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File 15767

November 9, 2007

VIA FAX, EMAIL AND COURIER

Ms. Kirsten Walli
Board Secretary
Ontario Energy Board
P.O. Box 2319
27th Floor, 2300 Yonge Street
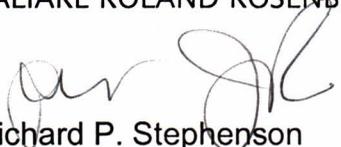Toronto ON   M4P 1E4

Dear Ms. Walli:

**RE: Union Gas and Enbridge – Combined Proceeding
Board File EB-2007-0606 and 0615
Dr. Cronin – Responses to Undertakings Given at Intervenor
Evidence Technical Conference.**

Please find enclosed the balance of Dr. Cronin's answers to Undertakings in connection with the above-noted matter. We have forwarded 12 hard copies to the Board via courier.

I trust this is satisfactory.

Yours very truly,
PALIARE ROLAND ROSENBERG ROTHSTEIN LLP

Richard P. Stephenson

RPS:jr

encl.

cc: All Participants (*via email*)

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Ian G. Scott, Q.C., O.C.

(1934 - 2006)

IN THE MATTER OF the *Ontario Energy Board Act*
1998, S.O.1998, c.15, (Schedule B);

AND IN THE MATTER OF an Application by Union Gas
Limited for an Order or Orders approving or fixing a multiyear
incentive rate mechanism to determine rates for the
regulated distribution, transmission and storage of natural
gas, effective January 1, 2008;

AND IN THE MATTER OF an Application by Enbridge
Gas Distribution Inc. for an Order or Orders approving or
fixing rates for the distribution, transmission and storage
of natural gas, effective January 1, 2008;

AND IN THE MATTER OF a combined proceeding Board
pursuant to section 21(1) of the *Ontario Energy Board
Act, 1998*.

Power Workers' Union Response to Board Staff/PEG

UNDERTAKING NO. JTE.1: DR. CRONIN TO PROVIDE A RESPONSE TO

BOARD STAFF QUESTION NO. 3(A).

Response:

Ref: pp. 7-12, sec 2 The Asymmetric Problem

a. On p. 7 you state that "Regulatory agencies have consistently found it
necessary to review and often revise upward the productivity offsets or targets
embedded in their IR plans due to unexpectedly strong growth in profits". A
table (in Appendix A) summarizing the rate escalation mechanisms of 15
approved IR plans for energy utilities that are based on input price and
productivity research appeared in the recent Board decision on the second
generation IRM for electricity distributors. Which plans on this list triggered
reviews of productivity targets, and which of these reviews lead to revised X
factors?

To my knowledge, none of the 17 IR plans cited on the table in Appendix A were subject to explicit reviews that lead to revised X factors.

However, of the 17 IR plans represented on the table in Appendix A, it should be noted that five (5) of these plans (CPUC plans for Pacificorp, Southern California Gas, and the gas and electric plans for San Diego Electric; and, the OEB first generation electric PBR) are based on industry specific measures, similar to my recommended approach, and as I described in my answer to Board Staff question 11 b.

It should also be noted that 9 out of 17 of these plans were not continued. Several of these were due to industry restructuring (e.g., Pacificorp and CMP (I) which transformed into CMP (II) after disposition of generation assets). However, the cited plans for Southern California Gas, Southern California Edison, San Diego Gas and Electric, Consumers Gas, and Union Gas were not continued. In addition, the Ontario PBR plan for electric distributors was never implemented for the purposes of making distribution rate changes under the incentive rate adjustment mechanism, due to Government intervention and rate freeze.

One other point should be made with respect to the cited price cap plan for the electric wires utilities in the Netherlands. The regulator in that jurisdiction did review and adjust the X-factors several times. While the particular plan cited has not, the predecessor plans did. In fact, from the first published consultation document in 1999, the Dutch Regulator published 4 different X-factors in the period of 2½ years. The initial specification ranked utilities based on their relative efficiency ranking, therefore, some of the revisions were downwards and some upwards. The initial productivity research relied upon partial cost data for only one year.

In my submission, I reference several instances where adjustment formulae employed by regulators (e.g., OFTEL, OFFER, OFGAS and the FCC) understated the nominal reductions embedded in the Plans and that should have been applied to incumbent monopoly rate ceilings due to biases in the estimated offset.

UNDERTAKING NO. JTE.2: DR. CRONIN TO PROVIDE A RESPONSE TO SECOND PART OF BOARD STAFF QUESTION NO. 3(B).

Response:

Ref: pp. 7-12, sec 2 The Asymmetric Problem

b. On pp. 7 and 8 you discuss several examples of low X factors from Britain. Please confirm that these examples involved recently privatized public enterprises rather than utilities that have, like Enbridge and Union, operated for years under periodic rate cases. <u>Please confirm as well that the X factors in none of these plans was based on input price and productivity research.</u>

I can neither confirm nor deny that the initial RPI-X plans in Britain were based on input price and productivity research.

**UNDERTAKING NO. JTE.3: DR. CRONIN TO PROVIDE A RESPONSE TO
BOARD STAFF QUESTION NO. 4(A).**

Response:

Ref: pp. 13-23, sec. 3 Allocative Efficiency

Section 3 of your evidence discusses the problem of allocative efficiency under cost of service regulation. You state on p. 16 that "researchers have often found that among utilities allocative efficiency is substantially larger than technical efficiency". You also state on p. 17 that "the proposal in the PEG Report completely ignores the potential existence of significant allocative inefficiency as well as any examination of the appropriate adjustment period".

a. Do you believe that price cap plans with a five year term (such as $\%\Delta P = \% \Delta GDP \ IPI \ FDD - X + Z + Y$) do not incent companies to improve their allocative efficiency? Please explain.

Whether a price cap plan with a five year term and the above form will provide incentives for companies to improve their allocative (or technical) efficiency depends entirely upon the plan parameters imposed relative to the company's actual position.

The problem of asymmetric information that a Regulator faces is daunting enough as it is. Layering on top of this additional opacity through the use of macroeconomic output price indexes, which likely do not accurately proxy utility input prices, and imposing the additional work and associated error of determining appropriate values for the input price and productivity differentials, make a positive outcome even more the product of happenstance than design.

Indeed, even if the input price and productivity differentials are accurately determined for any particular historical period, there is no reason to believe these relationships between industry and macroeconomic would not change over a three, four, or five-year plan. I have discussed this issue in my submission and expanded on the volatile nature of the IPD in JTE.17 (IGUA) and JTE.23 (VECC). Of course, once the IPD does change than either ratepayers or shareholders stand to gain or lose depending upon the direction of the change.

A price cap of the above form with incorrectly specified parameters could very likely provide perverse incentives to a utility resulting in worse (or at least no better) technical and allocative efficiency performance. Without proper investigation, the Regulator will not know whether this is the outcome or not.

UNDERTAKING NO. JTE.4: DR. CRONIN TO PROVIDE A RESPONSE TO

BOARD STAFF QUESTION 4(C).

Response:

Ref: pp. 13-23, sec. 3 Allocative Efficiency

Section 3 of your evidence discusses the problem of allocative efficiency under cost of service regulation. You state on p. 16 that "researchers have often found that among utilities allocative efficiency is substantially larger than technical efficiency". You also state on p. 17 that "the proposal in the PEG Report completely ignores the potential existence of significant allocative inefficiency as well as any examination of the appropriate adjustment period".

c. PEG uses productivity indexes of Tornqvist form in its research. The input quantity indexes have cost share weights, and thus are especially sensitive to economies in the use of high-priced inputs. Is it your view that if a utility managed to improve its *allocative* efficiency without improving its *technical* efficiency, that such an improvement would not be registered by a Tornqvist TFP index?

As I described in answer to undertaking JTE 18 to IGUA, technical efficiency refers to the ability of a firm to produce the maximum amount of output given the available technology and a given set of inputs whereas allocative efficiency reflects the ability of a firm to use the inputs in optimal proportions, given their respective prices and the production technology. In order to measure efficiency of the firm, something must be known about the production function of the firm. Economists have developed both stochastic and non-parametric methods to estimate production frontiers. In order to measure allocative efficiency, information on the prices of inputs and outputs must also be known. In general, index numbers such as the Tornqvist assume that in any given period, the firm is allocatively and technically efficient and are producing on their production frontier. That is, it makes the underlying behavioural assumption of profit maximization and cost minimization and optimal input and output selection based on the firm's production function. Generally, TFP analyses using indexes such as the Tornqvist, will measure productivity change from one period to the next. The standard interpretation of this is that the firm will have experienced technical progress; that is, technological or managerial innovation that has caused the production function to shift. Optimal combination of inputs results in greater output. It is my view that if a firm were not allocatively efficient and such efficiency were to improve from one period to the next, the TFP measured using a Tornqvist would show a productivity increase. However, the Tornqvist TFP does not reveal the extent of allocative inefficiency. Therefore, it is quite possible (and the evidence from researchers in this area that I have cited suggests it is likely) that significant allocative inefficiency does exist. If there are no incentives for firms to improve this inefficiency and it remains static from one period to another, the

Tornqvist TFP will not reveal anything about this. Without knowing the extent of allocative inefficiency, it is difficult to design incentives for utilities to respond to in order to address this allocative inefficiency.

UNDERTAKING NO. JTE.5: DR. CRONIN TO PROVIDE A RESPONSE TO

BOARD STAFF QUESTION NO. 6(A).

Response:

<u>**Ref: pp. 28-30, sec. 5.1 The IPD**</u>

1. On p. 28, you state that the use of macroeconomic inflation measures such as the GDP-IPI and of input price differentials (IPDs) "has been associated with long lasting distortions in many IR plans." Please identify four plans with IPDs in which such distortions have clearly occurred and explain the nature of the distortion.

I have referenced several plans in my filed comments where such distortions have occurred and that resulted in the revision of the X factor quantum, or revision of the methodology to determine the X factor. It is my view that the nature of the distortion is primarily attributable to the fact that (a) the input price differential was ignored; or, (b) even if correctly determined for any given year or time period, the relationship between utility input prices and economy-wide input prices changes from year-to-year and tends to be volatile. My view is that fixing an IPD, even if based on historical observations, will result in biased X factor estimates. In order to correct for this bias, the IPD would need to be updated every year. This requires calculating both economy-wide input price inflation and the industry input price index. This begs the question of why one would not use the industry IPI and calculate the price adjustment directly.

Three classic examples of the distortions I have discussed are the British plans originally put in place for BT (British Telecom), British Gas, and the Regional Electrics ("RECs") in England and Wales.

British Gas ("BG") was initially subject to an X factor of 2 established in its license to operate in its 1986 authorization (for the 1987 to 1992 period). The UK regulator, the OFGAS undertook its initial review during 1990-1991. OFGAS based its reset on what it viewed as excessive non-gas costs and BG's excessive rate of return. As a consequence, for the 1992-1997 period OFGAS raised BG's X factor to 5.

In the U.K., the relatively new OFTEL instituted a retail price index ("RPI") minus X design in its incentive review of BT. In fact, BT's X factor of 3 was set through a negotiated process between the Government and the company. Indeed, BT's regulatory framework was structured as a consequence of the decision to privatize this governmental monopoly by a Government which itself was the primary beneficiary of the proceeds of its sale. Presumably, higher earnings would result in higher sale proceeds.

And, BT's earnings did increase. For example, BT's return on capital increased from 9.7 percent in the year prior to its IR to 18.3 percent in the year following its introduction to IR. This trend peaked at 22.5 percent 5 years later. OFTEL determined that BT's

earnings relative to its cost of capital was excessive and raised its productivity offset to 4.5 in 1989. In 1991, the offset was again raised to 6.25 and finally in 1993 the offset was increased to 7.5.

The following chart (taken from an October 29, 1998 educational seminar prepared for the 1st Generation Electric PBR process) shows the increase in return following divestiture and RPI-X regulation in 1984.

**Financial Performance
of British Telecom**
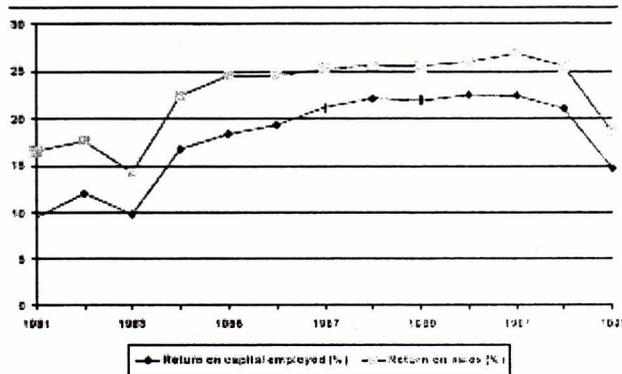
Source: "Regulatory Reform" Economic Analysis and British Experience.
Armstrong, Cowan, and Vickers. 1994

One can also look to the U.S. Telecom experience to see evidence of these distortions. For example, one can argue that in the U.S., the emergence of the local monopolies as winners in the communications battles with long distance carriers ("IXC") in the 1990s was tied directly to pricing and profit mistakes by the FCC in the design of their IR plan. Wide spread biases in parameters of the rate adjustment formula created the opportunity for incumbent monopolies to earn supra-normal profits.

In the case of incumbent local exchange carriers' ("ILEC"), biased parameters and the lack of competition led to substantial, broad-based and persistent supra-normal profits at both the federal and state level despite the fact that their offset was nearly doubled between 1991 and 1997. Unlike the ILEC process, in the case of AT&T, a robust competitive fringe enforced market discipline limited AT&T's pricing power and AT&T's productivity offset was not modified during the course of its restructuring.

Results in both jurisdictions raised ILEC revenues and profits. However, while at the state level the result initially was primarily a transfer of retail revenues from end-users to the ILECs, at the federal level the result was a higher wholesale price paid by one set of competitors to another for local access. For long distance carriers, these access revenues comprised approximately one half of their total costs; for ILECs, these charges comprised almost 40 percent of total revenues.

During the 1990s, the biases embedded in the IR adjustment process resulted in billions of additional dollars flowing from IXCs and end-users to ILECs. Despite the FCC raising its minimum total offset for ILECs from an initial 3.3 (1991) to 4.3 (1995) and

finally 6.5 (1997), ILEC ROEs increased almost 100 percent from 14.8 percent in 1994 to 29.0 percent in 1999. Not so for their buyers of local access: ROEs for IXCs declined from 16.7 percent to 2.1 percent. A comparison of US telecoms, utilities and Fortune 500 firms' ROE for 1994, 1997 and 1999 is shown in the table below.

US Telecoms, Utilities and Fortune 500 ROE: Selected Years

Industry	1994	1997	1999
RBOCs & GTE	14.8	19.8	29.0
IXCs	16.7	13.3	2.1
Utilities	11.0	11.0	12.0
500 Firm Median	13.7	13.9	15.2

Source: *Fortune Magazine and author calculations*

Finally, I can discuss an example that is closer to home. In late 2006, the OEB approved a "2nd Generation Incentive Regulation Mechanism" for electricity LDCs. This mechanism adjusts LDC rates via a price cap specified by GDPPI – 1.0%. For the purpose of this rough illustration, it is assumed that:

- the cost of capital and depreciation used by PEG in their June report also applies to the electric LDCs,
- the VECC assumed input cost shares of 60%, 30% and 10% for capital, labour and materials & services, respectively, also applies to the electric LDCs,
- using the electric utility distribution system construction price index (EDCP) as the asset price and using Canadian multifactor productivity in the business sector to represent economy wide TFP
- that the GDPPI plus business sector MFP represents aggregate input price changes. (I have discussed in my report and various undertakings my concerns with having to make such assumptions to analyze a Canadian IPI and the IPD).

The following table shows these illustrative results for the IPD for electric LDCs using the GDPPI and a calculated IPI using the above illustrative assumptions. Note the volatility in the IPD. Reversing the trend over the two earlier years, in 2006, utility input prices increased faster than those of the general economy, due in part, to the attenuation in the decline of financing cost and a significant increase in asset prices represented by the EDCP (due to the large increase in the cost of conductor and electrical equipment).

In particular, from 2005 to 2006 the electric utility distribution system construction price index showed very strong growth of 6.9 percent versus the 0.4 in and 1.9 percent in the two prior years. In the most recent year, the 2nd generation RAM would have

significantly understated the necessary increase in rates for electric distribution utilities based on this illustrative example.

Illustrative 2nd Gen RAM
Results (percent change)

Year	IPD	EDCP
2004	-2.3	0.4
2005	-4.4	1.9
2006	2.1%	6.7

UNDERTAKING NO. JTE.6: DR. CRONIN TO PROVIDE A RESPONSE TO

BOARD STAFF QUESTION 6(B).

<u>Response:</u>

> **<u>Ref: pp. 28-30, sec. 5.1 The IPD</u>**
>
> b. You also discuss the premise that the input price trend of the economy is accurately measured by the sum of the trends in the GDP IPI and the MFP trend of the economy. Please confirm that, however this sum is interpreted, the MFP trend of the economy falls out of the calculations (since it has equal and offsetting effects on the PD and the IPD) and ultimately has no effect on the X factor.

I do have a discussion about the premise that the input price trend of the economy is accurately measured by the sum of the trends in the GDPPI and the MFP trend of the economy However, my discussion questions whether this is a valid premise. Perhaps a reiteration of some of my discussion of PEG's "index logic" will clarify this issue.

In the case of the IPD, PEG has calculated a proposed IPI_U. Unfortunately, the second term in the IPD, the aggregate input price index IPI_A does not exist. Instead, Staff/PEG propose to use, an index based not on actual data, but on "index logic." "To the extent that the economy earns a competitive return in the longer run, the trend in its input prices is the sum of the trends in its output prices and its TFP (PEG Report, p. 53)."

(1) $\Delta P_A = \Delta IPI_A - \Delta TFP_A$

PEG provides no data or research to substantiate the appropriateness of this key assumption in the "logic" used to derive a critical parameter in the IPD. Let's look at the conceptual appropriateness of this "logic." Then we will examine the return data employed by PEG in this calculation.

To what extent can we assume that the economy earns a competitive return in the longer run and that assumption is applicable to the specific period chosen by PEG. According to the *Economist.com* magazine, "Perfect competition" is:

> *The most competitive market imaginable. Perfect <u>COMPETITION</u> is rare and may not even exist. It is so competitive that any individual buyer or seller has a negligible impact on the market <u>PRICE</u>. Products are homogeneous. <u>INFORMATION</u> is perfect. Everybody is a price taker. <u>FIRMS</u> earn only normal <u>PROFIT</u>, the bare minimum profit necessary to keep them in business. If firms earn more than that (excess profits) the absence of barriers to entry means that*

other firms will enter the market and drive the price level down until there are only normal profits to be made. OUTPUT will be maximised and price minimised. Contrast with MONOPOLISTIC COMPETITION, OLIGOPOLY and, above all, MONOPOLY.

And, again according to the *Economist.com* magazine, the "Long run" is:

When we are all dead, according to KEYNES. Unimpressed by the thrust of CLASSICAL ECONOMICS, which said that economies have a long-run tendency to settle in EQUILIBRIUM at FULL EMPLOYMENT, he wanted economists to try to explain why in the short run economies are so often in DISEQUILIBRIUM, or in equilibrium at high levels of UNEMPLOYMENT.

Economists generally consider the long run to be the period required for *all* inputs to be variable. For some instances of technological change, researches have concluded that it took decades for firms and industries to adjust fully (e.g., the introduction of electricity). Perfect competition as defined and used by economists is a hypothetical construct and, as stated in the Economist, "may not even exist."

In addition, it is probably the case that major sectors in the Canadian economy (and US economy) are more correctly identified as being closer to monopoly, oligopoly, or other non competitive market structures, especially if we are looking at periods encompassing the 1990s. These might include lumber; mining and some metals; gas and oil extraction; gas and oil processing; gas and oil transportation; automobile production; steel; operating software; utilities; rail; broadcasting; banking; health care; and, others. For the 1990s, telecommunications and cable would probably be added.

Indeed, Meagan Fitzpatrick, CanWest News Service January 17, 2007 reports that the Conference Board of Canada in its report "Mission Possible: Stellar Canadian Performance in the Global Economy" examines the regulatory burden, structural impediments and barriers to entry inhibiting industry competitiveness. Fitzpatrick reports the "study says that Canada's cumbersome system of regulations and barriers to competition interferes with the movement of goods and services, makes it harder for people to re-locate to obtain work and reduces the flow of investment within the country. The Conference Board wants the government to do something about the 'vast web of regulatory and other non-tariff barriers,' reform the tax system and open up more industries to competition…"

Furthermore, Bertrand Marotte recently reported in the *Globe & Mail* on a recent Liberal Party Conference that heard that Canada's economic performance was being affected by "everything from securities laws that are "an international embarrassment" to archaic interprovincial trade barriers, uncompetitive high corporate tax rates and a "think small" corporate mindset came under fire from many business, finance and academic players…"

"Royal Bank of Canada senior executive Barbara Stymiest slammed Canadian securities laws in her presentation. 'We need to rethink government and regulatory policies for

business in the context of Canada's ability to compete in the future,' she said at the all-day policy conference."

It appears that from the perspective of an economic paradigm, large, important sectors of the economy are not perfectively competitive. Further, key factor inputs (e.g., land, labor, location and infrastructure) may take more than 5 to 10 years to adjust to change. Conceptually, it appears that there is much doubt about the appropriateness of PEG's logic.

Board Staff are asking for confirmation that the MFP trend of the economy falls out of the calculations (since it has equal and offsetting effects on the PD and the IPD) and ultimately has no effect on the X factor. The premise of this question stems from acceptance of the equilibrium condition stated in equation (1).

For example, if a utility's output price is to change by the change in its input costs (mimicking price changes of a competitive firm), the price adjustment would be

(2) $\Delta P_U = \Delta IPI_U - \Delta TFP_U$.

If we assume the equilibrium condition in equation (1) holds, we can derive the following relationship between the change in utility output prices and the economy's aggregate output prices:

(3) $\Delta P_U - \Delta P_A = (\Delta IPI_U - \Delta IPI_A) - (\Delta TFP_U - \Delta TFP_A)$

and

(4) $\Delta P_U = \Delta P_A + (\Delta IPI_U - \Delta IPI_A) - (\Delta TFP_U - \Delta TFP_A)$

or

(5) $X = (\Delta TFP_U - \Delta TFP_A) - (\Delta IPI_U - \Delta IPI_A)$.

From this, due to the equilibrium condition in (1), we can say

(6) $\Delta IPI_A = \Delta P_A + \Delta TFP_A$

And therefore

(7) $X = (\Delta TFP_U - \Delta TFP_A) - (\Delta IPI_U - \Delta P_A - \Delta TFP_A)$.

From the expression in (7), we can see that ΔTFP_A, the aggregate economy TFP change, drops out. However, this is a tautological argument predicated on the acceptance of the condition in equation (1) that the economy earns a competitive return in the longer run and that assumption is applicable to the specific period chosen by PEG. This is the focus

on my entire discussion in section 5.1. PEG has offered no data or research to substantiate the appropriateness of this key assumption.

Furthermore, even if we accept the unlikely assumption that the aggregate economy earns a competitive rate of return and that output price inflation is the difference between aggregate input price inflation and aggregate TFP growth, the result in equation (7) would not hold for PEG's analysis. This is because PEG has mixed results from different time periods and different countries. Even if the competitive equilibrium were true, it would not mean that the ΔTFP_A figure would drop out if TFP in the PD and TFP in the IPD were measured for different periods and different economies.

UNDERTAKING NO. JTE.7: DR. CRONIN TO PROVIDE A RESPONSE TO

BOARD STAFF QUESTION 7(E).

Response:

Ref: pp. 31-36, sec 5.2 Data Period Selections and Exclusions

e. Do you have a preference in terms of starting points and/or weights?

To reiterate my comments in my written submission, oral testimony, and in answers in response to VECC in JTE 23 and IGUA in JTE 17, the results PEG obtains for input price trends vary dramatically depending upon whether the GD or COS methodology is employed, and by simply changing the sample selection by a single year. I cannot offer a precise answer as to preference in terms of starting points or weights, given that I do not have all the underlying data and certainly have not been a primary researcher on this project. However, if I were conducting this research, it would be of great concern to me that such inconsistent and unstable results were being obtained. This would prompt a review of data and models to ensure there were not errors. Consistency and stability, within reason, has to be a property of the findings.

As stated in my response to VECC in JTE 23, in my written submission, and in my oral testimony, my recommendation is that the Board adopt a RAM based on an industry IPI and industry TFP. This approach eliminates the need to calculate both the IPD and the PD with all the associated errors involved with those calculations. But, even more fundamental to the argument supporting the IPI approach over the GDP-IPI approach: the latter approach requires that the regulator determine an IPD value which is fixed for the term of the plan. In the macro approach, only the GDP-IPI varies during the term; it is assumed that the relationship that existed between the industry IPI and the macro (i.e., Canadian IPI) IPI will remain the same over the 3, 4, or 5 years of the plan. But, the fact is that the IPD can, over short periods of time, deviate from long-term trends that have been in place for many years if not decades. Such deviations after a RAM with a fixed IPD has been put in place for 3 to 5 years, means that unexpected gains and losses will accrue to various stakeholders due directly to the fundamental flaws inherent in an IR with an IPD. In JTE 15 (IGUA) I demonstrate how errors in a RAM of 1 percent can lead to substantial changes to an LDC's ROE.

UNDERTAKING NO. JTE.8: DR. CRONIN TO PROVIDE A RESPONSE TO BOARD STAFF QUESTION NO. 11(C).

Response:

Ref: pp. 51-56, sec. 5.9 The IPDs

    c. How would you design an input price index for EGD and Union? What sources would you use in designing an input price index?

Please refer to my response to VECC in JTE 23 for issues related to the calculation of an IPI. This undertaking calculates an IPI (and IPD) and discusses my results relative to those from PEG.

It is unfortunate that Union, Enbridge and the Board did not pursue the idea of developing an industry specific input price index, as put forward by Union in the RP-1999-0017 proceeding. In response to questioning by Mr. Janigan on behalf of VECC, Mr. Birmigham of Union responded:

> ...*With respect to setting the next generation of price cap parameters, we have indicated that we want to work with parties to try to develop an industry-specific input price index... (Ref. RP-1999-0017 Transcript, Vol. 3 at p. 450).*

Such an index could be developed collaboratively by parties in conjunction with the Board, involving the collection, analysis, and vetting of information by parties, similar to the process used to develop the IPI for the first generation draft electric PBR proposed by OEB Staff.

An additional or alternative proposal might be to develop a national IPI. This could be done with the help of Statistics Canada. Statistics Canada produced national MFP estimates for the gas distribution industry from 1981 to 1997. Statistics Canada also has data on natural gas distribution (NAICS 2212) real and nominal capital stock. These sources along with cooperation from the companies and the Board could result in an independent national IPI being developed.

UNDERTAKING NO. JTE.9: DR. CRONIN TO PROVIDE A RESPONSE TO BOARD STAFF QUESTION 12 (A) AND (B).

Response:

Ref: pp. 56-58, sec. 5.10 Examining the TFPs and Benchmarking in the PEG Reports

a. On p. 56 you state that "the input prices are used directly to calculate input quantities; errors in the former will cause errors in the latter". Please confirm the following:

    i. The capital price index is the only source of marked volatility in the input price index.

Agreed. The capital price index is the major source of marked volatility in the input price index. The cost of natural gas is also volatile, but has only a small weight in Union's IPI and is not used for Enbridge.

    ii. The rate of return is an important source of volatility in the capital price index.

Confirmed.

    iii. The rate of return has NO bearing on the calculation of the capital quantity.

From page 23 of June report:

The capital quantity index is, effectively, an index of the real (inflation-adjusted) value of plant where indexes of utility construction costs are used as deflators.

Therefore, the above statement in (iii) that the rate of return has no bearing on the calculation of the capital quantity is correct. However, the input quantity is a weighted average of the of the input quantity sub-indexes (capital, labour, materials and services, etc.). The weights to aggregate the sub-indexes are calculated using the share of the input category in the total cost. This is explained in the PEG June Revised Report at Appendix Section 3.1 at page 75 and reproduced below:

The summary input quantity index for each company was of Törnqvist form.[39] This means that its annual growth rate was determined by the following general formula:

$$\ln\left(Input\ Quantities_t \middle/ Input\ Quantities_{t-1}\right) = \sum_j \frac{1}{2} \cdot \left(SC_{j,t} + SC_{j,t-1}\right) \cdot \ln\left(X_{j,t} \middle/ X_{j,t-1}\right). \quad [A5]$$

Here for each company in each year t.

$Input\ Quantities_t$ = Input quantity index

$X_{j,t}$ = Quantity subindex for input category j

$SC_{j,t}$ = Share of input category j in applicable total cost.

It can be seen that the growth rate of the index is a weighted average of the growth rates of the input quantity subindexes. Each growth rate is calculated as the logarithm of the ratio of the quantities in successive years. Data on the average shares of each input in the applicable total cost of the utility during these years are the weights.

Further on in the Appendix, PEG explains the derivation of capital cost in Section 4. The explanation is reproduced below:

In the application of the general method used in this study, the cost of a given class of utility plant j in a given year t ($CX_{j,t}$) is the product of a capital service price index ($WKS_{j,t}$) and an index of the capital quantity at the end of the prior year ($XK_{j,t-1}$).

$$CX_{j,t} = WKS_{j,t} \cdot XK_{j,t-1}. \quad [A7]$$

Each capital quantity index is constructed using inflation-adjusted data on the value of utility plant. Each service price index measures the trend in the hypothetical price of capital services from the assets in a competitive rental market.

Then the report states:

The generic formula for capital service price indexes based on geometric decay that were used in the IPD calculations is

$$WKS_t = d \cdot WK4_t + WK4_{t-1} \cdot I_t + (WK4_t - WK4_{t-1}).$$ [A9]

We restated this as

$$WKS_t = d \cdot WK4_t + WK4_{j,t-1} \left[I_t - \frac{(WK4_{j,t} - WK4_{j,t-1})}{WK4_{j,t-1}} \right].$$ [A10]

The first term in [A10] corresponds to the cost of depreciation. The second term captures the opportunity cost of capital ownership net of capital gains. The term in brackets is the

real rate of return on capital. This bracketed term was smoothed by taking a three year moving average of its values. The term I_t is the nominal rate of return to capital.

Similarly, in the section describing PEG's COS methodology, the report states that:

it can be seen that the cost of capital is the product of a capital service price and a capital quantity index.

The statement in my report was that "input prices are used directly to calculate input quantities; errors in the former will cause errors in the latter." The correctness of this statement is confirmed in PEG's description of how input quantities are calculated in its report.

b. On. p. 57 you state that "It would appear that differences in input and output quantities, scale, and factors known to affect operating environment (e.g., frost depth, earthquake risk) were not factored into the peer group selection process. This raises questions of just how diverse these differences are and what impact they would have on such benchmarking?

i. PEG's approach was based on a discussion of the drivers of TFP growth that appears in Section 2 of the June report. This study is based on a classic mathematical exposition of this topic by Denny, Fuss, and Waverman. Please state any objections that you have to PEG's discussion or the Denny, Fuss, and Waverman paper.

PEG's discussion of TFP growth in Section 2.1.2 is generic and claims to rely heavily on a 1981 paper by Denny, Fuss, and Waverman (footnote 7 in PEG's Revised June 2007 Report). I have no opinion on the Denny, Fuss and Waverman paper as I have not reviewed it and it is not on the record of this proceeding.

ii. Do you acknowledge that some business conditions that affect cost levels might not have a material effect TFP growth?

This is an empirical question.

iii. Is it your view that PEG's peer group selection criterion, which is calculated using estimates of company-specific cost elasticities, takes no account of operating scale?

PEG purports to use company-specific cost elasticities as a peer group selection criterion. However, PEG's analysis is based on U.S. data (that is their LDC cost model is based entirely on US data) and a U.S. model. Key variables necessary to solve the model for the Ontario companies are unavailable. PEG solves this problem by substituting data from 2 US LDCs. No explanation or justification is given for this replacement. This may be part of the reason for the considerable instability in peer groups PEG has experienced. It is clear that from such inconsistency that there is a fundamental flaw in PEG's model and/or data and/or process.

UNDERTAKING NO. JTE.10: DR. CRONIN TO PROVIDE A RESPONSE TO BOARD STAFF QUESTION NO. 13(A) AND (B).

Response:

Ref: pp. 62-64, sec. 5.14 The Interclass Allocation Factor

On p. 62 of your evidence you state that PEG's proposed ADJ factor is "both substantial and unjustified."

a. If the impact of declining average use should not be differentiated by customer rate class, please explain how the impact of declining average should be applied.

b. PEG's March report presents ADJ results for Union that PEG acknowledged to be troubling. Results in the June report are more sensible, and reflect material changes in the "cost effects" that result from the removal of certain interaction terms from the cost function. The original cost function featured some implausible values for the company-specific elasticities used to calculate the cost effects.

You state on p. 64 of your evidence that "PEG offers no convincing explanation for these inter-class reallocations; indeed, we are left with no clear understanding regarding the remarkable changes among classes between the March and June 8 ADJ factor recommendations".

Please explain why a change in the cost function that has a material effect on the elasticity estimates used to calculate the ADJs could not change them materially.

I believe there are several issues to be addressed here. First of all, as I stated during oral testimony in response to IGUA, it is my view that the issues PEG's flawed ADJ factor is trying to address could be more adequately dealt with by implementing a fixed charge for distribution that would compensate utilities for the costs they actually incur, which are generally fixed.

Indeed, PEG makes this case on P.5 of their June report when they state "*Rate designs frequently don't reflect the drivers of utility cost well. For example, the costs of distribution and customer services are commonly driven chiefly by customer growth, whereas distribution revenue is commonly driven chiefly by growth in the delivery volumes to residential and commercial customers*". It would appear from PEG's own statement that it sees a disconnect between LDCs' cost drivers and rate designs which rely on delivery volumes. A fixed distribution charge would solve this problem.

The second issue relates to how PEG has developed the ADJ factor. According to PEG, in order to produce the ADJ they need company-specific cost elasticities by service class. However, PEG uses proxies and U.S. model-driven cost elasticity estimates using US LDC data for key inputs rather than Ontario company-specific cost elasticities by service class. What PEG claims it needs to calculate the ADJ they do not have.

Finally, there is another fundamental issue at stake. Natural gas distribution companies have sizable common and joint costs which support the provision of service across multiple rate classes. PEG's proposal does not deal with this important issue.

UNDERTAKING NO. JTE.11: DR. CRONIN TO PROVIDE A RESPONSE TO BOARD STAFF QUESTION NO. 14 (ALL).

Response:

Ref: pp. 65-68, sec. 5.15 Board's Just and Reasonable Rates

a. On p. 65 of your evidence you state that "Clearly the Board's historical rates for EGD and Union are just and reasonable, having been set through the Board's regulatory processes". Please reconcile this statement with your earlier statements that

    i.   Cost of service regulation often leads to marked allocative inefficiency

    ii.   The TFP performance of EGD has been substandard (p. 21)

b. On p. 66 you compare the rate trend yielded by PEG's proposed PCI for Union's M2 service with the trend in the M2 rate.

    i.   Please confirm that the downward trend in this rate from 1995 to 2006 was due chiefly to a marked decline in 1999.

        This was a period when Union was realizing merger economies and spun off its sizable appliance business. Please explain why the 1995-2006 sample period is nonetheless more relevant than the 2000-2006 period for appraising the reasonableness of the proposed PCI.

a) In my testimony at the Technical Conference held on October 25, 2007, I stated that cost of service has certain weaknesses, primarily that the regulator has limited knowledge and resources. Generally, regulatory bodies have employed prudency tests in such circumstances, not benchmarks to best or average practices. In such circumstances, technical or allocative inefficiency may be a by product.

In addition, TFP performance is often not a key feature of cost of service regulation. PEG's filed evidence documents EGD's productivity performance, and Consumer's (now EGD) TFP performance was discussed by Dr. Norsworthy in his testimony at the E.B.R.O's 467-01 proceeding before the Board.

b) Union's annual bills associated with the M2 rate during the period 1995 - 2006, decreased by 1.2%. While the annual bill decreased in 1999, this decline is independent of the amount of the decline experienced over the 1995 – 2006 period.

However, it should be noted that PEG's proposed PCI adjustment relating to the M2 rate also exceeded the bills associated with actual rates for the 2001-2006 period. As can be seen in Table 5-15 of my evidence, cumulative bill costs for the proposed rates exceed by 20%, bill amounts related to actual rates.

UNDERTAKING NO. JTE.12: DR. CRONIN TO PROVIDE A RESPONSE TO BOARD STAFF QUESTION 15.

Response:

Ref: pp. 68-77, sec. 6 Summary, Conclusions and Recommendations
Dr. Cronin recommends that the GDP IPI approach be replaced by a mechanism based on industry IPIs. Are there any other recommendations in the report?

Among my other recommendations in the report and undertakings:

1. The need to benchmark gas LDCs on total costs/total inefficiency including both allocative and technical inefficiency.

2. The need to include robust service quality/safety regulation (SQR) as part of the IR.

3. The need to include an earnings sharing mechanism (ESM).

4. The term should be shorter rather than longer, especially given the instability and volatile nature of the X factor components proposed by PEG.

5. The RAM needs to be based on an industry specific IPI and TFP.

6. The PWU IPI developed in JTE. 23 (VECC) should be the basis for the industry IPI.

7. The process/data for defining the peer groups needs to be improved.

8. The data for estimation of the gas LDC model needs to be improved to include Ontario data if this is to be the foundation of productivity target setting.

9. The data underlying the RAM and other key components of the IR need to be improved to eliminate the inconsistencies discussed by PEG.

10. The ADJ factor as proposed should be eliminated. More traditional means should be employed regarding the need for inter-class cost reallocations

11. A flat rate should be employed to recover distribution costs.