K3.4

EB-2012-0033

Ontario Energy Board

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 Enersource Hydro Mississauga Inc. for an order approving just and reasonable rates and other charges for electricity distribution to be effective January 1, 2013 and January 1, 2014.

ENERGY PROBE RESEARCH FOUNDATION
("ENERGY PROBE")
CROSS-EXAMINATION COMPENDIUM

PANEL 3

enersource

more than energy

BY EMAIL and RESS

August 23, 2012

Ms. Kirsten Walli
Board Secretary
Ontario Energy Board
P. O. Box 2319
2300 Yonge Street
Suite 2700
Toronto, Ontario
M4P 1E4

Dear Ms. Walli:

Re: EB-2012-0033 Enersource Hydro Mississauga Inc. ("Enersource") Cost of Service Rate Application ("Application")

Enersource advises parties that it will require up to one hour to present its witness panels during the hearing.

Also, Enersource wishes to advise parties that it has filed the following material via RESS today:

1. Hearing Exhibit – A presentation entitled "Enersource's Economic and Reliability Performance". This will be used during the Examination-in-Chief of Enersource's witness panels. Copies will be provided at the hearing;

2. Backup data for the above presentation – two live Excel sheets with the backup information from which the presentation was prepared; and

3. Evidence Update – Exhibit 3 Tab 1 Schedule 2 page 14 Table 7 is updated with year-to-date information to June 2012. Copies will be provided at the hearing.

Finally, Enersource advises parties that it will be making a correction to the evidence related to the 80,000 kWh adjustment (per Undertaking JT2.31 and Energy Probe Issue 3.1 IR #10b). The adjustment will be removed. Note that this does not affect the overall system load forecast. However, it will affect the Billing Demand for the GS 50-499 rate class. Enersource is advising parties today to assist with the preparation of cross-examination questions.

Sincerely,

Original signed by

Bill Killeen
Regulatory Affairs Advisor

Encl.

cc. Dan Pastoric, Executive Vice-President and Chief Operating Officer
George Vegh, McCarthy Tétrault
Richard Battista, Ontario Energy Board
All Intervenors EB-2012-0033

Enersource Hydro Mississauga Inc.
Response to Interrogatories by Issue

Interrogatory # 10

Energy Probe Research Foundation
(Energy Probe)

3. Operating Revenue

3.1 Is the proposed load forecast for 2013 and 2014, including billing determinants, appropriate?

Reference: Exhibit 3, Tab 1, Schedule 2, page 12 and Attachments 4 & 5

a) Please provide a table that shows the data used to calculate the average load factor for each of the applicable rate classes over the five years used in the average.

b) Please provide a table that shows the energy sales and the associated average calculated in part (a) above that results in the demand forecasts for 2012 and 2013 shown in Attachments 4 & 5.

Response:

a) The table below shows the data used to calculate the load in Attachments 4 and 5 based on a five-year average load factor.

	Metered kWh			
	GS 50 - 499	GS 500 - 4999	LU	SL
2007	2,295,138,843	2,418,440,232	1,016,874,990	38,604,861
2008	2,248,327,551	2,301,035,852	1,055,880,062	39,292,319
2009	2,112,001,401	2,173,434,670	1,009,596,919	39,271,032
2010	2,130,676,736	2,207,078,156	1,072,366,029	39,595,309
2011	2,132,641,331	2,169,087,426	1,038,245,079	39,839,581
Total	10,918,785,862	11,269,076,335	5,192,963,079	196,603,102

	Demand			
	GS 50 - 499	GS 500 - 4999	LU	SL
2007	6,487,946	5,400,270	1,747,676	109,052
2008	6,355,155	5,277,864	1,842,419	109,605
2009	6,352,348	5,081,457	1,800,927	110,507
2010	6,303,886	5,084,891	1,831,545	111,465
2011	6,265,460	4,997,505	1,837,737	112,096
Total	31,764,795	25,841,987	9,060,305	552,725
5 Year Average Load Factor	0.4711	0.5977	0.7856	0.4875

b) Please see the tables below which highlight the energy sales and the associated average calculated in part (a) above which results in the demand forecasts for 2012 and 2013 shown in Attachments 4 and 5.

2012 Year	Reference	GS 50-499	GS 499-5000	Large User	SL	Total
Forecasted Energy	E3-T1-S2, Attach 3	2,199,706,127	2,312,319,691	996,912,190	34,990,190	
Remove Line Losses to obtain metered billed kWh		2,123,268,462	2,231,968,813	982,663,568	33,774,315	
Load Factor	5 year average	47.11%	59.77%	78.56%	48.75%	
Average Days per month		30.4	30.4	30.4	30.4	
Hours per Day		24	24	24	24	
Billing Demand		6,177,418	5,118,233	1,714,425	94,957	
Less: Adjustment (1)		80,000				
		6,097,418	5,118,233	1,714,425	94,957	
Billing Demand	E3-T1-S2, Attach, 5	6,092,264	5,113,673	1,712,059	93,639	13,011,635
Rounding Difference (2)		5,154	4,560	2,366	1,318	

(1) One-time adjustment related to a change in billing methodology pertaining to one customer per OEB Decision.

2013 Year	Reference	GS 50-499	GS 499-5000	Large User	SL	Total
Forecasted Energy	E3-T1-S2, Attach 3	2,216,685,094	2,330,521,901	1,011,582,747	19,704,431	
Remove Line Losses to obtain metered billed kWh		2,139,657,427	2,249,538,514	997,124,443	19,019,721	
Load Factor	5 year average	47.11%	59.77%	78.56%	48.75%	
Average Days per month		30.4	30.4	30.4	30.4	
Hours per Day		24	24	24	24	
Billing Demand		6,225,100	5,158,523	1,739,655	53,474	
Less: Adjustment (1)		80,000	-	-	-	
		6,145,100	5,158,523	1,739,655	53,474	
Billing Demand	E3-T1-S2, Attach, 5	6,142,022	5,154,338	1,737,267	49,889	
Rounding Difference (2)		3,078	4,185	2,388	3,585	

(1) One-time adjustment related to a change in billing methodology pertaining to one customer per OEB Decision.
(2) Variance is due to rounding of the load factors

Attachment A – Short Term System Load Energy Model Statistics

Regression Statistics	
Iterations	18
Adjusted Observations	191
Deg. of Freedom for Error	173
R-Squared	0.988
Adjusted R-Squared	0.987
AIC	17.914
BIC	18.221
Log-Likelihood	-1,963.83
Model Sum of Squares	790,516,390,955.78
Sum of Squared Errors	9,533,001,678.53
Mean Squared Error	55,104,055.95
Std. Error of Regression	7,423.21
Mean Abs. Dev. (MAD)	5,413.50
Mean Abs. % Err. (MAPE)	0.86%
Durbin-Watson Statistic	2.092
Ljung-Box Statistic	35.95
Prob (Ljung-Box)	0.0556
Skewness	-0.168
Kurtosis	3.291
Jarque-Bera	1.577
Prob (Jarque-Bera)	0.4546

Variable	Coefficient	StdErr	T-Stat	P-Value
Monthly.MonthlyTimeTrend	-18692.675	1373.18	-13.613	0.00%
Population.Population	-0.271	0.063	-4.323	0.00%
Employment.EmpLand	0.573	0.156	3.673	0.03%
Employment.MajOff	6.305	0.507	12.441	0.00%
Monthly.MonthlyGDP	2.849	0.77	3.698	0.03%
MonthlyWeather.MonthlyDBCubed	-0.239	0.081	-2.958	0.35%
MonthlyWeather.MonthlyBuildUp	137.917	39.549	3.487	0.06%
MonthlyWeather.MonthlyCDD	1042.732	93.13	11.196	0.00%
MonthlyWeather.MonthlyHDD	323.34	36.225	8.926	0.00%
Monthly.WorkingDays	2889.973	464.444	6.222	0.00%
MonthlyWeather.MonthlyDwPtCubed	0.15	0.04	3.759	0.02%
MonthlyCalTrans.Month_Feb	-37044.965	2849.082	-13.002	0.00%
MonthlyCalTrans.Month_Aug2003	-4312.616	635.232	-6.789	0.00%
MonthlyCalTrans.Month_Apr	-18234.514	2706.349	-6.738	0.00%
MonthlyCalTrans.Month_Nov1996	-24857.429	6776.573	-3.668	0.03%
MonthlyCalTrans.Month_Dec1999	24056.334	6797.63	3.539	0.05%
AR(1)	0.292	0.076	3.831	0.02%
SMA(1)	0.352	0.078	4.522	0.00%

Attachment B – Short Term System Load Peak Model Statistics

Regression Statistics	
Iterations	10
Adjusted Observations	5842
Deg. of Freedom for Error	5821
R-Squared	0.950
Adjusted R-Squared	0.949
AIC	7.066
BIC	7.090
F-Statistic	5476.454
Prob (F-Statistic)	0.0000
Log-Likelihood	(28,908.71)
Model Sum of Squares	127,869,833.91
Sum of Squared Errors	6,795,732.00
Mean Squared Error	1,167.45
Std. Error of Regression	34.17
Mean Abs. Dev. (MAD)	24.16
Mean Abs. % Err. (MAPE)	2.46%
Durbin-Watson Statistic	2.021
Ljung-Box Statistic	708.89
Prob (Ljung-Box)	0.0000
Skewness	-0.031
Kurtosis	10.213
Jarque-Bera	12664.175
Prob (Jarque-Bera)	0.0000

Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	228.958	20.769	11.024	0.00%
EconomicDrivers.CPI	248.104	22.777	10.893	0.00%
Calendar.TWT	12.287	1.204	10.205	0.00%
EconomicDrivers.Employment_Land	0.003	0.000	21.081	0.00%
WeatherTrans.AveDB	4.726	0.502	9.409	0.00%
WeatherTrans.MaxDB	1.064	0.268	3.967	0.01%
WeatherTrans.BuildUp	-0.945	0.172	-5.505	0.00%
WeatherTrans.CDD	26.157	0.822	31.819	0.00%
WeatherTrans.HDD	9.971	0.430	23.209	0.00%
WeatherTrans.XCDD	4.898	1.117	4.386	0.00%
WeatherTrans.LaggCDD	8.028	0.495	16.207	0.00%
SunTime.HoursOfLight	-10.583	0.926	-11.428	0.00%
Daily.WkEnd	-151.266	1.255	-120.565	0.00%
Daily.Aug2003	-37.712	16.024	-2.353	1.86%
CalTrans.AugWkDay	50.029	3.448	14.511	0.00%
CalTrans.SeptWkDay	27.922	3.384	8.253	0.00%
CalTrans.JulWkDay	49.262	3.402	14.481	0.00%
CalTrans.OfficeHolidays	11.237	3.017	3.725	0.02%
AR(1)	0.487	0.013	36.539	0.00%
AR(2)	0.134	0.013	10.131	0.00%
SMA(1)	0.241	0.013	18.558	0.00%

Attachment C – Short Term Rate Class Model Statistics – Residential

Regression Statistics	
Iterations	1
Adjusted Observations	32
Deg. of Freedom for Error	24
R-Squared	0.963
Adjusted R-Squared	0.952
AIC	19.423
BIC	19.790
Log-Likelihood	(348.18)
Model Sum of Squares	135,900,847,872.91
Sum of Squared Errors	5,289,122,416.51
Mean Squared Error	220,380,100.69
Std. Error of Regression	14,845.20
Mean Abs. Dev. (MAD)	9,383.41
Mean Abs. % Err. (MAPE)	2.31%
Durbin-Watson Statistic	2.377
Ljung-Box Statistic	7.39
Prob (Ljung-Box)	0.4947
Skewness	0.407
Kurtosis	3.775
Jarque-Bera	1.685
Prob (Jarque-Bera)	0.4306

Variable	Coefficient	StdErr	T-Stat	P-Value
Q_Weather.Q_CDD	764.700	31.318	24.418	0.00%
Q_Weather.Q_HDD	132.434	8.189	16.172	0.00%
Q_EconDrivers.Q_Population	0.378	0.010	38.149	0.00%
Q_CalTrans.Q2_2005	-34372.503	15288.831	-2.248	3.40%
Q_CalTrans.Q3_2008	34237.981	15450.013	2.216	3.64%
Q_CalTrans.Q2_2007	-15612.602	15306.779	-1.020	3.79%
Q_CalTrans.Q4_2009	29870.666	15395.935	1.940	6.42%
Q_CalTrans.Q_Year2004	19462.189	8010.093	2.430	2.30%

Attachment D – Short Term Rate Class Model Statistics – Small Commercial

Regression Statistics	
Iterations	37
Adjusted Observations	32
Deg. of Freedom for Error	23
R-Squared	0.959
Adjusted R-Squared	0.945
AIC	8.373
BIC	8.785
Log-Likelihood	(170.37)
Model Sum of Squares	1,851,603.18
Sum of Squared Errors	78,920.24
Mean Squared Error	3,431.31
Std. Error of Regression	58.58
Mean Abs. Dev. (MAD)	37.50
Mean Abs. % Err. (MAPE)	1.25%
Durbin-Watson Statistic	1.307
Ljung-Box Statistic	11.23
Prob (Ljung-Box)	0.1887
Skewness	0.405
Kurtosis	3.511
Jarque-Bera	1.224
Prob (Jarque-Bera)	0.5422

Variable	Coefficient	StdErr	T-Stat	P-Value
Q_CalTrans.Q_TimeTrend	-25.847	5.670	-4.559	0.01%
Q_Weather.Q_AveDB	0.020	0.002	11.827	0.00%
EconomicIndicators.CPI	2786.183	4.983	559.084	0.00%
Q_CalTrans.Q4_2005	808.373	23.699	34.111	0.00%
Q_CalTrans.Q4_2007	-336.632	135.728	-2.480	2.09%
Q_CalTrans.Q3_2009	-674.028	147.716	-4.563	0.01%
Q_CalTrans.Q4_2009	-426.682	142.180	-3.001	0.64%
Q_CalTrans.Q3_2010	-794.230	149.602	-5.309	0.00%
SMA(1)	-2.415	0.058	-41.752	0.00%

Attachment E – Short Term Rate Class Model Statistics – General Service Less Than 50kW

Regression Statistics	
Iterations	11
Adjusted Observations	31
Deg. of Freedom for Error	24
R-Squared	0.863
Adjusted R-Squared	0.829
AIC	16.138
BIC	16.462
Log-Likelihood	(287.12)
Model Sum of Squares	1,269,715,582.57
Sum of Squared Errors	201,257,129.28
Mean Squared Error	8,385,713.72
Std. Error of Regression	2,895.81
Mean Abs. Dev. (MAD)	1,889.21
Mean Abs. % Err. (MAPE)	1.10%
Durbin-Watson Statistic	1.920
Ljung-Box Statistic	12.73
Prob (Ljung-Box)	0.1215
Skewness	0.001
Kurtosis	3.419
Jarque-Bera	0.226
Prob (Jarque-Bera)	0.8929

Variable	Coefficient	StdErr	T-Stat	P-Value
Q_CalTrans.Q_TimeTrend	-3324.979	220.242	-15.097	0.00%
EconomicIndicators.CPI	155292.199	1671.045	92.931	0.00%
Q_Weather.Q_CDD	51.889	7.314	7.094	0.00%
Q_Weather.Q_HDD	17.811	1.991	8.946	0.00%
Q_CalTrans.Q_Year2011	-8562.512	1620.425	-5.284	0.00%
Q_CalTrans.Q1_2011	9707.459	3454.548	2.810	0.97%
AR(1)	-0.382	0.183	-2.084	4.80%

Attachment F – Short Term Rate Class Model Statistics – General Service 50-499kW

Regression Statistics	
Iterations	1
Adjusted Observations	32
Deg. of Freedom for Error	24
R-Squared	0.909
Adjusted R-Squared	0.883
AIC	19.021
BIC	19.388
Log-Likelihood	(341.75)
Model Sum of Squares	35,458,613,737.04
Sum of Squared Errors	3,538,618,101.55
Mean Squared Error	147,442,420.90
Std. Error of Regression	12,142.59
Mean Abs. Dev. (MAD)	8,526.45
Mean Abs. % Err. (MAPE)	1.49%
Durbin-Watson Statistic	1.988
Ljung-Box Statistic	6.11
Prob (Ljung-Box)	0.6350
Skewness	-0.047
Kurtosis	2.036
Jarque-Bera	1.250
Prob (Jarque-Bera)	0.5352

Variable	Coefficient	StdErr	T-Stat	P-Value
Q_CalTrans.Q_TimeTrend	-22927.084	1142.967	-20.059	0.00%
EconomicIndicators.CPI	579044.308	7713.878	75.065	0.00%
Q_Weather.Q_CDD	97.614	26.379	3.701	0.11%
Q_Weather.Q_HDD	45.392	7.231	6.277	0.00%
Q_CalTrans.Q2_2006	-53885.942	12862.215	-4.189	0.03%
Q_CalTrans.Q1_2010	-24960.592	12927.060	-1.931	6.54%
Q_CalTrans.Q1_2006	31420.903	12734.248	2.467	2.11%
Q_CalTrans.Q2_2004	-30208.051	13623.602	-2.217	3.63%

Attachment G – Short Term Rate Class Model Statistics – General Service 500-4999kW

Regression Statistics	
Iterations	1
Adjusted Observations	32
Deg. of Freedom for Error	24
R-Squared	0.898
Adjusted R-Squared	0.869
AIC	18.806
BIC	19.172
Log-Likelihood	(338.30)
Model Sum of Squares	25,239,450,344.15
Sum of Squared Errors	2,852,229,979.36
Mean Squared Error	118,842,915.81
Std. Error of Regression	10,901.51
Mean Abs. Dev. (MAD)	7,252.23
Mean Abs. % Err. (MAPE)	1.25%
Durbin-Watson Statistic	1.763
Ljung-Box Statistic	5.49
Prob (Ljung-Box)	0.7038
Skewness	-0.092
Kurtosis	2.683
Jarque-Bera	0.179
Prob (Jarque-Bera)	0.9142

Variable	Coefficient	StdErr	T-Stat	P-Value
Q_CalTrans.Q_TimeTrend	-15283.215	1963.543	-7.783	0.00%
EconomicIndicators.CPI	-865520.175	125837.516	-6.878	0.00%
Q_Weather.Q_AveDB	16.736	2.513	6.659	0.00%
Q_EconDrivers.Q_TotalMajOff	8.471	1.670	5.073	0.00%
EconomicIndicators.GDP	3.682	0.660	5.579	0.00%
Q_CalTrans.Q3_2005	-28689.700	11783.883	-2.435	2.27%
Q_CalTrans.Q4_2005	27434.077	11329.100	2.422	2.34%
Q_CalTrans.Q2_2007	30297.268	11419.169	2.653	1.39%

Attachment H – Short Term Rate Class Model Statistics – Large User

Regression Statistics	
Iterations	99
Adjusted Observations	32
Deg. of Freedom for Error	22
R-Squared	0.936
Adjusted R-Squared	0.910
AIC	17.112
BIC	17.570
Log-Likelihood	(309.20)
Model Sum of Squares	6,814,771,577.35
Sum of Squared Errors	462,683,639.01
Mean Squared Error	21,031,074.50
Std. Error of Regression	4,585.96
Mean Abs. Dev. (MAD)	3,223.09
Mean Abs. % Err. (MAPE)	1.26%
Durbin-Watson Statistic	2.220
Ljung-Box Statistic	7.01
Prob (Ljung-Box)	0.5352
Skewness	-0.211
Kurtosis	2.035
Jarque-Bera	1.479
Prob (Jarque-Bera)	0.4773

Variable	Coefficient	StdErr	T-Stat	P-Value
Q_Weather.Q_HDD	-24.732	2.759	-8.963	0.00%
Q_Weather.Q_CDD	-36.251	9.535	-3.802	0.10%
EconomicIndicators.GDP	0.992	0.100	9.870	0.00%
Q_EconDrivers.Q_NumberLU	6244.775	2256.954	2.767	1.12%
Q_CalTrans.Q_Year2011	-18788.699	5988.308	-3.138	0.48%
Q_CalTrans.Q1_2004	26286.846	4144.135	6.343	0.00%
Q_CalTrans.Q3_2005	-15865.781	5715.458	-2.776	1.10%
Q_CalTrans.Q4_2007	23012.947	5571.305	4.131	0.04%
Q_CalTrans.Q3_2006	-14036.538	5486.102	-2.559	1.79%
MA(1)	1.450	0.238	6.090	0.00%

Enersource Hydro Mississauga Inc.
Response to Interrogatories by Issue

Interrogatory #25

Board Staff

3. Operating Revenue

Issue 3.1: Is the proposed load forecast for 2013 and 2014, including billing determinants, appropriate?

Reference: E3-T1-S2

a) Please provide a definition of the regression statistics AIC and BIC.

b) Please provide a brief explanation of why most of the regression models have a number of iterations, rather than a simple regression of energy on the independent variables.

c) Please provide a definition of the independent variables AR(1), AR(2), and SMA(1).

d) Please explain why the negative coefficients of population is a credible result for the total system (Attachment 1) while positive for the residential class (Attachment 3) and not included for other classes. Alternatively please provide a regression for the system in which population is omitted.

e) Please explain why the negative coefficients of HDD and CDD are a credible result for the Large User class, or alternatively please provide a regression in which those variables are omitted (similar to the GS 500-4999 model).

Response:

a) AIC and BIC are statistics or metrics used to determine accuracy of the model fit relative to the number of independent variables used in the regression model. These criteria are used to evaluate the trade-offs between model parsimony and model fit.

b) In multi-regression modelling, an iterative numerical optimization is used to estimate the coefficients that reduce the residuals between actual energy consumption and predicted energy consumption. This iterative process ensures that the model is repeatedly reduced for the large residuals (i.e., the outliers) down to an optimized level.

c) AR(1) is the first degree of an auto-regressive (non-seasonal) process of the error term.

AR(2) is the second degree of an auto-regressive (non-seasonal) process of the error term.

SMA(1) is the first degree of the seasonal moving-average process of the error term.

d) Population variable used in the load forecast model for the total system was found to be statistically relevant with T-Stat and P-Value of -4.32 and 0%, respectively. Also, population variable showed a negative correlation with the total system load.

Population variable was removed from the regression model. Model accuracy has decreased from adjusted R-Squared of 0.987 (see Exhibit 4 Tab 1 Schedule 2 Attachment A) to 0.986. In addition, the Mean Absolute Percent Error (MAPE) has increased from 0.86% to 0.90%. Refer to attached table for model statistics and variable coefficients.

The resulting forecast determination of energy purchases for 2012 and 2013 have increased from original submissions, as shown in the table below.

Year	Forecast Energy (MWh) as per Exhibit 3 Tab 1 Schedule 2 Table 1	Revised Forecast Energy (MWh) with Population removed	Difference (MWh)	% Difference
2012	7,749,733	7,771,455	21,722	0.28%
2013	7,817,741	7,847,948	30,207	0.39%

Population variable used in the residential regression model was found to be statistically relevant with T-Stat and P-Value of 38.15 and 0%, respectively. Also, population variable showed a positive correlation with the total system load.

e) HDD and CDD were found to be statistically relevant with P-Value 0.00% and 0.10%, respectively. In removing HDD and CDD variables from the regression model, the model accuracy has decreased from an adjusted R-Squared of 0.987 (see Exhibit 4 Tab 1 Schedule 2 Attachment A) to 0.977. In addition, the Mean Absolute Percent Error (MAPE) has increased from 0.86% to 1.22%. Refer to attached table for model statistics and variable coefficients.

The resulting forecast determination of energy purchases for 2012 and 2013 have decreased from original submissions, as shown in the table below.

Year	Forecast Energy (MWh) as per Exhibit 3 Tab 1 Schedule 2 Table 1	Revised Forecast Energy (MWh) with HDD & CDD removed	Difference (MWh)	% Difference
2012	7,749,733	7,742,549	-7,184	-0.09%
2013	7,817,741	7,800,793	-16,948	-0.22%

Regression Statistics	
Iterations	25
Adjusted Observations	191
Deg. of Freedom for Error	174
R-Squared	0.987
Adjusted R-Squared	0.986
AIC	17.996
BIC	18.286
Log-Likelihood	-1,972.67
Model Sum of Squares	789,591,555,746.94
Sum of Squared Errors	10,457,836,887.38
Mean Squared Error	60,102,510.85
Std. Error of Regression	7,752.58
Mean Abs. Dev. (MAD)	5,647.62
Mean Abs. % Err. (MAPE)	0.90%
Durbin-Watson Statistic	2.185
Ljung-Box Statistic	44.8
Prob (Ljung-Box)	0.0061
Skewness	-0.276
Kurtosis	3.349
Jarque-Bera	3.395
Prob (Jarque-Bera)	0.1831

Variable	Coefficient	StdErr	T-Stat	P-Value
Monthly.MonthlyTimeTrend	-15883.308	1486.18	-10.687	0.00%
Employment.EmpLand	0.386	0.186	2.08	3.90%
Employment.MajOff	5.106	0.562	9.09	0.00%
Monthly.MonthlyGDP	2.288	0.889	2.573	1.09%
MonthlyWeather.MonthlyDBCubed	-0.122	0.077	-1.591	11.35%
MonthlyWeather.MonthlyBuildUp	71.457	36.506	1.957	5.19%
MonthlyWeather.MonthlyCDD	952.591	91.538	10.407	0.00%
MonthlyWeather.MonthlyHDD	256.514	33.199	7.727	0.00%
Monthly.WorkingDays	2352.271	436.392	5.39	0.00%
MonthlyWeather.MonthlyDwPtCubed	0.11	0.041	2.714	0.73%
MonthlyCalTrans.Month_Feb	-39887.409	2761.266	-14.445	0.00%
MonthlyCalTrans.Month_Aug2003	-4084.304	634.511	-6.437	0.00%
MonthlyCalTrans.Month_Apr	-19766.124	2714.023	-7.283	0.00%
MonthlyCalTrans.Month_Nov1996	-26768.478	6736.326	-3.974	0.01%
MonthlyCalTrans.Month_Dec1999	22730.475	6769.559	3.358	0.10%
AR(1)	0.41	0.074	5.556	0.00%
SMA(1)	0.379	0.077	4.942	0.00%

Enersource Hydro Mississauga Inc.
Response to Interrogatories by Issue

Interrogatory #29

Board Staff

3. Operating Revenue

Issue 3.1: Is the proposed load forecast for 2013 and 2014, including billing determinants, appropriate?

Reference: E3-T1-S1 p. 2 & 11

At p. 2 Enersource states that sixteen years of Enersource's actual energy purchases from the Ontario electricity wholesale market from 1996 to 2011 are used to establish relationships between analytic and econometric drivers to energy and peak demand. At p. 11 Enersource also states that it developed multivariate regression models to determine energy consumption for each rate class and that the models capture the relationship between rate class sales and a number of explanatory variables including weather, calendar, econometric and other explanatory variables. The models were developed based on energy sales from 2004 to 2011 and include the same input variables such as weather, calendar, and econometric data as the system energy and peak demand models.

The models appear to utilize different historical periods, i.e. 15 years vs. 7 years.

a) Which model underpins the forecasted load (consumption purchases), for 2012 and 2013.

b) In the underpinning model, has Enersource made any adjustment to weight more recent years more heavily than earlier years? If so, please elaborate the details of the adjustment.

c) For the residential and large uses classes, please provide a description the actual steps, including the trail numbers, that was used to generate the load forecast (billed/charge determinant volumes) for 2012 and 2013.

Response:

a) Enersource created two independent forecasting models.

The first model is the load forecast model that captures purchases from the Ontario electricity wholesale market from 1996 to 2011 (i.e., sixteen years) based on weather, calendar, and econometric variables.

The second model was developed solely to determine a weather-correction normalization for rate classes and relied on seven years of actual energy sales data by customer class.

The load forecast model, which is the first model described above, underpins the energy purchase forecast, as addressed in Exhibit 3 Tab 1 Schedule 1 page 2.

b) No. Enersource has not made any adjustments to weight more recent years more heavily.

c) The following are the actual steps used to generate the load forecast, billed determinant volumes, for 2012 and 2013. The table below highlights these steps and the trail numbers used to generate the billed determinants for residential and large user classes.

1. Enersource developed a multivariate regression load forecast model to obtain total energy purchases for 2012 and 2013;

2. Enersource developed multivariate regression models for weather sensitive rate classes to derive weather corrected energy sales by rate class;

3. Enersource adjusted total purchases to incorporate projected incremental CDM activity in 2012 and 2013;

4. Enersource adjusted total purchases to account for line losses to derive total billed consumption;

5. Enersource converted billed consumption to billed demand for demand related classes (i.e., GS > 50 kW) by utilizing five year actual average load factors by class by average days per month and hours per day.

	Reference	2012		2013	
Step 1 – Load Forecast	E3-T1-S2, p. 2 of 31	7,749,732,964		7,817,740,567	
Step 2 – Weather normalization models	E3-T1-S2, p. 11 of 31	Residential	Large User	Residential	Large User
Residential		1,498,238,071		1,510,959,264	
Large User			1,011,627,005		1,020,566,402
Step 3 - Remove CDM Impact					
Residential	E3-T1-S2, p. 6 of 31	(22,709,000)		(35,842,920)	
Large User	E3-T1-S2, p. 6 of 31		(14,714,815)		(8,983,655)
	E3-T1-S2, p.29 of 31, Attach. 2&3	1,475,529,071	996,912,190	1,475,116,344	1,011,582,747
Step 4 - Remove Line Losses to obtain metered billed kWh					
Residential	E3-T2-S1, p.24-25 of 27, Attach. 10&11	1,424,255,860		1,423,857,475	
Large User (Note)			982,663,568		997,124,443
Step 5 – Convert consumption classes to demand					
Load Factor			79%		79%
Average Days per month			30.4		30.4
Hours per Day			24		24
Billed/Charge Determinant Volumes	E3-T2-S1, p.24-25 of 27, Attach. 10&11	1,424,255,860	1,712,059	1,423,857,475	1,737,267

Enersource Hydro Mississauga Inc.
Response to Interrogatories by Issue

Interrogatory #21

Vulnerable Energy Consumers Coalition (VECC)

3. Operating Revenue

Issue 3.1 Is the proposed load forecast for 2013 and 2014, including billing determinants, appropriate?

Reference: Exhibit 3, Tab 1, Schedule 2, pages 7 - 10

a) Please provide a schedule that sets out, for the energy forecasts for 2012 and 2013 (similar to Table 5) but based on an 11 and 31 year average of HDD and CDD values

Response:

a) Enersource believes that its application of the normal weather methodology, using 31 years data, is a common, accepted protocol, as is evidenced by the practices of Environment Canada, the World Meteorological Organization, Navigant, the IESO, Itron, and the Board. In addition, Enersource believes that weather normalization using medians is a more representative profile of normal weather.

On the other hand, the use of averages can result in placing greater emphasis on extreme weather conditions and/or measurement errors.

Enersource has been utilizing this load forecast process since 2004 and has found it to be robust and effective. Since 2004, the forecasts have produced energy consumption forecasts within 0.3% of actual energy purchases and 1.7% to weather-corrected energy purchases.

For all of these reasons, Enersource is not providing the requested schedule.

Environment Canada Environnement Canada

Canada

Daily Data Report for August 2012

TORONTO LESTER B. PEARSON INT'L A
ONTARIO

Latitude: 43°40'38.000" N Longitude: 79°37'50.000" W Elevation: 173.40 m

Climate ID: 6158733 WMO ID: 71624 TC ID: YYZ

Daily Data Report for August 2012

Day	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10s deg	Spd of Max Gust km/h
01†	28.0	19.3	23.7	0.0	5.7	0.0	0.0	0.0		34	33
02†	28.8	16.4	22.6	0.0	4.6	0.0	0.0	0.0			<31
03†	30.5	20.8	25.7	0.0	7.7	0.0	0.0	0.0			<31
04†	32.0	21.9	27.0	0.0	9.0	T	0.0	T			<31
05†	28.9	17.7	23.3	0.0	5.3	0.8	0.0	0.8		23	50
06†	26.2	14.9	20.6	0.0	2.6	0.0	0.0	0.0			<31
07†	29.9	15.7	22.8	0.0	4.8	0.0	0.0	0.0		26	37
08†	28.9	19.9	24.4	0.0	6.4	0.0	0.0	0.0			<31
09†	20.9	18.3	19.6	0.0	1.6	5.2	0.0	5.2			<31
10†	23.2	18.0	20.6	0.0	2.6	21.6	0.0	21.6			<31
11†	21.1	16.6	18.9	0.0	0.9	10.4	0.0	10.4		19	33
12†	25.2	15.8	20.5	0.0	2.5	0.4	0.0	0.4			<31
13†	27.5	18.5	23.0	0.0	5.0	0.6	0.0	0.6		19	32
14†	22.3	16.9	19.6	0.0	1.6	5.4	0.0	5.4			<31
15†	25.8	14.8	20.3	0.0	2.3	0.0	0.0	0.0			<31
16†	27.5	15.5	21.5	0.0	3.5	0.0	0.0	0.0			<31
17†	24.4	13.0	18.7	0.0	0.7	0.2	0.0	0.2		27	41
18†	22.0	10.5	16.3	1.7	0.0	0.0	0.0	0.0			<31
19†	25.1	13.7	19.4	0.0	1.4	0.0	0.0	0.0			<31
20†	23.9	13.0	18.5	0.0	0.5	0.0	0.0	0.0			<31
21†	25.9	11.4	18.7	0.0	0.7	0.0	0.0	0.0			<31
22†	27.7	13.0	20.4	0.0	2.4	0.0	0.0	0.0			<31
23†	29.5	16.2	22.9	0.0	4.9	0.0	0.0	0.0			<31
24†	29.8	16.3	23.1	0.0	5.1	0.0	0.0	0.0			<31
25†	30.8	17.9	24.4	0.0	6.4	0.0	0.0	0.0			<31
26†	28.5	19.3	23.9	0.0	5.9	0.0	0.0	0.0			<31
27†	26.0	19.1	22.6	0.0	4.6	7.8	0.0	7.8			<31
28†	25.8	14.1	20.0	0.0	2.0	0.0	0.0	0.0		36	44
29†	23.3	12.1	17.7	0.3	0.0	0.0	0.0	0.0			<31
30†	30.0E	13.1E	21.6E		3.6E	M	M			M	M
Sum				**2.0**	**112.1**	**52.4***	**0.0***	**52.4**			
Avg	**26.9**	**16.2**	**21.6**								
Xtrm	**33.1**	**10.5**								**23***	**50***

Summary, average and extreme values are based on the data above.

Environment Canada Environnement Canada

Canada

Daily Data Report for January 2012

TORONTO LESTER B. PEARSON INT'L A
ONTARIO

Latitude: 43°40'38.000" N Longitude: 79°37'50.000" W Elevation: 173.40 m

Climate ID: 6158733 WMO ID: 71624 TC ID: YYZ

Daily Data Report for January 2012

Day	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10s deg	Spd of Max Gust km/h
01†	7.2	0.3	3.8	14.2	0.0	4.0	T	4.0		26	67
02†	0.5	-11.4	-5.5	23.5	0.0	0.0	T	T	T	31	54
03†	-11.4	-16.5	-14.0	32.0	0.0	0.0	T	T	T	34	41
04†	-0.1	-12.7	-6.4	24.4	0.0	0.0	0.0	0.0		26	32
05†	1.6	-1.4	0.1	17.9	0.0	0.0	0.0	0.0		25	33
06†	9.0	1.3	5.2	12.8	0.0	0.0	0.0	0.0			<31
07†	7.8	0.3	4.1	13.9	0.0	0.0	T	T		30	48
08†	0.5	-5.2	-2.4	20.4	0.0	0.0	0.2	0.2	T		<31
09†	5.1	-3.3	0.9	17.1	0.0	0.0	0.0	0.0	T	23	33
10†	5.3	1.6	3.5	14.5	0.0	T	0.0	T			<31
11†	6.7	1.1	3.9	14.1	0.0	0.2	0.0	0.2		12	32
12†	5.0	1.6	3.3	14.7	0.0	9.6	0.0	9.6		10	35
13†	4.1	-7.4	-1.7	19.7	0.0	0.0	2.6	3.2	T	24	52
14†	-7.2	-15.3	-11.3	29.3	0.0	0.0	T	T	1	36	35
15†	-6.5	-16.3	-11.4	29.4	0.0	0.0	0.0	0.0	1		<31
16†	4.5	-7.2	-1.4	19.4	0.0	1.0	0.0	1.0	1	22	32
17†	10.0	-3.7	3.2	14.8	0.0	5.0	T	5.0		27	74
18†	-3.3	-8.4	-5.9	23.9	0.0	0.0	T	T		30	57
19†	-1.4	-11.2	-6.3	24.3	0.0	0.0	2.0	1.8	1	29	52
20†	-6.6	-11.6	-9.1	27.1	0.0	0.0	1.2	1.2	2		<31
21†	-3.4	-9.2	-6.3	24.3	0.0	0.0	1.0	1.0	2		<31
22†	1.7	-8.9	-3.6	21.6	0.0	0.0	0.0	0.0	1		<31
23†	8.5	1.0	4.8	13.2	0.0	9.2	0.0	9.2	1	23	65
24†	2.0	-1.7	0.2	17.8	0.0	0.2	0.8	1.0	1	25	56
25†	-0.9	-2.1	-1.5	19.5	0.0	0.0	0.4	0.4	T		<31
26†	2.3	-2.2	0.1	17.9	0.0	1.4	T	1.4	T		<31
27†	4.3	-1.5	1.4	16.6	0.0	6.8	2.4	9.2	1	31	41
28†	2.4	-3.2	-0.4	18.4	0.0	0.2	0.8	1.0	T	27	74
29†	1.0	-6.2	-2.6	20.6	0.0	0.0	T	T	T	23	46
30†	-0.6	-4.7	-2.7	20.7	0.0	0.0	4.8	4.8	T		<31
Sum				**611.1**	**0.0**	**37.6**	**16.2**	**54.2**			
Avg	**1.9**	**-5.3**	**-1.7**								
Xtrm											

Summary, average and extreme values are based on the data above.

Speed of Maximum Gust (km/h)

The speed in kilometres/hour (km/h) of the maximum wind gust during the day. The gust is the maximum or peak instantaneous or single reading from the anemometer (the instrument used to observe wind speed) during the day. The duration of a gust typically corresponds to an elapsed time of from 3 to 5 seconds.

Mean Temperature (°C)

The mean temperature in degrees Celsius (C) is defined as the average of the maximum and minimum temperature during the day.

Heating Degree Days

Heating degree-days for a given day are the number of Celsius degrees that the mean temperature is below 18°C. If the temperature is equal to or greater than 18°C, then the number will be zero. For example, a day with a mean temperature of 15.5°C has 2.5 heating degree-days; a day with a mean temperature of 20.5°C has zero degree-days. Heating degree-days are used primarily to estimate the heating requirements of buildings.

Cooling Degree Days

Cooling degree-days for a given day are the number of Celsius degrees that the mean temperature is above 18°C. If the temperature is equal to or less than 18°C, then the number will be zero. For example, a day with a mean temperature of 20.5°C has 2.5 cooling degree-days; a day with a mean temperature of 15.5°C has zero degree-days. Cooling degree-days are used primarily to estimate the air-conditioning requirements of buildings.

Monthly Weather

Snow on the Ground on the Last Day(cm)

The depth of snow in centimetres (cm) on the ground. Daily values displayed are measured during the early morning. Monthly values displayed are for the final day of the month.

Station Metadata

Latitude & Longitude

Latitude and longitude in degrees are usually recorded to the nearest second or to the nearest 0.003 of a degree. Negative values of longitude denote degrees west of the Greenwich meridian. All locations in Canada have negative values of longitude.

Elevation

The elevation in metres (m) refers to the elevation of the observing location above mean sea level.

Climate ID

The Climate ID is a unique identifier assigned by the Meteorological Service of Canada for each location having archived observations.

TC ID

The TC ID is the identifier assigned by Transport Canada to identify meteorological reports from airport observing sites transmitted in real time in aviation formats.

Environment Canada Environnement Canada

Canada

Canadian Climate Normals or Averages 1971-2000

Climate normals or averages are used to summarize or describe the average climatic conditions of a particular location.

At the completion of each decade, Environment Canada updates its climate normals for as many locations and as many climatic characteristics as possible. The climate normals and extremes offered here are based on Canadian climate stations with at least 15 years of data between 1971 to 2000.

Select a province or enter a text search string to view a list of possible locations for which climate normals have been calculated:

Province: All Search

OR

Location: Search

contains begins with

1961-1990 Climate normals & averages

We'd like to hear from you! Please click "Contact Us" to share your comments and suggestions.

Date Modified: 2012-05-29