday, June 21, 2000

3 at 0914

4 THE PRESIDING MEMBER: Good morning. Are
5 there any preliminary matters.

6 I believe Ms Lea has some.

7 Does Mr. Penny have any?

8 MR. PENNY: I have a couple as well,
9 Mr. Chairman.

10 PRELIMINARY MATTERS

11 MS LEA: Thanks. Mine was quite a minor one.

12 We have been attempting to set the dates for
13 intervenor panels. But I think it is important that we
14 fix the date for these panels either today or, at the
15 very latest, by the end of the day tomorrow.

16 I appreciate that we don't know exactly when
17 the hearing is going to end yet. But due to people's
18 various business constraints and the need to get airline
19 tickets, we are going to have to fix dates for these
20 panels, I believe.

21 Now, Dr. Wightman has had calls which indicate
22 the availability of panels from Mr. Poch, also for
23 Dr. Bauer for the CEED panel and for the TCPL panel.
24 Can any intervenors that have not contacted either
25 myself or Dr. Bauer about the availability of panels,
26 please do so.

27 THE PRESIDING MEMBER: Dr. Wightman.

28 MS LEA: Dr. Wightman.

Preliminary Matters

1 THE PRESIDING MEMBER: I don't think Dr. Bauer
2 wants to hear this.

3 MS LEA: Yes, well there are too many doctors.
4 Sorry.

5 Dr. Wightman or myself. Dr. Bauer does not
6 want to be contacted about this.

7 Anyway, sorry, the name is right in front of
8 me on the paper here.

9 So if anybody has not contacted those of us in
10 Board staff yet about dates for panels could you do so
11 please.

12 Thanks very much.

13 THE PRESIDING MEMBER: Thank you, Ms Lea.
14 Mr. Penny.

15 MR. PENNY: Yes, I agree with Ms Lea that we
16 should get the -- all available information on people's
17 constraints and then I think we should talk about
18 scheduling. I think we should do that off-line,
19 however. But until we have the information, I think we
20 should probably wait and we will do that. Given that
21 tomorrow is an off morning, I think it will give us the
22 opportunity to sort that out, and as Ms Lea says, have
23 it decided by the end of the day.

24 With respect to scheduling again, there was
25 some discussion on Monday about a number of options and
26 how we might proceed. And it seemed to us on reflection
27 that the thing that -- the manner of proceeding that
28 made the most sense would be to have the evidence from

Preliminary Matters

1 Christensen Associates. And if that is done before the
2 close of business Thursday, that we would go back to
3 Ms Elliott and Mr. Birmingham on the PBR issues and
4 continue with those until -- for any remaining time just
5 so that time is used.

6 And then, again, depending on the -- well, on
7 whether the Board is able to tell us today about the
8 unbundling portion of the hearing, if the agreement were
9 to be approved that we have the unbundling witnesses on
10 Friday and if the Board is not in a position to advise
11 us on that, that we would proceed with DSM on Friday.

12 THE PRESIDING MEMBER: Thank you, Mr. Penny.
13 I thought you were going to tell me that Ms Elliott and
14 Mr. Birmingham were to be here on Friday and I thought
15 that they already had other arrangements.

16 MR. PENNY: No, I was dealing with the
17 contingency that we either have time today or tomorrow.
18 And there was some uncertainty about how we would deal
19 with that, and I think it was Mr. Warren who raised it.
20 And when we reflected on it, we agreed really with the
21 parties who I think were of the same view that it made
22 the most sense to continue on with PBR issues.

23 The only other administrative issue I have
24 this morning, Mr. Chairman, is that we have filed just
25 for the record -- oh, sorry. There is one other issue
26 having to do with scheduling which had to do with G3.3
27 and the possibility that there might be other questions
28 on that. That was the O&M flow-through document.

Preliminary Matters

1 And it seemed to us, and I have discussed this
2 with Mr. Warren and he agreed, that if we do have time
3 to return to Ms Elliott and Mr. Birmingham on PBR issues
4 before Friday that he would deal with those up front at
5 the beginning of that. So that if we are finished
6 before the end of today, that could be later today or if
7 it were tomorrow, it could be tomorrow.

8 Then we have a series of additional answers to
9 transcript undertakings which are available to the Board
10 and to the parties. They are G3.2, G3.4, G3.5, G4.1,
11 G4.3 and G5.1.

12 THE PRESIDING MEMBER: Thank you, Mr. Penny.

13 MR. PENNY: Now, the only other issue I guess
14 that is outstanding is that, and perhaps Mr. Thompson
15 can speak to this. I had understood that both
16 Mr. Janigan and Mr. Warren were proposing to conduct
17 cross-examination of -- there we go. Mr. Janigan has
18 just arrived so that deals with my question.

19 So we are prepared to proceed and Mr. Janigan
20 is here. So could Mr. Schoech and Mr. Hemphill are here
21 from Christensen Associates. Perhaps they could come
22 forward and be sworn.

23 MR. MATTSON: Mr. Chairman, could I just --

24 THE PRESIDING MEMBER: Just a moment. There
25 is a question here.

26 MR. MATTSON: Right here, Mr. Chairman, just
27 on scheduling.

28 I mentioned to Mr. Penny I am still -- with

Preliminary Matters

1 respect to the unbundling overview and rationale panel,
2 my client has a substantial amount of questions on that
3 and I was going to indicate that I had some difficulty
4 being here Friday. But I can move things around to be
5 here Friday if the Panel is going ahead.

6 It is still uncertain whether or not it will
7 go ahead because I see we have the Christensen and PBR
8 to finish and we are not -- Mr. Penny isn't sure if we
9 will even be going ahead with that. And if I could just
10 find out today just with a little more certainty what is
11 happening with respect to Friday on that panel, it would
12 really be helpful.

13 MR. PENNY: Mr. Chairman, I thought I made it
14 clear. The only contingency with respect to Friday is
15 whether it is the unbundling panel or DSM. There is no
16 other contingency. Those are the only things we will be
17 doing on that day just depending on whether we have the
18 Board's advice on the ADR Agreement or not.

19 THE PRESIDING MEMBER: Mr. Penny, clearly
20 there is an issue here to this since I have no idea how
21 much cross-examination there would be of the unbundling
22 panel. If we go ahead with it, it may be that
23 Mr. Mattson can be accommodated by his sequence in the
24 cross-examination line-up.

25 MR. PENNY: Absolutely. I have no difficulty
26 with that.

27 MR. MATTSON: Thank you.

28 THE PRESIDING MEMBER: Please come forward.

Preliminary Matters

1 SWORN: PHILIP SCHOECH

2 SWORN: ROSS HEMPHILL

3 PREVIOUSLY SWORN: PAT ELLIOTT

4 EXAMINATION-IN-CHIEF

5 MR. PENNY: Mr. Hemphill, let me start with
6 you. You are a senior economist with Christensen
7 Associates?

8 DR. HEMPHILL: Vice-President with Christensen
9 Associates.

10 MR. PENNY: All right. And you have been with
11 Christensen Associates since when?

12 DR. HEMPHILL: I joined them in 1998,
13 mid-1998.

14 MR. PENNY: And what is the business of
15 Christensen Associates?

16 DR. HEMPHILL: Christensen Associates provides
17 economic and engineering consulting services for a
18 number of different industries including the utility
19 industries, telephone, natural gas and electricity.

20 MR. PENNY: I understand that you have been
21 involved in numerous projects involving the development
22 of competitive pricing products and restructuring of
23 energy utilities?

24 DR. HEMPHILL: Yes, I have.

25 MR. PENNY: And you have over 20 years
26 experience representing clients in federal and state
27 regulatory forums in both electricity, natural gas and
28 indeed in the telephone industry?

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 DR. HEMPHILL: Yes, I do.

2 MR. PENNY: And this includes a consideration
3 of issues relating to incentive regulation?

4 DR. HEMPHILL: That is correct.

5 MR. PENNY: Competitive restructuring?

6 DR. HEMPHILL: Correct.

7 MR. PENNY: And market-based pricing products?

8 DR. HEMPHILL: That is also correct.

9 MR. PENNY: You have a B.A. in Business
10 Economics from Louis University?

11 DR. HEMPHILL: Correct.

12 MR. PENNY: And a Masters of Science and
13 Economics from Indiana State?

14 DR. HEMPHILL: Correct.

15 MR. PENNY: And you have your PhD in Resource
16 Economics from the Ohio State University?

17 DR. HEMPHILL: Also correct.

18 MR. PENNY: Among your positions held before
19 joining Christensen Associates, you were the Director of
20 Electricity Pricing and the Director of Resource
21 Strategies for Niagara Mohawk Power from 1993 to 1997?

22 DR. HEMPHILL: Yes, I was.

23 MR. PENNY: And what was your principal
24 project while at Niagara Power?

25 DR. HEMPHILL: When I was at Niagara Mohawk
26 Power Corporation, as Director of Pricing in 1993 we
27 developed the price cap program that was proposed before
28 the New York Public Service Commission. We worked on

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 that price cap proposal pretty close to four years
2 before it was finally approved.

3 MR. PENNY: All right. And you have also held
4 positions with the American Electric Power Service
5 Corporation in 1982 and 1983?

6 DR. HEMPHILL: Yes.

7 MR. PENNY: And you were with the Illinois
8 Commerce Commission from 1980 to 1982?

9 DR. HEMPHILL: Yes, I was.

10 MR. PENNY: And what does the Illinois
11 Commerce Commission regulate?

12 DR. HEMPHILL: The Illinois Commerce
13 Commission regulates both transportation, natural gas,
14 electricity and telephone utilities.

15 MR. PENNY: And you worked with General
16 Telephone Company of Indiana from 1978 to 1990?

17 DR. HEMPHILL: That is right.

18 MR. PENNY: Sorry, 1980.

19 DR. HEMPHILL: Yes, 1980.

20 MR. PENNY: And in what capacity?

21 DR. HEMPHILL: At General Telephone I started
22 in a management training program as you typically do out
23 of college and then I was promoted into the position of
24 Valuation Engineer. I was in charge of putting together
25 the rate base for the cases that they had before the
26 Indiana Commission.

27 MR. PENNY: All right.

28 And your publications are listed in your CV,

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 which has been filed with your evidence?

2 DR. HEMPHILL: Yes.

3 MR. PENNY: And among these is a paper on
4 Natural Gas Rate Design and Transportation Policy?

5 DR. HEMPHILL: Yes.

6 MR. PENNY: And you have published in the area
7 of competitive pricing in the electricity industry?

8 DR. HEMPHILL: Yes.

9 MR. PENNY: I gather you have testified before
10 the New York Public Service Commission?

11 DR. HEMPHILL: Yes, I have.

12 MR. PENNY: The OMI Commerce Commission?

13 DR. HEMPHILL: Yes.

14 MR. PENNY: And the Pennsylvania Public
15 Utilities Commission.

16 DR. HEMPHILL: Yes, I have.

17 MR. PENNY: And this testimony included issues
18 of price cap and performance based regulations?

19 DR. HEMPHILL: Yes. The testimony before the
20 New York Public Service Commission included the -- it
21 was the comprehensive price cap plan that was proposed
22 before that Commission.

23 MR. PENNY: All right. And your testimony has
24 also included evidence on rates, rate design, cost of
25 service issues in natural gas?

26 DR. HEMPHILL: Yes. Not so much natural gas,
27 but I did cover a couple of natural gas issues.

28 MR. PENNY: All right. And also telephone

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 rates and cost of service?

2 DR. HEMPILL: Yes.

3 MR. PENNY: And pricing policies for
4 multi-year rate proceedings in electricity.

5 DR. HEMPILL: Correct.

6 MR. PENNY: Mr. Schoech, I gather you are a
7 Vice-President with Christensen Associates?

8 DR. SCHOECH: Yes, I am.

9 MR. PENNY: And you have held that position
10 since 1991?

11 DR. SCHOECH: That's correct.

12 MR. PENNY: You have a B.A. in Mathematics
13 from Northwestern University?

14 DR. SCHOECH: Yes, I do.

15 MR. PENNY: And you have an M.A. in Economics
16 from the University of Wisconsin?

17 DR. SCHOECH: Yes, I do.

18 MR. PENNY: And I gather you also received
19 your Ph.D. in Economics from the University of
20 Wisconsin.

21 DR. SCHOECH: That's correct.

22 MR. PENNY: You worked, before joining
23 Christensen Associates, with the University of Wisconsin
24 and have also held positions with the U.S. Bureau of the
25 Census.

26 DR. SCHOECH: That's correct.

27 MR. PENNY: And your publications are included
28 in your CV?

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 DR. SCHOECH: Yes.

2 MR. PENNY: And you have published in the area
3 of energy pricing and telephone service pricing?

4 DR. SCHOECH: That's correct.

5 MR. PENNY: And you have submitted testimony
6 to the Federal Communications Commission on price cap
7 plans and total factor productivity in the telephone
8 industry?

9 DR. SCHOECH: Yes, I have.

10 MR. PENNY: You have testified before the
11 Canadian Radio and Television -- sorry, the Canadian
12 Radio-Television and Telecommunications Commission.

13 DR. SCHOECH: I submitted written reports,
14 yes.

15 MR. PENNY: And those reports included a
16 survey of productivity offset experience in the United
17 States?

18 DR. SCHOECH: Yes, that's correct.

19 MR. PENNY: And an evaluation of the total
20 factor productivity of Bell and its related entities.

21 DR. SCHOECH: Yes.

22 MR. PENNY: You have also submitted reports to
23 the Peruvian Government on price cap and X factor design
24 issues for Peruvian telecommunications regulations?

25 DR. SCHOECH: Yes, I have.

26 MR. PENNY: And provided evidence on
27 productivity and price cap issues before the Illinois
28 Commerce Commission.

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 DR. SCHOECH: Correct.

2 MR. PENNY: And I gather you have conducted a
3 number of productivity and econometric studies for the
4 postal industry?

5 DR. SCHOECH: Yes.

6 MR. PENNY: The telecommunications industry?

7 DR. SCHOECH: Yes.

8 MR. PENNY: The cable television industry?

9 DR. SCHOECH: Yes.

10 MR. PENNY: For electric utilities?

11 DR. SCHOECH: Yes.

12 MR. PENNY: And for the transportation and
13 manufacturing industries.

14 DR. SCHOECH: Yes, I have.

15 MR. PENNY: Now, I understand that you were
16 asked by Union Gas to assist in the creation and
17 development of a PBR mechanism for Union Gas.

18 DR. SCHOECH: That's right.

19 MR. PENNY: And, among other things, you were
20 asked to assist in the derivation of a productivity or
21 X factor for use in the determination of Union's price
22 cap.

23 DR. SCHOECH: That's correct.

24 MR. PENNY: And in this regard you prepared a
25 Total Factor Productivity study.

26 DR. SCHOECH: Yes.

27 MR. PENNY: And you prepared evidence and
28 prepared answers to interrogatories in connection with

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 your work on Union's price cap in this proceeding?

2 DR. SCHOECH: Yes, I did.

3 MR. PENNY: And that evidence was prepared,
4 gentlemen, by you or under your supervision?

5 DR. SCHOECH: That's correct, yes.

6 MR. PENNY: Now, Mr. Schoech, I understand
7 that there were a couple of corrections that you wished
8 to make to the evidence, principally relating to the
9 data correction that was earlier dealt with. Is that
10 right?

11 DR. SCHOECH: That is correct.

12 The data revision had a couple of impacts on
13 our report that need to be changed. Two of them appear
14 on page 29.

15 MR. PENNY: Yes.

16 DR. SCHOECH: The first ones, lines 1
17 through 3. Those lines should be taken out since they
18 no longer are correct.

19 MR. PENNY: And as a result of the data
20 correction, what is the relationship of the quantity of
21 total input gross versus the quantity of total output
22 gross that is comparable to what you were speaking to.

23 DR. SCHOECH: Yes. With the data revisions,
24 now the productivity at the end of the period is higher
25 than it was at the beginning of the period rather than
26 being at the same level.

27 MR. PENNY: All right. And the numerical
28 value of that difference is elsewhere in your evidence.

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 DR. SCHOECH: Yes.

2 MR. PENNY: And has already been corrected in
3 the prior update.

4 DR. SCHOECH: That's correct.

5 MR. PENNY: All right.

6 MR. THOMPSON: I'm sorry, where are we,
7 please? What page?

8 MR. PENNY: Page 29.

9 MR. THOMPSON: Yes.

10 DR. SCHOECH: Lines 1 through 3.

11 MR. PENNY: Lines 1 through 3.

12 MR. THOMPSON: Take out those three sentences?
13 "During this period..."

14 MR. PENNY: Those three lines, yes.

15 MR. THOMPSON: Yes. Nothing goes in in its
16 place?

17 DR. SCHOECH: I offer nothing --

18 MR. PENNY: Mr. Schoech has just advised that
19 the number that is produced by the data correction is
20 elsewhere specified in the evidence and has already been
21 updated.

22 MR. THOMPSON: Where is that number, please?

23 DR. SCHOECH: That number is on the preceding
24 page, Table 4.

25 THE PRESIDING MEMBER: The change is the total
26 input goes down from 3.8 to 3.7 per cent. Is that
27 correct?

28 DR. SCHOECH: That's correct.

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 THE PRESIDING MEMBER: Okay.

2 MR. PENNY: And, as I understand it, under the
3 original data the differential was zero and it is now
4 a .1.

5 DR. SCHOECH: That's correct. And that's what
6 makes the sentence incorrect now.

7 MR. PENNY: All right. Thank you.

8 DR. SCHOECH: The second change also appears
9 on page 29 on line 10. The last number on that sentence
10 currently reads minus 0.9, it should read minus 0.8.
11 Once again, it's the result of the data correction.

12 The third change appears on page 31, line 7.
13 Because of the data revision, Union is now proposing
14 that the price cap index increase 1.9 per cent instead
15 of 2.0 per cent. So the 2.0 should be changed to 1.9.

16 And then, finally, on that same page, line 20,
17 parenthetically there is a number 0.4 which purportedly
18 represents reduction in throughput per customer. That
19 is incorrect so I wish to strike that. The actual rate
20 of reduction is closer to 1 per cent per year.

21 THE PRESIDING MEMBER: So do you want 1 per
22 cent replacing the 0.4 per cent?

23 DR. SCHOECH: It could say approximately
24 1 per cent.

25 --- Pause

26 MR. PENNY: Subject to those corrections,
27 Mr. Schoech, do you adopt your evidence?

28 DR. SCHOECH: Yes, I do.

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 MR. PENNY: Mr. Hemphill?

2 DR. HEMPILL: Yes, I do.

3 MR. PENNY: Mr. Schoech, what is total factor
4 productivity?

5 DR. SCHOECH: Total factor productivity is the
6 ratio of total output of a firm or industry to its total
7 input.

8 MR. PENNY: And how do you determine total
9 output?

10 DR. SCHOECH: Total output is determined by
11 looking at the different lines of business a company or
12 industry engages in, obtaining quantity measures
13 relevant to those and then aggregating those into an
14 overall index of total output.

15 MR. PENNY: And what is the principal quantity
16 measure for total output?

17 DR. SCHOECH: Well, the principal line of a
18 business is distribution services. And in our
19 productivity study there were two alternative quantity
20 measures that were relevant to distribution services:
21 The number of customers and the total volume of gas.

22 MR. PENNY: All right.

23 And with respect total input, how do you
24 measure -- or how do you determine total input?

25 DR. SCHOECH: Well, to determine total input
26 one first needs to look at the input associated with
27 labour, with capital and materials; one needs to develop
28 quantity measures for each of those; and then one needs

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 to aggregate those into an overall measure of total
2 input.

3 MR. PENNY: And for Union Gas, what was the
4 weighting of labour, materials and capital?

5 DR. SCHOECH: Well, the weights are based upon
6 the relative costs and for capital the cost weight is
7 approximately 65 per cent; for labour, 25 per cent; and
8 for materials, 10 per cent.

9 MR. PENNY: Using customers as the measure, as
10 the quantity measure, what was the result of your total
11 factor productivity study for Union Gas?

12 DR. SCHOECH: The result can be found on
13 Table 4, which is found at the bottom of page 28.

14 Using the number of customers as the measure
15 for distribution services, we found that total output
16 grew at an average annual rate of 3.8 per cent, total
17 input grew at an average annual rate of 3.7 per cent,
18 and total factor productivity grew at an annual average
19 rate of 0.1 per cent.

20 MR. PENNY: Using volume as the measure for
21 distribution services, what is the result of your total
22 factor productivity study for Union Gas?

23 DR. SCHOECH: That result can be found on
24 page 29, at line 10. As I indicated earlier, the result
25 of that is that the rate of productivity growth is
26 minus 0.8 per cent.

27 MR. PENNY: What did you do with these two
28 approaches?

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 DR. SCHOECH: Because Union Gas recovers its
2 revenue through both a volumetric charge and a fixed
3 monthly charge it was important to weight the two
4 studies together in proportion to the amount of revenue
5 generated from those two dimensions of the tariff
6 structure. The weighting needs to be in proportion to
7 the amount of revenue obtained from volumetric and
8 monthly charges. So we did that.

9 Sixty per cent of distribution service
10 revenue, roughly, is obtained through volumetric charges
11 and 40 per cent through customers, so we applied the
12 weights of 60 per cent and 40 per cent to the two total
13 factor productivity measures and obtained a weighted
14 average of total factor productivity growth of
15 minus 0.4 per cent per year.

16 MR. PENNY: What, then, is your final
17 conclusion on Union's historic average growth rate?

18 DR. SCHOECH: The average rate of total factor
19 productivity growth is minus 0.4 per cent per year.

20 MR. PENNY: What did you use as the basis of
21 your total factor productivity study?

22 DR. SCHOECH: The primary basis was financial
23 and other information specific to Union Gas.

24 MR. PENNY: Over what period of time did you
25 have data?

26 DR. SCHOECH: We had data for the period 1986
27 to 1996.

28 MR. PENNY: Why was the data that you used

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 that period, from 1986 to 1996?

2 DR. SCHOECH: First of all, we needed to have
3 an analysis over an extended period of time because
4 total factor productivity has substantial year to year
5 various, and it is important in measuring trend rates of
6 total factor productivity to look at it over a number of
7 years. Ten years provides a good indication of the
8 trend rate of total factor productivity growth.

9 The reason that the period ended in 1996 was
10 that that was the last year for which we had a
11 consistent series of data.

12 MR. PENNY: What was it about what happened
13 after 1996 that made the series of data inconsistent?

14 DR. SCHOECH: Beginning in 1997, Union began
15 sharing services with Centra and eventually merged with
16 it. In order to have a consistent time series of data
17 before 1997 and after 1997 it would have been necessary
18 to have Centra data for 1996 and earlier years.

19 MR. PENNY: Was the data available in a form
20 that was usable in your study?

21 DR. SCHOECH: No, it was not.

22 MR. PENNY: Were you concerned that the data
23 used did not extend beyond 1996?

24 DR. SCHOECH: As I indicated, since we were
25 looking at total factor productivity growth over a large
26 number of years, we felt it had a reliable indication of
27 the trend rate of total factor productivity, so, no, I
28 was not concerned.

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 MR. PENNY: You have had the opportunity to
2 review the evidence, Mr. Schoech, of John R. Norsworthy,
3 which has been filed in these proceedings?

4 DR. SCHOECH: Yes, I did.

5 MR. PENNY: At page 7 of Mr. Norsworthy's
6 evidence he says that the chief technical objection to
7 your productivity measurement approach is that the TFP
8 measurement method treats capital and material inputs
9 and input prices in non-standard ways. Are you aware of
10 that?

11 DR. SCHOECH: I am aware of that.

12 MR. PENNY: Do you agree with Mr. Norsworthy's
13 characterization?

14 DR. SCHOECH: No, I disagree with that.

15 MR. PENNY: Can you comment on that, please?

16 DR. SCHOECH: Yes. The methods that were used
17 in our study are definitely consistent with the standard
18 approaches in productivity measurement and are similar
19 to methods that we have used in measuring productivity
20 for other firms and industries.

21 MR. PENNY: On page 7 Mr. Norsworthy makes
22 reference to techniques, methods and data available from
23 Statistics Canada. Do you know what data is available
24 from Statistics Canada on the gas industry?

25 DR. SCHOECH: Yes.

26 MR. PENNY: What is that data?

27 DR. SCHOECH: The data are data that
28 Statistics Canada produces for the gas distribution

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 industry as part of their effort to measure total factor
2 productivity growth for that industry.

3 MR. PENNY: And how long does that data go
4 back?

5 DR. SCHOECH: I believe the data go back to
6 1961.

7 MR. PENNY: And when does it end?

8 DR. SCHOECH: It ends in 1995.

9 MR. PENNY: Were you aware of this data during
10 the course of your work on Union's total factor
11 productivity study?

12 DR. SCHOECH: Yes, I was.

13 MR. PENNY: Was that the same data which is in
14 the Norsworthy report that he refers to?

15 DR. SCHOECH: Yes. The data are the same.

16 MR. PENNY: Did you consider what the impact
17 of using this data would be on your work when you were
18 doing your total factor productivity study?

19 DR. SCHOECH: We did consider it, yes.

20 MR. PENNY: And did you use Statistics Canada
21 data?

22 DR. SCHOECH: No, we did not.

23 MR. PENNY: Why not?

24 DR. SCHOECH: I think there were two reasons.
25 First, as I mentioned to you, the data end in 1995. We
26 would have had to drop 1996 from the study if we were to
27 use it.

28 The second is that this is an unpublished

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 series of data that Statistics Canada puts together.
2 The reason that it is unpublished is that there is some
3 uncertainty about the precision of it. We felt it was
4 better to use published data that were precise rather
5 than unpublished data that were imprecise.

6 MR. PENNY: And if I can put it this way, did
7 you regard the Statistics Canada data on the natural gas
8 industry as being reliable for your purposes?

9 DR. SCHOECH: We did not use it at all, no. I
10 did not think it was reliable for our purposes.

11 MR. PENNY: On page 11 Mr. Norsworthy sets out
12 four areas in which he takes issue with your approach
13 versus the Statistics Canada approach to TFP
14 measurement, and he lists those as being the measures of
15 output, the treatment of the price as capital, the
16 deflator for materials inputs and the index methods
17 applied for aggregation of inputs and outputs. Are you
18 aware of those criticisms?

19 DR. SCHOECH: Yes, I am.

20 THE PRESIDING MEMBER: Excuse me, Mr. Penny.
21 Perhaps you could give me those references. I must have
22 a different version, because I don't tie in with
23 Mr. Norsworthy's --

24 MR. PENNY: I'm sorry about that,
25 Mr. Chairman. I am working with a hard copy that was
26 couriered to me by Mr. Janigan's office, but I know that
27 there are also electronic versions and it appears that
28 the pagination has turned out to be different. I think,

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 unfortunately, this may occur in some other instances
2 as well.

3 The first page reference I gave you,
4 Mr. Chairman, page 7, is a passage that is under heading
5 No. 4, "Overview of Productivity Measurement for
6 Performance-based Regulation of Union Gas".

7 THE PRESIDING MEMBER: Okay. I have a
8 different version here. It is page 5 on this one.

9 MR. PENNY: And the passage I was referring to
10 is in the first paragraph of that section.

11 And then the page 11 reference that I gave you
12 a moment ago is in section 7, which is called
13 "Comparison of Union/CA and Statistics Canada TFP
14 Methods".

15 THE PRESIDING MEMBER: Okay. Thank you.

16 MR. PENNY: I want to ask you about each of
17 those four criticisms, Mr. Schoech.

18 Dealing first with the measures of output,
19 what is the Norsworthy criticism of how you measured
20 output growth?

21 DR. SCHOECH: Quite simply, his criticism was
22 that instead of using the weighted average of the two
23 studies, he thought we should only use the study that
24 was based on gas volumes.

25 MR. PENNY: And why does he say that?

26 DR. SCHOECH: He said that that is what
27 Statistics Canada does.

28 MR. PENNY: Do you agree with that approach?

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 DR. SCHOECH: No, I do not.

2 MR. PENNY: Why is that?

3 DR. SCHOECH: For purposes of evaluating the
4 X factor, it is important to weight the different output
5 and output dimensions in proportion to the revenues
6 generated from them. That is the only way to calibrate
7 the X factor in a fair way. To use just gas volumes as
8 the output measure would be inappropriate in light of
9 that criterion.

10 MR. PENNY: Using your methodology, what again
11 was the measure of productivity growth, that is your
12 blended or weighted methodology?

13 DR. SCHOECH: The weighted method produced a
14 total factor productivity growth rate of minus 0.4 per
15 cent premium.

16 MR. PENNY: And using the recommended
17 Norsworthy method what is the measure of output of
18 growth?

19 DR. SCHOECH: Minus 0.8 per cent.

20 MR. PENNY: So using his method actually
21 reduces productivity growth not increases it?

22 DR. SCHOECH: That's correct.

23 MR. PENNY: Now, you told me earlier that
24 input prices are measured for capital, material and
25 labour. Does Mr. Norsworthy's report contain any
26 criticism of how you conducted your input price analysis
27 for the labour?

28 DR. SCHOECH: No, it does not.

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 MR. PENNY: I gather it does, as he says on
2 page 11, criticize your study with respect to the input
3 prices for capital?

4 DR. SCHOECH: That's correct.

5 MR. PENNY: First of all, how did you analyze
6 the input price for Union's cost of capital?

7 DR. SCHOECH: Well, the input price for
8 capital, also known as the service price of capital, was
9 constructed from Union data using an equation that
10 appears on page 26 of our report. On line 21 the
11 equation specified there is the equation used to
12 generate the service price of capital.

13 MR. PENNY: What is the derivation of that
14 equation -- I'm sorry -- what is the basis for that
15 equation?

16 DR. SCHOECH: This equation is derived from
17 the productivity literature and it is a standard
18 equation for application in network.

19 MR. PENNY: What is your understanding of the
20 Norsworthy criticism of that equation?

21 DR. SCHOECH: Mr. Norsworthy believes that a
22 characterization of this equation is inconsistent with
23 the literature on productivity and specifically
24 inconsistent with a layout of that theory that is
25 contained in a book written by Jorgenson & Young who are
26 two experts in the productivity area.

27 MR. PENNY: Are you familiar with that text?

28 DR. SCHOECH: Yes, I am.

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 MR. PENNY: Do you regard Jorgenson & Young as
2 being experts in the productivity area?

3 DR. SCHOECH: Yes.

4 MR. PENNY: Do you agree with the criticism
5 that the variable for cost of capital is mis-specified
6 having regard to the Jorgenson methodology?

7 DR. SCHOECH: No, I do not.

8 MR. PENNY: Why not?

9 DR. SCHOECH: Jorgenson & Young indicate that
10 the variable R, which is the variable in question, is an
11 opportunity cost of capital and, more specifically, that
12 it is a weighted average of the cost of debt and the
13 cost of equity.

14 We agree with that interpretation and use that
15 interpretation in our application of the equation to the
16 Union gas data.

17 MR. PENNY: So your factor "R" then is ---

18 DR. SCHOECH: Is consistent with that, with
19 that specification.

20 MR. PENNY: Now, does the Norsworthy report
21 offer -- well, first of all, does the Norsworthy report
22 offer any recalculation of Union's historic data based
23 on what Mr. Norsworthy says is the appropriate
24 application of the Jorgenson methodology?

25 DR. SCHOECH: No, he does not.

26 MR. JANIGAN: Excuse me, Mr. Chair, just I am
27 happy if we wish to drop the doctoral appellations for
28 all our witnesses, but remind Mr. Penny that

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 Mr. Norsworthy is in fact Dr. Norsworthy and might be
2 better reflected in the transcript.

3 THE PRESIDING MEMBER: Thank you, Mr. Janigan.

4 Mr. Penny, carry on.

5 MR. PENNY: Both Mr. Hemphill and Mr. Schoech
6 are Ph.D.s and they do not go by the designation
7 "doctor." So I apologize, Mr. Janigan, we do have, as
8 Ms Lea said this morning, lots of doctors.

9 I asked you, Mr. Schoech, whether the
10 Norsworthy report offered any recalculation of Union's
11 historic data based on what Dr. Norsworthy says is the
12 correct application of the Jorgenson methodology?

13 DR. SCHOECH: No, he did not.

14 MR. PENNY: Do you know why?

15 DR. SCHOECH: I don't know why. He offered
16 him something else instead.

17 MR. PENNY: What does the Norsworthy report
18 offer as an alternative approach?

19 DR. SCHOECH: He suggests that one can use the
20 data from Statistics Canada on the price of capital for
21 gas distribution that comes from the same database that
22 was I talking about earlier.

23 MR. PENNY: All right. Did you have that
24 capital information from the Stats Canada data when you
25 were performing your analysis?

26 DR. SCHOECH: Yes, I did.

27 MR. PENNY: Did you consider using it?

28 DR. SCHOECH: I considered it.

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 MR. PENNY: Did you use it?

2 DR. SCHOECH: I did not.

3 MR. PENNY: Why not?

4 DR. SCHOECH: Basically because there was no
5 way to apply it in a meaningful manner. The reason is
6 that the price series that Dr. Norsworthy refers to is a
7 price index just like the consumer price index.

8 What a price index does is it takes a base
9 year, say 1985, and sets that index to a number like
10 100. Then in other years the numbers may go up or down,
11 say in 1986 it might be 104. What that means is that
12 the prices in 1986 were 4 per cent higher than they were
13 in the base year 1985.

14 So that price series is just a series of price
15 relatives or relationships of prices between years.
16 What Dr. Norsworthy needed to do in order to
17 successfully accomplish his mission would be to
18 transform those price relatives to actual price levels
19 that were relevant for Union Gas. Neither his testimony
20 nor his work papers indicate how one does that.

21 MR. PENNY: Well, first of all, does
22 Dr. Norsworthy arrive at a linkage between the StatsCan
23 data set which is, as you said, it is just a percentage
24 and actual numbers of per unit cost?

25 DR. SCHOECH: I didn't find any linkage in his
26 testimony or work papers, no.

27 MR. PENNY: So do you know how Dr. Norsworthy,
28 based on his work papers, do you know how he arrived at

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 his capital growth?

2 DR. SCHOECH: I do not know how he arrived at
3 his present capital, no.

4 MR. PENNY: In your view, having regard to
5 your knowledge and familiarity with this StatsCan data,
6 is it possible to take the percentage data sets from the
7 StatsCan data and translate them into actual numbers?

8 DR. SCHOECH: No, it is not.

9 MR. PENNY: Why is that?

10 DR. SCHOECH: Well, once again, there is no
11 information in that data set that would provide a road
12 map for translating price relatives into price levels.

13 MR. PENNY: Now, the third complaint was over
14 the deflator used for material inputs, as he described
15 it.

16 DR. SCHOECH: That's correct.

17 MR. PENNY: Can you first of all explain to me
18 what the complaint is or what the criticism is?

19 DR. SCHOECH: First of all, let me explain
20 that the reason that one is looking at the price of
21 materials input is to take materials cost and obtain a
22 quantity measure from it.

23 In our work, we did not have any price indexes
24 that were specific to the types of materials input that
25 Union Gas purchased. Given the fact that materials
26 input constitutes only 10 per cent of total cost and
27 because we didn't have price indexes specific to Union,
28 we did something that is very common and accepted in the

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 productivity literature, which is to take a published
2 and broadly-based price index to reflect those prices.
3 That's what we did. We used the gross domestic product
4 price index.

5 Dr. Norsworthy disagrees with that and he says
6 once again that we should have used data that were
7 available in the Statistics Canada data set to generate
8 a price index of materials.

9 MR. PENNY: Did you consider using the
10 information available in the Statistics Canada data set?

11 DR. SCHOECH: We considered it, yes.

12 MR. PENNY: Did you use it?

13 DR. SCHOECH: We did not.

14 MR. PENNY: Why is that?

15 DR. SCHOECH: Well, as I indicated earlier,
16 there are two basic problems. One is that the data are
17 of questionable precision, the second is that the data
18 set ends in 1995.

19 MR. PENNY: Since reviewing Dr. Norsworthy's
20 evidence, have you recalculated the material price input
21 using the StatsCan data, excepting the problems with
22 doing so that you have outlined?

23 DR. SCHOECH: Yes, we did. In order to
24 determine how much of a difference the use of the
25 Statistics Canada data would have made to our
26 productivity study, we recalculated the productivity for
27 the years covered by the Statistics Canada data.

28 What we found was when we substitute the

SCHOECH/HEMPHILL/ELLIOTT, in-ch (Penny)

1 Statistics Canada prices for the gross domestic product
2 price index, that lowers the rate of total factor
3 productivity growth by a little bit more than one-tenth
4 of a per cent.

5 MR. PENNY: But does the use of the Statistics
6 Canada data result in a reduction of 1.4 per cent in the
7 material price index growth as Dr. Norsworthy alleges?

8 DR. SCHOECH: That's correct.

9 MR. PENNY: What does that translate into,
10 however, if you were to use the data in terms of the
11 bottom line of your analysis?

12 DR. SCHOECH: Well, that 1.4 per cent in terms
13 of the price difference translates into a 0.14 per cent
14 impact on total factor productivity. The reason, once
15 again, is that the cost of materials is only 10 per cent
16 of the total cost of input.

17 MR. PENNY: Was your use of GDPPI rather than
18 the StatsCan data a mistake, as Mr. Norsworthy alleges
19 on page 21?

20 DR. SCHOECH: No, no, it was not.

21 MR. PENNY: Now before leaving the StatsCan
22 data, does that data -- again accepting the problems you
23 have outlined with its use -- does that data enable you
24 to determine the total factor productivity growth that
25 is produced by comparing total outputs and total inputs
26 that were contained in the StatsCan data.

27 DR. SCHOECH: The StatsCan data do have
28 measures of total output, total input and total factor

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1 of productivity for the gas distribution industry, yes.

2 MR. PENNY: And what was the total factor of
3 productivity for the comparable period used in your ten-
4 year study if you were to derived it from the StatsCan
5 data?

6 DR. SCHOECH: If you were to derive it from
7 the Statistics Canada database, you would find that the
8 total factor of productivity growth rate was a minus
9 2.3 per cent.

10 MR. PENNY: And how does that compare with
11 your analysis based on Union's historic total factor of
12 productivity?

13 DR. SCHOECH: Well, based on the Statistics
14 Canada methods it would be most appropriate with the
15 study, what we call the sensitivity study, the one based
16 on gas lines which produced a TFP growth rate of a
17 minus 0.8 per cent.

18 MR. PENNY: And is the reason that that is the
19 appropriate comparator is that the StatsCan data also
20 uses the volume as the measure?

21 DR. SCHOECH: That's correct.

22 MR. PENNY: Now, Dr. Norsworthy relies on the
23 Statistics Canada data for his analysis of material
24 inputs?

25 DR. SCHOECH: Yes, he does.

26 MR. PENNY: And you told me that he relies on
27 Statistics Canada data for his alternative approach to
28 capital inputs.

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1 DR. SCHOECH: That's correct.

2 MR. PENNY: Does the Norsworthy approach rely
3 on Statistics Canada data to determine total factor
4 productivity?

5 DR. SCHOECH: No, it does not.

6 MR. PENNY: Now the fourth area -- or I should
7 say, Mr. Chairman, I apologize for having passed out a
8 piece of paper a moment ago, but we only copied it this
9 morning and I forgot about it, quite frankly, and left
10 it in the office. So it has become available. It is
11 two sheets which I am going to ask Mr. Schoech in a
12 moment to identify and comment on.

13 THE PRESIDING MEMBER: We would need to give
14 it a number when you reach it.

15 Could we make this Exhibit F6.1?

16 EXHIBIT NO. F6.1: Information derived
17 from Dr. Norsworthy's working papers that
18 were provided pursuant to an answer to an
19 undertaking

20 MR. PENNY: Thank you.

21 THE PRESIDING MEMBER: Would you give it a
22 title?

23 MR. PENNY: Well, it is actually information
24 derived from Dr. Norsworthy's working papers that were
25 provided pursuant to an answer to an undertaking, but
26 Mr. Schoech will explain it in a moment.

27 The fourth area of the Norsworthy criticism
28 was around the index methods applied for the aggregation

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1 of inputs and outputs. Do you recall that?

2 DR. SCHOECH: Yes, I do.

3 MR. PENNY: Can you tell us in a general way
4 what the significance is of an index in the overall
5 analysis and what use indexes play or what role they
6 play in the overall methodology?

7 DR. SCHOECH: Well, for both outputs and
8 inputs, indexing is required in order to take the
9 quantity measures for the different lines of business or
10 the different types of inputs and come up with a total
11 measure.

12 Let me focus in on output for just a moment.
13 To get a measure of total output, one needs to take the
14 quantity measures for distribution services, storage
15 services, et cetera, and aggregate them together into an
16 overall index of total output.

17 It is this aggregation that uses an index
18 number formula.

19 MR. PENNY: Which formula did you use, or
20 which index did you use to perform that aggregation of
21 data?

22 DR. SCHOECH: We used the Tornquist Index
23 which is widely used in productivity research.

24 MR. PENNY: And what is the Norsworthy
25 criticism of your aggregation method?

26 DR. SCHOECH: His criticism is that instead of
27 using the Tornquist Index we should have used an
28 alternative one called the Fisher Ideal Index.

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1 MR. PENNY: All right. And can you comment on
2 the suggestion, first of all, that you should have used
3 the Fisher Ideal Index as opposed to the Tornquist
4 Index.

5 DR. SCHOECH: Well, both the Fisher Ideal and
6 the Tornquist are legitimate alternatives for doing the
7 aggregation. Both of them are known as superlative
8 indexes in the productivity literature which means that
9 they are applicable to a wide variety of situations.

10 Furthermore, in many situations, the Tornquist
11 Index procedure and the Fisher Ideal Index procedure
12 produced nearly identical results.

13 MR. PENNY: Did Dr. Norsworthy attempt to
14 calculate output growth using the Fisher Ideal Index?

15 DR. SCHOECH: Yes, he did.

16 MR. PENNY: And what was the result of that in
17 his report?

18 DR. SCHOECH: Well, it one turns to Table 4 of
19 his report --

20 MR. PENNY: And that is in the evidence that I
21 have at page 17, Mr. Chairman, under the heading -- oh,
22 I am told it is page 15 in the other version, Table 4
23 headed: Union Gas Output Growth Rates.

24 In that table, he reproduces in the first
25 column the output growth rates that we computed in the
26 scenario where volumes are used as the output measure
27 for distribution services, and in the last column he
28 computes the growth rates that he purports you get when

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1 you use the Fisher Ideal Index instead of the Tornquist
2 Index.

3 MR. PENNY: And what is the result in his
4 report, as filed in his evidence, of the alleged use of
5 the two different approaches?

6 DR. SCHOECH: Well, if you look at the bottom
7 of that table, you will see that he reports that the
8 Tornquist Index produces an average rate of growth of
9 2.95 per cent whereas if you use the Fisher Ideal Index,
10 the average rate of growth is 3.58 per cent, an increase
11 of .63 percentage points.

12 MR. PENNY: And do you agree that the use of
13 the Fisher Ideal Index produces a greater output growth
14 amount?

15 DR. SCHOECH: No. When we looked at our data
16 and analyzed what impact using the Fisher Ideal Index
17 would have on a calculation, we found that our results
18 did not change when we used the Fisher Ideal Index
19 instead of the Tornquist Index.

20 MR. PENNY: Sorry, so I am clear on that. So
21 did you apply the Fisher index to your aggregation
22 methodology for input and output?

23 DR. SCHOECH: I am sorry. As I check on our
24 results, we recomputed input and output using the Fisher
25 Ideal instead of the Tornquist to see if that possibly
26 would have created a significant difference in our
27 results.

28 MR. PENNY: And what results did you obtain

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1 through the use of the Fisher Ideal Index.

2 DR. SCHOECH: We found that the Fisher Ideal
3 Index produced the same results as the Tornquist Index.

4 MR. PENNY: Now, did you then conduct an
5 analysis to determine why it was that Dr. Norsworthy
6 obtained a 3.58 per cent growth rate as opposed to your
7 2.95 per cent growth rate?

8 DR. SCHOECH: Yes. We looked at
9 Dr. Norsworthy's work papers to see if we could find out
10 how he produced the higher growth rate.

11 MR. PENNY: And were you able to determine how
12 he reached his results?

13 DR. SCHOECH: Yes, we did.

14 MR. PENNY: And how did he arrive at a
15 3.58 per cent result?

16 DR. SCHOECH: Well, it was the result of a
17 data error.

18 MR. PENNY: And can you explain in general
19 terms for us what the nature of that data error was?

20 DR. SCHOECH: Yes. If we refer to -- I
21 believe it is now Exhibit F6.1.

22 MR. PENNY: Yes.

23 DR. SCHOECH: You see the first page shows --

24 MR. PENNY: What is this?

25 DR. SCHOECH: These are extracts from
26 Dr. Norsworthy work papers where he computed the Fisher
27 Ideal Index's total output.

28 MR. PENNY: All right.

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1 DR. SCHOECH: And the first page of that
2 extract is titled Quantities and these are the quantity
3 measures for the different lines of business that
4 Dr. Norsworthy used when he applied the Fisher Ideal
5 Index.

6 Now for storage demand, transmission demand,
7 sales program, financing programs and rental programs,
8 he used the correct data, in other words the data that
9 we used in our study. But for some reason when it came
10 to distribution services, he did not use the volume of
11 the gas related to distribution services. Instead he
12 used something that he called gas volume.

13 MR. PENNY: And do you know then -- so you are
14 looking at column gas volume that starts 1.0 and then
15 ends at 1.329 at the bottom?

16 DR. SCHOECH: That is correct?

17 MR. PENNY: And do you know what those numbers
18 are?

19 DR. SCHOECH: Well, we investigated a little
20 further to try to figure out what they were and at first
21 I didn't know.

22 MR. PENNY: All right. And just so again we
23 are clear on the first page, in every other column he
24 used the identical data that you did?

25 DR. SCHOECH: That is correct.

26 MR. PENNY: All right. And what did your
27 investigation reveal?

28 DR. SCHOECH: Well, if you take a look at the

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1 second page of the exhibit at the far right, you will
2 see that gas in volume index replicated. In other
3 words, that series also begins at 1.0 and ends up at
4 1.329. Next to that he has shown the percentage change
5 from one year to the next of that index.

6 Now, if one goes back to Table 4 of his
7 testimony, and you look at --

8 MR. PENNY: That was at page 17 or in some
9 versions, page 15.

10 DR. SCHOECH: That is correct.

11 And you compare those percentage changes to
12 the percentage changes that were reported in the first
13 column, the column labelled "Output Growth: Tornquist
14 Index". You will see that these numbers match in every
15 year.

16 MR. PENNY: Right. So what is the column --
17 what is in the column "Output Growth: Union, Tornquist
18 Index" in Table 4 of his evidence?

19 DR. SCHOECH: That is the index of total
20 output of everything. Not just distribution services,
21 but everything, every line of business that Union was
22 involved in.

23 MR. PENNY: And on a spectrum of the six lines
24 of business, which line of business has the largest and
25 which has the lowest output growth rate?

26 DR. SCHOECH: Well, distribution --
27 distribution was at the low end of the spectrum.

28 MR. PENNY: Right.

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1 DR. SCHOECH: I mean except for the small
2 sales program, everything else grew at a more rapid
3 rate.

4 MR. PENNY: Right.

5 DR. SCHOECH: So in effect what he is doing is
6 he taking -- well, I should say that means that
7 distribution services grew at a slower rate than
8 everything combined. And what he has done is he has
9 taken an index that represents everything and put it in
10 just the distribution services line of business.

11 MR. PENNY: And is that an appropriate measure
12 of gas -- what he calls gas volume?

13 DR. SCHOECH: No, it is not.

14 MR. PENNY: And if you adjust for that data
15 error that was made by Dr. Norsworthy, what effect does
16 the use of the Fisher Ideal Index have on the
17 aggregation of total output?

18 DR. SCHOECH: Well, the end result is the
19 same. So there is no impact.

20 MR. PENNY: Now, Mr. Schoech, at page 11 of
21 Dr. Norsworthy's evidence, he says that the effects of
22 his corrections or the effects of the use of the
23 Statistics Canada data are summarized and their
24 approximate contributions to the differences in TFP
25 measures are summarized in Table 6 of his evidence. Do
26 you recall that?

27 DR. SCHOECH: I recall that.

28 MR. PENNY: And again at page 15 of his

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1 evidence, he says that Table 6 summarizes the separate
2 effects of each, what he calls "his corrections", based
3 on the Statistics Canada data. Do you recall that?

4 DR. SCHOECH: I recall that.

5 MR. PENNY: And would you turn to his Table 6,
6 which in my copy is page 23 and, Mr. Chairman, that is
7 part of heading "C". Productivity Target for Price Cap
8 PBR".

9 THE PRESIDING MEMBER: Page 21 in my copy.

10 MR. PENNY: Thank you, sir.

11 Mr. Schoech, does Table 6 reflect any changes
12 which arise from Dr. Norsworthy's use of Stats Can
13 material?

14 DR. SCHOECH: It does not, no.

15 MR. PENNY: And does Table 6 and indeed does
16 the evidence that precedes it under section C,
17 Productivity Target for Price Cap PBR, bear any
18 relationship to Dr. Norsworthy's use of Stats Can data?

19 DR. SCHOECH: Not at all, no.

20 MR. PENNY: And indeed does the evidence under
21 "C" and at Table 6 bear any relationship to the evidence
22 in the previous 21 pages of Dr. Norsworthy's testimony?

23 DR. SCHOECH: No, it does not.

24 MR. PENNY: He says in Table 6 that the
25 productivity target for Union should be 2.3 per cent.
26 How does that compare with your -- if you were to try
27 and compare apples to apples to that number, how does
28 that compare with your recommended productivity target?

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1 DR. SCHOECH: Well, our productivity target
2 consists of a minus 0.4 per cent historical rate of
3 productivity growth, plus a 0.4 per cent stretch factor.
4 So our recommended productivity target is 0.0. So
5 Dr. Norsworthy's productivity target is 2.3 percentage
6 points above ours.

7 MR. PENNY: How does he arrive at that
8 2.3 per cent?

9 DR. SCHOECH: Well, he does that in three
10 steps. The first step is he conjectures that economies
11 of density should lead to a 1.3 per cent increase in
12 Total Factor Productivity just by itself.

13 MR. PENNY: And do you agree that economies of
14 density can generate -- for Union -- can generate
15 1.3 per cent productivity?

16 DR. SCHOECH: No, I do not.

17 MR. PENNY: And why not?

18 DR. SCHOECH: Economies of -- or Total Factor
19 Productivity Growth will come out of economies of
20 density when volume per customer increases. Union is
21 facing -- faced with a situation where volume per
22 customer is decreasing. So rather than increasing the
23 rate of Total Factor Productivity Growth, if anything
24 economies of density will lead to negative productivity
25 growth.

26 MR. PENNY: What is the next factor in his
27 analysis?

28 DR. SCHOECH: The next factor is he believes

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1 that automation should add another 0.5 per cent increase
2 to productivity -- to the productivity growth rate.

3 MR. PENNY: And can you comment on the
4 relationship of automation to Union's historic
5 productivity factor?

6 DR. SCHOECH: Well, Union has been augmenting
7 for quite some time. So the historical numbers have
8 automation impacts contained within them.

9 MR. PENNY: And do you agree that there is any
10 -- with Dr. Norsworthy that there is any basis for
11 adding a net cost reduction for automation of 0.5
12 per cent as an add on to what is embedded in historic
13 productivity?

14 DR. SCHOECH: No, I do not.

15 MR. PENNY: And then what is the next factor
16 that leads to the derivation of the 2.3 per cent
17 productivity?

18 DR. SCHOECH: Well, the final factor is a
19 stretch factor of 0.5 percentage points.

20 MR. PENNY: And what is the basis on which
21 Dr. Norsworthy alleges that there should be a stretch
22 factor of 0.5 per cent?

23 DR. SCHOECH: Well, he believes that a newly
24 privatized and deregulated company should be able to
25 achieve a stretch factor of 0.5 percentage points.

26 MR. PENNY: And did you have any evidence in
27 your analysis that suggested that Union was a newly
28 privatized or newly deregulated company?

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1 DR. SCHOECH: My understanding is that it is
2 not -- that it is not a newly privatized company and
3 that it is not a newly deregulated company.

4 MR. PENNY: Given that Union is neither newly
5 deregulated or newly privatized, what is the impact of
6 that assumption on Dr. Norsworthy's assumed stretch
7 factor in your opinion?

8 DR. SCHOECH: Well, a newly privatized firm
9 often has opportunities for productivity growth that
10 wouldn't be available to a firm that has been in the
11 private market for quite some time. And similarly, a
12 deregulated company may have some opportunities for
13 productivity gains.

14 So therefore, if Union is not either a newly
15 privatized or newly deregulated, that would mean that
16 the stretch factor should be less than 0.5 per cent.

17 MR. PENNY: And then stepping back,
18 Mr. Schoech, and looking at the 2.3 per cent target
19 recommended by Dr. Norsworthy, having regard to Union's
20 historic productivity, can you comment on 2.3 as a
21 reasonable target?

22 DR. SCHOECH: I am sorry. Would you repeat
23 the question?

24 MR. PENNY: Can you comment on 2.3 per cent
25 and whether you consider it to be a reasonable target
26 having regard to Union's historic productivity?

27 DR. SCHOECH: Relative to Union's historic
28 productivity, for the industry information that is

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1 available, I would say that this is not a reasonable
2 target, no.

3 MR. PENNY: Again, based on Union's historic
4 total factor productivity, what is the implied stretch
5 factor in a 2.3 per cent target?

6 DR. SCHOECH: Since the historical rate of
7 growth was minus 0.4 per cent and his target is 2.3 per
8 cent, that would mean that his stretch factor is 2.7 per
9 cent.

10 MR. PENNY: Are you aware of any PBR mechanism
11 applying to an energy company with a stretch factor or
12 customer dividend of 2.7 per cent?

13 DR. SCHOECH: I am not, no.

14 MR. PENNY: There was also evidence filed in
15 this proceeding from Dr. Johannes Bauer. Are you
16 familiar with that evidence?

17 DR. HEMPILL: Yes, we are.

18 MR. PENNY: And you have had the opportunity
19 to review that evidence?

20 DR. HEMPILL: Yes, we have.

21 MR. PENNY: On page 27 of my copy, and I
22 believe page 30 of the electronic copy, Dr. Bauer is
23 commenting on the determination of input price inflation
24 in your model, and he says under the heading 5.2.2, in
25 the second paragraph, that the pre-filed evidence
26 provides only scant support for the assumption that the
27 input price differential is zero. Can you comment on
28 that observation?

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1 DR. HEMPHILL: Yes. It is typical in these
2 analyses to assume that the input price differential is
3 zero unless evidence can be provided that it is not
4 zero.

5 If I could direct you to our prepared
6 testimony at page 8, starting at line 3, we talk about
7 this issue. Starting at line 3 on page 8 we talk about
8 the fact that the Stentor companies did do an analysis
9 of the input price differential as part of a price cap
10 mechanism in 1996, and they found that the differential
11 was extremely volatile and had no reason to believe that
12 it would be anything significantly different than zero.

13 Also on this page we talk about evidence that
14 has been prepared, or a study that was prepared within
15 our company, which found a similar result.

16 If you were to look at page 30 of our
17 evidence, you would see that an estimate was made of the
18 input price differential, but it is also stated on page
19 30, starting at line 20, that those input prices show a
20 great deal of volatility. There are two years where it
21 increases more than 20 per cent. There is a year where
22 it decreases by 33 per cent. So we felt comfortable in
23 this study to consider -- to go ahead and make the
24 assumption that the input price differential is zero.

25 MR. PENNY: And on pages 30 to 32 of my
26 version, and I think 33 to 35 of the electronic version,
27 of Dr. Bauer's testimony, there is a discussion of a
28 process referred to as triangulation to review the

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1 results of the total factor productivity calculation.
2 He says on page 35, I think, of the electronic version,
3 that these figures, which reflect Union's own past
4 performance as well as a comparison of its proposal with
5 other PBR plans in the natural gas industry, shed some
6 doubt on the accuracy of the proposed X factor. Can you
7 comment on the use of what Dr. Bauer calls triangulation
8 to set the X factor and his conclusion that doing so
9 sheds some doubt on the accuracy of the proposed
10 X factor?

11 DR. HEMPHILL: Yes, we can.

12 As far as I can tell, the process of
13 triangulation is using what I would call secondary
14 sources of information rather than doing an empirical
15 study using data that is available; an empirical study
16 like what Christensen Associates did for Union Gas in
17 this case.

18 I would encourage in establishing any price
19 cap program that the X factor that is an important part
20 of that program be based first on an empirical analysis
21 of the total factor productivity, like what is specified
22 in our evidence, and also based on what is determined to
23 be an appropriate stretch factor, rather than using
24 secondary sources of information in order to arrive at
25 that.

26 There are reasons why you would want to avoid
27 doing that. A couple that I can mention are that you
28 have to be very careful about the industries and the

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1 companies that you are comparing to, and you also have
2 to be careful in terms of the time period, what is going
3 on in terms of inflation rates and other things in the
4 economy, with those figures that you are using for
5 comparative purposes.

6 MR. PENNY: All right. Thank you.

7 At page 33 of the hard copy, and I think 38 of
8 the electronic copy, Dr. Bauer discusses non-routine
9 adjustment factors and he states that from his
10 perspective several of the proposed non-routine
11 adjustment factors are too broad-based. Can you comment
12 on the criticism that the non-routine adjustment factors
13 proposed in the Union proposal are too broad-based?

14 DR. HEMPHILL: Yes, I will. First of all, I
15 am sure Dr. Bauer would agree that Z factors are usually
16 included in a multi-year price cap program. Z factors
17 are designed to address costs that the company will
18 incur or perhaps benefits that the company will enjoy
19 that are either unexpected and are uncontrollable or not
20 within the discussion of the management of the company.

21 Given the fact that they are, by definition,
22 unexpected and uncontrollable, it is very difficult to
23 be real specific in terms of what those Z factors are.

24 We looked at the Z factors that were designed
25 and proposed by the company in this case and found that
26 they did a very good job in terms of trying to get as
27 defined as possible, in terms of what those areas of
28 costs may be that you would want to include as a

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1 possible Z.

2 MR. PENNY: Thank you. On page 28 of my
3 version, and I think 31 of the electronic version, Dr.
4 Bauer has a criticism of the proposal for a return on
5 equity adjustment, and he criticizes the ROE adjustment
6 as taking the capital side of Union out of the incentive
7 mechanism and says that the company is essentially
8 indemnified from all risk related to its capital basis
9 and that in the proposed plan the OEB would not have
10 effective means to review the prudence of the capital
11 investment.

12 Can you comment, from your perspective, on
13 Dr. Bauer's criticism and on Union's proposal to contain
14 a return on equity adjustment in its non-routine
15 adjustments?

16 DR. HEMPHILL: Yes, we can. The change in the
17 cost of capitalization for Union is certainly a change
18 in an input price. So taking into consideration the
19 fact that part of the price cap program that is being
20 proposed by Union includes an assumed zero input price
21 differential, you may state that an increase in the cost
22 of capitalization would be an increase of that price
23 that would not be reflected or is not the same as the
24 price that would be incurred economy-wide, and that is
25 because of the high capitalization of Union in terms of
26 it having a high fixed cost component.

27 This cost also, I think, can easily be
28 identified as a cost that is uncontrollable. It is

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1 market driven in terms of the cost of procuring equity
2 for the capitalization. Therefore, given the fact that
3 this is a fixed price proposal, I find some very strong
4 evidence to allow them to use this -- or include this as
5 a Z factor passthrough in their proposal.

6 MR. PENNY: Dealing with Dr. Bauer's comments
7 on service quality at page 39, and in the electronic
8 version I think it is page 43, Dr. Bauer criticizes the
9 Union plan for the absence of automatic penalties and
10 recommends that the plan incorporate explicit penalties
11 if Union fails to achieve minimum standards.

12 Mr. Hemphill, can you comment on the use of --
13 from your perspective, on the use of penalties in the
14 application of service quality indicators?

15 DR. HEMPHILL: Yes. As we state in our
16 evidence that is filed in this case, as academics that
17 have been studying incentive regulatory structures for a
18 while, we have a preference in terms of service quality
19 and how it is treated within our price cap program.
20 That would include a symmetric treatment within the
21 price cap index itself.

22 In order to do that, you need some fairly good
23 information in terms of what the value is or the costs
24 are, the damages, and so on and so forth, depending on
25 the service quality area that you are looking at. There
26 is a lack of that type of information currently, but
27 what we did look at was the fact that the company, in
28 the absence of that, structured an agreement that they

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1 would continue to monitor particular areas that are of
2 concern regarding service quality and safety and would
3 include stakeholder participation and actual mitigation
4 measures, all at the cost of the company.

5 Given the lack of the information that I spoke
6 of earlier, I felt this was a good compromise in the
7 early stages of an incentive regulatory structure like
8 what is being proposed by Union.

9 MR. PENNY: Finally, with respect to
10 Dr. Bauer, at pages 44 and 45 of my version, there under
11 the heading of "Missing Risk Mitigation Measures 6.3"
12 there is a recommendation for consideration of earnings
13 sharing and some consideration of some specific possible
14 earnings sharing plans.

15 Did you recommend the use of earnings sharing
16 in this case?

17 DR. HEMPHILL: No, we did not.

18 MR. PENNY: Why not?

19 DR. HEMPHILL: We consider earnings sharing
20 mechanisms to diminish the incentives that are inherent
21 within a price cap program or incentive structure like
22 this.

23 MR. PENNY: Are there circumstances where
24 earnings sharing are appropriate?

25 DR. HEMPHILL: Yes. Earnings sharing are
26 often used when there is a lack of information on the
27 part of the regulator in terms of the company operations
28 or cost structure. Therefore, there is uncertainty in

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1 terms of what actually the outcome is going to be over
2 the term of the price cap program.

3 MR. PENNY: Can you then comment on
4 Dr. Bauer's recommendation on the need for earnings
5 sharing in this particular case?

6 DR. HEMPHILL: In this particular case we
7 don't think it is needed because the Board has much
8 experience regarding this particular utility, many years
9 of regulation. They know their cost structure, have
10 been through it many, many times through the course of
11 traditional cost-of-service regulation and, therefore,
12 there is relatively little uncertainty going into a
13 program like this.

14 MR. PENNY: All right, thank you.

15 I just want to turn finally for a few minutes
16 to Exhibit D21.1, which is the evidence of Mr. Hugh
17 Johnson, which has been filed on behalf of the
18 Industrial Gas Users Association.

19 Have you reviewed that testimony?

20 DR. HEMPHILL: Yes, we have.

21 MR. PENNY: Starting with page 13 at question
22 18, Mr. Johnson questions whether the price cap factor
23 should be applied to all cost items in the revenue
24 requirement base and recommends that the price cap
25 should only be applied to operating and maintenance
26 expense, taxes, other than income and the cost of debt
27 and preferred equity that would be reissued during the
28 PBR period.

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1 Can you comment on Mr. Johnson's discussion of
2 what the price cap factor should be applied to? That is
3 contained at question 18 of his testimony.

4 DR. HEMPHILL: Yes, I would like to offer a
5 general observation that we have regarding this line of
6 evidence. It is a concern that we have that you
7 frequently face when you are looking at a change in
8 regulatory paradigm like what is occurring here with the
9 proposal by Union Gas.

10 Union Gas is proposing a price cap program.
11 They are proposing leaving embedded cost-of-service
12 regulation. With that comes a new way for Union to look
13 at the operations and management of its business, a new
14 way that customers will look at Union and the way in
15 which rates are made, a new way that our stakeholders
16 will view the company.

17 It is not, in my view, productive to continue
18 to walk back into the embedded cost-of-service approach
19 to looking at things. The question should be what
20 should prices be, not what should costs be or what will
21 costs be, but what should prices be. It is the prices
22 from now on that are being regulated.

23 So you are going to find, and throughout, I'm
24 sure, the next day or so, we may find ourselves
25 grappling with the issue of is there a one to one here,
26 meaning is there a cost with the price, is there a cost
27 with the increase. You are not always going to be able
28 to identify that. Those places where you are able to

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1 identify it, as we indicated earlier, things such as
2 Z factor, passthroughs where it is identified that it is
3 outside the control of the company, separately
4 identified in that manner, as I spoke of earlier, then
5 you treat that separately.

6 But for everything else that is included in
7 the revenues that will be generated by a changing price
8 because of a change in the price, change in revenues
9 because of the change in the price -- I'm sorry -- you
10 are not going to be able to go back into the embedded
11 cost-of-service routine and be able to pick out
12 individual items and see if they are or are not properly
13 being recovered.

14 MR. PENNY: On page 12 of his testimony,
15 Mr. Johnson refers to inefficiencies inherent in
16 cost-of-service regulation and that it is inappropriate
17 to assume that these inefficiencies will continue. Your
18 evidence suggests that the system of regulation under
19 performance-based methodologies in a price cap will
20 become more efficient, but are you saying that the
21 current system has been inefficient?

22 DR. HEMPILL: No. We have absolutely no
23 reason to believe that the Board has conducted
24 cost-of-service regulation in an inefficient manner or
25 that the company has been inefficient in the past. Just
26 because something becomes more efficient doesn't mean
27 that it was inefficient. If I get better in tennis it
28 doesn't mean that I was bad before I got better. It

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1 just means that I got better.

2 MR. PENNY: On page 13 Mr. Johnson argues for
3 an X factor of 2 per cent to account for the elimination
4 of inefficiencies inherent in regulation and to reflect
5 the customer dividend. What is your reaction to that
6 proposal?

7 DR. HEMPHILL: We don't know what analysis
8 Mr. Johnson performed to arrive at these figures.
9 Therefore, we haven't provided any technical review of
10 the proposal.

11 As was stated earlier, our report and the
12 company's other evidence describes a fairly rigorous
13 analysis that was performed to arrive at Union's current
14 proposal.

15 MR. PENNY: Finally, on page 16, in response
16 to question 22, Mr. Johnson recommends a three year term
17 for the program as opposed to the five years that is a
18 part of Union's proposal in this case. How do you
19 respond to the suggestion that the term, the initial
20 term of the PBR should be three years rather than five?

21 DR. HEMPHILL: As I stated earlier, a number
22 of changes are going to take place with the change in
23 the regulatory structure going from embedded cost of
24 service to price cap regulation. It takes a while for
25 those changes to take place. You have to be very
26 careful that you don't structure a program that you are
27 checking so soon that you actually diminish or cause
28 some type of disturbance to the changes that have to

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1 take place and the process that the company is going to
2 go through, as well as all other parties in the case
3 and/in getting used to this new environment.

4 If you structure a program that ends within a
5 couple of years, three years, you are not probably going
6 to see the results as you would if you gave the program
7 a longer term of time. We tend to feel comfortable with
8 five years. If you look at programs in the past, the
9 ones that seemed to be working well, five years is a
10 typical time period.

11 MR. PENNY: Thank you, Mr. Schoech and
12 Mr. Hemphill.

13 Mr. Chairman, that concludes my examination-
14 in-chief.

15 THE PRESIDING MEMBER: Thank you, Mr. Penny.

16 I think it would be a good time to have our
17 morning break now and then we can start the cross-
18 examination.

19 So we will have a 15-minute break now.

20 --- Pause

21 Dr. Jackson has just told me that 15 minutes
22 is too short a period of time. So what about coming
23 back at five to eleven and we will start the cross-
24 examination then?

25 Thank you.

26 MEMBER JACKSON: Sorry about that.

27 THE PRESIDING MEMBER: Thank you, Dr. Jackson.

28 --- Upon recessing at 1026

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1 --- Upon resuming at 1057

2 THE PRESIDING MEMBER: I believe that it is
3 Mr. Janigan who is going to be leading this off. Is
4 that correct?

5 MR. JANIGAN: Mr. Brett will lead off.

6 THE PRESIDING MEMBER: Mr. Brett.

7 CROSS-EXAMINATION

8 MR. BRETT: Thank you.

9 With your indulgence, Mr. Chairman, I have to
10 get back downtown later on today.

11 Mr. Chairman, Dr. Jackson. Good morning,
12 panel.

13 THE PRESIDING MEMBER: Good morning.

14 MR. BRETT: Panel, I am going to ask you some
15 questions. The order of my cross-examination is really
16 first to deal with the approach you took to determining
17 the X factor in your study and then to talk a little bit
18 about comparison of your proposed plan, or Union's plan,
19 with other plans, other PBR plans.

20 And then a few questions on the relationship
21 between cost of service, ratemaking and going forward
22 into PBR and a few questions on earning sharing. So
23 that is the sequence of the questions.

24 Before I start get into that sequence, I had a
25 question or two arising out of your oral evidence-in-
26 chief.

27 Dr. Schoech, would it be fair to say that
28 while you are certainly expert in PBR programs of

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1 various sorts, that you have not had a great of
2 experience in applying PBR to the natural gas industry?

3 DR. SCHOECH: That is correct. This is the
4 first time that I have applied it to the natural gas
5 industry.

6 MR. BRETT: And further to that, would it be
7 fair to say that you are not an expert on the
8 electricity restructuring in the Ontario energy market
9 and the prospective changes coming in the next several
10 years in the Ontario energy market. Is that a fair
11 comment?

12 DR. SCHOECH: Aside from the review of the PBR
13 plan, no I don't have any experience in this area.

14 MR. BRETT: I may interchangeably call you
15 both doctor and mister, if you don't mind. There is
16 no --

17 DR. SCHOECH: Mister is fine.

18 DR. HEMPILL: The same here.

19 MR. BRETT: Mr. Hemphill, you mentioned -- or
20 Mr. Penny in his evidence, examination-in-chief referred
21 to an article that you had written on PBR in the natural
22 gas industry, among a lot of other writings and
23 submissions.

24 Would you consider yourself -- I take it,
25 would you consider yourself an expert in applying PBR to
26 the natural gas industry?

27 DR. HEMPILL: I couldn't consider myself an
28 expert in applying PBR to the natural gas industry, but

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1 I do view it pretty similarly to the other energy
2 industry that PBR is being applied to and that is
3 electricity.

4 MR. BRETT: Right. And are you in the same
5 boat as Dr. Schoech in the sense that you are not very
6 familiar -- you are not an expert in the structure of
7 the electricity market in Ontario and the upcoming
8 changes to that market?

9 DR. HEMPILL: I couldn't qualify myself as an
10 expert although I have been looking at it, and actually
11 one of my consulting jobs in the last year dealt with
12 it.

13 MR. BRETT: In what sense did you deal with
14 it?

15 DR. HEMPILL: I was working with the
16 independent market operator here in Toronto.

17 MR. BRETT: Okay. And you helped him with
18 some aspect of the market rules?

19 DR. HEMPILL: I was working on their
20 strategic plan.

21 MR. BRETT: The strategic plan for the IMO
22 itself?

23 DR. HEMPILL: Yes.

24 MR. BRETT: At one point in Mr. Penny's
25 questions to you, you discredited to some degree the
26 relevance of the Statistics Canada productivity factor
27 analysis, but then at the same time a little later on in
28 your testimony, you seemed to say that it was useful for

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1 certain purposes.

2 Now, I take it that you are not trying to have
3 it both ways, that on balance your view is that the
4 StatsCan material is not sufficiently developed to use
5 for these purposes.

6 DR. SCHOECH: I believe what I said was that
7 there was a lack of precision in the Statistics Canada
8 data and simply for that reason I didn't use the
9 minus 2.3 per cent in evaluating the X factor.

10 But at the same time, I think it gives a
11 qualitative indication of the direction of the industry.
12 I think there is a difference between quantitative
13 precision and qualitative indication.

14 MR. BRETT: You are not trying to use the
15 2.3 per cent in any major way to support your
16 conclusions or to support the relevant efficiencies of
17 Union Gas relative to the rest of the gas transportation
18 industry or anything of that sort.

19 DR. SCHOECH: The only way that I used it was
20 to look at Union historical performance in light of that
21 number and there was a large enough difference that I
22 think it was reasonable to make the inference that Union
23 had a higher rate of Total Factor Productivity growth in
24 the industry.

25 Now whether it was all of the 1.9 percentage
26 point difference or not, that I certainly wouldn't have
27 been prepared to say.

28 MR. BRETT: In your evidence -- and I think it

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1 starts at page 6 -- I don't know if you need to turn
2 this up, but let me just put the general proposition to
3 you.

4 You explained to us in your evidence that
5 there were two ways that people doing these sorts of
6 studies could arrive at an acceptable price cap index.

7 The first is what you call the industry input
8 price approach under which you calculated, as I
9 understand it, both an industry-wide TFP index -- Total
10 Factor Productivity index -- and an industry-wide
11 inflation index. In other words, a price index of a
12 specific industry inputs. That is one way to go and I
13 think you explained in your testimony that that is the
14 way that one of the regulatory bodies dealing with
15 railroads has gone historically, and parenthetically I
16 think that is the way the Energy Board here went with
17 respect to the municipal electric distribution
18 companies' analysis. Is that fair?

19 DR. SCHOECH: That's correct.

20 MR. BRETT: You did not go that way. You
21 explained there was a second way to do this, a second
22 approach, and that was what you called the economy-wide
23 price inflation approach and there you use an economy-
24 wide measure of inflation, the CPI or the GDPPI -- and
25 in your case you used the GDPPI -- and then you arrive
26 at an X factor from that by calculating both an input
27 price differential and a Total Factor Productivity
28 differential and you do that in the manner set out in

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1 the equation 7, on page 7 of your evidence. Is that
2 fair?

3 DR. SCHOECH: That's correct.

4 MR. BRETT: And you say, I think, in summary
5 that the first approach, that is the approach that the
6 Board used -- that this Board used in the electric
7 distribution industry analysis -- was the better
8 approach in theory because it more accurately reflects
9 the factors that are directly relevant to the regulated
10 industry. Is that a fair summary?

11 DR. SCHOECH: Yes. I believe you are
12 referring to line 21 on page 8 of our report.

13 MR. BRETT: That is correct. But you say that
14 in this case, and in some other cases, it is not the
15 approach chosen because of essentially problems of
16 getting good data at the industry level. Is that fair?

17 DR. SCHOECH: That is correct. What I say,
18 going down in that paragraph a little bit further, is
19 that there are data requirements to do the industry
20 approach and that the other approach does have the
21 virtue of relative simplicity.

22 MR. BRETT: Okay. Now, in using the second
23 approach, the economy-wide price inflation approach, you
24 use -- you choose the GDPPI and it is, as I recall, it
25 is 1.6 per cent in each of the five year periods. Is
26 that right?

27 DR. SCHOECH: The forecast that we use shows
28 an average rate of increase of 1.6 per cent over that

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1 five-year period. I believe the year-by-year numbers
2 have some small fluctuations around that average.

3 MR. BRETT: Okay. Well, that is the average
4 over the five-year period. And then you do a
5 calculation of the Total Factor Productivity for Union
6 Gas, the utility itself, of zero. Now, this is changed
7 slightly I believe with your revisions, which I am not
8 -- I am going to speak to the original numbers and then
9 we can mentally make an adjustment here because I have
10 trouble following one set of numbers, let alone two.

11 But in your initial calculation of TFP you got
12 a Total Factor Productivity of 0.0 per cent. Is that
13 right?

14 DR. SCHOECH: The one study which used the
15 number of customers as the quantity measure for
16 distribution services did originally produce the result
17 of 0.0 per cent.

18 MR. BRETT: I am sorry. I apologize. I
19 wanted to correct -- make my question more specific.

20 I was referring to the study -- the
21 calculation that used the number of customers and I am
22 quite -- I am aware from your comments to Mr. Penny, and
23 I don't wish to ignore the fact that you did a second
24 analysis using volumes, which turned out, I think, a
25 number of minus 0.9 per cent. But again, I am going to
26 use as my example, as my base for this example, I want
27 to run through with you the zero per cent calculation,
28 and everybody in the room can make a mental adjustment

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1 as we are going through to add on effectively the
2 volumetric calculation.

3 But in terms of the study you did or the
4 analysis you did, the first branch of your analysis when
5 you were using customers, you arrived at a 0.0 initially
6 Total Factor Productivity for Union Gas. Correct?

7 DR. SCHOECH: Before the data correction, yes.

8 MR. BRETT: Yes. And that is at page 30?

9 DR. SCHOECH: Yes.

10 MR. BRETT: It is also Table 4 on page 28, I
11 guess?

12 DR. SCHOECH: Yes, that is right.

13 MR. BRETT: And with the data correction that
14 would be 0.1?

15 DR. SCHOECH: That is right.

16 MR. BRETT: Okay. And you were using Union
17 Gas there, as I understand it, as a proxy for, in a
18 sense, as a proxy for the industry?

19 DR. SCHOECH: That is correct.

20 MR. BRETT: But you didn't have industry data?

21 DR. SCHOECH: That is correct. We did not
22 have industry data.

23 MR. BRETT: And then you noted also -- you
24 next noted that the Total Factor Productivity for the
25 Canadian economy over the same period was 0.3 per cent?

26 DR. SCHOECH: That is correct.

27 MR. BRETT: And then you -- the next step was,
28 and where I am heading here is just to get at these

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1 differentials, two differentials that you had to arrive
2 at as you can tell. And this is on page 30 of your
3 evidence, the top part of the page.

4 You inferred the input price index for the
5 Canadian economy to be 2.8 per cent and you did that, as
6 I understand it, by combining the Total Factor
7 Productivity number of 0.3 with the GDPPI of 2.5
8 per cent over the relevant period to get an input price
9 index for the Canadian economy as it were of 2.8
10 per cent. Right?

11 DR. SCHOECH: That is correct. You are
12 referring to the discussion on lines 10 through 14 of
13 page 30.

14 MR. BRETT: That is exactly right. The middle
15 of page 30, that short paragraph.

16 You then in the table on page 30, Table 5, you
17 show the Total Factor Productivity differential -- you
18 have to arrive at these two differentials that we spoke
19 of earlier. So the Total Factor Productivity
20 differential you show is minus 0.3. Correct?

21 DR. SCHOECH: Again, before the data
22 correction, yes, I guess it was a minus 0.3.

23 MR. BRETT: Right. And then the input punch
24 differential on the second, which is the second layer of
25 that Table 5, you have as originally in the Table 5 I am
26 looking at as minus 1.1 per cent.

27 DR. SCHOECH: That is correct.

28 MR. BRETT: And that is the difference in

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1 input price experience between Union Gas on the one hand
2 and the Canadian economy 2.8, which you inferred above,
3 on the other hand?

4 DR. SCHOECH: For that time period, yes.

5 MR. BRETT: For that ten-year time period.

6 Then you say at the bottom of page 30 and you
7 talked a little bit about this with Mr. Penny that, and
8 I quote, this is at line 19 on page 30:

9 "For the reasons cited in Section 2.2 it
10 is also important to look at the
11 volatility of the measured input prices
12 when setting the X factor. The measured
13 Union Gas input prices show ..."

14 My emphasis:

15 "... a great deal of volatility, with the
16 price of total input increasing more than
17 20 per cent in two years..."

18 And over the page, 30A:

19 "...and decreasing 33 per cent in one
20 year. In light of this volatility ..."

21 My emphasis:

22 "... it is appropriate to assume that the
23 input price differential will be zero
24 over the next five years."

25 Then you have a footnote at the bottom of the
26 page that says, and I quote, this is footnote 25A:

27 "The volatility of the input price
28 differential can also be observed by

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1 noting that over the last five years, the
2 average rate of Union Gas input price
3 growth was 5.1% per year."

4 Now, I have two questions, I guess, to you.

5 The first is why is it that you -- it appears
6 to me that there is no particular link between
7 volatility of the input price index and the proposition
8 that the average input price differential should be
9 zero. Could you not have a circumstance where there was
10 fluctuation around -- across a band but the average
11 price index is what you calculated it to be here, 1.1
12 per cent? Why do you link volatility with an input
13 price differential of zero?

14 DR. SCHOECH: Well, let me see if I can refer
15 you back to the discussion earlier in section 2 and
16 perhaps that will help clarify it.

17 MR. BRETT: Well, that was at page 8 I gather.

18 DR. SCHOECH: Yes.

19 MR. BRETT: You talked there about some
20 studies or a study that you had done for the Stentor
21 companies and I am reading from line 3, which provided
22 input price differentials in telecommunications. And
23 you say that:

24 "Stentor found that the telephone
25 industry input differential was extremely
26 volatile over very short periods of time,
27 but that the average rate of change could
28 not be statistically distinguished from

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1 zero."

2 Now, is that a study that you did?

3 DR. SCHOECH: It is not a study that we did.

4 It is a study we have reviewed though.

5 MR. BRETT: Over what period of time did they
6 make those calculations?

7 DR. SCHOECH: I don't recall precisely but I
8 know that they had a long period of time and a short
9 period of time. A long period of time meaning probably
10 20 or 25 years. Short period of time maybe being around
11 10 years.

12 MR. BRETT: Maybe I could ask you to explain.
13 They say here that they found that the average rate of
14 change could not be statistically distinguished from
15 zero. But what does that -- how does that bear on the
16 input price differential that you discovered of
17 1.1 per cent?

18 DR. SCHOECH: Well, perhaps I can help out
19 here.

20 The -- when you have a theory that is highly
21 volatile, even if on average it is going to be zero, you
22 are going to have a sequence of numbers which over given
23 time periods may be positive or other time periods may
24 be negative.

25 Now, what happened historically was that over
26 the 1986 to 1996 period the net impact was a negative.
27 In terms of looking forward towards the period of time
28 where this price cap would apply, just because these

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1 numbers with a lot of variation around them happen to
2 average out to be negative would not necessarily imply
3 that they are going to be negative in the future and
4 that is where the issue of statistical significance
5 comes in.

6 MR. BRETT: If I could just stop you for a
7 moment. Your proposition really is that reduced to
8 its -- your proposition here so far is that it was
9 negative over the ten-year period of your study, but
10 that doesn't mean it will be negative over the next ten
11 years.

12 DR. SCHOECH: That's correct.

13 MR. BRETT: But you are not saying it wasn't
14 negative by 1.1 per cent over the period of the study.

15 DR. SCHOECH: From 1986 to 1996, yes.

16 MR. BRETT: I am sorry, I interrupted you. I
17 didn't mean to --

18 DR. SCHOECH: In any event, that is where the
19 issue of statistical significance comes in.

20 If the series, in a statistical sense, can't
21 be distinguished from zero, it is my opinion -- my
22 expert opinion -- that it would be unwise to add an
23 input price differential to the type of plan we are
24 talking about, simply because you are just as likely to
25 have a positive in the future as you are a negative
26 differential.

27 MR. BRETT: But you have no way of knowing
28 that. What you do know for a fact here is that over

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1 this last ten years you have had a lower rate of input
2 price in Union than you had in the Canadian economy as a
3 whole.

4 DR. SCHOECH: Yes. There was a difference of
5 1.1 per cent.

6 MR. BRETT: And if you had used that 1.1 per
7 cent number instead of the zero assumption that you are
8 making about the input price differential, and if you
9 had input that into equation No. 7 on page 7 of your
10 evidence, then the rate of change in the price cap that
11 you would have found to be acceptable would have been, I
12 make it, something like .8 per cent. This is assuming
13 that we -- this is, in other words, on the original
14 numbers, and this is using as the output analysis the
15 output analysis related to customers, and this is before
16 a stretch factor.

17 I get that number by just going to your
18 equation No. 7 on page 7 and essentially taking the
19 DPGT, which is the allowed rate of change in the price
20 cap index, and it would equal the rate of general price
21 inflation in the whole economy, which is DPE, as I
22 understand it --

23 DR. SCHOECH: Yes.

24 MR. BRETT: -- which is 1.6, minus 1.1, plus
25 minus .3, effectively.

26 DR. SCHOECH: If one were to take the numbers
27 that appear on Table 5 and plug them into equation 7 on
28 page 7 and use the forecast of 1.6 per cent, then the

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1 result would be 0.8 per cent.

2 MR. BRETT: All right. Thank you. That was
3 my analysis. I just wanted to make sure I read the
4 equation properly, being a lawyer rather than a
5 mathematician.

6 The results -- and not to put too fine a point
7 on it, but the results of your analysis and the proposed
8 outcome are highly dependent on this assumption of the
9 input price differential being zero. I mean, we could
10 discuss the merits of that, I suppose, for a long time,
11 but do you agree that the results are highly dependent
12 on that assumption?

13 DR. SCHOECH: The results are dependent upon
14 that assumption.

15 MR. BRETT: Could I ask you, with respect to a
16 question that you were asked by way of
17 interrogatory -- and I touched on this the other day
18 with Ms Elliott and Mr. Birmingham, but I wanted to get
19 the benefit of your gentlemen's comments on it because I
20 know you have looked at a lot of plans.

21 I think it is Interrogatory 19.28. This is
22 the infamous interrogatory that deals with the negative
23 productivity factor, the X factor that is less than
24 zero. You were asked in that interrogatory: "Please
25 provide a summary" -- it is C19.28. It is the Wholesale
26 Gas Services Purchasers Group. You were asked there:

27 "Please provide a summary of PBR plans
28 approved in other jurisdictions that

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1 include a total factor productive..."

2 I guess that is what it is supposed to say:

3 "... (X factor) that is less than zero."

4 Your answer -- and just to focus people's
5 thoughts a bit I am going to read part of this. Your
6 answer was:

7 "Power distribution services, for
8 Regional Electricity Cos. (REC's) in
9 England & Wales are under traditional
10 RPI-X price control. Each of the
11 companies has a different X factor which
12 ranged between 0 to a -2.5% for the
13 1990-1995 period."

14 And then you go on to elaborate a little bit.

15 You say:

16 "The initial price controls on the public
17 electricity suppliers' (PES's)
18 distribution businesses were set by the
19 Government in 1990. In general these
20 permitted the level of average regulated
21 revenue to increase by more than the rate
22 of inflation. This reflected the need
23 for significant capital expenditure to
24 improve the state of the network.
25 Information at the company level is not
26 available at this time."

27 First, I take it that that is the only example
28 of a negative price factor that either of you are aware

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1 of in the energy business?

2 DR. HEMPHILL: Yes. We looked at secondary
3 information and that is what we found in terms of an
4 example of a negative X.

5 MR. BRETT: These companies are now, as I
6 understand it, shareholder owned companies?

7 DR. HEMPHILL: I believe that is true, yes.

8 MR. BRETT: You say here that you have no
9 information on the company level, but you make the
10 general comment about these companies -- this
11 experience -- this early experience. Do you know
12 whether or not --

13 Would you agree with me, first of all, that
14 these companies are still under price cap regulation?

15 DR. HEMPHILL: Yes, they are.

16 MR. BRETT: This price cap that you are
17 speaking of here was for what we will call the initial
18 period of price cap regulation that came in after they
19 were first made available -- first privatized, I guess.

20 DR. HEMPHILL: Yes. The time period would
21 indicate that, yes.

22 MR. BRETT: Do you have any information at
23 this point at a company level?

24 DR. HEMPHILL: No, I do not.

25 MR. BRETT: What is the source of the
26 information of your statement in the first paragraph, at
27 the first two sentences? Where did that come from?

28 DR. HEMPHILL: It is from secondary sources of

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1 information. It is a report on the restructuring of the
2 electric industry in England and Wales, and I do not at
3 this moment have the site in my head, but it could be
4 provided.

5 MR. BRETT: Would you mind providing us with
6 that?

7 Mr. Chairman, I would like to have that site
8 if --

9 THE PRESIDING MEMBER: What is the
10 interrogatory number?

11 MR. WIGHTMAN: G6.1.

12 THE PRESIDING MEMBER: I meant the undertaking
13 number. I apologize.

14 MR. WIGHTMAN: G6.1.

15 UNDERTAKING NO. G6.1: Dr. Hemphill
16 undertakes to provide the source of the
17 information of the statement in the first
18 paragraph, at the first two sentences of
19 the answer to Interrogatory C19.28

20 MR. BRETT: If you could give us that early
21 enough, gentlemen, so that we could have time to get
22 that document and look at it --

23 MR. PENNY: We will do the best we can,
24 Mr. Brett.

25 MR. BRETT: I am sure you will, Mr. Penny.

26 In light of the fact that there are no other
27 industry precedents for negative productivity factors,
28 other than this -- and we will have to analyze this to

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1 see what the circumstances of that were and whether
2 those persist --

3 I am not going to give evidence on that as I
4 sit here, but there has been a lot of material from the
5 U.K. over the last five to six years that talks about
6 the evolution of those plans.

7 But in any event, are you not struck in some
8 sense by the fact that Union -- that the proposal for a
9 negative productivity factor is unusual, highly unusual,
10 practically unique, unique in North American energy
11 terms? What is so different about Union Gas from all of
12 the other gas utilities that have these plans or all the
13 other electric utilities that have these plans that
14 would suggest that if I have -- going forward a negative
15 productivity factor?

16 DR. SCHOECH: Well, let me first respond by
17 saying that we believe that this plan was well analyzed
18 and well put together and in light of that evidence we
19 feel it is a reasonable proposal. I mean, it is a
20 proposal that was based upon evidence of total factor
21 productivity and a stretch factor. But we are
22 comfortable that this was an appropriately developed X
23 factor.

24 MR. BRETT: Do you think it is fair and
25 reasonable to look at other plans to see what other
26 people are doing and how these plans compare? I mean,
27 is it a relevant line of inquiry? You are not
28 suggesting it isn't, I guess?

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1 DR. SCHOECH: I'm not suggesting it isn't, no.

2 MR. BRETT: And you looked at them and Union
3 looked at them. But nonetheless, you have gone ahead
4 with your proposal even given this anomaly?

5 DR. HEMPHILL: Sir, if I could add, it is not
6 inappropriate to look at results from other studies, but
7 I think you have to take into consideration all the
8 other factors that come to play when you look at the
9 relative productivity between the different companies.

10 So I don't think on the surface you can just
11 say this result was this and this result was this. I
12 think you would have to do a more robust analysis in
13 terms of what is going on inside each of the companies
14 as well as inside the industries that you are looking
15 at.

16 MR. BRETT: All right. But you haven't done
17 that analysis. You haven't really, as I understand it
18 -- really, you have summarized these plans but you
19 haven't dug in deeply enough into each of these plans,
20 other plans, to be able to say -- you haven't drilled
21 down deeply enough into these plans to be able to say
22 notwithstanding the fact that this productivity factor
23 is negative and the others are different, there are
24 offsetting features of the circumstances of these
25 businesses or other aspects of the design of the plans
26 for these 26 other utilities that explain the different
27 approach in the case of Union.

28 Is that fair? I mean, I know you have

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1 summarized them, but I don't think -- you haven't done
2 what you have described to me, what you need to do?

3 DR. HEMPHILL: We have not done an empirical
4 analysis of each of those plans and the companies that
5 those plans are applied to.

6 MR. BRETT: Now, in a case of earnings
7 sharing, which you talk a little bit about, you talked
8 to Mr. Penny about this briefly this morning, at pages
9 36 and 37 of your evidence -- I think you referred to
10 this earlier this morning -- you talk a little bit about
11 when earnings sharing is appropriate. You say, for
12 example, at the bottom of page 36:

13 "ESMs are more attractive when there are
14 substantial uncertainties over the
15 appropriate values of price cap plan
16 parameters, especially the X factor.
17 Under a pure price cap plan, these
18 uncertainties can potentially lead to
19 unacceptably high or low profits for the
20 regulated firm. ESMs adjust a regulated
21 firm's allowed prices when its profits
22 fall outside of a prescribed range."

23 And so on and so forth.

24 At the bottom of page 7, page 37, the second
25 last paragraph, the long paragraph starting in the
26 middle of page 37, the last two sentences -- the last
27 three sentences:

28 "The one advantage of ESMs is that they

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1 are a predetermined and automatic means
2 of adjusting rates for a wide range of
3 external developments They
4 therefore reduce business and regulatory
5 risk and help the regulator in
6 maintaining acceptable levels of utility
7 profits. This may be important when a
8 price cap is first initiated, if there is
9 uncertainty regarding the correct levels
10 of price cap formula parameters,
11 especially the X factor."

12 Now, I got the sense from reading that you
13 didn't feel that strongly -- let me put it another way.
14 You weren't making a strong, negative case, a strong
15 case against earnings sharing.

16 You seem to be saying here that at the
17 beginning of a plan, particularly a five year plan, that
18 there may be -- you are speaking generally here -- there
19 may well be a case for earnings sharing for the reasons
20 you have laid out. You would agree with me that the
21 longer the initial term of the plan the stronger --
22 everything else being equal -- the stronger the case for
23 earnings sharing is, since that you are locked into a
24 price factor for a five year term rather than a three
25 year term -- sorry -- locked into a productivity factor,
26 an X factor?

27 DR. HEMPHILL: I was with you up until your
28 last sentence. If I could just start answering it --

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1 MR. BRETT: Sure.

2 DR. HEMPHILL: -- if I am not being responsive
3 then you can ask again.

4 MR. BRETT: That's fine.

5 DR. HEMPHILL: Our description here is talking
6 more on the lines of a rationale and perhaps an
7 explanation for the behaviour of regulators to implement
8 earnings sharing mechanisms as part of a
9 performance-based regulatory program and there are
10 certain situations where it is easily explained.

11 Uncertainty is a big problem because, as we
12 stated earlier, it is a major change to the regulatory
13 structure and you are uncertain about a number of things
14 and one thing that you don't want to have happen as a
15 result, an unacceptable result resulting from this
16 application in the way in which the firm is regulated.

17 The more information that you have about the
18 firm going in the less necessary any type of adjustment
19 is. This is again from the regulatory standpoint. In
20 this case -- let me back up -- what we found is in
21 telephone which is probably the most mature
22 PBR-regulated industry. It started out with earnings
23 sharing mechanisms in most every plan and then they are
24 phased out eventually by the -- the Federal
25 Communications Commission has recently phased them out.

26 In this case, our feeling regarding Union is
27 that there is a lot of information that the Board has
28 regarding Union and there is less uncertainty in our

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1 opinion regarding the X factor of the program. My
2 colleague can speak to this if he wishes to add, but it
3 appears to me that there are only two empirically-based
4 estimates right now on the record and if you make the
5 correction for the data error they are both very
6 similar, ours and that by Dr. Norsworthy's. Any other
7 estimates that we have seen that are on the record are
8 estimates that are based on pure judgment.

9 So in our opinion, there is much more
10 uncertainty in terms of what the X factor should be.

11 MR. BRETT: You are not, I suppose, aware of
12 the fact, having not been here for the last few days,
13 that some of us intervenors would say that there is a
14 considerable amount of uncertainty as to the savings
15 that Union will be able to achieve going forward in
16 labour and materials and capital and, therefore, a
17 considerable uncertainty with respect to what the actual
18 earnings of Union will be in each year of the price cap,
19 given a particular productivity factor.

20 MR. PENNY: Well, Mr. Brett is making an
21 argument, with great respect, Mr. Chairman. There is no
22 question and it's not the sort of information that is
23 properly elicited from the witness. I suggest with
24 great respect -- I would ask that Mr. Brett proceed with
25 his cross-examination.

26 MR. BRETT: Well, Mr. Chairman, I won't pursue
27 that. My friend was making some comments about what was
28 on the record.

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1 But in any event, the Board -- this Board in
2 deciding the electricity distribution case, RP-1999-
3 0034, which I am sure you are familiar with, stated at
4 page 41, I don't know whether you need to turn this up.
5 I can read it to you. I am sure you have looked at it
6 carefully. But in paragraphs 4217 and 4218:

7 "The Board is of the view that the
8 shareholder should retain a portion of
9 the excess earnings over the ROE ceiling
10 for the first PBR term. In considering
11 all the alternatives proposed by the
12 parties, and in light of the Board's
13 findings with respect to the proposed
14 menu, the Board finds that the excess
15 earnings ... resulting from any
16 difference between the achieved and
17 Board-specified rate of return on common
18 equity will be shared equally between the
19 shareholder and customers."

20 And then over the page:

21 "The Board is of the view that the 50/50
22 sharing will provide sufficient incentive
23 to encourage utilities to pursue
24 productivity improvements above that
25 included in the productivity factor."

26 Now, do you disagree that a 50/50 sharing
27 incentive will provide utilities with enough incentive
28 to pursue productivity improvements? If so -- well,

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1 first of all, do you disagree with that proposition?

2 DR. HEMPHILL: We disagree with that
3 proposition as it would be applied to Union. I believe
4 that this is a decision regarding a new form of
5 regulation for the municipal electric utilities.

6 MR. BRETT: It is a decision with respect to
7 implementing performance-based ratemaking for the
8 electric distribution utilities in Ontario. Correct?

9 DR. HEMPHILL: Yes, that is my understanding.
10 it is also my understanding that there is a lot of
11 uncertainty regarding the operations and the cost
12 structure of these utilities. I don't believe that they
13 have been regulated before by the Board. So I would not
14 take issue with the approach that the Board has taken in
15 this particular case, and I am not sure that is -- and I
16 don't think I am here to actually talk about the MUA
17 situation. But if you are asking if risks should be
18 transferred to Union Gas, we feel strongly no.

19 MR. BRETT: And in the case of Union Gas you
20 are also putting in place for the first time a
21 performance-based regulatory regime with a term of five
22 years rather than a term of three years. And your view
23 -- your reason for saying no is -- your reason for
24 saying no is that the Board will have a better idea here
25 of the actual -- likely actual earnings that the company
26 will make, a better idea of the earnings that Union will
27 be able to make here than it would have had with respect
28 to the earnings that the electric utilities will be

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1 likely to make. Is that the basis for your not wanting
2 to apply it here?

3 DR. HEMPHILL: Yes.

4 MR. BRETT: All right. Now, if I were to tell
5 you and ask you to assume with me for the moment that it
6 is likely over the next five years that the -- let me
7 step back a moment.

8 You have done in your second analysis of Total
9 Factor Productivity for Union you have used volume as
10 the basis for output.

11 DR. HEMPHILL: That is correct.

12 MR. BRETT: Volume of gas. And we have heard
13 a lot in this hearing in the last few days about
14 declining volume use per customer.

15 If I were to tell you that over the next five
16 years in Ontario it is highly likely that there will be
17 substantial increases in gas throughput in Union Gas
18 because of the restructuring of the power industry and
19 the establishment of a whole -- a very large number of
20 large and mid-sized and small gas fired power plants.
21 For example, it is a matter of public record I think in
22 Ontario that TransAlta is going to break ground this
23 fall on a 500 megawatt power plant in Sarnia in the
24 Union franchise area.

25 Now, I am not asking you to -- I am asking you
26 to take as a hypothesis that there is going to be a
27 significant increase in gas volumes as a result of the
28 restructuring of the electricity industry. I take it,

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1 it would flow from that if that were to happen, that
2 going forward -- that this would impact your view of how
3 to use volume in establishing what an appropriate TFP
4 should be. If the volume --

5 MR. PENNY: Sorry, Mr. Chairman, maybe I could
6 ask for clarification because I am not following.

7 Is Mr. Brett asking the witnesses to assume a
8 certain level of additional throughput?

9 MR. BRETT: Yes, Mr. Chairman, I am assuming
10 that -- I am asking a directional question. Let's
11 assume the throughput increased by 50 Bcf over the next
12 five years. Would this not -- I take it this would
13 impact your assessment of what the appropriate TFP
14 should be going forward to be inserted within a PBR
15 program. Is that fair? If you had reason to think
16 there was going to be a major change in -- a reversal of
17 current trends with respect to output.

18 DR. SCHOECH: Well, I think you would need to
19 provide me more information. Are you talking about
20 increases in throughput per customer for distribution
21 services in your hypothetical scenario?

22 MR. BRETT: Well, my hypothetical scenario
23 would involve a series of power plants being built for a
24 variety of different customers all within the Union
25 franchise area, all taking service from Union Gas
26 distribution system.

27 They would all be -- they would be new
28 customers of the distribution system. They would be

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1 relatively low cost customers because much of the
2 infrastructure would have been put in place, therefore
3 the ratio of revenue to costs that would arise from
4 these changes would be high. And I am asking you
5 directionally would that not impact your assessment of
6 what the appropriate factor, TFP, X factor should be
7 going forward?

8 DR. SCHOECH: Well, once again I will try to
9 answer your question, but just because gas volume is
10 going to increase in the future doesn't tell me enough
11 as to whether or not we should expect a productivity
12 growth rate increase or not. What is really --

13 MR. BRETT: Why is that? Can you elaborate on
14 that, please?

15 DR. SCHOECH: Pardon?

16 MR. PENNY: Sorry, can you let him finish,
17 Mr. Brett, and then you can ask follow-up questions.

18 DR. SCHOECH: What is relevant is the
19 relationship or I was just about to say what is relevant
20 is the growth in volume per customer for distribution
21 services. And that is what we were really focusing in
22 on in terms of our productivity analysis.

23 Now, historically that has been declining. If
24 it turns around and increases, that would produce a
25 Total Factor Productivity result.

26 MR. BRETT: All right. That is really what I
27 was asking. I am sorry I asked it awkwardly, but that is
28 what I was asking you.

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1 DR. SCHOECH: Okay.

2 MR. BRETT: These are all distribution
3 services customers we are talking about.

4 DR. SCHOECH: Okay. And we are talking about
5 usage per customer.

6 MR. BRETT: We are talking about overall --
7 yes, we are assuming that the number of customers will
8 go up slightly but that the usage will go up a lot more
9 than the number of customers will go up and therefore
10 the overall usage per customer will increase.

11 DR. SCHOECH: Okay.

12 MR. BRETT: Fair enough?

13 DR. SCHOECH: Fair enough.

14 MR. BRETT: Okay. Now, with respect to the --
15 just one last area.

16 You have said -- you made the point, I think,
17 that to say that you can improve -- well, you would
18 agree with me that these industries, that this industry,
19 the gas industry has been under cost of service
20 regulation since its inception really for the last
21 20-25 years here in Canada?

22 DR. HEMPHILL: Correct.

23 MR. BRETT: And this is a major shift to a new
24 form of regulation?

25 DR. HEMPHILL: I agree.

26 MR. BRETT: Which does all of the things that
27 we have been told PBR should do.

28 Would you agree with me that under cost of

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1 service regulation, everything else being equal, that
2 with respect to capital that companies had an incentive,
3 gas companies had an incentive to invest aggressively in
4 capital knowing that it would be -- particularly capital
5 related to new connections, connections with new
6 customers, in the knowledge that -- and I don't know --
7 if you can't say if this is going to be a problem for
8 you because of your lack of knowledge of the gas
9 industry, let me know.

10 But I -- would you agree with me that the
11 industry has had an incentive to invest aggressively in
12 capital facilities knowing that it would be able to --
13 except in highly unusual circumstances incorporate those
14 investment facilities into rate base and therefore grow
15 their regulated rate base and grow their return. Is
16 that fair or is it a generalization?

17 DR. HEMPHILL: I had problems with the gross
18 generalization. Yes, there is one line of thought in
19 regulatory economics that talks about the incentives of
20 the utility and it matters not if it is a natural gas or
21 electricity or telephone utility. It is highly capital
22 intensive and has a cost recovery structure based on
23 embedded cost regulation where there is a return on rate
24 base.

25 There is a line of thought that talks about
26 that incentive, the incentive that the company would try
27 to build its rate base -- some people use the term "gold
28 plate", the rate base.

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1 I don't necessarily buy into that and I do
2 have a hard time with generalizations.

3 MR. BRETT: You don't accept that as even a
4 directional tendency under cost of service regulation?
5 Let me -- sorry, you don't accept that even as a
6 tendency?

7 DR. HEMPILL: Not as a generalization.

8 MR. BRETT: What about as compared with the
9 PBR regime? Would you be more likely to see this kind
10 of over investment in a cost of service regime in a PBR
11 regime?

12 DR. HEMPILL: The two different regulatory
13 structures compared? Yes, there is less incentive under
14 a performance-based regulatory structure like price caps
15 than under embedded cost regulation.

16 MR. BRETT: For example, would you accept,
17 subject to check, that capital expenditures of the
18 utilities in Ontario, of gas utilities, both Union and
19 Consumers, had at times exceeded their budgets that had
20 been approved nonetheless by the regulator?

21 THE PRESIDING MEMBER: Mr. Brett, can these
22 witnesses answer that question?

23 MR. BRETT: No, I don't think so, actually.

24 MR. PENNY: Exactly, Mr. Chairman, I was about
25 to raise exactly that.

26 MR. BRETT: All right.

27 --- Pause

28 MR. BRETT: Thanks very much, panel. Those

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1 are my questions.

2 Thank you, Mr. Chairman, Dr. Jackson.

3 THE PRESIDING MEMBER: I apologize for not
4 going to you first. I should have looked at my list.

5 MR. BRETT: No problem, Mr. Chairman. We are
6 jumping around a bit here to accommodate everyone.

7 THE PRESIDING MEMBER: All right. Who is next
8 up then? Mr. Thompson, Mr. Janigan, Mr. Quinn?

9 MR. THOMPSON: Mr. Quinn has a problem with
10 his timing so he is going next.

11 THE PRESIDING MEMBER: Mr. Quinn.

12 CROSS-EXAMINATION

13 MR. QUINN: Thank you to the Board for their
14 indulgence and also to my fellow colleagues.

15 I am going to work through a line of
16 questioning and I am going try to edit out those
17 questions that maybe Mr. Brett has already covered. So
18 I apologize that there is going to be a gap in terms of
19 the flow here.

20 I guess my first question is at you,
21 Dr. Schoech, in terms of your experience. I was
22 impressed with some of the experience that you outlined
23 in your introduction and I guess I would ask the simple
24 question: Would you consider yourself an expert in PBR
25 as applied to utilities?

26 DR. SCHOECH: Certainly as applies to
27 telecommunications. That is where I have had my
28 strongest background.

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1 MR. QUINN: Telecommunications primarily, but
2 utilities in general in terms of the economics of
3 regulation?

4 DR. SCHOECH: Yes. I mean, the general
5 principles that underlie PBR for telecommunications
6 would also apply to the other industries.

7 MR. QUINN: Thank you.

8 Would you agree that there are a number of
9 changes going on to the traditional utilities markets in
10 North America?

11 MR. PENNY: What kind of utilities?

12 MR. QUINN: I asked the question broadly, but
13 let me be more specific if it is helpful. To
14 traditional utility markets, are there -- and I will
15 focus on the energy delivery systems in North America.
16 Would you agree that there are significant restructuring
17 and changes in those marketplaces?

18 DR. SCHOECH: I will defer to my colleague to
19 answer that.

20 DR. HEMPHILL: Yes.

21 MR. QUINN: Okay. Thank you. I will pose the
22 question -- and I apologize if I don't know your
23 individual lines of expertise, so please feel free to
24 answer.

25 So in your experience, why would a utility
26 propose PBR?

27 --- Pause

28 DR. HEMPHILL: I am taking some time to answer

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1 this because I am thinking back to -- I was in a key
2 role in a utility that from the very beginning decided
3 that it wanted to do something like this and I am
4 thinking back as to why we did.

5 And the answer is pretty amazing. It's a
6 combination of wanting to change the incentive structure
7 within the company itself, change the way the company
8 views itself and how it does business and how it views
9 its customers and also to minimize in the future the
10 enormous burden that is placed on all parties, the
11 utility especially, every time it wants to make a change
12 in its rates structure, its tariffs structure, and every
13 time it wants to achieve a revenue stream that is going
14 to keep it financially stable.

15 I think all of those things put together --and
16 speaking in terms of the experience that I had -- we
17 decided that this was a better system to propose. And I
18 was not with Union when it was conceived, when the idea
19 was conceived to do this, but I would imagine it was
20 probably a similar process that they went through in
21 determining to go ahead with this.

22 MR. QUINN: Well, thank you. It sounds like
23 you have some very specific practical experience in this
24 matter.

25 A very specific question to that experience:
26 What were the financial incentives for the shareholders
27 that were considered in determining that they would want
28 to go to a PBR system?

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1 DR. HEMPHILL: The incentives really to the
2 shareholder, from the perspective of the shareholder,
3 was the fact that it would provide more -- it would
4 provide incentive for increased productivity and
5 decrease the burden in terms of achieving a regulatory
6 outcome that was necessary to maintain the stability of
7 the financial interests of the company.

8 MR. QUINN: Okay. More specifically, was
9 increased return equity one of the considerations?

10 DR. HEMPHILL: Speaking from my experience,
11 no.

12 MR. QUINN: Okay. Well, thank you. That is
13 specific experience that may be applicable in this
14 matter.

15 From your more broad experience then, when
16 your company reviewed Union's plan, from my take on the
17 answer to Mr. Brett's question, I want to clarify: Did
18 you use all of your experience from whatever consulting
19 or past practice experience that you had to evaluate the
20 merits of Union Gas' proposal?

21 DR. HEMPHILL: We used all the experience we
22 could muster up given the questions that were posed to
23 us by Union. That's correct.

24 MR. QUINN: So all of the information that is
25 out and published that has been in the purview of your
26 company was used to evaluate Union's proposal?

27 DR. HEMPHILL: No. What I said was, "All of
28 our experience".

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1 MR. QUINN: Okay.

2 DR. HEMPHILL: To say that all of the
3 information that was available is pretty general, but
4 what I was speaking to was the fact that we used our
5 experience, the years of experience that we had looking
6 at regulatory economics and performance-based regulation
7 and productivity analysis to advise Union on the issues
8 that they asked us to address.

9 MR. QUINN: Okay. A maybe more specific
10 question then. In what way was the information that you
11 had available to you limited by the scope of the work
12 Union asked you to do?

13 --- Pause

14 MR. PENNY: Mr. Chairman, that is a "when did
15 you stop beating your wife" question. There is no basis
16 for the question because the presumption of the question
17 is that there was some limitations and Mr. Quinn has not
18 elicited that there was any such limitations.

19 THE PRESIDING MEMBER: Well, perhaps it could
20 be worked around slightly. I think what Mr. Quinn is
21 saying is were there any data deficiencies that they
22 were aware of in conducting the analysis. I think that
23 may be the question.

24 MR. QUINN: Yes, thank you.

25 DR. HEMPHILL: Perhaps my colleague can speak
26 to data deficiencies. One comment that I might make is
27 that when you get into a consulting agreement basically
28 you look at the questions that are being asked by the

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1 client and you decide what is necessary to bring to bear
2 in order to answer the questions that they are asking
3 sufficiently.

4 The only problem I had with your earlier
5 question is that you were saying that every piece of
6 information that was ever looked at in our life, it if
7 wasn't used, why wasn't it used? Well, it is probably
8 the one limitation you always have is time. You try to
9 address situations like this I think practically and
10 decide, all right there are certain pieces -- that is a
11 judgement call on our part, but there are certain pieces
12 of information that are going to be more useful than
13 others.

14 MR. QUINN: If I may, just on that question of
15 the scope, in terms of the contract with Union, did
16 Union limit the comparators in any way? Or, was your
17 mandate broad enough to review any comparator in North
18 America or abroad for PBR?

19 DR. SCHOECH: I think that for purposes of
20 doing the evaluation, if we had information on the
21 Canadian natural gas industry, it certainly would have
22 been well within the scope of our work. Whether we gave
23 consideration or even discussed the idea of using any
24 other information, it just never came up in discussion.

25 MR. QUINN: So the comparators you used were
26 those supplied specifically by Union?

27 DR. SCHOECH: I'm sorry. What do you mean by
28 comparators?

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Quinn)

1 MR. QUINN: Regulatory regimes in other
2 jurisdictions.

3 DR. SCHOECH: Different plans.

4 MR. QUINN: Yes.

5 DR. HEMPILL: We use different plans not as a
6 model, but more as ideas, because we view that a PER
7 mechanism like price caps is going to be unique to every
8 utility that you apply it to. There are certain
9 situations confronting Union that are not confronting
10 all of the other utilities around the world that have
11 applied PBR in the past.

12 So I personally have a real hard time looking
13 at a particular program and saying, "This is it. This
14 is the pattern. This is the model that should be used
15 by Union"; rather, looking at different approaches that
16 have been taken to give ideas as to an approach or
17 approaches that could be taken for this particular case,
18 this particular company.

19 MR. QUINN: So your evaluation wasn't
20 comparing only those jurisdictions that Union provided
21 to you?

22 DR. HEMPILL: No. Our company has been doing
23 incentive regulatory work for a number of years. I
24 forget the date when it was actually started in
25 Christensen Associates. Since it was started it has
26 been a regular part of doing business in that firm to
27 take a look at any plan that we can get our hands on,
28 for the reasons I stated earlier.

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Quinn)

1 MR. QUINN: Okay. I appreciate your
2 clarification in that area.

3 I want to turn to your TFP analysis as an
4 input to the overall PBR price cap proposal.

5 In your TFP analysis you commented -- and this
6 was in your opening statement -- on the need for an
7 empirical analysis of the company, and you separated
8 that from others in the industry or different
9 industries. Is that correct, that you believe that an
10 empirical analysis of the specific company under review
11 is required to establish a good TFP measurement?

12 DR. SCHOECH: I don't recall exactly what I
13 said, but if there had been a good study of the Canadian
14 gas industry, that would have been an appropriate basis
15 for setting the price cap index. I mean, certainly
16 telecommunications or manufacturing and things like that
17 would be inappropriate.

18 There wasn't data on the industry that were
19 reliable enough to establish a PBR plan. In lieu of
20 that, a company study is very important to conduct.

21 MR. QUINN: But the basis for using empirical
22 versus projected information, why would you use that
23 empirical information, in your expert opinion?

24 DR. SCHOECH: To say that you would use
25 projected information pretty much lets in just about
26 anything. It seems to me that historical data are
27 historical data and probably form the foundation for an
28 empirical analysis.

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1 MR. QUINN: Is a premise for that type of
2 analysis, though, that past productivity would be a good
3 benchmark for future performance?

4 DR. SCHOECH: The past productivity trends
5 would be a good benchmark for establishing the future
6 performance, yes.

7 MR. QUINN: So in your expert opinion, the
8 years 1986 to 1996 provided that type of empirical
9 benchmark which could be projected forward?

10 DR. SCHOECH: It gave a good indication of the
11 long-term trend in productivity, yes.

12 MR. QUINN: Maybe I stated that or heard that
13 differently.

14 Do you, in your expert opinion, believe it is
15 a good benchmark for productivity for this company
16 moving forward?

17 DR. SCHOECH: Actually, the benchmark is not
18 just the historical productivity trend; it also includes
19 the stretch factor. So with the stretch factor you are
20 saying that the benchmark in the future is going to be
21 higher than the historical benchmark.

22 MR. QUINN: So there have to be some
23 improvements, let's say, on the past productivity to be
24 able to project it going forward?

25 DR. SCHOECH: The rate of productivity
26 improvement will have to be greater than it was
27 historically.

28 MR. QUINN: Why would that be?

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Quinn)

1 DR. SCHOECH: The stretch factor is the
2 difference. I mean, the historical rate of productivity
3 growth was minus 0.4 per cent. The stretch factor is
4 added to that to make a higher benchmark, in terms of
5 the rate of total sector productivity growth.

6 MR. QUINN: Okay. Are you familiar with
7 organization restructuring that Union Gas undertook on
8 January 1, 1999, precipitated by E.B.R.O. 188?

9 MR. PENNY: There is no such restructuring,
10 Mr. Chairman.

11 MR. QUINN: Okay. Let me clarify, then -- and
12 maybe you could provide the appropriate context,
13 Mr. Penny.

14 The separation of Union Gas and Union Energy
15 into different sister affiliates --

16 MR. PENNY: Union Gas and Union Energy were
17 never one organization. Again, there is no such
18 reorganization.

19 THE PRESIDING MEMBER: I think what Mr. Quinn
20 is referring to is the separation out of certain
21 activities of Union Gas into a third company. Is that
22 what you mean, Mr. Quinn?

23 MR. QUINN: That's correct.

24 THE PRESIDING MEMBER: It is not 188, though.

25 MR. QUINN: I'm sorry. That was the
26 expansion. My mistake, sir.

27 Thank you for the clarification, Chair Dominy.
28 What I was looking for was, in different terms, the

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Quinn)

1 moving out of some business lines from Union Gas into
2 another affiliate. Are you familiar with that change in
3 their organization?

4 DR. HEMPILL: Yes, we are generally familiar
5 with that activity.

6 MR. QUINN: In your determination of capital
7 inputs, were the capital inputs that are now part of
8 Union Energy's company taken into account for total
9 productivity in the factor productivity analysis for
10 1986 to 1996?

11 MS ELLIOTT: The data that was provided for
12 the total factor productivity analysis included all of
13 the capital for the ancillary programs during that time.

14 MR. QUINN: Thank you. Do you know the amount
15 of that capital offhand? What was transferred to Union
16 Energy at that time?

17 MS ELLIOTT: I can't quote you the exact
18 amount of the asset base that was transferred January 1,
19 1999, but, given that the study was from 1986 to 1996,
20 during the term of the study all of that investment, all
21 of those costs and all of the output were included in
22 the study.

23 MR. QUINN: Thank you for the clarification.
24 It was included in the study then.

25 Given some of the work you have done in terms
26 of trying to establish a benchmark from past
27 productivity, and now looking at a company moving
28 forward, if there is a significant restructuring or, in

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1 this case, the moving out of business lines, would you
2 agree that there should be an appropriate adjustment for
3 the removal of capital, inputs and outputs, let's say,
4 from your analysis?

5 DR. SCHOECH: No. I mean, the time period in
6 which the analysis was done had all of the relevant
7 inputs and outputs.

8 MR. QUINN: Okay. For the time period it was
9 done. But we are here, I believe, to establish a
10 productivity factor for Union Gas as it exists today and
11 going forward through the PBR term. Given that
12 organization going forward, to do an empirical analysis
13 and to try to achieve the best information possible, in
14 your opinion, should some of those inputs and outputs be
15 removed for the analysis?

16 DR. SCHOECH: If I were to make any
17 modifications to the historical study, the way to do
18 that would be to include the more recent years and all
19 of the information, not all of the inputs and all of the
20 outputs. Unfortunately, that information isn't
21 available.

22 Now, there may have been a number of things
23 that happened in those years that might have led to
24 productivity growth going up or down in those particular
25 years. The reason one uses a number of years, a long
26 time period, is that one establishes a long-term trend.

27 I am sure that during the 1986 to 1996 period
28 there were various management initiatives and other

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1 programs that went on that did not go on in 1997 and
2 1998. So I have no evidence that that historical number
3 should have an ad hoc adjustment one way or the other
4 for individual programs. The way to do it would be to
5 look at all of the information for those years.

6 MR. QUINN: Let me then ask the question a
7 different way. If a company has moved out business
8 lines and you are trying to assess productivity expected
9 for the company that is going forward, would you not
10 remove out those business lines in an empirical analysis
11 to establish a benchmark for going forward?

12 DR. SCHOECH: It isn't possible to take the
13 historical data and estimate how much cost historically
14 were assigned to those lines of business, which is what
15 I think you are asking us to do.

16 Given that impossibility, the best way of
17 getting the trend rate of productivity for the company
18 with or without those lines of business would be to take
19 a look at the entire company and measure the
20 productivity for that time period based on that total
21 company and not start making ad hoc adjustments to the
22 data.

23 MR. QUINN: Okay. So hypothetically you are
24 saying or what you are telling me is your opinion is
25 that it would be impossible to do that type of analysis
26 at this point?

27 DR. SCHOECH: To go through the 1986 to 1996
28 data and pull out lines of business and pretend that

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1 they weren't there, yes. I am not aware of any
2 information that would allow us to do that.

3 MR. QUINN: Okay. I appreciate it would be
4 challenging and I guess I would not expect that is
5 something that you could furnish at this time. But just
6 hypothetically in that example, would you agree that
7 purchased heaters are a substitute for rental water
8 heaters in an industry or a market such as Union serves?

9 MR. PENNY: Well, Mr. Chairman, I'm not sure
10 that the witness' experience or qualifications put them
11 in a position to answer a question like that.

12 MEMBER JACKSON: Would the witness know
13 whether he was in a position to answer it?

14 DR. SCHOECH: Well, I haven't studied the
15 demand for water heaters so I don't offer expert
16 testimony in that area.

17 MEMBER JACKSON: That's good. I just didn't
18 want another thing on the record that Mr. Penny didn't
19 know.

20 MR. PENNY: There are many --

21 --- Laughter

22 MR. QUINN: I will rephrase the question then.
23 From an economic point of view, is the
24 purchase commodity for a purchaser a substitute for a
25 rented or a leased service?

26 DR. SCHOECH: In general, if they are both
27 rental and purchase markets for the same good, yes,
28 those would be substitutes.

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1 MR. QUINN: You are suggesting if there is a
2 market?

3 DR. SCHOECH: Yes. I mean, there are some
4 markets where you effectively don't have any rental
5 items, you just have purchases. In that case, yes, the
6 issue is moot, I guess.

7 MR. QUINN: So if you were to undertake an
8 analysis such as this and you look at the two output
9 parameters of volume and number of customers, would you
10 agree that the difference in the outputs would only be
11 at the margin, in other words, customers and volumes
12 that would not have been realized by Union if it did not
13 have such a program and other substitutes were not used
14 in its place?

15 DR. SCHOECH: I'm not sure I understand the
16 question.

17 MR. QUINN: If you were to analyze the output
18 from 1986 to 1996, and assuming you did not have a
19 rental water heater program or a finance program, that
20 the only output changes from your analysis would be
21 those outputs which would not be realized if another
22 substitute had not taken up those customers or volumes?

23 DR. SCHOECH: I interpret your question to be
24 that if some volume was lost from some program that in
25 order to get back to the original volume level something
26 else would have to make up for it. I would agree with
27 that premise.

28 MR. QUINN: Okay. Yes, in agreeing with that

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1 premise then, would you perceive that there would be a
2 substantial change in your output measurements if Union
3 did not have a rental water heater or finance program
4 through that period?

5 DR. SCHOECH: I have no reason to draw a
6 conclusion on that. You say substantially, I don't
7 know.

8 MR. QUINN: Well, let me put it another way
9 then. Would a factor such as this increase the lack of
10 certainty in your ability to say that this company as it
11 existed previously is a good benchmark for the company
12 going forward?

13 DR. SCHOECH: Again, I have no reason to doubt
14 the results. I'm still not sure what information you
15 are putting forward that would add doubt to the results
16 regenerated.

17 MR. QUINN: Speaking frankly, if the rental
18 water heater program and financing program did not
19 exist, I would propose that the output would not change
20 significantly or at all because a substitute is going to
21 be available in that market. Therefore, even if you
22 remove the capital on the input then you would come up
23 with a much different figure for a total productivity
24 factor for the company that exists today.

25 DR. SCHOECH: But you would be losing output
26 as well, wouldn't you?

27 MR. QUINN: And that's what I'm saying, the
28 output would not change because there would be

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1 substitutes in the market. Assuming, as it has been
2 over that period, that natural gas was the most
3 efficient energy value, substitutes would appear in a
4 market where an opportunity exists.

5 DR. SCHOECH: But I am referring to the
6 outputs from the rental programs that were incorporated
7 in that total factor productivity study. I mean, that
8 would be the output that would be going down, would be
9 eliminated.

10 MR. QUINN: And those outputs were tied to
11 what?

12 DR. SCHOECH: Those outputs went into our
13 measure of total output.

14 MR. QUINN: Right. But if Union did not have
15 that business line, as it does not have today, you are
16 suggesting in your study that none of those outputs
17 would be realized?

18 DR. SCHOECH: If during the historical time
19 period there had been no rental programs, then the
20 measured output levels would be lower, the measured
21 capital levels would be lower. The rate of productivity
22 growth probably would have been very close to what it
23 was before because as I see it, they are talking about 5
24 per cent of total revenue, of the total business. So in
25 light of the fact that we are talking about a very small
26 fraction of the business, I don't think that the
27 underlying total factor productivity rate would have
28 changed substantially.

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1 MR. QUINN: So specific to the question, if
2 the rental water heater program inputs were completely
3 removed, would you remove all of the output that you
4 have tied to rental water heater input?

5 DR. SCHOECH: The problem I am having is the
6 issue of removal. I am not -- are you suggesting that
7 if that line of business goes away would some inputs go
8 away as well?

9 MR. QUINN: Inputs would go away, outputs
10 would not completely go away and they actually would
11 only change at the margin, those people who would not
12 have switched to natural gas over that period of time.

13 DR. SCHOECH: Well, the outputs associated
14 with the rental program itself would go away, though.

15 MR. QUINN: Okay. Well, then I think we have
16 a fundamental difference on the economics at the margin
17 in this decision. So I will leave that line of question
18 then for now.

19 You have already discussed with Mr. Brett the
20 concerns about what was referred to as gold plating or
21 utilities being incented to invest in capital, so I
22 won't go down that line too far.

23 But further to that, in your experience, how
24 do regulatory authorities ensure that expansion projects
25 do not result in a utility expanding uneconomically
26 because of the bottom line incentives that may be there?

27 DR. SCHOECH: Under traditional regulation?

28 MR. QUINN: Yes.

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1 DR. SCHOECH: That is part of the typical rate
2 case in which all components of the revenue requirement
3 are evaluated by all parties in the case and ultimately
4 decided by the Board.

5 MR. QUINN: So specific to expansion projects,
6 what is your experience into what methods the regulatory
7 authority would use to limit investment to those that
8 are deemed economic?

9 DR. SCHOECH: Under traditional regulation
10 again?

11 MR. QUINN: Yes.

12 DR. SCHOECH: And when you say expansion
13 projects you are talking about increases in the rate
14 base for whatever?

15 MR. QUINN: For facilities to capture a larger
16 area of a franchised area.

17 DR. SCHOECH: So if the franchise area were to
18 grow there would need to be increased investment in
19 order to serve that franchised area. Is that the basis
20 of your question?

21 MR. QUINN: Yes.

22 DR. SCHOECH: And under traditional
23 regulations rate base would be evaluated. There are
24 various measures that are used, both quantitative and
25 qualitative in terms of whether the rate base level is
26 appropriate and over which there would be a recovery of
27 a return.

28 MR. QUINN: Yes.

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1 DR. SCHOECH: One approach, words that are
2 used frequently are used and useful, things like that in
3 traditional regulation. Is that in response to what you
4 are asking?

5 MR. QUINN: Thank you. Maybe I should be
6 specific. Are you familiar with Union's approved
7 methodology for expansion projects from 1986 to 1996?

8 DR. HEMPHILL: I'm not very familiar with what
9 they have done under traditional regulation in terms of
10 getting approvals now.

11 MR. QUINN: Okay. Maybe I should refer my
12 question to Ms Elliott.

13 Is it true during that period that projects
14 that had a profitability of less than 1 were deemed to
15 be used and useful and were completed by Union and
16 entered into rate base?

17 MS ELLIOTT: In our capital investment program
18 we looked at projects that have a profitable -- sorry --
19 a profitability index of 0.8 or greater. Individual
20 projects could be less than one, but the portfolio of
21 any projects during a year would be one.

22 MR. QUINN: Okay. So individual projects as
23 long as, as it is today, meet a profitability index of
24 0.8, could move forward if Union's overall index was at
25 least one?

26 MS ELLIOTT: That is correct, yes.

27 MR. QUINN: Is that the same policy as was in
28 place from 1986 to 1996?

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1 MS ELLIOTT: I don't know the specific date of
2 that policy. In terms of the practice the profitability
3 index would be something that was used on an ongoing
4 basis to measure whether or not projects would go into
5 rate base.

6 MR. QUINN: Okay. So if you do not have that
7 information, could you provide the minimum product
8 profitability index that Union would have used during
9 that period of time for any single expansion project?

10 MS ELLIOTT: Are you asking for a review of
11 all of the projects since 1986 to determine what the
12 minimum profitability would have been of a project?

13 MR. QUINN: What was Union's policy as the
14 minimum profitability during that period of time?

15 MS ELLIOTT: I can do that.

16 MR. QUINN: Thank you.

17 MR. WIGHTMAN: G6.2.

18 UNDERTAKING NO. G6.2: Ms Elliott to
19 provide what was Union's policy as the
20 minimum profitability during that period
21 of time

22 MR. QUINN: Further to that then, would you
23 ask for more from an -- not an individual project
24 perspective but an overall aggregation of those projects
25 for those, let's say, over a substantive amount of
26 capital, over \$100,000, any development projects that
27 Union did, would you be able to compile a list of the
28 amount of investment and the number of customers today

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1 and what profitability was realized?

2 MS ELLIOTT: I am sorry you will have to go
3 slower. I didn't catch what you are asking for.

4 MR. QUINN: For that period of time for
5 substantive investments, I don't want to suggest that
6 you do a lot of work here, but projects that were let's
7 say over \$100,000 of capital investment, have Union
8 reviewed those projects to say what the actual
9 investment cost was and the number of customers that
10 were acquired with that investment and more specifically
11 I guess volumes and revenues that were to be tied to
12 those volumes or overall profitability?

13 MS ELLIOTT: I am not aware that that
14 information exists. What I take it you are looking for
15 is a listing of the projects over \$100,000 between 1986
16 and 1996, their profitability index, the cost of the
17 project, the volume and the number of customers that
18 those projects attached?

19 MR. QUINN: Correct.

20 MS ELLIOTT: I am not aware that we have that
21 information compiled in a single source document that I
22 could produce. I will have to check to see how readily
23 available the material is.

24 MR. QUINN: Would it be helpful if we raised
25 the bar to a quarter of a million dollars or something?
26 I don't want a lot of substantial effort that doesn't
27 achieve an outcome. So I would be willing to use a
28 quarter of a million dollars as a higher bench mark so

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1 it will limit the number of projects that would have to
2 be reviewed and compiled.

3 MR. PENNY: Well, Mr. Chairman, it is unclear
4 to me before we launch off into what the work -- the
5 amount of work that would be required to accomplish any
6 of this as to what the end result is and whether it is
7 in fact relevant to anything. A hundred thousand
8 dollars or even \$250,000 from the point of view of
9 Union's rate base are extremely small projects and there
10 will be many of them.

11 And it is not clear to me what we are trying
12 to achieve in this exercise and if we could be clear
13 about -- clearer about that, it may be that there is
14 some other way that we could come at it that wouldn't
15 involve what to me, frankly, sounds like days of work.

16 THE PRESIDING MEMBER: Mr. Quinn, perhaps you
17 could clarify exactly what it is you are after? Would a
18 more aggregate number suffice your interest?

19 MR. QUINN: A more aggregate number would
20 suffice in terms of what we are trying to show is that
21 traditionally there has been an incentive there for
22 expansion, which my next question is going to talk
23 about. Going forward is that same incentive going to be
24 there and what is the impact on the TFP analysis for
25 that time period if Union is incented to invest at a
26 profitability less than one, that may lend some
27 understanding to why their productivity factor over that
28 period of time is actually negative.

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1 MR. PENNY: Mr. Chairman, given that the
2 evidence is that it is done on a pooled basis, it is not
3 clear to me why an analysis of individual projects is
4 necessary at all. What it sounds like Mr. Quinn wants
5 to know is whether there were occasions during the ten-
6 year period of the study that there were capital
7 projects in total that generated profitability indexes
8 of less than one. And that may be -- well, I don't
9 know. We will have to ask Ms Elliott, but that may be
10 more manageable.

11 MR. QUINN: Specifically, if I may, in terms
12 of what I was asking for is individual projects. They
13 can be aggregated if they fit that criteria of
14 individual projects that had a PI of less than one that
15 were over 250,000. You could aggregate that number but
16 not overall from the portfolio because there is the
17 economies of infill that would go into that number.

18 MR. PENNY: Mr. Chairman, that would be a
19 meaningless number because if you are going to do that,
20 you would also have to look at the projects that have a
21 profitability index that were greater than one in order
22 to know what the impact on the company was.

23 MEMBER JACKSON: Is this a distinction between
24 profitability indexes that are looked at on a forward-
25 looking basis for purposes of applications for capital
26 expenditure versus profitability indexes that might be
27 part of a capital monitoring program which a business
28 would engage in in order to see whether the projects it

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1 actually takes on are profitable? Is that a distinction
2 you are wanting to look at?

3 MR. QUINN: In essence, yes. But what I guess
4 the point -- the issue that I am trying to highlight is
5 the study was done on a company, it is no longer
6 incentive -- incented to do that type of investment.
7 And we are trying to all grapple with how could the
8 productivity factor be coming out negative. I think
9 this may help us understand why that is.

10 MEMBER JACKSON: Yes. I just want -- the
11 pause that I was making there was to try to understand
12 how that might relate to the testimony of the company
13 witness that in aggregate for every year's capital
14 expenditures the productivity index does meet the
15 criterion of one.

16 But maybe I could -- maybe what we should do
17 is give you a chance at the break to -- at the lunch
18 break to discuss this with the company and see what they
19 can come up with and by all means renew your request
20 after lunch. I think that may make some sense here.
21 Because I do see what you are trying to get at and
22 unless the other testimony under oath sort of closes off
23 your possibility of getting any information that would
24 support that line of argument, unless that is the case,
25 then you may have a legitimate request. But I think we
26 would have to hear a little bit more on what is easy for
27 the company to do.

28 THE PRESIDING MEMBER: Could I make an

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1 observation too. I do notice that there is another
2 panel attaching Ms Elliott and Mr. Birmingham and they
3 have on it an issue called "System Expansion and Service
4 Quality". And the information that you are seeking may
5 be better pursued on that panel as opposed to from this
6 panel, which is external to the company.

7 MR. QUINN: In terms of time efficiency, sir,
8 I agree with your distinction there and I can withdraw
9 at this time and come back at that time. In the interim
10 I will try to talk with the company in terms of what may
11 be available and reasonable to provide for everybody's
12 understanding. Thank you, sir.

13 THE PRESIDING MEMBER: But just before you
14 close, your question really goes to the fact that a
15 contributing factor to the productivity could be -- and
16 I am not referring to Union or anyone in this -- in a
17 utility the pursuit of investments which do not meet a
18 profitability criteria. Is that the question you are
19 asking?

20 MR. QUINN: That is. Just in a simple
21 example, if we -- they did ten projects, five were at
22 0.8 and five were at 1.2 and they had equal capital
23 investment, if they chose under a PBR regime to not do
24 the 0.8 projects, their overall productivity or
25 profitability would go up to 1.2 as opposed to 1.0.

26 THE PRESIDING MEMBER: So you are asking if
27 there is a view of the expert panel as to whether that
28 could be an influence on productivity measurement. And

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1 I don't know whether they would be prepared to answer
2 that question for you.

3 --- Pause

4 DR. SCHOECH: Okay. I think I have to preface
5 my answer by saying that it seems there are a number of
6 ifs here and I will try to work through them.

7 I think the ifs are if the company had engaged
8 in project, some which paid off and some of which didn't
9 pay off under cost of service regulation, and then under
10 PBR they were able to figure out which projects paid off
11 and only invest in those, the question then would be:
12 Would total factor productivity increase once you moved
13 to incentive regulation? And under all of those
14 hypotheses, the answer would be yes.

15 MR. QUINN: Okay. Well, thank you.

16 I understand the Board wants to break soon.
17 If I could have five more minutes indulgence -- and I
18 have been advised that I should have provided this to
19 the panel, and I apologize. Union was good enough to
20 make copies of something I want to refer to and then
21 just ask them their opinion on it, if that would be
22 appropriate.

23 THE PRESIDING MEMBER: As long as it is
24 something that they -- if you could ask them if they had
25 an opportunity to simulate what it is you have given
26 them before you ask the question.

27 MR. QUINN: Thank you, sir, and if they defer
28 their answer maybe I could ask it to be brought up at a

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1 time once they have had a chance for consideration.

2 THE PRESIDING MEMBER: If they look at it and
3 they decide we can break before they read it and then
4 you could be the first person to ask your questions
5 after the break, or if they want to do it now. I leave
6 it to the witnesses and to Mr. Penny.

7 MR. WIGHTMAN: If we could make this
8 Exhibit F6.2.

9 EXHIBIT NO. F6.2: An article by
10 Dr. Peter Navarro

11 MR. QUINN: I will ask a leading question
12 because it sounds like you have significant experience
13 on the publishing of --
14 --- Pause

15 THE PRESIDING MEMBER: Mr. Quinn, let the
16 witnesses see what their information is because if they
17 haven't it --

18 MR. QUINN: I am sorry, sir. I do have a
19 scheduling concern this afternoon that is why I asked
20 for the indulgence of my counterparts here. So I guess
21 I want to be respectful of a break time here at lunch
22 because I won't be here this afternoon.

23 MR. PENNY: I was just saying to take a moment
24 to let Mr. Hemphill know that the traditional rule
25 around here is the 24-hour rule which is to try and give
26 witnesses material in advance.

27 Mr. Hemphill has told me that he would like to
28 hear the question, and whether he needs time to review

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1 it or not may depend on the question.

2 So why don't we hear the question and if the
3 witnesses feel they would rather wait until they have
4 had an opportunity to review the article we can then
5 deal with them that way, as Mr. Chairman had indicated.

6 THE PRESIDING MEMBER: Thank you, Mr. Penny,
7 because the answer could be that they could take an
8 undertaking and provide a written comment if they
9 preferred to do that as well.

10 MR. QUINN: That would be satisfactory, sir.

11 THE PRESIDING MEMBER: Could you ask your
12 question so they know what it is your pursuing?

13 MR. QUINN: Thank you.

14 The article that was provided was from the
15 author Peter Navarro. Are you familiar with this
16 gentleman's work?

17 DR. HEMPHILL: I am familiar with this
18 article, yes.

19 MR. QUINN: Okay. Highlighted for you at the
20 top of page 116 is a concern in looking at, in his
21 estimation, a poor application or implementation of PBR.
22 This was the bottom line result.

23 MR. PENNY: So you said something was
24 highlighted. There is nothing --

25 MR. QUINN: Sorry. I am highlighting it for
26 them -- it wouldn't come across in the photocopier --
27 page 116, the very first paragraph if you would read
28 that please.

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1 --- Pause

2 MR. QUINN: Now, if you have had time to refer
3 to that, on page 124 -- and I am cutting to the chase
4 here for the benefit of all -- Dr. Navarro lays out the
5 mechanics of PBR in his estimation, and if you read the
6 article further, he comes to some conclusions on the
7 need for the three basic steps that are included in
8 Table 2, on page 124.

9 Now, my understanding of what you had offered
10 in introduction is that an earning sharing mechanism
11 would only be appropriate if there were some
12 uncertainties in terms of understanding the corporation
13 going forward.

14 In your experience and in your opinion, would
15 you agree with Dr. Navarro that with earning sharing
16 mechanisms it reduces the risk on the ratepayers?

17 DR. HEMPILL: I couldn't buy into that
18 wholesale because I feel that the presence of an earning
19 sharing mechanism actually diminishes the incentives
20 that the utility has under the regulatory program. So I
21 can't buy into a generalization like that, no.

22 MR. QUINN: You referred to it as diminution
23 of incentives. What ratepayer incentives are diminished
24 by an earning sharing mechanism?

25 DR. HEMPILL: What the earning sharing
26 mechanism does it that it diminishes the incentives on
27 the part of the utility.

28 MR. QUINN: So in other words there would be

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1 no benefit to ratepayers in not having an earning
2 sharing mechanism?

3 MR. PENNY: Sorry, there is a double negative
4 there.

5 DR. HEMPHILL: Yes, I am working on the double
6 negative here.

7 MR. QUINN: I will try to ask in the positive
8 then: From a ratepayer's perspective, is it your
9 opinion that the incentives that would be diminished
10 under an earning sharing mechanism, would it be your
11 opinion that the ratepayers are at risk if the company
12 is not incentive?

13 --- Pause

14 DR. HEMPHILL: Well, we believe that everyone
15 benefits by having the proper incentives in place. It
16 is difficult to speak just in dollars and cents terms in
17 terms of a company that is providing products and
18 services to a large group of customers becoming more
19 efficient. I believe that there are a lot of benefits
20 that are bestowed upon all participants by that
21 occurring.

22 So I have a hard time with the general
23 question or statement that you made regarding what would
24 occur with and without earning sharing.

25 MR. QUINN: Okay. Given some of the
26 uncertainty in terms of the corporation as it exists
27 today and what existed in 1996, including the -- as you
28 referred to it -- the difficulty in getting accurate

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1 information for 1997 to 1999 because of the merger with
2 another utility, would you not say that there is some
3 uncertainty in your ability to project productivity
4 going forward?

5 DR. SCHOECH: Well, as I said before, we don't
6 feel that the absence of the data from 1997 to 1999
7 produced a biased result in terms of the estimation of
8 the underlying productivity trend up to the time of PBR.

9 So I guess the answer to your question is we
10 don't have any concerns.

11 MR. QUINN: That was a core answer and you
12 have given it before in terms of up to 1996. I am
13 concerned about the PBR regime going forward and the
14 productivity estimate for this company as it exists
15 today.

16 Are there not a number of areas which we have
17 discussed that would create some uncertainty in the
18 accuracy of that productivity estimate?

19 DR. SCHOECH: Well, I thought I had answered
20 the question. Maybe not. Let me try to restate it.

21 What I said -- or I tried to say -- was that
22 the data from 1986 to 1996, I believe, provides a
23 reliable trend on total factor productivity growth up to
24 the time when PBR is going to be established. Yes, it
25 is missing the last couple of years, but we had looked
26 at productivity over a long enough period of time that I
27 think we got some reliable trends.

28 Going forward, the bench mark is going to

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1 be -- the hurdle is going to be raised for the company
2 through the stretch factor. So in terms of once the PBR
3 plan is in place, the bench mark level of productivity
4 is going to be higher than what we looked at
5 historically.

6 MR. QUINN: So your certainty in going
7 forward, you would suggest that an earning sharing
8 mechanism would not reduce risk then for the ratepayer
9 group?

10 DR. SCHOECH: Well, the concern that we have
11 about establishing an earning sharing mechanism is that
12 you are moving back in the direction of cost of service
13 regulation. I mean, if you have complete sharing, 100
14 per cent sharing to the customers, you are back to cost
15 of service regulation. So although you are not back
16 there, you are moving back in that direction and that
17 does change the incentives and it does change the
18 opportunity for productivity gains.

19 That means that the pie is going to be smaller
20 down the line and I think that ultimately that would
21 have some ramifications for rates.

22 MR. QUINN: So under Union's proposal, who
23 would share in that pie of productivity incentives at
24 this point?

25 DR. SCHOECH: Well, the customers are getting
26 the stretch factor so they are sharing in it.

27 MR. QUINN: Okay. Well, I think that we are
28 getting into argument.

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1 I think I will close off with thanks to the
2 Board and to my fellow intervenors.

3 THE PRESIDING MEMBER: Thank you, Mr. Quinn.
4 Panel, we will break now and we will be back
5 at two o'clock. I have a meeting, that is why I am
6 saying two o'clock.

7 Thank you.

8 --- Upon recessing at 1240

9 --- Upon resuming at 1415

10 THE PRESIDING MEMBER: I apologize for being a
11 little late.

12 Dr. Wightman asked me to confirm, I believe,
13 that the holiday is July 3. As far as the government is
14 concerned, it deferred the Saturday to the Monday. And
15 Dr. Jackson confirms that because there is a meeting of
16 some description on June 30.

17 Are there any procedural matters?

18 MR. PENNY: There are a couple, Mr. Chairman.
19 You had held out some help of hearing from you on the
20 ADR Agreement this afternoon.

21 THE PRESIDING MEMBER: I understand that. Can
22 you wait until the break?

23 MR. PENNY: I guess we will have to.

24 THE PRESIDING MEMBER: Is there anything else?

25 MR. PENNY: There are one or two other
26 matters. By my quick straw poll of cross-examination
27 for this panel, it looks like about two and a half to
28 three hours. So it would be our hope that we might

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1 finish with this panel today and let Mr. Hemphill and
2 Mr. Schoech return home.

3 If it were a question of sitting another half
4 an hour or something to do that, I would hope we might
5 attempt that, if that turns out to be the case.

6 Obviously, if we are way off and it is a
7 substantial period of time, we will deal with that.

8 THE PRESIDING MEMBER: Can I just confirm that
9 with the one person I want to check with, and that is
10 Mr. O'Brien, the court reporter. Is that all right with
11 you?

12 THE COURT REPORTER: Yes, Mr. Chairman.

13 THE PRESIDING MEMBER: Thank you.

14 MR. PENNY: Thank you, sir.

15 With respect to the scheduling of the
16 intervenor witnesses, I had a discussion with Mr.
17 Wightman, briefly, a few minutes ago. In general terms,
18 the kinds of dates that the intervenors are talking
19 about seem to us reasonable. On our forecast of where
20 we are going to be, it looks like that is probably about
21 right. The first week of July is probably what is going
22 to work out to be the time.

23 The only witness panel that is out of the
24 ballpark on that approach is the CEED panel, who said
25 they cannot be available until the 11th, which, I would
26 think, would be quite substantially out of whack with
27 the timing on which we might finish the other evidence.
28 I think we would be opposed to a delay of several days

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1 in which we did nothing just because of that issue.

2 I think what I should do is phone Mr. Vegh or
3 speak to him about that to see if we could firm that up.

4 MR. THOMPSON: You didn't get my input on
5 availability, and IGUA has a similar problem to Mr.
6 Vegh. Perhaps we could speak about it off-line.

7 MR. PENNY: All right. Thank you.

8 THE PRESIDING MEMBER: The 11th is a Tuesday.

9 MR. PENNY: Yes.

10 THE PRESIDING MEMBER: So there would not be
11 too much of a delay, in the sense that if the intervenor
12 panel says no meeting on the 3rd, you would have the
13 four days of that week.

14 MR. PENNY: If we started intervenor panels
15 that week I would be astonished if it was more than two
16 days, frankly.

17 THE PRESIDING MEMBER: I am sure you can get
18 together to see what you can resolve.

19 MR. PENNY: We will talk to Mr. Thompson and
20 Mr. Vegh about that. Thank you, Mr. Chairman.

21 THE PRESIDING MEMBER: Are there any other
22 matters?

23 If not, it will be either Mr. Thompson or
24 Mr. Janigan.

25 MR. THOMPSON: It will be Mr. Janigan.

26 CROSS-EXAMINATION

27 MR. JANIGAN: Thank you, Mr. Thompson. Thank
28 you, Mr. Chair.

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1 I wonder if I could just cover off a few
2 points, first, that arose from your examination-in-chief
3 this morning. I wonder if you could undertake to
4 provide me with the calculations and an electronic
5 spreadsheet, if it is relevant, associated with your run
6 on the materials price index that was compiled from the
7 StatsCan data and your calculations on its effect on
8 productivity.

9 DR. SCHOECH: Yes, I would be happy to.

10 MR. WIGHTMAN: G6.3.

11 UNDERTAKING NO. G6.3: Dr. Schoech to
12 provide calculations and electronic
13 spreadsheet, if relevant, associated with
14 the run on the materials price index
15 compiled from Statistics Canada data and
16 the effect on productivity

17 MR. JANIGAN: As well, if you could undertake
18 to provide me with calculations and/or an electronic
19 spreadsheet, if relevant, concerning the data set out
20 in F6.1.

21 MR. PENNY: That is Mr. Norsworthy's data.

22 MR. JANIGAN: It is the exhibit based on the
23 Norsworthy evidence.

24 MR. PENNY: It is the Norsworthy evidence.

25 MR. JANIGAN: Okay.

26 DR. SCHOECH: Yes. That was a printout of one
27 of the spreadsheets that Dr. Norsworthy provided us.

28 MR. JANIGAN: Did you do any other

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1 calculations associated with your observations
2 concerning Dr. Norsworthy's evidence?

3 DR. SCHOECH: My discussions pertaining to
4 that exhibit didn't incorporate anything other than
5 looking at that exhibit and comparing that to the tables
6 that we provided in our productivity analysis.

7 MR. JANIGAN: From my recollection, there is
8 no other additional calculations or analysis that you
9 have done, apart from the updated evidence -- and we
10 have already received the electronic spreadsheets
11 associated with that -- that I haven't mentioned.

12 DR. SCHOECH: I believe that everyone received
13 the data that underlie the revised productivity
14 analysis, yes.

15 MR. JANIGAN: I was just referring to your
16 evidence in the examination-in-chief this morning. The
17 materials index run and your observations of Dr.
18 Norsworthy's data. Those were the two new elements to
19 the data that were added to the data this morning.

20 DR. SCHOECH: There was one other item that we
21 raised, which was if one uses our data, but just uses
22 the Fisher Ideal Index if the results are identical.

23 MR. JANIGAN: Is it possible that we can
24 receive the calculations and the spreadsheet behind
25 that?

26 DR. SCHOECH: Definitely, yes.

27 MR. WIGHTMAN: G6.4.

28 UNDERTAKING NO. G6.4: Dr. Schoech

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1 undertakes to provide spreadsheet

2 MR. JANIGAN: Dealing with that particular
3 issue, is it my understanding of your evidence that the
4 use of the Fisher Ideal Index, as opposed to the
5 Tornquist Index, makes no difference to the measurement
6 of either outputs or inputs in the productivity formula?

7 DR. SCHOECH: Yes. When you use the Fisher
8 Ideal Index you get an identical rate of total output
9 growth and total input growth, as you do when you use
10 the Tornquist Index.

11 MR. JANIGAN: Now, I note in Dr. Norsworthy's
12 evidence that he discusses the two indexes on page 17 of
13 his evidence. I am afraid that I don't have the
14 electronic version pagination. It is right before
15 Table 5.

16 MR. PENNY: That is page 19.

17 MR. JANIGAN: Do you have that before you?

18 I am going to start about line 5 reading:

19 "The Fisher Ideal Index is especially
20 appropriate for the Union Gas PBR because
21 the company asserts that it may, through
22 unbundling, reduce or eliminate some of
23 the activities whose quantities are
24 aggregated into the measure of total
25 output, the Tornquist Index for
26 aggregated output processed by Union
27 cannot be calculated for zero level of
28 activity because logarithms are involved,

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1 and the natural log of zero is not
2 defined. Thus the year-to-year
3 calculation underlying the index cannot
4 be carried out when a new output is
5 added, or when an existing output is
6 dropped. The Fisher Ideal Index has no
7 such limitation. Consequently it is
8 preferable to the Tornquist Index for
9 dynamic situations where rapid market and
10 technological changes strongly influence
11 the enterprise or industry."

12 Do you agree with Dr. Norsworthy's statement?

13 DR. SCHOECH: Up to a point, yes.

14 MR. JANIGAN: Let's take where you agree.

15 DR. SCHOECH: If we take a look at the first
16 two sentences that you read, that the unbundling may
17 reduce or eliminate some of the activities and that the
18 Tornquist Index aggregated output proposed for Union
19 cannot be calculated in those situations when you have
20 zero levels, yes, I agree with that.

21 The last sentence:

22 "Consequently it is preferable to the
23 Tornquist Index for dynamic situations
24 where rapid market and technological
25 changes strongly influence the enterprise
26 or industry."

27 That is a much broader statement. It goes
28 well beyond situations where there may be reductions or

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1 eliminations of some of the activities.

2 To the extent that this comment is restricted
3 to those situations, where you end up with reductions or
4 eliminations of some lines of activity I would continue
5 to agree with this last sentence. But I can't agree
6 with the sentence as broadly interpreted.

7 MR. JANIGAN: How do you propose to deal with
8 the problem of an output in an individual measure going
9 to zero because of unbundling?

10 DR. SCHOECH: Well, during the time period
11 that we looked at, it -- the problem didn't arise. But
12 in the event that we were at some point in the future to
13 analyze productivity and during that time period there
14 were some -- the reduction or elimination of some of the
15 activities I would recommend that the Fisher Ideal Index
16 be used.

17 MR. JANIGAN: I note in your evidence on page
18 22 dealing with the Tornquist Index, you note in
19 footnote 18 -- well, first of all, you note that it is a
20 member of the Superlative Index family and a proper
21 basis for computing total output. And you note in
22 footnote 18 a discussion, which I take it is
23 authoritative on that subject by Professor Diewert on
24 exact and superlative index numbers in the Journal of
25 Econometrics. Am I correct in that assumption that
26 Dr. Diewert's work is authoritative?

27 DR. SCHOECH: Yes, you are.

28 MR. JANIGAN: Now, are you aware of the fact

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1 that the FCC in Decision 97-159, which rejected the use
2 of the Tornquist Index which apparently was urged by
3 Christensen Associates?

4 DR. SCHOECH: Well, the way I would put it is
5 they accepted the Fisher Ideal Index, yes.

6 MR. JANIGAN: And were you aware of the fact
7 that in that acceptance of the Fisher Ideal Index, the
8 FCC noted that Dr. Diewert states that the Fisher Ideal
9 Index is the only index that satisfies 20 well-defined
10 mathematical tests? Are you aware of that?

11 DR. SCHOECH: I am aware of that, yes.

12 MR. JANIGAN: Now, I wonder if we could turn
13 to your evidence associated with the input price
14 differential. And my friend, Mr. Brett, went over some
15 of this with you this morning and I won't repeat his
16 cross-examination.

17 But I note that you find on page 8 of your
18 evidence that -- after you cite the two studies, one
19 done for Stentor and one done for USTA by Christensen
20 Associates that:

21 "... we have no reason to believe that
22 the results for that industry ..."

23 meaning the natural gas -- well, I will start at the
24 beginning of the sentence. That makes more sense.

25 "While we are unaware of any gas
26 transportation studies that have been as
27 systematic as those conducted by Stentor
28 or Christensen, Schoech, and Meitzen, we

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1 have no reason to believe that the
2 results for that industry would vary
3 greatly from those found for the
4 telephone industry."

5 Now, I wonder how you were able to make this
6 comparison from telephones to natural gas?

7 DR. SCHOECH: Well, the reason we drew this
8 inference is that -- is that the natural gas industry
9 competes for capital labour and materials. And that
10 over extended periods of time there tend to be
11 convergences in input prices across industry because
12 they are competing for the same resources.

13 Now, the question would be whether there was
14 any evidence available that would lead us to a different
15 conclusion. And as we say in this paragraph, we were
16 unaware of any evidence like that.

17 MR. JANIGAN: So if I could paraphrase that if
18 no input price differential was evident in the telephone
19 industry, this would automatically hold true in the
20 natural gas industry?

21 DR. SCHOECH: No, not automatically. I
22 disagree with the characterization that it would
23 automatically hold true.

24 MR. JANIGAN: It would more likely to hold
25 true in the natural gas industry? That
26 characterization.

27 DR. SCHOECH: I think I would characterize my
28 answer is I would like a substantial amount of evidence

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1 that there is a persistent input price differential
2 before I adopted something other than zero.

3 MR. JANIGAN: So evidence of an input price
4 differential in the telephone industry might be
5 compelling evidence in favour of one in natural gas?

6 DR. SCHOECH: Well, I think -- I think it is
7 worth looking at the information on natural gas. I
8 wouldn't characterize it as compelling though.

9 MR. JANIGAN: No. I am --

10 DR. SCHOECH: The telephone data being
11 compelling -- a compelling bit of evidence for natural
12 gas.

13 MR. JANIGAN: But it would appear that on the
14 basis of these two studies of the telephone industry,
15 you conclude there was no compelling industry --
16 compelling evidence for evidence of an input price
17 differential in natural gas?

18 DR. SCHOECH: Oh, no, not at all. I mean when
19 we conducted the study we looked at the input price
20 differential information which is summarized later in
21 the report. And what we said was that the average rate
22 over the historical time period of the different --
23 sorry -- the average difference in input prices over
24 that time period was 1.7 per cent as was pointed out
25 earlier this morning.

26 But we also talked about the volatility of the
27 resulting series and how it could not be statistically
28 distinguished from zero. And it is that lack of a

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1 distinct statistically significant difference from zero
2 that led to our recommendations that a zero input price
3 differential be applied.

4 MR. JANIGAN: But that was the same analysis
5 that was used in the Stentor study and in the
6 Christensen study involving US local exchange carriers?

7 DR. SCHOECH: The same methodology but
8 different datas.

9 MR. JANIGAN: And you drew the same
10 conclusions on the basis of volatility?

11 DR. SCHOECH: Yes.

12 MR. JANIGAN: Okay. Now, just in terms of the
13 updated evidence, what accounted, and I am looking on
14 page 30 of your evidence, what accounted for the change
15 in the data for input price for Union Gas that gave rise
16 to this substantial difference?

17 MS ELLIOTT: When we were reviewing the study
18 results, what we noticed was a problem in the conversion
19 of our data from fiscal year information to calendar
20 year information. You will recall Union has
21 historically been on a fiscal year ending March and
22 starting -- that data was converted for the purpose of
23 this analysis into calendar year data. And what we
24 realized was we had calendar year data in 1995 and had
25 actually included the calendar year data plus three
26 months of the fiscal year data. So we had double
27 counted some of the capital input in the data.

28 So we collected that reducing the capital

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1 input in the year 1995 was the change in the study.

2 MR. JANIGAN: Now, getting back to the studies
3 that were cited in your evidence, the Stentor study that
4 you have said, that was presented in the CRTC in the
5 price caps decision, was it not?

6 DR. SCHOECH: That is correct.

7 MR. JANIGAN: And the CRTC in Decision 97-9
8 rejected the analysis that was in the study and in fact
9 found an input price differential in the telephone
10 industry, did it not?

11 DR. SCHOECH: That is not my recollection, but
12 I can't say that I remember.

13 MR. JANIGAN: I wonder if you would undertake
14 to confirm that or I will put it to find out. I have
15 the decision here, if you want to look it up, that the
16 CRTC in fact rejected the analysis and imposed an input
17 price differential of 0.3 in the price cap.

18 DR. SCHOECH: I will check.

19 MR. WIGHTMAN: G6.5

20 UNDERTAKING NO. G6.5: Dr. Schoech to
21 check whether the CRTC in Decision 97-9
22 rejected the analysis that was in the
23 study and in fact found an input price
24 differential in the telephone industry

25 MR. JANIGAN: And the Christensen study for
26 the local exchange carriers, which I guess was done for
27 USTA was also presented in the course of the FCC docket
28 on price caps which resulted in Decision 97-159 on

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1 May 21st, 1997, was it not?

2 DR. SCHOECH: That's correct.

3 MR. JANIGAN: Would you confirm to me that the
4 FCC found that the conclusion in your study that the
5 long-term input price differential was zero was
6 theoretically unsound and unsupported by your data?

7 DR. SCHOECH: As I recall, their conclusion
8 was that there was an input price differential. I don't
9 remember the exact words that they used in arriving at
10 that conclusion.

11 --- Pause

12 MR. JANIGAN: In the FCC case they in fact
13 found that there was an input price differential and
14 incorporated it in some fashion in the final price cap
15 they derived?

16 DR. SCHOECH: In their 1997 decision, yes,
17 they did.

18 MR. JANIGAN: Now, I note when we look at
19 Dr. Norsworthy's materials price index, which has been
20 compiled from the StatsCan -- used the StatsCan material
21 price index -- is set out in Table 5.

22 --- Pause

23 MR. JANIGAN: It suggests that the -- at least
24 with respect to materials, that the prices for materials
25 in the gas industry are increasing about half the rate
26 of the price increase in the general economy for
27 materials.

28 DR. SCHOECH: Well, that table does show that,

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1 but unfortunately there is a mistake in that table too.

2 MR. JANIGAN: Okay. Could you give me that?

3 DR. SCHOECH: If you compare the growth rates
4 that appear in the first set that says "Union Materials
5 Price Index Growth."

6 MR. JANIGAN: M'hm.

7 DR. SCHOECH: And you go back to Table 4.

8 MR. JANIGAN: Yes.

9 DR. SCHOECH: You compare those to the Union
10 Tornquist Index growth rates?

11 MR. JANIGAN: Yes.

12 DR. SCHOECH: You will see they are identical
13 numbers.

14 MR. JANIGAN: Yes.

15 DR. SCHOECH: So I think once again
16 Dr. Norsworthy inadvertently put the wrong numbers in a
17 table.

18 MR. JANIGAN: Okay. Now, in terms of the
19 conclusions, I believe you indicated this morning that
20 your conclusions were that the material price index
21 growth figure arrived at was in fact correctly done
22 conceptually or on a calculation basis?

23 DR. SCHOECH: I'm sorry, would you repeat the
24 question, please?

25 MR. JANIGAN: I believe you indicated that you
26 ran the numbers from the StatsCan material price index?

27 DR. SCHOECH: Yes.

28 MR. JANIGAN: Did you not?

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1 DR. SCHOECH: Yes.

2 DR. JANIGAN: And you arrived at the same
3 number of 1.56?

4 DR. SCHOECH: Oh, what we used was -- I'm
5 sorry -- with regard to the StatsCan material price
6 index we used what Dr. Norsworthy provided, yes, which
7 was based on the StatsCan data.

8 MR. JANIGAN: Okay. And that shows a rate of
9 growth for materials of 1.56 versus a 2.95 per cent
10 growth that is based on the GDPPI?

11 DR. SCHOECH: It shows that the materials
12 prices grew 1.56, yes.

13 MR. JANIGAN: And the industry?

14 DR. SCHOECH: And the industry at the GDPPI at
15 the higher rate.

16 MR. JANIGAN: Now, on a very simplistic level
17 this seems to confirm the existence of an input price
18 differential. Would you not agree?

19 DR. SCHOECH: Oh, not at all. You are looking
20 at a category of input that constitutes 10 per cent of
21 total cost, and you are saying that for that 10 per cent
22 of total cost that price goes to a different rate than
23 the price for the whole economy. That doesn't tell me
24 anything about the price of total input for Union Gas
25 relative to the input prices for the rest of the
26 economy.

27 MR. JANIGAN: So it would only suggest the
28 existence of an input price differential for the 10 per

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1 cent of Union's cost of materials?

2 DR. SCHOECH: That's correct.

3 MR. JANIGAN: Now, I wonder if you can just
4 confirm what I think I heard you say this morning, that
5 the Union method of calculation of the capital service
6 price conforms to the current techniques recommended by
7 Dr. Jorgenson, as contained in the Jorgenson and Young
8 paper that you cited this morning?

9 DR. SCHOECH: That's correct.

10 MR. JANIGAN: Now, Union proposes to treat
11 cost of capital as a separate passthrough. Is it
12 conventional to exclude ROE from the operation of a
13 price cap based on weighted capital productivity
14 measurements?

15 DR. SCHOECH: I was with you until the very
16 end when you started talking about weighted productivity
17 measurements.

18 MR. JANIGAN: Well, I'm just indicating the
19 way in which the capital inputs have gone into your
20 price cap. You have obviously used a measurement of
21 capital in order to arrive at a TFP formula. In most
22 cases there is some measurement of capital that goes
23 into the calculation of the TFP formula. Is it
24 conventional after you have arrived at that to exclude
25 ROE from the operation of the price cap derived from
26 that?

27 Perhaps it is best if I just give the question
28 without the final phrase that may be causing you

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1 problems.

2 Is it conventional to exclude ROE from the
3 operation of a price cap?

4 DR. SCHOECH: I would say it is not
5 conventional to exclude it from a price cap. I don't
6 think that it is being excluded from a price cap here,
7 if I understand the question correctly.

8 MR. JANIGAN: Is it conventional to treat it
9 as a passthrough item and not subject to increases by
10 way of the price cap?

11 DR. SCHOECH: One element is treated as a
12 passthrough and that is the change in the cost of
13 financing of an embedded number for ROE.

14 MR. JANIGAN: Is that conventional?

15 DR. HEMPHILL: Just so we are on the same page
16 in terms of what conventional is, what is your
17 definition of conventional?

18 MR. JANIGAN: Well, a practice that is common
19 and recommended in most jurisdictions.

20 DR. HEMPHILL: I haven't seen it a lot. It is
21 not unprecedented. A passthrough or a Z factor of that
22 sort, it has been defined in different ways but it is
23 not used a lot.

24 MR. JANIGAN: Have you ever recommended it
25 before?

26 DR. HEMPHILL: In a different way it was
27 recommended in the price cap program for Niagara Mohawk.

28 MR. JANIGAN: Can you elaborate on that a

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1 little further?

2 DR. HEMPHILL: There was a separate V factor
3 for variations in changes in the cost of capitalization
4 with some band around it, but I'm going back in memory
5 here. But it is a similar context.

6 MR. JANIGAN: Was that accepted by the
7 regulatory authorities?

8 DR. HEMPHILL: No. No, it wasn't.

9 MR. JANIGAN: Okay.

10 Now, would the predecessor of an inflation
11 index rather than a fixed increase solve the problems
12 associated with fluctuations in the financial markets
13 that you have alluded to?

14 --- Pause

15 DR. HEMPHILL: We really haven't done an
16 analysis but I will ask a question of clarification and
17 then perhaps see if we can't answer it.

18 Did you saw "alleviate" or "eliminate" it?

19 MR. JANIGAN: Well, let's take both. Would it
20 eliminate it?

21 DR. HEMPHILL: Well, we can't say if it would
22 eliminate it.

23 MR. JANIGAN: Would it alleviate it?

24 DR. HEMPHILL: Potentially yes.

25 MR. JANIGAN: You couldn't say to the extent
26 -- to what extent it would alleviate it?

27 DR. HEMPHILL: No.

28 MR. JANIGAN: I wonder if you could turn up in

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1 Appendix B, B1, the Alberta Northwestern Utilities.

2 I am a little unclear from the description of
3 what is going on in this particular circumstance. Is it
4 the case where there is a percentage -- if there is a
5 fixed percentage increase, the ROE is under the cap and
6 there are earnings sharing of some kind?

7 DR. HEMPILL: Well, first there are fixed
8 percentage increases set up for each of the years in the
9 program. There does not appear to be an ROE pass-
10 through if that is an answer to your second question.
11 And there is an earnings sharing mechanism.

12 MR. JANIGAN: Okay. Thank you. Now, just
13 some follow-up of some questions that were asked by my
14 friend from Kitchener.

15 As you may be aware that the portfolio
16 approach for system expansion that is adopted by Union
17 and sure as that system expansion on a portfolio basis
18 occurs at an MPV of one, is that too great a detail in
19 terms of your knowledge in that area?

20 MS ELLIOTT: As I indicated this morning, I
21 think our policy with respect to system expansion is
22 that the portfolio would have a profitability index of
23 one.

24 MR. JANIGAN: By way of EBO 188, projects can
25 be pursued if they have an MPV of 0.8 provided that the
26 whole portfolio meets the test of one.

27 MS ELLIOTT: Individual projects within the
28 portfolio can be managed between 0.8 and -- or above

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1 0.8.

2 MR. JANIGAN: Now, presumably to the extent
3 that system expansion goes forward as a program with an
4 MPV of one, this depresses productivity. Would you
5 agree with that, panel?

6 DR. HEMPHILL: I am sorry. Would you repeat
7 the question?

8 MR. JANIGAN: Well, to the extent that the
9 portfolio approach is used where the products go forward
10 provided that the portfolio with an MPV of one is met,
11 presumably this over the long term depresses
12 productivity. You are meeting an MPV of one every year,
13 you are not getting any more productive.

14 DR. HEMPHILL: I can't draw conclusions from
15 that, no.

16 MR. JANIGAN: I wonder if parenthetically to
17 the undertakings such as they were given today, whether
18 or not it is possible to get an estimate of the
19 customers and volume that were added by way of system
20 expansion during the period of productivity measured by
21 the price cap? I believe, Ms Elliott, you indicated to
22 me off-line that you did not know whether or not you had
23 that information or whether or not it would be easily
24 assembled.

25 MS ELLIOTT: Certainly in the productivity
26 study you see the customers as they are in each year.
27 So you see the customers that change year over year and
28 the volumes. Getting the information as to what of

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1 those customers were related to what growth project, I
2 am not sure that that information is available in the
3 level of detail you are requesting. We are putting a
4 call in to see that it is -- to see whether we have it
5 or not but the feeling is that it doesn't exist.

6 MR. JANIGAN: Is it possible to get an
7 estimate of the percentage every year that system
8 expansion would represent in terms of increases in
9 customers or increases in volume? A ballpark of any
10 kind?

11 THE PRESIDING MEMBER: Mr. Janigan, I am not
12 sure what percentage you are asking for. Is this the
13 total portfolio of customers and the total portfolio of
14 expenditures and the total portfolio of gas?

15 MR. JANIGAN: No, it would be the total
16 increases in either customers or volume in a given year
17 or over a series of years but maybe attributed to system
18 expansion rather than to any other reason. A ballpark
19 estimate of percentage of --

20 THE PRESIDING MEMBER: Does that help?

21 MS ELLIOTT: I guess I am having trouble --
22 when you refer to system expansion, you are referring to
23 major projects. Because obviously to attach a customer
24 we have to expand the system to some degree.

25 MR. JANIGAN: Oh, I got gas last month, I
26 wouldn't be included in that figure.

27 THE PRESIDING MEMBER: Mr. Janigan, are we
28 talking about just distribution system customers or are

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1 we talking about expansion of the Dawn-Trafalgar line
2 and all the other customers in Ontario?

3 MR. JANIGAN: Distribution system customers.

4 THE PRESIDING MEMBER: Thank you.

5 MS ELLIOTT: That will depend, I guess, on the
6 level of information that we can find that goes back to
7 1990 or 1986 that would allow us to do that.

8 MR. JANIGAN: I am looking for rough numbers,
9 Ms Elliott. So in either case if you could supply a
10 percentage or the actual numbers, I would be grateful.

11 MS ELLIOTT: I will do my best.

12 MR. JANIGAN: Thanks very much.

13 MR. WIGHTMAN: G6.6.

14 UNDERTAKING NO. G6.6: Ms Elliott to
15 provide a percentage or the actual
16 numbers of total increases in either
17 customers or volume in a given year or
18 over a series of years but may be
19 attributed to system expansion rather
20 than to any other reason

21 MR. JANIGAN: Let's turn to earnings sharing
22 and I believe you note in your evidence on page 37 at
23 the bottom that:

24 "It is useful to note that in 1997 the
25 FCC abandoned the [Earnings Sharing Menu]
26 ESM menu approach and adopted a pure
27 price cap plan."

28 Do you see that on page 37?

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1 DR. HEMPHILL: Yes.

2 MR. JANIGAN: Okay. Now, when the FCC made
3 that decision, this was after two rounds of decisions --
4 previous decisions imposing an earnings share mechanism,
5 was it not?

6 DR. HEMPHILL: That is my understanding, yes.

7 MR. JANIGAN: And when it abandoned the
8 earnings sharing mechanism, it also coupled it with a
9 more demanding X Factor of 6.5. Is that not correct?

10 DR. SCHOECH: Well, at the same time that they
11 abandoned sharing they adopted an X Factor that was
12 higher but which also was reversed and remanded by the
13 Court of Appeal through the District of Columbia.

14 MR. JANIGAN: I think that the Court of Appeal
15 in the District of Columbia ruled to the effect that the
16 exact point number that the FCC had landed on was not
17 supported in terms of the range of values that went
18 from, I believe, 5.6 to 6.2, if I am not certain. Is
19 that your understanding?

20 DR. SCHOECH: Well, my understanding was that
21 it said whatever number was chosen was not supported by
22 the evidence.

23 MR. JANIGAN: It has gone back to -- for a wee
24 hearing but the reduction that is associated with that
25 is certainly less than a hundred basis points, would you
26 not agree?

27 DR. SCHOECH: I am sorry, the reduction in
28 what?

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1 MR. JANIGAN: The reduction that may be
2 contemplated by any reversal is less than a hundred
3 basis points. In other words, the range of disagreement
4 was certainly not from one to 6.5; it was with a narrow
5 band.

6 DR. SCHOECH: Oh, no, there was parties to
7 that hearing that though a substantially lower number
8 was warranted.

9 MR. JANIGAN: But the decision of the court of
10 appeal was on a specifically narrow band.

11 DR. SCHOECH: The decision of the court of
12 appeal was that the number that was chosen was not
13 substantiated by the evidence. It requested that the
14 FCC revisit the issue, and the FCC issued a further
15 notice of proposed rule making.

16 MR. JANIGAN: The FCC's ruling in abandoning
17 the earnings share mechanism was that it was based on
18 the belief that it now had reliable data.

19 DR. SCHOECH: I don't remember those words
20 specifically appearing in the decision, no.

21 MR. JANIGAN: Would it be helpful to refresh
22 your memory?

23 DR. SCHOECH: Yes, it would.

24 MR. JANIGAN: I am quoting from the decision
25 at paragraph 159:

26 "We also believe that our X factor --"

27 MR. PENNY: Mr. Chairman, may I interject for
28 a moment? Does Mr. Janigan have copies of this for the

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1 rest of us?

2 MR. JANIGAN: No, I don't, but certainly the
3 decision is cited in the evidence of Drs. Schoech and
4 Hemphill. I would assume that they have access to it.

5 MR. PENNY: Further, Mr. Chairman, it is all
6 very interesting to debate what happened and who said
7 what in the court of appeal decision or the FCC
8 decision, but it says what it says. It is not really,
9 in my submission, a matter for evidence; it is a matter
10 for argument.

11 MR. JANIGAN: With great respect, Mr. Penny,
12 Dr. Hemphill and Dr. Schoech have stated that it is
13 useful to note the FCC decision with respect to the
14 abandonment of the earnings share mechanism. I think
15 you have to go into the reasons why the FCC abandoned
16 the earnings share mechanism in order to find that it
17 might be useful.

18 THE PRESIDING MEMBER: Is it possible to ask
19 that question? If they know the reasons why the FCC
20 stated that they were abandoning the earnings sharing?

21 MR. JANIGAN: Do you know the reasons why the
22 FCC stated that they were abandoning the earnings
23 sharing?

24 DR. SCHOECH: To the best of my knowledge, I
25 believe that there was some comfort level that they had
26 by having the earnings sharing mechanism in place for a
27 little while.

28 I think that, at the outset, there was some

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1 concern about how rates for particular services -- and
2 for telecommunications we were talking about just a
3 segment of the line of business, interstate services,
4 and I think there was some concern at the outset as to
5 what the appropriate X factor should be when you are
6 just regulating those services.

7 Over time they felt more comfortable with the
8 procedure, and that, I believe, led to the eventual
9 dropping of the earnings sharing mechanism.

10 MR. JANIGAN: I believe you indicated that one
11 of the reasons for imposing earnings sharing mechanisms
12 is uncertainty as to what the potential results might
13 be. Is that correct?

14 DR. HEMPHILL: That's correct.

15 MR. JANIGAN: Experience with cost of service
16 regulation for Union by this Board leads you to the
17 conclusion that there is less reason to believe that
18 there will be uncertainty or unreliability in the
19 Board's estimates.

20 DR. HEMPHILL: That is correct.

21 MR. JANIGAN: Would you not agree that there
22 is uncertainty about the effect of unbundling and new
23 services on Union's revenues and costs?

24 DR. HEMPHILL: There is uncertainty about most
25 everything in the world. Again, it is a very high level
26 generalization that you are making in terms of the
27 uncertainty of unbundling.

28 The question is: Does the unbundling and

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1 restructuring process lead the Board to question what
2 the earnings are going to be of the company as they move
3 forward in this process. That is the question.

4 MR. JANIGAN: And that, to that extent,
5 injects a note of uncertainty that wasn't present under
6 previous cost of service regulation.

7 DR. HEMPHILL: I am not saying that that is an
8 uncertainty, but it is potentially an uncertainty.

9 MR. JANIGAN: Yes.

10 Now, I note that --

11 MEMBER JACKSON: Mr. Janigan, I may have
12 forgotten the written testimony of these gentlemen, but
13 have you established that in looking forward they were
14 aware of this unbundling proposal and this uncertainty?
15 Is that something that has been established?

16 MR. JANIGAN: I certainly can ask them the
17 questions, Dr. Jackson.

18 MEMBER JACKSON: Yes. Could you just inform
19 us of that?

20 I expect it is in your testimony, but it just
21 seemed that as we were going past this point in the
22 proceeding it would be useful to know whether in coming
23 up with the stretch factor that would have been one of
24 the things that might have been in your mind.

25 DR. HEMPHILL: Certainly we are aware of the
26 restructuring and unbundling that is taking place in the
27 industry and with Union. We don't know the specifics of
28 it. Therefore, we wouldn't have any basis to build an

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1 uncertainty factor into the estimates.

2 MEMBER JACKSON: Fair enough. Thank you.

3 MR. JANIGAN: Following up on that, you
4 wouldn't have the basis in order to use that information
5 to build into your stretch factor calculation as well.

6 DR. HEMPHILL: That's correct.

7 MR. JANIGAN: Now, I note, in terms of the
8 data that was used for your productivity studies, that
9 you left off or did not include any data from Centra
10 Gas.

11 DR. SCHOECH: That's correct.

12 MR. JANIGAN: To the extent that those numbers
13 and that data may influence the results of your
14 productivity study, there is an element of uncertainty
15 as to what impact the merger of Centra and Union Gas has
16 had upon the company's productivity.

17 DR. SCHOECH: What we did was, we measured the
18 productivity growth for Union without Centra. I think
19 what you are asking is whether or not the Centra data
20 could have made any difference to that underlying rate.
21 It could have had a small impact upward or downward, I
22 suppose.

23 I believe we talked with Union staff people
24 and, based upon their knowledge of the two service
25 territories, we concluded that we were being
26 conservative by excluding the Centra territory. But we
27 did not empirically investigate how much of a difference
28 Centra would have made to the results, no.

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1 MR. JANIGAN: And to the extent that there may
2 be uncertainty, this introduces another element of
3 uncertainty going forward.

4 DR. SCHOECH: I am not exactly sure of
5 the -- I mean, the elements of uncertainty -- there
6 could be a number of things identified as elements of
7 uncertainty, and all of them could be of minimal
8 importance. I am not sure what --

9 MR. JANIGAN: But you have no way to tell,
10 because you don't have the data, right?

11 DR. SCHOECH: We have no way to tell what the
12 impact of Centra would have --

13 There are a number of other things, I guess,
14 that we could speculate on that might have had an
15 impact, and we wouldn't have a way of quantifying those
16 speculations either.

17 MR. JANIGAN: You indicated that you weren't
18 satisfied with the lack of precision in the Stats Canada
19 data. What tests did you do to come to that conclusion?

20 DR. SCHOECH: Well, we didn't conduct any
21 tests. We simply recognized the fact that Statistics
22 Canada doesn't publish those in the books that are
23 widely circulated that look at productivity for
24 different sectors of the economy, and also recognized
25 that there may be some bit of problems in acquiring data
26 for the gas distribution industry.

27 What sometimes happens is you go to smaller
28 and smaller segments of the economy. The amount of

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1 information available is less and less, particularly for
2 a government agency like Statistics Canada which is
3 trying to look at the whole economy at one time and
4 that was the basis of our conclusion.

5 MR. JANIGAN: Let me take the first one, that
6 the data was unpublished. Do you know whether or not
7 Statistics Canada keeps accurate data that it doesn't
8 publish?

9 DR. SCHOECH: It may.

10 MR. JANIGAN: Did you speak to any officials
11 from Statistics Canada?

12 DR. SCHOECH: No, we did not.

13 MR. JANIGAN: Were you aware that Professor
14 Jorgenson apparently has been advising Statistics Canada
15 on the composition of their indexes?

16 DR. SCHOECH: I wasn't until I read
17 Dr. Norsworthy's testimony, yes -- or no, I should say.

18 MR. JANIGAN: Thank you, Mr. Chair.

19 Those are all my questions for this panel.

20 THE PRESIDING MEMBER: Thank you, Mr. Janigan.
21 Mr. Thompson.

22 CROSS-EXAMINATION

23 MR. THOMPSON: Thank you.

24 Now, panel, I would like to start if I might
25 with some discussion about experience. Mr. Hemphill and
26 Mr. Schoech, do each of you bring different areas of
27 expertise to the table?

28 DR. SCHOECH: Yes, we do.

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1 MR. THOMPSON: Could you just describe for us
2 what they are?

3 DR. SCHOECH: I believe as I, or as we refer
4 to in our background on principles, my area of
5 specialization is in productivity measurement,
6 econometric analysis and incentive regulation. If you
7 read further you will see that I conducted productivity
8 econometric studies for a variety of industries.

9 MR. THOMPSON: Yes. You are referring there
10 down to the appendix to your testimony?

11 DR. SCHOECH: Oh, yes, I'm sorry, yes, the
12 appendix there.

13 MR. THOMPSON: Appendix A?

14 DR. SCHOECH: Yes.

15 MR. THOMPSON: It appears, Mr. Schoech that --
16 and I'm looking at page 8 -- one of your major clients
17 is the United States Telephone Association?

18 DR. SCHOECH: That's correct.

19 MR. THOMPSON: Is that an association of
20 utility companies?

21 DR. SCHOECH: Yes, it is.

22 MR. THOMPSON: You also in Canada represented
23 STENTOR which is in Canada an association that is a --
24 well, it is a group of utility companies?

25 DR. SCHOECH: That's correct.

26 MR. THOMPSON: Have you ever represented
27 consumer interests, that is apart from utility
28 companies?

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1 DR. SCHOECH: We have worked for regulatory
2 agencies, I believe, acting in the interests of
3 consumers.

4 MR. THOMPSON: But consumers. Consumers like
5 the people that actually consume and pay for the
6 services. I looked through your list. I couldn't
7 see -- nothing leapt out of there at me, but I'm sure at
8 some point in your history you must have.

9 DR. SCHOECH: Well, I did work in assisting
10 the chairman of our company, Lyle Christensen, when he
11 analyzed the price cap plan for the railroads and at
12 that time he was retained by the shippers which would
13 have been a customer group.

14 MR. THOMPSON: When was that?

15 DR. SCHOECH: That was back sometime in the
16 1980s.

17 MR. THOMPSON: The last time you testified
18 would appear, if I am not reading this incorrectly,
19 would be submitting testimony in 1997 on behalf of the
20 U.S. Telephone Association?

21 DR. SCHOECH: I believe that's correct, yes.

22 MR. THOMPSON: Have you ever testified in
23 Canada before a gas regulator before?

24 DR. SCHOECH: No, I did not.

25 MR. THOMPSON: Mr. Hemphill, what is the focus
26 of your expertise?

27 DR. HEMPILL: As stated on A2, that is
28 Appendix A, page 2, it speaks of me as focusing more on

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1 the development of competitive pricing products.

2 I would say in comparison between my
3 colleague, Mr. Schoech and me, I would be viewed, I
4 think, as more of the practitioner. We both have
5 academic training in economics up to the Ph.D., but I
6 have worked with many companies in the regulatory arena
7 in a lot of different capacities.

8 Throughout my career I have addressed
9 regulatory forums on behalf of public utilities, small
10 business advocates, residential customers. I worked for
11 a couple of years for -- as a consultant with the City
12 of Chicago in negotiations with Commonwealth Medicine
13 and submitted testimony before the Illinois Commerce
14 Commission regarding rate design for residential
15 customers.

16 MR. THOMPSON: In terms of the retainer by
17 Union in this case, you brought what to it, a sort of
18 high level practical overview?

19 DR. HEMPILL: I would say in comparison to my
20 colleague, Mr. Schoech, I was looking at the individual
21 elements of the program, how they fit together and the
22 entire package as it was designed.

23 MR. THOMPSON: So you are the big picture guy
24 and Mr. Schoech is the productivity guy. Is that
25 overstating it?

26 DR. HEMPILL: That's how we have sort of
27 divided up our duties, although we both meddle in each
28 other's areas.

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1 MR. THOMPSON: Okay.

2 All right, now in terms of retainer when was
3 the organization retained by Union Gas, give me a date
4 approximately.

5 DR. HEMPHILL: I first made a trip in March of
6 1999 to Chatham. It was cold.

7 MR. THOMPSON: All right. Was that part of
8 the retainer? There is in evidence at Exhibit 3, C3.40
9 the terms of reference for your work that -- it may well
10 be in the material, but I haven't seen it. Is there a
11 retainer letter somewhere?

12 --- Pause

13 DR. HEMPHILL: Ms Elliott, maybe you can help
14 us with this.

15 MS ELLIOTT: I don't believe there has been a
16 letter filed, no.

17 MR. THOMPSON: Is there a letter?

18 MS ELLIOTT: Yes, there is.

19 MR. THOMPSON: Could we undertake to have it
20 filed?

21 MS ELLIOTT: Yes.

22 MR. WIGHTMAN: G6.8 -- excuse me, G6.7.

23 UNDERTAKING NO. G6.7: Undertaking
24 by Patricia Elliott to provide
25 letter retaining Ross Hemphill

26 MR. THOMPSON: Mr. Hemphill, when you first
27 came to see Union at what stage of development was their
28 price cap plan?

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1 DR. HEMPILL: I caveat my answer with I am
2 going by memory back a ways, but I believe that they had
3 formed an internal committee to evaluate a
4 performance-based regulation proposal and they were
5 looking at the various components that would be included
6 in such a proposal.

7 MR. THOMPSON: Well, there is in evidence
8 given, and I hope I state this accurately, that by -- I
9 think it was either late March, certainly by April of
10 1999, the company was out consulting with its various
11 interest groups with a preliminary plan -- I guess I
12 could call it that.

13 Just stopping there, have I got that right,
14 Ms Elliott?

15 MS ELLIOTT: We actually went out in the fall
16 of 1998 with a very high level proposal to customers
17 which we worked on and put some more detail around for
18 the spring of 1999 until the April-May time frame.

19 MR. THOMPSON: My recollection, Ms Elliott, is
20 that at that time when you went out in the fall of 1998
21 and into the spring of 1999 what Union was seeking was
22 2 per cent by way of a price cap. Is that correct?

23 MS ELLIOTT: The discussions at that time were
24 for a price cap proposal at approximately 2 per cent or
25 no more than the rate of inflation.

26 MR. THOMPSON: And Mr. Hemphill, when you
27 arrived at Union in the spring of 1999, were you aware
28 that that was their preliminary proposal?

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1 DR. HEMPHILL: I can't remember if a number
2 had been stated. I would have to look back at my
3 records.

4 MR. THOMPSON: Would you that, please?

5 You see what strikes me is this: They start
6 out at 2 per cent, you folks show up and at the end of
7 the day we are still at 2 per cent. I will be coming to
8 the various permutations and combinations of that, but
9 is that just a coincidence?

10 MS ELLIOTT: We had provided, through
11 discussions with customers about a price cap, an
12 indication that inflation or a price cap around the rate
13 of inflation would be something that we are looking for,
14 the fact that inflation is around 2 per cent. The final
15 proposal following the calculation of the productivity
16 and the stretch factor is a coincidence.

17 But we were going forward with an inflationary
18 price cap from the very beginning.

19 DR. HEMPHILL: If I may add? The analysis
20 that Christensen Associates did that was directly input
21 into the proposal as it now stands was done totally
22 independently.

23 MR. THOMPSON: Well, that is what you say, but
24 you end up with the same number. That is what I am
25 wondering about.

26 MS ELLIOTT: It wasn't designed to come up
27 with that number.

28 MR. THOMPSON: All right. Well, let's just

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1 move on a little bit.

2 The terms of reference -- if you could go back
3 to them, please -- as disclosed in this undertaking
4 response, talk about developing a Total Factor
5 Productivity model for Union and then it talks about
6 reviewing underlying assumptions in support of various
7 features of the plan, it talks about reviewing Union's
8 proposal for SQIs and identifying criteria to establish
9 base rates for second generation PBR. It struck me when
10 I looked at it that this was a review engagement. Was
11 it?

12 In other words, you were reviewing what Union
13 had done, not doing something yourself, making
14 recommendations to Union and having Union implement
15 those recommendations.

16 DR. SCHOECH: In terms of the second point,
17 Union had proposals regarding various components and we
18 evaluated them and, as I recall, we basically found them
19 appropriate.

20 Well, offhand I don't recall going to them and
21 saying, "You can't do this". It seemed to me that
22 everything they were proposing was within the scope of
23 generally accepted practices for a price cap regulation
24 and therefore appropriate.

25 MR. THOMPSON: So do you agree with me that it
26 was a review engagement? You evaluated what they did.

27 DR. SCHOECH: Well, in terms of the Total
28 Factor Productivity study that was something we did. In

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1 terms of some of these other items, you might
2 characterize it as a review engagement if by review
3 engagement you mean that Union came forward with some
4 ideas and we evaluated them, yes.

5 MR. THOMPSON: Did you reject any ideas that
6 Union came forward with, and if so, what were they?

7 --- Pause

8 DR. SCHOECH: Well, one idea that I recall was
9 first to present two Total Factor Productivity numbers
10 and kind of bracket the range, and in looking at that we
11 told them that the appropriate way of dealing with Total
12 Factor Productivity would be taking the weighted average
13 of the two. That was our conclusion after looking at
14 how they were thinking about framing the results of the
15 productivity study.

16 MR. THOMPSON: Well, that essentially takes
17 two and brackets the range, doesn't it?

18 DR. SCHOECH: No, it takes two and gets a
19 result from them by weighting the two.

20 MR. THOMPSON: Oh, I see. So do you feel that
21 is a rejection of something they came up with or just
22 working it into the plan?

23 DR. SCHOECH: Well, they came forward with a
24 proposal for presenting the evidence and what we did is
25 we recommended an alternative way. Maybe to your mind
26 it may not be a rejection, but that is what we did.

27 MR. THOMPSON: All right. Had Union done its
28 own Total Factor Productivity analysis when you folks

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1 arrived on the scene? Were you revealing that as well?

2 DR. SCHOECH: As I recall the initial
3 discussions, they had attempted to do some in-house work
4 but were stymied and so, therefore, there were some data
5 that were already assembled and it was our job to take
6 those data, take other data that were needed, in order
7 to actually conduct the Total Factor Productivity study.

8 MR. THOMPSON: In the retainer document, the
9 second bullet point is: Review the underlying
10 assumptions in support of the various components,
11 including the price escalator, the productivity, X
12 factor, the off ramps, the Z factor, one-time cost
13 adjustments and passthrough costs of the price cap
14 formula and provide a reasonableness as to the
15 opinion -- an opinion as to the reasonableness of these
16 assumptions based on Union's support and experience in
17 other jurisdictions.

18 What did you do there other than read what
19 they had prepared?

20 DR. HEMPHILL: First of all, let me preface
21 what I am going to say because I am sitting here and I
22 am trying to think back to this process and I hope you
23 can understand that this was an evolutionary process
24 that took place. It included briefings by us at the
25 very beginning in terms of ways in which we might
26 suggest approaching the design of such a plan, looking
27 at alternatives as well as proposals that they had put
28 together.

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1 One time frame that I remember in particular
2 is talking about the pricing flexibility and the
3 creation of baskets and side conditions. That had not
4 evolved at all, that I remember, when we first came on
5 the scene in terms of working with them.

6 There were times in which they would brief us
7 through telephone calls and we would give responses and
8 then, you know, we would see the outcome and review that
9 and give them our opinion.

10 So it is not something -- we did not keep
11 documentation step by step in terms of what happened in
12 the program step by step as we worked together on this.
13 It is certainly in Union's proposal -- our role other
14 than the Total Factor Productivity study was to look at
15 the different components as they were created and give
16 them our opinion.

17 MR. THOMPSON: All right. In the course of
18 your work, did you review the various versions of the
19 proposal that developed over the course of 1999 and
20 presented to customers?

21 DR. HEMPHILL: We were given at least some
22 materials that were provided at the -- what is it
23 called? -- the stakeholdering process.

24 MR. THOMPSON: Yes.

25 DR. HEMPHILL: We were given at least some of
26 those materials. I can't say all, but we were given
27 some.

28 MR. THOMPSON: You can't recall whether you

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1 knew the goal was 2 per cent when you first came to
2 Union in the spring of 1999, but you must have known
3 that shortly after, if you read those materials.

4 DR. HEMPHILL: I would have to check on that,
5 but it is possible.

6 MR. THOMPSON: Would you take that subject to
7 check?

8 DR. HEMPHILL: I can check myself to see what
9 materials I had.

10 MR. THOMPSON: All right. Well, perhaps we
11 better give it an undertaking number then.

12 MR. WIGHTMAN: G6.8.

13 UNDERTAKING NO. G6.8: Mr. Hemphill
14 undertakes to check whether he knew that
15 Union's goal for a price cap was 2 per
16 cent when he first came to Union in the
17 spring of 1999

18 MR. THOMPSON: Your testimony in this is
19 December 8, 1999 -- if I am looking at the cover sheet
20 of Tab 3 and that is reviewing part of Union's proposal,
21 but Union's testimony at Tab 2 is dated December 19,
22 1999. So my question was whether you actually reviewed
23 what is found at Tab 2 or whether your review is of
24 something that preceded what is found at Tab 2. Can you
25 help me there?

26 DR. HEMPHILL: Yes, we will need help from the
27 company on the time line. We had reviewed drafts. I
28 could not tell you if we reviewed the final draft before

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1 it had the December 10 date stamp put on it, but we had
2 reviewed multiple drafts in the process.

3 MS ELLIOTT: I think we are just talking about
4 a difference in administration, whereas our filing would
5 have been dated the date of the filing. The
6 consultant's evidence would have been dated the day that
7 they provided it or that we got the final copy.

8 MR. THOMPSON: So the consultants did review
9 what is at B2, Tab 2?

10 MS ELLIOTT: Yes.

11 MR. THOMPSON: Thank you.

12 Does this retainer, the scope of the retainer
13 exhibit, cover everything that you did with the C3.40?

14 DR. HEMPHILL: Yes. We can't think of
15 anything else.

16 MR. THOMPSON: So can I conclude from that
17 that you were not asked to review or express any
18 opinions on the company's proposal to deprive ratepayers
19 of their share of revenue deferral accounts?

20 MR. PENNY: Maybe Mr. Thompson could put the
21 question in a way that is less argumentative and maybe
22 perhaps informative or helpful to the witness.

23 MR. THOMPSON: I didn't see anything improper
24 with the question, but were you asked to review the
25 company's proposal to deprive ratepayers of their share
26 of revenue deferral accounts? It's not in this retainer
27 letter. Therefore, I assumed you weren't asked to do
28 that.

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1 DR. HEMPHILL: No, I don't recall being asked
2 to review that.

3 MR. THOMPSON: And so then is it fair for me
4 to suggest that as far as you are concerned that feature
5 of the company's proposal has nothing to do with the PBR
6 plan that you reviewed?

7 DR. HEMPHILL: It did not enter into our
8 analysis, no.

9 MR. THOMPSON: Now, in the retainer letter you
10 refer to in the second bullet point a review of the one
11 time cost adjustments. Can you help me with what you
12 are referring to there?

13 I infer that you are referring to the
14 adjustments that the company was proposing for
15 accumulated UFG variances, changing in accounting for
16 pension, accumulated deferred tax amortization. Are
17 those the adjustments that you reviewed or are you
18 talking about something else?

19 DR. HEMPHILL: No. That is also called the
20 passthrough adjustments, yes.

21 MR. THOMPSON: There are two things described
22 here, one time cost adjustment and passthrough costs. I
23 know you reviewed the passthrough costs, but did you and
24 were you asked to review these one time cost
25 adjustments?

26 --- Pause

27 MR. THOMPSON: I didn't see anything in your
28 evidence about them, but maybe I am missing something.

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1 MS ELLIOTT: They didn't specifically review
2 the proposed base rate adjustments.

3 MR. THOMPSON: All right.

4 So it was not part of your mandate to review
5 the base?

6 DR. HEMPHILL: That's correct.

7 MR. THOMPSON: Is that unusual when that's a
8 critical element of a PBR plan?

9 DR. HEMPHILL: No, that's not unusual.

10 MR. THOMPSON: Do you agree with me the base
11 is a critical element of a PBR plan?

12 DR. SCHOECH: Well, establishing the correct
13 rates going in is important, but our experience has been
14 that when addressing a price cap plan, looking at the
15 plan is parcelled out to different experts.

16 Our area is the area of the adjustment
17 factors.

18 MR. THOMPSON: I understand you are not
19 experts on the base because you weren't asked to look at
20 it. You are not testifying here as experts with respect
21 to the base in this case. You haven't looked at it?

22 DR. HEMPHILL: That's fair.

23 MR. THOMPSON: Let's move on then to some
24 principles and objectives of price caps regulation.
25 This topic is discussed in your testimony I believe in
26 section 2.1 and it also forms part of the discussion in
27 section 2.2 and Dr. Bauer provides some evidence on this
28 topic as well, would you agree, the principles and

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1 objectives of price cap regulation?

2 DR. HEMPHILL: He discusses that in his
3 testimony, yes.

4 MR. THOMPSON: And at page 2 of your testimony
5 at line 5, you tell us price cap is an alternative to
6 the traditional cost of service approach. That's the
7 way you see it?

8 DR. HEMPHILL: Yes, that's what we have
9 stated, yes.

10 MR. THOMPSON: And just comparing the
11 alternatives, would you agree that cost of service
12 derives recoverable revenues on the basis of company
13 specific forecasts for particular test periods?

14 DR. HEMPHILL: Yes.

15 MR. THOMPSON: And whereas price cap derives
16 recoverable revenues by applying a formula to a
17 company-specific base?

18 DR. HEMPHILL: To prices. Parties are
19 formulated to the prices of the company, yes.

20 MR. THOMPSON: Well, the price cap, first of
21 all, is applied to derive recoverable revenues in total.

22 DR. HEMPHILL: A price cap is applied to the
23 prices of the company.

24 MR. THOMPSON: We have had a lot of discussion
25 here as to how it works in this case, but essentially
26 the company is starting with a Board approved delivery
27 related revenue requirement and applying the number that
28 falls out of the formula to that amount to produce what

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1 they call applicable revenues. That's what I would
2 describe as recoverable revenues. That's the cap within
3 which they must operate.

4 DR. HEMPILL: Yes. In cost-of-service
5 regulation that is the approach that is taken. The
6 amount of revenues that can be recovered is determined
7 through a revenue requirement formula.

8 In price cap regulation, you sheer away the
9 cost element and you look at the prices that have
10 resulted for each of the individual customer groups that
11 you are identifying and then you apply an escalator to
12 those prices.

13 MR. THOMPSON: Right.

14 Perhaps you would be good enough to turn up
15 the company's revenues just to see if we are on the same
16 page here or not. I think it's appendix -- Exhibit B,
17 Tab 2, Schedule 1. At line we have the company's price
18 cap and then there's line 9 we have the applicable
19 revenue and at lines 10 and 11 we have an amount,
20 slightly less than \$15 million. That's what I call the
21 price cap component of their claim in this case. What
22 do you call it?

23 DR. HEMPILL: The point that I'm trying to
24 make, Mr. Thompson, is that, - yes, this is the
25 definition of "applicable revenue", but the price cap
26 index is applied to prices not to the revenues. It's
27 not applied to a revenue base, a total embedded revenue,
28 it's applied to the individual prices that result from

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1 this, at first. Okay? This is an initialization stage
2 of the process, but it's applied to the prices that
3 result, for each of the customer groups that Union has
4 identified.

5 MR. THOMPSON: All right. Well, what's the
6 \$14 million or the \$15 million, then?

7 MS ELLIOTT: That's the impact of applying the
8 price cap to the prices that are currently in effect.

9 MR. THOMPSON: And is that not the number
10 of --

11 MEMBER JACKSON: Are you not multiplying those
12 against the volumes for 1999, too?

13 MS ELLIOTT: To determine the absolute value
14 of the increase, yes.

15 MEMBER JACKSON: Okay. Mr. Thompson was
16 asking about a dollar number.

17 MS ELLIOTT: The \$14 million is the current
18 prices times the volume.

19 MEMBER JACKSON: The 1999 volume?

20 MS ELLIOTT: The 1999 volume.

21 Escalated by the price cap amount.

22 MEMBER JACKSON: Right.

23 MR. THOMPSON: Well, maybe I'm quibbling here
24 but does that number not constrain -- is that not the
25 constraint on the amount that you can recover in rates
26 under the price cap plan?

27 MS ELLIOTT: That's the amount that we would
28 be showing the compliance with respect to when we apply

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1 the price cap formally to all of the individual prices.
2 The average increase of all of the prices will not
3 exceed 1.9 per cent, and that's the amount of the 1.9
4 per cent increase.

5 MR. THOMPSON: Well, the aggregate of
6 everything charged in 2000, under the price cap plan,
7 will not exceed the figure of slightly less than
8 \$15 million.

9 DR. SCHOECH: I mean that's true if lines were
10 to remain unchanged but the actual revenue increase or
11 decrease that would result from those price changes
12 would depend upon how lines change from one year to the
13 next.

14 This is just translating a percentage number
15 into a dollar number, as I understand it, using a
16 reference level of volumes.

17 MR. THOMPSON: Is that all it is, Ms Elliott?

18 MS ELLIOTT: That's all it is.

19 MR. THOMPSON: So, in theory, you could be
20 recovering more than \$15 million in 2000. Is that what
21 you are telling us?

22 MS ELLIOTT: To the extent that our volumes
23 increase, we will recover more than the \$14 million. If
24 our volumes are less than the current level of volumes
25 1999-approved, we will recover less than that.

26 MR. THOMPSON: Well, let's just quickly jump
27 forward to one of those exhibits you filed the other day
28 where you were telling us what your claim was in 2000.

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1 It's one of the G-24 corrected exhibits.

2 You were telling us their claim under the
3 price cap, in 2000, G-24, page 1, column (b), line 9,
4 was \$15 million.

5 Does that reflect the differences in volume
6 2000 over 1999? Or is that -- I understood that just to
7 be a mounding of what was in your Exhibit B, Tab 2,
8 Schedule 1, but I think maybe now you are telling me
9 something different.

10 MS ELLIOTT: No, in effect, our volumes for
11 2000 are approximately the same as they were in 1999, so
12 they -- the amount of the increased revenue is equal to
13 the amount of the price cap, as calculated on
14 Schedule 1.

15 MR. THOMPSON: But what I -- I accept that. I
16 guess I understand that this number was volume-sensitive
17 in 2000. If volumes were --

18 MS ELLIOTT: To the extent that their rate --
19 the price change is on a volumetric charge, the revenue
20 will be volume-sensitive.

21 MR. THOMPSON: So, to the extent that the
22 volume-sensitive component of the charges occurs in a
23 year where there's been, for example, a 20 per cent
24 increase in volume, then the 15 million would be higher?

25 MS ELLIOTT: For that portion of the revenue
26 that's recovered through volumetric charge would be
27 higher if there's a 20 per cent increase in volume.

28 MR. THOMPSON: Well, thanks. I'm glad we got

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1 that straight.

2 Now, it's pretty apparent that the elements
3 formula are inflation less productivity.

4 I have got that straight, have I, gentlemen?

5 DR. SCHOECH: That's correct.

6 DR. HEMPHILL: Yes, sir.

7 MR. THOMPSON: All right. And why are these
8 two components the components of a price cap?

9 DR. SCHOECH: Well, I believe we laid out the
10 framework on pages 4 through 9 of our testimony -- of
11 our report.

12 MS ELLIOTT:

13 MR. THOMPSON: Well, I took it -- and correct
14 me if I'm wrong -- that these are the elements of the
15 price cap because they are the economic forces that
16 drive changes in costs; and in a competitive market,
17 changes in prices will track changes in costs.

18 Have I got that straight?

19 DR. SCHOECH: Not quite. In a competitive
20 market, what you would find is a relationship between
21 the prices that a company or industry pays for its
22 inputs and the prices that it charges for its outputs,
23 and the relationship between the two is established by
24 the rate of productivity growth. And the relevance of
25 that is that we are now trying to cap the prices of
26 natural gas services in a way that would mimic the
27 dynamics of a competitive industry.

28 MR. THOMPSON: Well, looking at page 5 of your

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1 testimony, at lines 17 and 18, you say:

2 "Under competitive conditions, the growth
3 in the revenue of the gas transportation
4 industry would equal the growth in its
5 costs." (As read)

6 So I took that to mean growth in what I call
7 recoverable revenues should track growth in costs under
8 competitive conditions.

9 DR. SCHOECH: What we are saying is under
10 competitive conditions for the industry, the industry,
11 on average, would see a matching of the growth in
12 revenue and the growth of costs. That wouldn't be true
13 for any individual firm in the industry.

14 MR. THOMPSON: No, I appreciate that. But
15 that's where they will gravitate to.

16 Dr. Bauer says something about this in his
17 testimony, as I recall.

18 Well, what does that sentence mean:

19 "Under competitive conditions the growth
20 in the revenue of the gas transportation
21 industry would equal the growth in its
22 costs." (As read)

23 DR. SCHOECH: Well, what it means is that if
24 the growth in revenue were to be less than the growth in
25 costs, eventually, enough firms would be suffering
26 economic losses, cutting back.

27 There would be an industry adjustment so that
28 the industry would then arrive once again to a

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1 relationship between industry revenue and industry cost.

2 If on the other hand industry revenue was
3 growing more rapidly than industry cost, then
4 competitors would come into the industry. There would
5 be more supply of output. That would keep prices down,
6 and once again there would be a relationship between the
7 revenue and the cost.

8 In other words, in a competitive industry the
9 industry as a whole is not going to be able to maintain
10 revenues growing more rapidly than costs or ever
11 expanding profits; nor is it going to be able to
12 maintain ever increasing losses.

13 MR. THOMPSON: This is essentially what
14 Dr. Bauer says at page 11 of his testimony. This is
15 page 11 of what Mr. Penny calls the electronic edition.

16 MR. PENNY: What section is that in,
17 Mr. Thompson?

18 MR. THOMPSON: It is under the heading "Price
19 Cap Plans as Proxies for Market Outcomes", Item 3.2, the
20 first paragraph, about the first six lines.

21 Is that essentially what you just said,
22 Mr. Schoech?

23 DR. SCHOECH: Yes, it is.

24 MR. THOMPSON: Thank you. In that context, is
25 it correct to say price cap is divorced from costs? It
26 seems to me there remains a linkage.

27 DR. SCHOECH: Yes, price cap is divorced from
28 cost because the price cap mechanism sets a cap for

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1 prices without looking at the underlying costs, expenses
2 that the company incurs, particularly those that are
3 within the control of management, and makes adjustments
4 based on that.

5 For example, if a company were to start
6 behaving inefficiently and drove up costs because of
7 that, the price cap index would not be adjusted upward
8 to recover those types of costs that are under
9 management control.

10 DR. HEMPHILL: I would add, also, that where
11 there may be confusion is that prices in a comparative
12 market are not divorced from costs, as is stated by I
13 think both of these pieces of evidence.

14 However, if you don't mind if I use an
15 example, if I want to get a brand new frisbee for my son
16 for his birthday, I am going to go to the store and look
17 at different frisbees. But one thing I am not going to
18 do is spend a lot of time going and pulling in evidence
19 from the company that makes the frisbees to see whether
20 or not really the prices they want to charge me are
21 backed up by the costs of the production of that
22 frisbee. Basically I am going to be looking to see if
23 it is a good deal for me.

24 MR. THOMPSON: I think maybe we are just not
25 communicating.

26 You are talking about company specific costs
27 when you talk about prices being separated from costs.
28 I am talking about these measures of growth in costs

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1 that are used for the price cap formula. They are cost
2 based, if you will, from an industry perspective.
3 Inflation tracks increases in the costs of a basket of
4 items, and productivity as the other side of the
5 equation tracks reductions in costs.

6 DR. SCHOECH: When prices, say for instance
7 wage rates, labour contracts, are established, or when a
8 company decides to sell or an industry ends up selling
9 prices for a given product, those rates are not arrived
10 at by adding up different cost elements and deciding
11 whether or not those cost elements are going to be
12 recovered by that particular price. Prices are
13 determined by market forces.

14 Over time, the market forces do generate a
15 relationship between output prices and input prices, and
16 that is because market forces over time generate a
17 relationship between the growth of revenues in the
18 industry and the growth of costs in the cost of the
19 industry as well. But that does not mean that the
20 prices are built up from the costs.

21 MR. THOMPSON: I will move on. We are getting
22 into argument.

23 Do you agree that under price cap methodology
24 the formula applies prospectively from an existing level
25 of cost of service?

26 DR. HEMPILL: It's applied prospectively on
27 an existing level of prices.

28 MR. THOMPSON: And under cost of service

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1 régime prices reflect cost. So if we are moving from a
2 cost of service régime to a price cap, the starting
3 point is the existing level of cost of service?

4 DR. HEMPILL: That is the basis for setting
5 the prices.

6 MR. THOMPSON: So we agree on that point.

7 DR. HEMPILL: In year one.

8 MR. THOMPSON: Thank you.

9 Would you agree with me that it is not the
10 role of a price cap régime to perpetuate a reward to
11 management for having eliminated inefficiencies in the
12 past under a cost of service régime?

13 DR. SCHOECH: Would you explain what you mean
14 by reward.

15 MR. THOMPSON: Let's take an example of 1999.
16 You didn't look at that in Union's case. It wasn't part
17 of your retainer.

18 Let's assume that Union eliminated through
19 productivity measures and whatever else inefficiencies
20 in the cost of service régime of \$5 million. So that is
21 before price cap kicks in.

22 What I am asking you is to agree that it is
23 not the role of price cap to perpetuate a reward for
24 management by carrying forward that \$5 million
25 productivity gain into the price cap régime.

26 DR. SCHOECH: Well, the Board is going to be
27 faced with the position of determining what the
28 appropriate rates are going into this price régime.

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1 I think our answer would be that that
2 determination would determine the appropriate price
3 level which would not have excess company profits in it
4 as one might think of in terms of a cost of service
5 analysis.

6 MR. THOMPSON: You seem very reluctant to
7 express an opinion here. Do you feel like you are
8 getting off-side with Union perhaps?

9 Let's just take it at a high level of
10 principle. Assume a productivity gain has been made in
11 the year under cost of service of \$5 million. Going
12 forward, I am asking you: In your opinion, is it
13 reasonable to carry that gain into the price cap régime?
14 Dr. Bauer says no.

15 DR. SCHOECH: Well, the problem I have in
16 answering that question is that we are talking about
17 programs in isolation. Therefore, I find it difficult
18 in saying whether one program in isolation would -- that
19 there would need to be an adjustment made for that one
20 program.

21 I think what we have to do is look at the
22 rates going into the plan and determine whether or not
23 they are reasonable going in. I think probably the way
24 that is going to be done is by looking at it in a cost
25 of service framework.

26 MR. THOMPSON: Would you agree that the
27 objective of the price cap methodology is to prompt
28 management to perform prospectively to achieve

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1 additional efficiencies?

2 DR. SCHOECH: Yes.

3 MR. THOMPSON: Would you agree with me that
4 the values that should be used for determining the price
5 cap components should not be based on alleged premiums
6 associated with alleged risks that management is
7 managing under a price cap?

8 --- Pause

9 DR. HEMPHILL: Could you possibly break the
10 question down? You are talking about the components.
11 Could you be a little more specific.

12 MR. THOMPSON: We know inflation is one
13 component.

14 DR. HEMPHILL: Let's ask it in pieces, then.

15 MR. THOMPSON: Yes. That piece is not
16 derived, as I understand it, from considering any
17 alleged premiums associated with alleged risks that
18 management might be managing under the price cap.

19 That is derived from some external data source
20 that is representative of the company.

21 MR. HEMPHILL: We would agree with that.

22 MR. THOMPSON: So far as I can tell, that
23 factor is not derived from any evidence of alleged
24 premiums associated with alleged risks that management
25 is managing under the price cap; it's derived from total
26 productivity compared to the productivity of the economy
27 as a whole and a stretch factor.

28 MR. HEMPHILL: You are referring to the X

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1 factor and the X factor is made up of two components:
2 one, hopefully, is an empirically based total factor
3 productivity level; the second is the stretch factor.

4 The stretch factor gets into a more subjective
5 area and it's the determination of the stretch that you
6 may have to make consideration or give consideration to,
7 what some of the risks are depending on what other
8 elements of the program -- what the other elements of
9 the program are.

10 MR. THOMPSON: You came up with a stretch
11 factor of .4 per cent. That's your recommendation. Is
12 that right?

13 MR. SCHOECH: Yes, we determined that that was
14 a reasonable stretch factor.

15 MR. THOMPSON: And what did you consider in
16 coming up with that number?

17 MR. SCHOECH: Well, as my colleague indicated,
18 it is a subjective number. I guess what we did was we
19 looked at the way the stretch factor had been addressed
20 in other jurisdictions. It seemed that a range of .25
21 to, say, .75 was reasonable. And the discussions with
22 Union led us to the position where we found 0.4 an
23 acceptable stretch factor -- a recommended stretch
24 factor, I might add.

25 MEMBER JACKSON: Mr. Thompson, just so that I
26 can follow this, I would like to ask the witnesses if
27 they could refer us to where they dealt with that in
28 their evidence, what page, just so I can look it up.

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1 --- Pause

2 MR. SCHOECH: And then on page 31 we talk
3 about the stretch factor being 0.4 per cent in the Union
4 price cap plan.

5 MEMBER JACKSON: I'm sorry. Just where is
6 that on that page?

7 MR. SCHOECH: On line 21 there is a sentence
8 -- it says here the stretch factor is 0.4.

9 MEMBER JACKSON: I understand. Right.
10 You see I couldn't tell whether that was your
11 number or Union's at that point. But that was your
12 number?

13 MR. SCHOECH: Our discussions --

14 MEMBER JACKSON: By subtraction, as
15 Mr. Thompson was getting at earlier?

16 MR. SCHOECH: That's the way that this number
17 is arrived at. We did have discussions with Union
18 previously as to what would be a reasonable range of
19 consumer productivity dividends. My recollection of
20 those conversations was in the range of 0.25 to 0.75.

21 MEMBER JACKSON: I just wondered if I was
22 blanking out. I hadn't seen that before.

23 Thank you.

24 THE PRESIDING MEMBER: Mr. Thompson, when you
25 have a perfect moment, if we can have a break --

26 MR. THOMPSON: Yes. Sure. This would be
27 appropriate right now.

28 THE PRESIDING MEMBER: This would be

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1 appropriate?

2 MR. THOMPSON: Yes.

3 THE PRESIDING MEMBER: All right.

4 Let's break for 20 minutes and come back.

5 --- Upon recessing at 1558

6 --- Upon resuming at 1621

7 THE PRESIDING MEMBER: Mr. Thompson, before
8 you start, I just want to make a quick finding.

9 The panel has reviewed the settlement proposal
10 and the supporting evidence and are very appreciative of
11 the explanation that was provided to us on Monday. And
12 as a result of that explanation and our review of the
13 agreement, we are prepared to accept the Settlement
14 Proposal into the evidence and the agreements that have
15 been reached on the issues that were resolved in the
16 agreement.

17 Having made that statement, we do note that
18 there are a number of issues that were not settled:
19 1.1, 121, 122, 125 and 126. And the Board, and we are
20 not certain of this, but if there are findings that come
21 out of those, 121, those issues that were not settled
22 and they have an impact on some of these settled issues,
23 there may be a reason to have to examine them again in
24 the light of those findings. We are not sure if they
25 are connected, but at this stage we are not able to say
26 they are not connected.

27 We also -- so this is a connectivity issue,
28 and I think on all acceptances of settlement proposals,

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1 the Board has made an observation that connectivity can
2 lead to some adjustments or modifications necessary as a
3 result of those findings.

4 The Board also notes that one of the issues
5 that is outstanding in terms of one of the parties who
6 has accepted the settlements is the term of the
7 agreement. The term for which the settled issues would
8 apply is an issue for discussion in argument or cross-
9 examination and so we also alert you to that, that that
10 could also be an issue which could have affect.

11 And the other issue obviously outstanding is
12 the relationship that we agreed to that findings had
13 with regard to PBR and the rates and whether anything
14 arises out of that, that could again cause some
15 difficulty with the settled -- the agreed proposals is
16 an issue that I think will come clearer as we proceed
17 with the later stages of the evidence.

18 So with those comments, the Board accepts the
19 Settlement Proposal and the agreements reached in there.

20 Dr. Jackson, do you have anything to say?

21 MEMBER JACKSON: No, I think you have covered
22 that fine.

23 Thank you.

24 THE PRESIDING MEMBER: Thank you.

25 MR. PENNY: Thank you, Mr. Chairman.

26 That is very helpful. Because with respect to
27 those clarifications, I understand the need for the
28 Board to have those qualifications. However, I would

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1 observe that from the point of view of the parties and
2 their commitment to the agreements that those issues
3 were thought of and the agreement, vis-a-vis the
4 parties, stands. In other words, parties were prepared
5 to agree to these issues knowing that there were
6 outstanding issues.

7 So I am simply drawing the distinction between
8 the agreement that was reached, vis-a-vis the parties
9 and the scope that they have, which I think is limited
10 by their agreement. But I understand the Board needs to
11 finish the case before it can make that final
12 determination.

13 THE PRESIDING MEMBER: And that was one other
14 point I meant to say and that is that we interpreted the
15 statement in the Settlement Agreement, which is on
16 page 1:

17 "For greater certainty, the parties
18 further acknowledge and agree that these
19 conditions apply to several issues in
20 respect of which they are shown as taking
21 no position." (As read)

22 That in fact no party was going to dispute the
23 agreements that have been reached --

24 MR. PENNY: Exactly right. And that is why it
25 is there, yes.

26 MEMBER JACKSON: In other words, if you don't
27 take a position, you accept the agreement. Is that
28 right? That was our reading of it.

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1 MR. PENNY: That is right.

2 MEMBER JACKSON: Good.

3 MR. PENNY: I think the reason that arises is
4 because frequently in the course of the negotiation the
5 party doesn't wish to be shown as agreeing to something
6 but they are not disagreeing with it. And it is simply
7 to cover up the possibility that they don't circle
8 around back later and say, "Oh, well, I have decided I
9 do want to take issue with that."

10 So in order for the process to work people
11 have to make a commitment one way or the other,
12 otherwise there would be no point in doing it.

13 MEMBER JACKSON: Thank you.

14 THE PRESIDING MEMBER: Thank you.

15 Mr. Thompson, do you wish to resume now?

16 MR. THOMPSON: Yes, thank you.

17 Panel, when we broke, you were discussing with
18 Dr. Jackson the stretch factor range that you had
19 developed at some stage of your discussions with Union.
20 Did I understand that correctly? That you had developed
21 a range of stretch factors at some point in your
22 discussions with Union?

23 DR. SCHOECH: We had discussed the issue of
24 the range of stretch factors, yes.

25 MR. THOMPSON: And did I understand you to say
26 to Dr. Jackson that the range that you had identified
27 was 0.25 per cent to 0.75 per cent?

28 DR. SCHOECH: That is correct, yes.

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1 MR. THOMPSON: And when in the process did you
2 identify that range?

3 DR. SCHOECH: I think we had discussions about
4 that early on. I don't remember the precise month.

5 MR. THOMPSON: And what was the basis for
6 developing that range?

7 DR. SCHOECH: Well, I think the basis is that
8 the -- looking say at the FCC plans, often a stretch
9 factor of 0.5 per cent has been applied. And certainly
10 there may be some room for variation and it was a matter
11 of recognizing the fact that there is some subjective
12 evaluation in which we can provide the range that we
13 arrived at the precise range that I discussed.

14 MR. THOMPSON: So the factual basis for it was
15 a comparison to did you say FCC plans?

16 DR. SCHOECH: The FCC plans also state the
17 telephone plans. That was my frame of reference, yes.

18 MR. THOMPSON: So do you accept as a matter of
19 principle that it is appropriate to look at other plans
20 and in other jurisdictions as approved by other
21 regulators to develop the stretch factor range?

22 DR. SCHOECH: It is inevitable that one look
23 at what other jurisdictions are looking at when they
24 talk about stretch factors. I mean I think stretch
25 factors have become an accepted part of price cap
26 regulation. And as we indicated in our testimony there
27 the development of a stretch factor, I am trying to find
28 the exact statement, is a quantity that is determined

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1 through an individually negotiated and sometimes highly
2 political process.

3 And so I think that looking at what is going
4 on in other states helps one focus on what might be a
5 good stretch factor.

6 MR. THOMPSON: Yes. And would you agree that
7 one's examination of precedent, if you will, shouldn't
8 stop with the FCC. It should look at what is being done
9 with gas utilities in Canada as well as elsewhere. Is
10 that fair? Would you subscribe to that as a matter of
11 principle?

12 DR. SCHOECH: I could see regulators looking
13 at stretch factors that were applied in all industries,
14 not just telecommunications. Yes.

15 MR. THOMPSON: So coming back to the 0.4
16 per cent, was that your recommendation or Union's
17 subtraction from the initially 2.0 per cent, now 1.9?

18 DR. SCHOECH: We did not make a recommendation
19 of exactly 0.4 per cent. No.

20 MR. THOMPSON: No. Was -- did you make a
21 recommendation at all or was your recommendation, the
22 range is 0.25 to 0.75?

23 DR. SCHOECH: It was the latter.

24 MR. THOMPSON: All right. In terms of Union's
25 evolution of their proposal, I indicated earlier I
26 thought they started with 2 per cent and they end up
27 with 2 per cent and you had indicated that you believed
28 you saw various versions of what Union was developing

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1 throughout 1999. Do you recall if inflation changed
2 during the period -- from the forecast of inflation for
3 five years, whether that changed? Do you recall,
4 Ms Elliott, if it did in Union's materials?

5 MS ELLIOTT: Yes. From the time we went to
6 the initial customer consultation to the evidence that
7 we filed, and it continues to change in terms of
8 updating forecasts. I think in our original proposal we
9 were looking at inflation that was about 1.7 per cent.

10 MR. THOMPSON: And was the implicit stretch
11 factor then a subtraction from the two?

12 In other words, were you backing into the
13 stretch factor in your analysis? I guess that is really
14 what I am asking.

15 MS ELLIOTT: Until we had the analysis
16 complete we were speaking to customers very generally
17 about an inflationary increase in rates and, given that
18 inflation was averaging around 2 per cent, we were using
19 that number as a starting point for the discussions.

20 Once we went through the calculations and took
21 a look at the inflation and looked at the TFP
22 calculation, which would have, absent a stretch,
23 resulted in a price increase of greater than 2 per cent,
24 certainly at a minimum we needed to come back down to
25 the number that we had been previously discussing with
26 customers.

27 MR. THOMPSON: What prompted this discussion
28 about stretch factor was my question about the alleged

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1 premium for alleged management of risks under the price
2 cap as not being a factor in the price cap formula, and
3 I think you, Mr. Hemphill, said that it might come into
4 account when deriving the stretch factor.

5 DR. HEMPHILL: That's correct.

6 MR. THOMPSON: And I take it that is where it
7 should be taken into account, if it is to be taken into
8 account at all?

9 DR. HEMPHILL: Yes.

10 MR. THOMPSON: Would you agree with me that
11 from a principle level customers aren't buying insurance
12 under a price cap? That is not the theory on which the
13 price cap is developed.

14 DR. HEMPHILL: Maybe it is because it is late.
15 Are you asking if insurance rates are set by
16 price caps?

17 MR. THOMPSON: No. Union, in its material,
18 puts forward a lot of statements --

19 Whenever we try to beat Union down on a number
20 their comeback is, "Well, we are managing risk. We are
21 taking on all of this risk, and the premium for that
22 risk is a whopper." So that number goes down and the
23 base goes up. Or, you have to adjust the other
24 number up.

25 They are always factoring into their analysis
26 this suggestion of alleged risks that are being managed
27 under the cap and the alleged premium that is associated
28 with those risks. What I am suggesting to you is this:

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1 that the price cap is not wrapped up in some concept
2 that the customers are buying insurance from the utility
3 against risks that the utility is supposedly managing.
4 It is derived on some economic driver theory for prices.

5 DR. HEMPHILL: Okay. When you said, "Are
6 customers buying insurance under price caps?", it is,
7 are they obtaining some type of insurance against
8 something as part of a price cap program. Is that what
9 you are saying?

10 MR. THOMPSON: I think that is what I am
11 saying, yes.

12 Are price cap parameters, in your opinion, to
13 be derived in any way from this notion that customers
14 are buying insurance against risks that are to be
15 managed under the cap?

16 DR. HEMPHILL: I am struggling with the
17 phraseology a little bit, but let me answer a question
18 and then perhaps we can go at it again.

19 Let's just step back and say that if you
20 didn't have the fixed escalator and you had inflation
21 minus an X factor which is determined by two parts, an
22 empirically derived total factor productivity estimate
23 and a stretch factor, and that was the formula that was
24 going to be used to set prices during the term of the
25 program, then you do have this question of what should
26 the stretch factor be. And we have already agreed, I
27 believe, that the stretch factor is a number that is
28 subjective and a lot of things have to be taken into

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1 consideration.

2 I haven't seen any articles that go into an
3 empirical based calculation on what the stretch is based
4 on. Numerous different things have to be taken into
5 consideration because they are just not empirically
6 derived -- not able to be, anyway.

7 So what has to happen is that you take a look
8 at the entire package. You take a look at the situation
9 that the company is facing, you take a look at the
10 overall situation within the economy, and with all of
11 those things under consideration you determine what you
12 believe to be an appropriate stretch.

13 Now, I think what the company is saying, when
14 they are saying the things that you reiterated, is that
15 there are a number of risks, and they have laid out in
16 their testimony the risks that they believe they are
17 taking, the risks that they are not going to take --
18 there are passthrough adjustments and such. And with
19 that package, all into consideration, they have chosen a
20 stretch factor which they believe to be appropriate.

21 If you are asking, is that an appropriate
22 process for determining what these components are, yes.
23 And, is it typical? The answer is yes.

24 MR. THOMPSON: I think what you are saying is,
25 to the extent that all of that stuff is taken into
26 account, it is in the stretch factor. We shouldn't have
27 add-ons in addition to the stretch factor for all of
28 that stuff.

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1 DR. HEMPHILL: No, that is not true as well.

2 The add-ons you are referring to are, like, Z
3 factors and passthroughs?

4 MR. THOMPSON: No. Risks and the alleged
5 premium associated with those risks. Because that
6 becomes pretty subjective.

7 MR. PENNY: I am not following this. I don't
8 know what Mr. Thompson means when he talks about add-
9 ons. I haven't heard any evidence that the company is
10 asking for add-ons associated with additional risks that
11 they say they are taking on, so I have a lot of
12 difficulty with the evidence that underpins the
13 question. Or, I should say, the absence of the evidence
14 that underpins the question.

15 MEMBER JACKSON: Mr. Thompson, are you
16 basically saying that the stretch factor would be larger
17 if the company didn't want to be paid for all of the
18 additional risks it is taking on? Is that what you are
19 saying? Or, is that what you are asking?

20 MR. THOMPSON: I guess it could go many ways,
21 Dr. Jackson.

22 My understanding of where the company was
23 coming from -- and maybe it comes up in the next panel
24 where they talk about risks. But Dr. Bauer, in his
25 testimony, lists all of these risks that the company
26 says it is managing under the plan, and then he
27 questions, as I understand it, the burden of those risks
28 that the company says exist. My understanding is that

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1 the company relies on the existence of these risks in
2 its forecast of what it says are costs, which I call the
3 premium associated with the risk, in developing not only
4 its stretch factor, but other features of its plan.

5 What I am trying to get these witnesses to
6 concede -- and I thought they had -- is that, to the
7 extent those topics come into account, they come into
8 account in the stretch factor, and therefore, for
9 example, not in the base, which is where the company is
10 trying to load them in, as I understand it. They are
11 trying to prevent the base from being taken down because
12 of the existence of all of these risks.

13 MEMBER JACKSON: I heard up to the last point,
14 and I hadn't thought of the base in the context of your
15 question, but that is what I had understood by your
16 question too. You were trying to develop an analogy
17 between the premium that might be needed in a return on
18 equity and the determination of the stretch factor,
19 taking into account the risks the company was being
20 subjected to. That is where my mind was going as you
21 asked your question.

22 Now, I think you should see if you can get a
23 few comments on the record on it. But maybe I am
24 confused too. Please, don't just say yes; say no and
25 tell me if I am confused: "No, Dr. Jackson, you haven't
26 got it."

27 MR. THOMPSON: Let me try to come at it this
28 way. I will pick up on Mr. Hemphill's response.

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1 As I understand it, Mr. Hemphill, you said
2 that if inflation was calculated annually, based on some
3 annual measure of inflation, and Union hadn't locked it
4 in at 1.6 per cent, then these kinds of things, like
5 risks under the price cap and costs associated with
6 managing those risks, would not likely be taken into
7 account in the X factor. Did I understand that
8 correctly?

9 DR. HEMPHILL: No, I did not say that.

10 What I did say was -- I was using the example
11 of the purest form of a price cap, where you have an
12 inflation escalator that varies with inflation, and then
13 you have an X factor that has two components, and those
14 two components are made up of -- and I went through
15 that. I don't know if I need to repeat that. But they
16 empirically derived the total factor --

17 MR. THOMPSON: The TFP and --

18 DR. HEMPHILL: -- and then the stretch. Okay.

19 That stretch has to take a lot of things into
20 consideration, so maybe I should complete what I was
21 saying and say, "All right. Now, let's move away from
22 the purest form", and one step away is fixing it. So we
23 are going to fix the escalator and we are not going to
24 have any adjustment in inflation.

25 That is a package feature that may have to be
26 taken into account, as well as many other things that
27 have to be taken into account when you determine what
28 the stretch level should be.

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1 MR. THOMPSON: So the fixed inflation rate was
2 an element of the Union package. Do you know if they
3 took that into account in determining their stretch
4 factor of .4 per cent? Was that discussed?

5 MR. HEMPILL: To be honest with you, you
6 asked if there were some elements where we disagreed,
7 and actually one of them was that our recommendation was
8 that the inflation adjustment factors vary. I can
9 remember those discussions. They decided that they
10 would like to see a fixed escalator. I can go into the
11 reasons why they told us that.

12 I'm thinking out loud here. In those
13 discussions I don't recall, and I would have to review
14 some of the information that we have looked at in the
15 evolution of this program, but I don't recall them
16 making a lot out of the fact that they are fixing the
17 escalator. Now, I would have to review the background
18 information to see.

19 MR. THOMPSON: All right. So what does that
20 mean in terms of the question I asked, which was: Did
21 Union take into account the fact that it had fixed its
22 escalator in determining its stretch factor, to your
23 knowledge?

24 MR. HEMPILL: To the best of my knowledge and
25 memory right now I don't recall it being mentioned.

26 MR. THOMPSON: In your text, on inflation,
27 just picking up on this point where you say you actually
28 recommended to Union that they go with a variable

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1 inflation rate annually -- is that what you said?

2 MR. HEMPILL: Yes. It would vary with
3 inflation. I don't know if we said annually or
4 quarterly at the time, but we said that would vary with
5 inflation.

6 MR. THOMPSON: In your text at page 11 you
7 talk about the implications of this, and you sort of
8 express some concern about it. I'm reading your text
9 correctly?

10 MR. HEMPILL: Yes.

11 MR. THOMPSON: But in the final analysis you
12 supported it, did you?

13 MR. HEMPILL: Yes. Yes, we did.

14 MR. THOMPSON: What persuaded you to change
15 your mind?

16 MR. HEMPILL: It struck a chord with me. The
17 number one thing that they mentioned was the fact that
18 it would provide some stability for their customers. In
19 my experience as a pricing director, I have had the
20 opportunity to meet with many, many customers and found
21 that -- my memory was that customers liked
22 predictability in terms of -- especially commercial and
23 industrial customers liked predictability when it came
24 to what their bills were going to be. It helped them
25 budget it better into the future.

26 They had listed that as one of their primary
27 considerations that did strike a chord with me and I
28 thought, hey, that makes sense. So if that's the risks

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1 that they want to take, which we viewed it more -- I
2 think we talked more, my colleague and I, about the risk
3 to Union of doing that than they ever did. But we went
4 ahead with it in terms of agreeing with that component
5 because of that reason.

6 MR. THOMPSON: How does this make it more
7 stable for ratepayers when that feature of their plan,
8 as I understand it, is the justification for the
9 cost-of-equity passthrough? They have locked in a fixed
10 rate of inflation and I thought you said earlier to
11 someone that that was one of the reasons why you felt
12 cost-of-equity passthrough was okay. Did you not say
13 that to Mr. Janigan?

14 MR. HEMPILL: Yes. I may have said something
15 like that, yes.

16 MR. THOMPSON: Okay.

17 MR. HEMPILL: Certainly, there are parts of
18 the program that aren't going to be stable, I mean fixed
19 at a particular level, but it's going to be more stable,
20 I believe, than if you let the whole thing fluctuate
21 from year to year, quarter to quarter.

22 MR. THOMPSON: On the point about what is
23 stable and what is not stable, have you looked at the
24 components of the applicable revenues that are subject
25 to passthrough treatment, in whole or in part?

26 MR. HEMPILL: You could direct me to where it
27 is and I could tell you whether I have evaluated it.

28 MR. THOMPSON: Well, it's several places, but

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1 the most convenient place is Exhibit F2.2.

2 If you look in the first section there,
3 "A", we see again this base delivery revenue. This was
4 the number that was called applicable revenues in that
5 exhibit I referred you to earlier in Union's filing,
6 783?

7 MR. HEMPILL: Correct. Yes.

8 MR. THOMPSON: Over and above that number
9 there are gas supply commodity costs, there are upstream
10 transportation costs, there are gas supply load
11 balancing costs. Total approved revenue requirement for
12 Union in 499 is substantially higher than
13 \$787.2 million. Would you take that subject to check?

14 MR. HEMPILL: Yes, sir.

15 MR. THOMPSON: And these other items, "Gas
16 supply commodity", "Upstream transportation" and "Gas
17 supply load balancing" are all passthrough items and
18 Union witnesses have agreed that's continuing
19 cost-of-service protection. Would you agree with that?
20 I'm just trying to analyze what's under the cap and
21 what's not under -- what remains in cost of service.

22 So anything above 787.2 in the E.B.R.O. 499
23 revenue requirement updated for current WACOG is cost of
24 service. Do you accept that subject to check?

25 MR. HEMPILL: Except I would not call it
26 "cost of service". I believe they are passthroughs that
27 are based on variations in a cost.

28 MR. THOMPSON: What is that if it is not cost

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 of service?

2 MR. HEMPILL: It's a passthrough based on
3 variations in cost.

4 MR. THOMPSON: We have called that
5 cost-of-service regulation. What do you call it?

6 MR. HEMPILL: It's a passthrough based on
7 variations in cost as part of a price cap program.

8 MR. THOMPSON: Well, would you agree with me
9 there are more a cost-of-service regulation than --
10 well, there is no price cap feature to those elements of
11 the E.B.R.O. 499 revenue requirement. They continue
12 under cost-of-service regulation.

13 These are items -- you don't see them on this
14 exhibit, but they are for gas supply commodity, upstream
15 transportation and gas supply load balancing.

16 MS ELLIOTT: You are referring to the
17 cost-of-gas components that we have identified are not
18 subject to the price cap plan --

19 MR. THOMPSON: Right.

20 MS ELLIOTT: -- which are illustrated at
21 Appendix "C", Exhibit B, tab 2.

22 MR. THOMPSON: Correct.

23 --- Pause

24 MR. THOMPSON: I thought Union accepted that
25 these remained under cost-of-service regulation and the
26 witnesses, the experts, seem to be having some
27 difficulty with that. Maybe I misinterpreting everybody
28 here.

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 MR. PENNY: My recollection of the evidence is
2 that what Mr. Hemphill said is entire consistent with
3 the position that Union took.

4 MR. THOMPSON: What do you think,
5 Mr. Hemphill? I suppose you don't know.

6 MR. HEMPILL: We could get into a semantic
7 argument, but I will tell you that I view these as
8 passthrough items that are part of a price cap program.
9 I don't view it as cost-of-service regulation.

10 MR. THOMPSON: How does the price cap apply to
11 these items: gas supply commodity, upstream
12 transportation, and gas supply load balancing? It
13 doesn't apply at all.

14 MR. HEMPILL: They are part of the
15 comprehensive program. When people say "We have a price
16 cap program but there are the potential for Z factors",
17 you don't hear them referring to a price cap program and
18 part cost of service programs. It's a price cap program
19 that has Z factor features.

20 In this case, it is a price cap program and
21 added onto that are various passthrough items that are,
22 yes, cost based, but it's not cost of service.

23 MR. THOMPSON: Maybe the way to go at this is
24 to draw your attention to Dr. Bauer's interrogatory
25 response to Ontario Hydro Networks Company, answer
26 No. 1.

27 MS ELLIOTT: Is that question 1?

28 MR. THOMPSON: Yes.

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 --- Pause

2 MR. THOMPSON: The portion of this -- and this
3 again may be semantics. But I look at these plans in a
4 fashion similar to Dr. Bauer, where he says in his
5 answer to 1.1, the first paragraph:

6 "It is more appropriate to look at them
7 as two sets of regulatory methods that
8 can be ranked on a continuum from pure
9 cost of service to pure PBR." (As read)

10 That is the sort of mindset that I am coming
11 with when I asking you these questions. When I talk
12 about features that have the costs flowed through, to me
13 those are cost of service features remaining in place.

14 The spin you put on them is they are
15 Z-factors.

16 Is that essentially where we are coming apart
17 here?

18 DR. SCHOECH: I think that is an essential
19 difference. And the reason we call them Z-factors is
20 that I think that that is the common way of interpreting
21 them.

22 One of the first price cap plans -- I guess
23 maybe the second one in the United States -- was when
24 the U.S. Federal Communications Commission was
25 regulating AT&T rates. It was viewed as being a pure
26 price cap plan.

27 An essential element of that plan was the
28 Z-factor that applied to access charges that AT&T paid

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 the local exchange carriers. The costs passed through
2 there, but everyone recognizes that as a pure price cap
3 plan, at least the people that I talk to do.

4 MR. THOMPSON: So we are hung up on semantics.
5 Whether they are called Z-factors or anything else, they
6 are treated the same under cost of service as they are
7 under price cap in terms of recovery from ratepayers.

8 DR. HEMPILL: In some cases that could be
9 true, yes.

10 MR. THOMPSON: Shouldn't it be true in all
11 cases?

12 DR. HEMPILL: It depends on the individual
13 circumstances. You will always have a hard time getting
14 me to agree to a generalization. It depends on each
15 individual item whether you could say that to be true.

16 MR. THOMPSON: Then coming back to F2.2, when
17 we work our way through Union's base, the point from
18 which we are starting, the cost of service base proved
19 for prices in E.B.R.O. 499, of the \$783.8 million that
20 you see at line 5, \$208.4 million of those dollars have
21 one form or another of what I call cost of service
22 protection; what you would call Z-factor or passthrough
23 protection.

24 Would you take that subject to check?

25 MS ELLIOTT: These are passthrough items in
26 our price cap proposal, Mr. Thompson. The treatment
27 here is not identical to the cost of service treatment.
28 We are proposing only to recover the variance in prices

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 related to the cost of gas changes or the variance in
2 interest rates related to the return on equity; the
3 volume variance that Union is going to manage under the
4 price cap plan.

5 MR. THOMPSON: That was another factor that I
6 wanted to ask the professional witnesses your expert
7 opinion on.

8 Should the company be compounding what are in
9 essence passthrough items with price cap features?
10 Isn't that sort of double whammy?

11 DR. HEMPHILL: Would you describe the
12 compounding that you are speaking of.

13 MR. THOMPSON: Yes. They want passthrough
14 protection for an item of cost, like compressor fuel.
15 They also bring it in under -- they get the volumetric
16 risk or reward associated with this. Equity return is
17 the better example.

18 Then once they bring it in by way of a
19 passthrough, they add on 1.9 per cent. How many ways
20 can you cut it?

21 MR. PENNY: I am hearing a lot of argument but
22 I am not hearing a question.

23 MR. THOMPSON: The question is: As a matter
24 of principle -- that is what I call compounding. You
25 had asked for passthrough protection and variances in
26 costs are flowed through. Then once they are flowed
27 through, you want another 1.9 per cent price cap
28 addition to it.

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 As a matter of principle, is that consistent
2 with price cap methodology?

3 DR. HEMPHILL: I will attempt an answer at
4 that.

5 Z factors are a common feature in price cap
6 plans. The typical criteria for determining whether an
7 item is qualified for Z-factor treatment is (1) if it is
8 a cost that is outside the control of the company or
9 discretion of its management; and (2) if it is not
10 something that would be recovered by the escalation in
11 the inflation, the inflation adjustment factor. Those
12 two things.

13 In this case, when you start to take a look at
14 the individual items, you also have to look at the other
15 components of the price cap program, which include in
16 this case a fixed escalator. Therefore, there is an
17 adjustment.

18 Those things taken into consideration, you
19 would have to evaluate whether each of the times that
20 are being recommended for Z-factor treatment or Z-factor
21 passthrough adjustment mechanisms are appropriate.

22 MR. THOMPSON: Did you do that or did you just
23 endorse what the company has done?

24 DR. SCHOECH: We evaluated, in fact had to ask
25 a few clarifying questions regarding some of the things
26 that they wanted as passthroughs. Actually, the equity
27 return was one that we had a substantial amount of
28 discussion with them about. It was our understanding

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 that originally perhaps it was the case that all the
2 equity costs were going to be passed through, and that
3 caused us some concern.

4 It became clear to us that what this formula
5 is the price component of equity. If interest rates go
6 up, that is going to materially affect the price of
7 Union's inputs.

8 There was some concern expressed earlier today
9 about how the historical time period might have had an
10 input price differential that we are kind of ignoring in
11 the future.

12 Actually this equity return adjustment
13 addresses part of that concern because if interest rates
14 continue to go down, like they did in the last few
15 years, what will happen is that will push the rates
16 down. On the other hand, if interest rates go up, this
17 will address that price component.

18 MR. THOMPSON: Well, if inflation was being
19 calculated annually, as Dr. Bauer suggested and perhaps
20 others suggest, we wouldn't or we shouldn't have the
21 equity pass-through, should we?

22 DR. SCHOECH: That is a mistake because the
23 gas distribution industry is more capital intensive than
24 the economy at large.

25 MR. THOMPSON: Well, let me ask you this. You
26 recommended that they have inflation calculated
27 annually, right. Okay. Had they accepted your
28 recommendation what changes would fall out of that in

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 terms of passthrough? Would the equity return
2 passthrough be eliminated and go into the cap?

3 DR. SCHOECH: The concept of the equity return
4 would not be eliminated. We haven't looked at as to how
5 that calculation would be changed.

6 MR. THOMPSON: I don't understand what you
7 have --

8 DR. SCHOECH: Well, there is a particular
9 formula for the equity return passthrough that is under
10 this specific proposal where the price cap adjustments
11 are fixed for the five year period of time. They said a
12 few minutes ago that even if inflation were allowed to
13 adjust the price cap from year to year, there is still
14 an issue here because the gas distribution industry is
15 more capital intensive. That is, it is more affected by
16 interest rates than the economy at large. So in
17 principle, yes, there would be a reason for an equity
18 return adjustment.

19 Now, whether precisely the same formula would
20 be applicable in that case as opposed to this case, we
21 did not investigate.

22 MR. THOMPSON: Where would you make the
23 adjustment? In the inflation measure or in a
24 passthrough?

25 DR. SCHOECH: It would be accomplished through
26 a Z Factor adjustment, unless you went the full route
27 toward the industry. If you refer back to my Table 1 on
28 page 9, as long as we are talking about a GDPPI-based

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 approach, then that equity adjustment would be a
2 Z factor.

3 Now, if we go through the industry input
4 prices approach, then that would be picked up in the
5 inflation factor.

6 MR. THOMPSON: I guess I am a little confused.
7 Interest rates are covered -- they are within the cap.
8 But something that changes that is linked to interest
9 rates outside the cap, what is the logical rationale for
10 that?

11 DR. SCHOECH: Well all of the rates are
12 covered by the cap. It is the way that the cap is
13 adjusted. And I think what we are trying to explain is
14 that just an adjustment based on GDPPI without any
15 recognition that interest rate fluctuations would
16 disproportionately affect Union would divorce the GDPPI-
17 type plan from looking at input prices that are
18 applicable to the gas distribution industry.

19 MR. THOMPSON: Well, what about another
20 measure of inflation, CPI? Suppose it is CPI?

21 DR. SCHOECH: You run into the same thing.
22 The industries that --

23 MR. THOMPSON: It doesn't matter what we do
24 here, we are always going to be adjusting for equity.
25 Is that what you are telling us?

26 DR. SCHOECH: As long as you are basing it on
27 a broad inflation measure. And as I said before, if you
28 went to the industry input price approach where you are

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 constructing industry input prices, then that eliminates
2 the need for this type of Z Factor adjustment.

3 MR. THOMPSON: Sorry, I didn't understand that
4 last sentence, sir. Could you --

5 DR. SCHOECH: I am sorry. Let me try again.

6 If you go to the -- the concern that I have is
7 that the gas distribution industry is more affected by
8 interest rates than the economy at large. So if you
9 were relying on the GDPPI as your price cap inflation
10 mechanism, the problem would be that rising interest
11 rates or things that affect the price of capital would
12 be disproportionately affecting the gas distribution
13 industry. And just basing it on the GDPPI would not --
14 would not address that disparity.

15 If on the other hand, you crafted a price cap
16 model that was looking at the industry and the industry
17 input prices, you have now appropriately weighted
18 capital. And therefore you don't need to address it
19 through a Z factor adjustment.

20 MR. THOMPSON: Okay. Now, can you help me
21 reconcile that with what I think I heard from
22 Mr. Birmingham earlier and that is that if the company
23 were not to get this price adjustment of equity return
24 as a passthrough, they would need a higher price cap?

25 DR. SCHOECH: If I am not mistaken was he
26 talking about higher rates going into the plan, and
27 therefore, higher rates in every year through the plan?

28 MR. THOMPSON: I thought that he was just

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 saying that the price cap determination was based on
2 what the company was willing to take a risk for and that
3 in discussions with the stakeholders, some of the
4 stakeholders didn't want to see the company's view of
5 the increment to the price cap that would have to result
6 from taking on those risks. So that some of the
7 stakeholders expressed that they would rather have these
8 what you call Z factors than have a higher price cap.

9 DR. SCHOECH: Well, one could go in the
10 direction of a cleaner price cap, which would mean fewer
11 Z factors. But what is going to happen is that as we go
12 out in the future, you know, interest rates are going to
13 fluctuate. I mean right now we don't -- you know, they
14 may go up, they may go down. And the question is how --
15 if we are comparing two GDPPI-based plans, one with Z
16 Factor adjustments and one without Z Factor adjustments,
17 all else equal, the one without the Z Factor adjustments
18 would subject Union Gas to more volatility in their
19 earnings.

20 And I believe what Mr. Birmingham may have
21 been saying is that with that increased volatility in
22 earnings it would be appropriate for them to have higher
23 returns of equity.

24 MR. THOMPSON: Yes, he may have and I may have
25 been looking at it too simply when he said it. That is
26 okay. I think you have helped me reconcile that a bit.
27 Thank you.

28 I am not going to finish today, Mr. Chairman,

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 that is for sure.

2 I am not going to finish today, Mr. Chairman,
3 and perhaps I could just ask this question and then if
4 it is a convenient time to break, we could break.

5 Just looking at this big picture, gentlemen,
6 if a utility has achieved the ultimate level of
7 efficiency under cost of service, would that utility
8 ever propose a price cap regime and have its situation
9 based on bench marks external to the utility?

10 --- Pause

11 MR. THOMPSON: It must be a toughy.

12 MR. PENNY: Speaking for myself I am trying to
13 figure out what it means.

14 DR. HEMPHILL: We may have to break it down
15 again. We can start again with the preface, the "if."
16 If the utility has achieved the -- what was the word?
17 Was it the word "ultimate"?

18 MR. THOMPSON: Ultimate, yes. Can't be any
19 better.

20 DR. HEMPHILL: Ultimate level of efficiency.

21 MR. THOMPSON: But no more productivity to
22 squeeze out, would it ever go to price cap?

23 --- Pause

24 THE PRESIDING MEMBER: Do you want to take
25 this question under advisement and answer it tomorrow?

26 MR. PENNY: It is an interesting question, but
27 in all seriousness I question the relevance of it. What
28 difference could it possibly make?

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 DR. HEMPHILL: It would be an interesting
2 journal article.

3 MR. THOMPSON: Well, it comes back to I think
4 what the --

5 DR. HEMPHILL: As my colleague just told me,
6 but I will speak it, if they are at the ultimate level
7 of efficiency, that is probably the type of company that
8 would love the freedoms that would come with price cap
9 regulation.

10 And I was thinking along the same lines too.
11 There are many other benefits from price cap regulation
12 that I could see that the firm would want to enjoy. So
13 I would say, yes, I think that firm would probably run
14 to it.

15 MR. THOMPSON: All right. Well, I will
16 follow-up tomorrow I guess, Mr. Chairman.

17 THE PRESIDING MEMBER: Could I just ask before
18 we close, is there anyone here who has got very limited
19 questions who wants to get them finished or will we all
20 wait till tomorrow? I am just trying to think of the
21 people involved. For instance, I don't know, Ms Symes,
22 have you got much?

23 MS SYMES: I have questions but my limitation
24 is today.

25 THE PRESIDING MEMBER: So you have to leave
26 today and come back tomorrow?

27 MS SYMES: Yes.

28 THE PRESIDING MEMBER: Okay. That is all I

1 was concerned about. Okay. Well, in which case I think
2 we should close now. I am sorry, Mr. Penny, we didn't
3 get through.

4 MR. PENNY: No, I understand.

5 THE PRESIDING MEMBER: And it is a very
6 valuable panel to discuss these issues with.

7 MR. PENNY: And we are happy to stay.

8 THE PRESIDING MEMBER: Thank you.

9 So what time should we meet tomorrow? Dr.
10 Wightman, do you know what time that other event is
11 supposed to finish?

12 MR. WIGHTMAN: It is supposed to finish before
13 one or by one. I think they say nine to one or
14 hopefully earlier. And I think we could assume it is
15 going to be done by 1:00.

16 THE PRESIDING MEMBER: So would you be
17 prepared to start at 1:30; 1:30 tomorrow. Is that all
18 right with you?

19 MR. PENNY: We would certainly be prepared to
20 start at 1:30, yes, sir.

21 THE PRESIDING MEMBER: Okay. So 1:30 tomorrow
22 then.

23 MR. PENNY: Thank you, sir.

24 THE PRESIDING MEMBER: Thank you.

25 --- Whereupon the hearing adjourned at 1715,
26 to resume on Thursday, June 22, 2000
27 at 1330
28

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6	Cover		"Monday, June 19, 2000"
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9			2000"
10			should read
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12			2000"
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ONTARIO ENERGY BOARD

FILE NO.: RP-1999-0017

VOLUME: 7

DATE: June 22, 2000

BEFORE:	G.A. Dominy	Vice Chair &
	M. Jackson	Presiding Member
		Member

Les Services StenoTran Services Inc.
613-521-0703

RP-1999-0017

THE ONTARIO ENERGY BOARD

IN THE MATTER OF the Ontario Energy Board Act, 1998,
S.O. 1998, c. 15 (Sched. B);

AND IN THE MATTER OF an Application by Union Gas Limited
for an order or orders approving or fixing just and
reasonable rates and other charges for the sale,
distribution, transmission and storage of gas in
accordance with a performance based rate mechanism
commencing January 1, 2000;

AND IN THE MATTER OF an Application by Union Gas Limited
for an order approving the unbundling of certain rates
charged for the sale, distribution, transmission and
storage of gas.

B E F O R E :

G.A. DOMINY Vice-Chair and Presiding Member

M. JACKSON Member

Hearing held at:

2300 Yonge Street, 25th Floor, Hearing Room No. 1
Toronto, Ontario on Thursday, June 22, 2000,
commencing at 1332

HEARING

VOLUME 7

1		APPEARANCES
2	JENNIFER LEA/	Board Staff
3	MICHAEL LYLE/	
4	JAMES WIGHTMAN/	
5	STEPHEN MOTLUK	
6		
7	MICHAEL PENNY/	Union Gas Limited
8	MARCEL REGHELINI	
9		
10	ROBERT B. WARREN	Consumers Association of Canada
11		(CAC)
12		
13	THOMAS BRETT	Ontario Association of School
14		Business Officials
15		
16	PETER THOMPSON	Industrial Gas Users'
17		Association (IGUA)
18		
19	MICHAEL JANIGAN	Vulnerable Energy Consumers
20		Coalition (VECC)
21		
22	MURRAY KLIPPENSTEIN	Pollution Probe
23		
24	IAN MONDROW	Heating, Ventilation and
25		Air Conditioning Contractors
26		Coalition Inc.
27		
28		

1	APPEARANCES (Cont'd)	
2	BETH SYMES	Alliance of Manufacturers
3		and Exporters Canada
4		
5	MARK MATTSON/	Energy Probe
6	THOMAS ADAMS	
7		
8	GEORGE VEGH	Duke Energy, Coalition for
9		Efficient Energy Distribution
10		(CEED), TransCanada Gas
11		Services, PanCanadian
12		Petroleum, Dynegy Canada,
13		Suncor/Sunoco, CanEnerco
14		Limited
15		
16	ZIYAAD E. MIA	Coalition for Efficient Energy
17		Distribution (CEED),
18		TransCanada Gas Services,
19		PanCanadian Petroleum, Dynegy
20		Canada, Suncor/Sunoco,
21		CanEnerco Limited
22		
23	DAVID WAQUÉ	COMSATEC INC.
24		
25	STANLEY RUTWIND	TransCanada PipeLines Limited
26		
27		
28		

1	APPEARANCES (Cont'd)	
2	RICHARD KING/	The Wholesale Group and the
3	CHARLES KEIZER/	Major Energy Consumers And
4	PETER BUDD	Producers (MECAP)
5		
6	PETER SCULLY	Association of Municipalities
7		of Ontario
8		
9	TANYA PERSAD	Enbridge Consumers Gas
10		
11	ANDREW DIAMOND/	Enron Capital Corp.
12	JOHN ROOK	
13		
14	DWAYNE QUINN/	City of Kitchener Utilities
15	ALICK RYDER	
16		
17	DAVID POCH	Green Energy Coalition (GEC)
18		
19	MICHAEL M. PETERSON	Nova Chemicals
20		
21	RANDY AIKEN	London Property Management
22		Association
23		
24	VALERIE YOUNG	Ontario Association of Physical
25		Plant Administrators
26		
27	MARY ANNE ALDRED	HYDRO ONE NETWORKS
28		

1 Toronto, Ontario

2 --- Upon resuming on Thursday, June 22, 2000
3 at 1332

4 THE PRESIDING MEMBER: Good afternoon,
5 everyone. Are there any preliminary matters?
6 PRELIMINARY MATTERS

7 MR. PENNY: Thank you, Mr. Chairman.

8 I just want to indicate to the Board that we
9 are providing now answers to undertakings G6.3, G6.4 and
10 G3.6. I am also making available to parties a couple of
11 documents that will be part of the evidence of the
12 unbundling panel tomorrow.

13 We don't need to do anything with them right
14 now. They will be identified and can be given exhibit
15 numbers tomorrow when the panel comes forward.

16 I am making those documents available so that
17 they can see them in advance.

18 THE PRESIDING MEMBER: Thank you, Mr. Penny.
19 So we won't give them exhibit numbers yet.

20 MR. PENNY: I think we should wait, sir.

21 THE PRESIDING MEMBER: Ms Lea, I think you
22 wanted to --

23 MR. PENNY: Sorry, there was a second thing.
24 I was just about to speak to Mr. Wightman in terms of
25 scheduling. I won't bore you with all the details right
26 now or use up valuable hearing time beyond saying that
27 if there is a sufficient amount of time this afternoon,
28 we might be able to continue a bit with a further PBR

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1 panel. If not, we will have to continue that next week.

2 As we have discussed, unbundling will proceed
3 Friday. The PBR panels, the next ones, if there is time
4 on Monday. I know that there are a number of people
5 with unique interests around DSM. We thought it would
6 be worth letting parties know that the best thing to do
7 would be to try and fix DSM for Tuesday.

8 Our plan is to have the DSM panel available
9 for Tuesday. That way, the parties who have a unique
10 interest in that know in advance. Most of them are from
11 out of town and it will make it easier for them.

12 THE PRESIDING MEMBER: If I heard you
13 correctly, unbundling Friday and Monday and DSM on
14 Tuesday.

15 MR. PENNY: Yes. Well, I think what I said
16 was I don't know whether unbundling will spill over to
17 Monday or not. If it does, obviously we will carry on
18 with that.

19 To the extent that there is time available on
20 Monday, whether it is all or part of the day, we will
21 bring the PBR panels back.

22 THE PRESIDING MEMBER: I do know that it is
23 going to spill to Monday on unbundling. Yesterday
24 Mr. Mattson had asked if he could have the opportunity
25 to cross-examine the panel on Monday.

26 Can you hear me all right, Mr. Court Reporter?

27 I am not sure anything I have said is going to
28 be technically missing from the transcript, other than

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1 to alert you to the fact that Mr. Mattson had asked if
2 he could cross-examine the panel on Monday.

3 MS SYMES: Mr. Chair, is it at all possible
4 that the DSM panel could be scheduled for Wednesday, due
5 to a prior commitment?

6 THE PRESIDING MEMBER: Can I leave that as
7 something you can talk about amongst yourselves at the
8 break? I am not sure what is in line, and I think
9 Dr. -- and may I say "Dr." and not "Mr." Wightman, since
10 it seems to be an issue sometimes.

11 Dr. Wightman and Ms Lea will sort any
12 scheduling matters out. Thank you.

13 Ms Lea, were you going to raise a point?

14 MS LEA: I was going to suggest a couple of
15 dates be fixed for intervenor panels, if we had
16 sufficient certainty. I think for one or two of them
17 we do.

18 I think the return of Dr. Bauer should be
19 fixed for July 6th. Apparently that is the only day he
20 is available to come in that first week of July.

21 Other than that, I think we probably still
22 need to discuss things a little bit. I have some other
23 dates, but I think it is best that I continue to try and
24 find out when people are available.

25 THE PRESIDING MEMBER: Thank you, Ms Lea.

26 Ms Symes, you are going to discuss with
27 Mr. Penny and Dr. Wightman to see what we can fix on the
28 schedule.

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1 Mr. Thompson, I believe it is your
2 cross-examination, so whenever you are ready.

3 PREVIOUSLY SWORN: PHILIP SCHOECH

4 PREVIOUSLY SWORN: ROSS HEMPHILL

5 PREVIOUSLY SWORN: PAT ELLIOTT

6 CONTINUED CROSS-EXAMINATION

7 MR. THOMPSON: Thank you, Mr. Chairman.

8 I just noted on these exhibits filed today
9 that two of them, Exhibit G6.3 and G6.4, are described
10 as undertaking responses to me. They are really to
11 Mr. Janigan.

12 We probably should correct that. This will
13 make me look far more intelligent than I really am.

14 Panel, when we broke yesterday I had posed a
15 hypothetical, and I just want to follow up quickly on
16 that.

17 The hypothetical was a utility that had
18 reached its ultimate level of efficiency under cost of
19 service, and I asked whether that utility ever proposed
20 a price cap. Your answer was, Mr. Hemphill, after some
21 consideration, that yes, they would like to stick with
22 price cap because of the flexibility that it might
23 afford.

24 The point I was trying to make was that if a
25 utility has reached maximum efficiency and there are no
26 more productivity gains to be achieved, a price cap
27 based on industry standards, where there was still
28 productivity being achieved in the industry, could lead

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1 to a situation where the amount of increase allowed
2 would be less than needed to recover the costs that the
3 particular utility would incur.

4 The point I was driving at was that price caps
5 are more favourable to inefficient utilities than
6 efficient utilities.

7 Would you agree with that point?

8 DR. HEMPHILL: No, I would not.

9 MR. THOMPSON: Could you explain why?

10 DR. HEMPHILL: I think one of the things that
11 we said at the end of our discussion yesterday was that
12 the efficient utility, the utility that is constantly
13 looking for ways to increase the productivity would want
14 a regulatory structure like the price caps.

15 MR. THOMPSON: Even if its productivity
16 potential is less than the productivity potential of the
17 industry as a whole?

18 Do you see the point I am driving at?

19 DR. HEMPHILL: The point that you are driving
20 at, Mr. Thompson, and the question that you posed
21 yesterday, as well as the follow-up that you have so far
22 today, is purely hypothetical.

23 First of all, this example of the ultimate
24 efficiency level, no company is going to know that they
25 are at the ultimate. That is why we reached a
26 conclusion that if they were as efficient as you say
27 they are, they know that they are that efficient and
28 they are that efficient because they are progressive.

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1 By being progressive, they are going to constantly be
2 looking for other better ways to conduct their business,
3 which would include the regulatory structure that is
4 used to set the rates.

5 MR. THOMPSON: All right. I won't dwell on
6 it. Let's move on.

7 I want to follow up on the discussion we were
8 having yesterday.

9 I think it started at about transcript 983
10 where we got into a bit of a semantical debate as to
11 what's under the cap and what's not under the cap and I
12 just wanted to make sure that you understood so you
13 would have an opportunity to comment on the position
14 that my client, and I believe others take.

15 First of all, we do agree that there are
16 certain components of the company's 1999 revenue
17 requirement that are not subject to price cap increases,
18 and these are gas costs, upstream transportation and
19 load balancing.

20 DR. HEMPILL: Yes, I understand that.

21 MR. THOMPSON: All right. And then, there's a
22 dispute between the parties as to whether the price cap
23 increase should be limited to non-passthrough items in
24 the delivery revenue requirement or whether, as the
25 company suggests, it should apply to passthrough items.

26 Do you understand that?

27 DR. HEMPILL: Yes, I'm aware of that dispute.

28 MR. THOMPSON: Okay. And the passthrough

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1 items, dollar-wise, are shown in Exhibit F2.2 totalling
2 about \$208.4 million.

3 Would you take that subject to check? This is
4 in Section A of this document.

5 DR. HEMPILL: Yes.

6 MR. THOMPSON: All right. And we can see, in
7 Section E, that there will be added to those passthrough
8 items, in Year 2000, if the company's proposals are
9 adopted, a further \$20.2 million.

10 Do you see that?

11 DR. HEMPILL: I see that figure.

12 MR. THOMPSON: And that figure does not
13 reflect a current WACOG -- and would you take subject to
14 check that if the items at lines 29 and 30 are updated
15 to current WACOG, they become \$6.6 million and
16 \$4.7 million, respectively, producing a total of \$21.8
17 million?

18 Would you take that subject to check?

19 DR. HEMPILL: Yes, I will.

20 MR. THOMPSON: All right. And so, what we are
21 talking about here, in terms of a price cap component or
22 not having a price cap component, is 1.9 per cent times
23 \$208.4 million, increasing to 1.9 per cent of about
24 \$230 million, in the second year of the plan.

25 So those are the numbers I'm talking about,
26 dollar-wise.

27 Do you understand that?

28 DR. HEMPILL: Yes, I do.

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1 MR. THOMPSON: Okay. And so, this is what
2 I -- these were the numbers, this 400,000 in Year 1 and
3 roughly 460,000 in Year 2, are what I was calling the
4 compounding effect of the company's position, with
5 respect to passthrough items.

6 Do you understand that?

7 The intervenors' position is they shouldn't
8 get that extra 400,000, 460,000 in Year 2, and, to the
9 extent we have passthrough items in Year 2, a further
10 amount in Year 3. That's what I call the compounding
11 effect.

12 Do you understand where I'm coming from?

13 DR. HEMPILL: I comprehend your position.

14 MR. THOMPSON: All right. Now, we suggest
15 that's unreasonable, and I would like you to provide us
16 with your view on the reasonableness or unreasonableness
17 of having price cap increases added to passthrough
18 items.

19 DR. SCHOECH Our view is it's reasonable.

20 MR. THOMPSON: That doesn't surprise me, but
21 you, actually, better explain it.

22 DR. SCHOECH: Then let me try to explain.

23 What we are talking about is a price element
24 of the equity dollars that are being covered under the
25 price cap.

26 MR. THOMPSON: Can I just stop you there.

27 It's not just equity dollars, it's equity
28 dollars and gas cost dollars.

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1 DR. SCHOECH: I'm sorry. I was restricting my
2 discussion, for the moment, to the equity return. But I
3 take your point.

4 The reason that you want to include the equity
5 return adjustments under the general inflation minus X
6 adjustments is that this is an input price adjustment
7 for the industry that would not be picked up by the
8 GDPPI, in particular, as it's being applied in this
9 program where it's being forecasted at five years.
10 Therefore, it's appropriate to have that adjustment made
11 to the entire -- I'm sorry. Let me rephrase that again.

12 Because it's an input price adjustment that's
13 not covered by the GDPPI, what you do is you make an
14 adjustment to the GDPPI-based formula in moving your
15 rates from one year to the next. You aren't taking a
16 whole bundle of costs and moving them completely outside
17 of the cap and rolling them forward for inflation and
18 productivity impacts, what you are doing is you are
19 making -- your price cap covers all these costs that you
20 are starting from and then making price adjustments,
21 through time, to that entire bundle, and one element is
22 a price adjustment that happens to be related to capital
23 cost.

24 MR. THOMPSON: Now, did you just think of this
25 last night or was this part of your original thinking
26 here?

27 DR. SCHOECH: Well, this is the discussion we
28 had -- I think I told you yesterday that this was part

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1 of our discussion with Union early on. Our concern was
2 that the costs were going to be completely passthrough,
3 that if they kept adding plant and equipment that, you
4 know, the equity costs associated with that would also
5 be flowthrough and, therefore, you would be doubled
6 counting. But that's not what's going on here.

7 What's going on here is the quantity of
8 capital, the quantity of plant and equipment on which
9 this interest rate adjustment is being made is fixed and
10 what this is is a pure price adjustment.

11 MR. PENNY: Mr. Chairman, perhaps Mr. Thompson
12 could be requested to refrain from making these snide
13 sidebar remarks which are completely unfounded and,
14 indeed, contrary to the evidence. These were matters
15 that were discussed at some length yesterday and
16 Mr. Thompson's suggestion that this was just cooked up
17 overnight is not only unfair but it's completely, in my
18 submission, inappropriate.

19 MR. THOMPSON: I apologize to Mr. Penny, to
20 the witnesses.

21 What about the other items, then, panel?

22 DR. SCHOECH: We look at the other items in
23 the same way: these are price adjustments that need to
24 be adjustments to the inflation formula.

25 MR. THOMPSON: Why do gas-cost-related items
26 need to be -- which are passthrough items -- need to be
27 adjusted because of the inflation formula?

28 DR. SCHOECH: Once again, the adjustment is

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1 being made on a fixed quantity -- a base quantity of
2 gas, I should have said, and so, the adjustments we are
3 talking about are a pure parts adjustment.

4 MR. THOMPSON: Well, there's a dispute between
5 the parties as to the manner in which passthrough items
6 should be covered -- that's a volume-related dispute. I
7 was looking more to the principle of adding a price cap
8 amount on top of the passthrough item, with respect to
9 gas-cost-related items, and your justification for that
10 is what?

11 DR. SCHOECH: Well, I'm trying to say that the
12 justification is the same as for the equity return
13 because, again, the bundle of costs that, initially, are
14 being used to set the going in rates include all these
15 gas costs.

16 Now, going through time, we are not moving the
17 quantities of those gas up and down in the adjustment,
18 as I understand it. What we are looking at is the
19 degree to which these prices may go up or down, in the
20 future, and making a price adjustment for those.

21 MR. THOMPSON: Well, is that unusual, in your
22 experience? Gas costs are normally flowed through,
23 based on some estimate of current volumes -- prior
24 years' normalized actuals, for example.

25 Do you have any comment on that aspect of the
26 company's proposal?

27 DR. HEMPHILL: As I understand it, gas costs
28 are the result of a commodity market and it is not at

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1 all unusual that commodity costs or costs that result
2 from a commodity market are treated as a passthrough
3 item and a PBR mechanism.

4 MR. THOMPSON: I am talking about the volume
5 methodology that the company is applying to UFG and
6 inventory. Do you know what that is, panel?

7 DR. HEMPILL: Yes.

8 MR. THOMPSON: All right. And what is it?

9 DR. HEMPILL: Let me double check just so I
10 do not misstate on the record.

11 --- Pause

12 MR. THOMPSON: Conceptually, do you know what
13 they have done?

14 DR. HEMPILL: If it's gas and inventory, is
15 that what you are asking?

16 MR. THOMPSON: Yes, UFG, passthroughs.

17 DR. HEMPILL: Right. And are you asking what
18 the volume is or --

19 MR. THOMPSON: No. I am asking you
20 conceptually do you know what they have done, in terms
21 of the volume approach to these items compared to the
22 volume approach to gas costs, upstream transportation
23 and load balancing. Do you know the differences in
24 their approach? If you don't, just say so and I will
25 move on.

26 DR. HEMPILL: Well, I am trying to think to
27 see if I can actually fill the record properly on this.
28 No, I am not an expert on this, so it would probably be

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1 improper for me to go into detail on that.

2 THE PRESIDING MEMBER: The reporter has asked
3 me to make sure people speak into their microphones.
4 She is having difficulty recording. Could you make sure
5 the microphone is towards you when you speak. Thank
6 you.

7 MR. THOMPSON: Again, I am confused over how
8 this plan works, Ms Elliott, and I was left in confusion
9 as a result of a discussion we had yesterday about the
10 \$15 million. Do you recall that? This was the price
11 cap component of the rate relief you are seeking in
12 2000. Do you recall that discussion?

13 MS ELLIOTT: I do.

14 MR. THOMPSON: All right.

15 If you would just turn up, it's Tab 4 I
16 believe of the prefiled evidence. I had expressed to
17 you yesterday my understanding that the derivation of
18 the \$15 million by applying it to the applicable
19 revenues was a dollar constraint under your plan on the
20 amount that could be recovered in year 2000.

21 You had told me, well, no, it really wasn't,
22 that it's subject to volume fluctuations. Do you recall
23 that?

24 MS ELLIOTT: Yes.

25 MR. THOMPSON: And so I went back to Tab 4,
26 which is the rates evidence and if you go to page 5, and
27 I appreciate this hasn't been updated for your 1.9 per
28 cent, but in the last lines it talks about there the

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 application of the 2 per cent PBR escalator as it then
2 was results in a 15.676 million increase to rates. Do
3 you see that?

4 MS ELLIOTT: Yes.

5 MR. THOMPSON: And if you then go to Schedule
6 1, my understanding of the process before yesterday was
7 that starting at Column A, and the type here is so small
8 I can hardly read it, but if we go over to the second
9 page at line 22 we have the 787,204 delivery related
10 revenue requirement in E.B.R.O. 499 rates. Correct?

11 MS ELLIOTT: Yes.

12 MR. THOMPSON: And then if you move across to
13 the Column F, we then have adjusted revenue requirement.
14 Somebody complained about my use of that phrase, but
15 here it is in your exhibit, and then applied to that we
16 have the application of the price cap escalator, which
17 would be 2 per cent times that number. You then add the
18 passthroughs and we get the proposed revenue. Do you
19 see that?

20 MS ELLIOTT: Yes.

21 MR. THOMPSON: It is that proposed revenue and
22 its allocation to the various rate classes that gives
23 rise to the percentage amounts shown over in Column H.
24 Is that H? No. It's Column N. These range from --
25 well, there are various amounts in the various baskets.
26 Correct?

27 MS ELLIOTT: Column N/M, reflects the
28 percentage change, the new proposed rates compared to

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1 the existing rates and is really calculated by looking
2 at the revenue after the application of the price cap,
3 compared to the revenue before the price caps were
4 applied. So the percentage change is the result of
5 applying the price cap to the existing prices, adding
6 the passthrough items, coming up with a revised revenue
7 and comparing that to the existing revenues.

8 MR. THOMPSON: But does not Columns M and N
9 derive from the 15.676 million?

10 MS ELLIOTT: The \$15 million is determined by
11 applying the price cap to the existing rates,
12 calculating what that revenue would be, adding the
13 passthroughs and then recalculating the revenue at the
14 proposed rates and the percentages are really calculated
15 as a result of the application of the price cap.

16 MR. THOMPSON: But what comes first, the
17 dollars going into the rates? That was my understanding
18 is that these dollars going into the rates, the
19 percentages which you then checked against the
20 flexibility of your price cap and what was discussed
21 yesterday confused me because we seem now to be going
22 the other way.

23 MS ELLIOTT: The price cap will be applied to
24 the existing rates, but it has to be checked against the
25 results as to what the maximum price cap would
26 determine. So at 2 per cent or 1.9 per cent the maximum
27 revenue generated by the price cap or the application of
28 the price cap is limited at the \$15 million.

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1 If the price cap is applied to the existing
2 rate, then it is tested against the compliance with the
3 price cap formula and the pricing flexibility.

4 MR. THOMPSON: So, does the \$15 million
5 constitute a total dollar constraint on the price cap
6 plan in some fashion?

7 MS ELLIOTT: That's the number that we are
8 referring to when we prove compliance of the price cap
9 plan. So the application of the 2 per cent price cap on
10 existing rates will calculate out to incremental
11 revenues of \$15 million.

12 MEMBER JACKSON: But in Year 2, will it still
13 be only \$15 million?

14 MS ELLIOTT: The rates are calculated using
15 1999 approved volumes. So to the extent that the
16 volumes increase or decrease in Year 2, the amount of
17 revenue that will be recovered will vary depending on
18 the rate structures and the recovery. So everything
19 that is recovered in a commodity rate will vary as the
20 commodity increases or decreases.

21 MEMBER JACKSON: I think I understand that,
22 but what I don't understand is whether, having increased
23 the rates by 1.9 per cent the first year, I will then in
24 the second year increase by another 1.9 per cent those
25 then existing rates, not the 1999 rates.

26 MS ELLIOTT: No. Each year the price cap is
27 applied to the current rates.

28 MEMBER JACKSON: The then existing rates.

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1 MS ELLIOTT: The then existing rates would be
2 increased by 1.9 per cent.

3 THE PRESIDING MEMBER: Now I have an extension
4 to that question. As I read the price cap, it has
5 1.6 -- or whatever it is -- 1.9 times the current rate,
6 plus the Z factors, plus passthrough. When I apply it
7 in the second year, I drop the Z factors and the
8 passthroughs from the previous year, apply the price cap
9 to the rates that will result just from the 1.9 times
10 the 1999 rate, and add new Z factors and new
11 passthroughs. Is that correct?

12 MS ELLIOTT: No, that is the proposal that
13 Mr. Thompson is putting forward. In our proposal the
14 existing rates are increased by the price cap. The
15 Z factors are added to that. Those become the rates
16 that are escalated in Year 2.

17 THE PRESIDING MEMBER: And that is described
18 in the evidence?

19 The only formula I see in the evidence is PCI
20 equals 1.6, plus or minus .4, plus Z factors, plus --

21 MS ELLIOTT: The intent there is, the
22 Z factors apply to any adjustments made in this year.
23 They would then form part of the base rate in the second
24 year of the plan. And then there would be potentially
25 new Z factors in Year 2.

26 THE PRESIDING MEMBER: As I understand it, the
27 passthrough items and the Z factors are calculated as
28 percentages so that they can be applied to a rate?

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1 I mean, we have dollar numbers and we have
2 percentages.

3 MS ELLIOTT: The Z factors will be calculated
4 as dollar amounts. So the amount of the return on
5 equity adjustment is calculated, and then it will be
6 allocated to the various rate classes for recovery.

7 THE PRESIDING MEMBER: So that you would have
8 to have an adjustment --

9 How do you multiply it out? Do you have an
10 example in the evidence anywhere which shows how Year 1
11 translates into Year 2, translates into Year 3?

12 MR. THOMPSON: I think if you look at
13 Exhibit G3.6, Mr. Dominy, that will help you.

14 THE PRESIDING MEMBER: Thank you.

15 MR. THOMPSON: Do you have that in front of
16 you, Ms Elliott? That was just filed this morning.

17 MS ELLIOTT: No, I'm sorry, I don't.

18 MR. THOMPSON: Here it is.

19 THE PRESIDING MEMBER: Thank you. I will look
20 at it. At least I have something to work on.
21 Thank you.

22 MR. PENNY: This is the example of the
23 Kitchener case.

24 MR. THOMPSON: I just want to use it, if I
25 might, to perhaps help you, Mr. Dominy, but also to come
26 back to the point that I am just trying to nail down.

27 If we look at Union's position, Ms Elliott,
28 the base delivery revenue is 783.8 at line 5?

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1 MS ELLIOTT: That's correct.

2 MR. THOMPSON: And the price cap is 1.9 per
3 cent at line 20, and that produces the \$14.9 million at
4 line 21?

5 MS ELLIOTT: Yes, that's correct.

6 MR. THOMPSON: And then if we go over to the
7 next page, we get the add-on for adjustments to the base
8 that you are claiming? That is the 500,000 that is
9 shown at line 28?

10 MS ELLIOTT: Yes.

11 MR. THOMPSON: Then we get the passthrough
12 items totalling 20.2 at line 35?

13 MS ELLIOTT: Yes.

14 MR. THOMPSON: And then we have the rate
15 changes, which are summarized at 35, 36 and 38, the
16 14.9, the 500,000 and the 20.2, for a total of 35.6?

17 MS ELLIOTT: Yes.

18 MR. THOMPSON: That, then, brings the
19 revenue -- the new rates up to 819.4?

20 MS ELLIOTT: That's correct.

21 MR. THOMPSON: And then, under your
22 proposition, if we go back to 2001, that is the number
23 that carries forward and becomes the base against which
24 the price cap is applied and further passthroughs are
25 added on, and so on.

26 MS ELLIOTT: Yes.

27 MR. THOMPSON: Under the intervenor's
28 proposal, we are at lines 6 to 11 -- and for some reason

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 you haven't included equity return and taxes in here,
2 but this illustrates the point. We take out passthrough
3 items to develop base less passthroughs. We apply the
4 price cap to the passthrough, if there is one, and we
5 then have passthrough items at lines 29 to 35 totalling
6 \$12.1 million, producing rate changes that in this
7 example lead to \$784.2 million in Year 1, and then when
8 we go forward to Year 2, before we apply the price cap,
9 we back out at lines 6 to 9 the passthrough items in
10 Year 2, consisting of the base amount in 2000 plus the
11 add-ons. Right?

12 MS ELLIOTT: Yes, that's correct.

13 MR. THOMPSON: That, I think, illustrates the
14 differences in approach. But coming back to my
15 question, which was the total dollar constraint on the
16 price cap, is it, under your proposal, \$14.9 million?

17 You are very careful to say "This is the
18 number that we will use to establish compliance", but
19 does that mean that the total you will be recovering in
20 rates under this cap plan in 2000 will be \$14.9 million?
21 Is that a constraint on recovery in rates?

22 MS ELLIOTT: The amount recovered in 2000 will
23 depend on the rate structure. But if the full amount of
24 the \$14 million was recovered through a commodity
25 charge, and the volume in 2000 was less than the 1999
26 volume, we would recover less than \$14 million. If the
27 volume was greater than the 1999 volume, we would
28 recover more than the \$14 million.

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1 It isn't a cap on the revenue; it is a cap on
2 the price increases.

3 MR. THOMPSON: All right. So when you are
4 proving compliance, do you use the \$14 million in 1999
5 volumes? Is that what you are saying?

6 Let's assume the volumes are higher and you
7 recover \$15.5 million, just by way of illustration. You
8 are telling me we haven't breached the price cap plan,
9 even though --

10 MS ELLIOTT: Compliance with the price cap
11 plan will be calculated using the 1999 volumes and the
12 rates in effect at the time. So the evidence filed here
13 at Tab 4 is the current rate in place today times the
14 1999 volumes that will generate a level of revenue.

15 The new prices are calculated or determined,
16 and then to prove compliance, the new revenue, which is
17 those new prices times the 1999 volumes, is compared to
18 the revenue at existing rates, and it is not greater
19 than 2 per cent higher. That would comply with the
20 price cap plan.

21 MR. THOMPSON: All right. Just so I
22 understand this in its completeness.

23 At Exhibit B, Tab 4, page 6, you are talking
24 about applying the pricing cap plan to the average price
25 of all various charges. Now, just tell me how that
26 relates back to what is in Schedule 1 in terms of
27 demonstration compliance? What is wrapped up in this
28 concept of measuring compliance versus average prices?

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1 MS ELLIOTT: The average price is really the
2 total revenue divided by the total volume to get an
3 average price for the existing rates.

4 MR. THOMPSON: For each rate class. Is that
5 right?

6 MS ELLIOTT: Yes. To the extent that we --

7 MR. THOMPSON: Each basket?

8 MS ELLIOTT: For each basket, each of the
9 conditions that the price cap must comply with there
10 would be a calculation to prove that the pricing changes
11 comply with those conditions. The way we have
12 illustrated that here is to take the new prices times
13 the current volumes to get a revenue number, compare
14 that to the revenue generated by the current pricing and
15 calculate the change.

16 MR. THOMPSON: All right. So just going back
17 to Schedule 1. At line 14, this is Basket 1A, do I
18 understand you to be saying that for the purposes of
19 measuring compliance we would be looking at line 14?

20 MS ELLIOTT: Line 14, Column N shows the
21 increase of the average prices in Basket 1A is 2.46 per
22 cent.

23 MR. THOMPSON: That's taking the proposed
24 revenue in Column J and dividing it by 1999 volumes for
25 all of those rate classes in Basket 1A. Is that right?

26 MS ELLIOTT: This isn't my evidence, but I
27 think if you look it will be --

28 MR. THOMPSON: Probably -- okay. Sorry.

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 --- Pause

2 MS ELLIOTT: A calculation of that percentage
3 is really the revenue generated by the application of
4 the price cap, so the \$13.3 million in Column G, divided
5 by the revenue in Column F, which is the adjusted
6 revenue after the adjustments for the system integrity
7 capacity, the DCC and the short-term supply elimination.
8 That is at a 2.46 per cent increase.

9 MR. THOMPSON: And that is higher than 1.9 but
10 that is permitted under your pricing flexibility
11 proposal as it currently stands.

12 MS ELLIOTT: That's correct.

13 MR. THOMPSON: Okay.

14 Just before I leave this exhibit, G3.6, and
15 trying to translate into the price cap plan the Board's
16 agreement with us, if the Board agreed with us that
17 these passthrough items should be excluded before
18 applying the price cap, so for example in Year 1, the
19 base at line 16 to which one applies the cap is not
20 \$783 million but, say, \$730 million -- do you see that
21 on Schedule 1 at line 16 for the Year 2000, the
22 difference in the base?

23 MR. PENNY: Seven twenty-nine, Mr. Thompson.
24 Am I missing something?

25 MS ELLIOTT: You are talking about line 16,
26 the comparison between the \$783 million and the
27 \$729 million?

28 MR. THOMPSON: That's right.

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 MS ELLIOTT: I see that.

2 MR. THOMPSON: Okay.

3 Assume, for example, the price cap is 1 per
4 cent so that the price cap amount at line 21 in your
5 case would be \$7.83 million and in our case would be
6 about \$7.3 million --

7 MS ELLIOTT: That's the calculation --

8 MR. THOMPSON: All right.

9 MS ELLIOTT: -- the result you would get if
10 you applied a 1 per cent price cap to the numbers in
11 line 16, yes.

12 MR. THOMPSON: My question is this. If the
13 Board subscribed to our approach, in order to translate
14 that into the price cap applicable to rates should we be
15 taking, in our case, the \$7.3 million and dividing it by
16 the delivery revenue in current rates to get, in effect,
17 an effective price cap which would be slightly less than
18 1 per cent? Is that the approach that should be
19 followed if the Board subscribes to what we are
20 advocating?

21 MS ELLIOTT: Since we don't have rates for
22 prices that would generate the \$729 million, the prices
23 we have in place generate \$783 million of revenues. To
24 get the same effect you would have to divide the
25 \$7.3 million by the revenue generated by the existing
26 prices to get the amount of the cap.

27 MR. THOMPSON: All right. So we should, in
28 this road map, probably add another heading, heading C1,

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1 to deal with our situation of calling it effective price
2 cap which would take the dollars, if there are any, at
3 line 21 and divide them into 783.8 to get a percentage.
4 Is that fair?

5 MS ELLIOTT: Following the logic, that's the
6 mathematical exercise you would need to follow to get a
7 price cap that you could use against current prices.

8 MR. THOMPSON: All right. Then that slightly
9 lower percentage would be the fulcrum around which
10 pricing flexibility would operate if there is any
11 pricing flexibility afforded to you?

12 MS ELLIOTT: Yes. To the extent that our
13 pricing flexibility proposals are a factor that's based
14 on the price cap, yes.

15 MR. THOMPSON: Thank you.

16 Can I turn, then, quickly to some questions I
17 had on inflation factor.

18 We were discussing yesterday, panel, that
19 there are costs of capital included in inflation
20 measures, but you are making the point that they were
21 not reflective of the very high percentage of capital
22 that Union relies on and other gas distributors like
23 Union.

24 Is that a fair characterization of what we
25 were discussing yesterday?

26 DR. SCHOECH: Yes, it is.

27 MR. THOMPSON: Okay. Now, what is the source
28 of an externally derived inflation factor that is ideal

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1 as far as you are concerned?

2 MR. PENNY: I'm sorry, Mr. Thompson. For
3 clarification, does that question mean the idealized
4 source or are you asking whether there is a source
5 existing today that provides the ideal measure.

6 MR. THOMPSON: Well, I guess I'm asking all of
7 that, but I was trying to find out what the witnesses
8 were talking about -- when I understood them when they
9 were talking about a properly derived inflation factor
10 from external sources.

11 The point they are making, as I understood it,
12 was CPI wasn't good enough and GDPPI wasn't good enough.
13 What would be good enough?

14 DR. SCHOECH: Well, it isn't whether it's good
15 enough or not, it's whether or not if you use the GDPPI
16 whether you need a Z factor adjustment for something
17 like interest rates.

18 I believe what I said yesterday -- and in
19 saying that I refer to Table 1, page 9 of our report and
20 the paragraph preceding that, that in theory what would
21 be ideal would be an index that represented the prices
22 of the inputs used by the gas distribution industry.

23 To elaborate on that a bit, in the proportions
24 used by the gas distribution industry. In other words,
25 you wouldn't want to use just a labour wage index to
26 represent the prices of the gas distribution industry
27 when we all know that the gas distribution industry is a
28 very capital intensive industry.

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1 MR. THOMPSON: To your knowledge, is somebody
2 working on pulling that together?

3 DR. SCHOECH: To my knowledge, no.

4 MR. THOMPSON: So the second best source is
5 what, GDPPI?

6 DR. SCHOECH: That's correct.

7 MR. THOMPSON: All right.

8 And then you went on to say that this is
9 deficient because the capital weighting isn't adequate.
10 Were you asked to express an opinion on how to adjust
11 GDPPI to make the weighting adequate?

12 DR. SCHOECH: I wasn't asked and it didn't
13 occur to me to even try to do that. I didn't know how
14 one would go about doing that.

15 MR. THOMPSON: All right. So you can't help
16 us with -- although you say the weighting is inadequate,
17 you can't help us with how to make it adequate.

18 DR. SCHOECH: No. In a sense I guess what you
19 would have to do is smash the GDPPI to pieces and try to
20 build it together a different way.

21 MR. THOMPSON: All right.

22 But the fact that the GDPPI has this
23 inadequate reflection of capital is, as I understand it,
24 one of the prime reasons why you believe the equity
25 passthrough that Union proposes is appropriate in
26 conjunction with their selection of a fixed inflation
27 rate. Do I understand that correctly?

28 DR. SCHOECH: Particularly in a case where the

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1 inflation rate is fixed, yes, it is important.

2 MR. THOMPSON: Now, Union says, Ms Elliott,
3 that it adopted a fixed inflation rate and proceeded
4 with this equity passthrough, which is sort of a partial
5 passthrough, because the customers wanted it. Do I
6 understand that correctly?

7 MS ELLIOTT: It was the alternative that we
8 arrived at subsequent to our original proposal, which
9 was an adjustment to the base rates that would allow us
10 to manage the interest rate variability over the term of
11 the agreement.

12 MR. THOMPSON: What was the amount of the
13 adjustment you were proposing?

14 MS ELLIOTT: I would have to check it, but I
15 think it was in the order of \$30 million.

16 MR. THOMPSON: You wanted a \$30 million
17 bump-up in the base, subject to check?

18 MS ELLIOTT: Yes.

19 MR. THOMPSON: All right. And the customers
20 wouldn't go for that.

21 MS ELLIOTT: Given that it was proposed to
22 manage the interest rate variability and the customers
23 looked at the interest rate forecast over the term of
24 the agreement, the assessment was really whether the
25 upfront adjustment was better than a variability in
26 price over the term that was based on the year-over-year
27 interest rate forecasts.

28 MR. THOMPSON: Now, when Union decided to

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 proceed the way it did, did Union -- I'm asking you
2 this, Ms Elliott -- look at the annual inflation rate
3 option at a rate that would cover capital -- all
4 capital, debt and equity?

5 MS ELLIOTT: You are asking if we undertook to
6 modify the inflation rate to --

7 MR. THOMPSON: Did you consider that?

8 MS ELLIOTT: Absent a utility -- or an
9 industry-specific inflation rate we were dealing with
10 economy-wide measures. We didn't consider modifying
11 those. What we did propose was an adjustment, a
12 Z factor for the passthrough on equity.

13 MR. THOMPSON: All right. Well, in this
14 economy-wide measure of inflation, there are costs in
15 there pertaining to the costs of capital, both debt and
16 equity. Is that right?

17 DR. SCHOECH: Correct.

18 MR. THOMPSON: Okay. So if inflation goes up
19 the costs of capital that you recover under the
20 inflation-related price cap will go up.

21 DR. SCHOECH: Not under this proposal, no.

22 MR. THOMPSON: Excuse me. The cost of debt
23 capital fall inside the cap, so the company is content,
24 it seems, to have its costs of debt capital covered by
25 the 1.6 per cent that it has selected. Do I have that
26 straight, Ms Elliott?

27 MS ELLIOTT: Yes, that is correct.

28 MR. THOMPSON: Dr. Bauer's point is, if you

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 went to an annual measure of inflation you should be
2 prepared to put the costs of equity inside the cap, and
3 the company is saying no, because an annual measure of
4 inflation based on current external sources isn't good
5 enough. Do I have that straight?

6 MS ELLIOTT: The economy-wide inflation
7 measure doesn't reflect the weighting that Union has
8 with respect to its capital investments. That's
9 correct.

10 MR. THOMPSON: But there is a scenario here
11 where if we look at what you are claiming by way of
12 equity passthrough it is about \$5.7 million in 2000?

13 MS ELLIOTT: Based on the most recent -- or
14 the consensus forecast of interest rates at the end of
15 1999, yes.

16 MR. THOMPSON: That dollar amount translates
17 into about, would you take, subject to check, .7 per
18 cent of the applicable revenue base?

19 MS ELLIOTT: Yes.

20 MR. THOMPSON: If you add 1.6 and 0.7, you get
21 2.3 per cent?

22 MS ELLIOTT: Yes.

23 MR. THOMPSON: And if the proper inflation
24 measure, including capital, was 2.0 per cent, then what
25 you have proposed would be excessive.

26 MS ELLIOTT: I'm sorry, could you repeat that?

27 MR. THOMPSON: If the proper measure of
28 inflation for a company like Union was 2 per cent -- it

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1 is an assumption -- then what you have proposed here,
2 which would give 2.3 per cent recovery, is excessive.

3 My question is: Is that one of the kinds of
4 considerations that Union went through in deciding to go
5 with the combination of a fixed interest rate and an
6 equity passthrough?

7 MR. PENNY: Mr. Chairman, I wonder if we could
8 ask Mr. Thompson to clarify what he means by proper
9 measure.

10 MR. THOMPSON: Well a measure, like the
11 witnesses have described, that includes the costs of
12 capital reflecting the weight applicable to distribution
13 utilities.

14 MR. PENNY: A measure that doesn't exist.

15 MR. THOMPSON: You tell me it doesn't exist.
16 I don't know if it does or it doesn't.

17 MR. PENNY: Well, the evidence is that it
18 doesn't exist.

19 MR. THOMPSON: Fine. Very good. It is an
20 assumption.

21 MS ELLIOTT: You have asked me if 2.3 per cent
22 is greater than two, and I would have to agree that it
23 is. But I don't know what the two is.

24 So to agree that 2.3 is excessive over what it
25 should have been, I don't know what the inflation rate
26 forecast should have been.

27 MR. THOMPSON: Let me try it this way with the
28 experts.

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 As a matter of principle, gentlemen, would you
2 agree that Union should not be able to enhance its
3 situation by selecting a fixed inflation rate and then
4 using the fact of that selection to justify equity
5 passthrough?

6 MR. PENNY: Mr. Chairman, since that is not
7 what the company is asking, I am not sure what the
8 purpose of the question is.

9 THE PRESIDING MEMBER: Dr. Jackson wants to
10 comment.

11 MEMBER JACKSON: Mr. Thompson, I am sorry, I
12 would like the question repeated one more time, the one
13 that Mr. Penny is having trouble with.

14 MR. THOMPSON: Yes. It was a question of
15 principle: that Union should not be able to enhance its
16 situation -- and when I say that, I mean enhance its
17 situation in terms of recovering costs of capital, debt
18 and equity, under price cap, by selecting a fixed rate
19 for inflation and then using the fact of that selection
20 to justify an equity passthrough.

21 MR. PENNY: My submission to you,
22 Mr. Chairman, is that since that is not what the company
23 is saying or proposing, the question has no relevance or
24 meaning.

25 MR. THOMPSON: I am happy to move on.

26 THE PRESIDING MEMBER: Is the question that --
27 rather than say they can or cannot or are allowed to or
28 not, is the question: If a company selects a fixed

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1 interest rate, a fixed escalation rate, and then makes
2 an adjustment for a return on equity passthrough, does
3 that create a more favourable situation for the company
4 than if the equity return is reflected in the inflation
5 escalator that is chosen? And what has been the
6 experience of the experts with regard to the regulatory
7 treatment under these two different circumstances?

8 Is that the question?

9 MR. THOMPSON: Yes, thanks.

10 DR. SCHOECH: Let me take a stab at the first
11 part.

12 As we indicated earlier, an equity adjustment
13 would be necessary under this proposal where the
14 inflation rate is fixed. Also, we would envision that
15 even with a variable, like GDPPI inflation rate change
16 from year to year, there would be some sort of equity
17 adjustment necessary. That was because of the
18 difference in the capital intensity.

19 I have no evidence before me or belief that
20 choosing one or the other is going to be in the
21 strategic interest of Union for the purposes of
22 maximizing return on equity during the coming price cap
23 period. They may have different outcomes as we go into
24 the plan, but at this point in time I have no evidence
25 before me to say that one is a better choice over the
26 other.

27 To my mind this plan was kind of laid out on
28 principles that seemed objective and reasonable.

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 MEMBER JACKSON: Doesn't the difference that
2 results from the difference in capital intensity also
3 affect the cost of debt, though?

4 DR. SCHOECH: It does, yes.

5 MEMBER JACKSON: And possibly affect some
6 other costs? I am not sure to what extent it would
7 affect operating costs, but I imagine there is some kind
8 of a linkage between the --

9 DR. SCHOECH: Yes. The way I view this is
10 that this proposal takes a step toward the industry
11 approach where basically you would have prices specific
12 to the industry.

13 I believe the question is asking something
14 along those lines.

15 MEMBER JACKSON: Yes.

16 DR. SCHOECH: I could well have envisioned
17 Union asking that the debt part also be treated in a
18 similar way. They chose not to.

19 MEMBER JACKSON: So the step that you are
20 talking about is the step with respect to the return on
21 equity, but it could have been taken with respect to
22 other costs as well.

23 DR. SCHOECH: That's correct.

24 MEMBER JACKSON: I hope I haven't muddied the
25 waters on you, Mr. Thompson.

26 MR. THOMPSON: No, that's fine. Let's move on
27 to the X factor, panel.

28 Could you turn up transcript 858, please.

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 MR. PENNY: What is the page again,
2 Mr. Thompson?

3 MR. THOMPSON: Page 858. This was in your
4 examination-in-chief, Mr. Schoech.

5 At page 857 Mr. Penny was making reference to
6 Dr. Norsworthy's productivity target of 2.3 per cent and
7 he asked:

8 "How does that compare with your -- if
9 you were to try and compare apples to
10 apples to that number, how does that
11 compare with your recommended
12 productivity target?"

13 And you answered:

14 "Well, our productivity target consists
15 of a minus 0.4 per cent historical rate
16 of productivity growth, plus a 0.4 per
17 cent stretch factor. So our recommended
18 productivity target is 0.0."

19 MR. PENNY: That reads 0.4 in each case.

20 MR. THOMPSON: I'm sorry...?

21 MR. PENNY: It reads 0.4 in each case. You
22 said 4 per cent.

23 MR. THOMPSON: I apologize. You have a fussy
24 lawyer there, gentlemen.

25 MR. PENNY: You are reading from sworn
26 testimony, Mr. Thompson.

27 MR. THOMPSON: Relax.

28 "So our recommended productivity target

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 is 0.0."

2 Have I read that correctly?

3 MR. PENNY: Yes, you have.

4 MR. THOMPSON: All right. So that is the
5 X factor.

6 DR. SCHOECH: No, that is not the X factor.
7 Maybe that is confusing to some people.

8 Dr. Norsworthy made a projection of Union
9 total factor productivity growth, not a total factor
10 productivity differential. That is why the 2.3 per cent
11 that he arrived at needs to be compared to not the X
12 factor, which is based upon a total factor productivity
13 differential, but the Union total factor productivity
14 growth that is contained in that differential.

15 That would be the sum of the minus 0.4 and the
16 plus 0.4.

17 MR. THOMPSON: When you gave that testimony,
18 you were not telling us your X factor was 0.0?

19 DR. SCHOECH: No, I wasn't.

20 MR. THOMPSON: Where do you tell us what your
21 X factor is?

22 --- Pause

23 DR. SCHOECH: I guess I don't see the points
24 of it summed up to a grand total.

25 MR. THOMPSON: Well, is it anywhere in your
26 evidence where you tell us what your X factor is?

27 I took it, yesterday, that it was zero but --

28 DR. SCHOECH: Well, it would be a minus 0.7

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1 plus the stretch factor of 0.4. So it would end up
2 being a minus 0.3.

3 MR. THOMPSON: And do we find that in your
4 evidence? Or is that in Union's evidence?

5 DR. SCHOECH: I'm reading page 31 of my
6 testimony, and I'm adding the number that appears on
7 line 5 with the number that is found on line 21.

8 MR. THOMPSON: All right. Your line 5 -- I'm
9 a little puzzled by that -- you say, at page 30a, the
10 sentence at line 7, again:

11 "If we were to develop a distribution
12 output quantity index that would reflect
13 this revenue proportion, the resulting
14 measured rate of Union total factor
15 productivity growth would have been
16 approximately -0.4 per cent."

17 That seems to be talking about something that
18 you hadn't done.

19 THE CHAIRPERSON: Mr. Thompson, where were you
20 reading from, at that point?

21 MR. THOMPSON: It's the testimony of --
22 it's B2 Tab 3. It starts at --

23 THE CHAIRPERSON: I have got it now. Thank
24 you.

25 MR. THOMPSON: -- page 30a, at line 7, and
26 then goes over to page 31.

27 MEMBER JACKSON: And the only changes on
28 page 31, after January 14th, 2000, Ms Elliott, would be

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1 numbers? Because I think I have been up the number
2 changes.

3 MS ELLIOTT: Yes, they are just number
4 changes.

5 MEMBER JACKSON: Okay. Thank you.

6 MR. THOMPSON: Is that talking about something
7 you didn't do?

8 DR. SCHOECH: I'm sorry. Which number of
9 something that I didn't do.

10 MR. THOMPSON: The sentence that leads to the
11 "-0.4 per cent" reads:

12 "If we were to develop a distribution
13 output quantity index that would reflect
14 this revenue proportion, the resulting
15 measured rate of Union total factor
16 productivity growth would have been
17 approximately -0.4 per cent."

18 and that's a --

19 DR. SCHOECH: I understand the question.

20 What we did was something computationally
21 equivalent to that -- and I would refer you to
22 Appendix D, the impact of the conservational and the
23 X factors, that explains that equivalence.

24 MR. THOMPSON: You are ahead of me.

25 DR. SCHOECH: I'm sorry.

26 MR. THOMPSON: I'm talking about the number at
27 line 3 --

28 DR. SCHOECH: Yes, the minus 0.4.

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1 MR. THOMPSON: -- minus 0.4.

2 That doesn't talk about conservation, that's
3 talking about:

4 "If we were to develop a distribution
5 output quantity index that would reflect
6 this revenue proportion..."

7 That seems to refer back to the 60 per cent of
8 distribution revenue through volumetric charges at
9 line 7 on 30a:

10 "...the resulting measured rate of Union
11 total factor productivity growth would
12 have been approximately -0.4 per cent."

13 Is that describing something you didn't do?
14 Or does it describe what you did?

15 DR. SCHOECH: If you are asking whether we
16 went and constructed a TFP scenario where the
17 distribution quantity index was 60 per cent based on
18 volume and 40 per cent based on customers, the answer to
19 that question is, no, but we did something equivalent.

20 MR. THOMPSON: All right. And you came up
21 with the same number?

22 DR. SCHOECH: That's where we can up with the
23 minus 0.4.

24 Had we taken the step of constructing a third
25 total factor productivity study where we weighted those
26 two volume measures by the appropriate percentages, we
27 would have arrived at the identical minus 0.4.

28 MR. THOMPSON: And then, it goes on:

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 "If one were to expect future
2 conservation to continue at the same rate
3 as a past conservation, it would be
4 appropriate to reduce the TFP
5 differential by 0.5 percentage points, to
6 -0.7 per cent..."

7 Could you explain the math to me. Does it
8 work?

9 DR. SCHOECH: Yes.

10 On Table 5, we talked about a --

11 MR. THOMPSON: What page is Table 5 on?

12 DR. SCHOECH: On page 30.

13 In Table 5, we referred to a TFP differential
14 before we considered the impact on the declining use per
15 customer, and that differential was a minus 0.2.

16 MR. THOMPSON: Updated, I'm sure --

17 DR. SCHOECH: Oh. Yes.

18 MR. PENNY: Mr. Chairman, there was a revision
19 of June, 2000.

20 DR. SCHOECH: Then -- but in that case, the
21 Union Gas measure is a plus 0.1.

22 What we are saying is if you appropriately
23 weight the two volumes measures, instead of a plus 0.1
24 you get a minus 0.4. If you take the minus 0.4 and
25 subtract off the minus 0.3 for the Canadian economy, you
26 get minus 0.7.

27 MR. THOMPSON: No, that's what Union did.

28 DR. SCHOECH: No, that's what I did.

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1 MR. THOMPSON: Well, how does that jive with
2 this language, we reduced the TFP differential by 0.5
3 percentage points? What are we reducing 0.5 percentage
4 points? What number?

5 DR. SCHOECH: The minus 0.2.

6 MR. THOMPSON: All right. So that becomes
7 minus what, 1.5?

8 DR. SCHOECH: You take a minus 0.2 and you
9 subtract a 0.5 from it, you get a minus 0.7. Which is
10 what paragraph 7 --

11 MR. THOMPSON: Oh. All right. Sorry.

12 And so, did Union get to this negative
13 productivity number independently? Or did they get
14 there the same way as you did? Could you help me with
15 that, Ms Elliott, or do you know?

16 MS ELLIOTT: We went there together,
17 Mr. Thompson.

18 MR. THOMPSON: Yours, as I recall it, simply
19 looked at the Canada wide of 0.3 and you said yours was
20 negative 0.4 and, therefore, the spread between the two
21 was negative .7.

22 That's the way I understood your evidence but,
23 in any event, you ended up at the same point.

24 MS ELLIOTT: Yes, we ended up at the same
25 point.

26 MR. THOMPSON: All right. And you went there
27 together?

28 MS ELLIOTT: And we went there together.

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 MR. THOMPSON: Marvellous.

2 So, panel -- this is expert panel -- you are
3 here supporting a negative productivity factor for Union
4 of 0.3 per cent for five years?

5 DR. SCHOECH: That's correct.

6 MR. THOMPSON: Have you ever done that before,
7 supported a negative productivity factor? In effect has
8 the -- which increases the price cap above the rate of
9 inflation.

10 DR. SCHOECH: Not before regulatory
11 proceedings such as these, no.

12 MR. THOMPSON: Let's then turn, then, to your
13 derivation of the historic productivity factor for
14 Union. You have been asked some questions about this,
15 and you tell us, at page 21 of your testimony, that you
16 derived it using financial statements from Union --
17 perhaps we should turn up that page -- the data that you
18 used.

19 DR. SCHOECH: Yes, that's correct.

20 MR. THOMPSON: And these are what, audited
21 financial statements for the company?

22 MS ELLIOTT: The source of the information is
23 from the company's financial records, including the
24 audited financial statements, yes.

25 MR. THOMPSON: All right. Well, could you
26 just describe the nature of the information.

27 It's the audited financial statements and what
28 else? That's required.

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1 MS ELLIOTT: If you look at the response to
2 Exhibit C36.25, that interrogatory requested all of the
3 working papers and all of the information that was
4 provided to the consultants.

5 MR. THOMPSON: Perhaps the experts could tell
6 me, what do you need to do one of these studies, the
7 audited financial statements and what else?

8 DR. SCHOECH: Well, I think we laid out our
9 data needs in pages 21 through 27 I guess I would say.

10 In terms of output, the information we needed
11 was the revenue that was generated by the different
12 lines of business. We needed volume measures
13 appropriate to each line of business.

14 For labour and materials the cost information
15 that we needed came from operating expense statements.
16 We also got employee counts from Union in order to do
17 the work, and then, finally, for the capital measures we
18 needed information on plant and equipment off the
19 balance sheets.

20 MR. THOMPSON: You indicated to one of the
21 previous questioners that you didn't do Centra because
22 the information wasn't available, but you have described
23 what sounds to me that it is available from Centra.
24 Perhaps you could help me understand why nothing was
25 available from Centra?

26 MS ELLIOTT: Some of the detail that was
27 requested to do the study isn't available off of the
28 annual financial statements. So employee and labour

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1 expenses is not information that's available in the
2 annual financial statements itself. It has to be
3 acquired from the company's records.

4 Some of the capital information at the detail
5 that was requested also --

6 MR. THOMPSON: Why isn't this information
7 available from Centra?

8 MS ELLIOTT: For the period of time that we
9 were gathering it, we are going back to 1986 which was a
10 period of time prior to the shared services and merger
11 with Union, the information isn't available in an easily
12 accessible format.

13 MR. THOMPSON: What does that mean?

14 MS ELLIOTT: We would have had to spend some
15 time going through all of the old records to sort out
16 and acquire that information from the files. We
17 determined that doing that would likely reduce the
18 company's productivity factors, given the make-up and
19 the cost structure of Centra, and we didn't put the
20 resources to finding that information.

21 MR. THOMPSON: "We" being Union determined
22 that?

23 MS ELLIOTT: That's right.

24 MR. THOMPSON: Not the experts?

25 MS ELLIOTT: That's right.

26 MR. THOMPSON: Fine.

27 Now, you were asked some questions about not
28 carrying it forward to 1997, 1998 and 1999, this is the

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1 Union information, gentlemen. The answer -- I don't
2 have the transcript page, but my note was that you said
3 there was lack of consistent information or something to
4 that effect that precluded you from bringing it forward
5 for those three years?

6 DR. SCHOECH: It would be helpful if I could
7 find the transcript page first before responding.

8 MR. PENNY: I am sure we will find it in Mr.
9 Brett's cross-examination because he asked all these
10 questions yesterday.

11 MR. THOMPSON: Yes. It's at transcript 835.
12 Well, I don't know if that's it or not. That
13 may not be it, sorry.

14 Explain to me why you didn't bring it forward
15 to 1997, 1998 and 1999?

16 DR. SCHOECH: Well, the difficulty that you
17 run into is the fact that Centra is a higher cost area
18 than the Union service territory. We could have just
19 started adding Centra in 1997 with Union and then
20 comparing that with the information we had on Union in
21 1996, but what's going to happen is because Centra is a
22 higher cost area you are going to see a drop in total
23 factor productivity in that year, and that has nothing
24 to do with trends from year to year. That has to do
25 with simply the addition of a higher cost area.

26 MR. THOMPSON: I am talking about bring it
27 forward for Union, Union South, to be consistent with
28 the years that you analyzed previously.

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1 DR. SCHOECH: My understanding was that, first
2 of all, the information was totally unavailable for 1998
3 and 1999 for Union South, and in 1997, including 1997 to
4 the analysis would have been problematic because in that
5 year Centra and Union began sharing services, as I
6 understand it. So, once again you start to have a
7 mixing of the two companies.

8 MR. THOMPSON: Well, you start to have
9 productivity gains, it would seem. If they share
10 services they are making hopefully some productivity
11 gains. That's what they told us anyway.

12 DR. SCHOECH: Well, the sharing of the
13 services made by itself is related to some productivity
14 gains, but I can't speak for the whole year as to
15 whether productivity would have gone up or down.

16 MR. THOMPSON: You were asked by Mr. Quinn
17 about the fact that the company that you analyzed had a
18 lot of ancillary businesses in it. Do you recall that
19 question?

20 DR. SCHOECH: Yes, I do.

21 MR. THOMPSON: If you look at your table at
22 page 23, just talking about output, do you have that?

23 DR. SCHOECH: I have page 23, yes.

24 MR. THOMPSON: With the table and it
25 classifies output into distribution, storage,
26 transmission, sales programs, financing programs and
27 rental programs. Is there some reason why you could not
28 have confined the analysis to distribution, storage and

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1 transmission?

2 DR. SCHOECH: Yes, there is.

3 MR. THOMPSON: What is that?

4 DR. SCHOECH: Well, the problem is looking at
5 the inputs that would have been specific to
6 distribution, storage and transmission.

7 The output side is the easy side because you
8 can just look at the outputs for the lines of business
9 you are interested in. What's not possible is to take
10 the costs that are associated with sales, financing and
11 rental, pull them out of the data in a meaningful way
12 and then just look at what remains.

13 MR. THOMPSON: Did you consider trying to
14 evaluate the total factor productivity for a pure
15 distribution, storage and transmission utility, either
16 by analysis of the Union numbers or by looking at some
17 other representative pure utilities? Was that
18 considered?

19 DR. SCHOECH: Well, I guess I would say it was
20 considered to the extent that we had some discussions as
21 to what the cost and revenue information was available.

22 Now, had Union been able to provide us with
23 cost information that was specific to distribution,
24 storage and transmission we would have gone ahead and
25 looked at a total factor productivity measure specific
26 to those services.

27 MR. THOMPSON: Did you check any other
28 companies that might be representative of a pure

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1 utility?

2 DR. SCHOECH: We didn't do any pure analysis,
3 no.

4 MR. THOMPSON: Is that because you weren't
5 asked to or it wasn't part of you mandate?

6 DR. SCHOECH: It wasn't part of our mandate,
7 but I am not even sure how we would have gone about
8 doing that.

9 MR. THOMPSON: Well, your own analysis -- your
10 own evidence indicates that it's preferable to have the
11 data from an external -- a source external to the
12 utility.

13 DR. SCHOECH: That's correct.

14 MR. THOMPSON: Yet you focused entirely on
15 Union Gas.

16 DR. SCHOECH: Well, as I said yesterday, if
17 there had been good data on the Canadian gas
18 distribution industry we would have looked at that
19 industry.

20 MR. THOMPSON: In view of the fact that you
21 take the position that equity capital isn't contained in
22 any inflation factor, and your position was, as I
23 understand it, that Union should adopt an annual
24 inflation approach, is there some way to take equity
25 capital out of the input and output calculations?

26 DR. SCHOECH: Oh, I think you are moving in
27 the direction of simply capping O&M.

28 MR. THOMPSON: No, I was trying to get --

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1 DR. SCHOECH: But, no, I mean, that would be
2 the way to get the capital out of the price cap.

3 MR. THOMPSON: Equity capitalized.

4 DR. SCHOECH: I guess we could arbitrarily
5 divide plant and equipment into that which is financed
6 by equity and that which is financed by debt and treat
7 it as an O&M plus price cap.

8 MEMBER JACKSON: I'm sorry. Mr. Thompson, you
9 are exploring taking return on equity out of the price
10 cap entirely and treating it as a passthrough item, are
11 you? Is that what you are exploring? Or, are you
12 exploring --

13 MR. THOMPSON: I am exploring what impact the
14 partial adjustment, I guess, for equity that they are
15 making by way of passthrough would have on the
16 productivity calculation. That is really what I am
17 driving at.

18 It seems to me that if they are going to have
19 a partial passthrough of equity under the price cap
20 there should be some adjustment to the TFP.

21 MEMBER JACKSON: Certainly not for the one
22 they have calculated, though, Mr. Thompson. You are
23 talking about for the TFP in the future, if they were to
24 come back and calculate it again, aren't you?

25 MR. THOMPSON: I take your point, yes.

26 Let me move on.

27 There has been a lot of talk about decline in
28 customer use. Do we have anywhere in the record, Ms

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1 Elliott, the annual customer growth rate for the years
2 1997, 1998 and 1999? If not, could you undertake to put
3 it on the record?

4 MR. PENNY: I'm sorry. I don't understand the
5 connection between the two.

6 You have introduced this by saying that we
7 have had a lot of talk about declining use per customer,
8 and the evidence is that there is no relationship
9 between customer additions and declining use per
10 customer. So of what relevance is it? That is, I
11 guess, my question.

12 MR. THOMPSON: Maybe I shouldn't have put it
13 in that fashion.

14 Customer growth rates are relevant to a
15 calculation of total factor productivity. That is one
16 of the components of this calculation that you have
17 done, panel; am I right?

18 You have developed an average customer growth
19 rate for the years 1986 to 1996, as I understand it.

20 DR. SCHOECH: Yes. I believe the number you
21 are referring to is found on page 29, at line 8.

22 MR. THOMPSON: And that reflects customer
23 growth in that time frame.

24 I am just trying to -- if you could please
25 give to me by way of undertaking the annual rate of
26 customer growth for the years 1997, 1998 and 1999.

27 THE PRESIDING MEMBER: This is an undertaking
28 for Ms Elliott?

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1 MR. THOMPSON: Yes, please, Ms Elliott.

2 MS ELLIOTT: I thought there was an
3 interrogatory response that had the volumes in customers
4 for those years. I will either find the reference to
5 the interrogatory or provide the information.

6 MR. THOMPSON: Thank you. I wanted to cover
7 it for throughput/output growth as well. So that
8 interrogatory, you believe, covers it?

9 MS ELLIOTT: You want customers and volumes
10 for the period 1997 through to 1999?

11 MR. THOMPSON: Yes. The annual rate of
12 growth.

13 DR. WIGHTMAN: G7.1.

14 UNDERTAKING NO. G7.1: Ms Elliott
15 undertakes to provide annual rate of
16 customer growth for the years 1997, 1998
17 and 1999

18 MR. THOMPSON: Now, expert panel, in using
19 Union as the source of the TFP calculation, the
20 calculation does reflect the inefficiencies that arise
21 under cost of service regulation, particularly with
22 respect to expansion. Would you agree with that?

23 DR. SCHOECH: What I would agree to is that
24 the rate of productivity growth that we measured
25 reflects productivity change during a period of cost of
26 service regulation.

27 MR. THOMPSON: There is somewhere a Union
28 interrogatory response, I believe, and I believe in

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1 their evidence -- and I can't put my finger on it at the
2 moment -- it indicates that part of the negative
3 productivity over these years is tied to the expansion
4 policy that they had been following. And Mr. Quinn
5 discussed that with you, about proceeding with projects
6 with a profitability of less than 1.0. Are you familiar
7 with that evidence?

8 THE PRESIDING MEMBER: There was a discussion
9 yesterday with Mr. Quinn on this matter, wasn't there?
10 There was a discussion with Mr. Quinn, and then
11 ultimately Mr. Quinn asked for an undertaking, which was
12 referred to a future panel with regard to the expense
13 for specific projects or the specific construction of
14 extensions. It was referred to Ms Elliott and then it
15 was deferred to a subsequent panel.

16 Is that the area of examination you are
17 looking at?

18 MR. THOMPSON: It is related. I think
19 Mr. Quinn was asking how low could the profitability
20 index go. What I was just trying to focus on was the
21 acknowledgement somewhere in these interrogatories that
22 one of the causes for negative productivity is the
23 expansion policy that the company was able to follow in
24 the years 1986 to 1996.

25 THE PRESIDING MEMBER: It is not in the direct
26 evidence of Mr. Birmingham, is it?

27 MS ELLIOTT: No, it is actually included in an
28 interrogatory response.

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1 THE PRESIDING MEMBER: I am assuming that
2 information is there.

3 MR. THOMPSON: Yes. I wanted, then, to draw
4 the panel's attention to Mr. Johnson's evidence, at
5 question 18, which they criticized in their
6 evidence-in-chief. He talks about the inefficiencies in
7 cost of service regulation.

8 Do you recall criticizing that aspect of
9 Mr. Johnson's evidence, panel?

10 MR. PENNY: Hang on a minute. Do you want the
11 interrogatory or don't you?

12 MR. THOMPSON: I thought Ms Elliott was going
13 to get it later.

14 MR. PENNY: Oh, we are going to do that later.
15 Now we are on to something else?

16 MR. THOMPSON: Yes.

17 MR. PENNY: My apologies.

18 DR. HEMPHILL: I am looking at question 18 of
19 Hugh Johnson's testimony.

20 MR. THOMPSON: I'm sorry. It wasn't 18, it
21 was question 17.

22 DR. HEMPHILL: I am looking at question 17 of
23 Hugh Johnson's testimony.

24 MR. THOMPSON: Yes. Did you not criticize
25 this yesterday?

26 DR. HEMPHILL: Yes. I provided a general
27 comment regarding that, yes.

28 MR. THOMPSON: And he made reference to

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1 inefficiencies in this response?

2 DR. HEMPHILL: That's correct.

3 MR. THOMPSON: Do you accept that there are
4 inefficiencies tied to cost of service regulation,
5 particularly with respect to expansion policies?

6 DR. HEMPHILL: I don't like to view it as an
7 inefficiency. I believe that efficiencies can be
8 improved with performance based regulation or price cap
9 regulation.

10 MR. THOMPSON: Do you accept that the
11 expansion policies followed by Union and Centra under
12 cost of service regulation would have contributed to
13 their negative productivity? Do you accept that or not?

14 DR. HEMPHILL: I would have to review the
15 evidence that is on the record regarding that and then
16 give you an opinion.

17 MR. THOMPSON: You haven't done that yet.

18 DR. HEMPHILL: I would have to review it. I
19 may have in the past, but I would like to see it, and
20 then I could give you comment.

21 MR. THOMPSON: I am asking for comment now and
22 you can't do it. Is that what you are saying?

23 DR. HEMPHILL: What I am saying is, I can't do
24 it until I have reviewed the evidence that was put on
25 the record.

26 THE PRESIDING MEMBER: Maybe this would be a
27 good opportunity, as it is now 10 past 3:00, to have the
28 afternoon break. During that period of time I would

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1 like to find out what the prospect is for this panel, as
2 to whether we will be continuing this panel today
3 or not.

4 So maybe we could break now and come
5 back -- the time now is 12 minutes past 3:00, so we
6 could come back at 25 to 4:00. Hopefully, we will have
7 (a) addressed the question of where we are going to get
8 to today, and (b) perhaps give the witnesses a chance to
9 see what information there is on the record.

10 --- Upon recessing at 1512

11 --- Upon resuming at 1538

12 MR. PENNY: Mr. Chairman, before we resume
13 with Mr. Thompson's cross-examination, Mr. Wightman has
14 some questions and needs to leave, so he has agreed to
15 go next and then can leave and then Ms Symes has a few
16 questions --

17 THE PRESIDING MEMBER: What about Mr. Mondrow?

18 MR. PENNY: I had not understood Mr. Mondrow
19 had any questions since he wasn't here yesterday and if
20 we had finished the panel they wouldn't be here today.

21 MR. MONDROW: Yes, but you didn't -- in any
22 event, I don't have any questions --

23 --- Laughter

24 THE PRESIDING MEMBER: And I might add,
25 Mr. Mondrow was being very efficient and only coming in
26 when he had a question.

27 MR. MONDROW: And that is for G3.3, actually,
28 which I gather will not likely be reached this

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1 afternoon. So I will just read some transcripts in the
2 meantime. Thank you.

3 THE PRESIDING MEMBER: Carry on, Mr. Thompson,
4 then.

5 MR. THOMPSON: Thank you, Mr. Chairman.

6 I'm going to try and speed this up, panel.
7 Everybody has been very patient. Were you able to find
8 that interrogatory reference, by any chance, Ms Elliott,
9 to get that out of the way?

10 MS ELLIOTT: The interrogatory for volumes?
11 No, we couldn't, but we did find the interrogatory
12 reference that dealt with the reasons for the negative
13 productivity.

14 MR. THOMPSON: Yes, and that is...?

15 MS ELLIOTT: Which is C1.111.

16 MR. THOMPSON: Mr. Hemphill, do you wish to
17 provide your comment now? You said you wanted to review
18 that before indicating whether you agreed that system
19 expansion is one of the causes of negative productivity.

20 DR. HEMPHILL: Yes. And at break my colleague
21 and I remembered that yesterday we did respond --
22 actually, my colleague responded to a question almost
23 identical to that, so I will let him take that.

24 DR. SCHOECH: Yes. As I interpret this first
25 bullet point, what Union was saying was that one of the
26 reasons for the productivity performance was that,
27 loosely speaking, some of the expansion programs pay off
28 and others don't, and by "pay off" I mean either greater

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1 or less than 1. I think related to the question that
2 you would then ask about the difference between
3 cost-of-service regulation and PBR regulation, I will
4 refer you back to an answer I provided yesterday. It's
5 on page 932 of the transcript, and beginning on line 7
6 it says:

7 "I think the ifs are if the company had
8 engaged in project[s], some which paid
9 off and some of which didn't pay off
10 under cost of service regulation, and
11 then under PBR they were able to figure
12 out which projects paid off and only
13 invest in those, the question then would
14 be: Would total factor productivity
15 increase once you moved to incentive
16 regulation? And under all of those
17 hypotheses, the answer would be yes."

18 MR. THOMPSON: All right. Let's move on.
19 Perhaps the best way to do this is if you
20 could turn up Dr. Bauer's evidence at page 26.

21 MS ELLIOTT: Could you give us the section
22 reference? I'm not sure our pagination --

23 MR. THOMPSON: Yes. Sorry. It's the last two
24 sentences before 5.2.2 so it's in 5.2.1, the proposed
25 indexing plan, where he says:

26 "Union essentially proposes to use its
27 own historical performance as a proxy for
28 industry-wide data. The method has an

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1 inherent bias that needs to be
2 corrected." (As read)

3 Do you have that sentence?

4 DR. SCHOECH: Yes.

5 MR. THOMPSON: Okay. I'm sure you have sensed
6 from the cross-examination of others that there is a
7 position that what you have done is not a fair
8 representation of the productivity of Union's current
9 situation. Do you accept Dr. Bauer's point that the use
10 of Union's own historical performance does have this
11 inherent bias towards negative productivity?

12 DR. SCHOECH: No.

13 MR. THOMPSON: Do you accept that by not using
14 1996, 1997 and -- sorry, 1997, 1998 and 1999 data, you
15 have probably excluded productivity improvements in
16 Union's performance?

17 DR. SCHOECH: By excluding 1997, 1998 and
18 1999, we have excluded whatever happened in 1997, 1998
19 and 1999, which may have been some productivity
20 improvements. There also may have been some
21 productivity declines depending upon the circumstances.

22 MR. THOMPSON: Dr. Bauer, in his testimony at,
23 I believe it's -- well, it's a number of places,
24 suggests that risk mitigation measures should be adopted
25 to prevent miscalculations, and the risk mitigation
26 measures he refers to are, first, the stretch factor and
27 also earnings sharing or a combination of those two
28 features of a price cap plan.

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1 Are you familiar with that aspect of his
2 testimony?

3 DR. HEMPHILL: Yes, generally. Yes.

4 MR. THOMPSON: All right. Do you agree with
5 the principle that Dr. Bauer espouses that risk
6 mitigation measures should be adopted to prevent
7 starting from a miscalculated base or to prevent
8 miscalculation of the parameters of a plan.

9 DR. HEMPHILL: As we have previously
10 testified, we agree that the X factor should have two
11 components, which includes a stretch factor. We do not
12 agree with implementation of an earnings sharing
13 mechanism for Union.

14 I'm sorry. I can't remember the third that
15 you listed. Was there three?

16 MR. THOMPSON: No, there was two: stretch,
17 earnings sharing or a combination.

18 Do you agree earnings sharing is a risk
19 mitigation measure?

20 DR. HEMPHILL: As we stated yesterday, it is
21 looked at as such by the regulator many times to try to
22 mitigate the risks that come from uncertainty regarding
23 what is going to happen in the future during the process
24 of implementation of a performance-based regulatory
25 program.

26 MR. THOMPSON: I think that's a yes it is a
27 risk mitigation measure, but I will move on.

28 You were critical of Dr. Bauer's testimony.

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1 At page 30, I guess this is of the electronic file, this
2 is where he used the word "triangulation". Do you
3 recall that evidence you gave in-chief?

4 DR. HEMPILL: Yes, I do.

5 MR. THOMPSON: And to me what Dr. Bauer does
6 is look at -- I guess he checks the reasonableness of
7 your overall proposal against some other sources of
8 information. Is that what you understand as being the
9 process of triangulization?

10 DR. HEMPILL: Yesterday I characterized the
11 process of triangulation as using secondary sources of
12 information regarding X factors with other companies'
13 programs in comparison to the proposal for this before
14 the Board at this time.

15 MR. THOMPSON: All right. But if you look at
16 his testimony starting at page 30, this is in the
17 electronic -- it's right under Table 2 in section 5.2.3.
18 In the second line he starts:

19 "Such a process of triangulation is
20 frequently used in empirical research to
21 review results." (As read)

22 Do you have the passage?

23 DR. HEMPILL: I see that line.

24 MR. THOMPSON: Okay.

25 DR. HEMPILL: Yes, I see that line.

26 MR. THOMPSON: I wanted to make sure we are on
27 the same page in terms of the documentation.

28 He then goes on and he is looking at what was

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1 then the 2 per cent price cap that was being sought, now
2 1.9 per cent, and evaluating it, and also the pricing
3 flexibility that was originally proposed and evaluating
4 it against some certain historical data in Union's case.

5 At I guess -- it is in my page 31, is a
6 paragraph that begins:

7 "Another check on the accuracy of Union's
8 proposed X factor might be derived from
9 the overall average delivery rate."

10 (As read)

11 Do you see that?

12 DR. HEMPILL: I see that line, yes.

13 MR. THOMPSON: And then he goes on and based
14 on response to Exhibit C3.70, which is footnoted here,
15 he indicates that the average cost of gas in Union's
16 northern operations area, 1996 to 1999, increased by
17 approximately 1 per cent per year.

18 Do you see that?

19 DR. HEMPILL: I see that, yes.

20 MR. THOMPSON: Are you in a position to
21 dispute that conclusion?

22 DR. SCHOECH: Dispute the conclusion that the
23 rates increased less than 2 per cent per year?

24 MR. THOMPSON: Dispute the conclusion in the
25 northern operations area that the average cost of gas
26 increased by approximately 1 per cent per year.

27 DR. SCHOECH: We have no reason to dispute
28 that, no.

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1 MR. THOMPSON: And then he goes on and in
2 looking at that and the resulting overall increase in
3 the next paragraph, he suggests that that check, using
4 the average of delivery rate increases over the last
5 three years, suggest that a 2 per cent price cap is
6 excessive.

7 Do you have any problems with the process of
8 checking what the company is seeking against the average
9 delivery rate increases?

10 DR. SCHOECH: Well, I have problems when the
11 comparison isn't done accurately. One thing that
12 Dr. Bauer didn't take into consideration is that the
13 interest rates were falling during this period. He
14 ignores completely the fact that the equity return
15 adjustment would have resulted in rates rising less than
16 2 per cent per year during this period.

17 MR. THOMPSON: Sorry, under your 2 per cent we
18 have an equity flowthrough. Isn't his criticism -- or
19 his observation valid?

20 DR. SCHOECH: His observation was that rates
21 were increasing less than 2 per cent per year. But that
22 is not sufficient evidence to determine whether or not
23 this plan would have led to excessive price increases.

24 What Dr. Bauer left out was the fact that
25 interest rates were declining during that time. The way
26 that the equity return Z-factor worked in the price cap
27 formula, rates would not have been going up 2 per cent
28 per year under Union's proposal. They would have gone

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1 up by something less.

2 MR. THOMPSON: Do you agree with me, as a
3 matter of principle, that price cap overall should be
4 producing rates that are no worse than under cost of
5 service?

6 Is that a legitimate principle? In other
7 words, there must be some benefits here for ratepayers.

8 DR. SCHOECH: Well there are, and that comes
9 through the stretch factor.

10 MR. THOMPSON: That is Dr. Bauer's point. I
11 thought he said you look at these features to assess
12 them for reasonableness. And as he says on page 32, the
13 way to mitigate is to establish a stretch factor.

14 So, in principle, you agree with the use of
15 the stretch factor for that purpose. Is that right?

16 DR. SCHOECH: The stretch factor provides
17 lower rates for customers in the future than what one
18 would expect to see under continued cost of service
19 regulation.

20 MR. THOMPSON: Could you go to page 23. This
21 is turning now to the term of the program.

22 MEMBER JACKSON: Could I just check. That
23 assumes that the past measure of productivity is a good
24 indicator of what productivity is in the future, though,
25 doesn't it?

26 DR. SCHOECH: That does, yes.

27 MEMBER JACKSON: Thank you.

28 MR. THOMPSON: Turning to the term of the

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1 program, at page 23 of his testimony -- again, this is
2 in the third-last paragraph before Escalation Formula,
3 and it is in the section entitled "Base Rates".

4 The sentence begins:

5 "A major additional weakness is the
6 proposed plan that is based on the 1999
7 budget." (As read)

8 Do you have that paragraph?

9 DR. HEMPHILL: I am on page 23, but I am
10 having trouble finding it.

11 MR. THOMPSON: It is the third paragraph
12 before the Escalation Formula section; so 5.2. If you
13 count back three paragraphs from that heading, you
14 should have it.

15 The paragraph begins with "A major additional
16 weakness".

17 DR. HEMPHILL: Okay. I'm sorry. We have now
18 found it.

19 MR. THOMPSON: It is the next sentence that I
20 want to focus on.

21 You told me yesterday that PBR should be
22 implemented prospectively, yet Union is proposing to
23 start this plan January 1, 2000. Dr. Bauer says the
24 price cap would be introduced retroactively.

25 "This is a rather uncommon approach and
26 does not reflect regulatory practice."

27 (As read)

28 Do you agree with that statement?

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1 We are now at June of 2000, and they are
2 proposing to implement PBR January 1, 2000. Dr. Bauer
3 has a problem with that because that is retroactivity.

4 I thought you would too, since you told me
5 yesterday that the plan should be introduced
6 prospectively.

7 DR. SCHOECH: My understanding is that there
8 are certain unique aspects of this situation that may
9 make this element of the price cap plan unusual relative
10 to other plans, but certainly understandable in the
11 current situation.

12 As I understand it, this process of trying to
13 adopt a PBR mechanism has gone on for quite some time.
14 Basically the whole process seems to have been frozen
15 from 1999 as we kind of go through the negotiation
16 process and now through the regulatory process to
17 determine what the final outcome will be.

18 In light of that, yes, it is different than
19 what you would observe in other jurisdictions. But I
20 don't think that makes it unfair in any way.

21 MR. THOMPSON: So do you agree or disagree
22 with Dr. Bauer as a matter of principle? I am still not
23 clear.

24 We know you are supporting Union. But as a
25 matter of principle, is this a rather uncommon approach?

26 DR. SCHOECH: Whether it is common or
27 uncommon, I don't think it is a matter of principle; I
28 think it is matter of it's observed. If it's not

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1 observed very often, then it is uncommon. I think I
2 said it is uncommon; I haven't seen it elsewhere.

3 MR. THOMPSON: All right. Could you go to
4 Dr. Bauer's evidence at page 7, please. This is in the
5 Background section of his paper. It is towards the end.
6 I believe it is the last paragraph before item 3.

7 Sorry, it is in Role and Limits of Performance
8 Based Regulation, topic 2, and it is the last paragraph.

9 It starts with "PBR will not likely have
10 significant advantages". Do you have that paragraph?

11 DR. HEMPILL: Yes, we do.

12 MR. THOMPSON: And down towards the bottom he
13 says:

14 "PBR is much less appropriate during
15 times of rapid structural change." (As
16 read)

17 He is cautioning against the introduction of
18 PBR at a time when there is rapid structural change.

19 My question of you is: Do you agree that we
20 should be cautious when introducing PBR at a time of
21 rapid structural change?

22 DR. HEMPILL: If the natural gas industry has
23 been changing over time, yes.

24 MR. THOMPSON: Do you accept that the fact of
25 the existence of structural change warrants the adoption
26 of a risk mitigation factor, such as earnings sharing?
27 Which is one of Dr. Bauer's points.

28 --- Pause

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1 DR. HEMPHILL: Again, I'm pausing because I
2 have covered this a number of different ways, and so has
3 my colleague.

4 We have talked at length as to the various
5 reasons why there may be an earnings sharing mechanism.

6 MR. THOMPSON: That was rapid structural --
7 the fact that an entity is in a state of change one of
8 them?

9 DR. HEMPHILL: If that were to lead to the
10 uncertainty that we are talking about, yes. But, again,
11 our recommendation, in this case, is that there not be
12 one because, as one of us said yesterday, an earnings
13 sharing mechanism is putting one foot squarely into cost
14 of service regulation and the sooner that you can cut
15 those ties, the better.

16 MR. THOMPSON: Let's move on to monitoring and
17 reporting in second generation of PBR.

18 One of the terms of your mandate was to, as I
19 understand it, identify criteria for moving into the
20 second generation of PBR. Was that correct? Did I
21 understand that correctly?

22 DR. HEMPHILL: That's correct.

23 MR. THOMPSON: And at pages 42 and 43,
24 Dr. Bauer discusses two principal approaches to review
25 the PBR plan at the end of initial trial period -- that
26 is in a section numbered 6.2, plan term customer review
27 process and end of term review, and it's the third-last
28 paragraph.

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1 Do you have that?

2 DR. HEMPHILL: Okay. We are talking page 42?

3 MR. THOMPSON: That's in my copy. It's the
4 third-last paragraph in Section 6.2. Beginning:

5 "There are two principal approaches to
6 the review of the PBR plan at the end of
7 an initial trial period." (As read)

8 DR. HEMPHILL: Okay. I see that paragraph.

9 MR. THOMPSON: Okay. And he describes, in the
10 first part of that paragraph, the first approach, which
11 is to engage in only an incremental review of the plan
12 parameters, and so on. And then, at the bottom, he
13 says:

14 "Such a review may be justified if the
15 industry has not undergone larger
16 structural changes and has been on a
17 steady state path for some time. In all
18 other cases -- and the gas distribution
19 industry currently belongs to this second
20 category -- a more thorough review is
21 necessary." (As read)

22 Stopping there, do you agree with that
23 statement?

24 --- Pause

25 DR. HEMPHILL: One thing I will share with you
26 that I was talking with my colleague -- and he may take
27 this question -- is that we are taking reading this
28 because I feel very uncertain adopting others' testimony

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1 which I feel that you are asking me to do. So what I
2 want to do is reread everything that leads up to this
3 statement before I saw whether I agree with it or not,
4 so pardon the pause.

5 MR. THOMPSON: That's fine. Read what you
6 have to read to answer the question.

7 --- Pause

8 DR. SCHOECH: Well, my opinion will focus on
9 the comment that an incremental review of the plan
10 parameters -- i.e review of inflation measure and update
11 of the productivity offsets -- or review of the
12 appropriateness of the service quality indicators may be
13 justified that the industry has not undergone larger
14 structural changes and have been on a steady state path
15 for some time.

16 Once again, referring to the
17 telecommunications industry, that industry I would not
18 characterize as being one that has not undergone larger
19 structural changes or has been on a steady state cap for
20 some time and yet, the price cap reviews do focus on the
21 plan parameters.

22 MEMBER JACKSON: Excuse me. When you refer to
23 an industry as a whole, in this case, are you referring
24 to both the companies in it that are operating,
25 essentially, monopoly services, as well as those which
26 are operating and providing competitive services? Like,
27 do you group the whole together when you tell us about
28 an industry?

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1 DR. SCHOECH: Well, specifically, regarding
2 telecommunications, I'm thinking of, in particular, in
3 the United States, the regulation of the local telephone
4 companies. Now, those local telephone companies engage
5 in both competitive services and monopoly services and,
6 for some time, they have been under price cap regulation
7 and, in some circumstances, those plans are in the
8 process of being reviewed or, in terms of the F.U.C.
9 plan for interstate services, have gone through some
10 plan reviews already and in those plan reviews, the
11 focus of the plan review is on the plan parameters.

12 MEMBER JACKSON: Now, have you reviewed what
13 are the monopoly services and what are the competitive
14 services that this company, Union Gas Limited, offers?

15 DR. SCHOECH: No, I have not. I'm just
16 talking in general terms, regarding a sentence that I
17 was reading generally.

18 MEMBER JACKSON: Did Union advise you whether
19 their service is, as a whole, a monopoly set of services
20 or whether they were basically competitive services when
21 you started these discussions?

22 DR. SCHOECH: I don't recall discussions along
23 those lines, no.

24 MEMBER JACKSON: So, are you able to help me,
25 at all. Do you have any knowledge as to whether or not
26 this company offers services for which there is
27 competition here in Ontario?

28 DR. SCHOECH: I think I had better defer to my

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1 colleague or, perhaps, Ms Elliott.

2 MEMBER JACKSON: Well, either one of you.

3 DR. HEMPHILL: My understanding is that there
4 are services that are becoming more competitive. I'm
5 not sure I would be able to pass a quiz on exactly what
6 they are and what they cover.

7 I also understand that there's introduction of
8 competition even among monopoly services, fuel switching
9 and things like that, so it's -- I view it as very
10 similar to what is going on in the electric utility
11 industry in North America, as well, in terms of parts of
12 the business are becoming competitive and more
13 competitive over time.

14 MEMBER JACKSON: And to that extent, are you
15 aware that there have been some major restructurings
16 taking place, over the past 15 years, in both
17 electricity and gas, in gas first?

18 DR. HEMPHILL: Yes.

19 MEMBER JACKSON: Okay. And what sort of
20 restructuring might come to mind is the most obvious?

21 DR. HEMPHILL: The commodity is the most
22 obvious.

23 MEMBER JACKSON: That's what I would think is
24 the most obvious, too.

25 And then we are left with services that are
26 where, in the spectrum of competition?

27 DR. HEMPHILL: I believe it's upstream
28 transportation and storage services, as well.

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1 MEMBER JACKSON: Sorry. Is that an answer --
2 that's an answer to my previous question.

3 DR. HEMPHILL: That's the way I understand it,
4 yes.

5 MEMBER JACKSON: That those services have now
6 been separated out, as well, you are saying, as well as
7 the commodity?

8 DR. HEMPHILL: Either they are or they are in
9 the process of is how I understand it.

10 MEMBER JACKSON: And would you have any
11 comments to make, at all, about what remains? In terms
12 of whether it's a competitive services or whether it's a
13 monopoly?

14 DR. HEMPHILL: In terms of what is clearly a
15 monopoly service?

16 MEMBER JACKSON: My question is: Is there
17 anything left that is clearly a monopoly or clearly
18 competitive?

19 DR. HEMPHILL: In terms of clearly monopoly,
20 the distribution to the burnertip, I believe, that
21 system is clearly a monopoly.

22 MEMBER JACKSON: That helps for me to know
23 where you are coming from. Thank you very much.

24 Panel, do you accept that costs, just dealing
25 with the measuring device for assessing the
26 reasonableness of prices for monopoly services at the
27 end of the plan and during the course of the plan, do
28 you accept that cost to serve should remain the primary

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1 measuring device and, if not, what else is there?

2 DR. HEMPHILL: I apologize. Either repeat the
3 question or rephrase it. I know we are running short on
4 time, but try it again.

5 MR. THOMPSON: Well, you were just discussing
6 with Dr. Jackson the distinction between monopoly and
7 competitive services.

8 DR. HEMPHILL: Correct.

9 MR. THOMPSON: Dr. Bauer in the next paragraph
10 to the one that we just read says that:

11 "Only in an effectively competitive
12 environment is there no reason to worry
13 about the variation in the nexus between
14 costs and prices." (As read)

15 And he goes on and says, and I am paraphrasing
16 here, that for monopoly services, to evaluate their
17 reasonableness during the course of a plan and at the
18 end of it, you need to evaluate the reasonableness in
19 the context of cost to serve.

20 So my question of you was: Do you accept that
21 cost to serve should remain as the primary measuring
22 device for evaluating the reasonableness of the prices
23 of monopoly services during the course of the plan and
24 at the end of it?

25 DR. HEMPHILL: No, I don't agree with that.

26 MR. THOMPSON: Then what else is there to help
27 us with assessing the reasonableness of the prices for
28 monopoly services?

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1 --- Pause

2 MR. THOMPSON: Do you want to think about it
3 and give me an undertaking response? Can you think of
4 anything at the moment?

5 DR. HEMPHILL: I don't need to do an
6 undertaking on this. I am pausing because this has been
7 the essence of the last two days. I am trying to find a
8 good way to summarize it, to try to make the point maybe
9 a different way.

10 We go back to our testimony and yesterday
11 morning.

12 MR. THOMPSON: Well, can you summarize it and
13 say the price cap is reasonable, period?

14 DR. HEMPHILL: Well, the mechanism itself as
15 it's defined and approved by the Board defines the
16 reasonableness of the prices during the course of the
17 program.

18 MR. THOMPSON: All right. Well, it's clear
19 you don't support the use of cost to serve information,
20 to monitor the reasonableness of the plan. Others take
21 a different view.

22 DR. HEMPHILL: Yes, I am sure others do take a
23 different view, but my colleague and I do not support
24 using cost of service regulation when you are trying to
25 move into this new form of regulation, such as price
26 caps.

27 MR. THOMPSON: I have got three quick areas
28 here that I am going to try and expedite. Pricing

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1 flexibility and --

2 MEMBER JACKSON: Mr. Thompson, just before you
3 go on and, I am sorry, I am responsible for some of the
4 time you are taking, but it sounds as though you are
5 changing topics. So, I would just like to ask whether
6 you gentlemen have put your minds to whether costs would
7 play any role at the end of the term of the PBR?

8 DR. HEMPHILL: I believe what you are saying
9 is after the end of the first term, so let's say it's a
10 five-year program and you go through a review process,
11 should cost of service play any role in looking at
12 whether or not you view it as successful?

13 MEMBER JACKSON: Or how you view it before you
14 decide what to do next, assuming a going concern here
15 for the company.

16 DR. HEMPHILL: Yes, this may help to
17 understand our perspective. Costs don't disappear
18 because they are one of the key elements in what you are
19 going to want to look at, and that is only one of the
20 things you will look at is basically what is going on in
21 terms of the financial performance of the company. That
22 would certainly be a review.

23 In many jurisdictions, I apologize for not
24 knowing what's difficult here with the Board, but in
25 many jurisdictions annual reports are a regular filing.
26 They are nothing like the walls of evidence that come
27 from cost of service regulation in any rate case, but it
28 is information that I think is enlightening to a

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1 regulator such as the Board.

2 So, on an ongoing basis that information would
3 be available and certainly I would understand that it
4 would be a very important part of a review at the end of
5 the program or the first term of the program.

6 Now, part of that, a very important part of
7 looking at that are costs and another part are revenues.
8 Certainly that gives you an indication on how things are
9 going, what's going on in terms of the financial
10 viability of the company, but you would also be looking
11 at what the prices are doing, and I would imagine that
12 benchmarking and we can talk about what we mean by
13 benchmarking, if you want, but benchmarking of various
14 indicators as you are moving along and, as well, at the
15 end of the first program would play a very important
16 role in terms of seeing just how things are going in
17 terms of the services that are being provided to the
18 customers, as well as the prices that the customers are
19 paying in relation to what's going on in other parts of
20 the industry.

21 But when we say that we are encouraging the
22 moving away from cost of service, it's more along the
23 lines of the line items that you get into in terms of a
24 company under cost of service regulation is going to
25 basically take a look at everything they spend and see
26 whether or not this is going to be recoverable. So you
27 are focusing on recoverability of line items, rather
28 than focusing on the big picture.

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1 We encourage the movement towards more of the
2 big picture in terms of operating a business like a lot
3 of other businesses do that are competitive and not
4 regulated and moving away from the focus on the
5 individual line item costs and whether or not they are
6 going to meet the scrutiny of a very long process like
7 what we are going through here.

8 MEMBER JACKSON: Well, I will give you a
9 gratuitous comment. I think the process if it is long
10 here is because we are embarking on a new process. If
11 we were continuing with the old we might have people
12 that understood it and could move through it pretty
13 fast, but I am not saying that's a reason to stay with
14 the old.

15 I am just saying that when you look at a new
16 process for the first time, I don't see how you can be
17 too critical of the fact that it takes some reflection
18 of time.

19 DR. HEMPHILL: I apologize if you thought --

20 MEMBER JACKSON: I am not saying you were. I
21 think this is a general comment because I know we are
22 being hurried along and my colleague and I essentially
23 know on what issues we are not settled on for
24 approximately two weeks right now, and I think we have
25 done a pretty fast read, but that's just a personal
26 opinion.

27 I am trying to get my line around this new
28 method of regulation that this company wants to use and

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1 they have brought you in as experts to help us with it a
2 little bit. So that's my objective in pursuing some of
3 these questions with you.

4 I need to clarify whether you would be happy
5 to look at any financial reports which you say are
6 published, or whether you would want them purified to
7 remove the non-utility elements.

8 DR. HEMPILL: I just didn't catch the last
9 few words.

10 MEMBER JACKSON: Okay. Now, in Canada we have
11 been used to having utility operations which are price
12 regulated held within corporate entities that do other
13 business. Their other business, in some cases, has just
14 been to accumulate cash and have short-term investments,
15 but nonetheless we want to remove those sorts of things
16 and we want to look at financial statements for the
17 utility which is price regulated, don't we?

18 DR. SCHOECH: I think the answer to that would
19 be you would want to focus in on the regulated elements.

20 Having said that, there are some elements that
21 may have joint and common costs with those regulated
22 elements and so a financial statement, a legitimate
23 financial statement would have to look at the smallest
24 set of services that contains the regulated elements.

25 In other words, if there are activities that
26 have no joint and common costs with the regulated
27 activities, there would be no purpose for putting those
28 into the regulatory annual report, but there may be some

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1 lines that are so inextricably tied to the regulated
2 items that it would be appropriate to include those
3 then.

4 MEMBER JACKSON: But at least we would need or
5 probably benefit from the utility's help in preparing
6 statements that relate to the utility operations.

7 We are not going to just look at whatever
8 corporate financial statements are published, as your
9 colleague said. Is that right?

10 DR. SCHOECH: That's right.

11 MEMBER JACKSON: Thank you.

12 There is something else that I wanted to
13 clarify on what you said, too, but, I am sorry, it has
14 just slipped my mind. It may come back to me.

15 That is fair enough for now.

16 I am sorry, Mr. Thompson, but I just want to
17 nail some of this down, because it seems to me that it
18 is the only place that we get any outside opinion
19 supporting the company's position and I would like to
20 understand it clearly. Thank you.

21 MR. THOMPSON: Thank you, Dr. Jackson.

22 Just to complete this point, panel, you are,
23 then, as I understand you, supporting a requirement on
24 Union to provide cost information as part of the
25 monitoring and review process.

26 DR. SCHOECH: I think the types of information
27 that we would be recommending -- and it would be cost
28 data -- would be things like operating expense

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1 information, as well as revenue data.

2 MR. THOMPSON: All right. But in terms of
3 evaluating prices charged to rate classes or baskets,
4 that can't be done without some sort of either high
5 level or detailed cost allocation. Dr. Bauer makes that
6 point in the last paragraph of section 6.2. Do you
7 support a requirement on Union to provide that kind of
8 information?

9 DR. SCHOECH: These cost of service studies go
10 far beyond what we are recommending. I think he is
11 worried about issues of cross-subsidization, or, another
12 way of putting it, predatory pricing, and believes, I
13 believe, that in other industries that has been handled
14 satisfactorily through a complaint process, where if
15 someone has some concerns about predatory pricing the
16 Board can give some consideration to that. And if the
17 Board has some concern, it can ask for some clarifying
18 information.

19 MR. THOMPSON: We are talking about monopoly
20 services. Traditionally, the reasonableness of the
21 prices have been evaluated by reference to allocated
22 costs, and you suggest we should abandon that going
23 forward.

24 Do I understand you correctly?

25 DR. SCHOECH: Yes, we are going away from a
26 cost of service regime to a price cap regime, so, yes,
27 allocated costs like that I don't believe are
28 appropriate in that framework.

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1 MR. THOMPSON: We have disagreement there.

2 Let's move quickly to pricing flexibility and
3 baskets. Did you have any input into the pricing
4 flexibility and baskets which Union came up with?

5 DR. HEMPILL: I believe I did. You would
6 have to ask Ms Elliott just how much input. I do know
7 that our input was basically to say that you don't have
8 it set up so that everybody is in one basket, and that
9 it is typically divided between baskets, and then within
10 that basket there are side conditions. Just like what
11 we laid out in our testimony.

12 We didn't create the baskets. Union created
13 them. And I believe it was clearly long after we had
14 briefed them on that.

15 MR. THOMPSON: All right. There has been some
16 testimony filed, Exhibit B, Tab 2, Supplemental C,
17 describing Union's current position with respect to
18 pricing flexibility, and it is quite changed from when
19 they started. Have you had any input into the changed
20 parameters for pricing flexibility -- expert input?

21 DR. HEMPILL: Again, we continued to advise
22 them. We did not create this. They made the
23 adjustments. To what extent they took our advisement
24 into account in doing this, you would have to ask the
25 company.

26 MR. THOMPSON: Did you advise to reduce the
27 pricing flexibility or change it to 1.5 times the
28 cumulative impact of the overall price cap?

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1 DR. HEMPHILL: No.

2 MR. THOMPSON: Did you advise -- originally
3 they weren't proposing accumulations; now they are
4 proposing accumulations. Did you tell them to do that?

5 DR. HEMPHILL: We did not tell them to do
6 that.

7 MR. THOMPSON: And they originally had 10 per
8 cent pricing flexibility, and that is now gone. Did you
9 tell them to do that?

10 DR. HEMPHILL: We did not tell them to do
11 that.

12 MR. THOMPSON: All right. So I will take it
13 that your input on that topic was with respect to
14 principles, and how they proceeded to apply those
15 principles is something that you did not assist with.

16 DR. HEMPHILL: That is correct.

17 MR. THOMPSON: Quickly, earnings sharing -- as
18 I indicated previously, Dr. Bauer views this as a
19 measure to safeguard against mistaken choices in the
20 base or the parameters of the plan, and he describes it
21 as something that is linked to the stretch factor.

22 I took from your testimony yesterday that you
23 weren't asked to provide an opinion on the parameters of
24 an earnings sharing plan -- earnings sharing future.

25 DR. HEMPHILL: That's correct.

26 MR. THOMPSON: Is it fair to say that you have
27 nothing to offer by way of expert testimony on the
28 appropriate design of an earnings sharing feature if the

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1 Board finds that that is necessary in this case?

2 DR. HEMPHILL: That is a very different
3 question, I believe, than the first one you asked.

4 MR. THOMPSON: Yes, it is. Very different.
5 Do you have something to offer?

6 DR. HEMPHILL: Yes. We both consider
7 ourselves students of price cap regulation, so we have
8 thought about that quite a bit.

9 MR. THOMPSON: It is not in your testimony on
10 earnings sharing, I don't think, as to what approach you
11 support. Would you please tell us what is reasonable?

12 DR. SCHOECH: I think there are maybe three
13 principles that we believe are appropriate. The first
14 one is symmetry, because it is our belief that if there
15 is some uncertainty as to the appropriate parameters of
16 the price cap index, that uncertainty could go in either
17 direction: the price cap could be set too high or it
18 could be set too low.

19 The second one is that we believe that there
20 should be a substantial debt band where there is no
21 earnings sharing, because by that one continues to
22 incent the company in a way that a pure price cap plan
23 does. And then, beyond the debt band zone we would
24 recommend a sharing formula, say of something on the
25 order of 50 per cent for customers and 50 per cent for
26 the utility. If the Commission wished, we would have no
27 objection to having an upper limit pretty far out where
28 beyond that perhaps rates are kind of set back to the

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1 top of the earnings sharing limit.

2 MR. THOMPSON: Thank you.

3 Do you agree with Dr. Bauer that there is a
4 trade-off between the earnings factor and the X factor,
5 i.e., the higher the X factor the greater the share that
6 the company shareholder should get, and vice versa?

7 DR. SCHOECH: It seems to me that the earnings
8 sharing mechanism really doesn't have anything to do
9 with the X factor; it has to do with the uncertainty of
10 applying the parameters.

11 Now, there are some manual approaches that
12 have been proposed where there is a trade-off between
13 the X factor and the earnings sharing mechanism where
14 the company gets to choose its option, but that doesn't
15 say anything about a plan where there is no menu.

16 Again, the earnings sharing mechanism should
17 simply be viewed in terms of the uncertainty of the
18 plan.

19 MR. THOMPSON: All right. That is your view.

20 New services -- at page 16 of your testimony
21 you apparently agree with Union that revenues they get
22 from new services should be outside the scope of the
23 price cap. They just put those in their pocket.

24 Have I characterized your view correctly?

25 DR. SCHOECH: I think with any new services
26 there is a risk that they will lose money as well as
27 make money.

28 I think our view about having them outside the

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 scope of regulation is that I would envision new
2 services as being beyond the sort of essential
3 commodities and services that a public utility
4 commission is formed to protect customers over. I think
5 that is a good reason for limiting the price cap to
6 current services.

7 MR. THOMPSON: If the new services aren't
8 monopoly services, would you agree that they should be
9 brought into account?

10 DR. SCHOECH: I think the better view is
11 whether they are essential services or not.

12 MR. THOMPSON: What do you mean by essential
13 services?

14 DR. SCHOECH: If they were important for the
15 welfare of the public.

16 MR. THOMPSON: Let's just assume they are
17 monopoly services. Those revenues, should they be
18 brought in or left out, in your opinion?

19 DR. SCHOECH: If the company created a new
20 service that was essential to the welfare of the public,
21 I believe they should be brought in. If there are new
22 services which are discretionary, I think that there
23 would be no reason to regulate them under the price cap.

24 I will go back to telecommunications, although
25 I suppose I'm boring people. There are new services
26 that a telecommunications firm might provide, such as
27 colour ID, and they may have effectively a monopoly
28 position in terms of colour ID, but it is not really the

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 essential service function of the telephone firm. There
2 I wouldn't see why you would need to extend price cap
3 regulation to cover colour ID.

4 MR. THOMPSON: Thank you.

5 The last topic is service quality indicators.
6 You were asked some questions about this the other day.
7 Do you accept that a common feature of service quality
8 indicators is a penalty provision?

9 DR. HEMPHILL: You see that often in the
10 plans. That's correct.

11 MR. THOMPSON: You have taken the view that
12 there should be no penalty provisions in this particular
13 case? Is there some particular reason to Union why you
14 take that view?

15 --- Off record discussion

16 DR. HEMPHILL: As economists we believe that
17 there is -- any service quality program should be
18 symmetric and so that there should be awards as well as
19 penalties, number one.

20 Number two, we believe that the awards and/or
21 penalties should be based on the value that customers
22 place on whatever it is that is being tracked or the
23 cost/damages. Therefore, when we don't see information
24 such as that, we have a tendency to suggest that you
25 provide some other way in which to protect the interests
26 of the customers.

27 The manner in which the company has done it is
28 similar to a lot of programs where there is a monitoring

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Thompson)

1 and a mitigation program that includes a stakeholdering
2 process, interaction with customers and the regulator.
3 So we looked at what was proposed by Union and given the
4 lack of information, as we saw it, that was the best
5 approach.

6 MR. THOMPSON: Thank you, panel. Thank you,
7 Mr. Chairman, Dr. Jackson. Those are my questions.

8 THE PRESIDING MEMBER: Thank you,
9 Mr. Thompson.

10 Dr. Wightman and Mr. Motluk, if you have any
11 questions can you do it together?

12 DR. WIGHTMAN: Yes.

13 I would like to thank Ms Symes' for her
14 graciousness and the panel's indulgence in moving me out
15 of the normal order. I promise to be very brief. I
16 would also request to be excused upon the conclusion of
17 my questions. Ms Lea will be back.

18 THE PRESIDING MEMBER: Yes.

19 DR. WIGHTMAN: Thank you.

20 EXAMINATION

21 DR. WIGHTMAN: Panel, good afternoon.

22 DR. HEMPILL: Good afternoon.

23 DR. SCHOECH: Good afternoon.

24 DR. WIGHTMAN: I have just a few mainly
25 clarifying things I would like to get cleared up.

26 If I could refer to B, tab 3 of your evidence,
27 on the second page, under the heading 2.1 "Purpose and
28 Benefits, Price Cap Regulations".

SCHOECH/HEMPHILL/ELLIOTT, ex (Wightman)

1 DR. HEMPHILL: Yes.

2 DR. WIGHTMAN: Okay. You talk about attaining
3 higher efficiencies when things are working properly and
4 you mentioned productive and allocative efficiency.

5 DR. HEMPHILL: Yes.

6 DR. WIGHTMAN: And other things equal,
7 increases in efficiency are good. Would you agree with
8 that statement?

9 DR. HEMPHILL: Yes, we agree.

10 DR. WIGHTMAN: Then at line 17 you have a
11 sentence:

12 "Allocative efficiency is determined by
13 the extent to which consumer surplus has
14 increased." (As read)

15 DR. HEMPHILL: Yes, we see that.

16 DR. WIGHTMAN: So do I take from that if
17 something increases consumer surplus it increases
18 allocative efficiency?

19 DR. HEMPHILL: Yes.

20 DR. WIGHTMAN: Okay. Thank you.

21 Then in footnote (1) you have a bit of an
22 explanation of what consumer surplus is. You say:

23 "Economists refer to 'consumer surplus'
24 as the difference between the value
25 placed on a particular level of
26 consumption and the total amount paid for
27 such consumption." (As read)

28 I have that correct?

SCHOECH/HEMPHILL/ELLIOTT, ex (Wightman)

1 DR. HEMPHILL: Yes.

2 DR. WIGHTMAN: Now, bear with me for a second.
3 Would you agree that geometrically -- and this may help
4 or it may not, it's not essential -- that geometrically
5 consumer surplus is represented as the area under the
6 demand curve and above the price line?

7 DR. HEMPHILL: Yes.

8 DR. WIGHTMAN: Okay, because that effects
9 that.

10 Well then, for a given level of demand curve,
11 isn't the only way to increase consumer surplus by
12 lowering the price?

13 DR. SCHOECH: Perhaps our explanation of net
14 welfare was incomplete in terms of allocative
15 efficiency. The other element that one has to take into
16 consideration is the difference between price and
17 marginal cost of the commodity.

18 DR. WIGHTMAN: Thank you for that.

19 Can you tell me, having said that, are you
20 aware of any standard or necessary conditions in a
21 competitive market for allocative efficiency relating to
22 price and marginal cost?

23 DR. SCHOECH: Well, in a fully competitive
24 market, special welfare is maximized when all prices
25 equal marginal costs.

26 DR. WIGHTMAN: Thank you. When you say "all
27 welfare", you are saying producer surplus plus consumer
28 surplus.

SCHOECH/HEMPHILL/ELLIOTT, ex (Wightman)

1 DR. SCHOECH: I'm sorry. Yes.

2 DR. WIGHTMAN: Thank you.

3 Okay. Thank you. You have been very helpful
4 on that.

5 Very briefly now, yesterday, and I think it is
6 at page 992 with Mr. Thompson, you were having a
7 discussion I think about prices and costs. Now, this is
8 not directly related to what you discussed, but I would
9 just like to ask you, if we think of long-run
10 equilibrium as it is usually referred to, in a
11 competitive market where there is freedom of entry and
12 exit, if firms are making positive economic progress,
13 and I think you referred to this, that we have entry and
14 all factors are variable, in the end state, if we get to
15 a long-run equilibrium, is it your view that there is no
16 relationship between prices and costs?

17 DR. SCHOECH: No. I think my view, and I hope
18 I explained it clearly yesterday, was that the dynamics
19 of the market would align prices of outputs and prices
20 of inputs so that no economic profits were earned in
21 that industry, which is another way of saying that costs
22 would cover revenues and no more.

23 DR. WIGHTMAN: Thank you. I didn't know if
24 yours was just rates of change or not. Thanks a lot for
25 that.

26 I think I can get rid of this question from
27 what I heard. Did I understand you to say to
28 Mr. Thompson that you believe that, rewards and

SCHOECH/HEMPHILL/ELLIOTT, ex (Wightman)

1 penalties, there should be a symmetry, that if -- and
2 this would apply to the general plan. Correct?

3 DR. HEMPHILL: That's correct.

4 DR. WIGHTMAN: Thank you very much. That got
5 rid of that question.

6 Now, relating to Mr. Brett's cross-examination
7 yesterday, I think it is on page 885, line 20 of the
8 transcript, which I have lost, but I believe it dealt
9 with him inquiring about excess volatility leading to a
10 conclusion that there might not be a statistical
11 difference. I think that is what it was about, wasn't
12 it?

13 DR. SCHOECH: Yes, I believe that is right.

14 DR. WIGHTMAN: I read this and I wasn't quite
15 sure of one thing. I think you said something to the
16 effect at line 20, if -- and I will have to find my
17 transcript because that is all I wrote down. It's
18 really here somewhere.

19 DR. SCHOECH: Well, the paragraph I'm reading
20 says:

21 "If the series, in a statistical
22 sense, can't be distinguished from
23 zero..."

24 Is that the paragraph you are referring to?

25 DR. WIGHTMAN: Yes, that's it.

26 DR. SCHOECH: Okay.

27 DR. WIGHTMAN: Now, can I ask you, would it
28 have been possible to do a statistical hypothesis test

SCHOECH/HEMPHILL/ELLIOTT, ex (Wightman)

1 to see if you could accept or reject that based on the
2 data you had?

3 DR. SCHOECH: Yes, it would be.

4 DR. WIGHTMAN: Did you do that?

5 DR. SCHOECH: We did not, but we could.

6 DR. WIGHTMAN: Okay. Was there a reason you
7 didn't?

8 DR. SCHOECH: I felt that the data showed so
9 much variation from year to year that the statistical
10 "T" test would have definitely shown insignificance. I
11 think, as I pointed out in the testimony, there were
12 some big annual swings, both positive and negative, and
13 just a look at the data led me to believe that a "T"
14 test would have produced insignificance, but if the
15 Board would like that done I would be happy to do it.

16 DR. WIGHTMAN: And you would file the complete
17 test, like the levels of confidence used, et cetera, all
18 the assumptions?

19 DR. SCHOECH: I would certainly be happy to
20 conduct a "T" test of the data that I have and show the
21 standard errors and the 95 per cent confidence level if
22 that is what you would like.

23 DR. WIGHTMAN: Yes. And maybe the lower limit
24 of what would also not be rejected.

25 DR. SCHOECH: Yes.

26 DR. WIGHTMAN: Okay. Thank you.

27 THE PRESIDING MEMBER: Can we give it an
28 undertaking number, then?

SCHOECH/HEMPHILL/ELLIOTT, ex (Wightman)

1 DR. WIGHTMAN: Yes. Can we make that
2 Undertaking G7.2.

3 UNDERTAKING NO. G7.2: Mr. Schoech
4 undertakes to conduct a "T" test of the
5 data he has showing the standard errors
6 and the 95 per cent confidence level as
7 well as the lower limit of what would
8 also not be rejected

9 THE PRESIDING MEMBER: Thank you.

10 --- Off record discussion

11 DR. WIGHTMAN: Thank you very much. Can I ask
12 you a brief question: Do you regard firm and
13 interruptible delivery as different services or are they
14 pretty much the same?

15 DR. HEMPHILL: I view them as different
16 services.

17 DR. WIGHTMAN: And they are usually covered
18 under different rate schedules, aren't they?

19 DR. HEMPHILL: That is correct, yes.

20 DR. WIGHTMAN: You at your evidence on page
21 14 -- I hope I have this right. Mine is 18 to 20, if I
22 can read this. You are talking about service baskets:

23 "The number of baskets should also
24 depend, however, on the homogeneity of
25 services. Similar services should
26 generally be in the same basket while
27 dissimilar services should generally be
28 in different baskets." (As read)

SCHOECH/HEMPHILL/ELLIOTT, ex (Wightman)

1 Is that correct?

2 DR. HEMPHILL: That is correct.

3 DR. WIGHTMAN: You would not regard it
4 appropriate then to put firm and interruptible services
5 in the same service basket. Do I understand that?

6 DR. HEMPHILL: I hesitate to jump to that, but
7 certainly I can see where you would find interest in
8 looking at this line and seeing whether or not you would
9 define the interruptible and the firm as heterogeneous.

10 I would have to give it a little more thought,
11 but I can see where it is food for thought.

12 DR. WIGHTMAN: Great. Thank you.

13 One or two more and then I am done.

14 I believe yesterday someone referred
15 indirectly to what is called the average Johnson effect,
16 which I believe arose from an article published in the
17 American Economic Review in 1962. I believe the comment
18 was "I don't buy into it", or something like that.

19 Could I have some elaboration on that? Is the
20 American Economic Review a good or a top tiered journal?
21 Is there some problem with the analysis there or do you
22 just think it is not applicable? Just give me some
23 elaboration.

24 I believe in 1969 there was a technical
25 correction made to the paper by Takiyama(ph) in the same
26 journal, but I am not aware of any reputation of it on
27 the basis of it being flawed.

28 DR. HEMPHILL: I would not view it as flawed.

SCHOECH/HEMPHILL/ELLIOTT, ex (Wightman)

1 I can't remember what my exact words were, but one thing
2 I have said over the last couple of days is that I hate
3 generalizations.

4 In that context, I hate to say that it is
5 always going to be applicable. It is a line of argument
6 that has gotten a lot of attention and a lot of respect.
7 I do agree with that.

8 DR. WIGHTMAN: Thank you very much. I will
9 throw one more very general, which may have some
10 application. I believe it does.

11 If we think of a competitive market and we
12 think of supply/demand analysis and what they call
13 comparative statics, a shift in something and its impact
14 on price and quantities.

15 If we had a competitive market starting in
16 equilibrium and there were a decrease in demand, other
17 things equal, would that lead to a decrease in market
18 price?

19 DR. SCHOECH: Yes.

20 DR. HEMPILL: Yes.

21 DR. WIGHTMAN: Part (b): If we had a
22 competitive market and there was an increase in
23 productivity which resulted in a rightward shift of the
24 supply curve -- we would call it an increase in supply
25 actually -- would that result in a price decrease?

26 DR. HEMPILL: Yes.

27 DR. WIGHTMAN: Finally, if we had both of
28 these effects going on at the same time, would that

SCHOECH/HEMPHILL/ELLIOTT, ex (Wightman)

1 result in a price decrease?

2 DR. SCHOECH: Both a demand decrease and a
3 supply increase?

4 DR. WIGHTMAN: Yes.

5 DR. SCHOECH: Yes, the new equilibrium price
6 would be followed or --

7 DR. WIGHTMAN: Thank you very much, panel.
8 With that, I would like to be excused.

9 THE PRESIDING MEMBER: Thank you,
10 Dr. Wightman.

11 Mr. Motluk, do you have any questions?

12 MR. MOTLUK: Just a couple of clarifying
13 questions.

14 EXAMINATION

15 MR. MOTLUK: On page 28 of your report,
16 Table 3, you have an average price of total input
17 calculated from -- sorry.

18 On page 28 of your report on Table 3 you have
19 an average price of total input calculated for the 1986
20 to 1996 period. I presume in order to arrive at that
21 you actually did calculate an input price index for
22 Union.

23 DR. SCHOECH: Yes, that's right.

24 MR. MOTLUK: So I presume that you also
25 calculated the constituent components of that price
26 index: capital price index and materials price index --
27 well, the materials price index is actually just the
28 GDPPI, I believe -- and a labour price index as well.

SCHOECH/HEMPHILL/ELLIOTT, ex (Motluk)

1 DR. SCHOECH: That is correct; that over the
2 historical time frame, using the information provided by
3 Union and our other data sources, we did construct price
4 indexes.

5 MR. MOTLUK: Would it be possible for you to
6 provide the entire time series of the constituent
7 indexes and the total index and the weightings used to
8 calculate the total index?

9 Would it be possible for you to provide that?

10 DR. SCHOECH: Yes. I was just wondering
11 whether it might have been in our work papers, although
12 maybe buried.

13 The input price index is found on Table 5B.
14 That is Exhibit B36.25.

15 MR. MOTLUK: Okay. That has been provided in
16 another exhibit?

17 DR. SCHOECH: That's right.

18 MR. MOTLUK: That is the series from 1986 --
19 the total price index from 1986 to 1996.

20 DR. SCHOECH: That's correct.

21 MR. MOTLUK: Is that the index or is it just
22 percentage changes?

23 DR. SCHOECH: It's the index itself. The
24 percentage change was not computed in that spreadsheet.

25 MR. MOTLUK: It is the actual index that I am
26 interested in.

27 Are the constituent elements of that index
28 also reported?

SCHOECH/HEMPHILL/ELLIOTT, ex (Motluk)

1 DR. SCHOECH: Let me check.

2 --- Pause

3 DR. SCHOECH: As you indicated, the price of
4 materials is in the GDPPI.

5 MR. MOTLUK: Yes.

6 DR. SCHOECH: The price of capital is found on
7 Table 3B, in the last row, and the price of labour is
8 found on Table 2.

9 MR. MOTLUK: I apologize. I have not been
10 involved in this entire proceeding. I have only been
11 here for the past two days. So I apologize for asking
12 you for something you have already provided.

13 I would like to talk for a minute about the
14 output quantity indexes that you have calculated.

15 You have calculated a total output quantity
16 index, and as I understand it, from looking at Table 2
17 on page 23, what you have done is you have aggregated
18 indexes that represent quantities for distribution,
19 storage, transmission, et cetera, and you have done that
20 on the basis of looking at volumes and also on the basis
21 of looking at customers. Is that correct?

22 DR. SCHOECH: For distribution services we use
23 both volumes and customers, yes.

24 MR. MOTLUK: Looking at the output on the
25 distribution side, for example, if you were looking at
26 volumes or numbers of customers, did you do any further
27 analysis sort of breaking out distribution output by
28 class of customer, for example?

SCHOECH/HEMPHILL/ELLIOTT, ex (Motluk)

1 DR. SCHOECH: No, we did not.

2 MR. MOTLUK: Do you think that if you had done
3 that, that might have affected the PSP calculation that
4 you arrived at?

5 DR. SCHOECH: I honestly don't know if it
6 would have affected it or not.

7 MR. MOTLUK: Do you think that there is sort
8 of a differential input requirement for the different
9 classes of customers?

10 There are different rates for different
11 classes of customers, presumably because the costs of
12 providing services to those customers are different.

13 DR. SCHOECH: Yes.

14 MR. MOTLUK: You don't think there might be
15 some kind of relationship between the input that is
16 required to produce the output based on different class
17 of customer?

18 DR. SCHOECH: The question in terms of whether
19 it would have affected our overall results would be
20 whether the growth rates for individual customer groups
21 within the distribution services line of business would
22 have grown at different enough rates that constructing
23 an index of those different groups rather than using
24 total distribution volumes would have produced a
25 different result.

26 MR. MOTLUK: I guess that's essentially what
27 I'm asking. If that had happened and the resources
28 required to provide the outputs to those various groups

SCHOECH/HEMPHILL/ELLIOTT, ex (Motluk)

1 were differential, would that have an effect on your TFP
2 calculation?

3 DR. SCHOECH: Well, I'm perhaps answering the
4 question a little bit differently than the way you
5 intended, but the way I see it is that we have the input
6 data there. We know how many resources were actually
7 utilized during the historical time frame. What we are
8 trying to do is get a measure, an accurate measure of
9 those as well as getting an actual measure of the
10 outputs that were actually produced during that same
11 time frame.

12 MR. MOTLUK: So you just didn't think it was
13 an empirically interesting question to try to divide the
14 outputs into a finer level of classification and detail.
15 I mean, considering that there are different rate
16 classes for these customers, you didn't think it was
17 empirically interesting to determine whether that might
18 have an effect on the TFP?

19 DR. SCHOECH: I did not think to go down
20 that path.

21 MR. MOTLUK: Okay.

22 You also have output quantity indexes for --
23 or you calculated an output quantity index for storage.

24 DR. SCHOECH: Yes.

25 MR. MOTLUK: Now, I think I heard you say
26 yesterday that -- well, would it be possible for you to,
27 and did you in fact calculate TFP for different parts of
28 the operations of the company? For example, to look at

SCHOECH/HEMPHILL/ELLIOTT, ex (Motluk)

1 TFP for distribution and TFP for storage?

2 DR. SCHOECH: We didn't, because I don't
3 believe that that would be possible.

4 The reason is that the -- well, first of all,
5 I'm not sure that you can meaningfully divide up all the
6 inputs in a way that assigns those inputs to the
7 different lines of business. Even if you could, we
8 didn't have that information available.

9 But my sense is that there are common costs in
10 the provision of those services and then in that case
11 there isn't really a way of computing total factor
12 productivity for each line of business.

13 MR. MOTLUK: So I guess you're saying the
14 problem is on the measurement of the inputs --

15 DR. SCHOECH: Yes.

16 MR. MOTLUK: -- the input side?

17 DR. SCHOECH: Oh, yes.

18 MR. MOTLUK: So there is no way to separate
19 the input for the storage side of the business from the
20 transportation side of the business?

21 DR. SCHOECH: So there may be some inputs that
22 are specific to those lines of business, but you have to
23 be able to determine where all of the inputs go, and
24 that is the problem

25 MR. MOTLUK: Okay. Okay, that's fine.

26 There is just one other quick thing.

27 There was an issue that was discussed
28 yesterday and I sort of had a feeling it was left

SCHOECH/HEMPHILL/ELLIOTT, ex (Motluk)

1 hanging, and it relates around C19.28, which is your
2 response to the question -- I believe the question was:
3 Do you know of any price cap plans that proposed
4 negative X factors?

5 I think your response was that the price cap
6 plans for the regional electric companies in the U.K.
7 from 1990 to 1995 proposed some negative X factors.

8 There was a little bit of discussion around
9 that and then the issue just was kind of left hanging.

10 I think in your response you said you didn't
11 have any information about the individual companies, but
12 I think there has been some information about the
13 experience of those companies and the regulator from
14 that time period that has been published, and I was just
15 wondering if you knew -- if you could tell us, if you
16 know, what the experience was in terms of those
17 companies' profitability over that time period and if
18 you know the reason why, if you are aware, if that has
19 been discussed in the literature at all, the reason why
20 for the profitability performance of those companies and
21 for that time period?

22 DR. HEMPILL: Yes. Very generally, and then
23 I would have to go back and review because I look at it
24 every now and then.

25 First of all, I think -- well, we refer to the
26 British style price cap regulation is where the X factor
27 is set in a fairly different manner than what we have
28 been proposing here. The entire "X" is fairly

SCHOECH/HEMPHILL/ELLIOTT, ex (Motluk)

1 subjective. In fact, I once sat through a session with
2 the regulator at that time and he said that what he
3 tries to do in setting the "X"s is look in the eyes of
4 the company and see how much pain they have.

5 --- Laughter

6 DR. HEMPILL: I do believe there is a report
7 that we used in showing this range that was done by the
8 Electricity Association in England, and it may be in
9 that report or there could be other reports that were
10 covered by OFFER -- O-F-F-E-R, which was once the
11 regulator at that time -- and it indicated that in the
12 early stages where they had determined these X factors
13 in that manner that in some circumstances they found
14 that there were firms that were enjoying profits that
15 were beyond what they would have considered acceptable.

16 MR. MOTLUK: Do you know why that might be?
17 Did they identify any specific elements of the plan that
18 might have been responsible for that?

19 DR. HEMPILL: I would have to go back and
20 look again, but the plans were fairly -- it was an
21 RPI minus X structure, so they didn't change the RPI so
22 I would imagine it was the "X" that they were adjusting.

23 MR. MOTLUK: Do you know what the "X" in the
24 RPI minus X for the U.K. RECs is correctly?

25 DR. HEMPILL: That I better not state because
26 I have read it but I can't tell you what the range is
27 currently.

28 MR. MOTLUK: Could you provide that as an

SCHOECH/HEMPHILL/ELLIOTT, ex (Motluk)

1 undertaking?

2 DR. HEMPHILL: Sure.

3 MR. MOTLUK: Thank you.

4 Okay. That's all.

5 MEMBER JACKSON: Did you give it a number?

6 MS LEA: Thank you.

7 I am just wearing a single hat today and I
8 will assign it Undertaking No. G7.3, please.

9 That is an undertaking to provide the current
10 RPI and X factor for the companies that you have
11 discussed?

12 DR. HEMPHILL: Yes.

13 MS LEA: Okay.

14 UNDERTAKING NO. G7.3: Dr. Hemphill
15 undertakes to provide the current RPI and
16 X factor for the companies that have been
17 discussed

18 --- Pause

19 THE PRESIDING MEMBER: Thank you.

20 Ms Symes.

21 MS SYMES: Thank you.

22 CROSS-EXAMINATION

23 MS SYMES: You have spoken with Dr. Jackson
24 and a number of the intervenors that as we embark on a
25 process of introducing a price cap, a comprehensive PBR
26 for Union Gas, that for the regulatory officials that
27 uncertainty is a real problem. Is that fair?

28 DR. HEMPHILL: Yes, I would say that's fair.

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Symes)

1 MS SYMES: And that one of the obvious things,
2 perhaps your example from England and Wales, is that the
3 regulator doesn't want an unacceptable result.

4 DR. HEMPHILL: Correct.

5 MS SYMES: Unacceptable defined as the prices
6 are too high?

7 DR. HEMPHILL: Or too low.

8 MS SYMES: And the rate of return for the
9 utility is not politically acceptable?

10 DR. HEMPHILL: It's the word "politically"
11 that I have a problem with.

12 May I just state what I would view as
13 unacceptable?

14 MS SYMES: Sure.

15 DR. HEMPHILL: Bankruptcies on the part of the
16 companies and prices that are far higher than anywhere
17 else in the industry.

18 MS SYMES: Isn't one of the problems that
19 happened in England and Wales is that the companies
20 became very efficient quickly, much to the astonishment
21 of, perhaps the companies as well as the regulators?

22 DR. HEMPHILL: That did happen, yes.

23 MS SYMES: Now, as we embark on establishing
24 the first price cap, the regulator here is faced with
25 what are we going to choose for inflation and what are
26 we going to choose for the "X", the productivity factor?

27 DR. HEMPHILL: That's correct.

28 MS SYMES: That leaves the first two key

SCHOECH/HEMPHILL/ELLIOTT, cr-ex (Symes)

1 decisions.

2 And would you agree with me that they should
3 make those decisions based upon the best possible
4 evidence available to them?

5 DR. HEMPHILL: Yes.

6 MS SYMES: So let's look, first of all, to
7 inflation.

8 Union proposes to fix inflation at 1.6 per
9 cent in each year, over five years. That's their
10 proposal.

11 DR. HEMPHILL: Correct.

12 MS SYMES: And you told Mr. Thompson,
13 yesterday, that when you came to Union, you said, "You
14 should have inflation float with the actual inflation --
15 "I" float with the actual inflation."

16 DR. HEMPHILL: Yes, but that was our
17 recommendation.

18 MS SYMES: And I gather, from your evidence,
19 that in your review of the PBR mechanisms "I" is usually
20 set to the annual GDPPI not fixed over five years in
21 advance.

22 DR. HEMPHILL: Yeah. In response to, I
23 believe, one of the interrogatories, there are a few
24 examples that you can find of the fixed escalator but,
25 usually, it does float.

26 MS SYMES: Well, in fact, if you look at, I
27 think it's both page 11 in your evidence, but if you
28 look at Union's evidence, in Appendix B1 -- that's the

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1 lists of the experience -- maybe it's yours -- of the
2 various plans. The only one that I could find was the
3 northwestern utilities in Alberta, on page B1, that had
4 a price cap fixed at .5 per cent, 1 per cent, 1 per cent
5 and 2 per cent, over the 1999 to 2000 period.

6 DR. HEMPHILL: We did respond to -- either we
7 or Union responded to an interrogatory on this and I
8 thought we found at least one other.

9 MS SYMES: Okay. But let's deal with this
10 one, first.

11 Would you agree with me that although the
12 price cap is fixed over the term, it's not clear how
13 they arrived at it or what they set "I" or "X" to during
14 the five-year period?

15 DR. HEMPHILL: Not based on this, no.

16 MS SYMES: Okay. And you think there's one
17 other?

18 DR. HEMPHILL: Well, let's find the
19 interrogatory.

20 --- Pause

21 MEMBER JACKSON: Could you look at
22 Interrog G3.39. That may be --

23 MS SYMES: Number two...?

24 MEMBER JACKSON: C3.39.

25 --- Pause

26 MS SYMES: So, in that one, Exhibit C3.39, you
27 refer to: Bay State Gas agreed to fix increases in
28 absolute dollar amounts and Consumers Energy and

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1 Michigan Consolidated Gas were put on a PBR program with
2 a multi-year price freeze.

3 So, in those cases, they set the price cap, as
4 opposed to dealing with inflation and productivity
5 factors?

6 DR. HEMPHILL: Correct. I wanted to make sure
7 I had a chance to review this.

8 MS SYMES: All right. So the three examples
9 that have been given, the regulator has come up with
10 some increases or escalations in the price cap where the
11 methodology, at least from the materials we have, is not
12 known as to what the "I" was or what the "X" is?

13 DR. HEMPHILL: Yes, at least from these
14 materials, that's correct.

15 MS SYMES: Right. And you said that you were
16 convinced by Union that, as a result of their
17 consultations, that their customers would be happier,
18 happier campers, if the prices were steady over the
19 five-year period?

20 DR. HEMPHILL: Yes, the convinced me of that.

21 MS SYMES: And if intervenors are objecting to
22 the fixing of the inflation rate over a five-year period
23 and, instead, wanted to float with actual inflation
24 rates, I presume you would go back to your principal
25 position?

26 DR. HEMPHILL: Yes; when I heard that it
27 wasn't being received as well as everyone thought it
28 would, I was surprised, but I agree that if that's the

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1 position, certainly, if the rationale is to best serve
2 the interest of the customers, it's not doing that if
3 they say it's not.

4 MS SYMES: And that's because the actual
5 inflation would be the best evidence available, as
6 opposed to an approximation?

7 DR. HEMPHILL: Well, both is using the best
8 estimates available, at this time.

9 MS SYMES: But going forward for five years to
10 use actuals will produce more reliable evidence than
11 estimations?

12 DR. HEMPHILL: Well, yes, inflation is what it
13 is each year but, at this point in time, in setting the
14 fixed price escalator, they are using the best
15 information available, as well.

16 MS SYMES: Now, in terms of "X", obviously,
17 the best measure of "X" would be an external indicator.
18 Do you agree with that?

19 DR. SCHOECH: Yes; we would want one that
20 couldn't be manipulated or affected by the company's
21 performance during the terms of the price cap plan.

22 MS SYMES: And I gather that you said that you
23 didn't use Statistics Canada because their data was not
24 published?

25 DR. SCHOECH: Well, I believe I said the
26 reason was because it was of uncertain precision, not --
27 I mean just because it was unpublished by itself didn't
28 disqualify it; it was because it was of questionable

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1 precision.

2 Now, we could have -- I'm sorry.

3 MS SYMES: Did you make any enquiries of them,
4 as to the degree of precision they thought of their
5 data?

6 DR. SCHOECH: No, I didn't.

7 In looking at it, it -- I had my own concerns
8 about a series that was showing a negative 2.3 per cent
9 productivity growth and I just didn't think that that
10 was likely to be the case of the true industry
11 productivity trend. Or, another way of putting it: I
12 didn't really envision coming in here and saying that
13 the "X" factor should be a -- well, it would be plus 2.6
14 per cent or -- I'm sorry -- letting prices rise faster
15 than inflation by 2.6 percentage points per year.

16 MS SYMES: But let me ask you: Did you ask
17 Statistics Canada to do any specific runs for you, with
18 respect to the years, for example, 1997, 1998 or 1999?

19 DR. SCHOECH: Well, I didn't request
20 Statistics Canada to do anything, and I doubt if they
21 would.

22 MS SYMES: Well, have you ever worked with
23 Statistics Canada, in the past?

24 DR. SCHOECH: No.

25 MS SYMES: So are you aware as to whether or
26 not they do or do not do specific runs, upon request,
27 when paid?

28 --- Pause

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1 MS SYMES: Do you know whether or not you can
2 pay Statistics Canada to do specific runs?

3 DR. SCHOECH: I knew that we had paid
4 Statistics Canada to get the data that we did get. I
5 guess I don't know if they can do -- if they are willing
6 to do special studies, other than say the studies they
7 have already done for the gas distribution industry.
8 The latter I don't know.

9 MS SYMES: Then, in looking to predict for the
10 PBR period you looked at the historic data from 1986 to
11 1996 because -- and you have given us the reasons.
12 That's the data that was available to you, the
13 compounding problems of Centra and Union and I think
14 those were the two reasons that you had given.

15 You agree with me that in the period 1986 to
16 1996 Union was regulated under the cost of service
17 during that time?

18 DR. SCHOECH: Yes.

19 MS SYMES: And so that there were no
20 particular incentives in that 10-year period to be
21 efficient?

22 DR. SCHOECH: Well, I don't understand the --
23 I know the specifics about regulation in the Province of
24 Ontario. I would expect that there would be a prudence
25 review of expenditures that would cause the Board some
26 concern.

27 MS SYMES: Well, would you agree with me that
28 the history of Union's conduct from 1986 to 1996 may

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1 well not be a good predictor as to how they conduct
2 business moving forward from year 2000 to 2004?

3 DR. SCHOECH: I would agree it's not a good
4 predictor and that isn't what we used. We added a
5 stretch factor to the historical performance and that
6 stretch factor is what accounts for the improved
7 expectations during the PBR regime.

8 MS SYMES: I am going to come to the stretch
9 factor in a moment, but with respect to the historical
10 figures are not a good predictor moving forward into the
11 PBR period of 2000 to 2004?

12 DR. SCHOECH: Well, I have to go back to the
13 stretch factor because the stretch factor is what you
14 would expect the improvement in total factor
15 productivity to be during the PBR period.

16 I mean the stretch factor isn't just the
17 number you happen to add on after you account for
18 inflation and productivity. What it is is an expected
19 improvement in productivity growth during the PBR
20 regime.

21 MS SYMES: Let me just understand. Dr.
22 Schoech, you are saying then that what the Board should
23 take from your evidence is that the improvement to be
24 expected of Union from its performance of 1986 to 1996,
25 first of all with a three-year gap and going forward
26 from 2000 to 2004 is 0.4 per cent?

27 DR. SCHOECH: That the improvement --

28 MR. PENNY: I am sorry, but this question has

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1 now been asked three times. We are not getting
2 anywhere, Mr. Chairman.

3 MS SYMES: Well, with respect, I haven't asked
4 that question. That's an entirely different question
5 and Mr. Schoech has answered a different question.

6 THE PRESIDING MEMBER: Let's carry on for a
7 moment and see where we go.

8 DR. SCHOECH: What my expectation is is that
9 beginning with the PBR plan that Union's productivity
10 would increase relative to what we observed under cost
11 of service regulation at 0.4 per cent per year. Now,
12 that's a compounding effect.

13 I think the nature of your question was
14 indicating that the total performance at the end of --
15 the total improvement at the end of five years would be
16 a cumulative amount of 0.4 per cent and that is not what
17 I am saying. It would be an improvement that cumulates
18 at a rate of 0.4 per cent per year.

19 MS SYMES: But, Mr. Schoech, you have
20 testified that when you re-examined the data from 1986
21 to 1996, in fact, the productivity at Union was higher
22 at the end than it was at the start of the period?

23 DR. SCHOECH: That the productivity was higher
24 at the end than at the start of the period?

25 MS SYMES: Yes. That was your evidence.

26 DR. SCHOECH: Yes, I believe the primary study
27 showed that there was a rate of productivity growth at
28 0.1 per cent per year and that means that productivity

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1 would be higher at the end than at the beginning.

2 MS SYMES: And you say, of course, we can't
3 tell anything what happened in 1997, 1998 and 1999?

4 DR. SCHOECH: I was not able to do anything
5 with what Union said they would be able to give me.

6 MS SYMES: And as we begin the PBR period we
7 heard that there were three reasons for the productivity
8 of Union being what it had been, a negative 0.8. Number
9 one was decreased volumes per customer. Number two was
10 legislation, such as pay equity, and number three were
11 initiatives such as DSM. Were you advised by Union that
12 these were parts of the reasons or the reason was
13 productivity had been minus 0.8 per cent?

14 DR. SCHOECH: I'm sorry, do you mean minus 0.8
15 or minus 0.4, which is the weighted average of the two
16 studies?

17 MS SYMES: Well, minus 0.4 is the weighted
18 average, sure.

19 DR. SCHOECH: Okay. With regarding to the
20 declining use per customer, certainly that's what I
21 observed.

22 MS SYMES: Were you told about the legislative
23 change of pay equity?

24 DR. SCHOECH: No.

25 MS SYMES: Were you told about DSM?

26 DR. SCHOECH: No.

27 MS SYMES: And obligations due DSM?

28 DR. SCHOECH: No.

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1 MS SYMES: Would you agree with me that if
2 those factors are not major changes for Union starting
3 the PBR period, they are not explanations for retarding
4 productivity in the PBR period?

5 DR. SCHOECH: Could you repeat the question?
6 I got lost.

7 MR. PENNY: Is the question asking Mr. Schoech
8 to assume that there is no declining use per customer?

9 MS SYMES: No, no. We are not doing that. We
10 are doing the last two.

11 I want you to assume that Union achieved pay
12 equity in the early 1990s and so that going into the PBR
13 period of 2000 to 2004 that is not an additional
14 requirement.

15 MR. PENNY: He has already said he doesn't
16 rely on that.

17 MS SYMES: I am not asking him to rely on it.

18 Would you agree with me that that factor which
19 was given as a reason for a productivity of minus 0.4
20 per cent would no longer be operative?

21 DR. SCHOECH: Well, to the extent that that
22 particular program is no longer operative that would
23 have one impact, but at the same time there may be other
24 obligations that Union would incur in the future,
25 depending upon whatever happens.

26 I think what they were explaining, they were
27 trying to give an explanation as to why it declined
28 during that period. I mean, you could have a sequence

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1 of things like that which would happen one after the
2 other on a regular basis, and so what would happen is
3 that the first event would disappear, but then if the
4 new event appears you will still have the same end
5 results.

6 If under this assumption that you would like
7 to make one of these programs that retarded productivity
8 disappeared and no other program like it reappeared,
9 then the answer is the rate of productivity growth would
10 increase.

11 MS SYMES: Now, in terms then of -- you have
12 been taken through the number of changes that have
13 happened to Union since you stopped analyzing the data,
14 that is 1986 forward. For example, the separation of
15 the merchant function, the removal of ancillary
16 functions from the regulated utility commencing January
17 1, 1999 and the concurrent application to unbundle
18 upstream transportation and storage and potential
19 changes to the scope of business activities and the way
20 that Union does business.

21 My question to you is: As Union goes forward
22 in the year 2000 to 2004 would you agree with me that
23 these changes may well affect the calculation of "x",
24 the productivity factor?

25 MS ELLIOTT: May I just request -- sort of
26 make a correction to your question? You referred to the
27 separation of the merchant function. The separation
28 that Union has undergone is the separation of the

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1 ancillary program from the distribution business and the
2 shared services and merger with Centra.

3 With respect to the separation of the merchant
4 function, I am not sure what reference you are making to
5 that.

6 MS SYMES: The thing I am referring to is the
7 beginning to -- the ongoing process of unbundling the
8 commodity function from the utility functions in terms
9 of bundled "T" and a variety of other services and the
10 introduction of marketers into your franchise area.

11 MR. PENNY: I think the evidence, Ms Symes, on
12 that is that that happened -- that did not happen in the
13 1997, 1998 and 1999 period. That happened starting
14 in 1985.

15 MS SYMES: Ms Elliott, would you agree with me
16 that the separation of the merchant function has in fact
17 accelerated in 1997, 1998 and 1999?

18 MS ELLIOTT: I can't agree with you in that
19 respect. We have had direct purchase on our system
20 since 1987, and it has been growing during the period.
21 Whether it has grown at a faster rate in 1997, 1998 and
22 1999, I can't say specifically whether that has been the
23 case.

24 MS SYMES: Let's take the other matters, then.

25 MS ELLIOTT: But the cost of gas is not
26 included in this analysis. This is an analysis of
27 distribution revenues, distribution costs. The cost of
28 gas and the upstream transportation costs are not

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1 included in the total factor productivity study.

2 MS SYMES: Let's take off that function, and
3 let's look, then, at the removal of the ancillary
4 functions from the regulated utility which commenced
5 January 1, 1999, the concomitant unbundling upstream of
6 transportation and storage, and the future plans to move
7 things like the bearing functions out of the utility.
8 Would you agree with me that these functions, which are
9 post-1996, post your analysis, and perhaps moving into
10 the PBR period, will in fact impact on the calculation
11 of X?

12 MEMBER JACKSON: For what time period?

13 MS SYMES: For the period 2000 to 2004.

14 As you sit here today and begin to set it for
15 that period.

16 DR. SCHOECH: The problem that I have in
17 answering this question is, when we looked at the
18 long-term trend I am guessing that there were other
19 initiatives that Union took on a one-time basis that had
20 some ramifications. And, as you go through time, there
21 will be not only these programs that you are talking
22 about, but others. It is not clear to me that --

23 In order not to have declining volumes per
24 customer lead to even greater productivity declines, you
25 have to undertake some programs like this on a regular
26 basis. I would think that these things are one of a
27 sequence of events that have happened historically.

28 Now, if this was an unusual event, way beyond

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1 what Union had ever done before in terms of management
2 initiatives and activities, there would be a one-time
3 bump-up in the level of total factor productivity
4 growth -- I'm sorry, the level of total factor
5 productivity. In other words, there would be a one-year
6 increase in the productivity growth rate, and then you
7 would be going back to the same trend rate. You have to
8 have programs regularly occurring to have a cumulative
9 effect that would affect a growth rate.

10 MS SYMES: Dr. Schoech, I presume that you are
11 in no position to tell this Board what changes Union has
12 done from 1986 to 1996.

13 DR. SCHOECH: I cannot identify particular
14 programs, no.

15 MS SYMES: One of the terms of your
16 retainer -- and the evidence is found in Exhibit
17 C3.40 -- was to review Union's proposal for service
18 quality indicators and provide an opinion as to the
19 reasonableness of these assumptions, based on Union's
20 support and experience in other jurisdictions.

21 In fact, that was your retainer?

22 DR. HEMPHILL: Yes, that's what it says.

23 MS SYMES: Yes, but it was as well?

24 I know that is what it says, but that was your
25 retainer?

26 MS ELLIOTT: That is what their letter of
27 agreement indicated that the scope of their agreement
28 would be.

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1 MS SYMES: And that is what you did?

2 DR. HEMPHILL: Yes, that's what we did.

3 MS SYMES: I would like to ask you to turn,
4 then, to Exhibit B, Tab 2, beginning, I guess, on
5 page 63. It is the actual evidence that begins,
6 probably, on pages 60 and 61.

7 As part of the service quality indicators,
8 Union is proposing a sharing savings mechanism, an SSM,
9 as part of its five-year DSM plan. Did you create the
10 SSM program that is in this evidence?

11 DR. HEMPHILL: No, we did not.

12 MS SYMES: Did you review this SSM program
13 that is in this evidence?

14 DR. HEMPHILL: We have reviewed it, but we did
15 not review and advise Union on it.

16 MS SYMES: In looking through your background,
17 I don't see any experience that either of you have had
18 in DSM programs. Is that fair?

19 DR. HEMPHILL: No, it's not fair for me. I
20 was director of pricing at Niagara Mohawk and DSM was a
21 major program there.

22 MS SYMES: Were you responsible for the DSM
23 program at Niagara Mohawk?

24 DR. HEMPHILL: I wasn't the person responsible
25 for it, no.

26 MS SYMES: Were you responsible for the shared
27 savings mechanisms at Niagara Mohawk that were
28 instituted?

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1 DR. HEMPHILL: No, I wasn't --

2 MS SYMES: Or were they after your time?

3 DR. HEMPHILL: It was through my time, but I
4 was not responsible for them. Although, we had to be
5 familiar with them because they were part of the
6 pricing.

7 MS SYMES: Are you, then, in a position to
8 give your expert opinion with respect to the SSM program
9 proposed by Union in this case?

10 DR. HEMPHILL: I don't think it would be
11 appropriate because it wasn't part of our testimony.

12 MS SYMES: It may not have been, sure.

13 You have given no pre-filed evidence with
14 respect to the SSM program.

15 DR. HEMPHILL: That's correct.

16 MS SYMES: But I did notice that it was part
17 of your terms of engagement.

18 DR. HEMPHILL: If you are referring to the
19 service quality indicators, yes. What we looked at was
20 the way in which the service quality program was built
21 into the five-year price cap program.

22 MS SYMES: Are you saying, then, that you
23 looked at the other service quality indicators and gave
24 opinions, but you didn't give an opinion about this
25 particular SSM?

26 DR. HEMPHILL: What I gave an opinion about
27 was the package. The identification of the individual
28 indicators was something that was done without our

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1 advisement or review. We took as a given that these are
2 the service quality indicators, as they were described,
3 and we provided advice as to how they could be
4 incorporated into the price cap program.

5 Regarding the shared savings, we did not get
6 into the specifics of the shared savings mechanism.

7 MS SYMES: So I presume, then, that you did
8 not look at the other shared savings mechanism that has
9 been approved in Ontario; the SSM for Enbridge?

10 DR. HEMPHILL: That's correct.

11 MS SYMES: You did not look at it.

12 DR. HEMPHILL: That is correct.

13 MS SYMES: And you did not look at, then, the
14 criticisms of Dr. Bauer on page 45 of his evidence?

15 DR. HEMPHILL: I did read it.

16 MS SYMES: Did you review the criticisms of
17 Chris Neime on page 3 of the SSM mechanism -- proposed?

18 DR. HEMPHILL: That name does not ring a bell.

19 MS SYMES: First of all, would you agree with
20 me that it is not symmetric, in the sense that it does
21 not pivot around the forecast?

22 DR. HEMPHILL: I have no knowledge at this
23 point --

24 MR. PENNY: Mr. Chairman, Mr. Hemphill has
25 already indicated that he was not retained to review
26 this document. I am not sure what the point of asking
27 him a bunch of questions about it is now, given that he
28 said he didn't advise on it.

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1 MS SYMES: I'm sorry, I misunderstood him. I
2 actually had understood that he said that he thought
3 these were appropriate SQIs, and he has specifically
4 said that one of the indicia of an SQI is that it be
5 symmetric.

6 THE PRESIDING MEMBER: What I heard Dr.
7 Hemphill say was that they had given some general advice
8 on SQIs and the structure of SQIs, but he had not worked
9 on the specifics of the SSM/SQI. So I don't know
10 whether he had any more detailed information, but that's
11 what I think I heard him say.

12 DR. HEMPHILL: Thank you. That's correct.

13 MS SYMES: Then you are in no position to
14 comment with respect to any of the specifics in the
15 design of the SSM plan proposed by Union.

16 DR. HEMPHILL: That is correct.

17 MS SYMES: Those are my questions. Thank you.

18 THE PRESIDING MEMBER: Thank you, Ms Symes.
19 Dr. Jackson.

20 MEMBER JACKSON: I will try to be as brief as
21 possible.

22 I wonder if you would turn up Exhibit C1.75
23 please. Gentlemen, had you seen this response before?

24 DR. SCHOECH: No.

25 MEMBER JACKSON: I guess what I would like to
26 ask you is under a PBR mechanism would you agree that
27 there need to be strong incentives put in place for
28 senior management in order to accomplish the

1 productivity gains that you think come along with a PBR
2 mechanism?

3 DR. SCHOECH: I would say that strong
4 incentives for senior management are certainly a very
5 good way of achieving those gains, yes. If incentives
6 aren't provided to senior management, then the
7 difficulty comes in getting management to act in ways
8 that benefit the overall corporation.

9 MEMBER JACKSON: Did you have any discussion
10 with Union about changes that might occur in terms of
11 incentives through senior management under a PBR
12 process?

13 DR. SCHOECH: No, we did not.

14 MEMBER JACKSON: In your experience, such
15 incentives, though, would have to be in place in order
16 to -- it wouldn't be just enough, would it, to have the
17 incentives that we have been talking about with respect
18 to price flexibility and other freedoms that occur for
19 the company under a price cap methodology? You would
20 have to impose management incentives as well, wouldn't
21 you? You can't just have the first without the second,
22 the second being management incentives.

23 DR. HEMPHILL: It would certainly be
24 preferable. Yes.

25 --- Pause

26 MEMBER JACKSON: I guess what I would like to
27 do is turn the question around and ask you to speak from
28 your experience whether it is possible to get these

1 productivity improvements to a large extent by putting
2 in place an appropriate incentive scheme for management.

3 Does one have to reach all the way in terms of
4 the freedoms of a price cap mechanism in order to get
5 these productivity improvements or should we be able to
6 get them under other more traditional forms of
7 regulation, such as cost of service regulation or some
8 amalgam of that and price flexibility? Should we be
9 able to get those productivity achievements if we look
10 carefully at what management incentives there are to get
11 them?

12 DR. HEMPHILL: I guess, just to make sure I
13 understand, at the high level you have the proper
14 incentive structure. Are you saying it must flow
15 through in management in order to --

16 MEMBER JACKSON: Those were the first
17 questions I asked you, would it be any good to introduce
18 all of these incentives at the rate of return level if
19 you didn't somehow link them to management incentives so
20 that your management performed in accordance with
21 achieving these productivity goals and getting a better
22 return for the shareholders. But then I said could we
23 turn it around and could we look and see whether we
24 could get significant productivity improvements if we
25 merely focused on management incentives. In other
26 words, if they can come up with these productivity gains
27 we would give them huge bonuses.

28 DR. HEMPHILL: I understand the question now.

1 Don't change the regulatory structure but change the
2 manner in which management is compensated.

3 MEMBER JACKSON: Yes. I realize it is
4 hypothetical to a certain extent, but I'm saying, yes,
5 let's take that because that is sort of a -- holding as
6 many other things equal as we can in order to try to get
7 a grasp on this problem, can we say that we will assume
8 that we don't change the method of regulation and that
9 we just try to put in better management incentives?

10 DR. HEMPHILL: It is an interesting question.
11 I can't say that I have thought of it that way.
12 Certainly, any incentive structure is preferable to a
13 structure without incentives. To the extent that it
14 will accomplish the same end, can you answer that?

15 DR. SCHOECH: Well, I will try. Actually, I
16 will draw on my experience from another industry.

17 One of our clients is the United States Postal
18 Service. For the last few years they have had an
19 incentive mechanism for management which is called EVA.
20 It is a scheme that basically gives a payout based upon
21 the net income generated. That has had some
22 productivity performance.

23 But the postal service is still under
24 cost-of-service regulation and there are still limits to
25 the productivity gains that they have been able to
26 generate throughout the corporation. Quite honestly,
27 under cost-of-service regulation, you cannot in the
28 situations where the EVA formula would generate a nice

1 income to the senior management, but the Board would
2 have to go along and see costs rising and raise rates.
3 So I guess I'm a little concerned about a program where
4 you just incent senior management to make money but
5 still retain the cost-of-service framework.

6 MEMBER JACKSON: Please comment on this. On
7 the face of it, though, it sounds as if we are talking
8 about incentives for senior management that don't
9 somehow link to the productivity measures that hopefully
10 we have all been understanding in this discussion until
11 now.

12 DR. SCHOECH: Yes. I think that the
13 disconnect is that one way that senior management has
14 been able to generate net income maybe to hold off on
15 making necessary expenditures for a few years, have a
16 nice net income, then, when the costs are needed to be
17 made, they come in to the Commission and say, "Now we
18 need to raise rates."

19 MEMBER JACKSON: How would that be different
20 under the PBR process?

21 DR. SCHOECH: Under the PBR process they could
22 not come back to you and say, "Well, now it is time to
23 raise rates." They would have to abide by the price cap
24 mechanism.

25 MEMBER JACKSON: For several years --

26 DR. SCHOECH: Yes.

27 MEMBER JACKSON: -- until there was a
28 rebasing.

1 DR. SCHOECH: Until there was a rebasing. I
2 think at the time of the review a recommendation would
3 be not to simply look at the firm's costs and say,
4 "Okay. Now we are going to true-up to the firm's
5 costs", but rather, as my colleague was talking about,
6 look at benchmarks to see what sort of adjustments, if
7 any, are necessary.

8 MEMBER JACKSON: And the benchmarks would
9 hopefully be external benchmarks, I think you have
10 commented as well.

11 DR. SCHOECH: That's right.

12 MEMBER JACKSON: Okay. I thought the other
13 day Mr. Thompson might be looking for analogies between
14 determination of a price cap number and the
15 determination of an appropriate target rate of return in
16 a cost-of-service hearing. Maybe the analogy isn't so
17 tight.

18 Nonetheless, you have said that we start off
19 with a cost basis but then for the part of the rates
20 which are under price cap regulation we then don't need
21 to look at costs for a few years, I think is basically
22 what you are saying, and I'm not sure whether you -- I
23 think you have committed to the fact that one has to
24 have some eye on costs at the end again. But going
25 through this, we have several different aspects of the
26 proposal where the company is saying it will take on
27 some more risks but here is where the limits are on some
28 of those risks and we have talked about that in

1 connection with the return on equity.

2 I am just wondering, in your discussions with
3 the company, did they tell you that whatever they came
4 up with in a price cap formula would somehow have to
5 have some reasonable expectation of achieving some sort
6 of a rate of return on this fixed equity component of
7 their capital structure?

8 DR. HEMPHILL: We never had such a discussion
9 with the company.

10 MEMBER JACKSON: Ms Elliott, maybe I could ask
11 you at this moment: Was that part of your analysis in
12 deciding the appropriateness of the stretch factor?

13 MS ELLIOTT: You are asking if I used a
14 targeted rate of return to come up with the stretch
15 factor?

16 MEMBER JACKSON: Yes, if it was one of the
17 considerations, for example, in doing balance sheet
18 forecasting or some kind of forecasting over the next
19 five-year period.

20 MS ELLIOTT: No, it wasn't. We really did
21 just look at our ability to manage the risks that we
22 thought we might encounter during the five-year term and
23 look at the 1.9 or the 2.0 per cent price cap as a
24 reasonable revenue stream under which we would manage
25 the risks -- and I should say, I guess, in conjunction
26 with the elimination of the deferral accounts.

27 So the revenue from new services or
28 transactional services, as well as the price cap, gave

SCHOECH/HEMPHILL/ELLIOTT

1 us a revenue stream that we looked at against the risks
2 that we were managing.

3 MEMBER JACKSON: Am I right, though, that it
4 would be Union's position that in this process it is
5 going to take on more risks?

6 MS ELLIOTT: To the extent that we are not
7 coming back on an annual basis to reset rates, to
8 respond to normal than warmer weather, to respond to
9 increases in costs for wage settlements, in response to
10 capital expansion, yes, we are taking on more risks.

11 MEMBER JACKSON: In order to sell this concept
12 of PBR internally, you are saying you didn't have to
13 justify it in terms of an improved rate of return on
14 equity for those additional risks taken.

15 MS ELLIOTT: Not a specifically targeted rate
16 of return. We looked at the revenue stream and said
17 given the risks that we thought or could assess the
18 probability of occurring over the five-year period, the
19 revenue stream gave us what we needed to manage those
20 risks.

21 MEMBER JACKSON: Thank you. I think I can
22 pass on any other questions, given the time of day.
23 Thank you very much for your attention.

24 Mr. Dominy may want to second me on this or
25 say his own thanks, but thank you very much for coming
26 to Toronto and talking with us about this subject.

27 DR. SCHOECH: Thank you for listening to us.

28 DR. HEMPHILL: Thank you very much.

1 THE PRESIDING MEMBER: I have two very
2 straightforward questions.

3 I believe you said that the stretch factor --
4 in fact, I believe it is in your evidence -- is the
5 subject of negotiation. I think you even used the word
6 politics in it somewhere. And you said that the British
7 regulators had said they looked in the eyes to see how
8 much pain they would accept, was the way they decided,
9 but this is a different process here.

10 What sort of information do you think the
11 Board here needs in order to be able to judge that the
12 stretch factor is reasonable or not?

13 DR. HEMPHILL: The first answer that comes to
14 the surface is that the process that you are going
15 through here right now, the evidence that is being put
16 on the record by the company as well as all other
17 stakeholders, I believe is the right process to go
18 through.

19 I certainly don't envy you in making the
20 decision. But I do believe, and I think we have said
21 this: we encourage you to look at empirically based
22 studies in terms of productivity. I think probably over
23 the two days you have probably got a feel for how
24 strongly we feel about that.

25 That is the starting point. Of course, the
26 stretch factor itself turns out to be the subjective
27 decision. It is based on evidence that the company has
28 put on in terms of the position they feel they are in

1 terms of the risk and as well balancing the interests of
2 all the other stakeholders.

3 THE PRESIDING MEMBER: Do you think there is
4 any need for any evidence or information on the future
5 direction the company intends to take over the next five
6 years, to give a sort of framework within one could see
7 how the company is moving forward and therefore get some
8 sort of -- I know the company is empirically going
9 forward, but some sort of indication of the scope or
10 productivity improvements that might exist.

11 DR. HEMPHILL: I do believe that that has to
12 be taken into account.

13 THE PRESIDING MEMBER: Does that mean that one
14 should be asking for plans?

15 DR. HEMPHILL: I am pausing again because I
16 always hesitate when it requires more information and a
17 process. I would think at a high level that is probably
18 reasonable.

19 THE PRESIDING MEMBER: The second question is
20 quite different, and this has nothing really to do with
21 this hearing but has to do with the whole concept of PBR
22 and the current focus on PBR as a mechanism for -- I
23 don't know what you would call it -- incentive
24 regulation, light-handed regulation, et cetera. It is a
25 philosophical question I would like to ask you.

26 I may not be completely accurate in this, but
27 this is an impression. My impression is that these
28 approaches to regulation have gained a lot of favour

1 during a time when inflation has been pretty low.

2 What do you think would be the reception to
3 these sorts of processes of regulation if we went back
4 to a period when inflation was pretty high and that
5 formulas were generating not numbers in the half, one,
6 one-and-a-half to two per cent but were generating
7 numbers in the five, six, seven and eight per cent
8 because of the application of a formula which allowed a
9 passthrough of what were essentially inflationary
10 expectations.

11 DR. SCHOECH: Well actually some of the
12 earliest academic writings along this line occurred in
13 the late 1970s. It was precisely the concern of
14 inflation and rate shock that sent academics back to
15 their offices to write about this.

16 Their view was formulaic increases in prices
17 from year to year would probably, in the eyes of the
18 customer, be better than having the utility come in
19 every two or three years and have a substantial rate
20 impact result from that.

21 I guess in light of that I don't think that a
22 future of increased inflation would scare people away
23 from this approach.

24 THE PRESIDING MEMBER: I can remember there
25 were discussions about these sorts of formulas about 10
26 or 15 years ago, but they didn't get picked up as
27 quickly as that.

28 I also thank you for your time and for giving

1 us the information you provided. It has been a long
2 day. You are excused, if that is the right word.

3 DR. SCHOECH: Thank you.

4 MR. PENNY: Mr. Chairman, I do have a couple
5 of questions in re-examination, and I apologize.

6 THE PRESIDING MEMBER: I apologize. I should
7 have remembered redirect. I keep forgetting that.

8 I thought you wouldn't have any.

9 MR. PENNY: I apologize. It is late, but I
10 guarantee I will be extremely brief. I only have about
11 four or five questions.

12 RE-EXAMINATION

13 MR. PENNY: Mr. Schoech, Mr. Janigan had asked
14 you some questions about an FCC decision that adopted an
15 input price differential in 1997.

16 DR. SCHOECH: Yes, that's right.

17 MR. PENNY: What happened to that decision of
18 the FCC?

19 DR. SCHOECH: That decision was appealed by
20 the United States Telephone Association to the Court of
21 Appeals for the District of Columbia. The court
22 rejected that decision and remanded it back to the FCC.

23 MR. PENNY: A number of questions have been
24 put to you about your role in the adoption of the .4 per
25 cent stretch factor. Certainly Mr. Thompson asked you
26 about that and others did as well, I believe.

27 Having regard to the work that you had done on
28 the company's total factor productivity and the

SCHOECH/HEMPHILL/ELLIOTT, re-ex (Penny)

1 information about the company that you gained throughout
2 the course of your retainer, is the .4 per cent stretch
3 factor, in your professional opinion, a reasonable one?

4 DR. SCHOECH: Yes.

5 MR. PENNY: Mr. Thompson asked you questions
6 about whether you had ever filed evidence supporting a
7 negative X factor before.

8 Do you recall that?

9 DR. SCHOECH: Yes, I do.

10 MR. PENNY: First of all, can I ask you, have
11 you applied the methodologies and analytical tools for
12 determining total factor productivity that you used in
13 this case before?

14 DR. SCHOECH: Oh, yes, we have.

15 MR. PENNY: Did you adjust the fundamentals of
16 your methodologies or analytical tools for the total
17 factor productivity analysis for Union in any way?

18 DR. SCHOECH: No.

19 MR. PENNY: I think you said that you had not
20 submitted negative productivity factor material in
21 regulatory proceedings before. Have you encountered
22 negative productivity -- I'm sorry, not negative
23 productivity, but negative X factors --

24 Have you encountered those in circumstances in
25 which you were not filing before a regulatory
26 proceeding?

27 DR. SCHOECH: Yes.

28 MR. PENNY: And what are those circumstances?

SCHOECH/HEMPHILL/ELLIOTT, re-ex (Penny)

1 DR. SCHOECH: The circumstance that I recall
2 is, once again, when I was working for the U.S. postal
3 service a couple of years ago. They were engaged in a
4 process, which is called legislative reform in the
5 States. What that is, is that it is an attempt to move
6 toward performance based rate making for the U.S. postal
7 service. In our discussion with other parties we were
8 explaining to them that if a CPI based price cap plan
9 were adopted, that it would be necessary to have -- I
10 guess I would call it a negative stretch factor, or one
11 that would allow rates to increase faster than the rate
12 of inflation.

13 MR. PENNY: With respect to pricing
14 flexibility, you had indicated to Mr. Thompson and
15 others, I think, that you reviewed the principles around
16 pricing flexibility, but had not made specific
17 recommendations about the specific pricing flexibility
18 proposals that are contained in the original evidence or
19 in the evidence update.

20 DR. HEMPHILL: That is correct.

21 MR. PENNY: Did you review what Union did,
22 however?

23 DR. HEMPHILL: Yes, we did.

24 MR. PENNY: In your professional opinion, did
25 the specific Union recommendations fit within the
26 principles that you had advised on?

27 DR. HEMPHILL: Yes, they did.

28 MR. PENNY: Ms Symes asked you a question

SCHOECH/HEMPHILL/ELLIOTT, re-ex (Penny)

1 about -- you will recall that there were some questions
2 about the RECs from the U.K.

3 DR. HEMPHILL: Yes.

4 MR. PENNY: Some questions came from Board
5 Staff and Ms Symes also touched on that. What was the
6 ownership and regulatory structure of the RECs
7 immediately prior to the introduction of the incentive
8 mechanism?

9 DR. HEMPHILL: Yes, I meant to mention that at
10 the time, that it was nationalized. It was --

11 MR. PENNY: It was government owned --

12 DR. HEMPHILL: It was government owned.

13 MR. PENNY: -- previously?

14 DR. HEMPHILL: Correct.

15 MR. PENNY: Ms Symes also asked some questions
16 about the StatsCan data.

17 First of all, Dr. Schoech, is the minus 2.3
18 negative productivity that comes out of the Statistics
19 Canada data a function of all of the Statistics Canada
20 data, including the input price growth information and
21 the capital output data?

22 DR. SCHOECH: Yes, it definitely is.

23 MR. PENNY: And there is no evidence in the
24 record about whether Statistics Canada does or does not
25 provide special studies to consultants, such as
26 yourselves, but you were about to say why -- I think,
27 and Ms Symes cut you off -- why you didn't think
28 Statistics Canada would provide that kind of

SCHOECH/HEMPHILL/ELLIOTT, re-ex (Penny)

1 information. Could you please give the answer that you
2 were going to give?

3 DR. SCHOECH: My frame of reference is with
4 the U.S. statistical agencies. My experience with
5 them -- and I have had quite a bit -- is that they are
6 so busy with their obligations that they don't entertain
7 requests for conducting special studies.

8 MR. PENNY: Dr. Hemphill, based on your
9 experience, does the need to run a regulated company
10 under a PBR mechanism more productively than it has been
11 in the past, in order to achieve reasonable returns for
12 the owner, create incentives for senior management?

13 DR. HEMPHILL: The experience I have had is
14 that it does.

15 MR. PENNY: Can you also comment on the
16 following scenario. An applicant for a performance
17 based mechanism is required to provide all of the plans
18 that it may have for the achievement of productivity
19 incentives in advance of the approval of a PBR
20 mechanism. What effect will that have on the company's
21 incentives to achieve productivity gains and also to
22 design an appropriate PBR mechanism?

23 DR. HEMPHILL: Would you repeat that question?

24 MR. PENNY: It is a scenario in which a
25 company, in advance of embarking on a performance based
26 regulation model, is required to produce all of its
27 plans on how it might achieve productivity gains
28 throughout the term of the PBR mechanism.

SCHOECH/HEMPHILL/ELLIOTT, re-ex (Penny)

1 DR. HEMPHILL: That certainly would run
2 counter. I mean, there would be disincentives built
3 into that, I think, for some obvious reasons.

4 MR. PENNY: Why?

5 DR. HEMPHILL: There is a lot of information,
6 first of all, that I think, in normal circumstances, is
7 viewed as proprietary. But I also believe that it works
8 counter to their own interests. It could actually be
9 used against them.

10 MR. PENNY: Used against them in what sense?

11 DR. HEMPHILL: As I understand it, the
12 question is that it is basically if the company in
13 advance of proposing a PBR program were to lay out
14 everything, all of their plans that they would have, and
15 actually go through the process of planning and lay out
16 all of the plans that they could muster to accomplish
17 productivity. Would that not possibly result in a plan
18 that would not provide the incentives for them to go
19 ahead and achieve the efficiencies?

20 MR. PENNY: All right. Thank you.

21 Thank you, Mr. Chairman, those are my
22 questions.

23 Thank you, panel.

24 THE PRESIDING MEMBER: So we have finished
25 with the panel, then, Mr. Penny.

26 Have we any other business tonight, or do we
27 just get back at nine o'clock tomorrow morning with the
28 unbundling panel?

1 MR. PENNY: Tomorrow.

2 THE PRESIDING MEMBER: With that, we will see
3 you tomorrow.

4 --- Whereupon the hearing adjourned at 1802,
5 to resume on Friday, June 23, 2000
6 at 0900

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Nancy Santos, Union Gas

**ONTARIO ENERGY BOARD
DRAFT GUIDELINES ON A FORMULA-BASED RETURN ON
COMMON EQUITY FOR REGULATED UTILITIES**

March, 1997

DRAFT GUIDELINES ON A FORMULA-BASED RETURN ON COMMON EQUITY FOR REGULATED UTILITIES

PURPOSE

The Ontario Energy Board (“the Board”) intends to move to a formula-based approach using the Equity Risk Premium method for determining the fair rate of return on common equity (“ROE”) for Ontario natural gas utilities. The following guidelines have been developed to facilitate the implementation of a formulaic ROE mechanism. The guidelines have two phases: an initial setup and an ongoing adjustment mechanism.

THE INITIAL SETUP

The initial setup will establish a just and reasonable return on equity for each of the Ontario LDCs, given a test year long Canada forecast, which will be the base against which subsequent adjustments to the formula-based ROE can be made.

Step 1: Establish the forecast of the long Government of Canada yield for the test year

The forecast yield for long-term Government of Canada bonds will be established for the test year by taking the average of the 3 and 12 months forward 10-year Government of Canada bond yield forecasts, as stated in the most recent issue of Consensus Forecasts, and adding the average of the actual observed spreads between 10 and 30-year Government of Canada bond yields, as reported in the Financial Post, for each business day in the month corresponding to the most recent Consensus Forecast issue.

Step 2: Establish implied risk premium

A utility’s test year ROE will consist of the projected yield for 30-year long Canada bonds plus an appropriate premium to account for the utility’s risk relative to long Canada bonds. The primary methodological approach to be used in evaluating the appropriate risk premium should be the equity risk premium test.

THE ADJUSTMENT MECHANISM

Once the initial ROE has been set for each of the utilities, as per the above-mentioned steps in the initial setup phase, a procedure must be put in place to automatically adjust the allowed ROE for each utility to account for changes in long Canada yield expectations. The timing of the adjustment mechanism process for each utility will be consistent with its fiscal year-end.

Step 1: Establish the forecast long Canada rate

The formula-based equity risk premium approach annually adjusts a utility's allowed ROE based on changes in forecast long-term Government of Canada bond yields. Each year the process outlined in Step 1 of the initial setup phase will be repeated and an updated, consensus-based forecast of 30-year long-Canada bond yields will be obtained. The current test year rate forecast will then be compared to the previous test year forecast.

Step 2: Apply adjustment factor

The Board suggests that the difference between the forecast long Canada rate calculated in Step 1 and the corresponding rate for the immediately preceding year should be multiplied by a factor of 0.75 to determine the adjustment to allowed ROE. This adjustment factor will then be added to the utility's previous test year ROE and the sum should be rounded to two decimal points. An illustration of the adjustment formula is shown below.

Allowed ROE for test year 1		12.25%
Test year 2 long-Canada forecast (30-year)	8.30%	
Test year 1 long-Canada forecast (30-year)	<u>9.25%</u>	
Change in interest rates	-0.95%	
Adjustment factor (0.75 to 1)		<u>-0.7125%</u>
ROE for test year 2		11.5375%
Approved ROE for test year 2 (rounded to nearest 2 decimal points)	<u>11.54%</u>	

TERM OF THE RATE OF RETURN FORMULA

The rate of return formula should be reviewed as conditions arise that may call into question its validity. Parties to a proceeding may ask the Board to review the formula when they feel it is appropriate or the Board may do so on its own initiative. In either case it will be the Board's decision as to the time for a review.

The Board may request the presentation of other tests or require some weighting for other tests in the formula should the Board want to assure itself that the ERP formula approach does not lead to perverse results and is directionally in line with other market indicators.

An adjustment to the utility-specific risk premiums should be done only when there is a clear indication that relative risks have changed. The Board believes that the capital structures should be reviewed only when there is a significant change in financial, business or corporate fundamentals.



uniongas

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30 January 2007

30 January MNL Response

1 February Union Response

1 February MNL Response

5 February Union Response

February 8 Lowry Response

Feb 12 Union Response

Feb 14 Union Response

March 2 Lowry Response

March 2 Union Response

Dr. Mark Lowry,
Pacific Economics Group, LLC,
22 East Mifflin Street,
Madison, WI 53703

**RE: January 14, 2007 Request:
February 1, 2007 Responses to Outstanding and New Questions**

Dear Dr. Lowry,

The response to the outstanding question (#24 – taxes) is now available (see attached Union Data Input Sheet Line 6.1 Property & Capital Taxes and 6.2 Income Taxes). All of the requested data has now been provided.

Data Digest

1. Do the numbers pertain to a calendar year or a fiscal year?

Response: The fiscal year was changed to the calendar year in 1995.

2. Do the delivery volumes reported on line 2.2 pertain to both in franchise and ex franchise customers?

Response: These are volume for in-franchise customers only.

Jan. 30: Do they include the volumes for in-franchise contract and wholesale service?

Feb Response: Yes, see the attached document “Volume Detail for Dr. Lowry”.

3. The reported volumes saved due to DSM (line 2.2a) and expenditures on DSM (line 6.4 a) start in 1998 rather than 1997, the first year for which most other required variables are available. Since we want to exclude DSM activities from our TFP

calculations, and the numbers are fairly inconsequential, it would be desirable to estimate the DSM savings and expenditures for 1997. Which estimate would be more accurate: 0, the 1998 value, or something in between?

Jan 19 Response: Estimated numbers for 1997 (the budgeted number supplied in EBRO 493/494 has been used) have been included in Union Data Input Sheet Line 6.4a DSM Expenditures.

Jan. 30: Thanks

4. How difficult would it be to decompose the DSM expenditures by rate class? We may need this for at least the bigger rate categories. At a minimum, it may be easy for you to state that some rate classes are not involved.

Jan 19 Response: See the attached document called DSM Expenditures Allocated by Rate Class.

Jan. 30: Thanks

5. On line 2.3 you provide data on storage demand. Please explain what this means. For example, is this the contract demand (or the peak demand) for ex franchise customers?

Response: Storage Demand Volumes – This volume represents the maximum storage quantity that was contracted for by *ex-franchise* customers for the indicated period.

And am I right that the maximum storage quantity is the chief billing determinant for ex franchise service?

Jan 19 Response: See the Market Price Service Schedule and the C1 Schedule (attached).

Jan. 30: Is it reasonable to take the ratio of the storage revenue to the quantity to obtain an approximate price for this storage service?

Feb Response: No. The storage revenue is net of the margin that, until the NGEIR decision, has been given back to in-franchise customers in the form of a subsidy (the subsidy will be eliminated over the next 4 years 2008 – 2011). Also, historically the ex-franchise storage has been sold at negotiated market prices within an approved range rate. With the NGEIR Decision the range rate will be eliminated (there will be no “rate” as the sale of storage to ex-franchise customers will no longer be regulated and will be sold at market prices).

6. On line 2.4 you provide data on transmission demand. Please explain what this means. For example, is this the contract demand (or the peak demand) on the Dawn-Parkway system?

Response: Transmission Demand Volumes – This volume represents the daily maximum quantity (“DCQ”) of gas that was contracted for by ex-franchise customers to be transported for the periods indicated.

And am I right that the maximum storage quantity is the chief billing determinant for ex franchise service?

Jan 19 Response: See M12 Rate Schedule attached (ignore the storage portion of this rate schedule as it pertains to Enbridge only and the related contracts will be eliminated over the next few years).

Jan. 30: Is it reasonable to take the ratio of the transmission revenue to this quantity to obtain an approximate transmission price?

Feb Response: No. The calculation would not be reasonable since the transportation revenue supplied also includes revenues from various rate classes: M12, M16, M15, C1 Transport and small miscellaneous services. Also, the transportation price would be dependant on whether it was a firm or interruptible service and which system was being utilized; Dawn-Parkway, Dawn to Kirkwall, Ojibway to Dawn. So based on all these factors, we would conclude that it is not a reasonable proxy to calculate the transmission price.

Feb. 1 Now I’m confused. What does this quantity correspond to?

Feb 5 Response: See response to the Question in the Miscellaneous Section called New Question. I think you are looking for the same info with both of these questions (i.e. determining the way that output growth affects revenue).

7. In Section 3 you provide data on FTEs and labour costs exclusive of capitalized overheads. Is it reasonable to take the ratio of these variables as a proxy for compensation per employee? Or are the FTE figures effectively “bloated” by the inclusion of employees used for capitalized O&M? If they are, can data easily be provided on S&W gross of capitalization? (Just asking at this point).

Response: Union is OK with using your proxy calculation.

But, do these match up or not?

Jan 19 Response: We cannot provide the S&W on a gross basis. We have provided as a proxy gross S&W (Line 3.2a on the Union Input Data Sheet) that has been calculated by taking the net S&W and grossing it up by the O&M capitalization rates (Line 6.4d in the Union Input Data Sheet).

Jan. 30: Don’t the gross figures match up better than the net figures with the headcount data?

Feb Response - The (derived) gross figures for S&W would match up with the FTE data to calculate a proxy for gross compensation per employee. There really are

only a handful of employees whose salaries are capitalized entirely. Having said this, using the net S&W figures would still be an accurate calculation of net compensation per employee. To be clear: We've expressed expenses from a net perspective across the board and don't want any double counting (capitalized overheads are captured in the plant adds each year).

Feb. 8: We are interested in $WL = \$/FTE$ as a means of calculating the trend in the labour quantity using a formula: $S\&W^{Net}/WL$. For this purpose, I would think the $S\&W^{Gross}/FTE$ is better since FTE and $S\&W^{Gross}$ both pertain to all labourers so that the trend won't be contaminated by a change in the propensity to capitalize salaries and wages. For example, if less capitalization occurs over time, this accelerates the measured growth in $S\&W^{net}$ per employee and reduces the measured growth in labour quantity (thereby accelerating measured productivity growth). Please note that this proposed use of $S\&W^{Gross}$ would not result in a double counting of capitalized labour for purposes of TFP measurement. So, given this explanation, which ratio should you recommend?

The attached table shows, in any event, the results of $\$/FTE$ calculations using both approaches. The results are disquieting in several respects:

- *S&W/FTE grew at a 4.36% clip using the imputed gross S&W. This results chiefly from a 13% run-up in 2002 and a 5% runup in 2003.*
- *The result using net S&W was 4.84% 2000-2005.*
- *The analogous wage rate inflation was much less rapid for Enbridge and the assortment of Stats Canada indexes that we collected.*

Confronted with these facts, can you please comment on whether the trend in Union's typical salaries and wages has been well-measured by this approach? For example, was there a noteworthy surge in the S&W of employees 2001-2003? If not, why do we get these results? For example, could the downsizing that occurred in 2002 and 2003 have affected lower-wage workers disproportionately? Do you have your own internal measures of typical wage rate trends? How can our measure of your wage rate trend be upgraded? For example, should we take a weighted average of wage trends for different employment categories (e.g. Management/Supervisory, non-union clerical, non union technical/sales, Unionized Clerical, Unionized hourly) like Christensen did in its productivity study? Are the requisite data readily available?

Feb 12 Response:

We recommend the use of $S\&W^{Gross}/FTE$ to remove the effect of overheads. The aggressive growth trend observed (not typical of S&W) is the result of several factors: 1) increased overtime due to staffing reductions; 2) increased contracting activity (locates, meter reading) that would have affected the mix of FTE's by removing predominantly lower-than-average wage earning roles (leaving higher proportion of mgt); 3) Higher incentive payments. Clearly our pure S&W growth would be closer to that of Enbridge and the Stats Canada indices (or CPI).

We don't have any internal measures of wage rate trends in total, or by the various employment categories readily available. This is due to the complex interplay of factors described above.

Feb. 28 Response

We are having a hard time choosing a labor price inflation measure since your measure seems unsuitable and we are reluctant to use the Enbridge \$\$/employee

metric (which is also very crude) for both companies. We have, accordingly, tried to gather data from Stats Canada but haven't been very happy with what we found. The labour inflation data we have gathered are summarized in the attached table. Stats Canada reports that the hourly earnings of Ontario energy utility workers *fell* by 0.5% on average 2000-2005. But inflation of +3% is reported using both the hourly Labour Force Survey estimate for Ontario utility workers and the Construction union wage rate index for all Ontario construction workers. Weekly earnings for *all* Ontario workers from another survey, meanwhile, rose by 1.87%. For Canada as a whole, weekly earnings for all workers rose by 2.09% on average whereas those for gas distribution grew by only 0.4%. Unfortunately, all of these figures pertain only to salaries and wages and not to *total* compensation, as we might hope. A total compensation index is available only for the construction workers. Confronted with this confusing welter of data, what external data do your human resources people use when considering suitable wage hikes?

March 2 Response - Union's compensation philosophy is to target total cash and total direct compensation levels to the 50th percentile in the marketplace at target variable pay levels. The competitive market analysis includes a cross-section of national companies of similar revenue size and scope. Union filed a letter from Towers Perrin (HR Services) in the 2007 cost of service case regarding comparison of Union's compensation to comparator groups (Exhibit D1, Tab 3, Appendix B).

8. The number of FTEs fell markedly during the sample period. The biggest cuts occurred in 1998, 1999, 2000, and 2002. You state in a December letter that reductions in 1999 and 2000 were due to "reorganization". Does this include the suspension of the utility financing and rental programs? If so, how hard would it be to split out the FTEs and costs associated with this program for 1997 and 1998?

Response: Yes, it does include the suspension of the utility financing and rental programs. Union is unable to split out the FTE's and costs associated with this program in 1997 and 1998 since they were never tracked at that functional level.

Christensen kept the cost of these programs in its TFP calculations but used three additional output variables and the corresponding revenues. Could you report this for 1997 and 1998 on a consolidated basis for both companies?

Jan 19 Response: The Union Data Input Sheet has been updated to include this information. Please see Lines 1.4, 1.5 & 1.6.

Jan. 30: These lines weren't printing out properly for some reason but we figured out how to fix the problem.

9. Was there much change in the propensity of the company to capitalize O&M expenses during the sample period? If the capitalization percentages are readily available, please provide them.

Response: The capitalization rates have been included in Union's updated Data Input Sheet (attached). See line 6.4d.

Thanks. That's helpful. I see that the capitalization percentage has drifted *downward* over time. What does the future hold?

Jan 19 Response: The capitalization rates do not change unless a capitalization study is done. Any changes would be dependent on changes in the cost-drivers used to determine the rates. It would be hard to speculate on what the future will hold.

March 2: Does the gross OM&A include salaries and wages for workers when they are engaged in conventional plant construction?

March 2 Response - Gross O&M salary and wages do not include workers when they are engaged in conventional plant construction.

10. Compensation per employee was less for Union than for Centra in 2007. Can you briefly explain the sense of this? For example, does it reflect a greater propensity for Union to capitalize O&M expenses?

Response: This is the result of market conditions related to geography. The Centra head office was located in Toronto and the Union head office was located in Chatham. Also, the two companies had a different compensation philosophy and this was the first year after amalgamation.

11. Lines 3.4 reports pension expenses. Comments on line 3.4 (by D.A. McFadden) suggest that the pension numbers are "gross" through 2002, then "net". The "net" numbers are much higher. What is the difference between gross and net pensions? Also, I am still unclear after reading your December commentary whether and why these numbers should be adjusted for purposes of TFP calculation.

Response: The information has been updated on Union's Data Input Sheet (attached) to reflect pension costs at both a gross level and a net level (see lines 3.4a and 3.4b which are highlighted in yellow). We have estimated the capitalization rate for the years 1997-2001.

The reasons for the increase in pension costs between 2004 and 2005 included a continued decline in long-term government and corporate bond yields and recognition of investment-related experience losses during 2001 and 2002, much of which were deferred through smoothing mechanisms.

I am still unclear on the difference between gross and net pension expenses. Do the net expenses just pertain to O&M expenses?

Jan 19 Response: Background on Capitalization Process: On a regular basis, a cost driver-based analysis is performed by the Company to determine the % of time that a given area (and ultimately the entire company) spends supporting capital projects through traditional O&M functions. These allocations are then applied via our financial system to capture the portion of O&M expenses that should be added to capital expenditures

(thereby reducing O&M). Net pension expense (gross pension expense less capitalization) is determined using the same process.

Jan 30: So, are the estimates for net pensions 97-2002 and for gross pensions 03-05?

Feb Response – Yes that is correct.

12. The value of annual plant additions tailed off quite a bit during the sample period but rebounded a bit in 2005. Can you provide an explanation for this pattern? What does the future hold and why?

Response: The entire Duke Energy Corporation was focused on strengthening its financial position, primarily by conserving cash which would allow for a reduction in the amount of corporate debt.

13. Union's compressor fuel expenses rose quite rapidly during the sample period. This is presumably due in part to higher gas prices. Are there other reasons? In your spreadsheet you report O&M expenses net of those for compressor station fuel. Is there any reason not to include compressor station fuel in the TFP study? Should we decide to include compressor station fuel we will need a gas price so that we can calculate the trend in the amount of gas used. Can you recommend a price and provide a data series if one is readily available?

Response: We are currently looking for a pricing schedule and working on a response to your other questions. We hope to have this to you by the end of the week.

Thanks

Jan 19 Response: Expenditures relating to compressor fuel should be removed from O&M in order to normalize the data. Therefore, the pricing schedule is not required.

Jan 30: Why do you say removal is required for normalization? Because the gas price run up is unlikely to repeat itself? I might still want to include this in the calculations. So, please provide a gas price series if one is readily available. Doesn't have to be perfect.

Feb Response – See the attached document “WACOG 1999 to present.xls” which is a gas price series.

Feb 1: Thanks, that's helpful We have already integrated this information.

Feb. 5: When we take the ratio of your compressor fuel costs to the WACOG we obtain a measure of your compressor fuel quantity. It seems that this quantity rose briskly during the sample period. Does that make sense? For example, did compressor capacity rise due to pipeline looping?

Feb 12 Response: We are still working on this one and hope to have a response for you by tomorrow.

Feb 14 Response: During the period of 1997 to 2005, throughput on Union's system (in-franchise and ex-franchise) almost doubled, which increased the use of compressor fuel during this period.

14. The cost of Union's non-labour O&M expenses (e.g. materials and services) rose at a pretty brisk pace during the sample period even with compressor station expenses excluded. This suggests quite a bit of outsourcing. Can you provide a brief discussion of this? For example, was the bulk of the outsourcing to affiliates?

Response: There was an increased hiring of contractors. The management fee (charged by Duke Corporate Head Office and Duke Energy Gas Transmission Head Office) increased because more work was being done by these head offices and charged to Union. There was some outsourcing of ITI Services.

Jan. 30: When did the Duke merger occur?

Feb Response: The merger was effective March 2002.

Feb. 1: So when we look at the trend in the headcount we find a 9% reduction in 1999 and a 5% reduction in 2000. Is the 5% reduction related at all to the spinoff of the appliance businesses? If not, what was the cause?

Feb 5 Response:

The decreases in both 1999 and 2000 were due to the spin off of the appliance business. It was really just an extended process that stretched beyond the first year. The headcount management that is evidenced by the escalation in non-labour expenses happened primarily after the Duke merger in 2002 (outsourcing and mgt fees).

Feb. 8: Are you saying that the 5.4% headcount reduction in 2000 was due chiefly to the appliance business? No other noteworthy causes?

Feb 12 Response:

The headcount reduction observed in 2000 was chiefly due to the spin off of the appliance business.

15. You have provided information on the value of total net plant additions. Can this data in principle be broken down by function (e.g. intangible plant, production & gathering plant, etc? (Just asking at this point). Enbridge has reported such a breakdown.

Response: This information was provided to you on January 12th. It is in the same excel spreadsheet as the accumulated depreciation but on a separate sheet/tab.

OK.

16. The plant value data indicate a small amount of production and gathering plant during most of the sample period. Do the corresponding O&M data include a small amount of production and gathering O&M expenses?

Response: This is a very insignificant amount and we do not track the expenses functionally.

17. Why did the gross value of general plant fall sharply in 1999?

Response: The retail business was retired in 1999.

18. Why did the accumulated depreciation of local storage surge in 2004?

Response: This was a result of the depreciation study (provided to you on December 21, 2006). See Statement C, Local Storage.

19. I will need further explanation of your December comment regarding Gross Contribution in Aid of Construction, perhaps by phone.

Response: Union previously recorded Contributions in Aid of Construction as a separate line item. From 2003 forward, the contributions are netted against the asset.

Sorry, what are Contributions in Aid of Construction? Still not clear.

Jan 19 Response: Aid to Construct is a charge collected in advance of construction from new customers who have agreed to fund the shortfall in the economics.

Jan. 30: So for purposes of establishing rates you would net out these contributions? We are not familiar with contributions of these magnitudes in the States. Are they somewhat peculiar to Ontario are is there just a lack of itemization of these contributions in the States?

Feb Response: These are external contributions that are received to assist with project economics and facilitate construction (examples municipal work and customer connections not in close proximity to our facilities). Rate base would net out these contributions. As noted in the data set, in conjunction with the 2004 depreciation study contributions were transferred back to the appropriate asset classes and going forward contributions are netted against the appropriate classes.

I don't know how this is tracked in the States.

Feb. 8: Enbridge doesn't seem to itemize these contributions. Is that because they have fewer of them or because they are netted from the other categories?

Feb 12 Response: I don't know how Enbridge itemizes these items.

20. The accumulated depreciation figures that you sent me in the separate attachment on Friday are not quite the same as those in the data digest (e.g. check distribution plant end year 1998). Which should we trust?

Response: The Union Data Input Sheet amount was incorrect. The Continuity Schedule is correct. The Union Data Input Sheet has been updated to reflect the correct numbers (attached).

Thanks

21. The accumulated depreciation figures you sent me in the separate attachment on Friday do not clearly indicate that the numbers for year end 1996 and 1997 include the totals for Centra. Do they?

Response: Yes, they include Centra.

22. It is highly desirable to have net plant value data five or ten years prior to 1998 even if the sample period is 1998-2005. Is this possible on a consolidated basis that includes Centra?

Response: Union merged with Centra in 1996 and the Centra data is not available prior to the merger.

The Union data can be found in the information provided on December 21, 2006 titled Exhibit C36.25 – Schedule 2. It contains continuity schedules beginning in 1980.

Jan 19 Response: We have been able to find some of the data for Centra and have provided a data sheet that includes gross cost of plant (balance at year end) and depreciation (balance at year end). We were not able to find the underlying Continuity Schedules.

Jan. 30: Is the accumulated depreciation reported for 1985 a good approximation to the actual?

Feb 1: Still no answer

Feb 5 Response: This is the actual accumulated depreciation for 1985.

New Questions about the plant value data:

- **We were wondering what the capital leases data pertain to? Also, why does the amount fall to zero in 2006?**
- **There are no planted additions reported for Centra in 2006. Should we impute a normal amount?**
- **An underground storage amount pops up for Centra in 1990. Is this covered by the gross plant additions in that year?**
- **Was Centra on a calendar or fiscal year during the reporting years?**

Feb Response:

- The capital leases pertain to: transportation equipment/vehicles, heavy work equipment, structures and improvements and computer equipment. We have verified that the actual capital lease for 1996 was for vehicles in the amount of \$7,299,000 (It was included in the general plant category for 1996).

Feb. 1: So, is this the book value of some equipment you leased from others or leased to others? Why did you treat it like plant and how did you arrive at these totals? Why did it disappear in 2006? Were the costs of these leases reported elsewhere such that we should be ignoring these dollars?

Feb 5 Response: It is equipment leased from others. It is treated like plant as it would have been considered a capital lease. There are Canadian Generally Accepted Accounting Principles (GAAP) that are used to determine if a lease is a capital or operating lease. I have not included the detailed rules here but, as a summary, a capital lease is a lease that, from the point of view of the lessee, transfers substantially all the benefits and risks incident to ownership of property to the lessee.

Method of accounting for a capital lease

To report the total resources at the lessee's disposal and all aspects of the lessee's long-term obligations, a capital lease would be accounted for by the lessee as an acquisition of an asset and an assumption of an obligation.

The lessee should account for a capital lease as an asset and an obligation. The asset value and the amount of the obligation, recorded at the beginning of the lease term, would be the present value of the minimum lease payments, excluding the portion thereof relating to executory costs. The discount rate used by the lessee in determining the present value of minimum lease payments would be the lower of the lessee's rate for incremental borrowing and the interest rate implicit in the lease, if practicable to determine. Notwithstanding the foregoing, the maximum value recorded for the asset and obligation may not exceed the leased asset's fair value.

The capitalized value of a depreciable asset under a capital lease would be amortized over the period of expected use, on a basis that is consistent with the lessee's depreciation policy for other similar fixed assets.

2006 - We have assumed you mean 1996

The dollars did not disappear in 1996. The original data that we provided to you was prepared by someone else (several years ago) using a variety of source documents that did not always present the data in the same way. The amount was, as noted above, \$7,299,000.

Feb. 8: So, long story short, should we treat this category like we treat other plant categories?

Feb 12 Response: Yes

- **We do not have a continuity schedule for 1996 to determine the amount. If you want to impute an amount; we can verify dollar amounts for retirements for: 1995 \$ 11.4M, 1997 \$9.2M and 1998 \$10M.**
- **Yes it is covered by gross plant additions that year.**
- **Centra's fiscal year was a calendar year.**

23. Staff proposes in its recent report that the capital cost (at least) of extensions to new communities that require explicit Board approval be exempted from indexing. Please provide a brief discussion of the nature of these extensions in the case of Union. Is it possible for you to split the costs of these investments out for the sample period?

Response:

There are two occasions where we would go to the OEB for an explicit approval for an expansion to a new community. One when the project meets the leave to construct criteria (costs greater than 2 Million, pipeline greater than 20 kilometres in length) and two when Union did not have the necessary franchise and certificate rights for the new area to be served.

There are 26 projects that required explicit Board approval (leave to construct and/or new franchise approval). We are working on trying to find the timing and the costs and hope to have this to you by Friday.

What I don't understand is what share of customer additions fall into the leave to construct category. Suppose, for example, that metro London is growing to the point where service will soon need to be extended to a new township. Is a leave to construct required in this case? Or are we talking towns a fair bit off the beaten path. And what about Enbridge?

Jan 19 Response:

We have updated the Union Input Data Sheet (Line 4.9b) to include New Business Projects that required a Leave to Construct. The \$22 Million in 1998 reflects one project (with two phases) that went into service in 1998 but was built over the 1997/1998 timeframe. The \$8.8 Million in 1999 also represents one project. There were no projects that required a leave to construct in the years 2000 to 2005.

Jan 22 - The New Business numbers for Gross Cost of Plant have been provided in the updated Union Data Input Sheet (attached).

A leave to construct is not required for a new franchise. It is only required if:

- a) The proposed pipeline is more than 20 km in length;
- b) The proposed pipeline is projected to cost more than the amount prescribed by the regulations (\$2 million for the pipeline portion of the project only);
- c) Any part of the proposed pipeline,
 - i) Uses pipe that has a nominal pipe size of 12 inches or more, and
 - ii) Has an operating pressure of 2,000 kilopascals or more; or
- d) Criteria prescribed by the regulations are met.

Jan. 30: Must all of these criteria apply or (at the other extreme) just one of them?

Feb Response - A Leave to Construct is required if any of the criteria are met; however, if c) is met, both part i) and ii) need to apply.

Just to be clear on my previous response: Franchise and leave to construct are two different applications. We apply to the board for a franchise when we do not have a franchise for the area. We apply to the board for a leave when we meet any of the criteria described above. There have been situations where we do not have the franchise rights and the leave criteria are met, in that case we require both a leave and a franchise application.

Feb. 1: It sounds like normal extensions of service to subdivisions on the edge of town usually don't trigger a leave to construct even if they involve a new township because it is incremental growth that doesn't involve much of a pipeline. Have I got it right?

Feb 5 Response: Yes that is right.

24. Several kinds of data have not yet been provided, including revenue by rate class and the corresponding billing determinant quantities, taxes, and the approved return on rate base. We need, at a minimum, the first two of these. Data on the ROR would also be helpful.

Response:

We have updated the ROR on Union's updated Data Input Sheet attached. See line item 6.3.

Jan 19 Response:

The Revenue by rate class and the corresponding billing determinant quantities is included in the attached Revenue Detail document.

Jan. 30: I have now had a chance to examine these data in some detail and find that there is no detail concerning the

Jan 30 Response: The Union Data Input Sheet (attached) has been updated to include tax expense.

Jan. 30: In reviewing these revenue data, one question I have is what is the nature of the billing determinants that fall into the "fixed" and "volume" categories in the case of the major contract and wholesale categories (e.g. M4, M7, and T-1)? Are these really customer and volumetric charges or something else? Mainly looking here for a high-level characterization unless data are easy to come by.

Also, I had asked previously about the pervasiveness of inframarginal rate blocks that are nominally volumetric charges but act more like customer charges.

Feb Response – The general service fixed charge is the amount we recover through the monthly *customer* charge.

The fixed column of the contract and wholesale category is made up of a customer charge and a demand charge. There are no volumetric (consumption of gas) charges included in the fixed charges. The majority of the fixed charges are demand charges since the customer charge for contract customers is quite miniscule.

Feb. 1: In the revenue-weighted output index we were contemplating for Union there would be separate categories for Volumes, Customers, and Transmission and Storage Contract Demand. In examining the disaggregated volume data that you sent this morning I notice that contract and wholesale customers actually account for the bulk of the distribution delivery volume even though they account for only 20% of distribution revenue. So now I'm thinking that we need to split the distribution volumes into (1) general service and (2) contract and wholesale categories to avoid aggregation bias. Since C&W isn't a very important revenue category, and since volumes seem to account for roughly half of the C&W revenue, should I just use the contract and wholesale delivery volumes you have provided as the output measure on the grounds that they are reasonable proxy for the trend in demand charges? If so, I need one more year of this disaggregated data, 1999, at least at the aggregate level (i.e. general service vs. other). An alternative would be for you to send me the volumes and maximum demands for this customer class (1999-2005).

Feb 5 Response: Please see attached:

1. Actual detailed revenue by rate class 1999 – 2005
2. Actual detailed volumes by rate class 1999 – 2005
3. Union Data Input Sheet updated to show the Actual Distribution Contract Demand 1999 – 2005 (see line item 2.2(b))
4. Interrogatory response (Document named J14.43) that includes actual Distribution Contract Demand by Rate Class for 2004&- 2005

Feb. 8: Thanks for these data. I will use both of these numbers in the revenue-weighted output quantity index.

Pervasiveness of inframarginal rate blocks - The only rate class where the volumetric recovery is akin to fixed recovery is Rate 10. With a minimum volume of 50,000 m³, and a first block of 1,000 m³/month all customers go through the first block. From a cost point of view, although the first block produces a fixed revenue stream, we do not set the rate or adjust the blocking to ensure a certain level of cost recovery.

25. Feel free to comment on any errors that you notice in our supplementary calculations.

Response: I have not had a chance to review your supplementary calculations.

TFP Study

Exhibit C36.25 provides details of TFP calculations. These presumably pertain to the South system.

Response:

Yes

1. The Christensen data include Distribution Revenue. Please explain this data category. For example, does it pertain to the bundled storage, transmission, and distribution services? Is it exclusive of gas supply cost? Data on distribution revenue appear in your December spreadsheet for some years as well. Were you planning on filling this out?

Response:

Yes, it pertains to the gas bundled services that include distribution, storage and transmission. Yes, it is exclusive of gas supply costs.

The distribution revenue for 1997 to 2005 will be provided along with the rate class detail identified in your question 24 above.

2. Comparing the numbers for year end 1997 in the data digest to the numbers presented here, there is a category labeled undistributed plant that you have labeled “gross contribution in aid of construction. Are these the same thing? Can you provide a brief explanation of this category?

Response:

Yes they are the same thing.

3. The Christensen net book value data contain several categories (*e.g. construction inventory/work in progress*) that are not included in the data you have sent. Can you explain why? Were these numbers used in Christensen’s TFP estimates?

Response:

I do not know whether Christensen used this data or not. Construction work in progress reflects dollars spent for projects that have not yet gone into service. Therefore, these dollars are not included in rate base until the year they go into service.

4. These numbers include a break out of transmission O&M expenses and salaries & wages. Why were these numbers available then and not now? Your December comments suggest that these numbers may be available for some years (*e.g. 1999, 2004*). If so, can you provide them?

Response:

We could provide **forecasted** numbers that were produced as a result of the cost allocation study for 1999 and 2004. These are the only years that we filed for a cost of service rate increase during the 1998 to 2005 period (and therefore performed a cost allocation study).

We do not currently track transmission and storage separately. Looking back at the pre-1996 financial reporting it looks like we did report this data separately at that time. Although I know that the reporting changed around the 1996 to 1997 time frame, I have not been able to at this point, find anyone that can tell me why the reporting structure changed.

5. Could you provide me with a copy of the testimony or report that discusses Christensen's TFP evidence?

Response:

I have attached transcripts Volume 6 and 7 from the pilot PBR proceeding (RP-1999-0017). If you would like the decision from this proceeding, please let me know.

6. Have any other TFP studies been prepared for Union that you could provide?

Response:

There is nothing that can be provided. Union did some preliminary work on this several years ago but it was never completed or finalized. The data used in that preliminary work has been provided to you and more (given that there are more years of data now available).

Miscellaneous Questions

1. Please provide an estimate of the share of distribution revenues that are recovered via customer, volumetric, and demand charges. To the extent practicable, please present this information as well for the major rate classes.

Jan 19 Response: Please see attached Revenue Detail document.

2. Please provide the cooling degree days data for the sample period that you consider to be relevant in volume normalization.

Response:

I am assuming you mean heating degree days and not cooling degree days. We can have heating degrees days to you by the end of the week.

Thanks. I did mean HDD.

Jan 19 Response:

Please see attached schedule from the 2007 Rate Case.

Jan. 30 These numbers only extend to 2003. Are the corresponding numbers for 2004 and 2005 unavailable?

Feb Response: See attached schedule "WEATHER 1969 TO 2006_JAN 2007.xls"

New Question: We would like the accumulated depreciation for rental and leased equipment in 1997 and 1998 if readily available.

Jan 19 Response:

Union's Data Input Sheet has been updated to include this information (Lines 4.7a which includes the Gross Cost of Plant for Rental Leased Equipment and Line 5.9b which includes the Accumulated Depreciation for rental leased equipment).

January 30: New Question: We need to convert the net book value of plant in the benchmark year (probably 1985) to the replacement cost (current value) in that year. For purposes of this calculation, it would be helpful to know a little more about the history of Union in the 40 years prior to 1985. For example, Enbridge reported that Consumers operated systems delivering manufactured gas in the larger towns before natural gas arrived in 1956 from the Tennessee system. They provided data on the number of customers served (from their annual reports) back to 1954. Any analogous commentary and/or data that you could provide would be appreciated.

Feb Response: We have checked with various departments and we do not have any information that is readily available. If necessary, we could ask someone to pull the information from the annual reports, however, this exercise would take some time. Please advise.

Feb 1: Attached document includes some Union Gas history. If you still need number of customers from the beginning (I think we can get info back to the 50s), please let me know as I will need to assign someone to the task.

Feb. 1: Thanks, that's helpful. I am trying to devine from this account whether the great bulk of customers were added after natural gas became available from the U.S. and Canada, as was the case with Union. I am reminded that Union probably always used a fair bit of natural gas in its system due to the proximity of the fields around Dawn. Was this supplemented materially with manufactured gas in some towns? Was there nonetheless a big surge in the number of customers served after supplies became available from Canada and the U.S.? I am guessing that there may not have been.

Feb 5 Response: A listing of meters/customers by year (1945 – 1984) has been attached. You already have the numbers for 1985 to 2005.

Feb.8: Thanks very much. We have used the analogous Enbridge data in their TFP index but realize now that your situation is a bit more complicated because of the transmission line. The brief history that you sent indicates that the Dawn Oakville line was completed in 1957 and that “three parallel 34, 42, and 48 inch diameter lines have since been added”. Can you provide the years in which these three additions were made? Also, was there a year that one chiefly associates with the big storage investments?

Feb 12 Response:

Listed below is a summary of the Dawn-Trafalgar System construction that the Board has reviewed and approved in prior applications.

<u>Pipe Diameter</u>	<u>Years</u>	<u>Sections</u>
NPS 26	1957 - 1958	Dawn-Lisgar
NPS 34	1964 - 1972	Dawn-Lisgar
NPS 42	1975 - 1989	Dawn-Kirkwall
NPS 48	1990	Kirkwall-Hamilton
NPS 48	1991	Milton-Parkway
NPS 48	1991	Lobo-London
NPS 48	1991	London-St. Marys
NPS 48	1993	St. Marys-Beachville

<u>Pipe Diameter</u>	<u>Years</u>	<u>Sections</u>
NPS 48	1994	Enniskillen-Brooke
NPS 48	1996	Bright-Owen Sound
NPS 48	1999	Dawn-Enniskillen
NPS 48	2001	Beachville-Bright
NPS 48	2002	Owen Sound-
Brantford		
NPS 48	2006	Brooke-Strathroy
NPS 48	2006	Hamilton-Milton

There is no one year that had significant storage pool construction. I have attached the listing of storage pool additions from 1999 to 2005 that we provided to you in December.

Feb. 1 Total Throughput includes the Distribution Volumes (not weather normalized – Line 2.2 on Union's Data Input Sheet) and all of Transportation Volumes for utilities and other energy market participants outside Union's service area.

Feb. 1: We computed the difference between throughput and volume and found that it grows much more rapidly than the transmission contract demand. Why is this? Which of the two variables is a better measure of the way that output growth affects revenue?

Feb 5 Response: We reviewed the numbers and do not see the growth you have identified. We suggest that you use the transmission demand as the weight.

Feb. 8: Transmission deliveries (throughput – volumes) grew at a 2.9% average annual rate 1999-2005. During the same period, transmission demand grew at a 1.6% average rate. So, it does matter which variable we use in the output index. Should we just use the transmission demand? Is there any argument for a weighted average of the two? Are more detailed transmission revenue and output data readily available?

Feb 12 Response:

The main driver of ex-franchise transmission revenue is transmission demand. The volumetric revenue is largely fuel, UFG and revenue from interruptible services. The volume growth is likely the result of customers improving their load factor or increased interruptible/authorized overrun volumes

One quick question: we were wondering if the numbers for the transmission and contract demand were mislabeled since the storage numbers were much larger than the volume numbers.

Email Response: Storage Demand Volumes – This volume represents the maximum storage quantity that was contracted for by ex-franchise customers for the indicated period. In other words the number provided is the maximum that they can put into storage at any given time.

Transmission Demand Volumes – This volume represents the daily maximum quantity (“DCQ”) of gas that was contracted for by ex-franchise customers to be transported for the periods indicated.

It really represents two different things.

NEW QUESTION: You provided us with data on the “Board Approved Annual Rate of Return”. Is this just the ROE or is it a more comprehensive rate of return?

Feb 12 Response:

Please see attached file ROE Calculation March 1997

NEW QUESTION: Is the Company’s distribution construction cost driven more by the prices for steel or plastic pipe?

Feb 12 Response:

We don’t understand the question. Steel verses plastic is based on operating pressure of the pipeline and the requirements of the customer.

Feb. 28: What I would like to know is which matters more to your cost when prices of steel pipe and PVC piping soar? Or are the impacts about equal? Do you have any comments about the outlook for these prices? They obviously soared 2004-2006. But is there any reason for them to continue to soar?

March 2 Response - Pipe pricing and mix are questions that we cannot get a quick answer to. Further, this information would have to be gathered from (Houston) Procurement and Engineering.

New Questions February 9th email:

We are testing out the price cap indexes that we have developed to see how well they track your historical rate trend. It makes sense in such an inquiry to use start and end dates featuring “fresh” rates that resulted from a cost of service rate case. So: in which years of the 1999-2006 period were your rates based on a rate case?

Feb 12 Response:
1999 and 2004

Using the “actuals” data you have provided to us, it seems that your volumetric rates for distribution services (contract and wholesale as well as general service) have fallen on average whereas your customer charges have risen considerably. Does that make sound right?

Feb 12 Response:

Yes, between 1999 and 2007, Union has increased the general service monthly customer charge from \$7.50 to \$16.00 per month.

Using a sophisticated price index, we find that your rates typically grew by about 0.7% annually during the 2000-2005 period. Does that sound right to you?

Feb 12 Response: Not sure. I would need to see the output of your model. Is this general service, contract and ex-franchise in total? What is a “sophisticated price index” anyway? Keep in mind that for the 2000 to 2003 period our rates were flat

even decreasing in some years. We then had a relatively large increase in 2004 followed by virtually flat rates in 2005 and 2006.

Feb. 28: We measure the growth in your rates as a weighted average of the growth in the rate elements where the shares of each element in base rate revenue serve as the weights. The elements are:

Customer Charge = General Service Fixed Revenue/Number of Customers

Rate M2 Volume Charge = M2 Volume Revenue/M2 Volume

Rate 01 Volume Charge = Rate 01 Volume Revenue/Rate 01 Volume

Rate 10 Volume Charge = Rate 10 Volume Revenue/Rate 10 Volume

Contract & Wholesale = Contract & Wholesale Revenue/C&W Contract Demand

Storage = Storage Revenue/Contract demand

The price of transmission has been calculated in two ways:

Transmission = Transmission Revenue/Transmission Contract Demand

Transmission = Transmission Revenue/Transmission Volume.

With the trends in rate elements thus calculated, we take a weighted average of them using their shares in total revenue as weights. The results can be found in the attached table. Please note the following

- The research suggests that from 1999 to 2005 Union was engaged in a fairly ambitious redesign of rates that raised customer charges and lowered volumetric charges
- This redesign materially slowed the company's rate growth using the most sophisticated inflation measure available, which has flexible revenue shares.
- Using a less sophisticated fixed revenue shares, your average rate growth was much more substantial (*e.g.* 1.6% average over the 2000-2005 period).
- A crude inflation measure such as revenue/MCF would generate an even more rapid inflation result for distribution services given the slow volume growth.
- Rates for transmission fell, whereas rates for storage rose (we know that these are crude measures...are they worthless?).

We would really appreciate your comments on any aspect of this table.

P.S. You mentioned that it would be easier to provide the kind of forecast-based revenue and output data that Enbridge have provided than the kind of actuals data that you have provided. How hard would it be at this late date for you to provide comparable forecasts? Just asking at this point.

Feb 12 Response:

Since we have only had 3 rate cases since 1999 the billing determinants would be the same for the 1999 to 2003 period and the 2004 to 2006 period. It could, however, be pulled together but not before the end of the week. We have sent actual info to you which, I would assume, is of more use to you for the productivity study.

Feb. 18: New Question When Union does a cost of service filing, how does it deal with plant additions in a given year for purposes of depreciation and return on net plant value in that year? Do you include the return on net plant value and depreciation as if the plant

had been in service all year, ignore these costs until the following year, or do something in between? I need to know this to better figure out how fast rates should escalate to reflect this kind of equipment price surge.

March 2 Response - New plant additions receive a ½ year of depreciation in the year that they are added. Plant additions are recorded to Rate Base in the month that the project is completed. Neither one of these treatments is unique to cost of service filings.

Sincerely,

Connie Burns, CMA, PMP
Manager, Regulatory Initiatives

CC: Laurie Klein, OEB
Mike Packer, Union Gas
Nancy Santos, Union Gas

November 17, 2005

Mr. Bohdan Bodnar
Vice President, Human Resources Canada
Duke Energy Gas Transmission
P.O. Box #: 11162
#1100 – 1055 West Georgia Street
Vancouver, BC V6E 3P3

Dear Bohdan:

UNION GAS 2007 RATE APPLICATION – TOTAL CASH COMPENSATION

This letter has been prepared for Union Gas Limited (the “Company”) in support of its 2007 rate application. It provides information on:

- The Company’s change in base salary for 2004 and 2005, along with an outlook for 2006; and
- Eligibility for participation in the Company’s annual short-term incentive plan and the level of incentive targets.

For all regular full-time employees, the structure of the Company’s total cash compensation includes both a base salary component and a short-term incentive component. The design of the short-term incentive compensation plan is intended to focus employees’ efforts on achieving and exceeding specific corporate, business unit, team and/or individual goals. These performance goals are reviewed and revised annually to reflect current business objectives. For each of the annual goals, a minimum performance threshold is established; if actual performance is below the minimum threshold established for a specific goal, there is no payout for that element of the incentive opportunity.

The inclusion of a short-term incentive component within the structure of the Company’s total cash compensation, and the performance conditions attached to each of the annual goals, are consistent with competitive market practice within the National comparator group of companies used for the purpose of our analysis.

BASE PAY TRENDS

Methodology

In 2004, the Company's costs were reviewed when rates were approved by the Ontario Energy Board. We have used 2004, therefore, as a base year for this analysis, comparing the trend in compensation costs since 2003 between Union Gas Limited and the competitive labour market with which the Company competes for talent. Further, since base salary is the foundation upon which total compensation is typically based in the marketplace, the trend in base salary movement since 2003 will provide a reasonable indication of the degree to which the Company's total cash compensation has kept pace with or diverged from the marketplace.

For the purpose of this analysis and commentary, the Company's workforce is divided into four groups – Executive, Management, Salaried Professional, and Unionized. The Company has provided data on the average base pay increases for 2004 and 2005. This has been compared with the same base pay trend data, over the same period, for a "comparator group" of companies, defined as National companies with annual revenues in excess of \$1 billion. There are over 100 companies that met this criterion in 2005. This is a large and robust sample for analysis and commentary.

For base salary analysis, the cumulative average salary increases for 2004 and 2005 were calculated for both the comparator group of companies, and for the Company.

Executives

For 2004 and 2005, the cumulative median increase for executive base salaries within the comparator group was 6.9%, as compared with the Company's cumulative base salary increases of 4.9%. If 2006 market projections from the Towers Perrin Salary Management Survey (3.6%) and the Company's 2006 salary increase budget for executives (3.5%) are taken into account, executive base salaries within the comparator group will have increased by a total of 10.8% from 2004 through 2006, as compared with the Company's cumulative base salary increases of 8.5% over the same period.

Managers

For 2004 and 2005, the cumulative median increase for management base salaries within the comparator group was 6.7%, as compared with the Company's cumulative base salary increases of 6.1%. If 2006 market projections from the Towers Perrin

Salary Management Survey (3.4%) and the Company's 2006 salary increase budget for managers (3.5%) are taken into account, management base salaries within the comparator group will have increased by a total of 10.3% from 2004 through 2006, as compared with the Company's cumulative base salary increases of 9.8% over the same period.

Salaried Professionals

For 2004 and 2005, the cumulative median increase for salaried professional base salaries within the comparator group was 6.3%, as compared with the Company's cumulative base salary increases of 5.8%. If 2006 market projections from the Towers Perrin Salary Management Survey (3.3%) and the Company's 2006 salary increase budget for salaried professional staff (3.5%) are taken into account, salaried professional base salaries within the comparator group will have increased by a total of 9.8% from 2004 through 2006, as compared with the Company's cumulative base salary increases of 9.5% over the same period.

Unionized Employees

For 2004 and 2005, average wage rates for the Company's unionized employees increased by a total of 6.1%. This average adjustment is not in excess of the marketplace movement during this period. We understand that 2006 wage rates for unionized employees will be subject to collective bargaining.

SHORT-TERM VARIABLE INCENTIVE PROGRAM

Methodology

For the purpose of our analysis of the Company's annual variable incentive program, we have compared, for three of the four employee groups – Executive, Management, and Salaried Professional, the degree to which employees at the same levels in a National comparator group of companies are eligible for participation in an annual short-term incentive plan, as well as the level of average incentive targets, expressed as a percentage of base salary. For this purpose, the National comparator group is defined as all companies participating in the Towers Perrin 2005 Compensation Data Bank. There are over 200 companies that met this criterion in 2005.

Executives

Within the National comparator group of companies, almost all executives in the same salary bands applicable to the Company's executives are eligible to participate in an annual incentive plan. The average incentive target for the Company's executives, approximately 35% of base salary, is consistent with the market median for the National comparator group.

Managers

Within the National comparator group of companies, 75% to 80% of managerial employees in the same salary bands applicable to the Company's managers are eligible to participate in an annual incentive plan. The average incentive target for the Company's managers is 14% of base salary, compared with a range of 10% to 15% at the market median for the National comparator group.

Salaried Professionals

Within the National comparator group of companies, 60% to 65% of employees in the same salary bands applicable to the Company's salaried professionals are eligible to participate in an annual incentive plan. The average incentive target for the Company's salaried professionals is 6% of base salary, compared with a range of 5% to 10% at the market median for the National comparator group.

* * * * *

We trust this provides the information you require at this time concerning base salary trends and short term incentives. Please call me if you should have any questions.

Sincerely,



Fiona L. Macdonald
Managing Principal

cc: Ashley Witts — Towers Perrin/Vancouver

1 4/ **EXPLANATION OF UNION'S WEATHER NORMALIZATION PROCESS**

2 **WEATHER AFFECTS DEMAND**

3 The total throughput volumes in the general service market are affected by variation in
4 the weather. Total HDD are used to measure the recorded weather since customers use
5 energy primarily for space heating.

6

7 An HDD measures the amount of temperature below and relative to 18 degrees Celsius.

8 For example, if the mean daily temperature is 10 degrees Celsius, then there are 8 HDDs
9 on that day. Union compiles the daily, monthly and annual heating degree days and has
10 weather data going back to the 1960's for its Northern & Eastern and Southern operations
11 areas.

12

13 **WEATHER DEMAND COEFFICIENTS**

14 Weather demand coefficients are used to estimate the amount of energy associated with a
15 HDD in each customer market. The econometric demand forecast equations provide the
16 weather demand coefficients. The nine weather sensitive months of September through
17 May possess weather demand coefficients in the residential and commercial markets.
18 September is not weather sensitive in the light industrial market. The weather demand
19 coefficients can be expressed on a per customer basis or a total throughput volume basis.
20 For example, the current weather demand coefficient for Residential Rate M2 customers

December, 2005

for the month of January is 0.54. This means it takes about 2 HDDs to change the average consumption per customer by one cubic metre.

WEATHER NORMAL

Normal weather describes the most likely weather, or HDDs that can be expected in the long run. Weather normalization estimates what the actual natural gas consumption would be at a normal level of HDD. Union's weather normal is approved by the Board.

WEATHER VARIANCES & DEMAND

The variance in the observed weather is indicated by comparing the actual and normal weather. For example if the actual weather during a month was colder than normal and equaled 500 HDD, and the normal level was 400 HDD, then the weather variance equals 100 HDD.

ESTIMATED WEATHER DEMAND IMPACT

If the weather variance is 100 HDD and the residential weather demand coefficient is 0.54 then the weather demand impact is estimated to be 54 m³ per customer in that month. Multiplying this estimate by the total number of customers yields the total weather impact volumes for the residential market. For example, 54 m³ multiplied by one

1 million customers equals $54 \times 10^6 \text{ m}^3$ of estimated weather impact. Repeating this
2 calculation in each month and market with the appropriate weather demand coefficients
3 and weather variances and then summing the estimated weather normalized impact
4 volumes for each market provides the total throughput volumes impact estimate.

5

6 When it is colder than normal the total throughput volumes impact estimate is subtracted
7 from the total actual volumes to yield the total weather normalized volumes. For
8 example, if the actual volumes were $754 \times 10^6 \text{ m}^3$ in the month, following the above
9 examples the weather normalized volume in the residential market would be $700 \times 10^6 \text{ m}^3$
10 (i.e. $754 \times 10^6 \text{ m}^3 - 54 \times 10^6 \text{ m}^3 = 700 \times 10^6 \text{ m}^3$).

11

TFP Study
Responses to May 30 and 31st Questions
5/31/2007

1. Can you provide some details of your econometric demand models that you use for weather normalization?

Response: Econometric Demand Model: The weather normalization demand coefficients are taken directly from the demand equations. Attached is the Rudden report that describes the demand equations. We have updated these equations and the weather coefficients have changed slightly.

2. Why were the normalized volume per customer trends presented at the stakeholder conference so different from those calculated using the other method?

Response: Stakeholder Meeting Presentation: The numbers I provided previously were 70% 30 year average and 30% 20 year trend. When I went back to look at the presentation I realized that only the 30 year average and the 20 year trend were provided separately (not the blended methodology).

Detailed Spreadsheets: The weather normalized data included in the spreadsheets provided as part of the information for the TFP model was calculated using the weather normalization methodology in place for each respective year.

3. With regard to Union's weather normalization method, the explanation from EB-2005-0520 that you sent me says that "Union's weather normal is approved by the Board". Does that mean that in its weather normalization calculations Union uses the Board's "backward looking" methodology for setting budget degree days, which generates an HDD time series that is sensitive to the fluctuations in recent actual HDDs?

Response:

- **20 year declining trend** – The 20-year declining trend is a method used to establish the weather normal assumption that is used in the demand forecast for the residential, commercial and light industrial markets. The 20-year declining trend is a simple linear trend line developed from the most recent 20 years of annual heating degree data. This trend line is then projected forward to provide the expected annual heating degree-days for forecast years.
- **30 year average** – The 30-year average is the previous method Union used to establish the weather normal assumption that was used to develop the demand forecast for the residential, commercial and light industrial core markets. The 30-year average is a simple mathematical average of the most recent 30 years of annual heating degree data. This average is then the expected annual heating degree-days for forecast years.
- **The "OEB weather normal blending formula" as directed in its 2004 rate case Decision:** On page 23 of the RP-2003-0063 Decision, the Board stated, "[i]n order to test the suitability of changing the normalization methodology, and in consideration of the principle of minimizing rate shock, the Board will allow Union, for 2004, to forecast HDDs based on a 70:30 weighting of the 30-year average forecast and 20-year trend forecast respectively. For each year thereafter, the Board will consider 5% declines and inclines to the weighting of the 30 year and 20 year methodology respectively until such time as a 50:50 weighting is in place." A 55:45 weighting was used to develop the demand forecast for 2007.

4. Do you believe that there is a material declining average use problem in any service class that doesn't include residential customers? If so, why? For example, it appears that the volume per customer in Rate 10 fell noticeably from 2000 to 2005. Why is that?

Response: The declining average use problem applies to all general service customers (residential, commercial and small industrial) which include M2, Rate 01 and Rate 10.

5. Union's Rate 01 is more reliant on residential revenue than Rate M2. The volume per customer decline is more marked for Rate 01. Yet we estimate that whereas the price of M2 averaged 2.68% growth from 2000 to 2005, the price of Rate 01 service averaged only 0.98% growth. Why is that? For example, was there some kind of regional normalization going on?

Response: 2000 to 2003 was Union's trial PBR plan. 2004 was the first rate case since 1999 where rates were designed (included an updated cost study). There was no regional normalization going on.

6. We estimate that the price of Union's Rate 10 service fell substantially 2000-2005 and that the price of transmission service also fell considerably. Please explain these trends. Is there any reason that they would continue in the next 5-7 years?

Response: We do not see the decline in the Rate 10 service price as you describe. Transmission in the North is predominately based on TCPL tolls and not subject to the price cap (upstream transmission costs would be a Y Factor).

7. Intuition suggests that if we had one price cap for all services other than M2 and 01 that the PCI would rise gradually. Are there special circumstances for any of the affected rate classes such that we would expect the rates under continuing cost of service regulation to grow much more rapidly than this? To put it another way, which service groups merit their own PCI?

Response:

We don't know how the prices would change under cost of service.

Declining average use per customer is primarily a concern for the general service group (M2, Rate 01 and Rate 10) which includes residential and small volume commercial/industrial customers. Accordingly, a price cap formula which differs by service group should not result in higher annual rate increases for non-residential and large volume commercial/industrial customers.

8. It occurs to us that a properly designed ADJ would raise residential rates more aggressively in response to average use trends than would cost of service regulation. Do you believe that the company's ability to raise residential rates in response to declining average use is materially constrained by political/equity considerations?

Response: We don't know what weight the Board would put on political/equity considerations.

*Report to
Union Gas Limited*

Regarding

*Union Gas Forecast Analysis
December 16, 2004*



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SECTION I

INTRODUCTION

In August 2004, R.J. Rudden Associates, Inc. (“Rudden”) was retained by Union Gas (“Union”) to perform an independent, expert evaluation of its forecasting methodology. Union engaged Rudden pursuant to a Directive by the Ontario Energy Board in Union’s last rate case (RP 2003-0063). In order to meet the requirements of this project, Rudden assembled a team of professionals with more than forty person-years of gas and electric forecasting experience and industry-recognized expertise in the evaluation and development of such forecasts for electric and gas utilities.

The Principal Investigator for this assignment was George L. Fitzpatrick, a Senior Associate of Rudden and the Principal/CEO of Harbourfront Consulting Group LLC. He is a recognized statistician and econometrician with more than 30 years of experience in developing electric and gas sales and demand forecasts - both econometric and end use; electric and gas weather normalization studies; electric and gas load research programs and analyses; and interfuel competition analyses. He has provided direct and rebuttal expert testimony before many regulatory bodies for more than 30 utility clients throughout the U.S. on subjects such as forecasting, weather normalization, and a variety of comparative economic, statistical and econometric-related analyses. A complete resume for Mr. Fitzpatrick, as well as the other members of Rudden, can be found in Appendix A of this report.

The objective of this project was to evaluate the Union Gas Forecast Models applicable to general service customers from the following perspectives:

- Forecast accuracy
- Logical construction
- Statistical “goodness-of-fit”

Rudden reviewed a variety of documents from Union Gas including the following:

- The May 2004 forecast document entitled, “Union Gas - Demand Forecast Methodology - General Service Markets - Rates M2, 01 & Banner 10” (See Appendix E of this report),
- Information concerning Union’s forecast accuracy,
- A summary of the critiques that were made of Union’s forecast methodologies by both the OEB and interveners in the last rate case, and
- A complete list of all of the descriptive statistics for all of the models that were in our scope of evaluation.

It should be noted that Rudden’s assignment was limited to the review and evaluation of Union’s current forecasting practices. While we have made recommendations for Union to consider in future forecast cycles, we were not commissioned to develop new methodologies and forecasts - nor did we see the need to after our review.

SECTION II

FORECASTING ACCURACY

For models designed to forecast in the short term, the best indicator of forecasting success is the accuracy achieved by the forecasting process. The forecasting process refers to both the methodologies employed and the team that has developed those forecasts. Since judgment is an integral part of any forecast, Rudden had to satisfy itself that the team making those judgments was both knowledgeable about the service territory and the factors that affect that service territory.

Since statistical/econometric models are quantitative expressions of the forecasting team's judgment, the best way to evaluate its collective success is to review the accuracy of the forecasts produced over a reasonably representative period of time - in this case, 2001-2003. Before that time, the methodologies employed by Union were of a less complex structure and the specification of the Heating Degree Day (HDD) weather variables, by month, has evolved based on a different set of controlling forecast assumptions (i.e., 30-year Normals have been replaced by a blend of a 30-year Normal combined with a lesser-year declining HDD trend). For example, earlier forecasts did not:

- Include a two-equation approach for the five primary customer rate classes.
- Recognize the impact of past and audited DSM plans.
- Include the impact of future marketing and DSM plans.
- Span 14-year time periods; the early 1990 forecasts were based on 60 months of data.
- Include the retail energy price in most models.
- The energy efficiency variables were not supported by residential and commercial customer survey results.

After evaluating the forecasts of Union Gas over the 1994-2003 periods, Rudden concluded that the most appropriate focus of a forecast accuracy analysis would be the 2001-2003 time period, since it is over this time frame that significant enhancements were made to the Union Gas methodologies and key assumptions about forecast period weather. The following four tables exhibit both the absolute and arithmetic signed "forecast vs. weather normalized actual" percent variances on a year-by-year basis for each of the four primary rate classes. (Both absolute and signed variances are reviewed since Rudden wanted to capture the average yearly error without having positive errors in one year cancel out the negative errors in another). Accuracy is measured by the absolute percent error measurement.

Forecast accuracy for logically constructed short-term models¹ (that is, models with a forecast horizon of up to 12-24 months) is far and away the most important barometer for judging a modeling system's quality. Statistical elegance is less important with these models—performance, as measured by accuracy, is paramount. The reasons for this are threefold:

1. Accuracy of short-term forecast projections are most important to a utility since these forecasts predict near-term revenue adequacy and resource sufficiency for a time period that is critical to the security of energy

¹ **Short-term models** for electric and gas utility forecasting are defined by Rudden as having a duration of 1-2 years (i.e., 12-24 months ahead).

supply for customers and adequacy of returns to stakeholders. Clearly, the accuracy of short-term models becomes apparent to both utility and regulator over a time frame in which these results are fresh in everyone's mind. Accuracy comparisons can be made 12 months after a forecast is produced.

This is not the case with long-term forecasts. Long-term forecasts² can be predicted as much as 30 years into the future. Further, they are usually updated every year. Thus, there is never a timely debate over long-term forecast accuracy but, rather, a debate over theories, specifications and assumptions.

2. Statistical issues (e.g., autocorrelation, multicollinearity and heteroskedasticity³) that could render long-term models unreliable/unstable are less of an issue in a short-term structure. The reason for this is that short-term forecasts progress only a short time distance (in term of time periods ahead) from the end point of the history of the estimated model (in the case of Union's short-term forecasts, the models only predict two months ahead for each calendar month forecasted). Thus, such structural problems, if they do exist, have less of an absolute influence on the forecast results. Autocorrelation, multicollinearity and heteroskedasticity actually increase their influence in a compounding fashion, the longer the forecast horizon. Thus, the shorter the forecast period, the less the overall effect.
3. Further, in monthly model structures, it would be unusual not to have both explainable and unexplainable autocorrelation and multicollinearity since successive monthly observations are usually related and driver variables have a tendency to move together (e.g., it is unlikely that a warmer than normal January will immediately be followed by a colder than normal February). The comparison of the relative accuracy of alternative model structures, when used to backcast the last year of the historical data series, usually provides guidance in selecting the best model structure.

² **Long-term forecasts** for electric and gas utilities as defined by Rudden generally have an outlook of between 10-30 years.

³ **Autocorrelation** refers to correlations among adjacent time periods (lag 1 autocorrelation). There may be an autocorrelation for a time lag of one period, another autocorrelation for a time lag of two, and so on. The residuals serve as surrogate values for the error terms. There are several tests for autocorrelated errors. The Box-Pierce test and the Ljung-Box test check whether a sequence of autocorrelations is significantly different from a sequence of zeros; the Durbin-Watson statistic checks for first-order autocorrelations.

Multicollinearity is defined as the presence of correlation among explanatory variables in a regression analysis. This commonly occurs for nonexperimental data. Parameter estimates will lack reliability if there is a high degree of covariation between explanatory variables, and in an extreme case, it will be impossible to obtain estimates for the parameters.

Multicollinearity is especially troublesome when there are few observations and small variations in the variables.

Heteroskedasticity refers to nonconstant variances in a series (e.g., differing variability in the error terms over the range of data). Often found when small values of the error terms correspond to small values of the original time series and large error terms correspond to large values. This makes it difficult to obtain good estimates of parameters in econometric models. It also creates problems for tests of statistical significance.

J. Scott Armstrong, "Principles of Forecasting: A Handbook for Researchers and Practitioners"
<<http://morris.wharton.upenn.edu/forecast/dictionary/defined%20terms.html>> (2001)

Component Forecast Accuracy:

The tables found in Appendix B show the forecast accuracy that has been achieved by the Union forecasts. The summary table appears in the text below, and more detailed tables can be found in Appendix B.

The table below sums the results for the four primary rate classes (i.e., Residential M2, Residential 01, Commercial M2, and Commercial 01), representing about 1.2 million customers and 85% of Union's general service rates throughput volumes. It also shows the forecast error for the years 1994 through 2000 and the error for the years 2001 through 2003. The results demonstrate Union's average error for the first seven years and the last three years.

FORECAST ACCURACY – TOTAL YEAR VOLUMES - SUM OF THE FOUR PRIMARY RATE CLASSES (10*3 m3)					
<u>Year</u>	<u>Normalized Actual</u>	<u>Forecast</u>	<u>Difference</u>	<u>Actual % Diff.</u>	<u>ABS % Diff.</u>
1994	5,065	5,214	149	2.86%	2.86%
1995	5,022	5,089	67	1.32%	1.32%
1996	5,098	4,911	187	-3.80%	3.80%
1997	5,071	4,784	287	-5.99%	5.99%
1998	4,825	4,802	23	-0.48%	0.48%
1999	4,759	4,960	201	4.05%	4.05%
2000	4,719	4,803	84	1.75%	1.75%
2001	4,554	4,597	43	0.94%	0.94%
2002	4,517	4,426	91	-2.06%	2.06%
2003	4,441	4,406	34	-0.78%	0.78%
Average from 94-00				-0.04%	2.89%
Average from 01-03				-0.63%	1.26%

As can be observed from the table above, as well as those found in Appendix B, it is Rudden's conclusion that the forecast accuracy achieved by Union over this 2001 through 2003 time period was quite acceptable and in line with other short-term electric and gas forecasts reviewed by Rudden. ***To contrast, the overall absolute variance from the years 1994 through 2000 was 2.89%. For the years 2001 through 2003, this forecast accuracy improved significantly to 1.26%.***

Finally, a look at the overall total volumes of the Union forecast shows the following for the most recent five-year period (a five-year period has been used due to limitations in the number of years that forecasts were produced on a comparable basis).

**FORECAST ACCURACY - TOTAL YEAR VOLUMES - SUM OF ALL
RATE CLASSES**

<u>Year</u>	<u>Normalized Actual</u>	<u>Forecast</u>	<u>Difference</u>	<u>Real % Diff.</u>	<u>ABS % Diff.</u>
1999	5,499	5,707	208	3.65%	3.65%
2000	5,436	5,569	132	2.38%	2.38%
2001	5,294	5,318	24	0.45%	0.45%
2002	5,276	5,153	123	-2.38%	2.38%
2003	5,183	5,136	47	-0.92%	0.92%
Average from 99-00				3.01%	3.01%
Average from 01-03				-0.95%	1.25%

From an accuracy perspective, Union's forecasts have improved over the analysis period shown above. The last three forecast years, which are the result of forecasts with enhanced multi-equational methodologies, have produced more accurate results than earlier years.

In Rudden's judgment, Union's Residential and Commercial Volume Forecast Models (i.e., the forecasts for the four primary rate classes) have historically produced accuracy that is consistent with and in some cases better than other gas utilities whose forecasts have been reviewed by Rudden in the past.

The Industrial Models do not meet that same standard. This is due to the economic vagaries under which Union's general service rate industrial customers operate. That is, their dependence on exports to the U.S. economy and the attendant microeconomic production impacts at the factory floor level, have varying and largely unforeseeable quarter-to-quarter effects on the space and process related natural gas consumption. In addition, the distribution of general service rate industrial customers according to total annual volumes is skewed towards large volume customers. Consequently, industrial NAC is sensitive to the consumption behaviour of these large volume customers.

Union Gas recognizes that the forecast accuracy level for industrial customers is more difficult to achieve than it is for residential and commercial customers. The stand-alone accuracy level for industrial customer volumes is plus or minus four percent.

It may well be that this is the best that can be achieved with a modeling system that does not include a costly segmented, formal and constant customer interview process as part of the methodology.

The general service industrial demand is more difficult to forecast than the comparatively more homogeneous residential and commercial customer. Industrial demand includes both space heating and process-related energy requirements. Both of these energy requirements are affected by factors described below.

The two general service industrial rate classes, rate M2 & 10, that are forecast by the demand volume forecast equation that is under review serve customers that form a small portion of the total industrial sector. These industrial customers are classified as general service by the nature of the size of their natural gas consumption as set by Union Gas rate schedules and not by the nature of their production. Industrial customers can migrate between rate classes, e.g., rate M2 to rate M4 and rate 10 to rate 20 and vice-versa, as their consumption levels change.

The general service industrial customers produce goods for North American and global markets and are affected by economic conditions such as U.S. and Canadian economic growth, foreign currency exchange rates, and global manufacturing competition to name the major factors.

As many of the industrial customers are part of larger corporations, changes in production lines, closures and factory floor expansions and inventory-related production changes are determinants to changes in demand. The distribution of general service customers by annual volume is more skewed to large volume customers in contrast to residential customers, which have a more normal distribution. Changes in the number of large volume customers consequently can have a greater effect on industrial NAC.

These four factors described above combine to make the industrial NAC forecasting activity more challenging. Union Gas recognizes that the demand forecast accuracy for industrial customers is more difficult to achieve than for residential and commercial customers. The accuracy level for industrial customer volumes per se is plus or minus four percent.

SECTION III

FORECASTING PROCESS

Analysis of Forecasting Models

While many forecasting models exhibit statistically significant “goodness-of-fit,” it is far more important that forecasting systems start off with a solid logic, supported by economic, technological and/or behavioral theory. Once that foundation is achieved, it is then a matter of selecting available independent variables and statistical constructs that produce a cost-effective, unbiased, and accurate forecasting process. The model’s structures and variables employed by Union are consistent with those employed by other utilities that Rudden has evaluated in the past as “best practice” for gas utilities.

Given the fact that Union’s forecasting process has the objective of providing accurate results over a one-two year time frame, we believe that proven historical accuracy and solid causal logic override are certain statistical issues that would become far more important if the forecast time frame was long-term. The reason for this opinion is that, systemic equational problems such as multicollinearity, heteroskedasticity, and autocorrelation, if they exist in a forecasting model of monthly projections with a 10-year or so historical database, do not have the ability, unless they are dramatic in nature, to have a meaningful, statistically significant effect on a set of short-term forecasting predictions.

To explain, heteroskedastic and autocorrelation disturbances exhibit themselves through either expanding or declining error term amplitudes or discernable patterns in error terms, respectively, associated with successive observations in the historical regression equation observations used to estimate the model. Often times, these estimation problems can be attributable to either a missing variable, co-mingling of causality, or misspecification of an included variable. This non-randomness of the error term may manifest itself in an increasingly expanding effect that may result in the over-or-under forecasting of the dependent variable or certain months of the forecast. Thus, the length of the projection period has a direct bearing on the nature and extent of the heteroskedastic, multicollinearity and autocorrelation effects. In Union’s case, each monthly observation is forecast only two steps ahead, thus minimizing any deleterious impact. This reality, coupled with the observed historical forecast performance serves to discount heteroskedasticity, multicollinearity and autocorrelation as important considerations.

Finally, it is clear that the relative accuracy of short-term forecasts becomes evident within a short period of time, thus validating their credibility on a year-to-year basis.

The Rudden team has examined the models used by Union, segmenting our analysis into the following categories:

1. Modeling Approach
2. Variables
3. Regression Results (Descriptive Stats)

1. Modeling Approach

The job of any forecasting group is to produce the most accurate forecasts possible given the resources made available. This is not a matter of statistics or econometrics, per se, but rather one of the allocation of resources within available budgets. In the case of Union Gas, there are a number of forecast components that must be developed every year, each of which requires expert internal resources. The following table shows the relative magnitude of volumes for each class that is subject to the Union forecast process:

UNION GAS RATE CLASSES

	<u>Residential</u>		<u>Commercial</u>			<u>Industrial</u>		<u>Total</u>
	M2	01	M2	01	10	M2	10	
# of Customers	827,198	254,998	77,957	25,375	2,567	5,224	189	1,193,508
% Customers	69.3%	21.4%	6.5%	2.1%	0.2%	0.4%	0.0%	
NAC	2,614	2,734	17,319	9,103	95,713	85,161	276,159	488,803
Total Volumes	2,162,296	697,165	1,350,137	230,992	245,694	444,881	52,194	5,183,359
% Volumes	41.7%	13.5%	26.0%	4.5%	4.7%	8.6%	1.0%	

Union employs a reasonable and commonly used approach to the forecast of customer class usage over a two-year forecast horizon. This approach employs separate models for the forecasting of Use per Customer and the total number of customers. The econometric models incorporate measures of gas price, economic activity, and month-to-month weather explanatory variables (for heating season months). These variables are commonly employed by many gas and electric utilities in the forecast of customers and use per customer, and represent a logical and accepted approach.

The primary drivers of use per customer are traditionally defined as weather, as measured by heating degree-days, gas price elasticity of demand, the positive growth impact of new (or net new) gas appliances, and the negative impact of more efficient appliances/equipment entering the end-use pool. The primary elasticity drivers of these models are short-term in nature and, thus, the models have logically been specified with variables that lean more toward short-term nominal gas price drivers.

Of note is a statement found on page 12 of the Union Gas Demand Forecast Methodology - May 2004 -“For the majority of the 136 demand variables tested that are contained in the eleven demand equations, this 95 percent (Confidence Level of the “t” value of each partial regression coefficient) level is met as 127 demand variables had test scores above the 95 percent confidence level. In nine instances, a lower confidence level was considered ...” This acceptance of a lower statistical Confidence Level is quite acceptable if the economic relationship attempted to be captured has sound theoretical basis. Often times, the appropriate economic relationship is not able to be

captured with the level of confidence a forecaster would like due to the availability of a data series that would most accurately capture that relationship.

Additionally, all exogenous variables that were employed in these models had the appropriate arithmetic sign, which means that the estimated partial regression coefficient for each independent variable was consistent in the direction of the impact that would be expected under economic theory.

2. Variables

The first issue that was uncovered by Rudden in its analysis revolved around Union's somewhat unconventional, yet well supported, statement that a forecast of gas total throughput volumes should take into account evidence that winter weather in the Union Gas service territory, as measured by heating degree days, has actually exhibited a warming trend over the last thirty or so years. From a practical perspective, the theory of global warming suggests that such a trend is likely, and to include such a theory in a short-term forecast appears reasonable in this case.

Evaluation of the Forecast Methodologies for Residential M2, 01; Commercial M2, 01 and 10 Classes

Union employs a multi-equational approach to the forecasting of the Residential M2 and 01 classes, and the Commercial M2 and 01 & 10 classes. The construct of the volume equations employs commonly used variables such as:

- Number of Customers
- Natural Gas prices
- Weather (as captured in nine separate weather variables identifying the heating months of the year)

This model structure is commonly used to forecast short-term sales by month. The overall statistics of these models are acceptable and the signs of the partial regression coefficients comport with accepted economic theory.

Union takes two additional steps to ensure they capture the appropriate month-to-month distribution of volumes and the noticeable declining trend in use per customer. The first of those steps is to estimate use per customer as a function of the following variables:

- Retail Price of Natural Gas
- Residential Energy Efficiency / or Commercial Segmentation Index
- Weather (as measured by monthly heating degree days)

The Retail Price of Natural Gas Price variable used in the model is specified as a nominal value,⁴ as opposed to a real value. A short-term model structure should capture "intensity of use" (i.e., responses to a customer's monthly

⁴ **Nominal value** is the actual price experienced by a customer without adjustment for the effects of inflation. Real prices are adjusted for inflation.

budget) responses rather than longer-term structural changes; therefore, a nominal price variable would be acceptable, and probably preferable, from both a statistical and logical perspective.

The Residential Energy Efficiency Variable and Commercial Segmentation Index have been developed to capture the overall declining trend in use per customer, ostensibly caused by increasing appliance/end-use efficiency. The construct of these variables is based upon surveys of both existing and new residential and commercial customers. While the constructs are different, the overall objective of both is reasonable. The resultant variables add to the explanatory power of the models.

The Weather Variables are specified as a series of monthly variables for the nine heating months of each year. These variables capture both relative monthly use intensities and certain sociological-driven use patterns that go hand-in-hand with the months of the year (e.g., Christmas, New Years, winter school breaks, etc.). The mathematical construct of these variables is one of two major constructs that have been proven to be valuable in predicting monthly gas-use intensity.

Rudden found out that a number of other variables have been tested and Union selected the variables primarily used according to their accuracy, in their forecasting systems. From a practical process perspective, a forecaster must choose a set of independent variables that are logical, measurable and readily obtainable in a time period that meets forecast preparation deadlines. The variables used by Union meet all of these criteria.

While Rudden recognizes that there may be other variables that would perform adequately in the Union forecasting system, we are satisfied with the accuracy that has been achieved by Union, especially over the last three years. Further, the use of multiple equations in the development of the forecasts for five of the rate classes has merit even though each equation includes some of the same variables contained in the other. The reason for this conclusion is that each individual equation has been shown to be less accurate than the average result of both equations. Further, Union has not been successful in finding alternative equations that combine the key demand drivers of the current equations.

Judgmental Adjustments

After the use per customer key demand drivers are developed, there are certain judgmental adjustments that are applied to the NAC forecasts to account for influences that cannot be statistically estimated in the historical series. Those adjustments include:

- Marketing Plan Impacts
- DSM NAC Impact
- Water Heater Standards Efficiency Changes

In Rudden's opinion, judgmental adjustments to a statistically prepared forecast are both appropriate and necessary if the influences being recognized through forecaster judgment are known to exist and are also known not to have existed in the historical data series upon which the models have been estimated.

3. Regression Results (Descriptive Statistics)

Rudden reviewed a comprehensive set of descriptive statistics output for each of the ten residential and commercial models.

As evidenced by the data contained in Appendix C, the models' R-Squares⁵, t values of the partial regression coefficients, and Standard Errors are all statistically competent. Further, the arithmetic signs of the independent variables are correct.

As evidenced by the data contained in Appendix D, all of the models have acceptable heteroskedastic disturbances. In the models that do contain autocorrelation, as evidenced by the Durbin Watson d or h statistic, the potential effect of this autocorrelation in the equation is far outweighed by the accurate performance of such models. In multiple regression⁶ time series modeling, the presence of autocorrelation and multicollinearity are usually not a question of "if," but "how much." Taking steps to eliminate these time series side effects may have the unwanted result of damaging a model's explanatory and predictive power. In any event, Rudden's view of these issues is that the presence of these side effects is not a serious problem for models that forecast 12-24 months into the future. However, in the interest of completeness, Rudden has included a suggested set of tests for Union to consider in the future forecast cycles.

Valuation of the Methodologies to Forecast Industrial M2 & 10 Classes

Conceptually, the model structure utilized for these classes is commonly used by utilities today. The volume equations developed for these classes include:

- Weather
- Number of Customers
- Lagged Change in GDP
- Price Ratio-Natural Gas to Fuel Oil

The problem is that the resulting forecasts are less accurate than the residential and commercial forecasting efforts. However, the problem is most likely not with the model but with the forecasts of the independent variables used to drive the model. In the case of these customers, their "derived" demand for natural gas varies directly with the demand for their industrial output, and the demand for their industrial output varies depending on national and international forces that are beyond their control.

⁵ **R-Squares**, or the Coefficient of Determination, measures the percent of the variance in the dependent variable that is explained by the independent variable(s).

⁶ **Multiple Regression** is an extension of simple regression analysis that allows for more than one explanatory variable to be included in predicting the value of a forecast variable. For forecasting purposes, multiple regression analysis is often used to develop a causal or explanatory model.

J. Scott Armstrong, "Principles of Forecasting: A Handbook for Researchers and Practitioners"
<<http://morris.wharton.upenn.edu/forecast/dictionary/defined%20terms.html>> (2001)

SECTION IV

OBSERVATIONS ON OEB AND INTERVENOR CONCERNS

In reviewing the concerns of both the OEB and intervenors in Union's last rate case, there were three areas of focus. They were:

1. Statistical Significance vs. Judgment
2. Economic Theory vs. Statistical Estimation
3. Autocorrelation, Multicollinearity and Heteroskedasticity

With these concerns, Rudden offers the following comments for all parties' consideration.

Statistical Significance vs. Judgment

It is Rudden's perspective that every forecast is a mirror of a forecaster's judgment. Regardless of the sophistication of the models employed, it is the forecaster that selects the models, variables and transformations and then makes informed judgments about influences known to exist, but are not modellable for one reason or another. In short-term model structures, there is great value in trying to capture and model "persistence"-- that is, the experience and trends of the recent past. Short-term demand for natural gas for residential and commercial consumers is often best described as changes in intensity of use, usually as a response to weather. Price effects may not be "capturable" with a high degree of statistical accuracy due to the fact that customers have a limited opportunity to respond in meaningful ways (e.g., families need to keep warm and cook meals, and merchants need to open each day for business regardless of how cold it may be). For this reason, time series and pooled structures used to develop long-term forecasts will have more to work with in the development of own price, cross price and income effect elasticities. Critics of the Union forecasts appear to have a focus on statistical "perfection," perhaps at the expense of a good forecast.

Thus, judgment is entirely appropriate under the following circumstances:

- There is a phenomenon that is known to exist by the forecaster that has not been a factor in the historical series (e.g., new technologies, new efficiencies, weather changes, etc.).
- The judgment of the forecaster is experienced, based upon the latest information, and, where applicable, consistent with accepted economic theory.
- The credibility of the forecaster's past efforts is favorable.

Union forecasters meet these tests for appropriateness.

Economic Theory vs. Statistical Estimation

There are instances in which a forecaster knows that there is a certain logical relationship between a dependent and independent variable. As an example, the relationship known as “price elasticity of demand,” in Rudden’s experience has not been challenged (i.e., a negative arithmetic sign). However, there are times when a forecaster attempts a statistical estimation of this relationship and there are deficiencies in the data or other overshadowing circumstances (e.g., multicollinearity) that will not permit the statistical estimation algorithm to estimate this relationship with a high level of statistical confidence. The fact remains that this relationship is known to exist. If the resultant statistical estimation procedure captures the correct arithmetic sign of the relationship, it is preferable to include the variable in the forecasting model, even though it has a lower confidence “t” value.

Rudden suggests that critics of “t” values of partial regression coefficients below 95% should consider this perspective in weighing the importance of this criticism.

Autocorrelation, Multicollinearity and Heteroskedasticity

In our review of Union’s forecasting models, there were instances in which we found evidence of each of these three statistical problems. In our opinion, the impact of these problems on Union’s forecasting results were insignificant given the relatively short forecast horizon; and, given Union’s accuracy record (see a complete explanation of the reasons for this conclusion on page 5). Any attempt to fix these problems would have to proceed cautiously due to the construct of the models. However, we would like to discuss the practical aspects of these so-called statistical problems in turn:

- Autocorrelation is usually present to some extent in most time series of a monthly construct. Month-to-month observations usually have some serial linkage and this fact can be of value when forecasting one-to-two years into the future.
- Multicollinearity may exist in a relationship estimation structure such as a multiple regression but it does not impede the model’s ability to forecast reliably unless the correlated variables make a sudden departure from this collinear relationship in the forecast period—this is not likely in a 1-2 year ahead forecast. We conclude that this concern is without merit in this case.
- Heteroskedasticity can become a problem in a forecast model if the forecast period is sufficiently long enough to allow the non-constancy of a forecast variance to become unstable. In our Recommendations in Section VI, we do offer some ideas for Union to consider in future forecast cycles. However, at this point, given Union’s forecast accuracy track record and the length of the forecast period, we do not believe that this represents a significant threat to forecast accuracy.

SECTION V CONCLUSIONS

Based upon Rudden's review of Union Gas Ltd. Demand Forecast Methodology - General Service Markets - Rates M2, 01 and Commercial M2, 01 & Banner10 - May 10 2003; our analysis of Union's workpapers; our evaluation of forecast accuracy data, as well as discussions with the Union Gas forecasting staff, we conclude the following:

1. In Rudden's opinion, Union's forecasts and underlying methodologies are reasonable and produce accurate results.
2. Union's Volume Forecasts for the Residential M2, 01 and Commercial M2, 01 and 10 classes are logical and statistically credible forecasting methodologies that produce accurate results sufficient for reliable 12-24-month-ahead projections.
3. Union's Industrial Volume Models are competent and credible as to their logical and statistical construct. However, their accuracy performance is not up to the level of the Residential and Commercial Models. Rudden's scope of work did not envision the development of alternate structures, databases and/or specifications. However, it may well be that these models' accuracy performance is the best that can be obtained for this class due to the nature of industrial customers' gas consumption and the many potential national and international influences that affect their demands for natural gas.
4. For short-term forecasts, such as the ones produced by Union and focused upon in this report, the most important performance parameter that should be considered is the accuracy of the resultant 12-24 months-ahead projections.
5. There are certain judgmental components that have been made by Union forecasters to the subject forecasts. Rudden's position on judgmental forecasts is that it is acceptable and even preferable for qualified forecasting personnel to adjust forecast model outputs under the following circumstances:
 - The phenomenon that is to be captured is known to be influential on current experience and/or future forecasts but there is a lack of historical influence of this phenomenon on the databases that are being used to estimate the econometric forecast model equation(s).
 - The judgmental adjustment should be the product of a structured estimating process that ought to be documented at the outset and reviewed at the time of each forecast update. Additionally, forecasters should continue to test for the statistically significant presence of the phenomenon that is the subject of the judgmental process by including a relevant independent variable that should logically capture that phenomenon when it does become a statistically significant driver in the forecasting model. Once that variable achieves an acceptable "t" value for its partial regression coefficient, with the expected arithmetic sign, then this variable may replace the judgmental adjustment.

SECTION VI

RECOMMENDATIONS FOR FUTURE INVESTIGATION

This section has been developed to offer Union's forecasting team some ideas that may prove to be cost effective if tested in future forecasting efforts. However, Rudden offers these caveats:

- Union has in place a competent forecasting process yielding accurate results. If Union judges that these recommendations are worthy of consideration, then we suggest that Union start with the first recommendation and, after testing, proceed to the second, and so on. However, it is conceivable that the first recommendation may be the only one necessary to test, since it may serve to improve model performance and reduce statistical side effects to a degree that would make further testing unnecessary at this time.
- While Rudden believes that the following recommendations will improve the statistical sophistication of the model, we do not know whether they will provide any marginal benefit in terms of additional accuracy for the additional cost. Union's first consideration should be to preserve the accurate performance of its forecasts.

Given the caveats mentioned above, Rudden recommends the following for Union's consideration:

Respecification of Weather Variables

Currently, Union's weather variables, by virtue of their specification, capture the **average** effect of heating degree-days over the historical data series. If the weather sensitivity of the monthly use per customer were effectively a constant that varied year-to-year around some average, then the Company's current specification would be optimal. However, it is conceivable that the current specification, by virtue of the fact that use per customer seems to be declining over the historical model estimation period, may be overstating the monthly correction in the forecast year. Further, this error could be compounded when Union normalizes NAC to assess forecast accuracy using the partial regression coefficients from each model.

A potential remedy for this potentially suboptimal specification would be to normalize each historical month in the model database, using a monthly regression analysis of the form $(U/C = a + b * (\text{monthly HDD}) + c * (\text{monthly trend variable}))$ for each calendar month group of observations. Then the monthly-normalized equation output could be included in the forecast model to more accurately capture declining weather sensitivity.

When forecasting for the test year and beyond, Union's monthly forecasts would already contain the latest weather sensitivity coefficients as a result of the pre-normalization process and the efficiency trend phenomenon may be more identifiable from a statistical perspective.

An additional benefit may be the fact that, since model variance would be decreased; there may be a better chance of higher "t" values of the partial regression coefficients for the nominal price, customer and efficiency variables.

Testing of ARIMA Model Structures

As a check on the currently employed model structures, Union may want to consider employing an ARIMA-type⁷ structure on the individual-month normalized U/C data by class. The Rudden team has had success utilizing, for example, Box Jenkins Model⁸ and Box Jenkins Transfer Function models⁹ for the purpose of forecasting 12-24 “steps ahead.”

An alternate suggestion would be to consider the use of a tool such as Dynamic Regression that has the capability of identifying annual, monthly, or seasonal trends, and accounting for those trends. Perhaps, a coupling of this tool with a linear or polynomial trend parameter to capture the conservation effect would give Union a more powerful single equation perspective and reduce the need for averaging of two forecast equation results.

Alternatives for Minimizing Autocorrelation and Heteroskedasticity

In reviewing the descriptive statistical outputs for the ten residential and commercial models, the early years of the historical series tended to fit the data better than the later years. In other words, the scatter of the residual plots widened at the end of the historical series. Rudden recommends that Union consider testing in future forecast efforts:

1. Shorten the historical data series upon which the models are based. This may help remove the potentially less relevant data in favor of focusing on the most recent history.
2. Experiment with weighted regression. This would allow Union to keep the same data series but add emphasis to the latter year observations.

In those models that exhibit significant Durbin Watson¹⁰ test results, Rudden recommends:

⁷ **ARIMA** (Auto Regressive Integrated Moving Average model.) A broad class of time-series models that, when stationarity has been achieved by differencing, follows an ARMA model. An ARMA model is a type of time-series forecasting model that can be autoregressive, moving average, or a combination of the two. In an ARMA model, the series to be forecast is expressed as a function of previous values of the series (autoregressive terms), and previous error terms (the moving average terms).

⁸ **Box Jenkins Model** is a form of autoregressive-integrated-moving average (ARIMA) models for time series forecasting problems. Originally developed in the 1930s, the approach was not widely known until Box and Jenkins (1970) published a detailed description. For more information see: Box, G. E. P. & G. M. Jenkins (1970), *Time-Series Analysis*. San Francisco: Holden-Day. Later editions were published in 1976 and 1994, the latter with G.C. Reinsel, J. T. & K. B. Kahn (1995), “Forecasting technique familiarity, satisfaction, usage, and application” *Journal of Forecasting*, 14, 465-476.

⁹ **Box Jenkins Transfer Function Model** is a model that employs other independent variables other than time as drivers in an ARIMA model framework.

¹⁰ **Durbin Watson** is a measure that tests for autocorrelation between error terms at time t and those at $t + 1$. Values of this statistic range from 0 to 4. If no autocorrelation is present, the expected value is 2. Small values (less than 2, approaching 0) indicate positive autocorrelation; larger values (greater than 2, approaching 4) indicate negative autocorrelation. Is autocorrelation important to forecasting? It can tell you when to be suspicious of tests of statistical significance, and this is important when dealing with small samples. However, it is difficult to find empirical evidence showing that knowledge of the

1. Experiment with a Cochrane Orcutt –type model structure. We have found the models to be effective at capturing periodicity that may not be captured by the monthly HDD variables.
2. Review the practicality of transformations and elimination of lagged dependent variables, so long as they do not interfere with accuracy objectives.

In sum, Rudden makes the recommendations in recognition of the reality that all forecasting processes are in constant need of review and upgrade, when and where they make sense. However, Union forecasters should first and foremost ensure that any suggestion contained in this report, or from any other source, does not conflict with the accuracy that Union is currently achieving. The goal of statistical perfection must come second to accuracy projections in a short-term forecasting environment.

Durbin-Watson statistic leads to accurate forecasts or to well- calibrated prediction intervals. Do not use it for cross-sectional data as they have no natural order.

J. Scott Armstrong, “*Principles of Forecasting: A Handbook for Researchers and Practitioners*”
<<http://morris.wharton.upenn.edu/forecast/dictionary/defined%20terms.html>>(2001)

APPENDIX A

PROFESSIONAL RESOURCES

GEORGE L. FITZPATRICK

George L. Fitzpatrick is the Managing Principal/CEO of Harbourfront Consulting Group LLC. His professional experience includes eight years of service at Long Island Lighting Company managing the Load Research, Forecasting, and Cost of Service Divisions. After that, he held the position of Vice President of Demand Planning with Stone and Webster Management Consultants, Inc.

Twenty-two years of his career have been spent with Applied Energy Group, Inc. as its founder, CEO and Managing Principal. Over his tenure as CEO, he built the firm from one consultant to over twenty-five employees. In 2002, he reached an agreement to sell his share of the firm in order to pursue consulting and expert witness assignments that were specific to his experience, expertise and past utility client relationships.

In 2002, Mr. Fitzpatrick formed Harbourfront Consulting Group LLC to focus on the provision of expert witness services and litigation support in areas that have been central to Mr. Fitzpatrick's practice over his career. More information about the firm and its professional resources can be found at www.harbourfrontllc.com.

Mr. Fitzpatrick has provided expert direct and rebuttal testimony before federal and state regulatory bodies and judicial authorities on subjects such as:

- Lifecycle Economic Evaluation of Utility Investments
- Econometric/statistically-based Load and Energy Forecasting
- Weather Normalization Studies of both gas and electric test year sales
- Weather Normalization probabilistic correction of System Peaks and Class components
- Strategic Planning
- Comparative Economics of Electric Generation Investments
- Load Research Program Sample Design, Implementation and Analysis
- Nuclear and Fossil Power Plant Cost and Performance analyses
- Econometric and Statistical Studies on Utility- related Issues
- Rate Design
- Cost of Service Studies
- DSM/ Renewable Program Evaluation
- Performance Standard design and statistical construction
- SAIDI / SAIFI-related statistical investigations
- Rebuttal testimony on a wide range of statistical and econometric-related subjects.

Over Mr. Fitzpatrick's consulting career he has provided services to over 50 electric and gas utility clients both in the U.S. and abroad. However, there are a number of clients that have utilized his services on an ongoing basis over the years as a senior management consultant and/or expert witness. These clients include:

- Arizona Public Service Company (Pinnacle West)
- Bermuda Electric Light Company Limited
- Consolidated Edison Company of New York
- El Paso Electric Company
- Entergy
- Freeport Electric
- Georgia Power Company (Southern Company)
- KeySpan Energy
- New England Electric System
- Niagara Mohawk Power Corp. (National Grid)
- New York Power Authority
- Northeast Utilities
- TXU Electric (TXU)
- Westar Energy (and its three predecessor companies)

Over his 24 year professional consulting career, he has also served his client base as a negotiator, often playing a key role in the negotiation of multi-million dollar, short and long term utility power supply and franchise contracts (e.g., Ft Bliss, White Sands Missile Range, University of Texas, and El Paso Water Utilities and El Paso Electric Vs. the City of Las Cruces).

Mr. Fitzpatrick has a Master of Business Administration degree in Economic Theory and a Bachelor of Arts in Economics, both from St. John's University. He has also completed course work toward a Master of Science degree in Management Engineering from Long Island University (C.W. Post) as well as advanced training in Box Jenkins forecasting techniques and econometric and statistical modeling. He possesses a Certificate of Mastery in Reengineering from the Hammer Institute and is a member of the Association of Energy Engineers (AEE) and the Energy Services Marketing Society.

PROFESSIONAL EMPLOYMENT

2003-Present Harbourfront Consulting Group, LLC
Managing Principal and CEO

Founded Harbourfront in 2002. HFG's focus is the development of strategies, analyses and expert testimony to assist its primarily investor-owned utility client base in objectively and expertly presenting and defending issues central to the client's corporate mission. Primary areas of the practice are electric and gas forecast development and review; engineering economic studies; comparative economic studies; lifecycle economic studies; statistical and econometric analyses and rebuttal; rate design and cost of service studies; performance standard statistical design and rebuttal; distribution reliability-related analyses and utility accounting-related matters.

1982 - 2003 Applied Energy Group, Inc.
Founder, President & CEO

Founded AEG in 1982. The focus of this consulting practice centered in the areas of Peak Load and Energy Forecasting, Load Research program sample design, implementation and analysis, Demand Side Management Program Evaluation, Electric and Gas Weather Normalization Studies, Nuclear and Fossil Generation Cost and Performance Studies and Comparative Engineering Economic Studies of Utility Generation and other investments. Mr. Fitzpatrick provided expert testimony on the above-mentioned areas and also provided clients with leadership services in the startup of new diversification ventures.

1979 - 1981 Stone & Webster Management Consultants, Inc.
Vice President—Demand Planning

Responsible for the coordination and direction of consulting activities in the Planning, Load Research, Load Forecasting, and Load Management areas within the corporation. Additional responsibilities included analysis of data processing requirements and potential new markets for consulting activities - a diversification from Stone & Webster's traditional lines of business.

1971 - 1979 Long Island Lighting Company
Manager—Load Research, Costing and Forecast Division

Primary responsibilities centered on Electric Peak and Energy Forecasts; Electric and Gas Weather Normalization; Statistical Sample Design Development; Load Research Study Implementation; Load Data Management and Analysis; Long Island Lighting Company's Annual Population Survey; all Long-Range Demographic Projections; the collection, processing, and overall supervision of the billing of customers under the Long Island Lighting Company's commercial/industrial time-of-use rate, the Electric Class of Customer Annual System Load Research Study; and all statistical and econometric - based studies performed by Long Island Lighting Company's Economic Research Department.

In 1978, responsibilities were expanded to include fully allocated and marginal cost-of-service studies for electric and gas and total factor productivity studies.

PROFESSIONAL EXPERIENCE

Expert Testimony and Regulatory Support (Selected Assignments)

El Paso Electric vs. City of Las Cruces, New Mexico-2000 Federal Court-Ordered Mediation:

Participated as part of El Paso Electric's officer/attorney team in the final court-ordered mediation sessions that resulted in the settlement of the 10-year dispute between the two parties. Prior to this mediation, worked on behalf of the Company to negotiate a settlement with the City's consultants. .

Freeport Electric-1995 Docket No. 95-E-0676, 2001 Docket No. 01-E0965, 2003 Docket No. 03-E-0686:

Provided direct testimony supporting Freeport's KWH sales and peak demand forecasts in four NYPSC proceedings. Constructed econometric models based forecast methodology by calls along with weather

normalization of the test year sales. Provided testimony on the selection of Freeport-specific DSM programs to meet Commission requirements.

Indian Point 2 and Indian Point 3 / Consolidated Edison Company of New York, Inc. and New York Power Authority - NRC Docket Nos. 50-247-SP and 50-286-SP:

Prepared rebuttal testimony comparing the economics of early retirement of the Indian Point units vs. potential conservation investment alternatives in New York State.

KeySpan Energy-1998 Docket Nos. ER98-11-000 and EL98-22-000, 2003; Docket Nos. ER04-112-000 and ER04-112-001:

Provided expert testimony before FERC on the appropriate segmentation of fossil generating plant fixed and variable O&M Costs. Developed statistical models, by plant, to support this segmentation. Testimony was updated again in 2003 for the FERC Docket related to the renewal of the contract that was originally brought before FERC in 1998.

Oklahoma Natural Gas Company- 1991 PUD Docket No 001017:

Provided rebuttal testimony on the comparative economics and efficiency of electric and gas DSM programs and made recommendation to the Oklahoma Commission on incentive rate making for DSM-related investments.

Palo Verde 1, 2, & 3 / Arizona Public Service Company-Docket Nos. U-1345-85-156 and U-1345-85-367:

Provided direct testimony presenting comparative economic analysis of Palo Verde vs. hypothetical coal unit alternative. Provided econometrically developed estimates of Operation and Maintenance Costs, as well as Capital Additions Costs. Provided independent statistically derived estimates of lifecycle Capacity Factors for the Palo Verde units. Participated in the training of APS witnesses.

Palo Verde 1 & 2 / El Paso Electric Company / Texas - Docket No. 7460:

Provided direct testimony on lifecycle economics of nuclear vs. coal alternative. Provided direct testimony on decisional prudence of company to enter into nuclear investment. Provided load forecast of company's future energy and peak demand needs. Participated in the training of Company witnesses.

Palo Verde 1, 2, & 3 / El Paso Electric Company Docket Nos. 8892, 9069 and 9165:

Provided Direct Testimony presenting comprehensive industry analysis and statistical analysis of Nuclear Performance Standards. Presented statistically derived optimal Performance Standard for Palo Verde Units 1, 2, and 3. Provided Rebuttal Testimony discussing theoretical and statistical flaws in intervenor's Performance Standard proposal.

Plant Hatch and Plant Vogtle / Georgia Power Company / Georgia - Docket Nos. 3554-U and 3673-U:

For the Vogtle Financing Case, the Vogtle Rate Case and the Hatch Rate Case: Provided rebuttal testimony on comparative economics of Plant Vogtle, provided rebuttal testimony (with presentation to Commission) on Vogtle's economics, and statistically derived projections of Vogtle's performance and Hatch O&M Costs, participated in witness training, and developed internal statistically-based O&M and Capital Additions "Targets" for Plant Hatch and Plant Vogtle.

Plant Hatch and Plant Vogtle / Georgia Power Company - Docket No. 3840-U:

Provided Rebuttal Testimony that pointed out methodological and statistical flaws in Staff consultant's Performance Standard proposal. Presented parameters for a statistically unbiased, optimal Performance Standard.

Shoreham / Long Island Lighting Company / New York-Docket No. 28252:

Provided rebuttal testimony on most likely performance of Shoreham Unit. Provided testimony on most likely Operation and Maintenance Cost levels and Capital Additions Cost level for Shoreham based upon econometric analysis of nuclear industry. Provided testimony on demand-side vs. supply-side alternatives for the Long Island Lighting Company.

Western Resources-2001 KCC Docket No. 1-WSRE-436-RTS:

Provided direct testimony and supporting statistical / engineering economic analyses on the prudence of Western's investment in the Stateline Generating Plant. Also provided direct testimony on the statistical weather normalization of test year sales.

Developed comparative economic analysis on the benefits to Westar and remaining customers of special power supply contracts for Large C&I customers.

Western Resources – 1996 KCC Docket Nos.193, 305 and 193,30; -U96-KG&E-100-RTS:

Developed an accelerated depreciation plan for Wolf Creek Nuclear Unit to reduce cost of production to market-based competitive levels by 2000 - 2005.

Western Resources – 1996 KCC Docket No. 193,307-U96-WSRE-101-DRS:

Provided expert testimony and supporting statistical analysis for test year, class weather normalization, as well as, primary and secondary economic benefits of key customer discounted contracts.

Western Resources - Missouri Testimony in Generic Proceeding (1994:)

Provide expert testimony during the Missouri Public Service Commission's rule making proceeding concerning Integrated Resource Planning. The testimony discussed the consideration of alternative fuel sources as an end-use measure when developing their resource plan. (MPSC Docket)

Wolf Creek / Kansas Gas and Electric Company / Kansas City Power and Light Company/Kansas-1984 Docket Nos. 84-KG&E-197-R-142, O98-U / Missouri Docket #ER-85-128, EO-85-185:

Provided rebuttal testimony on lifecycle economics of nuclear vs. coal alternative. Provided first-year and lifecycle statistically based estimates of Wolf Creek's Operation and Maintenance Costs and Capital Additions Costs. Provided first-year and lifecycle estimates of Wolf Creek's Capacity Factors. Participated in the preparation of KG&E witnesses on the subjects of statistics, econometrics, forecasting, and engineering economics.

Atlanta Gas Light – Georgia (1997):

Worked with senior management to develop testimony for a performance based rate plan in support of the unbundling of gas service.

El Paso Electric Company -Texas (1997-1998):

Developed unbundling strategy and performance based rate plan in support of ongoing Texas PUC workshops on the unbundling of electric service.

Empire District - Missouri (1992):

Provided econometric rebuttal testimony critiquing MPSC Staff's direct testimony on Empire District's forecast. Staff accepted rebuttal testimony and the Company's forecast was accepted for use in the rate case.

Minnegasco - Docket No. G-008/GR-92-400 (1993 - 1994):

Developed a set of econometrically derived, short run forecasts for Minnegasco's major customer classes. Provided direct expert testimony regarding the use of these forecasts as a factor in determining the need for and magnitude of Minnegasco's requested rate increase. Assisted in preparation of cross-examination of intervening parties. On rebuttal, supported the implementation of weather normalization adjustments and discussed the effects of an adjustment on varying classes of customer use. All testimony was accepted by Staff.

Missouri Public Service (MOPUB) - (1992):

Provided econometric-based rebuttal testimony critiquing MPSC Staff's direct case criticizing MOPUB's forecast. Rebuttal testimony resulted in Staff stipulating to the use of the Company's forecast.

Palo Verde / Arizona Nuclear Power Project:

Developed computer software to facilitate budget tracking and comparison. Developed econometric-based target estimation models of Operation and Maintenance Costs. Developed target estimation of Capital Additions Costs based upon econometric modeling. Developed forced and planned outage statistical models to be used in regulatory proceedings for all participants as well as for internal outage planning. Acted as Advisor to Palo Verde Participant's Engineering and Operating Committee on Palo Verde Cost and Performance budget targeting.

Iowa Power Company:

Preparation of a generic proceeding-related evaluation of Iowa Power Company's current and planned DSM activities in light of its specific planning related need for DSM resources.

Long Island Lighting Company :(1974-1979)

Testified as an expert witness, usually in both the direct and rebuttal phases, in the following New York State Public Service Commission proceedings: Docket Numbers:

- 26733
- 26829
- 26985
- 27136
- 27154
- 80003
- 27319
- 27374
- 27375
- 28223
- 28252

on subjects such as econometric and econometric-end use Electric and Gas Peak and Energy Forecasts, Load Research studies for cost-of-service analysis, Load Management, Cogeneration, Conservation and statistical studies for weather normalization of gas send out and electric energy requirements data.

SELECTED CONSULTING ASSIGNMENTS

El Paso Electric Company

Developed a business plan for and then implemented an Energy Services Business Unit (ESBU) that had as its mission key customer retention contracting and the provision of value added products and services in the areas of energy efficiency, power quality, standby generation, and “behind the fence” maintenance and support services.

Bermuda Electric Light Company, Ltd.

Consulted senior management on opportunities for diversification and franchise protection; from 1993 through 1997. Businesses developed include a full service ESCO (BESCO) and Power Protection Leasing Programs for Residential and Commercial customers.

Western Resources

In 1995, was retained by Western Resources to provide expert advisory services and supporting research to assist in the development of a non-traditional Energy Service Company (ESCO). This engagement also involved the analysis of profitability of certain customer classes.

WPI Group International

In 1993 through 1994, provided advisory services for the acquisition of MICROPALM by WPI. After acquisition, provided strategic market and product planning advisory services to the CEO.

Delmarva Power & Light Company (DP&L)

From 1994 to 1998, supported a market research and business plan development project for the development of a dispatchable photovoltaic power supply system business. Based on our initial contribution, DP&L turned over the entirety of the Phase II commercialization to my firm.

Richardson & Associates

Since 1982, has provided expert technical, economic and business plan analysis for over 15 energy-related venture capital business opportunities. This consulting relationship is ongoing.

Applied Energy Technologies Corporation (AET)

Led the formation of a jointly held subsidiary with Delmarva Power & Light Company, A.C. Battery Corporation (a subsidiary of General Motors) to advance both grid-connected and non-grid-connected dispatchable photovoltaics to domestic and international commercialization. Other contributors include the U.S. Department of Energy, Solarex Corporation (a division of Amoco/Enron), and Ascension Technologies

NCR Corporation

In 1981 through 1983, was retained by NCR to develop a diversification business in the automatic meter-reading field. Developed business plans, marketing plans, and product functional specifications. Worked with NCR's CEO and senior management team.

Confidential Diversification Studies and Business Planning Engagements

Senior Management advisory services, development of business plans, and diversification strategies for twelve nationally known organizations. Since these assignments are governed by strict confidentiality agreements, they cannot be publicly identified.

Planning & Forecasting (Selected Projects)***New York State Electric & Gas Corporation (NYSEG) - (1994 -1997)***

Served as Responsible Officer for AEG's development of a Multi-Equational Small Area Forecast Modeling System. This system is used to track monthly sales geographically in the NYSEG system, identifying significant weather normalized monthly variances almost in "real time" so that NYSEG can recognize and react to significant changes in a shorter elapsed time.

Western Resources/Westar - (1984 - 2004)

Provide continuing advisory services to Western Resources (now Westar) on potential methodological upgrades to their forecast and weather normalization methodologies.

Long Island Lighting Company (LILCO)

Directed the preparation of LILCO's Annual Long Range Peak and Energy Forecasts during the years 1974 - 1979. Constructed the first Engineering End Use and Econometric End Use models for electric forecasting in New York State; utilized Box-Jenkins stochastic and multiple transfer functions for short run electric forecasts; employed two and three stage regression techniques in SIC-based commercial-industrial forecasting.

In 1994, provided advisory services to review adequacy of the econometric methodologies for the capture of "market transformation" DSM and efficiency effects.

Saudi Arabia – 1995

Selected from an international list of experts to perform a comprehensive review of Saudi Arabia's largest utility's overall planning and forecasting procedures, methodologies, and results. This two-phase project also called for the reengineering of these processes once the analytical and fact-finding phase was complete.

Bermuda Electric Light Company, Ltd. (BELCO) - (1994)

Reviewed BELCO's existing forecasting process and provided a "phase in" solution for enhancing their forecasting systems.

Freeport Light & Power - (1995-2004)

Have and continue to prepare Freeport's short and long-term electric peak and energy forecasts. Have presented and defended Freeport's forecasts and weather normalization studies in its last three rate cases.

INNOVATIVE MARKET SEGMENTATION & PROFITABILITY STUDIES

Western Resources

Served as Responsible Officer for a Competitive Assessment of Western Resources key customer's responses to cost competition.

CINergy

In 1995, advisor to senior staff in a multi-phase project that had as its objective the meaningful (from a risk-profit perspective) segmentation of CINergy key customer markets and the analysis of profitability of the segments. This was followed by the development of strategies to optimize the use of CINergy's marketing resources to maximize shareholder returns while ensuring the long-term viability of the company.

Demand-Side Management Program Design, Reengineering, & Evaluation

Bermuda Electric Light Company, Ltd.

Directed a multi-faceted evaluation of the potential for DSM on Bermuda. Conducted in-depth research of various customer classes to determine likelihood of adoption of available DSM technologies. Building on this research, developed a series of pilot programs that were implemented in 1993, as well as evaluation strategies to be employed at the programs' conclusion.

Consolidated Edison Company of New York, Inc.

Project Manager for a Conservation Assessment Study which included designing a methodology and performing analysis to impact Conservation measures in the residential and commercial sectors to meet requirements imposed by New York PSC in Case No. 28223.

Long Island Lighting Company (LILCO)

Directed a research project focusing on the right-sizing of LILCO's DSM program in the face of a maturing market condition, as well as on the measurement of the extent to which LILCO's programs have successfully moved the market to energy efficient technologies. Research includes an assessment of the impacts of pure market forces on DSM and the role of rebates and information in overall market capture for DSM technologies.

Project Manager for LILCO's 1992 Research and Development Initiative entitled, "Institutional Barriers to Conservation in Master-Metered, Tenant-Occupied Commercial Office Space." The project involved determining the market conservation potential, identifying institutional barriers through focus groups and interviews with landlords and tenants, and establishing a pilot program and blueprint lease to implement in order to enhance DSM measures in the relevant market.

Directed the comprehensive evaluation of LILCO's 1987 Conservation and Load Management Programs. This evaluation is contained in a three-volume report, which has been called the "most comprehensive" effort to date in this area.

Directed the evaluation of LILCO's 1988 and 1989 Conservation and Load Management Programs. Directed the preparation of a June 1988 Load Management Study. Specific responsibilities included estimating Load Management reductions included in LILCO's Load Forecasts by major components.

Minnegasco

Served as the Senior Management Advisor to Minnegasco's DSM/Load Research Program from 1993 through mid-1995. Responsibilities included contract negotiations with consultants, supervision of consultant's activities, and resolution of technical issues, and on-site presence as required to effectively oversee all Load Research-related activities.

New York Power Authority (NYPA)

Served as the Senior Management Advisor for NYPA's \$120 million High Efficiency Lighting Program (HELP) having primary responsibility for drafting and negotiating DSM cost sharing umbrella contracts with New York State and New York City.

Analysis on behalf of NYPA of Energy Systems Research Group's (ESRG) Conservation Assessment Report submitted in FERC Case No. 2729: Prattsville Pumped Storage Facility.

Supervised the development of an evaluation of potential Load Management strategies for the NYPA's municipal customers, including a cost/benefit analysis and specific Load Management test programs.

Named "Advisor" to NYPA's extensive Conservation Ten-Year Program.

New York Power Pool

Analyzed the conservation forecasts contained within the Member Systems' individual long range forecasts and critiqued intervenors' conservation forecasts and analyses.

New York State Electric & Gas Corporation (NYSEG)

Served as Responsible Officer for NYSEG's 1991 & 1992 Commercial / Industrial Process and Impact Evaluations. Served as Responsible Officer in the development of NYSEG's June 1994 DSM Market Transformation Study.

Orange and Rockland Utilities (O&R)

Assessed the potential for and designed an Energy Cooperative Program for O&R's commercial customers. Directed project to assess new regulated and unregulated business opportunities to diversify O&R from its core business.

Rochester Gas & Electric Corporation

Served as Responsible Officer for RG&E's 1990-94 DSM Evaluations. Represented RG&E in all DSM-related interactions with PSC Staff.

Load Research

Electric Power Research Institute (EPRI)

Advisor to EPRI's Demand Program. Author of RP 1588-3 "Load Data Management and Analysis"; co-author of EPRI Rate Design Study Topic Paper 3: "Issues in Load Research."

Elizabethtown Gas Company

Asked by Senior Management to assess Elizabethtown's Load Research Program and develop a set of recommendations that would result in full cost-effective utilization of the Load Research resource, developed study plan, conducted in-depth technical interviews of potential load research clients, and presented findings and recommendations to all levels of Management.

Iowa Power Company

Directed weather normalization analysis on historical system peak demands. Results from analysis will be utilized in future system peak demand forecasts.

Long Island Lighting Company (LILCO)

Designed and implemented stratified sampling software that employed Dalenius-Hodges and Neyman Allocation techniques with stratum optimization and validation. Also directed LILCO's Load Research Program.

New England Power Service Company (NEPSCO)

Reviewed NEPSCO's Load Research Data Management and Analysis System from analytical and data perspectives and developed a NEPSCO-specific computer hardware and software plan for implementation.

New York Power Authority

Directed the review of the existing Load Research Program and formulated a Management Plan to specify future needs in the areas of sample design, hardware, software, and staffing.

Assisted in the development of specifications for a microcomputer-based Load Research Data Collection, Editing and Analysis System.

New York State Electric & Gas Corporation (NYSEG)

Served as Technical Advisor to the Manager of NYSEG's Load Research Department.

Northeast Utilities Service Company

Performed a comprehensive audit of the technical, software, and organizational aspects of the Northeast Utilities Load Research Program, including the identification of current uses and recommended future cost-effective uses within the company.

Supervised development of a study to analyze load research, weather, and attribute data for the small Commercial and Industrial customer group.

Northern States Power Company (NSP)

Directed the review of all aspects of NSP's load research process and presented findings in a comprehensive presentation to senior management.

Pacific Gas & Electric Company (PG&E)

Performed a comprehensive audit of the PG&E Load Research Data Management and Analysis System. Also, assessed the value of Load Research to all relevant departments in the company including recommendations for more cost-effective uses of Load Research data for both current and future applications.

Tennessee Valley Authority (TVA)

Conducted review of TVA's Sampling Plan strategies and methodologies.

DSM Bidding***Orange and Rockland Utilities***

Directed the economic evaluation of the first utility bidding program in New York State.

Cogeneration***Caribbean Gulf Refining Corporation***

Performed an economic review for the construction of a nine megawatt Cogeneration facility.

Day and Zimmermann, Inc.

Performed a detailed analysis on the potential for Cogeneration Systems in the United States, which included the development of a comprehensive marketing strategy.

Orange and Rockland Utilities

Developed a Corporate Strategy for Cogeneration in the O&R service territory.

PUBLICATIONS, PRESENTATIONS, AND SEMINARS

Speaker, "The Electrotechnologies Conference," El Paso Electric Company; El Paso, Texas; March 31, 1998.

Speaker, "The Customer Information Seminar," El Paso Electric Company; El Paso, Texas; October 7, 1997.

Speaker, "The Energy Revolution Conference," El Paso Electric Company; UTEP Campus; El Paso, Texas; June 3, 1997.

Speaker, "Customer/Market Segmentation to Optimize Competitive Opportunities," AMRA 1996 Annual Symposium; New Orleans, Louisiana; September 10, 1996.

Speaker, "Customer Segmentation," Infocast; Deloitte & Touche; Strategic Marketing Seminar; Atlanta, Georgia; May 1996.

Speaker, "Reengineering Customer Service & DSM - Keys to Building Competitive Advantage in the Future" with Steven J. Maslak; CARILEC CEO Conference; Freeport, Bahamas; June 1 & 2, 1995.

Speaker, "A Presentation To The Deloitte & Touche Partners" with Steven J. Maslak; Public Utilities SLIP Meeting; Las Vegas, Nevada; December 12-13, 1994.

Speaker, "Demand Side Management Alternatives for the Caribbean," Caribbean High-Level Workshop on Renewable Energy Technologies; December 5-9, 1994.

Speaker, "Projects For Energy Efficiency, And The Conservation Of Economic And Environmental Resources," The Caribbean Workshop On Renewable Energy Technologies; St. Lucia, West Indies; December 5-8, 1994.

Speaker, "Demand Side Management As An Economic Development Tool," MEUA Conference; Syracuse, New York; October 13, 1994.

Speaker, "The Effect Of The Market Transformation Phenomenon On DSM And Utility Competitiveness," EUMMOT Fall 1994 Meeting; Corpus Christi, Texas; September 9, 1994.

Speaker, "Evaluation Protocols: Preparing For DSM Evaluation," Presentation to the 4th Quarter EUMMOT Meeting; Columbia Lakes, Texas; December 13, 1993.

Author, "Incentive Regulation in the United States: an Update," EEI; 1992.

Speaker, "The Career Challenges Facing the Electric Industries in the 1990's," Hofstra University, M.B.A. Career Forum; Hempstead, New York; April 1992.

Speaker, "DSM Evaluation for Incentives: How Heavy Should the Burden of Proof Be?" Washington Gas Least-Cost Planning Conference; Washington D.C.; April 1992.

Speaker, "Practical Cases in Evaluating Energy Efficiency Initiatives," Hydro-Quebec Symposium; Montreal, Canada; November 1992.

Author, "Integration of Load Research into the DSM Evaluation Framework," Chapter 8; DOE DSM Evaluation Handbook.

Speaker, "Measuring the Impacts of Demand Side Management Programs," Northern States Power DSM Evaluation Overview; Minneapolis, Minnesota; December 1991.

Speaker, "Incentive Regulation an Overview of Operating Incentive Programs in the U.S. Today," The Southeastern Electric & Gas Conference; University of Georgia; Atlanta, Georgia; August 1991.

Speaker, "The Comparative Costs of and Sensitivities Surrounding the ALWR vs. Alternate Generation Options," EEI Working Group; Washington D.C.; July 1991.

Speaker, "The Role of Load Research in DSM Evaluation," NYSEG Conference; Saratoga Springs, New York; May 1991.

Speaker, "The Role of Load Research in Demand Side Management" with Joseph Lopes; Northeast AEIC Load Research Conference; Farmington, Connecticut; September 1989.

Speaker, "The Role of Load Research in Demand Side Management," 1989 APPA Accounting, Finance, Rates and Information Systems Workshop; Chicago, Illinois; September 1989.

Speaker, "Demand Side Management; The Key to Measuring Success and Cost Recovery," Iowa Utility Association; Integrated Resource Planning Conference; Des Moines, Iowa; August 1989.

Speaker, "DSM Program Monitoring & Evaluation Workshop," Rochester, New York; December 1988.

Speaker, "The Massachusetts Joint Utility Monitoring Projects" with Eric P. Cody; Northeast Regional AEIC Load Research Conference; Farmington, Connecticut; September 1986.

Author, "The Load Research Process Above and Beyond PURPA," Public Utilities Fortnightly; March 18, 1982.

"Load Data Management and Analysis," EPRI RP1588-3; December 1981.

Co-Author, "Issues in Load Research," Topic Paper 3; EPRI Rate Design Study; 1981.

Instructor, "Load Research and Load Management Seminar," Stone and Webster Utility Management Development Course; New York (2 courses); 1980.

Speaker, "Allocating Revenues Between Service Classifications: Necessary Load Research," National Regulatory Research Institute; Ohio State University; 1980.

Speaker, "Issues in Load Research," EPRI Rate Design Study Executive Transfer Conferences; San Francisco, Kansas City, and Washington D.C.; 1980.

"How Electric Utilities Forecast," EPRI Peak Load Forecasting Methodologies; EPRI Symposium Proceedings; New Orleans, Louisiana; 1979.

"Report of the Member Electric Systems of the New York Power Pool and the Empire State Electric Energy Research Corporation pursuant to Article 3, Section 5, 112 of the Energy Law of New York State, Exhibit 7," LILCO Load Forecast Methodology; 1979.

Speaker, "Load Forecasting Working Group Chairman Reports (3)," Utility Modeling Forum (EPRI sponsored); San Francisco, California; 1979.

"Report of the Member Electric Systems of the New York Power Pool and the Empire State Electric Energy Research Corporation pursuant to Article 8, Section 149-b of the Public Service Law, Exhibit 7," LILCO Load Forecast Methodology; 1974-1978.

AFFILIATIONS

Association of Energy Engineers

American Statistical Association

American Economic Association

Mathematical Association of America

Omicron Delta Epsilon

Advisor to American Management Association

EDUCATION

St. John's University, M.B.A., Economic Theory, 1972

St. John's University, B.A., Economics, 1969

C.W. Post College, course work toward an MS, Management Engineering

Mr. Fitzpatrick has also completed course work in Engineering Economics, Load Research, Demand Forecasting in Electric Power Systems, Box-Jenkins Forecasting Techniques, logistic curve analyses; two and three stage multiple regression techniques; advanced econometric modeling and the utilization and interpretation of multiple regression models and associated analytical techniques. Mr. Fitzpatrick also holds a "Certificate of Mastery" in Reengineering from the Hammer Institute's Speaker: Center for Reengineering Leadership.

RICHARD J. RUDDEN

Mr. Rudden is a generalist in the areas of energy industry change, strategic and business planning, financing, and organizational restructuring and analysis. He is a specialist in the practice areas of energy and utility strategy, pricing, financing, economic and regulatory policy analysis, economic analysis, and related management consulting. He is highly proficient in the management of large, complex and multi-disciplinary management consulting projects.

PROFESSIONAL EMPLOYMENT

1981 - Present	R.J. Rudden Associates, Inc. <i>Chairman, President & Chief Executive Officer</i>
1975 - 1981	Stone & Webster Management Consultants, Inc. <i>Vice President, Regulation Services Division</i>
1970 - 1975	Consolidated Edison Company of New York, Inc. <i>Divisional Manager, Rate Design; Rate Engineering Department</i>
1967 - 1970	U.S. Navy <i>Commissioned Officer</i>

PROFESSIONAL EXPERIENCE**Strategic and Business Planning, Merger and Acquisition Analysis**

Mr. Rudden has been involved in many engagements in this area of the firm's practice. As the Responsible Officer for these projects, he has been asked to identify and screen potential merger or acquisition candidates, participate in the restructuring of financially-distressed assets and corporations, and assess the strategic compatibility of acquirer and the acquired, including reviews of their organizations, managements, and regulatory environments. He has also directed due-diligence reviews, the determination of enterprise value, and the analysis of the supply, distribution and market infrastructures of the parties to the transaction. He has also assisted members of the financial community in assessing the risks of increased competition and open access in electric utility industry. He has participated in joint venture and acquisition negotiations on behalf of the principals, and has testified on reorganization and bankruptcy issues. In addition, he has been involved in evaluating proposed utility municipalization/privatization activities, and was retained as the independent consultant to the Board of Directors of one utility that was the object of a proposed state takeover. In that project, he was responsible for overseeing an analysis of the market power exerted by the acquisition target. Mr. Rudden's clients have included the New York, Midwest and PJM Independent System Operators; Long Island Lighting Company (now LIPA); Fitch Investors Service, Inc.; J.P. Morgan Chase; Goldman Sachs; Macquarie Holdings; Edison Source; EON; Centrica; Sempra Energy; Hydro Quebec; NUI Corporation; Orange & Rockland Utilities; Norstar Energy

Limited Partnership; KCS Power Marketing, Inc.; Star Gas Partners; Blavin & Co.; EPRI; Macquarie Capital; ProLiance Energy, LLC; GE Nuclear Energy; the Equity Committee of Public Service Company of New Hampshire; PEPCO; Utah International; Philadelphia Gas Works; GWC Corporation; ENERGYINTELLECT (New Zealand); State Street Bank & Trust Company; SHV Oil and Gas; Southern Union Company; a number of U.K.- and Asia-based utility acquirers; and a U.K. developer of cogeneration engines.

Utility Pricing and Regulatory Policy Analysis

Mr. Rudden has participated in both electric and gas pricing and cost analyses, and has held operational responsibilities within a major utility for cost analysis, tariff design and administration. He has experience in virtually every facet of utility pricing and has provided expert testimony before the FERC, state and Canadian provincial regulatory commissions, as well as civil and bankruptcy courts, on such issues as general regulatory policy, ISO/RTO rate design; revenue enhancement strategies; integrated resource planning; fully allocated and marginal costs; service unbundling and rate design; proforma adjustments and revenue requirements; sales and revenue forecasts; strategic and market sensitive pricing; incentive rate making, rate and regulatory policies for cogenerators, both with respect to rates for natural gas as a fuel, and electric standby, supplemental, maintenance and sale-back rates; revenue sharing and automatic adjustment mechanisms; by-pass; price elasticity and fuels switching; rate phase-in plans; transmission pricing; and other issues.

In addition, Mr. Rudden has testified on a diversity of other matters, such as utility revenue requirements, financial matters, sales forecasts, and proforma adjustments to test periods. Complementing his work in rate design, Mr. Rudden has also participated in a variety of projects relating to the establishment of new regulatory policies, including industry restructuring, competitive market analysis, market power issues, cogeneration policies, generic rate design issues, PURPA guidelines, regulatory aspects of utility bankruptcy, and price discrimination. A few of the clients for whom Mr. Rudden has performed these services include: the California ISO, PJM, the Midwest and MAPP ISOs; Con Edison; Energy West; China Light & Power; Seattle City Light; the City of Calgary Electric System (ENMAX); Long Island Lighting Company; Atlanta Gas Light Company; Chugach Electric Cooperative; Empire District Electric; Elizabethtown Gas Company; Philadelphia Gas Works; the Equity Committee for Public Service Company of New Hampshire; Southern Connecticut Gas; Vermont Gas Systems; Gulf States Utilities; Nova Scotia Power Corporation; Southern Union Gas Company; the U.S. Department of Energy; Bethlehem Steel; New Jersey Transit Corporation; Co-Steel; and AGL Gas Companies (Sydney, Australia).

Market Analysis, Sales Forecasting and Marketing

Mr. Rudden has directed or participated in a number of projects related to market analysis and forecasting, as well as the functional area of marketing. These projects include market research and segmentation analysis, new market entry strategies, market forecasting for both rate cases and other applications, analysis of declining customer use, the development of new unbundled products and services, load research, and customer attitude surveys. The results of his work have been used in expert testimony, business plans, joint venture and merger and acquisition activities, and client-internal reports. Mr. Rudden has also directed a number of studies that have assessed the changes in the competitive positions of both electric and gas utilities resulting from energy industry restructuring. His work includes the development of a framework for analyzing the market and financial risks of

electric utilities, the costs of least-cost alternative power supplies under open access conditions, and the determination of the value of both natural and regional markets for power sold in the open access market. Mr. Rudden's clients in this area have included Edison Source; Atlanta Gas Light Company; Philadelphia Gas Works; Elizabethtown Gas Company; Con Edison; Star Gas Partners; GE Nuclear Energy; Niagara Mohawk Power Corporation; Gas Company of New Mexico; Rochester Gas & Electric Corporation; KCS Power Marketing, Inc.; Utah International; SHV Oil and Gas; Long Island Lighting Company; the Department of Energy, Mines and Resources, Canada; the Columbia Gas Distribution Companies; and IBC Fitch Investors Service, Inc.

Corporate and Project Financing

Mr. Rudden has participated in numerous energy project analyses and financings. Matters with respect to which he has offered advice and expert testimony include: power purchase and sales agreements; fuels availability; utility interconnects; utility standby, back up and power purchase contracts; the market for project power and project revenue streams; wheeling options for project power; and regulatory policies. His expertise has been applied in a variety of ways, including due-diligence reviews, project risk identification and management, contract negotiations, business plans, feasibility analysis, and testimony. Clients for whom he has performed this work include Donaldson, Lufkin & Jenrette; Macquarie; Goldman, Sachs & Company; a group of Detroit pension funds; Inter-Continental Energy; KIAC Project Partners; State Street Bank & Trust Company; Allegheny Power System; The Royal Banks of Canada and Scotland; Bank of Montreal; Amtrak; Long Island Lighting Company; Arkla, Inc.; the University of Pennsylvania; the State University of New York at Stony Brook; Utah International; Reckson Associates; and the Montecristi Corporation.

Generation and Transmission Planning

Mr. Rudden has been involved in a variety of consulting projects and employment positions dealing with the issues of generation and transmission planning, especially as they relate to electric ratemaking, establishment of regulatory policies, and RTO/ISO formation and regulation. Mr. Rudden has dealt with these matters in the context of FERC Orders 2000 and 888, PURPA regulations, the development of wheeling and wholesale rates, cogeneration project feasibility analyses, utility bankruptcies, generation and transmission reliability studies, strategic planning, and the analysis of regional markets for bulk power. He has also directed benchmarking studies related to T&D operations, and an analysis of historical reliability performance and the establishment of reliability objectives in the context of utility budgeting and performance-based ratemaking. In addition, while at Con Edison, Mr. Rudden had responsibilities in the areas of generation operations and transmission load flow analyses. Utilities and other clients with respect to whom Mr. Rudden has provided consulting services in this area include: the New York ISO; Sempra; the U.S. Department of Energy; El Paso Electric Company; Entergy/Gulf States Utilities; the Canadian Department of Energy, Mines and Resources; Chugach Electric Cooperative; ENMAX/City of Calgary Electric System; Amtrak; NU/Public Service Company of New Hampshire; Philadelphia Electric Company; Baltimore Gas & Electric Company; State Street Bank & Trust Company; and Nantahala Power & Light Company.

Gas Supply and Transportation Planning

Mr. Rudden has performed gas supply and transportation studies for both utility companies and non-utility marketers, transporters and end-users of natural gas. He has advised cogenerators on gas acquisition policies; LDCs on transportation policies, pricing strategies, and bypass issues; large end-users on appropriate price levels for purchased gas and related contractual terms and conditions; and third party developers and financial institutions with regard to fuel supplies to independent power projects. In addition, he has directed projects relating to gas supply modeling for the purposes of least-cost planning, marginal costing, and merger and acquisition work. Clients for whom Mr. Rudden has provided these services include: Atlanta Gas Light Company, Energy West/Great Falls Gas Company, NUI Corporation, GWC Corporation, Intercontinental Energy; Southern Union Company, Elizabethtown Gas Company, Niagara Mohawk Power Corporation, Providence Memorial Hospital, Standard Chlorine of Delaware, Sithe Energies/Bank of Montreal, and State Street Bank & Trust Company.

Integrated Resource Planning and Demand-Side Management

Mr. Rudden has been responsible for many of the firm's projects within the integrated resource planning area. Projects which the firm has performed include the development of complete integrated resource plans for Atlanta Gas Light Company, Providence Gas Company, and The Peoples Gas Light and Coke Company; a critical review and evaluation of both Commonwealth Edison's Least-Cost Plan and Entergy's regional IRP; a review of the merged PacifiCorp-Utah Power & Light least cost plan as applied to the Utah division; the evaluation of proposed DSM programs by TransAlta Utilities and Alberta Power Corporation on behalf of ENMAX/ City of Calgary Electric System; identification and quantification of least cost gas supply plans for NUI Corporation and Southern Union Company, both in connection with proposed reorganization and acquisition activities; the development of an integrative utility planning methodology for the U.S. Department of Energy; and the development of PC-based gas supply models for two LDCs in conjunction with least-cost supply planning. Mr. Rudden has also been involved in the review and critique of Public Service Company of New Hampshire's demand-side management (DSM) program within the context of its Chapter 11 Bankruptcy proceeding, and Oklahoma Natural Gas with regard to the DSM programs of Oklahoma Gas & Electric Company. Finally, Mr. Rudden has assisted a variety of industrial clients in developing and implementing least-cost energy purchasing strategies, such as Amtrak, Reckitt & Coleman, New Jersey Transit, Bethlehem Steel, Standard Chlorine of Delaware, and Geneva Steel.

Organizational Consulting

Mr. Rudden's years of experience and his diverse technical background have made him very effective as an organizational consultant, especially in such areas as organizational structuring, cultural change, forecasting and planning processes, rate and regulatory support, information systems, market and load research, marketing, and gas supply. As a part of these assignments, Mr. Rudden has provided leadership not only at the higher levels associated with strategic plan implementation, but also at the more "granular" levels of operations. He has reviewed and made recommendations pertaining to operating policies and procedures, strategic mission and objectives statements, program implementation plan, spans of control, staffing levels and qualifications, culture change, salary structures and bonus plans, and information systems support. His clients have included Energy West; Star Gas Partners, Edison Source; Rochester Gas and Electric Corporation; the New York Independent

System Operator; Western Gas Interstate Pipeline Company; Con Edison; Norstar Energy Partners, LLC; the City of Colorado Springs Municipal Utility System; the City of Garland, Texas; a confidential New York State gas distribution company; Philadelphia Gas Works; EPRI; Atlanta Gas Light Company; and GWC Corporation.

Information Systems Support

Mr. Rudden has been responsible for the specification of user requirements, conceptual system design, and components of detail system design, and for the testing and acceptance of a number of information technology and software development projects. These systems related to costing and rate design, complete FERC rate filing requirements, forecasting, load research, market information systems, least-cost energy acquisition, utility billing and revenue reporting systems, integrated supply and demand side planning, litigation support systems, and financial analysis and reporting. Clients whom Mr. Rudden has served in these areas include: Valero Energy Corporation, El Paso Electric Company, Con Edison, Utah International, Southern Connecticut Gas Company, Amtrak, Western Gas Interstate, Southern Union Company, and NUI Corporation.

Litigation Support

As an integral part of the service that he has provided clients in the above areas, Mr. Rudden has frequently offered expert testimony before state regulatory commissions, city councils, the FERC, civil court, Federal Bankruptcy Court and Canadian regulators. This includes testimony before the U.S. Bankruptcy Court in the Public Service Company of New Hampshire Chapter 11 proceedings; before a civil court on behalf of a plaintiff in a class action suit against a facility owner, alleging overcharges for electric service; before the FERC on both electric and natural gas matters; and before many state regulatory commissions on a variety of costing, rate design, revenue requirement, market, economic and regulatory policy issues. In all, Mr. Rudden has submitted testimony in approximately 37 proceedings, in 19 jurisdictions.

PUBLICATIONS AND PRESENTATIONS

“A Primer on the Regulatory Environment for Energy Utilities,” presented at the American Gas Association’s Financial Forum; Bonita Springs, Florida; May 2, 2004.

“Utility Regulatory Preparedness,” presented at the American Gas Association’s Rate & Regulatory Issues Seminar; Phoenix, Arizona; April 6, 2004.

“Regulators and Regulations,” presented at the American Gas Association Workshop, Introduction to the Energy Industry; New York, New York; March 15, 2004.

“Utility Rate Case Preparedness – A Commentary Based on Survey Results,” presented at the EEI Strategic Issues Committee; October 17, 2003.

“The Mother of All Rate Cases,” published by *Hart’s Energy Markets*, October 2003.

“The Energy Marketplace: The Advisors Weigh-In,” moderator at the North American Energy Standards Board 2nd Annual Meeting; Austin, Texas; September 16-17, 2003.

“Massive North American Blackout and the Lack of Investment,” interview published in *World Interview*, The Nihon Keizai Shimbun Japan Economic Journal; September 8, 2003.

“The Shock Heard ‘Round The World Or ... The August 14th Birth Of The United Grid Of America,” August 2003.

“Distribution Reliability and Power Quality: The Next Industry Time Bomb?” June 2002 (co-authored).

“Legal Document Management in the Energy Industry: Moving From Information Flow to Knowledge Leadership,” June 2002 (co-authored).

“Mergers & Acquisitions, 2002: An Urgent Need for Strategic Clarity,” *Public Utilities Fortnightly*; April 15, 2002 (co-authored).

“What Has the Energy Industry Learned From Deregulation?” presented at the American Gas Association’s 20th Annual Bankers Conference; New York, New York; November 11-13, 1998.

“Ten Hurdles to Full-Scale Competition in the U.S. Electric Power Industry,” presented at the National Association for Business Economics; Washington, D.C.; October 4-7, 1998.

“Utility Strategic Planning,” presented at the Exnet Utility Strategic Planning Seminar; Washington, D.C.; July 14-15, 1997.

“Winners in Deregulation—Electric or Gas?” presented at ANR Pipeline Company’s 1997 Business Strategy Meeting, Ideas for the Future; Phoenix, Arizona; March 14, 1997.

“Electric Industry Restructuring and its Affects on the U.S. Natural Gas Industry,” presented at the International Centre for Gas Technology Information Seminar; Tokyo, Japan; September 18, 1996.

“Product Pricing Considerations in Energy Company Mergers,” presented at the Institute of Gas Technology’s Financing the Fusion of the Gas and Electric Industries Conference; New York, New York; July 24, 1996 (co-authored).

“The Barbarians at the City Gate,” presented at the American Gas Association’s *Competing in a Restructuring World: Becoming the Customer’s Choice*; Orlando, Florida; April 10, 1996.

“Electric Industry Restructuring 101: Trends in State PUC Regulatory Policies, Attitudes, and Opinions Regarding Electric Industry Changes” and “Electric Industry Restructuring 102: Implications of Competitive Electricity Price Trends and Pricing Strategies for Natural Gas Markets,” presented at the American Gas Association’s Industrial Marketing Committee Meeting; Salt Lake City, Utah; April 1, 1996.

“Operating in a Competitive Environment: Will the Market Stay the Way It Is?,” presented at the ZECO’s Conference on *Operating in a Competitive Environment*; Salt Lake City, Utah; March 5, 1996.

Effect of Electric Industry Restructuring on the Competitive Price Position of Natural Gas, February 1996 (co-authored).

1995 Survey of State Regulatory Commissions Regarding Electric Utility Competition, December 1995 (co-sponsored by the American Gas Association).

“Electric Industry Change: Bringing Order Out of Chaos,” presented at the American Gas Association’s Conference on Electric Industry Restructuring; Baltimore, Maryland; October 26, 1995.

“Electric Industry Restructuring: Its Implications for the Natural Gas Industry,” presented at the American Gas Association Rate Committee Meeting; New Orleans, Louisiana; April 4, 1995.

“The Electric Industry Change: The Views of State Regulators,” presented at the AIC Conference on *Positioning for the New Integrated Gas & Electric Power Market*; New York, New York; March 27, 1995.

“The Implications of Electric Restructuring for the Use of Natural Gas,” presented at the American Gas Association’s Symposium on *The Effects of Deregulation in the Electric Industry on Gas Markets*; Albuquerque, New Mexico; March 20, 1995.

“Competitive Forces and Market Risks: Regulators’ Views of the Future Electric Utility Industry,” *Public Utilities Fortnightly*, November 1994 (co-authored).

“A Survey of State Regulatory Commissions on Competitive Forces and Market Risks in the Electric Utility Industry,” presented before the Public Service Company of Colorado; Denver, Colorado; November 1994.

“The Future Power Industry—Defining the Boundaries,” *Cogeneration and Competitive Power Journal*, Fall 1994.

“Competition in the Electric Markets,” *The Energy Daily—Special Insert*, October 1994.

“A Survey of State Commissions on Electric Industry Competition,” presented at the *Energy Daily’s* Impact of Retail Competition on the Electric Markets Conference; San Diego, California; September 1994.

R.J. Rudden Associates, Inc. 1994 Survey of State Regulatory Commissions Regarding Electric Utility Competition, September 1994 (co-authored).

“The EPAct of 1992: New Players, New Plays,” presented at the Association of Energy Engineers Competitive Power Congress; Philadelphia, Pennsylvania; June 9, 1994.

“Quantifying Competitive Forces in the Electric Industry,” *The Rudden Resource—Special Edition*, June 1994.

“Electric Utility Competition: A Survey of Regulators,” presented at the Transmission Access, Wheeling and Deregulation of America’s Utilities—A National Conference and Summit Meeting; Arlington, Virginia; May 23, 1994.

“Changing Financial Risks in the Restructured Gas Industry,” presented at the Tejas Power Corporation’s Seventh Annual Conference on Industry Issues, April 1994.

“Electric Utilities in the Future,” *Fortnightly*, April 1994 (co-authored).

“Electric Utility Competition: A Survey of State Regulators,” presented at the Edison Electrical Institute’s 28th Financial Conference; Orlando, Florida; November 1993.

“Electric Utilities Competitive Risk: A Commentary,” presented at Fitch Investors Service’s Electric Utility Roundtables; Boston, Massachusetts; Hartford, Connecticut; Chicago, Illinois; and Minneapolis, Minnesota; August 1993.

“Integrated Resource Planning: Ensuring Technological Excellence in the Natural Gas Industry,” presented at the Southern Gas Association’s 85th Annual Meeting, April 1993.

“IRP and its Impacts on Architects and Engineers,” presented at the Southern Gas Association’s Southern Conference for Architects and Engineers, October 1992.

“Integrated Resource Planning: Nationwide Trends,” presented at the American Gas Association Rate Committee Meeting, April 1992.

“IRP: A Forecaster’s Fantasy,” presented before the American Gas Association’s Statistics and Load Forecast Methods Committee Seminar on Long Range Forecasting for Integrated Resource Planning, March 1992.

“Integrated Resource Planning—A Strategic Marketing Perspective,” presented before the Southern Gas Association Marketing Executives Committee, February 1992.

“Supply Side Marginal Costs as an Element of Integrated Demand and Supply Side Planning, Natural Gas Strategies: Integrating Supply Planning, Marketing and Pricing,” presented at before the American Gas Association Rate Committee and Marketing Section, May 1989.

“The Impact of Current Market Changes on Distributors: Diversification Strategies and Regulatory Issues,” presented at the Fifteenth Annual Rate Symposium, University of Missouri, February 1989.

“Natural Gas: Issues and Outlook, Unbundling at the Distribution Level,” presented before The Energy Bureau Inc., October 1988.

“Natural Gas, Cogeneration, and Merchant Generation in New England: Pipeline Capacity Constraints,” presented before the American Bar Association, October 1987.

“Utility Rate Unbundling,” presented at the American Gas Association Advanced Regulatory Seminar, University of Maryland, 1986-1990.

“Effective Diversification Strategies and Regulatory Issues Surrounding Diversification in a Competitive Market,” presented at the IGT Conference, November 1986.

“Cogeneration Financing in a Changing Utility Market,” presented at the Proceedings of the 9th World Energy Engineering Conference, October 1986.

“The Strategic Utility Response to Power Wheeling Initiatives,” presented before the Energy Management Division Conference of the Electric Council of New England, August 1986.

“How Can Cogenerators Take Advantage of Current Natural Gas Dislocations?” *Strategic Planning and Energy Management*, Spring 1985.

“The Economics of Gas-Fired Cogeneration,” presented before the American Gas Association Rate Committee, April 1985.

“Cogeneration: the Strategic Opportunity,” presented at the Southern Union Gas Cogeneration Seminar and Workshop, December 1984.

“Choices,” presented before the ANR Pipeline Company Annual Marketing Meeting, June 1984.

“Natural Gas Regulation,” presented before the New England Gas Users Group, March 1984.

“A Survey of Rate Case Computerization,” presented before the Rate Committee of the American Gas Association, September 1983.

“Natural Gas Deregulation: Options at the Distribution Level,” presented before the Seventh Annual Public Utilities Conference at the University of Texas, July 1982.

“The Public Utilities Regulatory Policies Act of 1978 - A Wolf in Sheep’s Clothing,” presented before the Northwest Public Power Association Consumer Services and Communications Conference, August 1979.

“Regulatory Guidelines and Standards Under the Public Utilities Regulatory Policies Act of 1978,” presented before the Fifth Annual Symposium on the Problems of Regulated Industries, February 1979.

“The DOE Ratemaking Guidelines Project,” presented before the Northwest Public Power Association, January 1979.

“New Ideas in Gas Rate Design,” presented before the Texas Gas Association, June 1978.

“A Technical and Organizational Overview of the Nova Scotia Rate and Load Control Experiment,” presented before the Canadian Electrical Association, March 1978.

“Another Kind of Audit,” *Public Utilities Fortnightly*; October 13, 1977.

AFFILIATIONS AND HONORS

Board Member, North American Energy Standards Board

Financial Associate, American Gas Association

Marketing Associate, American Gas Association

Associate Member, Edison Electric Institute

Member, EEI Strategic Issues Committee

Member, National Association of Business Economists; Corporate Planning Roundtable

Member, American Gas Association Rate Committee

Member, Association of Energy Service Professionals

Member, Society of Gas Lighting

Omicron Delta Epsilon (Honor Society in Economics)

Past Member, Presidential Cogeneration/Energy Advisory Committee, State University of New York at Stony Brook

Past Member, Advisory Board, W. Averell Harriman School for Management and Policy, State University of New York at Stony Brook

EDUCATION AND LICENSES

Queens College, City University of New York, B.A., Economics, 1967, with Honors

New York Graduate School of Business Administration, course work in finance and economics for M.B.A.

NASD licensed Securities Representative (Series 7 and 63) and General Securities Principal (Series 24).

JOSEPH T. TRAINOR

Mr. Trainor is an electrical engineer with specialties in the areas of cost of service and financial modeling. He has broad experience in the fields of unbundled cost of service modeling, statistical analysis, forecasting, load research and analysis, transmission system benchmarking, Form 1 and NERC Form 411 data analysis, and database management.

Mr. Trainor is the architect and implementer the Rudden Electric and Gas Cost of Service Model. He has performed both electric and gas cost of service and marginal cost of service projects for a variety of clients, as well as benchmarking studies for transmission entities. He created models to forecast revenue requirements. He has also created models to perform economic, rate and financial valuations of multi-jurisdictional utilities for the purpose of investment. He analyzed electric load data for State Agencies to support its competitive procurement. He has assisted in the economic evaluations of Power Plants to assess their performance in a deregulated environment. He has developed systems for managing large and complex data sets for energy prices and costs. He has performed statistical sampling and forecasting for the purpose of load forecasting and investment.

In addition to his utility and energy industry analytical skills, Mr. Trainor's broader IT expertise includes, application programming and database management. He has extensive experience in supporting computer user applications, including the Microsoft Office Suite, Lotus and WordPerfect, and has created applications in VB/VBA, FoxPro, C, Access and Excel.

PROFESSIONAL EMPLOYMENT

1998 - Present	R.J. Rudden Associates, Inc. <i>Senior Consultant</i> <i>Director of Information Systems</i>
1994 - 1998	MUZE, INC., NY (Software Development Firm) <i>Supervisor of Software Updates</i>

- Produced 10 software applications monthly used for the retail of entertainment products.

PROFESSIONAL EXPERIENCE**Computer Modeling and Database Creation**

Mr. Trainor has utilized his modeling skills to develop and enhance analytical tools, as well as enhance and upgrade the R.J. Rudden Cost of Service Models. The enhancements to the models include a VBA-user interface that allows the user to navigate the model, analyze the data, and perform maintenance functions through menu routines. In addition to the numerous PC-based programs, he has experience in running, modifying and extracting information from databases that contain hundreds of thousands of records and made them available to clients using a graphical user interface. Mr. Trainor has designed and used computer models to perform economic, rate

and financial planning. He has analysis customer databases to perform statistical sampling. He is skilled in multiple spreadsheet and database application software, including Microsoft Excel, Access, and FoxPro. Clients for whom Mr. Trainor has served in these areas include: Nissequogue Cogen Partners, Connecticut Natural Gas, Baltimore Gas and Electric Company, Kansas Gas Service and Philadelphia Gas Works.

Electric and Gas Costing

Mr. Trainor has performed both electric and gas cost of service and marginal cost of service projects. He has developed the special studies, interviewed personnel and performed other data gathering procedures necessary to obtain all of the information needed to perform both Marginal and Cost of Service Studies. Mr. Trainor has completed these studies for both wholesale and retail clients using an enhanced version the R.J. Rudden Cost of Service Study Model. The completion of the Cost of Service Study included Functionalizing, Classifying and the allocation of all the Utility's Rate Base, operating and maintenance costs, production costs, gas costs, taxes and working capital costs, development of all Allocators, and implementation of billing determinants for rate design. Clients for whom Mr. Trainor has served in these areas include: Philadelphia Gas Works, Baltimore Gas and Electric, Keyspan, MidWest Energy, Energy West Resources, and Niagara Mohawk Power Corporation.

Competitive Procurement

Mr. Trainor has participated in a project to procure electric supply for a group of State Agencies. He assisted in the creation of the Request for Proposal, Appendixes and Exhibits. He managed the collection of the historical load data by obtaining, cleaning and presenting the data. He developed an easy to use front-end application, which became part of the RFP and was posted on the Rudden Website for distribution to Bidders.

Energy Project Financing and Analysis

Mr. Trainor has participated in projects in this area. Participation consists of assisting in economic and financial modeling of multi-jurisdictional utilities for the purpose of investment analysis. Mr. Trainor has assisted in performing economic and rate forecast modeling for Bond issuance and financial analysis of regulated utilities for investment purposes. Mr. Trainor has participated in economic and financing analyses evaluating the performance and profitability of electrical power plants. He has assisted in the economic evaluations of Power Plants to project their performance in a deregulated environment. Clients for whom Mr. Trainor has served in these areas include: Enmax Power Corporation, Nissequogue Cogen Partners, and Blavin & Company.

EDUCATION

Long Island University, New York, Master of Business Administration, 2003

Manhattan College, New York; Bachelor of Electrical Engineering, 1993

R. J. RUDDEN ASSOCIATES, INC.

R.J. Rudden Associates, Inc. (Rudden) provides economic, management and financial consulting services to utilities and their customers throughout North America and internationally. Founded in 1981, we have approximately 70 consultants. Our headquarters office is in Hauppauge, New York with regional offices in Washington, D.C. and San Francisco, California. Rudden's major practice areas include utility pricing; regulatory policy analysis; strategic and market planning; market research, demand forecasting and marketing; merger and acquisition assistance; generation and transmission planning; energy project management, financing and analysis; fuels analysis and acquisition; and litigation support and testimony. Our clients include electric and gas utilities subject to FERC and state regulation, energy producers and consumers, other industrial and commercial organizations, financial institutions and the U.S. and Canadian government.

APPENDIX B

COMPONENT ACCURACY TABLES

Residential Rate Class

FORECAST ACCURACY - TOTAL YEAR VOLUMES for RESIDENTIAL RATE M2 (S)

<u>Year</u>	<u>Normalized Actual</u>	<u>Forecast</u>	<u>Difference</u>	<u>Actual % Diff.</u>	<u>ABS % Diff.</u>
1994	2,496	2,539	44	1.73%	1.73%
1995	2,486	2,485	1	-0.03%	0.03%
1996	2,521	2,439	82	-3.36%	3.36%
1997	2,500	2,408	92	-3.81%	3.81%
1998	2,392	2,397	5	0.22%	0.22%
1999	2,334	2,452	117	4.79%	4.79%
2000	2,317	2,364	47	1.99%	1.99%
2001	2,221	2,267	46	2.04%	2.04%
2002	2,211	2,183	28	-1.27%	1.27%
2003	2,162	2,158	5	-0.21%	0.21%
Average from 94-00				0.22%	2.28%
Average from 01-03				0.19%	1.18%

FORECAST ACCURACY - TOTAL YEAR VOLUMES for RESIDENTIAL RATE 01 (N)

<u>Year</u>	<u>Normalized Actual</u>	<u>Forecast</u>	<u>Difference</u>	<u>Actual % Diff.</u>	<u>ABS % Diff.</u>
1994	824	837	12	1.49%	1.49%
1995	795	795	1	-0.06%	0.06%
1996	780	794	14	1.74%	1.74%
1997	779	752	27	-3.59%	3.59%
1998	748	752	4	0.51%	0.51%
1999	755	756	1	0.13%	0.13%
2000	757	747	10	-1.30%	1.30%
2001	714	723	9	1.27%	1.27%
2002	695	706	11	1.55%	1.55%
2003	697	683	14	-2.07%	2.07%
Average from 94-00				-0.15%	1.26%
Average from 01-03				0.25%	1.63%

Commercial Rate Classes**FORECAST ACCURACY - TOTAL YEAR VOLUMES for
COMMERCIAL RATE M2 (S)**

<u>Year</u>	<u>Normalized Actual</u>	<u>Forecast</u>	<u>Difference</u>	<u>Actual % Diff.</u>	<u>ABS % Diff.</u>
1994	1,470	1,550	80	5.17%	5.17%
1995	1,478	1,547	69	4.46%	4.46%
1996	1,533	1,409	125	-8.85%	8.85%
1997	1,528	1,368	160	-11.71%	11.71%
1998	1,443	1,398	45	-3.25%	3.25%
1999	1,440	1,504	63	4.22%	4.22%
2000	1,397	1,444	47	3.22%	3.22%
2001	1,374	1,373	1	-0.09%	0.09%
2002	1,381	1,299	82	-6.33%	6.33%
2003	1,350	1,334	16	-1.24%	1.24%
Average from 94-00				-0.96%	5.84%
Average from 01-03				-2.55%	2.55%

**FORECAST ACCURACY - TOTAL YEAR VOLUMES for
COMMERCIAL RATE 01 (N)**

<u>Year</u>	<u>Normalized Actual</u>	<u>Forecast</u>	<u>Difference</u>	<u>Actual % Diff.</u>	<u>ABS % Diff.</u>
1994	275	287	13	4.37%	4.37%
1995	263	262	1	-0.25%	0.25%
1996	264	270	6	2.24%	2.24%
1997	263	256	8	-2.93%	2.93%
1998	241	255	14	5.31%	5.31%
1999	229	248	19	7.60%	7.60%
2000	247	248	0	0.08%	0.08%
2001	245	234	11	-4.81%	4.81%
2002	230	238	8	3.28%	3.28%
2003	231	232	1	0.46%	0.46%
Average from 94-00				2.35%	3.26%
Average from 01-03				-0.36%	2.85%

APPENDIX C

SUMMARY OUTPUT		HETEROSCEDASTICITY TEST			
RES 01 VOL		"Constant Variance Confirmed"			
Regression Statistics		Regression Statistics			
Adjusted R Square	0.9837	Adjusted R Square	-	0.0066	
Standard Error	4,442.11				
Observations	154.00			t Stat	
Durbin's h	3.77	Residuals	-	0.00	
MAPE	1.0%				
Coefficients		Standard Error		t Stat	
Intercept	-	16,820.76	2,589.06	-	6.50
VOL lag 1m		0.12	0.04		3.12
CUST		0.15	0.02		8.49
PRICE LAG 1M	-	13,437.33	6,362.45	-	2.11
HDD Jan		94.89	3.25		29.23
HDD Feb		89.03	4.74		18.79
HDD Mar		80.79	4.71		17.16
HDD Apr		69.17	6.00		11.53
HDD May		53.92	7.68		7.02
HDD Sept		66.49	8.49		7.83
HDD Oct		72.47	3.87		18.74
HDD Nov		87.86	2.79		31.47
HDD Dec		88.15	2.88		30.56
DUMMY VOL 3D MAY-00		19,147.19	4,624.36		4.14
DUMMY VOL 3D OCT-00		16,091.72	4,615.00		3.49
DUMMY VOL 3D Jan-03		20,345.54	4,688.80		4.34

SUMMARY OUTPUT RES 01 USE		HETEROSCEDASTICITY TEST "Constant Variance Confirmed"		
Regression Statistics		Regression Statistics		
Adjusted R Square	0.9907	Adjusted R Square	-	0.0065
Standard Error	16.00			
Observations	155.00			<i>t Stat</i>
D W Test	1.87	Residuals	-	0.00
Coefficients		Standard Error		<i>t Stat</i>
Intercept	688.21	94.69		7.27
Price (Ex. Summer mnths) -	41.50	19.83	-	2.09
R.F.E.I -	823.17	126.18	-	6.52
HDD Jan	0.52	0.01		68.28
HDD Feb	0.51	0.01		58.24
HDD Mar	0.47	0.01		45.73
HDD Apr	0.43	0.02		27.59
HDD May	0.37	0.03		12.69
HDD Sept	0.35	0.04		8.41
HDD Oct	0.38	0.02		19.74
HDD Nov	0.46	0.01		37.97
HDD Dec	0.47	0.01		53.11
Dummy May-00	101.22	16.58		6.10

SUMMARY OUTPUT RES M2 VOL		HETEROSCEDASTICITY TEST "Constant Variance Confirmed"		
Regression Statistics		Regression Statistics		
Adjusted R Square	0.9886	Adjusted R Square	-	0.0061
Standard Error	11,608.66			
Observations	167.00			<i>t Stat</i>
Durbin's h	5.70	Residuals	-	0.00
MAPE	1.3%			
	Coefficients	Standard Error		<i>t Stat</i>
Intercept	- 58,701.68	8,061.46	-	7.28
VOL Lag 1m	0.09	0.03		3.01
CUST	0.15	0.02		9.17
PRICE Lag 1m	- 338.27	185.69	-	1.82
HDD Jan	375.87	10.82		34.74
HDD Feb	363.13	14.76		24.60
HDD Mar	358.68	14.71		24.39
HDD Apr	315.95	21.03		15.02
HDD May	254.74	27.48		9.27
HDD Sept	161.15	37.86		4.26
HDD Oct	267.84	13.61		19.67
HDD Nov	321.18	8.85		36.30
HDD Dec	375.73	8.40		44.74
Dummy Vol Feb-00	44,979.67	12,077.28		3.72
Dummy Vol Jan-03	54,731.76	12,289.98		4.45

SUMMARY OUTPUT RES M2 USE		HETEROSCEDASTICITY TEST "Constant Variance Confirmed"		
Regression Statistics		Regression Statistics		
Adjusted R Square	0.9969	Adjusted R Square	-	0.0060
Standard Error	9.07			
Observations	168.00			<i>t Stat</i>
D W Test	1.56	Residuals	-	0.00
Coefficients		Standard Error	<i>t Stat</i>	
Intercept	386.54	52.66		7.34
R.F.E.I -	425.04	70.17	-	6.06
Price(Ex. Summer mnths) -	0.48	0.11	-	4.26
HDD Jan	0.64	0.01		117.76
HDD Feb	0.63	0.01		102.35
HDD Mar	0.62	0.01		89.01
HDD Apr	0.59	0.01		52.89
HDD May	0.52	0.02		24.16
HDD Sept	0.31	0.04		7.96
HDD Oct	0.44	0.01		30.12
HDD Nov	0.52	0.01		60.94
HDD Dec	0.60	0.01		99.19
Dummy Use Jan-90	33.26	9.44		3.52
Dummy Use Jan-00	65.81	9.49		6.94
Dummy Use feb-00	34.97	9.42		3.71

SUMMARY OUTPUT COM M2 VOL		HETEROSCEDASTICITY TEST "Constant Variance Confirmed"		
Regression Statistics		Regression Statistics		
Adjusted R Square	0.9860	Adjusted R Square	-	0.0061
Standard Error	8,283.36			
Observations	167.00			<i>t Stat</i>
Durbin's h	2.66	Residuals		0.00
MAPE	1.5%			
	Coefficients	Standard Error		<i>t Stat</i>
Intercept	-	38,960.44	7,569.28	- 5.15
CUST		0.97	0.15	6.63
PRICE NO LAG	-	71.72	125.75	- 0.57
LAG VOL		0.06	0.04	1.77
HDD Jan		241.42	7.98	30.26
HDD Feb		244.19	10.48	23.31
HDD Mar		242.50	10.63	22.82
HDD Apr		225.27	15.98	14.09
HDD May		185.58	20.11	9.23
HDD Sept		95.68	26.90	3.56
HDD Oct		191.56	9.70	19.76
HDD Nov		242.01	6.57	36.81
HDD Dec		247.11	6.85	36.07
Dummy VOL Mar'00		50,185.44	8,751.49	5.73
Dummy VOL Apr'00		57,583.38	8,689.89	6.63

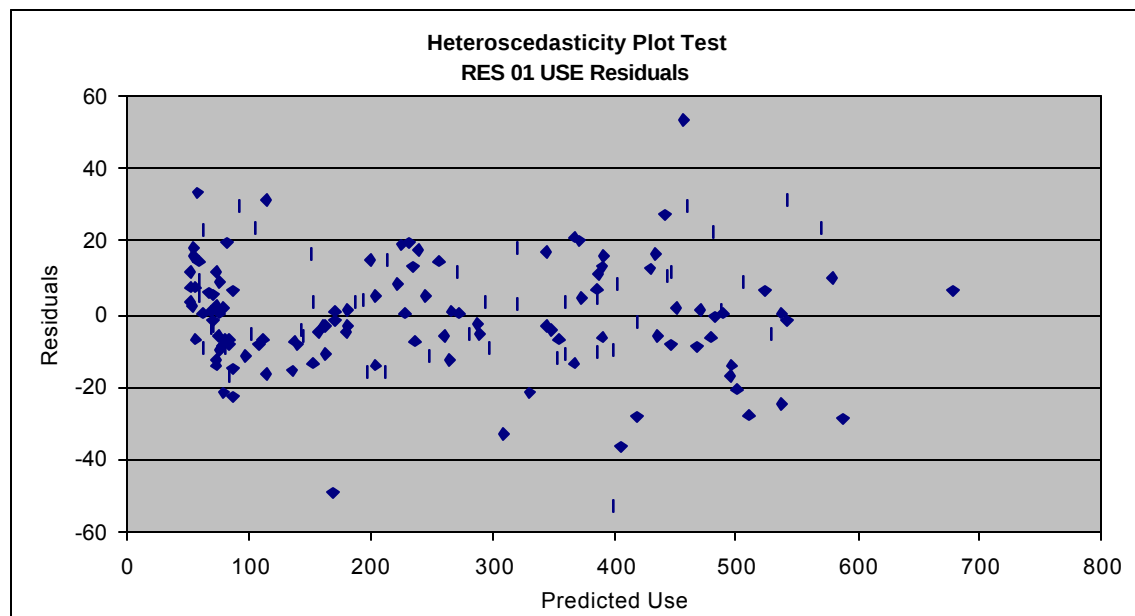
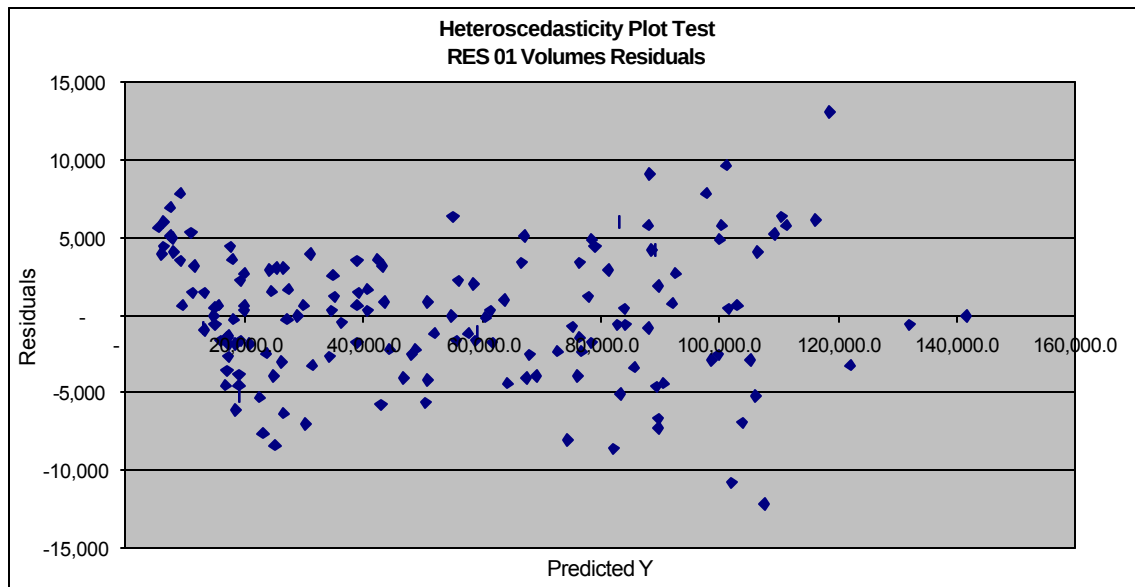
SUMMARY OUTPUT COM M2 USE		HETEROSCEDASTICITY TEST "Constant Variance Confirmed"	
Regression Statistics		Regression Statistics	
Adjusted R Square	0.9902	Adjusted R Square	- 0.0060
Standard Error	103.09		
Observations	168.00		<i>t Stat</i>
D W Test	1.76	Residuals	- 0.00
	Coefficients	Standard Error	<i>t Stat</i>
Intercept	- 5,573.22	1,229.93	- 4.53
C.F.E.I	6,039.80	1,240.89	4.87
HDD Jan	3.82	0.04	86.34
HDD Feb	3.93	0.05	77.49
HDD Mar	3.89	0.06	66.89
HDD Apr	3.78	0.10	39.20
HDD May	3.11	0.18	17.12
HDD Sept	1.08	0.33	3.26
HDD Oct	2.87	0.12	23.83
HDD Nov	3.70	0.07	50.91
HDD Dec	3.81	0.05	74.50
Dummy Use Mar-00	655.20	105.64	6.20
Dummy Use Apr-00	805.27	107.42	7.50

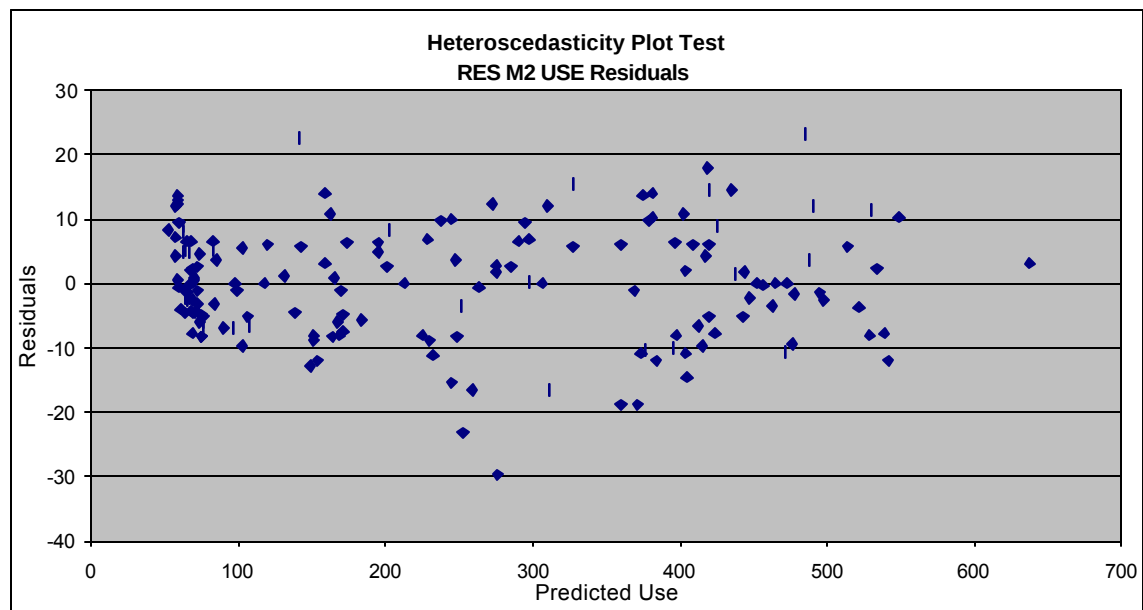
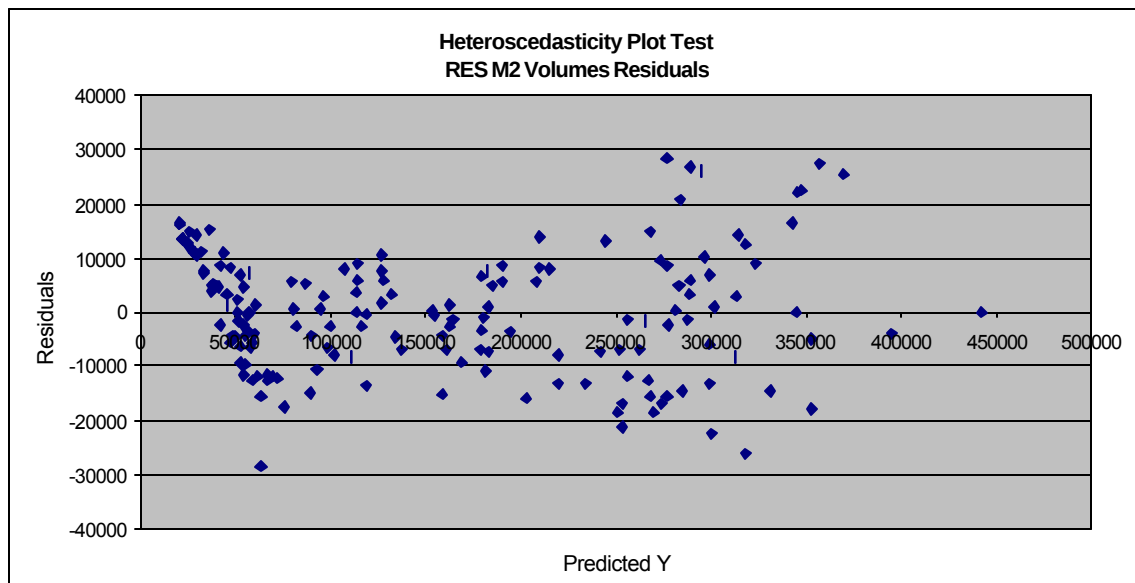
SUMMARY OUTPUT COM 01 VOL			HETEROSCEDASTICITY TEST "Constant Variance Confirmed"		
Regression Statistics			Regression Statistics		
Adjusted R Square	0.9896		Adjusted R Square	-	0.0068
Standard Error	1,352.19				
Observations	150.00				<i>t Stat</i>
Durbin's h	3.16		Residuals		0.00
MAPE	1.8%				
	Coefficients		Standard Error		<i>t Stat</i>
Intercept	-	2,121.44	1,268.81	-	1.67
CUST		0.30	0.07		4.08
PRICE	-	1,281.48	2,040.20	-	0.63
Lag VOL	-	0.03	0.04	-	0.70
HDD Jan		40.18	1.17		34.34
HDD Feb		41.18	1.65		24.98
HDD Mar		38.78	1.69		22.94
HDD Apr		32.62	2.23		14.63
HDD May		23.11	2.54		9.09
HDD Sept		15.02	2.68		5.61
HDD Oct		28.52	1.17		24.38
HDD Nov		34.04	0.93		36.49
HDD Dec		37.78	0.99		38.02
Dummy vol May-00		6,738.85	1,405.59		4.79
Dummy vol Sep-00		4,367.96	1,441.44		3.03

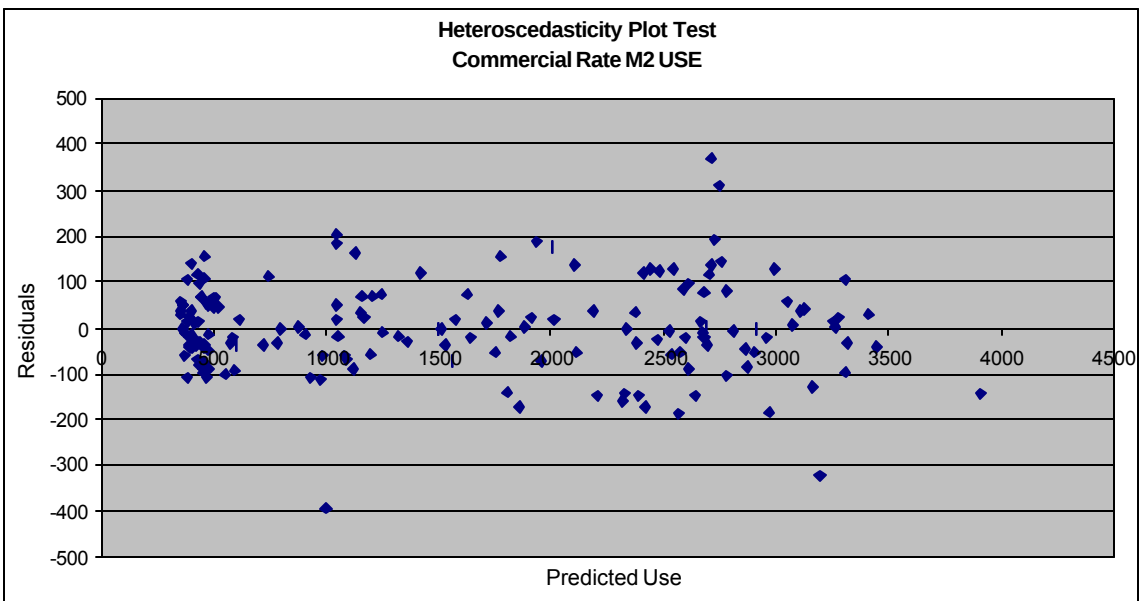
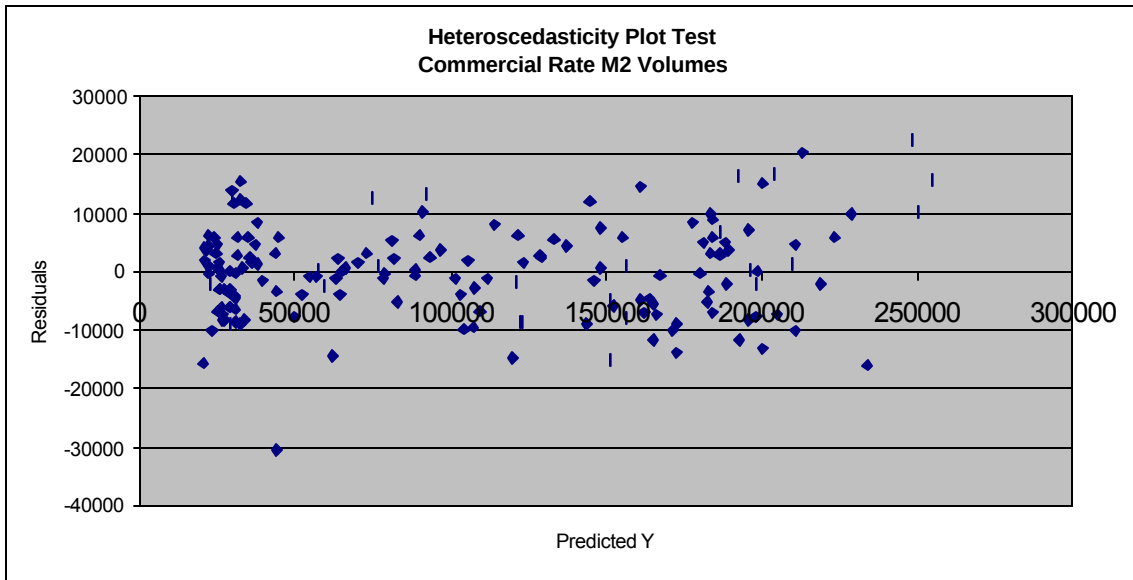
SUMMARY OUTPUT COM 01 USE		HETEROSCEDASTICITY TEST "Constant Variance Confirmed"		
<i>Regression Statistics</i>		<i>Regression Statistics</i>		
Adjusted R Square	0.9894	Adjusted R Square	-	0.0067
Standard Error	63.41			
Observations	151.00			<i>t Stat</i>
D W Test	1.40	Residuals	-	0.00
<i>Coefficients</i>		<i>Standard Error</i>	<i>t Stat</i>	
Intercept	- 7,140.28	787.99	-	9.06
Price(Ex. Summer mnths)	- 261.89	232.02	-	1.13
C.F.E.I	7,387.19	794.25		9.30
HDD Jan	1.87	0.05		38.91
HDD Feb	1.91	0.06		34.69
HDD Mar	1.80	0.06		28.20
HDD Apr	1.54	0.10		15.08
HDD May	1.19	0.19		6.38
HDD Sept	0.90	0.27		3.29
HDD Oct	1.48	0.12		11.97
HDD Nov	1.64	0.08		20.94
HDD Dec	1.77	0.06		31.51
Dummy Use May-00	323.56	65.84		4.91
Dummy Use Aug-00	216.46	64.42		3.36

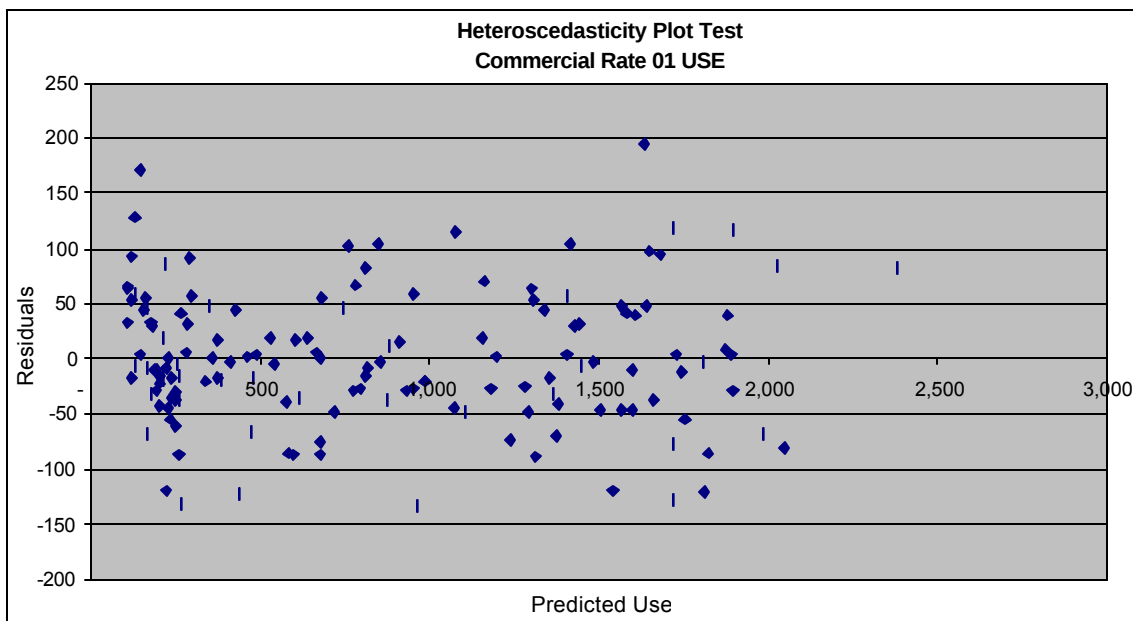
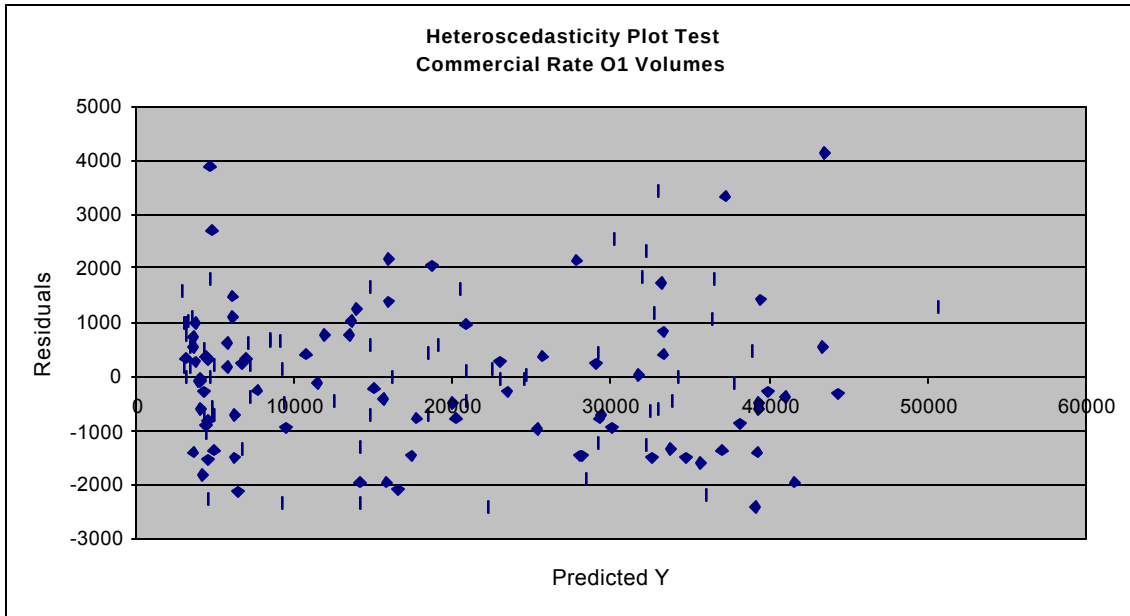
SUMMARY OUTPUT COM 10 USE		HETEROSCEDASTICITY TEST "Constant Variance Confirmed"	
Regression Statistics		Regression Statistics	
Adjusted R Square	0.9861	Adjusted R Square	- 0.0070
Standard Error	657.24		
Observations	145.00		<i>t Stat</i>
D W Test	1.66	Residuals	- 0.00
Coefficients		Standard Error	<i>t Stat</i>
Intercept	- 14,188.05	10,748.54	- 1.32
PRICE(Ex Summer Mnths)	- 1,979.92	881.33	- 2.25
C.F.E.I	16,942.90	10,823.72	1.57
HDD Jan	16.63	0.30	54.96
HDD Feb	16.98	0.35	48.82
HDD Mar	16.89	0.41	41.66
HDD Apr	15.51	0.62	24.84
HDD May	11.52	1.13	10.16
HDD Sept	7.89	1.70	4.64
HDD Oct	15.69	0.76	20.75
HDD Nov	16.89	0.49	34.65
HDD Dec	16.41	0.37	44.38
Dum Use Nov-00	3,675.77	686.55	5.35
Dum Use Dec-00	4,782.40	706.82	6.77

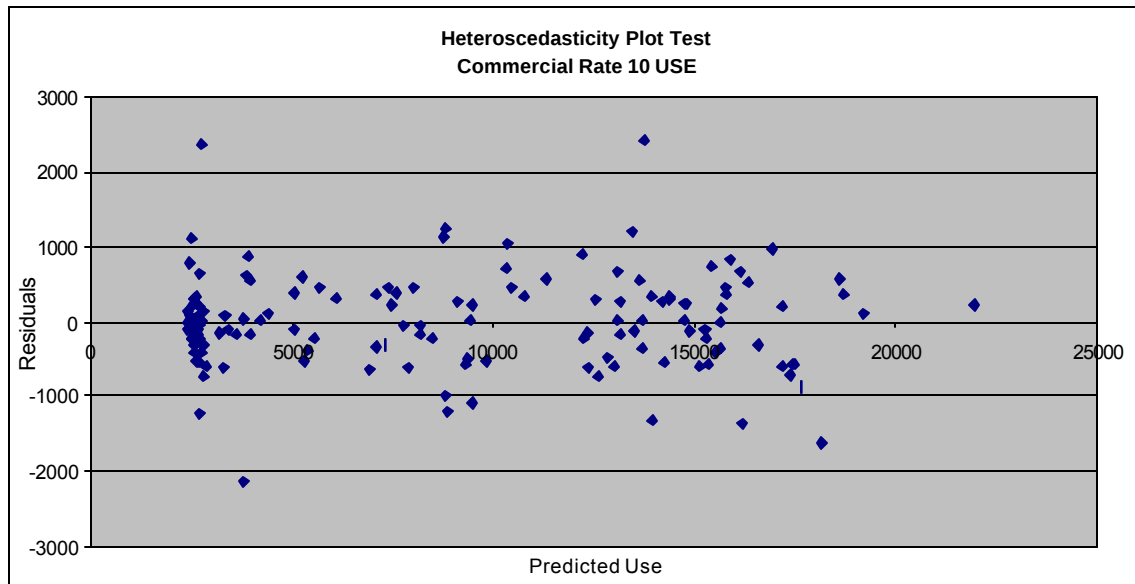
APPENDIX D
HETEROSCEDASTICITY PLOT TEST
CHARTS BY RATE CLASS











APPENDIX E
DEMAND FORECAST METHODOLOGY
(SEE NEXT PAGE)



uniongas

A Duke Energy Company

Demand Forecast Methodology

General Service Markets

Rates M2, 01 & Banner 10

May 2004

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1. Introduction:

This report documents the methodology used to prepare the total throughput volumes demand forecast for the general service market served by the following rate classes: Rate M2, Rate 01 & Banner Rate 10. These three rate classes are also classified according to residential, commercial and industrial market sectors, also referred to as customer service classes.

This document does not review either the forecast assumptions or the forecast estimates¹.

The contract rate demand forecast for large volume commercial and industrial accounts served by Union Gas Rates M4, M5, M6, M7, M9, T-1, T-3 20, 25/30, and 100 are prepared by a different methodology and process.

The general service demand forecast provides the basic planning information used to prepare annual corporate budgets, regulatory evidence and capacity management planning related activities. The demand forecast horizon is four years long and includes a bridge year, a budget year, and a rate case test year which could be the budget year or post budget year depending on circumstances.

The demand forecast provides the customer and consumption data needed to prepare the revenue forecast.

The demand forecast uses both internal and external information sources.

The customer billing system and the financial reporting system provides internal information in the form of monthly customer statistics pertaining to the number of customers, the actual total throughput consumption, and the average use per customer consumption for each service and rate class, e.g. residential rate M2. Calendar month consumption data is used; the billing cycle reported information has been adjusted for unbilled consumption estimates. These customer statistics have been compiled in a demand forecast data base with data starting in January 1990. Union Gas rate schedules are also used in preparing monthly retail energy gas price information. Results from Union Gas residential market gas appliance penetration surveys are also considered.

External information related to housing start forecasts, North American economic growth and conditions as measured by the real gross domestic product, light fuel oil prices and trends in the commercial sector are used in the preparation of the demand forecast. Forecasts from the Canada Mortgage and Housing Corporation, Consensus Economics, external economic service consultants and energy price journals are referenced.

2. Econometric Demand Forecast Variables:

Economic demand and consumer behaviour principles suggest that the demand variables selected and contained in the econometric demand equations need to account for several factors.

Seasonality: Any seasonality that is present in the consumption data needs to be explainable. The total monthly heating degree-day weather data accounts for the seasonality.

Trends: Any increasing or declining trend that is present in the consumption data needs to be explained. The energy efficiency trend variable in the residential market explains the declining usage over time and reflects the energy efficiency choices and behaviours of energy consumers. The commercial market segmentation & efficiency trend variable accounts for the declining usage present in the commercial market. Total customer

¹ A forecast assumption indicates the future direction or level of the demand variable, e.g. the number of new customers being added each year ; forecast estimates indicate the result of the forecast, e.g. residential rate M2 NAC estimate of 2,627 cubic metres per year.

growth in the industrial market accounts for the increasing total throughput volumes observed over the estimation period.

Economic Behaviour: Changes in retail natural gas energy prices affect consumption in the residential and commercial markets, and changes in relative prices between natural gas and light fuel oil affect total throughput volumes in the industrial market. As well changes in North American gross domestic product affect total throughput volumes in the industrial market as the provincial economy is well integrated with the larger economy especially via the automotive manufacturing industry.

The criteria used to select the demand variables are important as the econometric estimates of the average consumption per customer are a key component of the demand forecast. There are several criteria for selecting demand data.

The demand variables must be available according to a monthly format and span a fairly long period; 1990 to present in this instance. The monthly data requirement arises from both the seasonality that is present in the demand data and the ultimate client need for the forecast information which is monthly in nature. Monthly data can be a limiting factor in selecting the demand variable data.

The demand variables must be relevant and founded on economic behaviour and energy demand principles; demand theory suggests that weather and retail energy prices are two key demand drivers to consider. Correlations of energy demand to other data that possess a seasonal characteristic that is not related to natural gas energy demand in Ontario, e.g. beer consumption in Australia, is not sound or reasonable.

The data should be ideally franchise area or provincial level detail specific, with the notable exception for the industrial market where North American data can be used. This geographic criterion can also limit the data selection.

The demand data should be public and obtained from reputable sources, e.g. Statistics Canada, external economic services consultants, and should be reproducible.

The demand variables ideally should be statistically significant at the 95 percent level, although lower levels of significance as explained below may be accepted. A student's t test is used to examine the statistical significance of the demand variable in the regression equation.

3. Actual & Normal Weather:

The weather factor is the key demand forecast variable in the econometric analysis. The demand equations and the associated demand coefficients that are estimated are based on actual weather data. Weather is measured by total monthly heating degree-days (HDD) below 18 degrees Celsius. Historic monthly weather data for the southern and northern franchise areas has been compiled since the mid 1960's.

3.1. Actual Weather

Actual monthly weather time series data is used in the estimation of the econometric demand equations. The actual weather data is specified in the regression analysis as a nine month matrix where each heating season month, September through May, is a separate weather variable. For example January HDD is a time series demand variable where all the January months between the years 1990 and 2003 possess as a value the actual observed total heating degree-days during the month and zero values for all other data in the present time series. The other heating season months are set up in similar fashion. **[See Appendix 3.1]**

This weather matrix approach enables a separate weather coefficient to be estimated for each heating season month and this recognizes that consumer behaviour differs between the shoulder months and high heating seasons. The summer months of June through August were identified by previous statistical analysis as being non weather related and represent only base loads. In the industrial equation the time series are quarterly as a result of the GDP data, and the weather demand variable includes the first, second and fourth quarters where the second quarter excludes the month of June.

3.2. Normal Weather

The demand forecast estimates are based upon an assumption of normal weather occurring over the forecast horizon. Normal weather conditions are defined separately for the southern and northern franchise areas; as well, consolidated total company weather normal is established for the industrial demand equation.

Normal weather is defined as a blend of two estimated normals following a decision made by the Ontario Energy Board in April 2004: the blend incorporates a thirty year average normal estimate and an estimate obtained from the 20 year declining trend methodology that Union Gas developed in 2002 and has used in the preparation of the 2002 through 2004 budgets.

The weather normal blend assumes a ratio of 70:30 between the thirty year average normal estimate and the 20 year declining trend estimate for the years 2004 and 2005. The blend drops to a ratio of 60:40 in 2006 and 2007.

The thirty year average is based on monthly weather data spanning the 1974 to 2003 period. Averages are calculated for each month and then summed to yield the annual estimate.

The 20 year declining trend is based on weather data spanning the 1984 to 2003 period. A linear trend in the annual weather data is established by regression analysis; this trend is projected forward. The monthly forecast estimates are obtained from the annual forecast weather normal estimates by applying historic percent distributions for each month. These percent distributions are the average percent shares for the past twenty years.

Historic weather normals are also used to identify past cold and warm years as well as provide a standard weather condition for energy growth analyses of past and future consumption.

The actual weather and forecast normal estimates are shown in **[appendix 3.2]**.

4. Environment Scan:

The environment scan is a forecast assumption document that states expectations regarding key demand factors such as: total housing starts, retail energy prices, alternate fuel prices, real economic growth in Canada and the United States, mortgage interest rates, provincial unemployment rates and service sector employment growth. Sources include: Statistics Canada, Canada Mortgage and Housing Corporation (CMHC), Consensus Economics, The Centre for Spatial Economics (C4SE), Global Insight.

Housing start estimates and mortgage rate forecasts are directly used in the preparation of the customer attachment forecasts. In addition Canadian and U.S. real GDP growth rate forecasts are used to prepare the economic activity variable used in the light industrial demand equation. Retail natural gas and light fuel oil prices at April 2004 are used to prepare the energy price variables used in the regression analysis. The other economic indicators contained in the environment scan are considered in preparing the marketing and DSM plans and are also used for other planning activities within Union Gas, e.g. inflation rates for budgeting purposes.

The environment scan is prepared by Market Knowledge early in the year and updated in September.

The environment scan used in the preparation of the 2005 budget demand forecast is presented in [appendix 4]

5. Customer Attachment & Total Customer Forecast:

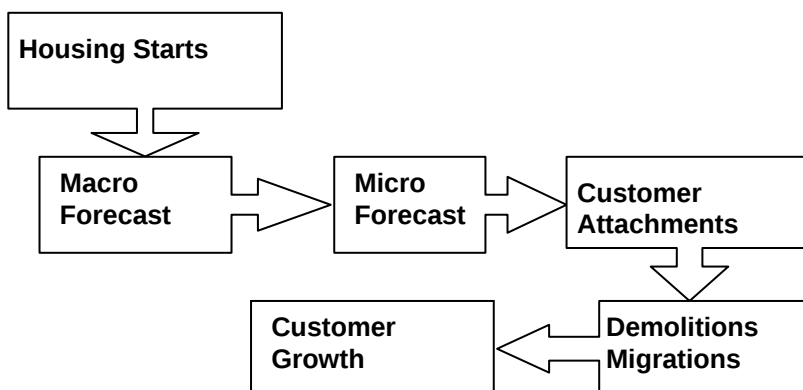
The total customer forecast estimates are obtained primarily from the customer attachment forecast estimates.

The customer attachment estimates are based on a macro analysis and a micro regional based assessment. The customer attachment estimates are gross new customer additions.

The macro analysis translates provincial housing start estimates obtained from several external housing start analysts (CMHC, the Chartered Banks, Consensus Economics, etc.) into a Union Gas franchise housing start estimate. Macro commercial and light industrial customer attachments are also provided. These commercial and industrial customer growth estimates are based on historic residential to commercial and industrial to commercial customer ratios. These annual customer growth estimates do not include any conversion market related customer attachments. This macro analysis is prepared by Market Knowledge for Channel Management.

Channel Management reviews the estimates obtained from the macro analysis and prepares the micro regional based estimates that include the conversion market related customer attachments. The micro regional based estimates become the recommended customer attachment forecast which is reviewed for approval by executive management.

The total customer forecast recognizes that demolitions, customer losses and rate class migration or classification related changes occur; the latter pertain mainly to commercial and industrial customers. These demolitions and other customer losses are subtracted from the gross customer attachment estimates to yield the net customer growth levels.



Monthly customer growth estimates are obtained from the annual estimates by applying historic percent distributions for each service and rate class.

The monthly customer growth estimates for each service and rate class are applied to the most recent historic December total customer level to yield the forecast total customer levels. For example December 2003 was used in preparing the 2005 demand forecast.

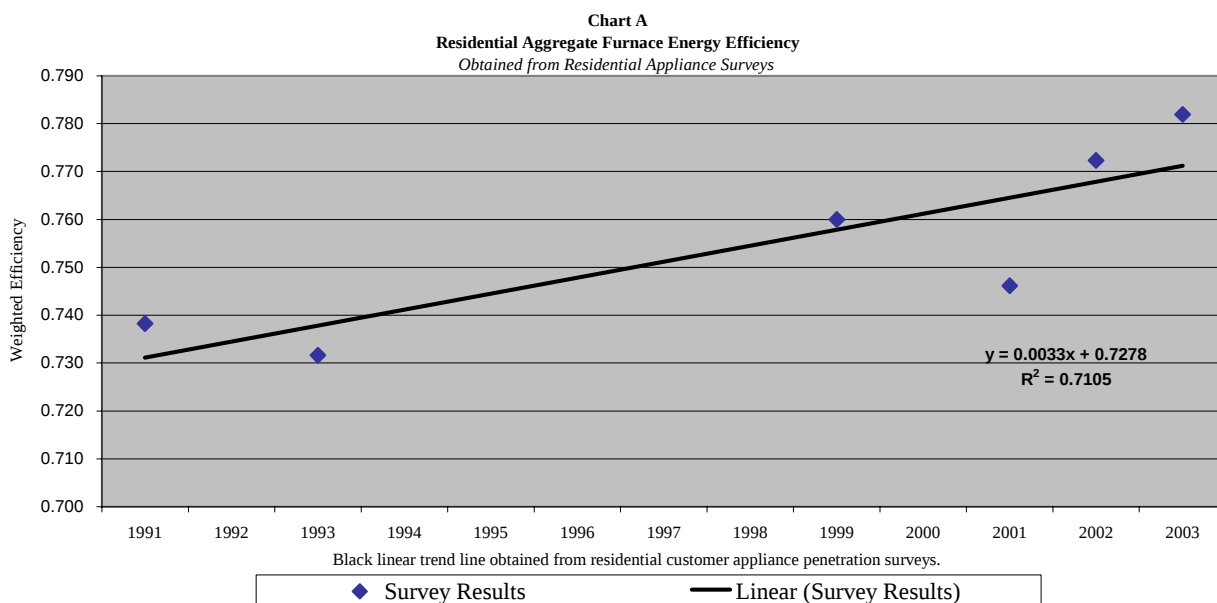
The customer attachment and total customer forecast is tabled in [appendix 5.1 & 5.2].

6. Residential Energy Efficiency:

A declining trend is present in the average consumption of a residential customer. A linear trend variable is created and used in the residential use equation regression; this trend variable is established from analysis of furnace type penetration data obtained from Union Gas appliance surveys since 1991. This data is used to establish a weighted furnace efficiency level. Weighted furnace efficiency is determined by multiplying the furnace type market shares by the recognized furnace efficiencies: conventional furnace 60% AFUE, mid efficient furnace 80% AFUE and high efficiency furnace 95% AFUE.

Non linear trends were examined but proved to be statistically inferior to a linear trend according to regression R square results which indicate degrees of fit.

The chart below indicates the weighted efficiency trend which is projected forward to obtain the forecast assumption for this variable. A 71% R-square was obtained.



7. Commercial Market Segmentation:

The use equations in the commercial market demand equations contain a demand variable that represents the changing composition of the commercial market. This trend variable is developed from a commercial market segment analysis that is described below.

The trend variable was derived using the results of the past four years of data created by the model. The following is a discussion of the model and the variables used.

7.1. *Commercial Segmentation Model – A Discussion*

The model has been designed to be rebased each year using actual consumption data from the billing system. The 2005 Demand Forecast version used actual volumes and customers counts pulled from the customer database for 2003.

Consumption and customer counts are extracted from the billing system using a Discoverer query. The data is then pulled together to classify the data in to the following segments.

7.1.1. Commercial Segments

- | | |
|-------------------------------|---------------------|
| ➤ Office | ➤ Restaurant |
| ➤ Elementary/Secondary School | ➤ Recreation |
| ➤ Health Service | ➤ Hotel/Motel |
| ➤ Retail | ➤ Religious |
| ➤ Warehouse/Wholesale | ➤ Multi-residential |
| ➤ College/University | ➤ Other |

Each of the segments is made up of several different dwelling types [see Appendix 7.1], these are compiled together using the monthly consumption data, which is then weather normalized. The annualized data for consumption and dwelling counts are entered in to the model for the base year. Currently we do not split the data into Northern and Southern franchise areas, for analysis, we compile the statistics for the entire franchise area.

7.2. Fuel Shares

The model makes certain assumptions on penetration and use; these assumptions come from outside consultants' reports that have not been updated since the model's creation.

7.2.1. Fuel Shares

	FUEL SHARE EXISTING STOCK			FUEL SHARE NEW STOCK		
	Space Heating	Water Heating	Other	Space Heating	Water Heating	Other
Office	88%	50%	100%	90%	50%	100%
Elementary/Secondary School	94%	75%	100%	95%	75%	100%
Health Service	94%	94%	100%	95%	95%	100%
Retail	88%	50%	100%	90%	50%	100%
Warehouse/Wholesale	80%	50%	100%	80%	50%	100%
College/University	94%	94%	100%	95%	95%	100%
Restaurant	96%	75%	100%	97%	80%	100%
Recreation	90%	75%	100%	92%	80%	100%
Hotel/Motel	91%	91%	100%	92%	92%	100%
Religious	90%	75%	100%	92%	80%	100%
Multi-residential	91%	60%	100%	92%	80%	100%
Other	80%	50%	100%	80%	50%	100%

7.3. Floor Space

The model calculates energy usage based on floor space, the model assumes specific square footage based on external reports provided in 2002. The current assumptions for floor space per dwelling are as follows:

COMMERCIAL SEGMENT	SQUARE FOOTAGE per dwelling
Office	6,000
Elementary/Secondary School	30,000
Health Service	22,500
Retail	5,000
Warehouse/Wholesale	25,000
College/University	150,000
Restaurant	4,000
Recreation	25,000
Hotel/Motel	17,500
Religious	5,000
Multi-residential	41,400
Other	5,000
Total (Average)	8,500

7.4. Growth and Decay

The model uses assumptions on growth and decay rates, which the model designer derived from external sources, Energy use indices that are derived from Natural Resources Canada and other studies are used to calculate the use based on the total square footage of the segment. The model calculates the annual consumption by sector for the forecast period.

The following table can be also be found in the [appendix 7.4]

	Assumptions used for growth, decay & vacancy		
	(percentage per year)		
	Floor Space Growth rates	Floor Space Decay Rates	Vacancy Rates
All segments (except Multi Res)	0.25%	0.10%	5.00%
Multi-residential	0.25%	0.10%	2.70%

7.5. Energy Use Model

The general form for the equation used for the commercial sector energy model is as follows:

$$\text{Energy Use} = f (A \times B \times C \times D),$$

Where, A=Activity variable (floor space)

B=Fuel share

C=Energy Technology Intensity

D=Usage

The Activity variable – A – comes from our Union's segment research and industry information. For the model, C and D are combined to create an energy intensity (EI) or end-use intensity (EUI) – [See Appendix 7.5]. Fuel shares – B – comes from information obtained by Union's own research. Once the model is populated, a calibration exercise may be performed if it is deemed necessary. This exercise allows the user to tailor the model for changes in any of the variables, such as changes in floor space of a sector, change in growth patterns or changes in use.

The following has been extracted from the current model and shows relative impacts on overall energy use of various changes in our inputs.

Volumes in 10 ³ m ³	Model 2004	1% Customer Change	1% Fuel Share
Office	420,984	4,210	8,378
Elementary/Secondary School	219,525	2,195	2,195
Health Service	89,369	894	868
Retail	182,789	1,828	1,806
Warehouse/Wholesale	96,291	963	963
College/University	65,406	654	631
Restaurant	82,973	830	784
Recreation	78,441	784	784
Hotel/Motel	25,180	252	247
Religious	28,803	288	288
Multi-residential	242,762	2,428	2,104
Other	276,396	2,764	2,641
Total	1,808,918	18,089	21,689

Each year when the data is extracted from the billing system there are checks that must be run against the data. One of the key items is customer count; if there is an unexpected result, the reason for its occurrence is investigated. This may mean re-pulling the data and/or contacting the Banner group to determine if there may have been changes to the system that may have accounted for this. If this does not resolve the issue, we try to determine if something has happened in the affected sectors that may be driving change.

The model uses a historical growth rates for fuel share and floor space applied across all the segments. The model may be changed to reflect changes in growth across the various segments. Demolitions and vacancies are also accounted for within the model and may be changed as needed.

Floor space Growth Rate used is 0.25% per year Decay rate used is 0.10%. The Assumed vacancy rate is 5% with the exception of Multi-residential at 2.7%

Fuel Share Growth Rate - % Existing is 0.25% New 0.50%

EUI Improvement - % - Existing is 0.10% New 1.0%

Overall percentage growth built into the model

Year	2004	2005	2006	2007	2008	2009
Percentage Growth	0.264%	0.035%	0.035%	0.035%	0.035%	0.035%

The largest sectors in terms numbers, floor space and total volumes are really office and retail. The Commercial "Other" group tends to be a group of unclassified businesses that at the time of being entered in to the billing system were just lumped into the generic category. Some work has been completed in the clean up of these records.

BASE YEAR:		2003		
COMMERCIAL SEGMENT	REPORTED GAS USE (10 ³ m ³)	NUMBER OF BUILDINGS	TOTAL FLOORSFAC (SQ. FT)	AVERAGE ANNUAL USE (m ³ /bldg)
Office	417,948	34,342	206,052,000	12,170
Multi-residential	278,568	2,600	107,640,000	107,141
Other	268,915	19,839	99,195,000	13,555
Retail	179,890	18,023	90,115,000	9,981
Elementary/Secondary School	167,618	2,457	73,710,000	68,221
Health Service	85,528	910	20,475,000	93,986
Restaurant	75,489	4,651	18,604,000	16,231
Warehouse/Wholesale	69,578	3,283	82,075,000	21,193
Recreation	65,886	1,227	30,675,000	53,697
Religious	39,944	2,623	13,115,000	15,229
Hotel/Motel	21,283	602	10,535,000	35,354
College/University	13,251	124	18,600,000	106,860
Total	1,683,900	90,681	770,791,000	18,569

To summarize the commercial segmentation model provides us with a tool to predict the various dynamics of our commercial market. The model is easily adaptable to changes within our markets and is an invaluable tool for analyzing the commercial segments.

The commercial segment model predicts total volumes and total use per customer. The total commercial use per customer estimate is then converted into the trend index variable that represents the changing commercial segmentation and energy efficiency characteristics present in the market. The Model's usefulness will improve as additional years' of data are accumulated.

8. Retail Energy Prices:

The retail natural gas prices used in the regression analyses were constructed from the monthly actual use per customer statistics for each customer service & rate class and the appropriate delivery, commodity and transportation rate schedules for the period January 1990 to December 2003.

The consumption of an average system sales customer was assumed in the creation of the burner-tip unit prices; this average consumption was applied to the delivery consumption rate blocks in the rate schedules to derive the average unit price. Retail price information that direct purchase customers pay is spotty and the market share of each retail energy marketer is not available to create a weighted market retail price due to code of conduct ethics.

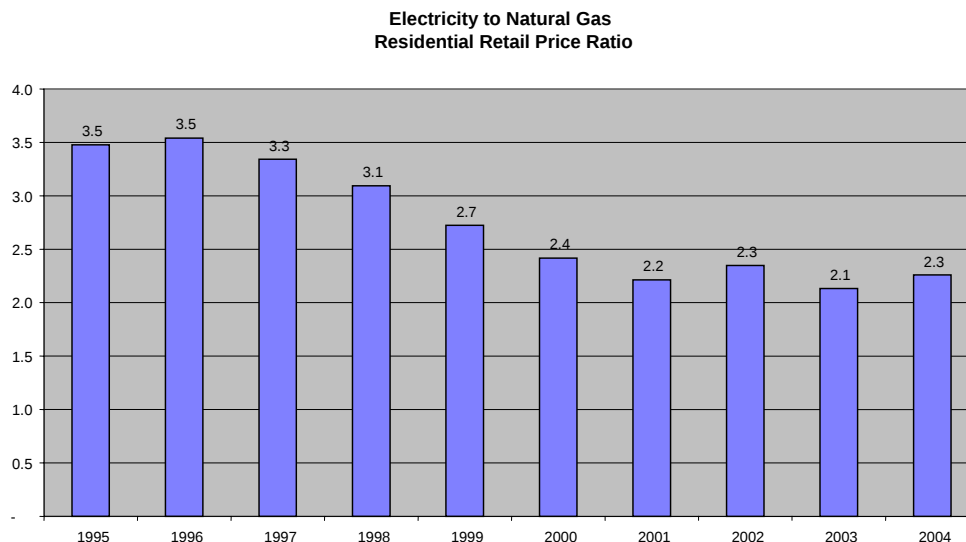
Retail energy prices primarily change when the more volatile commodity price changes.

Light fuel oil prices reported for the London, Ontario wholesale market are used in the estimation of the industrial demand equation.

Electric power retail prices were not analyzed for the following two reasons:

Electric distribution company retail power prices for the 90 odd electric power companies located throughout the Union Gas franchise area are not available on a monthly basis. Residential average use statistics for electric power are not public and easily made available. Electric power usage in the commercial segment would vary widely by commercial segment, and commercial segment consumption data is limited for gas consumption and non-existent for electricity consumption.

Over the 1990 to 2003 period electricity prices were frozen in Ontario; price comparisons indicate that electricity is not competitive with natural gas as the price ratio between electricity and natural gas has ranged from the 3.0 to 2.0 levels. Any relative price demand price variable in the regression equation would essentially reflect the gas price variation.



9. Econometric Equations:

The estimation of econometric demand equations for forecasting purposes is based upon econometric practices and principles. Economic theory and statistical methods are the basis of econometrics. Energy forecasting is applied econometrics. Forecasters are challenged by data limitations due to the availability and appropriateness of the information, the cost of obtaining the information, and the complexity in creating the appropriate information in certain instances, e.g. weighted market share retail energy prices.

Forecasters seek to improve their forecast equations by enhancing the equation specifications which may involve lagging variables, pooling data, adding newly obtained information, and incorporating knowledge obtained from forecasting journals and attendance at forecasting conferences to name a few examples.

10. *NAC Forecast:*

The normalized average consumption (NAC) forecast estimates for the general service rate and service class customers are a major component of the total throughput volumes demand forecast. The NAC forecast is a key determinant to the rate of growth present in the demand forecast.

The NAC forecast estimates are obtained by summing the results of three separate analyses. These three analyses are: the econometric NAC forecast estimates, the marketing plan NAC impact estimates and the DSM plan NAC impacts. These are described below.

10.1. *DSM Plan & Energy Efficiency Trend*

As described in the Use Equation section below, the historic Union Gas DSM plans need to be recognized in the regression analysis. The energy efficiency trend variable that is used in the use equations should not contain the impact of the past DSM plans.

Double counting the DSM plan impact in a going forward analysis is the issue; the historic energy efficiency trend that is estimated by the regression analysis should only reflect the condition where there is no DSM plan in place, as the new incremental DSM plan impacts is overlaid. This issue affects only the residential and commercial use equations and is not present with any of the volume equations.

This double-counting issue is resolved by restating the reported consumption statistics that are used to estimate the energy efficiency coefficient present in the use equation. Two regressions are undertaken; one with the actual reported statistics and one with the restated statistics. The restatement makes an account for the total consumption impact of past DSM plans. Audited annual DSM plan consumption statistics are used to restate the actual consumption data; monthly allocation is based on the seasonality present in the reported actual statistics. The restatement affects only the energy efficiency coefficient. The remaining coefficients contained in the use equation are based on the actual reported statistics.

11. Econometric NAC Forecast Estimates:

Econometric normalized average consumption (NAC) forecast estimates are determined for each service and rate class: residential Rate M2 and 01, commercial Rate M2, 01 & 10, and industrial Rate M2 and 10. The forecast estimates are referred to as normalized average consumption because they are based on normal weather assumptions as discussed earlier in the weather normal section above.

11.1. Statistical Estimation & Rigour

The econometric estimation process that is applied in preparing the NAC forecast estimates follow generally accepted energy demand forecasting methods. The independent demand variables included in estimated demand equations are variables that are conceptually well recognized as drivers for energy consumption, e.g. weather, retail energy prices, etc.

The estimated demand equation are selected on the basis of the conventional tests: Regression R Square, F and t tests, and Mean Absolute Percent Error (MAPE) for the equation fit, the Durbin Watson (DW) & Durbin H (DH) tests for auto correlation, and the Chow test for the presence of heteroskedasticity. Graphic examination is also undertaken.

A 95 percent confidence level is ideally the first screen or test level that one considers for determining the statistical significance of a demand variable.

For the majority of the 136 demand variables tested that are contained in the 11 demand equations, this 95 percent level is met as 127 demand variables had t test scores above the 95 percent confidence level. In nine instances a lower confidence level was considered and this is noted in the table below. The column titled P-value indicates the inverse of the confidence level. The percent level is obtained if the P-value is subtracted from 1.

The table shows that in three instances a 90 percent level indicates significance (Res M2 Price, Comm M2 Volume lagged and Ind Volume GDP); in 5 cases a level of 80 percent indicates significance (Res M2 Price, Comm M2 Volume lagged, Ind Volume GDP, Com 10 Commercial Index, Ind Volume Price Ratio).

Rate Class	Equation	Variable	P-value
Res M2	Volume Equation	Price	0.07
Com 01	Volume Equation	Volume Lagged	0.49
Com 01	Volume Equation	Price	0.53
Com 01	Use Equation	Price	0.26
Com 10	Use Equation	Commercial Index	0.12
Com M2	Volume Equation	Volume Lagged	0.08
Com M2	Volume Equation	Price	0.57
Ind	Volume Equation	GDP	0.06
Ind	Volume Equation	Price Ratio	0.19

A lower confidence level is acceptable if the dependent variable is widely recognized in the energy demand forecast community as a key demand forecast variable, e.g. retail energy prices. Furthermore, if the estimated demand relationship is correct, e.g. an inverse relationship between price and demand, and the estimated demand elasticity is within the expected range as indicated by a research of external literature then the variable can be included. If the inclusion of the variable improves the historic accuracy of the predicted estimate or does not materially affect the forecast estimate then also the inclusion of the variable is not a concern. Materiality defined as being within the standard error or mean absolute percent error range. If the inclusion of the variable eliminates an auto correlation issue that is present in the equation without the variable then the inclusion of the variable is a sound and reasonable forecasting technique.

For example: The price ratio variable in the industrial volume equation is significant at the 81 percent confidence level. Excluding the price ratio variable from the industrial volume equation yields a demand equation whose residuals are positively correlated, whereas the demand forecast equation that incorporates the price ratio variable is not auto correlated. The excluded variable equation possesses both a larger standard error and a larger mean absolute percent error for the predicted annual estimate. The t statistics for the remaining variables in the excluded variable equation all pass the 95 percent confidence test. The total volume estimate for 2005 obtained from the demand equation that excludes the price ratio variable is 0.7 percent higher than the estimate obtained from the demand forecast equation.

The presence of autocorrelation in an initial demand equation is remedied by introducing a lagged dependent variable in the equation and using the Durbin H statistic to test for autocorrelation.

11.2. Two Equation Approach

Specifying the demand equation as either an “average use per customer” equation or a “total volume” equation follows a conventional approach in econometric estimation. Either approach can yield strong and statistically significant demand equations. Both equations have their merits; the use equation identifies the trend present in the consumption data and the volume equation better identifies the demand-price relationship. And both approaches share common demand variables such as weather.

For the residential and commercial service classes, Union Gas has found that averaging the estimates obtained from each approach yields an econometric NAC estimate that is more accurate than the results that would be obtained from the individual equations.

The volume and use per customer demand forecast equation approaches are described below.

11.3. Volume Equations

See [Appendix 11.3] for Volume Equation Coefficients.

11.3.1. Residential Rate M2 & 01

The volume equation approach is used to estimate NACs in all three service classes.

The process of forecasting demand relies on using historical consumption data and identifying variables that can, at first accurately replicate historical demand patterns. The statistical results reveal the significance of the variables included and the extent to which they are able to predict historical demand. The object being that the models include all the primary drivers of demand and have the capacity to predict future demand with the same accuracy as it predicts historical demand.

Based on 14 years of monthly reported throughput volumes data for each of the rate classes, various drivers which could influence demand were tested using regression analysis to arrive at the final three, which are Number of Customers, Natural Gas Prices and Weather data for the two principal southern and northern franchise areas.

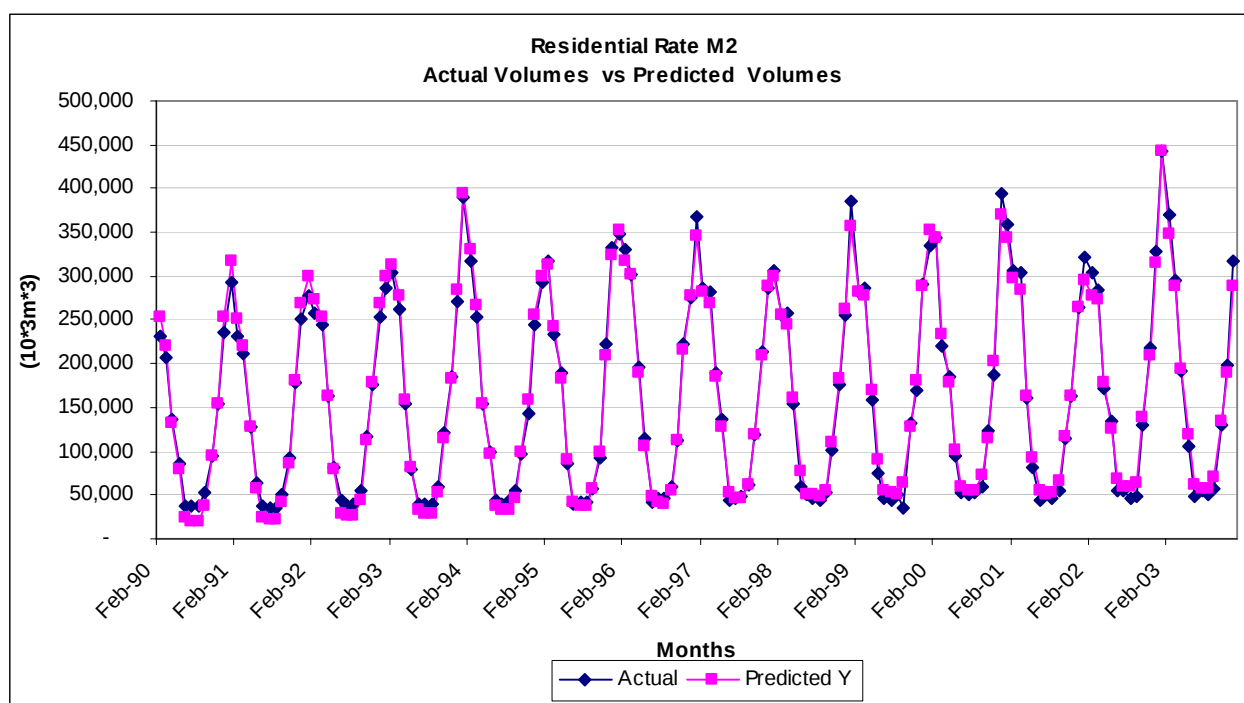
The Volume Equation for the residential market is defined by the relationship, total throughput volumes are a function of number of customers, natural gas prices and weather.

The monthly total number of customers captures the growth over time in throughput volumes. The retail natural gas prices identifies the consumer economic behaviour as the price variable is a retail burner tip price that is determined from the average use per customer statistics for each rate class and the past and current Union Gas delivery, transportation & commodity charge rate schedules. The weather variable, which is the primary driver of demand, is set-up as a matrix that excludes the summer months of June, July and August. Weather accounts for the seasonal patterns contained in the consumption data. Actual monthly weather data for the southern and northern franchise areas is considered.

$$\text{Total Throughput Volumes} = f \{ \text{Number of Customers, Natural Gas Prices, Weather} \}$$

Where:

Number of customers is the total number within the residential service and rate class, e.g. Rate M2.
 Natural gas price is the residential retail burner tip unit price that excludes the fixed monthly charge.
 Weather measures the total number of heating degree-days during the month.



The historic fit between the actual total consumption and the demand equation's estimated predicted values is shown in the chart above. The mean absolute percent error between the actual consumption and predicted estimates for the total annual throughput volumes is **1.3** percent with a standard deviation of **0.8** percent. This implies that the demand equation has forecast capability of roughly plus or minus **1.6** percent.

The regression results are presented in **[Appendix 11.3.1]**

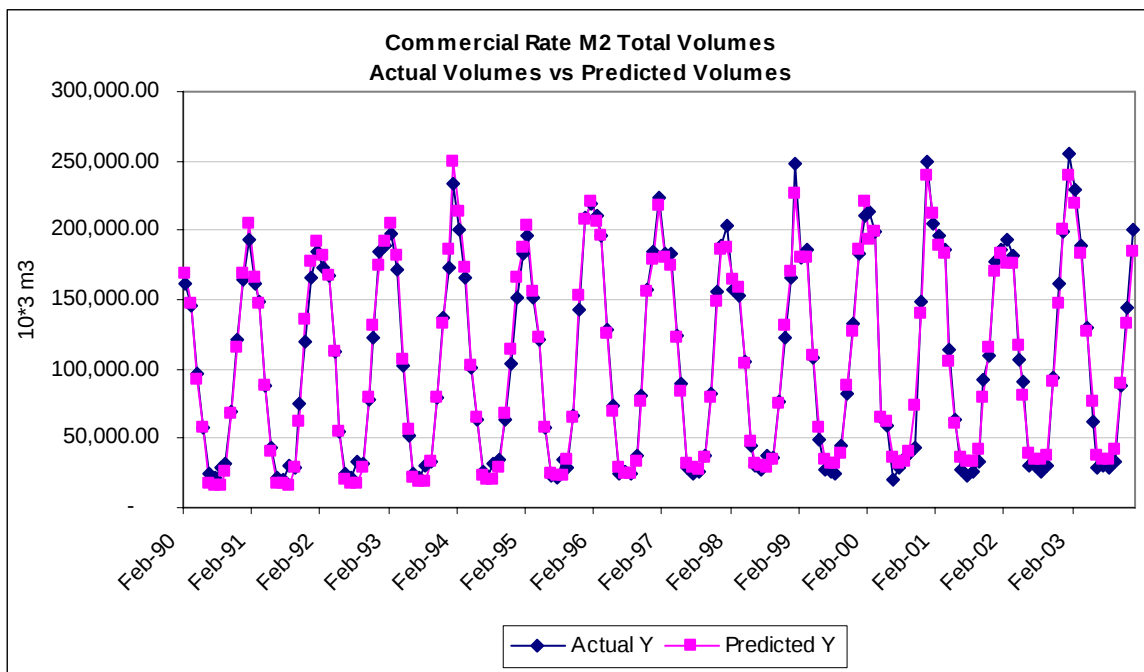
11.3.2. Commercial Rate M2, 01 & 10

The demand variables contained in the volume equation that were found to drive demand in the commercial market are similar to those cited above for the residential market. The only difference being that the total number of customers and the retail unit prices are based on the individual commercial customer rate class statistics. The structure of the volume equation is the same as that used in the residential service class. The volume equation is defined as follows: total throughput volumes are a function of natural gas prices, weather and number of customers.

$$\text{Total Throughput Volumes} = f \{ \text{Number of Customers, Natural Gas Prices, Weather} \}$$

Where:

Number of customers is the total number within the commercial service and rate class, e.g. Rate M2.
Natural gas price is the commercial retail burner tip unit price that excludes the fixed monthly charge.
Weather measures the total number of heating degree-days during the month.



The historic fit between the actual total consumption and the demand equation's estimated predicted values is shown in the chart above. The mean absolute percent error between the actual consumption and predicted estimates for the total annual throughput volumes is **1.5** percent with a standard deviation of **1.1** percent. This implies that the demand equation has forecast capability of roughly plus or minus **2.2** percent.

The regression results are presented in **[Appendix 11.3.2]**

11.3.3. Industrial Rate M2 & 10

The volume equation was the only approach selected for the industrial service class. The volume approach enabled the identification of an economic activity variable in the demand equation. This economic activity variable is based on quarterly changes in North American real gross domestic product (GDP). A relative industrial gas to fuel oil price variable completed the demand equation. Weather identifies the seasonality present in the monthly total consumption data. The total customer variable accounts for the growth over time in the consumption.

A consolidated industrial service class was examined as opposed to three individual rate class equations. The total volumes represent the sum of Rate M2, Banner Rate 10 and CIA Rate 10 customers. Industrial Rate 16 volumes were also included; this interruptible rate class is currently vacant. Inclusion of CIA Rate 10 and industrial Rate 16 customers improved the statistical estimation and this inclusion recognized that there has been migration back and forth over time between Banner and CIA Rate 10 customer classes, as well as with the Rate 16 customer class.

Pooling the industrial rate classes together creates a light industrial sector that correlates with North American GDP, which is not the case if individual and separate service class demand equations were specified. Weaker results were obtained if the volume equation was specified using the individual rate class information, e.g. the industrial rate M2 which represents about 83 percent of the total light industrial volumes, the regression analysis identifies only the weather relationship and the overall regression results are weaker in terms R Square and F statistics. This pooled rate class approach also enables the demand equation to identify a relationship between consumption and comparative energy prices.

The estimated industrial demand equation based on historical quarterly data spanning 1996 to 2003 is the following:

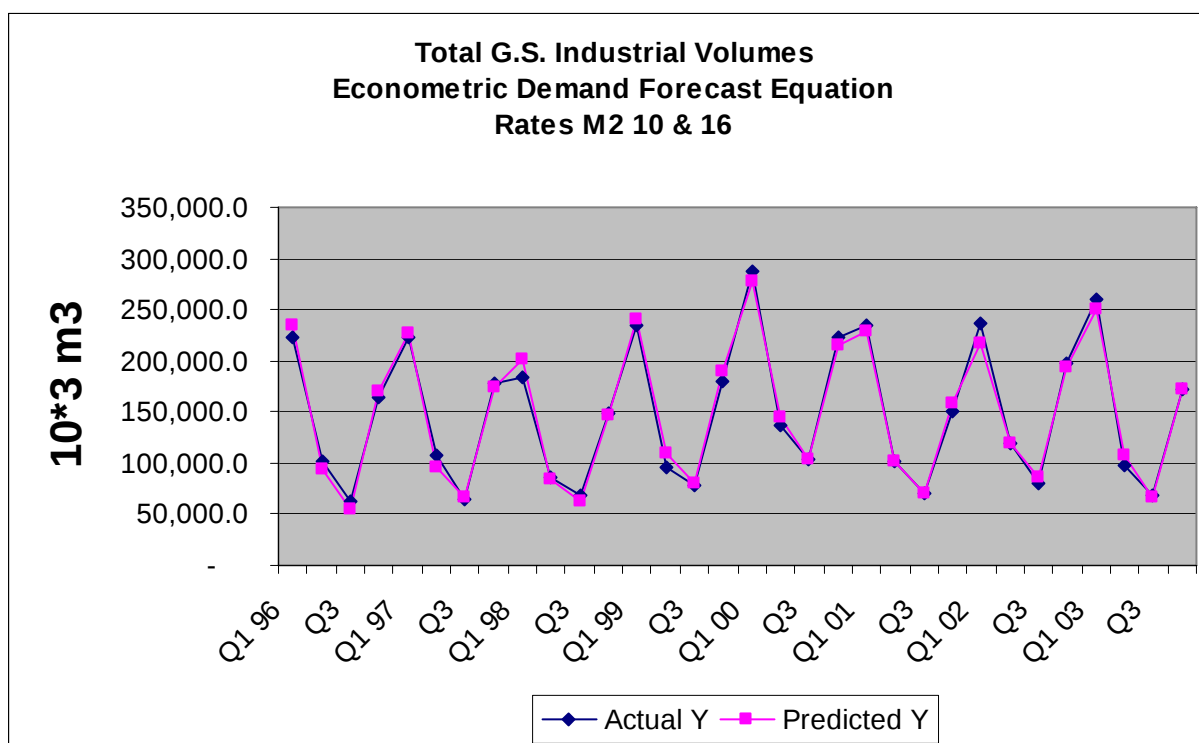
Volumes = f (weather, customers, lagged change in GDP, and the price ratio between natural gas and fuel oil.)

Where:

- Volumes is the consolidated total throughput of industrial Rate M2, 10 and 16 customers
- Weather represents the total heating degree-day weather matrix for nine heating months
- Customers is the consolidated total number of industrial Rate M2, 10 and 16 customers
- Lagged change in GDP is the quarter to quarter real dollar change in gross domestic product
- Price ratio relates the industrial burner tip natural gas unit price and the wholesale light fuel oil No. 2 price at London Ontario.

Consistent price data prior to 1996 was limited and this constrained the analysis.

The historic fit between the actual total consumption and the demand equation's estimated predicted values is shown in the chart below. The mean absolute percent error between the actual consumption and predicted estimates for the total annual throughput volumes is 1.8 percent with a standard deviation of 1.7 percent. This implies that the demand equation has forecast capability of roughly plus or minus 3.5 percent.



The statistical results for industrial volume equation are presented in **[Appendix 11.3.3-1]**.

The total throughput volumes for the industrial Rate M2 service class customers are obtained from the total consolidated volumes equation by means of a subsidiary regression equation that relates industrial Rate M2 volumes to the consolidated volumes. The results for this subsidiary regression are also shown in **[Appendix 11.3.3-2]**.

The total throughput volumes for the industrial Banner Rate 10 service class customers are obtained as a residual once the historic market share of CIA Rate 10 customers of the total consolidated volumes is attributed. CIA Rate 10 customers over the past two years have represented about 13.8 percent of the total consolidated light industrial throughput. The currently are no industrial rate 16 customers and none are expected in the future.

Once the historic predicted estimates and the forecast estimates, for the Rate M2 and Banner Rate 10 industrial volumes are obtained, the actual predicted average use and the forecast NAC estimates are determined by dividing the total volume estimates by the number of industrial customers in each service class.

Note that the volume approach demand specification yields an equation whereby increases in the total number of customers increases the NAC estimate. This seemingly paradoxical result arises from the presence of the other variables in the equation and the large estimated constant value that is part of the equation. The equation infers that over the past new industrial customers were larger than the average customer.

11.4. Use Equations

The use equation approach is used to estimate NACs in the residential and commercial service & rate classes. See [Appendix 11.4] for Use Equation Coefficients.

11.4.1. Residential Rate M2 & 01

The residential use equation emerged out of a need to capture the impact that energy efficiency has on overall consumption. As described earlier, a residential trend variable that represents energy efficiency gains was included in the use equation.

The residential use equation is determined from 14 years of monthly reported consumption data starting in January 1990 and finishing in December 2003.

Since reported use per customer data is used in the regression analysis, this implies that all the past DSM plan related efficiency gains are included in this historic consumption data. The incorporation of an efficiency variable in the model causes DSM gains to be counted twice. In order to prevent this, cumulative audited DSM impacts since 1995 were obtained and then added back into the actual reported use per customer statistics.

The use equation for the residential market is defined by the relationship; total use per customer is a function of natural gas prices, residential energy efficiency trend and weather.

$$\text{Use per Customer} = f \{ \text{Natural Gas Prices, Residential Energy Efficiency, Weather} \}$$

Where:

- *Natural Gas Prices* are an average price that is representative of the economic forces driving energy demand
- *Energy Efficiency Trend*, captures the changing mix in appliance type and penetration
- *Weather* represents the total heating degree-day weather matrix for nine heating months.

11.4.2. Commercial Rate M2, 01 & 10

The use equation for the commercial market is similar to the use equation in the residential market as it defines use per customer is a function of natural gas prices, a trend variable representing the changing mix in commercial market segmentation and weather.

$$\text{Use per Customer} = f \{ \text{Natural Gas Prices, Commercial Segmentation Index, Weather} \}$$

Where:

- *Natural Gas Prices* are an average price that is representative of the economic forces driving energy demand
- *Segmentation Index*, captures the changing mix in commercial market segmentation and energy efficiency.
- *Weather* represents the total heating degree-day weather matrix for nine heating months

11.4.3. Industrial Rate M2 & 10.

No use equation is estimated for the light industrial rate class.

The application of a use equation approach for the industrial market is difficult as the energy demand forecaster is confronted with the presence of an increasing trend in the average consumption that does not appear to relate to economic conditions. This conclusion is based on various exploratory regression equations that were undertaken. Identifying the price variable in the use equation, specified as either a single natural gas price variable or as a relative price, was not found to be significant. The use equation approach yielded weaker statistical results (R Square, F and t tests, MAPE) compared to the volume equation approach and therefore this use equation approach was not pursued any further.

12. DSM & Marketing Plan NAC Impacts:

The econometric demand equations do not take account of the incremental impact on total throughput of new Demand Side Management (DSM) and marketing plan programmes. Being new programmes, the actual customer consumption statistics do not reflect these programmes.

New DSM programmes lower total throughput by encouraging increased energy efficiency. New marketing plans encourage customers to consider clean natural gas energy instead of other energy types; these marketing plans marginally increase total throughput.

The Channel Management department provides the total volume estimates associated with these new DSM and marketing programmes. These annual volumes for the pertinent service class are cumulated over the multi-year forecast horizon and then divided by the forecasted total average number of customers in the service class to yield the incremental NAC impact. These are shown in **[Appendix 12]**.

A small water heating energy efficiency related impact is also recognized. New water heater standards support this adjustment.

The volume impact of previous DSM plans were taken into account in the estimation of the demand equations following the use equation approach as described earlier in the econometric NAC Forecast Estimates section.

13. Total NAC Forecast

The two tables below summarize the preparation of the NAC Forecast and show the forecast estimates. The first table indicates the process:

$$\text{NAC Forecast} = \text{Econometric Forecast} + \text{DSM \& Marketing Plan NAC Impacts} + \text{Other Adjustments}$$

NAC ESTIMATES & ADJUSTMENTS

<u>YEAR 2004</u>	<u>Res M2</u>	<u>Res 01</u>	<u>Comm M2</u>	<u>Comm 01</u>	<u>Comm 10</u>	<u>Ind M2</u>	<u>Ind 10</u>
Use Equation NAC Estimate (1)	2,748	2763	18,153	8,751	102,625		
Historic DSM NAC Impact	-70	-72	-701	-364	-3,806		
Use NAC Estimate (A)	2,678	2,691	17,452	8,387	98,819		
Volume Equation NAC Estimate (B)	2,646	2,748	17,715	9,215	99,101	85,797	261,926
Average of A & B	2,662	2,720	17,584	8,801	98,960	85,801	261,931
Marketing Plan NAC Impact	12	12	112	112	112		
DSM NAC Impact	-2	-2	-67	-25	-265	-332	-774
Water Heater Standards Eff	-2	-2					
NAC	2,669	2,728	17,629	8,888	98,807	85,469	261,157
FINAL NAC Forecast Estimate	2,670	2,728	17,629	8,888	98,807	85,469	261,157

The following table indicates the final annual NAC forecast estimates developed by the forecast methodology and process. Charted illustrations of the NAC forecast are presented in the table below.

BUDGET 2005: TOTAL NAC FORECAST: m3								
	<u>Residential Customers</u>		<u>Commercial Customers</u>				<u>Industrial Customers</u>	
	Rate M2	Rate 01	Rate M2	Tobacco M2	Rate 01	Rate 10	Rate M2	Rate 10
2003	2,700	2,819	17,877		9,412	98,675	88,884	282,671
2004	2,669	2,728	17,629	29,895	8,888	98,807	85,469	261,157
2005	2,627	2,677	17,290	29,895	8,647	97,355	88,054	303,146
2006	2,594	2,635	16,972	29,895	8,435	96,125	88,448	299,766
2007	2,570	2,602	16,796	29,895	8,293	95,554	89,165	297,211

14. Direct Purchase Market Estimates:

The direct purchase (DP) market includes customers served by the following delivery service options (DSO): ABC-T service, bundled T service and the new unbundled service option.

The demand forecast estimates for this market are based on two key determinants:

1) The total number of customers by service and rate class for each direct purchase service option is set by the total number reported at a specified time. For the 2005 Demand Forecast the total count at March 2004 set the total direct purchase customer levels. Total customers by direct purchase service option are held constant over the forecast horizon, except for one situation. The total number of ABCT customers decreases by the number of unbundled service customers when that service offering commences, e.g. May 2004. Total unbundled customers remain constant over the forecast period. The assumed constant level of direct purchase customers recognizes the difficult challenge and uncertainty related to forecasting the market share held by direct purchase service suppliers.

2) The NAC forecast estimates for each DP service & rate class is related to the all DSO or aggregate NAC estimates. These aggregate NACs indicate the average consumption of all customers regardless of delivery service option being used. A historic ratio relates the DP NACs to the aggregate NACs. These ratios are based on the most current historic relationship between the aggregate and the DP NACs based on customer billing information and DP customer information as provided by Customer Fulfillment Support Services. In general, the residential ratios are close to one, whereas the commercial and industrial DP NAC ratios show a notable difference between the aggregate NAC and DP NACs.

The northern region is obtained by a residual calculation from the northern rate 01 &10 franchise area after the five other regions have been estimated based on historic volume market share percentages. This provides a reconciliation feature for the very detailed regional volume forecast calculation.

The product of forecast DP customer and NAC estimates derives the DP total demand forecast. The subtraction of the DP customers and total throughput volumes from the aggregate All DSO customer and total throughput volumes forecast yields the system sales forecast of customers and total throughput volumes.

15. Total Throughput Volumes Forecast:

The total throughput volumes forecast is the product of the service class customer and NAC estimates for each month, rate class, delivery service option and region that has been described above. Annual consumption estimates are summations of the monthly estimates.

The total throughput volumes forecasts provide the base gas supply planning information as the throughput forecast identifies total monthly demand by delivery service option for both northern and southern franchise regions; the northern franchise can further be subdivided into six regions that indicate TCPL toll zones and specific single supply source situations, e.g. Sault Sainte Marie.

16. Differences in methodology from Budget 2004 filed Evidence:

The Budget 2005 Demand Forecast methodology very closely follows that of the Budget 2004 Demand Forecast filed evidence. The only notable differences are outlined below:

- All the models in each of the rate classes have been updated to reflect an additional one year of data.
- Some of the assumptions previously used in the Total Throughput Volumes Industrial Model have been replaced with variables which are more significant and far more reflective of the actual relationship. The previous equation was defined by the relationship: *Volumes = f {Number of Customers, Gas Prices, Heavy Fuel Oil Prices, Weather, Efficiency Trend}*.
- The NAC Reasonability Test is no longer a part of the methodology in determining the Budget 2005 Demand Forecast.

16.1. NAC Reasonability Test As Used in Budget 2004

16.1.1. NAC Reasonability Test

The January to March period represents a significant portion of the total annual consumption, almost half of the annual consumption in certain rate-service classes. The table below shows these proportions for each service and rate class. Examining the trends present in the historic proportions as well as the past 5-year average provides an analytical tool, or a “*NAC Reasonability Test*”, to estimate in a simple fashion the total annual NAC estimates for the bridge year. High and low range estimates can be obtained by using the standard deviations present in the data for each proportion. Dividing the observed total January to March NAC by the trend proportion yields a simple statistical estimate of the total annual NAC for the bridge year.

16.1.2. How the Reasonability Test is used

The annual NAC estimates obtained from the NAC Gauge can be used to assess the NAC estimates obtained from the sum of the econometric analysis and the marketing plan NAC impact assessments. The econometric analysis is a robust statistical analysis that incorporates weather, energy efficiency and price related factors. The marketing plan NAC impacts build into the NAC forecast the expected consumption gains arising from marketing initiatives aimed at specific market segments or growth gas application opportunities. The marketing plan impacts are the first year impacts that cumulate over time. The NAC Gauge also provides a quick check on the current budget year NAC estimates.

The table below shows the January to March NAC proportions for each of the rate and service classes. This table was used to prepare the 2004 energy demand forecast. The bridge-year for this forecast is the year 2003. Note that the trend and past five-year average proportions are very close in most cases. Also note that the standard deviations of the proportions are generally similar in magnitude to the standard errors that are obtained from the econometric estimation and analysis.

The January to March trend and range proportions were applied to sum of the reported January and March 2003 NAC levels in order to derive the trend and range total NAC estimates shown in the table. All the NAC's were weather normalized using the 2004 declining trend weather normal. This illustrates the NAC Reasonability Test concept.

JANUARY TO MARCH NAC as % of TOTAL ANNUAL NAC TABLE

Year	Res M2	Res 01	Comm M2	Comm 01	Comm 10	Ind M2	Ind 10
1991	46.0%	44.7%	45.8%	46.7%	42.8%	41.0%	37.2%
1992	45.9%	44.6%	44.9%	47.1%	43.3%	42.2%	38.5%
1993	46.3%	45.4%	45.6%	47.8%	44.0%	40.5%	38.4%
1994	46.6%	45.5%	45.2%	48.1%	42.7%	41.9%	37.6%
1995	45.8%	45.3%	45.1%	47.2%	44.3%	40.6%	37.4%
1996	45.7%	44.8%	44.6%	46.9%	43.3%	41.5%	36.9%
1997	46.8%	46.8%	45.3%	46.9%	44.2%	42.4%	42.8%
1998	47.1%	48.4%	45.1%	51.2%	46.8%	40.1%	48.0%
1999	46.7%	45.0%	45.9%	46.9%	46.0%	40.5%	41.2%
2000	45.9%	43.9%	50.0%	44.9%	44.3%	41.9%	40.0%
2001	46.9%	45.7%	43.9%	49.0%	44.1%	41.9%	34.8%
2002	46.7%	46.1%	45.1%	49.1%	45.9%	39.4%	40.5%
past 5 Years	46.7%	45.8%	46.0%	48.2%	45.4%	40.8%	40.9%
Trend	46.8%	46.0%	45.8%	48.4%	46.3%	40.8%	40.7%
<i>past 5: Trend</i>	<i>99.7%</i>	<i>99.6%</i>	<i>100.4%</i>	<i>99.6%</i>	<i>98.2%</i>	<i>100.0%</i>	<i>100.5%</i>
Low Trend	46.3%	44.8%	44.3%	46.8%	45.0%	39.8%	37.2%
High Trend	47.3%	47.2%	47.3%	50.0%	47.5%	41.7%	44.1%
Std. Dev.	0.5%	1.2%	1.5%	1.6%	1.3%	0.9%	3.5%
<i>As % of Trend</i>	<i>1.1%</i>	<i>2.6%</i>	<i>3.3%</i>	<i>3.3%</i>	<i>2.7%</i>	<i>2.3%</i>	<i>8.5%</i>

Jan-March NAC	1,207	1,270	7,756	4,461	41,298	35,485	111,326
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Estimated Annual NAC: m3 per Customer

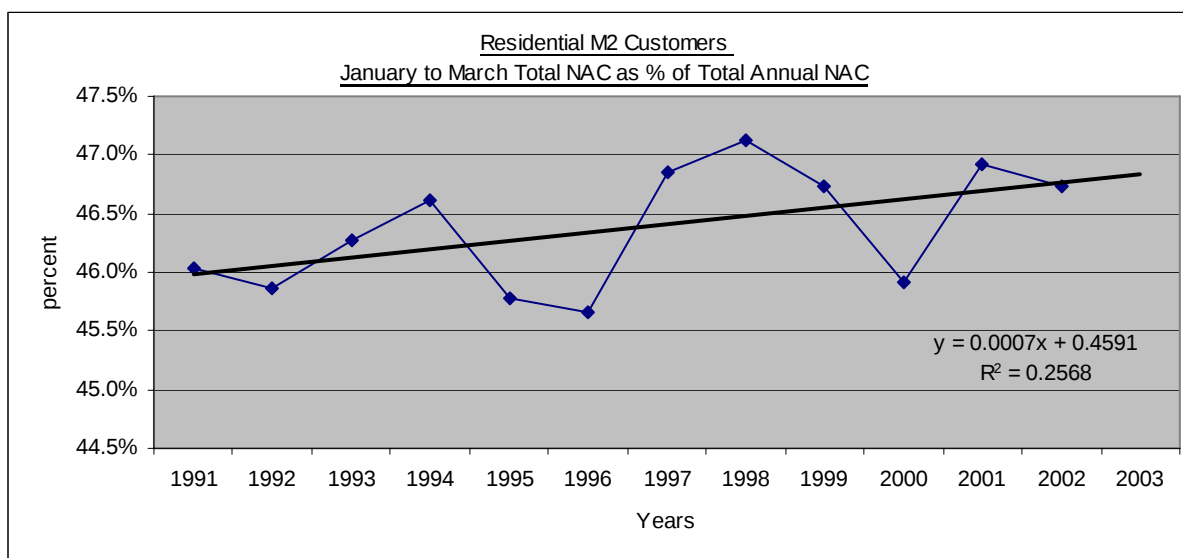
Trend Estimate	2,578	2,760	16,934	9,217	89,293	87,079	273,589
Upper Range	2,607	2,834	17,514	9,534	91,825	89,142	299,001
Lower Range	2,551	2,690	16,392	8,920	86,898	85,109	252,158
Budget 2003	2,608	2,679	17,107	9,145	100,476	82,213	223,860

Preliminary NAC Estimates (First Draft Estimates)

Econometric Estimate	2,611	2,710	17,394	9,071	95,348	87,129	291,335
DSM Plan	-4	-11	-52	-19	-198	(244)	(486)
Plus Mkt Plan	14	14	22	15	138	7	27
Total NAC Prelim.	2,621	2,713	17,364	9,067	95,288	86,893	290,876
Reasonability Test Adjustment	(14)	-	-	-	(3,463)	-	0
FINAL NAC Bridge Yr 2003	2,607	2,713	17,364	9,067	91,825	86,893	290,876

The NAC Reasonability Test suggests that the **Preliminary NAC** estimates for the year 2003 in the case of Residential Rate M2 & Commercial Rate 10 may be on the high side, when compared to the upper and lower limits as assigned by the reasonability tool. In this case, the relationship defined by the forecast equation is re-examined, the assumptions are checked and alternatives are examined. If all else fails then the suggested adjustment is made to the preliminary NAC estimates to line it up with the limit that it is closest to. This is done solely to ensure that the size of the reasonability adjustment is kept to a minimum. As in the case of the Residential Rate M2, a preliminary NAC estimate of 2,621 m³ is deemed to be too high since it is outside of the band, i.e. the Upper & Lower limits of the Reasonability Test. Since the closest limit is the Upper limit, the preliminary estimates are lowered by 14 m³ to 2,607 m³. This adjustment is then made to all the years in the forecast horizon. Interestingly, the Actual 2003 Year NAC came in at 2,601 m³.

The chart below further illustrates the January to March NAC proportions. The proportions for residential rate M2 customers are presented. The trend line shows how the proportions are changing over time. An increasing proportion indicates that base load is being lost over time. Loss of base load can result from various factors: replacement of pilot lights in new and replacement furnaces and water heaters with electronic ignition systems will lower the base load energy requirement, increased energy efficiency in furnaces and dwelling construction, and customer behaviour.



The NAC Reasonability Test is a very useful tool in the forecaster's toolkit. This tool relies on accurate and sound reported customer statistics for it to be valuable.

17. Appendices

ACTUAL HEATING DEGREE-DAYS: SOUTH RATE M2 & NORTH RATES 01& 10

HISTORICAL HEATING DEGREE DAYS - UNION SOUTH

Year	Jan	Feb	Mar	Apr	May	Non Heating Summer Months			Sep	Oct	Nov	Dec	Annual Htg. Deg.Days
						Jun	Jul	Aug					
1969	733.9	639.1	593.8	215.9	181.3	74.3	10.5	10.1	88.4	272.1	443.9	701.2	3,964.5
1970	812.9	660.9	621.7	312.7	136.2	41.2	5.6	8.0	73.8	200.1	409.6	659.5	3,942.2
1971	794.9	624.3	625.9	381.4	181.7	27.1	11.6	20.0	61.0	145.0	447.2	564.2	3,884.3
1972	724.7	722.5	643.1	416.5	128.2	80.4	23.5	24.7	79.3	335.4	486.8	616.9	4,282.0
1973	669.4	693.8	434.5	326.9	205.0	13.7	5.3	9.6	97.1	196.9	419.2	666.6	3,738.0
1974	701.5	697.8	567.4	313.0	224.4	41.8	6.8	4.9	127.5	308.7	430.2	611.9	4,035.9
1975	649.5	602.7	622.5	439.8	94.0	30.0	8.2	14.7	137.1	235.3	326.7	660.6	3,821.1
1976	827.4	573.3	499.3	307.6	205.3	19.5	8.8	30.4	114.5	344.9	545.2	779.5	4,255.7
1977	924.1	664.2	471.6	294.7	112.3	62.1	7.4	32.5	71.2	284.5	413.1	676.2	4,013.9
1978	814.7	802.0	677.1	384.4	165.8	55.6	16.6	5.6	83.8	290.9	440.2	633.3	4,370.0
1979	806.2	797.2	498.3	375.6	195.9	52.1	12.7	24.3	90.6	285.9	423.7	580.5	4,143.0
1980	714.2	735.0	612.1	346.4	136.6	86.4	4.4	1.3	90.4	339.2	474.7	724.2	4,264.9
1981	829.0	572.3	542.5	305.9	186.8	28.9	7.7	9.7	115.4	333.4	422.7	643.8	3,998.1
1982	846.4	711.7	600.2	397.9	85.5	67.6	5.1	41.6	102.7	238.1	407.5	506.6	4,010.9
1983	663.2	566.7	513.3	364.6	228.6	47.2	7.9	5.6	78.6	257.6	417.8	757.0	3,908.1
1984	836.3	553.0	683.1	322.6	228.8	22.8	12.5	10.5	117.4	207.8	442.2	560.2	3,997.2
1985	793.4	667.1	523.0	279.2	126.4	62.1	7.8	12.4	79.9	239.8	413.1	722.0	3,926.2
1986	723.7	665.4	527.6	299.7	126.1	52.6	9.3	37.2	87.1	259.9	490.5	602.7	3,881.8
1987	706.6	633.7	492.4	282.0	130.9	24.4	5.3	26.2	70.0	338.6	407.3	566.2	3,683.6
1988	720.0	702.5	559.7	339.5	126.8	53.1	2.9	14.8	86.2	343.7	397.1	640.1	3,986.4
1989	613.5	679.2	581.3	382.0	168.0	35.1	3.1	17.0	101.4	251.8	472.3	849.2	4,153.9
1990	583.4	586.1	502.5	303.0	195.3	39.0	6.2	8.0	98.9	269.4	393.6	586.1	3,571.5
1991	735.0	561.8	497.9	276.4	100.8	16.6	4.3	5.4	118.2	230.2	468.9	615.7	3,631.2
1992	676.5	622.6	574.6	376.2	168.1	72.3	26.8	40.7	109.2	314.5	447.0	602.2	4,030.7
1993	665.8	714.9	619.2	343.0	167.1	50.3	2.4	9.4	143.0	304.5	448.1	637.2	4,104.9
1994	905.8	729.9	578.2	318.0	205.5	38.1	4.1	27.1	81.1	238.4	369.4	559.2	4,054.8
1995	646.7	695.7	499.1	403.2	152.1	21.0	11.0	2.4	116.2	217.2	514.1	708.3	3,987.0
1996	757.8	683.1	650.5	393.4	201.0	20.5	11.3	2.8	79.6	258.0	517.8	576.7	4,152.5
1997	743.0	572.5	558.7	371.2	265.8	29.5	13.8	26.7	84.3	263.6	480.8	595.2	4,005.1
1998	608.1	504.9	492.5	289.3	68.0	59.4	1.5	6.2	44.5	225.9	393.8	530.6	3,224.7
1999	761.5	545.7	565.3	300.7	105.3	36.1	2.0	12.9	67.1	281.5	371.7	591.2	3,641.0
2000	734.5	603.2	422.2	343.0	134.0	33.7	12.6	19.4	111.3	217.2	440.4	804.9	3,876.5
2001	680.0	587.7	574.1	276.8	119.4	35.8	12.5	2.0	95.1	236.4	321.2	525.70	3,466.7
2002	577.5	537.8	540.1	319.2	218.3	35.8	0.5	3.4	28.5	294.7	445.2	634.6	3,635.6
2003	799.3	691.8	557.4	358.1	184.8	47.1	4.7	4.9	70.0	279.6	384.8	575.0	3,957.5

HISTORICAL HEATING DEGREE DAYS - UNION NORTH

Year	Jan	Feb	Mar	Apr	May	Non Heating Summer Months			Sep	Oct	Nov	Dec	Year
						Jun	Jul	Aug					
1969	895.5	747.8	746.7	275.3	282.1	150.2	39.3	25.7	169.5	392.0	553.5	842.9	5,120.5
1970	1,026.9	868.8	750.0	439.6	287.3	92.7	26.2	48.0	159.5	294.1	540.2	881.0	5,414.3
1971	1,023.9	802.8	764.9	469.8	270.4	75.2	54.1	77.5	125.2	241.3	575.8	793.2	5,274.1
1972	950.2	914.6	813.7	514.5	196.6	118.0	48.5	74.8	196.8	430.2	591.7	892.2	5,741.8
1973	855.9	846.6	541.6	422.3	270.7	77.6	26.2	20.5	188.1	276.2	564.7	850.6	4,941.0
1974	947.9	888.9	759.0	453.2	316.1	86.7	25.8	46.7	237.1	413.2	543.4	727.9	5,445.9
1975	871.3	763.5	764.9	524.7	151.2	71.7	26.4	46.1	206.4	324.5	509.0	874.3	5,134.0
1976	1,029.4	765.2	738.2	395.8	272.1	46.6	34.0	61.7	199.8	431.3	650.9	1,018.3	5,643.3
1977	1,054.6	786.4	588.2	407.3	165.3	119.6	38.4	98.8	170.9	367.0	533.7	857.9	5,188.1
1978	1,006.5	876.8	780.3	498.1	191.6	130.4	48.4	56.0	192.6	385.3	601.9	871.6	5,639.5
1979	1,008.5	967.7	667.8	465.0	261.6	100.8	34.4	83.1	177.1	395.4	546.1	744.2	5,457.9
1980	906.7	895.9	744.5	404.2	196.6	153.2	25.8	27.7	207.4	443.0	594.2	959.5	5,558.7
1981	994.7	693.9	641.0	420.9	255.0	102.9	27.0	30.3	203.4	420.2	522.7	780.3	5,092.3
1982	1,118.7	839.5	732.0	515.5	163.2	143.2	33.1	103.0	180.4	322.1	555.6	723.4	5,429.7
1983	876.3	726.1	663.8	465.1	318.6	93.9	22.1	21.1	136.4	356.8	552.6	962.5	5,195.3
1984	1,027.0	670.3	799.2	356.0	295.8	89.6	35.2	35.9	207.6	311.1	553.6	793.4	5,174.7
1985	994.5	815.9	672.4	428.3	225.4	137.4	51.7	64.7	156.0	342.5	614.6	934.4	5,437.8
1986	947.1	815.2	670.7	363.0	191.8	131.7	37.0	76.8	197.5	384.1	630.0	730.3	5,175.2
1987	846.3	741.0	619.2	322.4	218.1	69.5	28.1	61.5	135.3	417.3	550.2	713.5	4,722.4
1988	933.8	903.7	728.0	426.7	191.5	100.0	15.9	51.6	165.5	422.4	514.3	863.3	5,316.7
1989	855.2	874.2	798.9	481.5	208.6	104.6	21.9	64.7	159.0	348.0	658.7	1,078.9	5,654.2
1990	780.2	785.1	662.4	410.4	273.6	95.5	33.8	46.8	185.7	386.4	527.4	806.5	4,993.8
1991	972.1	733.0	667.0	371.0	176.4	52.7	30.7	38.1	200.9	368.6	586.3	821.7	5,018.5
1992	905.5	811.0	766.3	479.6	231.8	135.5	92.8	93.7	181.2	411.1	591.9	788.5	5,488.9
1993	903.8	887.6	704.0	450.8	254.8	110.0	22.6	33.8	235.8	431.7	621.5	803.9	5,460.3
1994	1,180.2	902.6	674.8	463.0	258.1	75.1	32.8	82.3	136.0	305.9	502.9	679.9	5,293.6
1995	831.7	861.6	642.8	516.2	237.5	59.5	32.1	29.1	210.4	329.4	701.9	905.6	5,357.8
1996	1,015.5	874.6	792.6	525.5	293.5	67.4	50.4	39.4	130.3	366.3	633.5	761.0	5,550.0
1997	987.3	798.9	764.3	466.6	336.6	51.1	47.3	77.3	154.1	363.3	594.5	742.8	5,384.1
1998	852.2	610.2	646.3	360.9	141.0	87.4	23.5	29.3	130.9	326.9	517.3	731.5	4,457.4
1999	956.3	686.7	676.6	382.5	165.3	64.1	16.1	58.4	134.1	389.2	482.3	742.4	4,754.0
2000	946.2	744.7	554.6	441.4	217.9	117.3	45.7	51.1	193.3	332.0	542.1	971.9	5,158.2
2001	827.9	790.4	679.3	383.9	172.7	69.9	43.0	27.7	155.4	337.2	449.8	654.5	4,591.8
2002	782.8	706.2	746.0	447.0	299.0	83.5	14.1	28.7	99.3	440.4	611.5	738.0	4,996.5
2003	978.9	869.3	717.9	487.5	199.9	74.5	24.7	27.1	120.4	368.5	519.3	723.2	5,111.2

2005 Budget Demand Forecast Weather Normal
OEB 70:30 BLENDED Weather Normal

<u>Blend</u>	<u>Year</u>	<u>January</u>	<u>February</u>	<u>March</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>	<u>October</u>	<u>November</u>	<u>December</u>	<u>Total</u>
Union South Heating Degree Days below 18 C														
70:30	2004	721.5	653.7	547.1	331.1	158.6	41.2	7.8	14.9	91.2	267.8	426.5	625.8	3,887.4
70:30	2005	720.9	630.5	546.6	330.8	158.5	41.2	7.8	14.9	91.1	267.6	426.1	625.2	3,861.2
60:40	2006	715.3	625.9	543.6	328.3	157.5	40.7	7.7	14.7	90.2	265.4	424.1	621.1	3,834.6
60:40	2007	714.4	625.1	542.9	327.9	157.3	40.7	7.7	14.7	90.1	265.1	423.5	620.3	3,829.8
Union North Heating Degree Days below 18 C														
70:30	2004	928.6	819.8	694.3	428.6	226.5	91.7	34.1	51.8	169.6	369.5	561.4	802.8	5,178.7
70:30	2005	927.6	790.7	693.6	428.2	226.3	91.6	34.0	51.8	169.4	369.1	560.8	801.9	5,145.0
60:40	2006	920.6	785.5	689.8	424.6	225.0	90.6	34.0	51.3	167.9	366.7	557.9	795.8	5,109.6
60:40	2007	919.3	784.4	688.8	424.0	224.6	90.5	34.0	51.2	167.7	366.2	557.1	794.7	5,102.4

**ECONOMIC OUTLOOK - 2005 Demand Forecast
Canada & U.S.A.**

Economic Indicator	Actual <u>2002</u>	Outlook <u>2003</u>	Outlook <u>2004</u>	Outlook <u>2005</u>	Outlook <u>2006</u>
U.S. Real GDP Ann. Growth Rate: % p.a.	2.4	3.1	4.9	4.3	
U.S. Light Vehicle Production: million units	16.7	16.5	16.8	16.7	
Canada Real GDP Ann. Growth Rate: % p.a.	3.3	1.6	2.8	3.1	2.8
Manufacturing GDP Ann. Growth Rate: % p.a.	2.6	-0.6	2.4	3.1	2.4
Machinery & Equipment Prices: % p.a.	-2.5	-9.8	-6.4	-5.4	-3.1
Machinery & Equipment Cap. Ex.: % p.a.	-3.2	4.3	7.8	7.3	8.8
Total Housing Starts Canada: 000's	205.7	220.6	216.2	196.6	163.5
Canadian Unemployment Rate: %	7.6	7.6	7.6	7.5	7.7
Canadian Consumer Price Index: % p.a.	2.2	2.8	0.9	0.8	1.2
Canada USA Exchange Rate: U.S. \$ in Cdn \$	1.570	1.401	1.261	1.218	1.203
Canada 3-Month T Bills: %	2.59	2.9	2.33	2.53	3.39
GOC 10-Year Bonds: %	5.29	4.81	5.01	5.44	5.86
5-Year Mortgage Rates: %	7.02	6.29	5.45	5.51	6.34

source: Centre for Spatial Economics (C4SE) January 2004

**Ontario Real GDP Growth by Industry
at 1997 chained dollars**

Year	Total GDP	Goods Production	Auto Mfg	Service Sector
1998	4.9%	5.1%		4.7%
1999	7.6%	8.2%	20.8%	7.4%
2000	6.0%	7.4%	0.7%	5.3%
2001	1.3%	-2.8%	-9.4%	3.4%
2002	3.8%	3.5%	7.3%	4.0%
2003	1.4%	0.1%	0.8%	1.9%
2004	3.0%	2.9%	3.5%	3.1%
2005	3.3%	3.7%	4.1%	3.1%

NEW CUSTOMER ATTACHMENTS

	Residential Customers		Commercial Customers				Industrial Customers		Total Customers	
	Rate M2	Rate 01	Rate M2	Tobacco M2	Rate 01	Rate 10	Rate M2	Rate 10		
2004	20,953	4,476	1,681		411	46	123		9	27,699
2005	20,385	4,524	1,630		311	132	119		9	27,110
2006	19,321	4,397	1,543		377	42	112		8	25,800
2007	18,628	4,301	1,476		361	41	108		8	24,923

DEMOLITIONS / LOST CUSTOMERS / RATE MIGRATION & RECLASSIFICATION

2004	-683	-17	-50	-30	18	-38	-95		-7	-902
2005	-533	-164	-52	-30	101	-122	-93		-7	-900
2006	-632	-69	-50	-30	12	-32	-85		-6	-892
2007	-622	-78	-49	-30	10	-31	-82		-6	-888

NET CUSTOMER YEAR END GROWTH

2004	20,270	4,459	1,631	-30	429	8	28		2	26,797
2005	19,852	4,360	1,578	-30	412	10	26		2	26,210
2006	18,689	4,328	1,493	-30	389	10	27		2	24,908
2007	18,006	4,223	1,427	-30	371	10	26		2	24,035

2005 DEMAND FORECAST
TOTAL NUMBER OF CUSTOMERS

CUSTOMERS AT DECEMBER 2003

Residential Customers			Commercial Customers			Industrial Customers			TOTAL
Rate M2	Rate 01	Rate M2	Tobacco M2	Rate 01	Rate 10	Rate M2	Rate 10		CUSTOMERS
827,198	254,998	77,957	977	25,375	2,567	5,224	189		1,194,485

TOTAL CUSTOMERS - ALL DSO

		Residential Customers			Commercial Customers			Industrial Customers		TOTAL
Month		Rate M2	Rate 01	Rate M2	Tobacco M2	Rate 01	Rate 10	Rate M2	Rate 10	CUSTOMERS
Forecast	Jan-04	829,241	255,711	78,894	977	25,405	2,567	5,225	189	1,198,210
Forecast	Feb-04	830,795	256,045	79,126	977	25,398	2,568	5,227	189	1,200,324
Forecast	Mar-04	831,916	256,164	79,413	977	25,452	2,568	5,228	189	1,201,908
Forecast	Apr-04	832,542	256,107	79,488	977	25,728	2,569	5,230	189	1,202,830
Forecast	May-04	832,862	255,788	79,521	977	25,904	2,569	5,232	190	1,203,044
Forecast	Jun-04	832,858	255,512	79,080	977	25,846	2,570	5,235	190	1,202,268
Forecast	Jul-04	832,825	255,332	78,840	977	25,522	2,571	5,238	190	1,201,494
Forecast	Aug-04	830,107	255,124	78,603	977	25,763	2,572	5,241	190	1,198,576
Forecast	Sep-04	835,736	255,280	78,452	947	25,739	2,573	5,244	190	1,204,161
Forecast	Oct-04	840,133	256,626	78,728	947	25,756	2,573	5,246	191	1,210,201
Forecast	Nov-04	844,859	258,315	79,314	947	25,785	2,574	5,249	191	1,217,234
Forecast	Dec-04	847,468	259,457	79,588	947	25,804	2,575	5,252	191	1,221,282
Forecast	Jan-05	849,469	260,154	80,495	947	25,833	2,576	5,253	191	1,224,917
Forecast	Feb-05	850,991	260,480	80,719	947	25,826	2,576	5,255	191	1,226,985
Forecast	Mar-05	852,089	260,597	80,997	947	25,878	2,577	5,256	191	1,228,532
Forecast	Apr-05	852,702	260,541	81,069	947	26,143	2,577	5,257	191	1,229,428
Forecast	May-05	853,016	260,230	81,101	947	26,312	2,578	5,260	192	1,229,635
Forecast	Jun-05	853,011	259,960	80,674	947	26,257	2,579	5,262	192	1,228,882
Forecast	Jul-05	852,979	259,783	80,442	947	25,945	2,580	5,265	192	1,228,133
Forecast	Aug-05	850,317	259,580	80,213	947	26,176	2,581	5,268	192	1,225,273
Forecast	Sep-05	855,830	259,733	80,067	917	26,154	2,582	5,270	192	1,230,745
Forecast	Oct-05	860,136	261,049	80,334	917	26,170	2,583	5,273	193	1,236,655
Forecast	Nov-05	864,765	262,700	80,901	917	26,198	2,584	5,275	193	1,243,533
Forecast	Dec-05	867,320	263,817	81,166	917	26,216	2,585	5,278	193	1,247,492
Forecast	Jan-06	869,204	264,509	82,024	917	26,243	2,586	5,279	193	1,250,954
Forecast	Feb-06	870,636	264,833	82,236	917	26,237	2,586	5,281	193	1,252,919
Forecast	Mar-06	871,670	264,949	82,499	917	26,286	2,587	5,282	193	1,254,383
Forecast	Apr-06	872,247	264,894	82,568	917	26,536	2,587	5,283	193	1,255,225
Forecast	May-06	872,543	264,584	82,597	917	26,696	2,588	5,286	194	1,255,405
Forecast	Jun-06	872,538	264,316	82,194	917	26,643	2,589	5,289	194	1,254,680
Forecast	Jul-06	872,508	264,141	81,974	917	26,349	2,590	5,292	194	1,253,965
Forecast	Aug-06	870,002	263,939	81,757	917	26,567	2,591	5,294	194	1,251,262
Forecast	Sep-06	875,192	264,091	81,619	887	26,546	2,592	5,297	194	1,256,419
Forecast	Oct-06	879,246	265,397	81,871	887	26,562	2,593	5,300	195	1,262,051
Forecast	Nov-06	883,604	267,036	82,408	887	26,588	2,594	5,302	195	1,268,614
Forecast	Dec-06	886,009	268,145	82,659	887	26,605	2,595	5,305	195	1,272,400
Forecast	Jan-07	887,824	268,820	83,479	887	26,631	2,596	5,306	195	1,275,738
Forecast	Feb-07	889,204	269,136	83,681	887	26,625	2,596	5,308	195	1,277,633
Forecast	Mar-07	890,200	269,249	83,933	887	26,672	2,597	5,309	195	1,279,042
Forecast	Apr-07	890,756	269,195	83,999	887	26,910	2,597	5,310	195	1,279,850
Forecast	May-07	891,041	268,893	84,027	887	27,063	2,598	5,313	196	1,280,017
Forecast	Jun-07	891,036	268,632	83,641	887	27,013	2,599	5,315	196	1,279,320
Forecast	Jul-07	891,007	268,461	83,431	887	26,732	2,600	5,318	196	1,278,633
Forecast	Aug-07	888,593	268,264	83,224	887	26,940	2,601	5,321	196	1,276,026
Forecast	Sep-07	893,593	268,412	83,092	857	26,920	2,602	5,323	196	1,280,996
Forecast	Oct-07	897,499	269,687	83,333	857	26,935	2,603	5,326	197	1,286,437
Forecast	Nov-07	901,698	271,286	83,846	857	26,960	2,604	5,328	197	1,292,776
Forecast	Dec-07	904,015	272,368	84,086	857	26,976	2,605	5,331	197	1,296,435
control chek								59,712.921		59,712.921

TOTAL CUSTOMERS - ALL DSO

Year	Residential Customers			Commercial Customers			Industrial Customers		TOTAL CUSTOMERS
	Rate M2	Rate 01	Rate M2	Tobacco M2	Rate 01	Rate 10	Rate M2	Rate 10	
No. of Customers at Year End December									
2003	827,198	254,998	77,957	977	25,375	2,567	5,224	189	1,194,485
2004	847,468	259,457	79,588	947	25,804	2,575	5,252	191	1,221,282
2005	867,320	263,817	81,166	917	26,216	2,585	5,278	193	1,247,492
2006	886,009	268,145	82,659	887	26,605	2,595	5,305	195	1,272,400
2007	904,015	272,368	84,086	857	26,976	2,605	5,331	197	1,296,435
Annual Increase in Number of Customers at December									
2004	20,270	4,459	1,631	30	429	8	28	2	26,797
2005	19,852	4,360	1,578	30	412	10	26	2	26,210
2006	18,689	4,328	1,493	30	389	10	27	2	24,908
2007	18,006	4,223	1,427	30	371	10	26	2	24,035
Average Annual No. of Customers									
2003	817,445	253,810	77,587	994	25,104	2,564	5,205	191	1,182,899
2004	835,112	256,288	79,087	967	25,675	2,571	5,237	190	1,205,128
2005	855,219	260,719	80,681	937	26,092	2,580	5,264	192	1,231,684
2006	874,617	265,069	82,201	907	26,488	2,590	5,291	194	1,257,356
2007	893,039	269,367	83,648	877	26,865	2,600	5,317	196	1,281,909

2003 Pull

Segment	Dwtp Code	Dwtp Code Desc
Colleges/Universities	CEDCU	EDUCATION COLLEGE/UNIVERSITY
	PBIEDC	EDUCATION COLLEGE/UNIVERSITY
Elementary/Secondary Schools & Daycares	CEDPS	EDUCATION PRIMARY/SECONDARY
	PBIEDP	EDUCATION PRIMARY/SECONDARY
	CDAYCA	PERMANENT DAY CARE CENTRE
	CDIDAY	PERMANENT DAY CARE CENTRE
Heath Services	CDIHOS	HOSPITAL FACILITY
	CHOSP	HOSPITAL FACILITY
	PCOR	PERMANENT CORRECTIONAL FACILITY
	CDIPSY	PERMANENT PSYCHIATRIC INSTITUTION
	PPSYC	PERMANENT PSYCHIATRIC INSTITUTION
	CDIHEA	SENIOR/NURSING/HEALTH CARE
Hotel/Motel	CHEAL	SENIOR/NURSING/HEALTH CARE
	CHOTMO	HOTEL/MOTEL
Multi-Residential	CIHOTM	HOTEL/MOTEL
	CIPTB	APARTMENT BUILDING
	MAPTBG	APARTMENT BUILDING
	CICDO	CONDOMINIUM BUILDING
	MCNDOB	CONDOMINIUM BUILDING
	CIFUNC	MULTI-FAMILTY OTHER
	MFUNCD	MULTI-FAMILY OTHER
	MROW	ROW/TOWNHOUSE COMPLEX
Office	CIOFFI	OFFICE BUILDING
	COFFIC	OFFICE BUILDING
	CIOFFU	OFFICE BUILDING UNIT
	COFFUN	OFFICE BUILDING UNIT
Other	CCOMM	COMMERCIAL OTHER
	CICOMM	COMMERCIAL OTHER
	CISPEC	COMMERCIAL SPECIAL
	CSPEC	COMMERCIAL SPECIAL
	CIINST	INSTITUTIONAL OTHER
	CINSTO	INSTITUTIONAL OTHER
Recreation	CARENA	ARENA
	PBIARE	ARENA
	CAUDI	AUDITORIUM
	PBIAUD	AUDITORIUM
	CPOOL	COMMERCIAL POOL
	CENTER	ENTERTAINMENT FACILITY
	PBICEN	ENTERTAINMENT FACILITY
	OPARK	PARK LAND
	CTHEAT	THEATRE
Religious	CREL	RELIGIOUS FACILITY
	PBIREL	RELIGIOUS FACILITY
Restuarants	CIREST	RESTAURANT / FOOD SERVICE
	CREST	RESTAURANT / FOOD SERVICE
Retail	CILAUN	COMMERCIAL LAUNDROMATS
	CLAUN	COMMERCIAL LAUNDROMATS
	CGSCW	GAS STATION / CAR WASH
	CIRET	RETAIL BUILDING
	CRET	RETAIL BUILDING
	CIRETP	RETAIL PLAZA
	CRETPL	RETAIL PLAZA
	CRETPU	RETAIL PLAZA UNIT
Warehouse/Wholesale	CIWARE	WAREHOUSE FACILITY
	CWARE	WAREHOUSE FACILITY

**Assumptions used for growth, decay & vacancy
(percentage per year)**

	Floorspace Growth rates	Floorspace Decay Rates	Vacancy Rates
Office	0.25%	0.10%	5.00%
Elementary/Secondary School	0.25%	0.10%	5.00%
Health Service	0.25%	0.10%	5.00%
Retail	0.25%	0.10%	5.00%
Warehouse/Wholesale	0.25%	0.10%	5.00%
College/University	0.25%	0.10%	5.00%
Restaurant	0.25%	0.10%	5.00%
Recreation	0.25%	0.10%	5.00%
Hotel/Motel	0.25%	0.10%	5.00%
Religious	0.25%	0.10%	5.00%
Multi-residential	0.25%	0.10%	2.70%
Other	0.25%	0.10%	5.00%

2005 to 2007 DEMAND FORECAST
VOLUME EQUATION
REGRESSION EQUATION COEFFICIENTS

<u>Demand Variable</u>	<u>Residential</u>		<u>Commercial</u>		
	<u>Rate M2</u>	<u>Rate 01</u>	<u>Rate M2</u>	<u>Rate 01</u>	<u>Rate 10</u>
Adjusted R Square	98.9%	98.4%	98.6%	99.0%	98.6%
F	1,033.63	617.71	837.50	1,017.28	769.02
MAPE	1.3%	1.0%	1.5%	1.8%	2.0%
INTERCEPT	- 58,701.68	- 16,820.76	-38,960.44	- 2,121.44	- 7,163.48
VOLUME LAGGED	0.09	0.12	0.06	0.03	n/a
TOTAL CUSTOMERS	0.15	0.15	0.97	0.30	6.39
RETAIL GAS PRICE	- 338.27	- 13,437.33	- 71.72	- 1,281.48	- 5,982.22
HDD January	375.87	94.89	241.42	40.18	35.84
HDD February	363.13	89.03	244.19	41.18	36.55
HDD March	358.68	80.79	242.50	38.78	36.20
HDD April	315.95	69.17	225.27	32.62	32.27
HDD May	254.74	53.92	185.58	23.11	21.83
HDD September	161.15	66.49	95.68	15.02	13.55
HDD October	267.84	72.47	191.56	28.52	32.51
HDD November	321.18	87.86	242.01	34.04	36.20
HDD December	375.73	88.15	247.11	37.78	35.44

t-statistics for key demand variables in Volume Equations

<u>Demand Variable</u>	<u>Residential</u>		<u>Commercial</u>		
	<u>Rate M2</u>	<u>Rate 01</u>	<u>Rate M2</u>	<u>Rate 01</u>	<u>Rate 10</u>
INTERCEPT	- 7.28	- 6.50	- 5.15	- 1.67	- 2.67
VOLUME LAGGED	3.01	3.12	1.77	4.08	n/a
TOTAL CUSTOMERS	9.17	8.49	6.63	0.63	4.73
RETAIL GAS PRICE	- 1.82	- 2.11	- 0.57	- 0.70	- 2.71
HDD January	34.74	29.23	30.26	34.34	66.09
HDD February	24.60	18.79	23.31	24.98	58.16
HDD March	24.39	17.16	22.82	22.94	52.26
HDD April	15.02	11.53	14.09	14.63	29.65
HDD May	9.27	7.02	9.23	9.09	11.08
HDD September	4.26	7.83	3.56	5.61	4.66
HDD October	19.67	18.74	19.76	24.38	25.38
HDD November	36.30	31.47	36.81	36.49	41.71
HDD December	44.74	30.56	36.07	38.02	53.86

<u>Demand Variable</u>	<u>Industrial</u>	
	<u>Merged</u>	<u>Rate M2</u>
Adjusted R Square	98.3%	99.7%
F	297.58	5,404.70
MAPE	1.8%	1.8%
INTERCEPT	- 404,048.72	- 10,864.16
HDD Q1	74.77	
HDD Q2	50.05	
HDD Q4	71.34	
GDP(CAN&US)	57.42	
GAS/LFO PRICE RATIO	- 313,929.36	
CUSTOMERS	88.83	
Total Ind Vol M21016		0.84

t-statistics for key demand variables in Volume Equations

<u>Demand Variable</u>	<u>Industrial</u>	
	<u>Merged</u>	<u>Rate M2</u>
INTERCEPT	- 8.57	- 8.35
HDD Q1	31.82	
HDD Q2	6.15	
HDD Q4	21.63	
GDP(CAN&US)	2.00	
GAS/LFO PRICE RATIO	- 1.36	
Total Ind Vol M21016		103.85

Note: Industrial is a combination of Total Industrial
Demand Forecast Methodology

BASE YEAR

SECTOR

	BASE YEAR EUI EXISTING			EUI - NEW STOCK		
	Space Heating	Water Heating	Other	Space Heating	Water Heating	Other
Office	2.23	0.15		2.007	0.135	0
Elementary/Secondary School	3	0.2		2.7	0.18	0
Health Service	3	1.1	0.5	2.7	0.99	0.45
Retail	2.1	0.15	0.1	1.89	0.135	0.09
Warehouse/Wholesale	1.4	0.1		1.26	0.09	0
College/University	2.8	0.4	0.5	2.52	0.36	0.45
Restaurant	2.5	1.4	1	2.25	1.26	0.9
Recreation	2.5	0.4		2.25	0.36	0
Hotel/Motel	1.9	0.5	0.2	1.71	0.45	0.18
Religious	2.1	0.4	0.0	1.89	0.36	0
Multi-residential	2.1	0.48	0.05	1.89	0.432	0.045
Other	2.6	0.4	0.5	2.34	0.36	0.45

SUMMARY OUTPUT: Consolidated Light Industrial Volume Equation Regression

Rates M2, 10 & 16

Regression Statistics	
Multiple R	99.3%
R Square	98.6%
Adjusted R Square	98.3%
Standard Error	8,733.4
Observations	32

ANOVA							
	df	SS	MS	F	Signif. F	DW	
Regression	6	136,180,409,441.0	22,696,734,906.8	297.6	0.0	2.32	No positive auto
Residual	25	1,906,799,919.6	76,271,996.8			DW lwr	1.11 2.89
Total	31	138,087,209,360.6				DW uppr	1.82 2.18

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	- 404,048.7	47,165.2	- 8.6	0.0	- 501,187.1	- 306,910.3	- 501,187.1	- 306,910.3
HDD Q1	74.8	2.3	31.8	0.0	69.9	79.6	69.9	79.6
HDD Q2 (May & June)	50.1	8.1	6.2	0.0	33.3	66.8	33.3	66.8
HDD Q4	71.3	3.3	21.6	0.0	64.5	78.1	64.5	78.1
CAN-USA QTR - Qtr GDP	57.4	28.8	2.0	0.1	1.8	116.7	1.8	116.7
PM210LFO Ratio	- 313,929.4	230,909.4	- 1.4	0.2	- 789,495.9	161,637.1	- 789,495.9	161,637.1
Customers	88.8	8.4	10.6	0.0	71.6	106.1	71.6	106.1

RESIDUAL OUTPUT

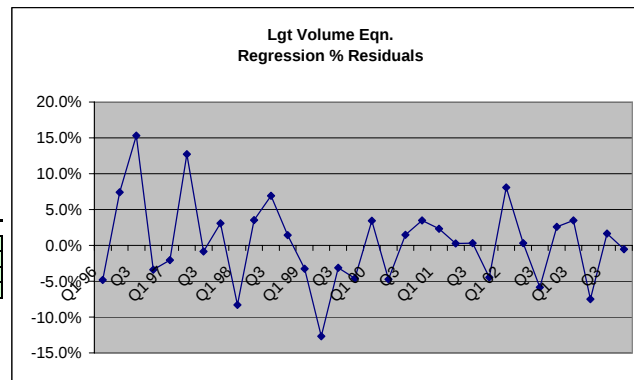
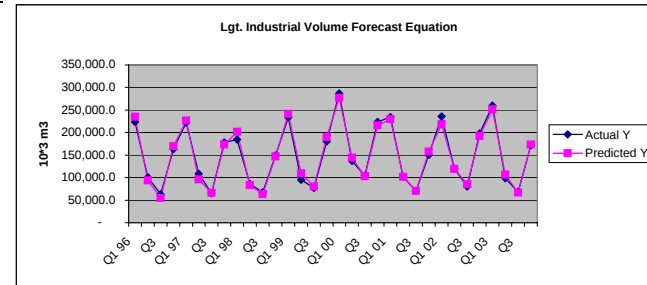
Observation	Actual Y	Predicted Y	Residuals	%Resid.	Abs Resid.	% Abs Resid.
Q1 96	223,754.5	235,105.1	- 11,350.7	-4.8%	11,350.7	4.8%
Q2	100,896.4	93,940.9	6,955.4	7.4%	6,955.4	7.4%
Q3	62,862.0	54,513.1	8,348.8	15.3%	8,348.8	15.3%
Q4	163,601.1	169,350.1	- 5,749.0	-3.4%	5,749.0	3.4%
Q1 97	221,998.8	226,617.1	- 4,618.3	-2.0%	4,618.3	2.0%
Q2	108,299.9	96,085.7	12,214.2	12.7%	12,214.2	12.7%
Q3	65,165.0	65,709.3	- 544.3	-0.8%	544.3	0.8%
Q4	178,467.7	173,130.6	5,337.1	3.1%	5,337.1	3.1%
Q1 98	184,749.7	201,487.3	- 16,737.6	-8.3%	16,737.6	8.3%
Q2	86,208.3	83,279.0	2,929.3	3.5%	2,929.3	3.5%
Q3	67,604.4	63,223.9	4,380.5	6.9%	4,380.5	6.9%
Q4	149,282.6	147,151.7	2,131.0	1.4%	2,131.0	1.4%
Q1 99	233,795.4	241,634.1	- 7,838.7	-3.2%	7,838.7	3.2%
Q2	95,187.5	108,996.4	- 13,808.9	-12.7%	13,808.9	12.7%
Q3	77,670.8	80,171.2	- 2,500.3	-3.1%	2,500.3	3.1%
Q4	180,677.7	189,376.6	- 8,698.8	-4.6%	8,698.8	4.6%
Q1 00	286,682.2	277,110.0	9,572.2	3.5%	9,572.2	3.5%
Q2	137,266.4	144,100.9	- 6,834.5	-4.7%	6,834.5	4.7%
Q3	104,407.2	102,906.7	1,500.5	1.5%	1,500.5	1.5%
Q4	223,343.4	215,796.0	7,547.5	3.5%	7,547.5	3.5%
Q1 01	234,424.2	229,066.0	5,358.1	2.3%	5,358.1	2.3%
Q2	101,656.3	101,399.1	257.2	0.3%	257.2	0.3%
Q3	70,387.3	70,177.0	210.3	0.3%	210.3	0.3%
Q4	150,537.0	157,600.1	- 7,063.1	-4.5%	7,063.1	4.5%
Q1 02	235,876.8	218,215.3	17,661.5	8.1%	17,661.5	8.1%
Q2	119,849.1	119,489.6	359.5	0.3%	359.5	0.3%
Q3	80,363.4	85,352.2	- 4,988.8	-5.8%	4,988.8	5.8%
Q4	197,741.1	192,713.0	5,028.1	2.6%	5,028.1	2.6%
Q1 03	259,728.1	250,970.9	8,757.2	3.5%	8,757.2	3.5%
Q2	98,734.5	106,717.6	- 7,983.1	-7.5%	7,983.1	7.5%
Q3	68,189.3	67,080.4	1,108.9	1.7%	1,108.9	1.7%
Q4	172,154.4	173,095.3	- 941.0	-0.5%	941.0	0.5%

Q1	MAPE Q1	4.5%
Q2	MAPE Q2	6.1%
Q3	MAPE Q3	4.4%
Q4	MAPE Q4	3.0%

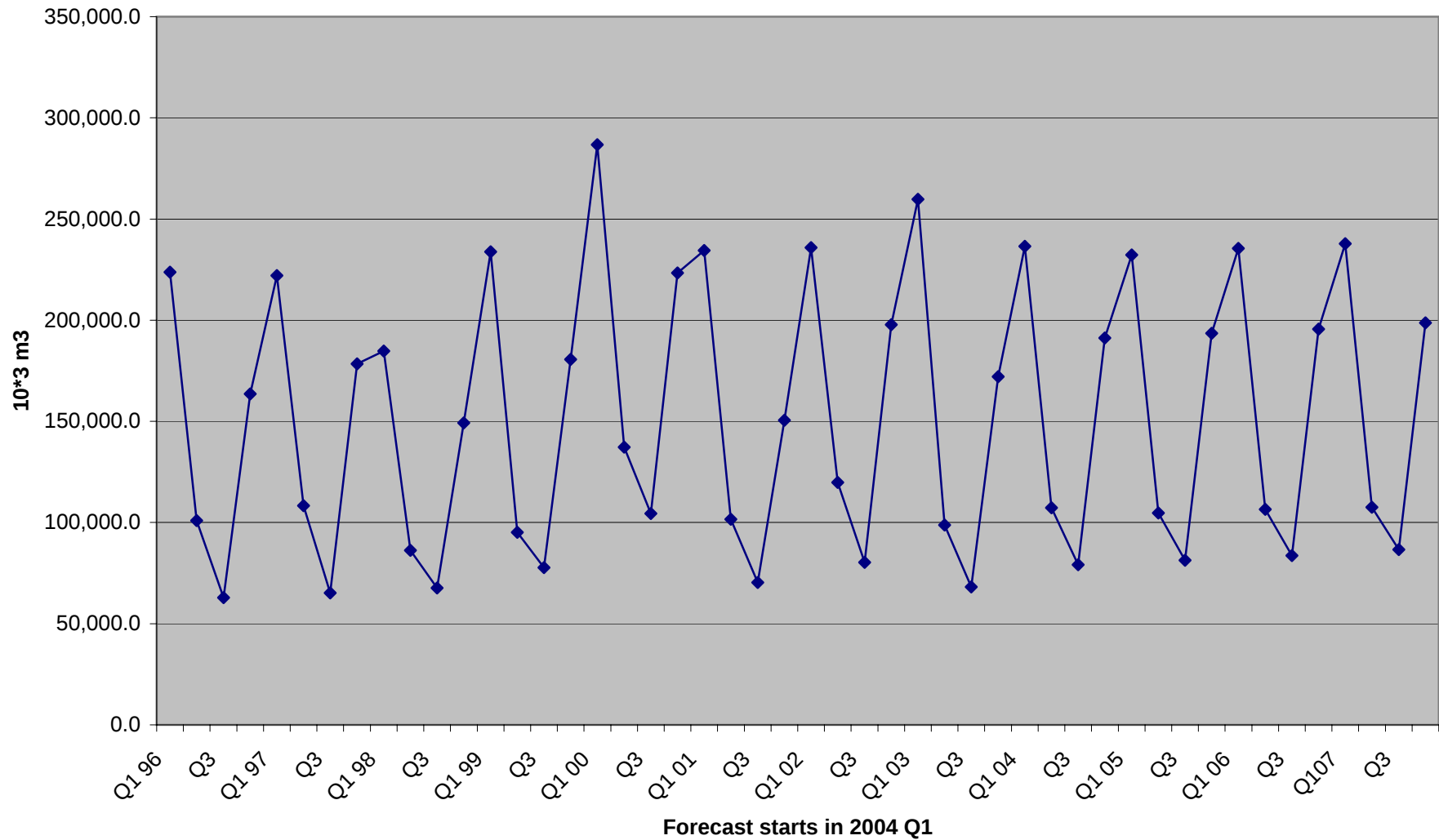
1996	551,113.9	552,909.3	- 1,795.4	-0.3%	-0.3%	0.3%
1997	573,931.3	561,542.7	12,388.6	2.2%	2.2%	2.2%
1998	487,845.0	495,141.9	- 7,296.9	-1.5%	-1.5%	1.5%
1999	587,331.4	620,178.2	- 32,846.8	-5.3%	-5.3%	5.3%
2000	751,699.3	739,913.7	11,785.6	1.6%	1.6%	1.6%
2001	557,004.7	558,242.2	- 1,237.5	-0.2%	-0.2%	0.2%
2002	633,830.4	615,770.1	18,060.3	2.9%	2.9%	2.9%
2003	598,806.3	597,864.3	942.0	0.2%	0.2%	0.2%

MPE	-0.1%
MAPE	1.78%

MPE - Mean Percent Error
MAPE - Mean Absolute Percent Error



Light industrial Volumes Actuals & Forecast



LIGHT INDUSTRIAL VOLUME REGRESSION DATA (Rates M2, Banner and CIA 10 & 16)

		Rates M2 10 16				Lagged 1 Qtr.			
		Total Volumes	Weather Htg. Degree-Days 18C			North Am. GDP			
		10*3 m3	HDD Q1	HDD Q2	HDD Q4	Qtr-Qtr Change	Natural Gas	Total No.	
						97 \$ Billions	LFO Price Ratio	Customers	
1996	Q1 96	223,754.5	2,239.2	0.0	0.0	60.3	0.0223	5,350	
Act.	Q2	100,896.4	0.0	650.6	0.0	50.5	0.0233	5,289	
Act.	Q3	62,862.0	0.0	0.0	0.0	130.8	0.0252	5,167	
Act.	Q4	163,601.1	0.0	0.0	1,454.5	41.6	0.0199	5,330	
1997	Q1 97	221,998.8	2,043.3	0.0	0.0	103.0	0.0252	5,402	
Act.	Q2	108,299.9	0.0	678.6	0.0	87.4	0.0281	5,291	
Act.	Q3	65,165.0	0.0	0.0	0.0	110.7	0.0301	5,323	
Act.	Q4	178,467.7	0.0	0.0	1,429.8	94.6	0.0263	5,381	
1998	Q1 98	184,749.7	1,731.3	0.0	0.0	51.5	0.0300	5,432	
Act.	Q2	86,208.3	0.0	393.5	0.0	120.5	0.0369	5,317	
Act.	Q3	67,604.4	0.0	0.0	0.0	42.6	0.0418	5,381	
Act.	Q4	149,282.6	0.0	0.0	1,256.7	63.5	0.0367	5,285	
1999	Q1 99	233,795.4	1,980.9	0.0	0.0	138.1	0.0384	5,648	
Act.	Q2	95,187.5	0.0	441.5	0.0	84.8	0.0354	5,597	
Act.	Q3	77,670.8	0.0	0.0	0.0	64.3	0.0318	5,522	
Act.	Q4	180,677.7	0.0	0.0	1,334.0	116.0	0.0265	5,628	
2000	Q1 00	286,682.2	1,881.3	0.0	0.0	168.1	0.0231	6,058	
Act.	Q2	137,266.4	0.0	522.6	0.0	72.1	0.0260	5,922	
Act.	Q3	104,407.2	0.0	0.0	0.0	102.0	0.0254	5,731	
Act.	Q4	223,343.4	0.0	0.0	1,558.4	19.3	0.0232	5,796	
2001	Q1 01	234,424.2	1,955.8	0.0	0.0	9.5	0.0307	5,583	
Act.	Q2	101,656.3	0.0	436.3	0.0 -	14.2	0.0397	5,594	
Act.	Q3	70,387.3	0.0	0.0	0.0 -	40.4	0.0452	5,524	
Act.	Q4	150,537.0	0.0	0.0	1,172.9 -	10.4	0.0364	5,516	
2002	Q1 02	235,876.8	1,800.3	0.0	0.0	51.2	0.0421	5,605	
Act.	Q2	119,849.1	0.0	589.6	0.0	117.6	0.0302	5,592	
Act.	Q3	80,363.4	0.0	0.0	0.0	114.1	0.0314	5,547	
Act.	Q4	197,741.1	0.0	0.0	1,478.4	95.4	0.0284	5,569	
2003	Q1 03	259,728.1	2,178.2	0.0	0.0	31.6	0.0258	5,611	
Act.	Q2	98,734.5	0.0	579.0	0.0	64.8	0.0355	5,507	
Act.	Q3	68,189.3	0.0	0.0	0.0	112.2	0.0470	5,397	
Act.	Q4	172,154.4	0.0	0.0	1,332.6	226.3	0.0425	5,431	
2004	Q1 04	236,554.8	2,052.5	-	-	133.9	0.0301	5,504	
Frcst	Q2	107,269.8	-	531.1	-	107.2	0.0346	5,510	
Frcst	Q3	79,114.1	-	-	-	65.8	0.0346	5,519	
Frcst	Q4	191,152.3	-	-	1,423.5	234.4	0.0346	5,528	
2005	Q1 05	232,239.5	2,026.5	-	-	70.8	0.0346	5,534	
Frcst	Q2	104,718.0	-	530.6	-	17.7	0.0346	5,539	
Frcst	Q3	81,281.7	-	-	-	59.0	0.0346	5,548	
Frcst	Q4	193,585.5	-	-	1,422.2	234.9	0.0346	5,556	
2006	Q1 06	235,448.8	2,012.6	-	-	101.3	0.0346	5,562	
Frcst	Q2	106,480.2	-	526.7	-	8.0	0.0346	5,568	
Frcst	Q3	83,670.7	-	-	-	56.4	0.0346	5,576	
Frcst	Q4	195,645.0	-	-	1,413.1	237.4	0.0346	5,585	
2007	Q107	237,847.0	2,010.0	-	-	101.8	0.0346	5,591	
Frcst	Q2	107,481.1	-	526.0	- -	18.4	0.0346	5,596	
Frcst	Q3	86,588.6	-	-	-	63.3	0.0346	5,605	
Frcst	Q4	198,753.9	-	-	1,411.2	250.4	0.0346	5,613	

**2005 to 2007 DEMAND FORECAST
USE EQUATION
REGRESSION EQUATION COEFFICIENTS**

<u>Demand Variable</u>	<u>Residential</u>		<u>Commercial</u>			<u>Industrial</u>
	<u>Rate M2</u>	<u>Rate 01</u>	<u>Rate M2</u>	<u>Rate 01</u>	<u>Rate 10</u>	<u>Merged</u>
Adjusted R Square	99.7%	99.1%	99.0%	98.9%	98.6%	<u>N/A</u>
F	3,784.65	1,362.57	1,400.62	1,077.21	789.10	
MAPE	1.0%	1.6%	1.8%	2.7%	2.1%	
INTERCEPT	386.54	688.21	- 5,573.22	- 7,140.28	- 14,188.0	
EFFICIENCY	- 425.04	- 823.17	6,039.80	7,387.19	16,942.9	
GAS PRICE	- 0.48	- 41.50	n/a	- 261.89	- 1,979.9	
HDD January	0.64	0.52	3.82	1.87	16.63	
HDD February	0.63	0.51	3.93	1.91	16.98	
HDD March	0.62	0.47	3.89	1.80	16.89	
HDD April	0.59	0.43	3.78	1.54	15.51	
HDD May	0.52	0.37	3.11	1.19	11.52	
HDD September	0.31	0.35	1.08	0.90	7.89	
HDD October	0.44	0.38	2.87	1.48	15.69	
HDD November	0.52	0.46	3.70	1.64	16.89	
HDD December	0.60	0.47	3.81	1.77	16.41	
t-statistics for key demand variables in Use Equations						
<u>Demand Variable</u>	<u>Residential</u>		<u>Commercial</u>			<u>Industrial</u>
	<u>Rate M2</u>	<u>Rate 01</u>	<u>Rate M2</u>	<u>Rate 01</u>	<u>Rate 10</u>	<u>Merged</u>
INTERCEPT	7.34	7.27	- 4.53	- 9.06	- 1.32	<u>N/A</u>
EFFICIENCY	- 6.06	- 6.52	4.87	9.30	1.57	
GAS PRICE	- 4.26	- 2.09	n/a	- 1.13	- 2.25	
HDD January	117.76	68.28	86.34	38.91	54.96	
HDD February	102.35	58.24	77.49	34.69	48.82	
HDD March	89.01	45.73	66.89	28.20	41.66	
HDD April	52.89	27.59	39.20	15.08	24.84	
HDD May	24.16	12.69	17.12	6.38	10.16	
HDD September	7.96	8.41	3.26	3.29	4.64	
HDD October	30.12	19.74	23.83	11.97	20.75	
HDD November	60.94	37.97	50.91	20.94	34.65	
HDD December	99.19	53.11	74.50	31.51	44.38	

2005 Marketing Plan
TOTAL THROUGHPUT VOLUME IMPACT: 10*3 M3

	2004	2005	2006	2007
Residential Rate M2	10,099.2	10,344.6	13,836.0	14,170.0
Residential Rate 01	3,123.3	3,171.2	4,206.4	4,271.4
Total Residential	13,222.5	13,515.7	18,042.4	18,441.4
Commercial Rate M2	8,675.3	8,848.8	9,025.8	9,206.3
Commercial Rate 01	2,823.8	2,880.3	2,937.9	2,996.6
Commercial Rate 10	285.7	291.4	297.2	303.1
Total Commercial	11,784.8	12,020.4	12,260.9	12,506.1
Tot. Res. & Comm.	25,007.2	25,536.2	30,303.2	30,947.4

ESTIMATED ANNUAL NAC IMPACT: m3 / customer

	2004	2005	2006	2007
Residential M2 & 01	12	12	16	16
Commercial M2	112	112	111	111
Commercial 01	112	114	114	114
Commercial 10	111	114	115	117

2005 Cost of Service
DSM Plan Total Volumes: 10*3 m3

	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>
Residential Rate M2				
2004	1,658.5	3,317.0	3,317.0	3,317.0
2005		1,691.7	3,383.3	3,383.3
2006			1,725.5	3,451.0
Total	1,658.5	5,008.7	8,425.8	10,151.3
Residential Rate 01				
2004	480.5	961.0	961.0	961.0
2005		490.1	980.2	980.2
2006			499.9	999.8
Total	480.5	1,451.1	2,441.1	2,941.0
Commercial & Industrial Rate M2				
2004	6,992.5	13,985.0	13,985.0	13,985.0
2005		7,132.4	14,264.7	14,264.7
2006			7,275.0	14,550.0
Total	6,992.5	21,117.4	35,524.7	42,799.7
Commercial M2	5,249.5	15,853.6	26,669.7	32,131.3
Industrial M2	1,743.0	5,263.8	8,855.0	10,668.4
Commercial Rate 01& 10 & Industrial Rate 10				
2004	1,458.0	2,917.0	2,917.0	2,917.0
2005		1,487.2	2,974.3	2,974.3
2006			1,516.9	3,033.8
Total	1,458.0	4,404.2	7,408.2	8,925.1
Commercial 01	628.9	1,899.6	3,195.3	3,849.6
Commercial 10	680.7	2,056.1	3,458.6	4,166.8
Industrial 10	148.4	448.4	754.3	908.7
Total DSM	10,589.5	31,981.3	53,799.9	64,817.2

2005 DSM PLAN EST. NAC IMPACT: m3 per customer

	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>
Residential M2 -	2 -	6 -	18 -	21
Residential 01 -	2 -	6 -	31 -	34
Commercial M2 -	66 -	196 -	492 -	615
Commercial 01 -	24 -	73 -	156 -	203
Commercial 10 -	265 -	797 -	1,720 -	2,263
Industrial M2 -	332 -	991 -	2,464 -	3,110
Industrial 10 -	774 -	2,266 -	4,745 -	6,117

IGUA #23

INTERROGATORY

Ref: PEG Report, page 21

Issue No.: 1.2

Issue: What is the method for incentive regulation that the Board should approve for each utility?

In describing the primary sources of data used in its research on the index trends of Ontario gas utilities, PEG states that there are inconsistencies in the data that EGD and Union made available.

- (a) Were Union and EGD requested to provide the same data? If not, why not?
- (b) Once it became apparent that inconsistencies in the data existed, did PEG make a further request to EGD and/or Union to provide further information? If not, why not? If so, please provide a copy of all related correspondence.

RESPONSE

- (a) Yes.
- (b) Yes. For evidence on PEG's efforts towards consistency regarding EGD and Union, please see IGUA Q22 Attachments A, B, C, and D. In particular, see pages 103-116 of Attachment B and pages 375-395 of Attachment D.

IGUA #53

INTERROGATORY

Ref: EGD Evidence, Ex.B, Tab 3, Schedule 3, page 29 of 64
Issue No.: 4.1
Issue: Is it appropriate to include the impact of changes in average use in the annual adjustment?

Dr. Bernstein states that the sample period for the IPD component differs from the PD component of PEG's analysis. Dr. Bernstein states that this is inconsistent and could lead to sample "cherry picking". Does PEG agree? If not, why not?

RESPONSE

No. The sample period for IPD calculation must be chosen carefully so as to capture the long term trend in the input price differential. PEG has selected a sample period in which the rate of return is stable believing that there are no grounds for an increase or decrease in the return in the foreseeable future. This is obviously not an example of cherry picking.