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A. "DO FIRMS SHIFT DEMAND IN RESPONSE TO HIGH PRICES? AN EMPRICIAL ANALYSIS", EXPERT REPORT OF ANINDYA SEN

Interrogatory #1

Reference: Page 2, paragraph #7

a) Please provide a schedule that sets out for each of analyzed months in 2006 and 2007, the following:

Response:

- The total "Allocated Quantities of Energy Withdrawn" from the IESO controlled grid (in kWhs).

Year	2006		
	Sum of Industry	Sum of LDC	Total by month
May	2,044,568,000	9,647,029,000	11,691,597,000
June	2,069,281,000	10,215,526,000	12,284,807,000
July	2,017,280,000	11,539,181,000	13,556,461,000
August	2,065,568,000	10,975,508,000	13,041,076,000
TOTAL	8,196,697,000	42,377,244,000	50,573,941,000

Year	2007		
Month	Sum of Industry	Sum of LDC	Total by month
May	1,983,755,000	9,589,522,000	11,573,277,000
June	1,870,881,000	10,502,569,000	12,373,450,000
July	1,847,422,000	10,640,373,000	12,487,795,000
August	1,874,955,000	11,202,665,000	13,077,620,000
TOTAL	7,577,013,000	41,935,129,000	49,512,142,000

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- The total "Allocated Quantities of Energy Withdrawn" by each of the five industrial sectors analyzed (in kWhs).

Year	2007					
Month	Sum of Iron and Steel Mills and Ferro-Alloy Manufacturing	Sum of Metal Ore Mining	Sum of Motor Vehicle Manufacturing	Sum of Petroleum and Coal Products Manufacturing	Sum of Pulp, Paper and Paperboard Mills	Total by month
May	381,145,000	401,655,000	123,602,000	171,124,000	348,699,000	1,426,225,000
June	368,078,000	351,656,000	115,658,000	177,358,000	319,381,000	1,332,131,000
July	333,211,000	359,405,000	91,718,000	187,035,000	327,918,000	1,299,287,000
August	320,714,000	415,102,000	121,700,000	113,591,000	343,890,000	1,314,997,000
TOTAL	1,403,148,000	1,527,818,000	452,678,000	649,108,000	1,339,888,000	5,372,640,000

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Interrogatory #2

Reference: Page 3, paragraphs 8 & 10

a) Please explain why the effect of the current transmission tariffs on "on-peak" prices was not factored into the formulation of the model.

b) Did the model differentiate between the peak hours on weekdays vs. weekends & statutory holidays as the current transmission tariff does? If yes, how was this done (e.g., were weekends and statutory holiday excluded from the analysis?)?

c) Please provide the model results (similar to Table 1) for the specification set out in footnote #1.

d) Did Dr. Sen also run a regression using the same data omitting the regressor that is the coefficient of the parameter b2, i.e., the HOEP averaged over previous 12 hours? If so, please provide the output produced in running the regression with the adjusted R2 statistic provided for both the regression which is the subject of Dr. Sen's evidence and the alternate regression requested and the F statistic for the alternate regression requested. If not, please explain why not and please run an alternate regression using the same data but omitting the regressor that is the coefficient of b2 and provide the requested statistical output.

e) Did the regression methodology used implicitly assume (i) that industrial loads can shift demand from the second 12-hour period in a given 24-hour period to the first 12-hour period in the same 24-hour period, i.e., assuming discrete, non-overlapping 24-hour periods or (ii) did it take into account that load could be shifted from the second 12-hour period in the current 24-hour period to the first 12-hour period of the next 24-hour period? That is, was the lagged specification applied to each 12-hour period successively, or only for every second 12-hour period (once per 24-hour period)?

f) Did Dr. Sen undertake any specification tests on the regression equation estimated? If so, please provide. If not, why not?

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g) Does Dr. Sen agree that firms must make decisions to shift load and reschedule labour from one period to another before the actual electricity prices re known?

Response:

a) Because there was no variation in transmission tariffs over the sample period, it is not possible to directly identify the effects of changes to transmission tariffs on demand.

b) The model did not differentiate between weekdays and weekends.

c) Model Results (similar to Table 1) for the specification set out in footnote #1.

   a. 2007

```
    1.  Regression Analysis for Dependent Variable pulp
Fit Summary

R-square            0.4288
Root MSE            0.1130
Denominator DF          30

          Estimated Regression Coefficients

                             Standard
Parameter      Estimate         Error    t Value    Pr > |t|

Intercept     6.4173159    0.07655127      83.83      <.0001
lhoep        -0.1638014    0.01492793     -10.97      <.0001
lhoep1        0.0979717    0.01200972       8.16      <.0001
mm1          -0.0140267    0.01839960      -0.76      0.4518
mm2          -0.0613879    0.01845101      -3.33      0.0023
mm3          -0.0654384    0.02239278      -2.92      0.0065

    2.  Regression Analysis for Dependent Variable metal

     Fit Summary

R-square            0.4743
Root MSE           0.07048
Denominator DF          30

           Estimated Regression Coefficients

                             Standard
Parameter      Estimate         Error    t Value    Pr > |t|

Intercept     6.2340965    0.04301630     144.92      <.0001
lhoep        -0.0116500    0.00605368      -1.92      0.0638
lhoep1        0.0372317    0.00606392       6.14      <.0001
mm1          -0.0226924    0.00895185      -2.53      0.0167
mm2          -0.1281930    0.01705333      -7.52      <.0001
mm3          -0.1406223    0.01649375      -8.53      <.0001
```

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3. Regression Analysis for Dependent Variable lron

Fit Summary

R-square	0.4507
Root MSE	0.08738
Denominator DF	30

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	6.0527751	0.06348123	95.35	<.0001
lhoep	-0.0230404	0.00953335	-2.42	0.0219
lhoep1	0.0279786	0.00968921	2.89	0.0071
mm1	0.1729576	0.01782933	9.70	<.0001
mm2	0.1703102	0.01790586	9.51	<.0001
mm3	0.0398936	0.02099521	1.90	0.0671

4. Regression Analysis for Dependent Variable motor

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	3.7479477	0.20788551	18.03	<.0001
lhoep	0.2212472	0.02564062	8.63	<.0001
lhoep1	0.1209495	0.02711280	4.46	0.0001
mm1	0.1417328	0.04631275	3.06	0.0046
mm2	0.0679507	0.06506950	1.04	0.3047
mm3	-0.2471054	0.08592693	-2.88	0.0073

5. Regression Analysis for Dependent Variable lpetrol

Fit Summary

R-square	0.9392
Root MSE	0.05268
Denominator DF	30

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	4.93755118	0.04207497	117.35	<.0001
lhoep	0.00929960	0.00530710	1.75	0.0899
lhoep1	0.01380352	0.00558875	2.47	0.0194
mm1	0.42220940	0.02012019	20.98	<.0001
mm2	0.48769238	0.01605467	30.38	<.0001
mm3	0.50633989	0.01176630	43.03	<.0001

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d) 2006 data

1. Regression Analysis for Dependent Variable lpulp

Fit Summary

R-square	0.5337
Root MSE	0.08231
Denominator DF	30

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	6.7911139	0.06021402	112.78	<.0001
lhoep	-0.2067729	0.01107745	-18.67	<.0001
lhoep1	0.1106385	0.01057117	10.47	<.0001
mm1	-0.0653232	0.01267775	-5.15	<.0001
mm2	-0.0272372	0.01766721	-1.54	0.1336
mm3	0.0108516	0.01538218	0.71	0.4860

2. Regression Analysis for Dependent Variable metal

Fit Summary

R-square	0.4981
Root MSE	0.1093
Denominator DF	30

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	6.0129676	0.13325387	45.12	<.0001
lhoep	-0.0008687	0.01881843	-0.05	0.9635
lhoep1	0.0784447	0.01850064	4.24	0.0002
mm1	-0.1277725	0.01091579	-11.71	<.0001
mm2	-0.0642273	0.00952025	-6.75	<.0001
mm3	-0.2747351	0.03567542	-7.70	<.0001

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3. Regression Analysis for Dependent Variable iron

Fit Summary

R-square	0.3064
Root MSE	0.07695
Denominator DF	30

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	5.95824560	0.06885015	86.54	<.0001
lhoep	0.00201665	0.01052975	0.19	0.8494
lhoep1	0.06449235	0.01008592	6.39	<.0001
mm1	0.11228604	0.01493260	7.52	<.0001
mm2	0.10964508	0.01756750	6.24	<.0001
mm3	0.09989233	0.01645504	6.07	<.0001

4. Regression Analysis for Dependent Variable motor

Fit Summary

R-square	0.2885
Root MSE	0.3092
Denominator DF	30

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	3.4949917	0.25529300	13.69	<.0001
lhoep	0.2879774	0.03340815	8.62	<.0001
lhoep1	0.1725779	0.03154638	5.47	<.0001
mm1	-0.0696857	0.05984691	-1.16	0.2534
mm2	0.0368622	0.08156363	0.45	0.6546
mm3	-0.3158065	0.07363822	-4.29	0.0002

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4. Regression Analysis for Dependent Variable lpetrol

Fit Summary

R-square	0.7631
Root MSE	0.06305
Denominator DF	30

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	5.2163897	0.05829422	89.48	<.0001
lhoep	-0.0084597	0.00946112	-0.89	0.3784
lhoep1	-0.0031357	0.00760678	-0.41	0.6831
mm1	0.2003417	0.01543301	12.98	<.0001
mm2	0.2729446	0.01151103	23.71	<.0001
mm3	0.2703014	0.01841326	14.68	<.0001

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d) Model results omitting the HOEP averaged over previous 12 hours

In all cases lhoep = natural logarithm of hoep

1) Regression Analysis for Dependent Variable Pulp

2007

R-square 0.1841

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	6.7347624	0.08726211	77.18	<.0001
lhoep	-0.1680733	0.02233242	-7.53	<.0001

2006

R-square 0.2006

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	6.9965626	0.05725014	122.21	<.0001
lhoep	-0.1606562	0.01486301	-10.81	<.0001

2) Regression Analysis for Dependent Variable Metal

2007

R-square 0.000072

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	6.24154459	0.07980652	78.21	<.0001
lhoep	0.00225287	0.02027673	0.11	0.9123

2006

R-square 0.004510

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	6.05343503	0.11904342	50.85	<.0001
lhoep	0.03227319	0.03017663	1.07	0.2934

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3)Regression Analysis for Dependent Variable iron

2007

R-square 0.08425

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	6.5168817	0.08945602	72.85	<.0001
lhoep	-0.0937479	0.02321470	-4.04	0.0003

2006

R-square 0.000787

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	6.25208225	0.09608295	65.07	<.0001
lhoep	0.00795589	0.02466791	0.32	0.7493

4) Regression Analysis for Dependent Variable motor

2007

R-square 0.1695

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	3.53466584	0.22086731	16.00	<.0001
lhoep	0.37671784	0.05798111	6.50	<.0001

2006

R-square 0.1666

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	3.37919794	0.27744144	12.18	<.0001
lhoep	0.44995277	0.06976577	6.45	<.0001

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5) Regression Analysis for Dependent Variable petrol

2007

R-square 0.06518

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	5.9367906	0.13006989	45.64	<.0001
lhoep	-0.1472480	0.03355961	-4.39	0.0001

2006

R-square 0.007731

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	5.4925836	0.14645525	37.50	<.0001
lhoep	-0.0346597	0.03779146	-0.92	0.3664

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e) While it is possible that a firm might schedule electricity consumption over alternative time periods, such as from one day to the next, or from a working weekday to a weekend, the approach assumed that changes in demand would take place within a day, i.e., within a 24 hour period from midnight to midnight. This approach was informed by discussion with industrial customers based on generally understood industrial approaches to shift scheduling and operational planning.

f) Dr. Sen used the standard F test to estimate the joint significance of the regressors and hence, the model. Below is the output for 2007 and 2006.

A. 2007 Data

1. **ANOVA for Dependent Variable pulp**

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	1.363559	0.272712	17.67	<.0001
Error	238	3.673570	0.015435		
Corrected Total	243	5.037129			

2. ANOVA for Dependent Variable metal

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	1.100722	0.220144	43.51	<.0001
Error	238	1.204217	0.005060		
Corrected Total	243	2.304939			

3. ANOVA for Dependent Variable iron

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	1.473815	0.294763	35.98	<.0001
Error	238	1.949870	0.008193		
Corrected Total	243	3.423685			

4. ANOVA for Dependent Variable motor

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	10.07221	2.014442	27.54	<.0001
Error	238	17.40631	0.073136		
Corrected Total	243	27.47852			

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5. ANOVA for Dependent Variable petrol

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	10.22276	2.044553	700.66	<.0001
Error	238	0.69449	0.002918		
Corrected Total	243	10.91725			

B. 2006 Data

1.ANOVA for Dependent Variable pulp

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	1.158845	0.231769	25.15	<.0001
Error	238	2.193446	0.009216		
Corrected Total	243	3.352291			

2. ANOVA for Dependent Variable metal

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	2.920071	0.584014	44.90	<.0001
Error	238	3.095875	0.013008		
Corrected Total	243	6.015947			

3.ANOVA for Dependent Variable iron

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	0.627550	0.125510	20.37	<.0001
Error	238	1.466211	0.006161		
Corrected Total	243	2.093761			

4.ANOVA for Dependent Variable motor

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	10.75271	2.150542	24.48	<.0001
Error	238	20.90482	0.087835		
Corrected Total	243	31.65753			

5. ANOVA for Dependent Variable petrol

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	3.045635	0.609127	144.71	<.0001
Error	238	1.001792	0.004209		
Corrected Total	243	4.047427			

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g) Yes. Conversations with industrial customers indicate that they forecast HOEP based on temperature forecasts and thus respond to informed expectations of HOEP.

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Interrogatory #3

Reference: Page 3, paragraph 12

a) Please explain why the existence of frequent price spikes is relevant when the empirical specification of the model involves average demand and prices over the entire 12 hours of the peak period.

b) The analysis was done for two separate years (i.e., 2006 and 2007) using the months of May, June, July and August. Please explain how this gave rise to 244 observations for each year (per Table 1)?

Response:

a) Price spikes push up hourly averages, the effect of which the analysis aims to capture.

b) As detailed in the report, the day was split up into two halves (peak and off-peak). Therefore 2 x 122 days in May, June, July and August = 244 observations.

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Interrogatory #4

Reference: Page 4, Table 1

a) Please provide the output of the statistical software program that was produced in running the regressions summarized in Table 1. If not included in the statistical output, please provide the F statistics and Durbin-Watson statistics for each.

b) Table 1 appears to indicate that in 2007, the demand curve for electricity as an input in the Motor and Petrol sectors was upwards sloping as evidenced by the positive parameter estimates associated with the current HOEP. Please confirm that in microeconomic production theory, no input demand curves can ever be upward sloping (whether they be normal or inferior inputs).

c) Please indicate whether there was any correlation between HOEP averaged over a 12-hour period and HOEP averaged over the next period. If so, please indicate how this affected the estimation exercise and how the effects were mitigated.

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Response:

a) The F statistics are provided above in AMPCO's response to VECC IR 2 f).

Durbin Watson statistics were not generated. Any autocorrelation due to correlation between hours within a day was taken into account by clustering standard errors of coefficient estimates by day. The output for 2007 and 2006 data is shown below.

A. For 2007
1.Regression Analysis for Dependent Variable pulp

Fit Summary

R-square	0.2707
Root MSE	0.1242
Denominator DF	30

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	6.6189796	0.11512305	57.49	<.0001
lhoep	-0.2260794	0.02186786	-10.34	<.0001
lhoep1	0.0968973	0.02159990	4.49	<.0001
mm1	-0.0149659	0.02462949	-0.61	0.5480
mm2	-0.0594246	0.02413192	-2.46	0.0198
mm3	-0.0593645	0.02987683	-1.99	0.0561

2. Regression Analysis for Dependent Variable metal

Fit Summary

R-square	0.4775
Root MSE	0.07113
Denominator DF	30

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	6.2751075	0.08064904	77.81	<.0001
lhoep	-0.0451720	0.01320993	-3.42	0.0018
lhoep1	0.0581636	0.01078319	5.39	<.0001
mm1	-0.0244235	0.01093338	-2.23	0.0331
mm2	-0.1305586	0.01776333	-7.35	<.0001
mm3	-0.1441804	0.01739332	-8.29	<.0001

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3. Regression Analysis for Dependent Variable iron

Fit Summary

R-square	0.4305
Root MSE	0.09051
Denominator DF	30

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	6.1382786	0.10986650	55.87	<.0001
lhoep	-0.0439256	0.01730631	-2.54	0.0166
lhoep1	0.0254336	0.01921707	1.32	0.1957
mm1	0.1621057	0.02160992	7.50	<.0001
mm2	0.1668569	0.01975757	8.45	<.0001
mm3	0.0356795	0.02353001	1.52	0.1399

4. Regression Analysis for Dependent Variable motor

Fit Summary

R-square	0.3665
Root MSE	0.2704
Denominator DF	30

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	2.9753165	0.29413471	10.12	<.0001
lhoep	0.3665096	0.04589222	7.99	<.0001
lhoep1	0.1505515	0.04369858	3.45	0.0017
mm1	0.1897371	0.05331766	3.56	0.0013
mm2	0.1058539	0.05881057	1.80	0.0819
mm3	-0.2031320	0.08180325	-2.48	0.0188

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5. Regression Analysis for Dependent Variable petrol

Fit Summary

R-square	0.9364
Root MSE	0.05402
Denominator DF	30

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	4.90787312	0.05634515	87.10	<.0001
lhoep	0.01360895	0.00948146	1.44	0.1615
lhoep1	0.01561346	0.00911141	1.71	0.0969
mm1	0.42187906	0.02032713	20.75	<.0001
mm2	0.48792513	0.01610866	30.29	<.0001
mm3	0.50506929	0.01230688	41.04	<.0001

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A.2006 data

1.Regression Analysis for Dependent Variable pulp

Fit Summary

R-square	0.3457
Root MSE	0.09600
Denominator DF	30

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	6.8756467	0.09186940	74.84	<.0001
lhoep	-0.2593455	0.02014924	-12.87	<.0001
lhoep1	0.1326179	0.02126338	6.24	<.0001
mm1	-0.0542350	0.01877677	-2.89	0.0071
mm2	-0.0187463	0.02305274	-0.81	0.4225
mm3	0.0239338	0.02090417	1.14	0.2613

2. Regression Analysis for Dependent Variable metal

Fit Summary

R-square	0.4854
Root MSE	0.1141
Denominator DF	30

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	5.9984802	0.16205766	37.01	<.0001
lhoep	-0.0211859	0.02743867	-0.77	0.4461
lhoep1	0.0968564	0.02660638	3.64	0.0010
mm1	-0.1178853	0.01326971	-8.88	<.0001
mm2	-0.0593234	0.01282728	-4.62	<.0001
mm3	-0.2803693	0.03674212	-7.63	<.0001

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3. Regression Analysis for Dependent Variable iron

Fit Summary

R-square	0.2997
Root MSE	0.07849
Denominator DF	30

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	5.9683775	0.09967579	59.88	<.0001
lhoep	-0.0369796	0.01879125	-1.97	0.0584
lhoep1	0.0969226	0.01885216	5.14	<.0001
mm1	0.1165965	0.01777615	6.56	<.0001
mm2	0.1062836	0.01852289	5.74	<.0001
mm3	0.1005079	0.01842235	5.46	<.0001

4**. Regression Analysis for Dependent Variable motor**

R-square	0.3397
Root MSE	0.2964
Denominator DF	30

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	3.0886015	0.35979860	8.58	<.0001
lhoep	0.3857465	0.05644687	6.83	<.0001
lhoep1	0.1582651	0.06172294	2.56	0.0156
mm1	-0.0423700	0.06923158	-0.61	0.5451
mm2	0.0566287	0.08438506	0.67	0.5073
mm3	-0.3180922	0.07345792	-4.33	0.0002

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5. Regression Analysis for Dependent Variable lpetrol

Fit Summary

R-square	0.7525
Root MSE	0.06488
Denominator DF	30

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	5.1932719	0.07453011	69.68	<.0001
lhoep	-0.0065366	0.02102387	-0.31	0.7580
lhoep1	0.0010854	0.01615625	0.07	0.9469
mm1	0.2022538	0.01644711	12.30	<.0001
mm2	0.2727886	0.01188012	22.96	<.0001
mm3	0.2687525	0.01900025	14.14	<.0001

b) Economic theory does make allowance for goods for which demand rises as price rises. These are called ‘Giffen goods’ after Sir Robert Giffen’s observations of the consumption of basic foodstuffs by the nineteenth-century poor. The Irish potato famine of the mid-nineteenth century is the example most frequently cited.

This is not to suggest that electricity is a Giffen good for the motor vehicle manufacturing and petroleum refining sectors. In this analysis, the model is specified to consider only the relationship between HOEP and industry demand by sector. The counter-intuitive results obtained for the motor and petrol sectors suggest that there may be something specific in the operational and electricity consumption patterns of these industries which manifests as correlation between consumption and the HOEP but cannot be explained on that basis. AMPCO’s response to VECC’s interrogatory #10(d) shows the pattern of consumption by the motor vehicle manufacturing sector—largely a function of shift management decisions—and the limited extent to which average demand by the petroleum refining sector varies from hour to hour and day to day.

Since, as the question points out, the results for these sectors are counter-intuitive, and cannot be relied upon properly to explain a causal relationship between price and demand, it is appropriate to disregard the results for these sectors and exclude them from the analysis.

c) There is correlation between within-day HOEP. The way to mitigate any error in standard errors of coefficient estimates is to cluster them by day, which was done.

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Interrogatory #5

Reference: Page 4, paragraph 15

a) Please provide a precise statistical definition as to what is meant by the expression "the coefficient estimate of an explanatory variable is significant at the 1% level" as used in paragraph 16 and also please indicate how this statement should be interpreted by the layperson and the assumptions under which such confidence statements hold true.

Response:

a) It implies that if the same experiment were repeated 100 times with different and randomly generated samples of the same data, one would obtain a similar coefficient estimate in 99 of those experiments.

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Interrogatory #6

Reference: Page 5, paragraphs 16-18

a) Please confirm that (per paragraph 16) the model estimates suggest that a 10% increase in the average price over a given period will lead to a 2.3-2.6% decrease in average use by the pulp and paper industry during the same period.

Response:

a) Correct.

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C. "<u>THE BENEFITS OF IMPROVEMENTS IN TRANSMISSION RATE DESIGN", PREPARED BY AMPCO</u>

Interrogatory #7

Reference: Page 2, lines 25-28

a) The first sentence in the paragraph suggests that the government's focus is on reducing system peak demand. While the second sentence suggests the focus is on demand during the peak periods. Please clarify what AMPCO's understanding of the government's policy focus is and whether "peak periods" involves more than just the time of the system peak. Please provide relevant references.

<u>Response:</u>

Statements of the Government's policy rely principally on the June 13, 2006, directive from Hon. Dwight Duncan, Minister of Energy, to Jan Carr, President and CEO of the Ontario Power Authority setting out goals for an Integrated Power System Plan. In that directive, the Minister directs the OPA to meet a goal for "total peak demand reduction". The Minister does not define the term.

The OPA subsequently (in EB-2007-0707, Exhibit D, Tab 4, Schedule 1, Page 2 of 58) provides the following definition:

> "Actions to reduce peak demand are encouraged through demand management programs and other programs aimed at influencing Conservation behaviour (collectively referred to as "Demand Management/Conservation behaviour"). Demand management occurs when customers reduce their electricity demand during peak use hours (peak clipping) or shift some of their demand to off-peak hours (peak shifting). Demand management can occur in a number of ways: for example, when residential customers shift use of their dishwasher and laundry appliances to off-peak hours; when certain industrial customers contractually agree to shut down assembly lines in response to an automatic signal; and when residential and other customers participate in programs, allowing their use to be temporarily reduced by their utility or a demand aggregator."

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AMPCO does not promote a single definition but suggests that the term takes on meaning in relation to the context in which it is used. In the current transmission tariff, the system peak is defined as the hour in which system demand is highest. While this is not seen as inconsistent with the government’s statements, it is a narrower definition of the term.

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Interrogatory #8

Reference: Page 3, lines 2-5

a) This paragraph sets out two objectives for transmission rate design. In AMPCO's view are there any other objectives/criteria that should be taken into account when designing transmission rates? If yes, please outline what they are.

Response:

a) While adherence to the principle of cost causality should be the first objective, there are secondary objectives that stakeholders may want a good rate design to meet, such as surety of revenue for the transmitter, predictability of cost for the customer and provision of the opportunity for customers to influence the cost of their services.

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Interrogatory #9

Reference: Page 3

a) With respect to line 9, please clarify what AMPCO means by "during monthly system peaks", e.g., is this meant to refer to the one-hour monthly system peak?

b) With respect to line 14, please clarify what AMPCO means by "periods of peak demand", i.e., specifically what hours or periods of the year are being referred to?

c) With respect to lines 12-16, does AMPCO agree that for customers whose monthly coincident peak demand exceeds 85% of their non-coincident (peak period) demand, the current rate design for the Networks Charge provides an incentive for them to reduce their coincident peak demand? If not, why not?

d) With respect to lines 16-18, is it AMPCO's contention that all investment in Transmission Network assets is driven solely by system peak demand. If not, what other drivers are there for Network assets and how does AMPCO's proposed rate design reflect these cost drivers?

e) With respect to lines 22-27, during the last Hydro One Networks' Transmission Rate Proceeding (EB-2006-0501), AMPCO's witness (Mr. Saleba) put forward a number of tests FERC used to establish which months of the year should be included when determining cost causation and concluded (Exhibit J/Tab 13/Schedule 9 and Transcript Volume 10, page 89) that these tests supported the inclusion of all 12 months in Hydro One Networks' transmission rate design.

- Has AMPCO updated these calculations based on more recent data?

- If yes, please provide the results.

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Response:

a) The reference to monthly system peaks refers to the hour of highest Ontario demand during the month.

This refers to the hours in the year when Ontario demand is close to it's annual peak. Currently, the "ratchet" provides only limited incentive to reduce demand on the highest demand day of each month, while there are often multiple days in a single month that have a peak of demand well above the peak demand in other months of the year.

b) The current rate design severely limits the incentive for customers to reduce their demand at times of coincident peak, because it limits the available savings to levels that often cannot recover the costs associated with demand response.

c) It is AMPCO's contention that, the design and cost of a transmission network is ultimately driven by the capacity requirements placed on the network. There are of course specific investments required in a network each year for such reasons as maintaining reliability, environmental compliance, connecting new generation (and disconnecting old), etc. But ultimately, it is the demands placed on the network that are the primary cost driver.

d) AMPCO's position in this proceeding is different than EB-2006-0501. FERC tests seek to establish the specific months of significant peak demand, whereas the AMPCO proposal is designed to focus on the actual days of highest peaks in the year, regardless of the months in which they occur. This approach is intended to capture the peaks that matter from the perspective of managing system demand, while balancing the costs and benefits associated with demand response activity.

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Interrogatory #10

Reference: Pages 4-5

a) With respect to Table 1, please confirm if Hour #1 is Midnight to 1:00 am.

b) Please provide a table similar to Table 1 but based on 2006 data.

c) Does the analysis set out in Table 1 cover all industrial consumption or just that associated with five industrial sectors analyzed by Dr. Anindya Sen?

d) Please provide a schedule similar to Table 1 for each of the five sectors analyzed by Dr. Sen.

e) Has AMPCO or Dr. Sen undertaken any statistical analysis to determine whether average industrial demand in the peak hours (i.e., weekdays 7 am to 7 pm) is significantly different from average demand in the off-peak hours? If yes, please provide.

Response:

a) Yes. Hour 1 is the hour ending at 1:00 a.m.

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b) The table is provided below.

Table 1 Average Industrial Consumption: Summer 2006

Hour	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2870	2987	3007	**3029**	2984	2998	2946
2	2902	3010	**3039**	**3040**	3010	**3021**	2967
3	2918	2999	**3035**	**3038**	3009	**3031**	2955
4	2924	2999	**3032**	**3019**	2990	**3030**	2939
5	2918	2987	2995	2986	2943	2996	2917
6	2887	2869	2862	2829	2797	2855	2865
7	2855	2750	2734	2703	2695	2755	2780
8	2745	2727	2723	2683	2649	2716	2726
9	2731	2708	2704	2666	2630	2680	2710
10	2711	2687	2680	2647	2621	2665	2702
11	2709	2662	2650	2621	**2597**	2665	2699
12	2693	2651	2630	2620	**2604**	2675	2712
13	2697	2655	2648	2615	2616	2669	2708
14	2690	2655	2662	**2614**	**2603**	2663	2691
15	2693	2645	2630	**2609**	**2610**	2674	2685
16	2688	2657	2648	**2604**	**2610**	2675	2675
17	2662	2657	2648	**2589**	2620	2661	2667
18	2661	2647	2657	**2607**	2629	2650	2656
19	2699	2700	2712	2662	2687	2688	2689
20	2734	2737	2755	2713	2736	2720	2707
21	2776	2777	2798	2754	2784	2774	2730
22	2813	2833	2835	2813	2818	2811	2770
23	2885	2932	2924	2890	2901	2865	2809
24	2966	2978	2981	2933	2958	2907	2844

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The following table shows the difference between average industrial consumption by hour and day of week in 2006 and 2007. Average industrial consumption is down in all hours, and varies in the level of reduction between 134 and 281 MW in each hour: on average 210 MW.

Table 2 Difference between Average Industrial Consumption: Summer 2007 and Summer 2006

Hour	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	-195	-228	-181	-232	-245	-253	-220
2	-204	-220	-208	-239	-244	-244	-194
3	-202	-201	-207	-221	-242	-249	-196
4	-220	-228	-211	-213	-254	-250	-177
5	-233	-251	-217	-219	-249	-237	-170
6	-213	-234	-194	-191	-211	-208	-186
7	-231	-190	-195	-210	-257	-227	-155
8	-198	-195	-201	-210	-254	-214	-135
9	-199	-181	-201	-222	-243	-190	-134
10	-183	-186	-191	-213	-255	-203	-135
11	-204	-174	-185	-200	-239	-219	-147
12	-177	-181	-185	-228	-228	-234	-183
13	-190	-205	-190	-224	-239	-220	-181
14	-177	-183	-188	-215	-218	-207	-162
15	-170	-174	-167	-203	-224	-212	-172
16	-172	-204	-187	-221	-232	-206	-163
17	-166	-211	-214	-201	-242	-195	-164
18	-182	-209	-211	-217	-243	-192	-175
19	-187	-207	-236	-218	-253	-174	-192
20	-190	-203	-254	-221	-266	-173	-184
21	-202	-207	-258	-217	-281	-197	-187
22	-212	-212	-229	-223	-265	-188	-210
23	-234	-223	-238	-248	-276	-198	-218
24	-249	-204	-230	-245	-267	-207	-198

c) The analysis considers the five sectors for which the data were made available to AMPCO by the IESO.

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d) The tables are shown below.

Average of Pulp, Paper and Paperboard Mills

Hour	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	526	523	524	**533**	524	523	530
2	524	529	529	**533**	523	521	**532**
3	523	**531**	527	**539**	521	525	**533**
4	523	527	525	**541**	518	529	530
5	519	518	523	**531**	506	528	**533**
6	515	492	511	503	488	512	530
7	515	458	436	428	413	447	523
8	514	450	423	416	393	428	520
9	505	444	410	407	390	419	517
10	491	436	391	393	378	390	506
11	479	429	376	381	374	377	495
12	474	409	**358**	**355**	373	367	479
13	466	384	362	**337**	375	360	472
14	471	383	360	**327**	370	359	465
15	469	385	359	**328**	367	366	468
16	465	375	364	**337**	365	373	470
17	457	369	**358**	**344**	**359**	377	467
18	459	378	365	**357**	369	388	465
19	475	400	388	389	382	428	467
20	490	418	407	412	398	439	481
21	494	438	426	435	419	450	495
22	503	471	474	472	462	481	509
23	512	503	512	510	498	512	520
24	522	516	**530**	523	512	527	529

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Average of Metal Ore Mining

Hour	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	538	536	**543**	538	**540**	538	**548**
2	537	534	538	536	537	539	**548**
3	533	531	531	532	531	534	**545**
4	526	523	523	523	520	529	536
5	516	511	511	509	506	522	526
6	501	495	**491**	493	**489**	506	514
7	510	498	**485**	493	**492**	509	523
8	515	501	**484**	495	495	504	530
9	523	506	**487**	499	497	507	533
10	526	505	**493**	499	498	508	532
11	526	506	494	499	499	506	533
12	526	507	497	500	499	507	529
13	525	513	501	506	496	514	532
14	531	517	503	509	503	521	535
15	528	517	507	512	505	521	533
16	521	512	507	507	501	515	529
17	511	506	498	498	495	506	522
18	503	493	**490**	**484**	**486**	496	512
19	513	511	502	502	505	517	524
20	522	522	510	516	515	529	530
21	531	527	521	527	524	539	535
22	537	535	530	534	531	**545**	537
23	538	539	538	539	535	**550**	536
24	536	**542**	536	538	537	**550**	**540**

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Average of Iron and Steel Mills and Ferro-Alloy Manufacturing

Hour	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	486	498	**522**	**506**	456	479	487
2	491	503	**509**	497	458	477	497
3	491	498	**512**	**509**	459	484	484
4	491	493	**515**	500	440	485	491
5	487	490	501	493	443	482	491
6	483	493	500	480	437	488	471
7	471	487	492	463	**419**	478	459
8	476	472	487	452	**396**	471	469
9	479	472	481	429	**390**	466	464
10	488	459	487	440	**384**	465	473
11	478	457	476	441	**379**	464	477
12	494	455	474	438	**398**	469	478
13	495	448	479	444	**398**	474	484
14	486	468	496	460	**403**	479	493
15	502	469	487	471	**411**	485	483
16	505	474	483	452	**418**	493	486
17	500	481	475	461	429	497	488
18	492	475	490	464	440	487	483
19	491	488	492	467	455	483	483
20	488	497	487	474	461	490	488
21	494	505	494	481	459	490	484
22	493	**507**	499	477	456	494	478
23	498	**514**	**506**	465	465	500	484
24	499	**507**	502	457	473	494	487

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Average of Motor Vehicle Manufacturing

Hour	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	**85**	151	166	168	170	162	123
2	**85**	151	164	168	168	161	122
3	**84**	153	165	168	169	159	119
4	**84**	151	163	167	167	160	117
5	**86**	156	169	169	173	162	117
6	**88**	161	173	177	177	165	117
7	**90**	170	184	185	188	171	121
8	**90**	172	187	187	**189**	174	123
9	91	174	188	**190**	**190**	174	122
10	94	175	**189**	**189**	**192**	175	122
11	97	173	188	188	**190**	175	119
12	100	176	187	187	**190**	174	115
13	102	177	186	188	**191**	175	115
14	103	175	184	185	**189**	172	112
15	103	170	179	180	184	168	104
16	104	166	176	176	180	162	101
17	107	163	173	175	178	159	99
18	106	162	171	172	174	158	98
19	110	163	170	172	172	155	97
20	119	163	169	171	171	154	96
21	126	163	169	169	171	154	96
22	132	162	167	169	166	147	93
23	143	164	168	170	165	134	**89**
24	149	165	170	171	164	127	**86**

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Average of Petroleum and Coal Products Manufacturing

Hour	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	221	221	**225**	219	219	219	220
2	221	221	**225**	219	220	219	220
3	221	221	**225**	219	220	220	220
4	221	221	**225**	219	220	220	220
5	221	221	**225**	219	219	219	220
6	220	220	224	218	218	**216**	219
7	219	221	224	218	219	216	219
8	219	221	**224**	219	219	216	219
9	219	221	**225**	219	219	**216**	219
10	219	221	224	219	219	**216**	219
11	219	221	224	219	219	216	219
12	219	221	223	218	218	**216**	219
13	219	222	222	219	218	216	219
14	220	222	222	218	219	217	220
15	220	224	222	218	219	**216**	220
16	220	224	222	218	219	**216**	219
17	220	223	222	218	219	**216**	220
18	220	223	222	217	218	**215**	219
19	221	223	222	218	218	**216**	220
20	221	223	222	218	218	**215**	220
21	223	224	221	219	219	216	221
22	223	**224**	221	219	219	216	221
23	223	**225**	220	219	219	216	221
24	223	**225**	219	219	220	**216**	221

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e) The results of tests of sample means is provided below.

	N	Mean	Std Dev	N	Mean	Std Dev				Calculated test statistic	null hypothesis: no difference in average demand between peak and non-peak hours
May		**Peak**			**Non-Peak**						
pulp	403	424.7519	75.12102	341	520.5982	58.91629	95.84638	24.18216	4.917536	19.49073242	null hypothesis rejected
metal	403	531.206	37.51497	341	550.085	37.48618	18.87909	7.613101	2.759185	6.842270526	null hypothesis rejected
iron	403	500.5409	52.14723	341	526.1789	44.67115	25.63794	12.59967	3.549601	7.222767479	null hypothesis rejected
motor	403	170.7295	46.15919	341	160.6979	38.67648	-10.0316	9.67374	3.110264	-3.225315456	null hypothesis rejected
petrol	403	229.2878	14.405	341	230.8534	12.87139	1.565531	1.000742	1.000371	1.564951068	cannot reject null hypothesis
June		**Peak**			**Non-Peak**						
pulp	390	405.8667	68.26018	330	488.1606	48.39624	82.29394	19.04488	4.364044	18.85726718	null hypothesis rejected
metal	390	480.1564	36.97847	330	498.1667	36.59255	18.01026	7.563793	2.750235	6.548624357	null hypothesis rejected
iron	390	503.3256	49.43692	330	520.5485	43.86792	17.22284	12.09819	3.478245	4.951590127	null hypothesis rejected
motor	390	165.8641	41.15754	330	154.4576	34.29994	-11.4065	7.908553	2.812215	-4.056065144	null hypothesis rejected
petrol	390	245.7821	6.980781	330	246.9788	6.575919	1.196737	0.255991	0.505955	2.365302017	cannot reject null hypothesis
July		**Peak**			**Non-Peak**						
pulp	403	402.7692	68.21107	341	485.6364	54.13412	82.86713	20.13914	4.487665	18.46553542	null hypothesis rejected
metal	403	473.0496	45.12264	341	494.915	50.9258	21.86533	12.65763	3.557756	6.145820597	null hypothesis rejected
iron	403	437.4665	51.57143	341	460.1525	50.01559	22.68599	13.93549	3.733026	6.077104637	null hypothesis rejected
motor	403	126.7618	49.34358	341	119.1584	44.91356	-7.60343	11.95728	3.457931	-2.198837905	null hypothesis rejected
petrol	403	251.0248	7.612139	341	251.824	10.56234	0.799233	0.470948	0.686256	1.164627589	cannot reject null hypothesis
August		**Peak**			**Non-Peak**						
pulp	403	414.2208	74.59615	341	518.9413	56.91099	104.7205	23.30603	4.827632	21.69189871	null hypothesis rejected
metal	403	547.4814	28.88107	341	570.2845	26.0752	22.80307	4.063655	2.015851	11.31188214	null hypothesis rejected
iron	403	422.0819	49.39727	341	441.6862	38.48672	19.60433	10.39859	3.224685	6.079456868	null hypothesis rejected
motor	403	168.3598	39.13876	341	157.9208	33.76218	-10.439	7.14387	2.672802	-3.905631961	null hypothesis rejected
petrol	403	152.6799	11.41502	341	152.6716	10.72095	-0.00835	0.660396	0.812648	-0.010270627	cannot reject null hypothesis

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Interrogatory #11

Reference: Page 6

a) With respect to lines 8-20, please confirm that:

- References to changes in price are with respect to the average price over the 12 hour peak period or 4 hour off-peak period. If not, please explain why.

- References to changes in demand are with respect to the average demand in the 12 hour peak period and the average demand in the 4 hour off-peak period. If not, why not.

<u>Response:</u>

- Correct.
- Correct.

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Interrogatory #12

Reference: Page 7

a) Please indicate which Ontario industrial consumers (and sectors) have operations in jurisdictions with transmission rate designs similar to that proposed by AMPCO.

b) Please indicate the jurisdictions and provide copies of their transmission tariff sheets.

c) Please provide any documentation or analyses that would verify the suggestion that 3-5 production curtailments for periods of 2-4 hours ensures that consumption is reduced during the actual hours of a system peak.

d) Please confirm whether each of the production curtailments typically occurs on a different day.

e) Has AMPCO compared the load profiles in these jurisdictions with those of Ontario to determine whether the load profiles on system peak days are similar?

- If yes, please provide the analysis.
- If no, on what basis is it reasonable to conclude that 3-5 production curtailments for periods of 2-4 hours would ensure that consumption is reduced during the actual hour of the Ontario system peak?

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Response:

a) AMPCO is not aware of any jurisdiction with the precise design it is proposing. This design is adapted to Ontario market demand characteristics. The closest design we are aware of is in PJM, which has a 5 peak day determinant design similar to what AMPCO is proposing, but which is restricted to the 5 days of highest demand in a four month period from June through September. AMPCO does not know the location of all members' facilities outside of Ontario. However, Gerdau Ameristeel does have facilities in PJM as well as Ontario and several other jurisdictions.

b) The PJM tariff is over 1700 pages in length, so it is not provided directly here in hard copy. However, it can be downloaded from http://www.pjm.com/markets-and-operations/transmission-service.aspx

c) It cannot be verified that any particular curtailment strategy will be 100% effective. AMPCO's proposal requires a customer to seek the 5 days of highest peak demand in the year. The table below is from a spreadsheet that was developed to test customer's estimates of the amount of "peak hunting" that would be required for success, using 2007 hourly demand data from the IESO. This scenario has several limitations that should be kept in mind. First, it used actual demand as reported by the IESO, when a customer would only have forecast demand to work with, either its own, the IESO's or some combination. Second, it assumes the customer has perfect flexibility to defer demand, when this is often not the case. For example, this scenario assumes the customer would defer demand on each of February 5,6,7,& 8. Many industrial processes would be unable to sustain such repeated interruptions without incurring escalating costs or possibly even equipment damage. In brief, total success for a customer may require more demand response than is realistically achievable.

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Operational Scenario for 2007

Day	Peak Ont Demand (days>23000)	#hrs>22700 or within 500 of peak	Hrs Hunting	Threshold	Shift?
16-Jan	23261	3	18-20	23000	True
25-Jan	23537	3	18-20	23000	True
5-Feb	23913	4	18-21	23000	True
6-Feb	23621	4	10,18-20	23000	True
7-Feb	23403	3	18-20	23000	True
8-Feb	23092	2	19-20	23261	FALSE
13-Feb	23935	3	18-20	23261	True
14-Feb	23171	2	19-20	23403	FALSE
15-Feb	23380	2	19-20	23403	FALSE
12-Jun	23067	2	16-17	23403	FALSE
13-Jun	23338	4	14-17	23403	FALSE
18-Jun	23028	2	16-17	23403	FALSE
25-Jun	24038	3	14-16	23403	True
26-Jun	25737	4	14-17	23537	True
27-Jun	25467	4	12-15	23621	True
9-Jul	24473	4	13-16	23913	True
10-Jul	24243	4	14-17	23935	True
30-Jul	23071	4	14-17	24038	FALSE
31-Jul	24561	4	15-18	24038	True
1-Aug	25402	5	14-18	24243	True
2-Aug	25584	5	13-17	24473	True
3-Aug	24642	4	12-15	24561	True
8-Aug	24623	4	14-17	24642	FALSE
24-Aug	23497	4	14-17	24642	FALSE
29-Aug	25003	4	14-17	24642	True
6-Sep	23608	4	15-18	25003	FALSE
8-Sep	24046	3	13-15	25003	FALSE

Operational Analysis
Procedure:

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1. Identify 5 peak days for each of 2003-2008
2. Identify lowest peak of 5 (23309)
3. Set initial trigger just under min of 5 (23000 MW)
4. Shift demand on days when > 23,000MW expected, until 5 days accumulated
5. Thereafter, shift only if demand is expected to exceed lowest of 5 highest days (e.g., displace 5th peak)
6. Shift in hours when demand is rising quickly and after is noticeably declining

Note: A "true" decision to shift indicates the customer would feel compelled to shift because of the possibility of the day being one of the "top 5". A "FALSE" indication means that the day being considered had a peak demand less than the "top 5" among the previously selected days.

d) Production curtailments would typically occur no more than once on a particular day. However, winter daily demand patterns do often exhibit a “two hump” characteristic that may require more than one curtailment in a day to ensure success, if the customer can do so. The table provided in response to c) above shows that Feb 6, 2007 may have required two curtailments. The graph below from the IESO illustrates this pattern for Jan 27, 2009.

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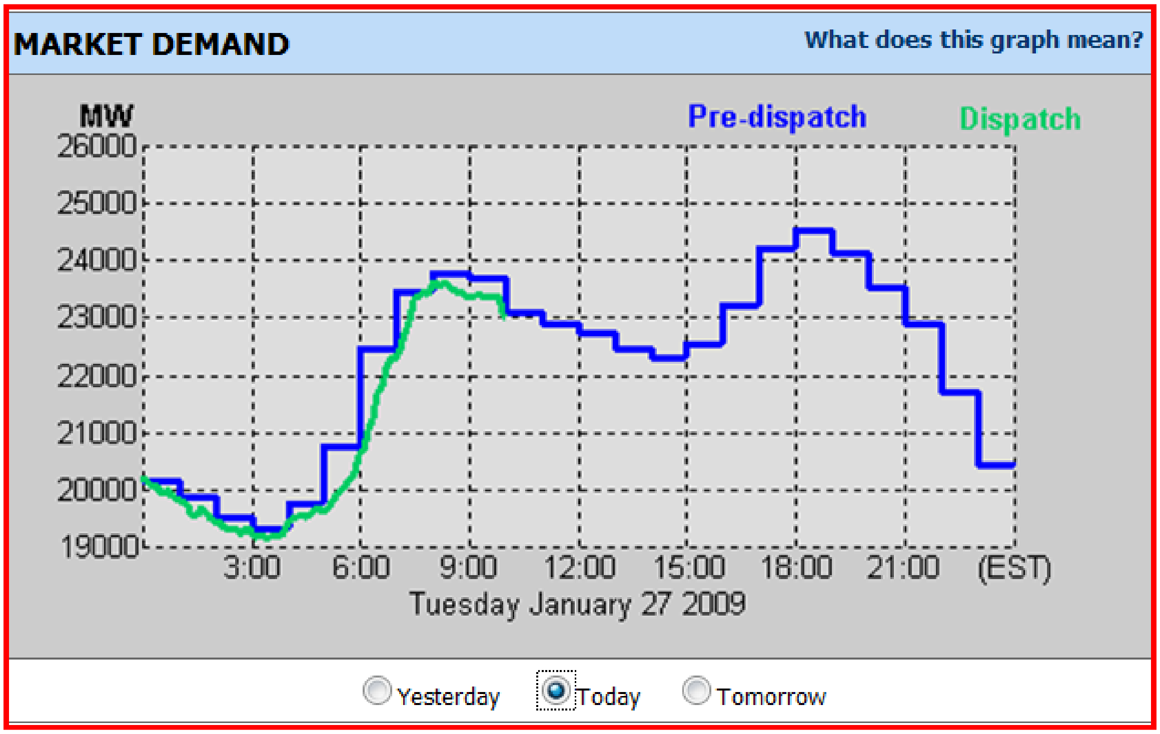

e) AMPCO has not compared Ontario load profiles with those of other jurisdictions, although a member with specific experience in PJM corroborated the conclusions from our modelling in Ontario. Because other jurisdictions all exhibit significant differences from Ontario with respect to geography, climate and customer characteristics, this did not appear to be a useful approach.

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Interrogatory #13

Reference: Page 8

a) Why is it reasonable to assume that if it takes 20 hour of curtailment to avoid the system peak, it will take 100 hours of curtailment to avoid the 5 days with the highest peaks? As the number of days to be included increases, doesn't the uncertainty as to which days will be captured by the highest 5 also increase?

b) Table 3 calculates a value of $308/MWh for transmission cost savings from demand response in the 100 curtailed hours.

Assuming each reduction occurs on a different day (i.e. 25 days at 4 hours each), please confirm that the impact of the transmission cost savings would translate into an average cost reduction of $30.84 / hour over a 12 hour peak period (i.e., $30,840 / (25 periods * 12 hours / period)).

If not confirmed, what is AMPCO's estimate of the average cost saving (i.e., shadow price) over the 12 hour peak period associated with avoiding the transmission network charge.

c) Please provide the current shadow price for transmission for those customers whose demand at system peak exceeds 85% of their non-coincident (peak period) demand. Please provide the supporting calculations and assumptions.

d) Please provide the current shadow price for transmission for those customers where 85% of non-coincident demand exceeds their coincident peak demand. Please provide the supporting calculations and assumptions.

Response:

a) Because Ontario can exhibit peak days in either summer or winter, it is in fact difficult to predict when the "high five" will occur. This forces the customer to begin peak hunting in January and February. However, once the customer has established a base of "best five" days where it has shifted demand, it will only respond thereafter to days where the forecast demand would exceed the lowest of the current "best five".

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As the year progresses, the bar for deciding to shift demand gradually increases, reducing the uncertainty about whether or not to shift demand on a particular day. However, it would be true that a hot summer following a cold winter would significantly increase the volume of demand response needed for success. This increased response would reduce the benefit for the responding customer while increasing benefits for other customers (i.e., more demand response yields more instances of HOEP reduction).

b) The transmission cost saving is only realized if demand reductions occur during all 5 peak periods, i.e., during 4 hours of 5 days for each of 5 peak periods: for 100 hours. Expressing the realized transmission cost saving on the basis of an average during 12 hour periods would be calculated by $30,840 divided by 25 days having peak periods of 12 hours each, i.e., $30,840 ÷ 300 = $102.80.

c) AMPCO has no specific information about which customers' demand at system peak exceeds 85% of their non-coincident (peak period) demand or by how much.

For the sake of analysis, consider a hypothetical situation in which a customer's peak demand is perfectly concurrent with the system peak demand, and the network charge is determined on the basis of that customer's demand during the system peak, and that the customer then chooses to reduce demand so that the network charge would thereafter be determined based on 85% of the customer's demand between the hours of 0700 and 1900 on working weekdays, and further, that the network charge is applied in 12 months of the year.

In this scenario, the shadow price would be identical to that calculated by AMPCO, i.e., $30,840 per year for each MW of demand response. However, it would require demand reductions during peak periods in 12 months to achieve this saving. Expressed on a per MWh basis, then, the shadow price would be calculated by $30,840 divided by 4 hours in 5 days for each of 12 months, i.e., $30,840 ÷ 720 = $128.50.

The amount of demand response which would result in transmission cost savings also is capped at 15 percent of the customer's demand between the hours of 0700 and 1900 on working weekdays.

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d) Since, in the current regime, there is no transmission cost saving from demand reduction by customers where 85% of non-coincident demand exceeds their coincident peak demand the shadow price would be zero.

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Interrogatory #14

Reference: Page 9

a) The first paragraph suggests that this section is estimating the amount of industrial demand response to a change in transmission prices. However, the table appears to report the impact average demand has on average price. Please reconcile.

b) Please reconcile the use of the months June through September for this analysis with the fact Dr. Sen's analysis (page 3) was based on the months May to August.

c) Table 4 purports to set out the "effect of average demand on average HOEP for 2007 during the on-peak hours and during off-peak hours". Please explain fully (with supporting calculations and schedules):

- What the $0.012 / MWh and $0.010 / MWh values are meant to represent.
- How the $0.012 / MWh and $0.010 / MWh values were calculated.

d) Please explain why it is appropriate and how Dr. Sen's analysis – which estimates the impact of changes in average price on average demand in a period – can be used to determine the impact of demand on price as suggested in Table #4.

e) With respect to Table #4, please clarify what the min/mean/max summer demand values for each industrial sector represent. For example, are they the one-hour minimum, mean and maximum values over the entire summer period?

f) For each industrial sector, please provide the minimum, mean and maximum average 12 hour peak period demands during the summer months for 2007.

g) Please re-do Table #4 using a transmission shadow price of $30.84 / MWh.

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Responses:

a) Understanding the change in transmission rates as the shadow price or opportunity value of transmission cost savings resulting from demand reduction during peak hours, (i.e., expressed on a $/MWh basis), combined with AMPCO's analysis of the effects of changes in demand on HOEP provides a methodological basis for estimating the energy price effects of changes in transmission rates.

   In the first instance, AMPCO estimates the effect on average demand during peak and off-peak periods of changes in average prices. This can be understood as a shift along a demand curve, i.e., as the price rises, demand falls.

   In the second instance, AMPCO estimates the effect of those demand changes on HOEP. This can be understood as a shift in the demand curve, i.e., at the same HOEP, less demand occurs. Less demand occurs for the same level of HOEP because customers are responding to a price signal comprised of HOEP plus a shadow price of transmission.

   We assume that demand reductions take place for an average of 4 hours each day, during 25 days of a year, so that it requires 100 MWh of demand reduction to achieve 1 MW of transmission cost savings.
   Expressing the realized transmission cost saving on the basis of an average during 12 hour periods would be calculated by $30,840 divided by 25 days having peak periods of 12 hours each, i.e., $30,840 ÷ 300 = $102.80.

b) The submission contains a misstatement. The analysis is based on the summer months May through August.

c) These values are estimated coefficients for the effect of changes in demand on HOEP. The complete regression results are provided below. The methodology uses a multivariate regression model to fit a straight line to data points represented by a dependent variable and a single or several independent variables. In other words a linear relationship is assumed between a dependent and a single or several independent variables.

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This methodology reveals not only whether the relationship between the dependent variable and a specific explanatory variable is statistically significant, controlling for other factors, but also gives information on the magnitude of the specific relationship through a coefficient estimate. In the above specification each of the coefficients gives the marginal impact of a 1 unit increase in the explanatory variable with respect to the dependent variable, holding the effects of other possible determinants constant.

The model is known as a 'reduced-form approach' and is a standard approach to evaluate the impacts of demand, costs, and market structure on observable energy prices in a given market. The model is straightforward and intuitive. The Hourly Ontario Energy Price ("HOEP", expressed in $/MWh) is a function of total market demand (MW), imports (MW), exports (MW), gas prices ($/MMBTu), and the mix of power supply between coal, nuclear, gas, and hydro (MW) in each hour. Dummy variables are constructed for each hour, month, and year in order to control for the potentially confounding effects of other unobserved determinants of wholesale electricity prices.

In preparing a response to the interrogatory, a miscalculation was identified in the numbers supporting AMPCO's submission. The corrected numbers are:

Coefficient of Demand on HOEP during peak periods	0.016012
Coefficient of Demand on HOEP during non-peak periods	0.00469

These numbers are expressed in natural units and are interpreted as meaning for every 1000 MW of demand increase during peak periods, HOEP will increase by $16.01/MWh. For every 1000 MW of demand increase during off-peak periods, HOEP will increase by $4.69/MWh.

d) Dr. Sen's analysis to determine the impact of demand on price is documented below. As explained earlier, the methodology used is different from that used to estimate the impact of changes in average price on average demand in a period.

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A. Regression result with peak hours

The SURVEYREG Procedure

Regression Analysis for Dependent Variable hoep

Data Summary

Number of Observations	1599
Mean of hoep	55.40158
Sum of hoep	88587.1

Design Summary

Number of Clusters	13

Fit Summary

R-square	0.5336
Root MSE	19.4315
Denominator DF	12

ANOVA for Dependent Variable hoeep
Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	53.2597446	22.4545588	2.37	0.0353
odem	0.0160120	0.0059967	2.67	0.0204
imp	-0.0089499	0.0070229	-1.27	0.2267
exp	0.0168655	0.0058724	2.87	0.0140
coal	-0.0107080	0.0060929	-1.76	0.1043
gas	-0.0066367	0.0068186	-0.97	0.3496
CERIgp	-5.1416661	1.9671194	-2.61	0.0226
nuclear	-0.0169337	0.0064702	-2.62	0.0225
hydro	-0.0073114	0.0061823	-1.18	0.2599
HHI1	-0.0097013	0.0029131	-3.33	0.0060
day	0.1175944	0.0399269	2.95	0.0123
m5	11.3359143	3.0513855	3.72	0.0030
m6	4.6024678	1.4665779	3.14	0.0086
h7	-1.2462055	2.0363051	-0.61	0.5520
h8	-1.6131161	1.1299073	-1.43	0.1789
h9	0.5094699	0.5528933	0.92	0.3750
h10	6.6918553	0.1291980	51.80	<.0001
h11	6.4505091	0.3350625	19.25	<.0001
h12	11.2999925	0.5157134	21.91	<.0001
h13	11.4616571	0.6736106	17.02	<.0001
h14	8.7898941	0.6697599	13.12	<.0001
h15	7.1847880	0.5653182	12.71	<.0001
h16	5.9423754	0.5727469	10.38	<.0001
h17	7.0016206	0.5525728	12.67	<.0001
h18	3.4487014	0.2851244	12.10	<.0001

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B. Non peak hours

The SURVEYREG Procedure

Regression Analysis for Dependent Variable hoep

Data Summary

Number of Observations	1353
Mean of hoep	32.94302
Sum of hoep	44571.9

Design Summary

Number of Clusters	11

Fit Summary

R-square	0.7306
Root MSE	9.4208
Denominator DF	10

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	-45.507725	11.8919967	-3.83	0.0033
odem	0.004690	0.0026415	1.78	0.1062
imp	0.002425	0.0024808	0.98	0.3515
exp	0.003381	0.0025770	1.31	0.2189
coal	-0.000313	0.0025185	-0.12	0.9035
gas	0.008086	0.0038675	2.09	0.0630
CERIgp	-1.210530	1.9808169	-0.61	0.5548
nuclear	-0.004515	0.0023839	-1.89	0.0875
hydro	-0.002848	0.0022749	-1.25	0.2390
HHI1	0.009426	0.0016959	5.56	0.0002
day	0.143582	0.0314830	4.56	0.0010
m5	1.654817	3.5707928	0.46	0.6530
m6	-2.706608	1.1730698	-2.31	0.0437
h1	-0.344341	1.3895402	-0.25	0.8093
h2	-0.985381	1.5386002	-0.64	0.5363
h3	-0.834814	1.6357733	-0.51	0.6209
h4	-0.421874	1.6421779	-0.26	0.8025
h5	-0.592774	1.5243042	-0.39	0.7055
h20	4.617288	2.3632019	1.95	0.0792
h21	8.645244	2.3106849	3.74	0.0038
h22	0.084083	1.7466861	0.05	0.9626

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e) The values provided are one-hour minimum, mean and maximum values over the entire summer period.

f) The 12-hour min-mean-max values for each industry over the summer period are shown below.

Average Hourly Demand

month=May type=7 am – 7pm

The MEANS Procedure

Variable	N	Mean	Std Dev	Minimum	Maximum
pulp	403	424.7518610	75.1210166	253.0000000	575.0000000
metal	403	531.2059553	37.5149690	422.0000000	601.0000000
iron	403	500.5409429	52.1472293	352.0000000	619.0000000
motor	403	170.7295285	46.1591859	70.0000000	223.0000000
petrol	403	229.2878412	14.4049993	185.0000000	247.0000000

month=May type=other hours

Variable	N	Mean	Std Dev	Minimum	Maximum
pulp	341	520.5982405	58.9162905	256.0000000	607.0000000
metal	341	550.0850440	37.4861752	457.0000000	611.0000000
iron	341	526.1788856	44.6711543	394.0000000	618.0000000
motor	341	160.6979472	38.6764820	71.0000000	213.0000000
petrol	341	230.8533724	12.8713851	186.0000000	243.0000000

month=June type=7am – 7 pm

Variable	N	Mean	Std Dev	Minimum	Maximum
pulp	390	405.8666667	68.2601832	266.0000000	557.0000000
metal	390	480.1564103	36.9784714	390.0000000	588.0000000
iron	390	503.3256410	49.4369231	320.0000000	604.0000000
motor	390	165.8641026	41.1575379	72.0000000	214.0000000
petrol	390	245.7820513	6.9807805	227.0000000	256.0000000

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month=June type=other hours

Variable	N	Mean	Std Dev	Minimum	Maximum
pulp	330	488.1606061	48.3962396	301.0000000	561.0000000
metal	330	498.1666667	36.5925497	400.0000000	596.0000000
iron	330	520.5484848	43.8679188	368.0000000	601.0000000
motor	330	154.4575758	34.2999422	67.0000000	200.0000000
petrol	330	246.9787879	6.5759189	227.0000000	257.0000000

month=July type= 7am – 7 pm

The MEANS Procedure

Variable	N	Mean	Std Dev	Minimum	Maximum
pulp	403	402.7692308	68.2110702	243.0000000	553.0000000
metal	403	473.0496278	45.1226358	374.0000000	581.0000000
iron	403	437.4665012	51.5714328	276.0000000	595.0000000
motor	403	126.7617866	49.3435800	59.0000000	205.0000000
petrol	403	251.0248139	7.6121388	218.0000000	262.0000000

month=July type= other hours

Variable	N	Mean	Std Dev	Minimum	Maximum
pulp	341	485.6363636	54.1341175	314.0000000	570.0000000
metal	341	494.9149560	50.9257976	374.0000000	599.0000000
iron	341	460.1524927	50.0155879	344.0000000	587.0000000
motor	341	119.1583578	44.9135591	60.0000000	188.0000000
petrol	341	251.8240469	10.5623419	173.0000000	262.0000000

month1=8 type=7 am – 7 pm

Variable	N	Mean	Std Dev	Minimum	Maximum
pulp	403	414.2208437	74.5961489	267.0000000	575.0000000
metal	403	547.4813896	28.8810655	469.0000000	604.0000000
iron	403	422.0818859	49.3972701	256.0000000	530.0000000
motor	403	168.3598015	39.1387641	86.0000000	214.0000000
petrol	403	152.6799007	11.4150232	131.0000000	174.0000000

month1=8 type=other hours

Variable	N	Mean	Std Dev	Minimum	Maximum
pulp	341	518.9413490	56.9109942	336.0000000	588.0000000
metal	341	570.2844575	26.0751971	500.0000000	615.0000000
iron	341	441.6862170	38.4867214	322.0000000	544.0000000
motor	341	157.9208211	33.7621813	83.0000000	198.0000000
petrol	341	152.6715543	10.7209545	133.0000000	172.0000000

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g) As explained in AMPCO response to VECC IR 13(b), the correct number is $102.8. The following tables show details of the analysis using this number, including the assumptions and details of formulas used.

Estimated Coefficients of Price with Respect to Demand

Effect of Demand on HOEP during peak periods	0.016012
Effect of Demand on HOEP during non-peak periods	0.00469

Mean Demand by Sector, Summer 2007, Peak and Off-Peak Periods

Year Hour	2007 0700 to 1900	2007 2000 to 2400
Pulp	410.07	491.10
Metal	509.69	535.91
Iron	466.81	487.63
Motor	157.12	148.57
Petrol	219.50	220.34

The Effect of Transmission Rates on Demand in Real-Time

	Industrial demand Summer 2007 Peak Periods	**Average HOEP Summer 2007 Peak Periods**	**Transmission Shadow Price**	**% change in price on-peak**	**Elasticity of Demand with respect to HOEP in Real-Time**	**% change in demand in response to % change in price**	**Average Hourly Change in Demand**	**Effect of demand response on HOEP**
	Qnp	Pnp	T$	(t$+P)/P	e=(dq/pd)*(P/Q)	e*(Q/P)/100	MW	$/MWh
Pulp	410.07				-0.2260794	-1.626%	-18.68	-$0.299
Metal	509.69				-0.045172	-0.404%	-5.77	-$0.092
Iron	466.81	$57.02	$102.80	280%	-0.0439256	-0.360%	-4.70	-$0.075
Motor	157.12							
Petrol	219.50							
Note: statistically insignificant results are excluded							-29	-$0.222

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The Effect of Transmission Rates on Peak Shifting

	Industrial demand Summer 2007 Non-Peak Periods	Average HOEP Summer 2007 Non-Peak Periods	Transmission Shadow Price	% change in price off-peak	Elasticity of Demand: Average HOEP for past 12 hours	% change in demand in response to % change in price	Average Change in Demand	Effect of demand response on HOEP
	Qnp	Pnp	T$	(t$+P)/P	e=(dq/pd)*(P/Q)	e*(Q/P)/100	MW	$/MWh
Pulp	491.10				0.0968973	1.141%	19.42	$0.091
Metal	535.91				0.0581636	0.747%	13.88	$0.065
Iron	487.63	$41.70	$102.80	347%	0.0254336	0.297%	5.03	$0.024
Motor	148.57				0.1505515	0.536%	2.76	$0.013
Petrol	220.34				0.01561346	0.082%	0.63	$0.003
Note: statistically insignificant results are excluded							42	$0.068

The Impact of Transmission Rate Changes on Other Customers

Average industrial demand response during summer months	-29	MW/year
Annual transmission savings per MW	$30,840	$/MW
Total annual industrial transmission savings	-$899,206	$/year
Total annual demand by other customers	132,334,189	MWh
Total summer demand by other customers	44,139,502	MWh
Transmission cost increase to other customers (applies to all MW in the year)	$0.0068	$/MWh
	$899,206	$/year
Net wholesale price change for all customers (applies only to MW during summer months)	-$0.1544	$/MWh
	-$6,813,147	$/year
Net effect on other customers	-$5,913,941	$/year

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Interrogatory #15

Reference: Page 10

a) Using the results for the Pulp and Paper sector, please provide the supporting calculations that show how each of the following values was determined:

- The reported 204% change in demand in response to a change in price
- The reported 175 MW absolute change in demand during the peak periods
- The reported 6 MW demand response as average of summer hours
- The reported $0.07/MWh effect of demand response on HOEP

b) Please explain why a demand reduction was attributed to the Motor sector when the elasticity estimate is "positive", which would suggest a demand increase.

c) Please re-do Table 5 with the following changes:

- Use a transmission shadow price of $30.84 / MWh
- Correct the impacts to recognize that the elasticity estimate for the motor sector is positive.

d) Please confirm that the results set out in Table 5 assume the current transmission shadow price is zero. If this is not the case, please explain why.

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Responses:

a) Using the numbers in the table above, the calculation for the pulp and paper sector is as follows:

   i) Average hourly demand for the pulp and paper sector was 410.07 MW during summer peak periods in 2007, 512.95 MW during off-peak periods;

   ii) The average HOEP during peak periods was $57.02; $41.70 during off-peak periods;

   iii) The transmission shadow price, calculated as an average hourly transmission cost saving during peak-periods (per the response in VECC IR#13(b)), is $102.80/MWh;

   iv) The transmission shadow price therefore represents a change in peak HOEP of 280 percent; 347 percent off-peak;

   v) The elasticity of demand is as estimated by Dr. Sen (-0.2260794 for the pulp and paper sector);

   vi) The percent change in electricity demand by pulp and paper is given by the elasticity times the average demand divided by the average price, all divided by 100;

   vii) This percent is applied to the average demand to calculate the average change in demand resulting from the change in price;

   viii) The change in demand is multiplied by the coefficient of price with respect to demand estimated by Dr. Sen to calculate the effect on HOEP of the change in demand.

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ix) The methodology described above differs in a number of respects from that described in AMPCO's original submission. First, VECC's interrogatories prompted a change to express transmission cost savings on an average basis during peak periods, rather than as a per megawatt-hour value. Second, and as a consequence of the first point, a further review of the analysis revealed an error in a formula which has been corrected. Third, as a result of formulas being corrected, the approach taken in the submission of using minimum and maximum values as lower and upper bounds became unnecessary.

b) The error has been corrected.

c) See response to VECC IR #14 g).

d) See response to VECC IR #13 c).

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Interrogatory #16

Reference: Page 11

a) Using the results for the Pulp and Paper sector, please provide the supporting calculations that show how each of the following values was determined:

- The reported 87% change in demand in response to a change in price
- The reported 129 MW absolute change in demand during the peak periods
- The reported 4 MW demand response as average of summer hours
- The reported $0.04/MWh effect of demand response on HOEP

b) Please confirm that the results set out in Table 6 assume the current transmission shadow price is zero. If this is not the case, please explain why.

Response:

a) See response to VECC IR #15.

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Interrogatory #17

Reference: Page 12

a) Please confirm if the reference to "days of the five highest peaks in Ontario" – means the average of the customer's coincident peak demand on the 5 days with the highest Ontario peaks. If not, what is the intended billing determinant?

b) What is AMPCO's rationale for using the highest 5 days?

c) Please provide a Table that sets out the peak demands in 2007 for the 50 days with the highest Ontario peaks; the day and hour each occurred and what each day's peak is as a percentage of the overall system peak value for 2007.

d) With respect to lines 22-24, how would AMPCO's proposal work in the future if Hydro One Networks requested a two-year rate order?

<u>Response:</u>

a) Confirmed.

b) Please refer to AMPCO's response to EDA IR #1.

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c) This chart was developed in response to this request from IESO hourly demand data:

Order	Date	Hour	Ontario Demand	% of Peak 2007 Ontario Demand
1	26-Jun-07	16	25737	100.0%
2	2-Aug-07	15	25584	99.4%
3	27-Jun-07	14	25467	99.0%
4	1-Aug-07	16	25402	98.7%
5	29-Aug-07	16	25003	97.1%
6	3-Aug-07	13	24642	95.7%
7	8-Aug-07	16	24623	95.7%
8	31-Jul-07	17	24561	95.4%
9	9-Jul-07	15	24473	95.1%
10	10-Jul-07	16	24243	94.2%
11	7-Sep-07	14	24046	93.4%
12	25-Jun-07	16	24038	93.4%
13	13-Feb-07	19	23935	93.0%
14	5-Feb-07	19	23913	92.9%
15	6-Feb-07	19	23621	91.8%
16	6-Sep-07	16	23608	91.7%
17	25-Jan-07	19	23537	91.5%
18	24-Aug-07	16	23497	91.3%
19	7-Feb-07	19	23403	90.9%
20	15-Feb-07	19	23380	90.8%
21	13-Jun-07	16	23338	90.7%
22	16-Jan-07	19	23261	90.4%
23	14-Feb-07	19	23171	90.0%
24	8-Feb-07	19	23092	89.7%
25	30-Jul-07	17	23071	89.6%
26	12-Jun-07	16	23067	89.6%
27	18-Jun-07	16	23028	89.5%
28	29-Jan-07	19	22996	89.3%
29	6-Mar-07	20	22969	89.2%
30	17-Dec-07	18	22935	89.1%
31	30-Jan-07	19	22929	89.1%
32	12-Feb-07	19	22810	88.6%

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33	31-Jan-07	19	22749	88.4%
34	17-Jan-07	19	22719	88.3%
35	19-Feb-07	19	22715	88.3%
36	19-Jun-07	14	22710	88.2%
37	3-Dec-07	18	22679	88.1%
38	24-Jan-07	19	22592	87.8%
39	5-Mar-07	20	22582	87.7%
40	5-Dec-07	18	22550	87.6%
41	11-Dec-07	18	22534	87.6%
42	26-Jan-07	19	22526	87.5%
43	15-Jan-07	18	22479	87.3%
44	13-Dec-07	18	22443	87.2%
45	18-Dec-07	18	22442	87.2%
46	16-Aug-07	16	22432	87.2%
47	25-Sep-07	20	22392	87.0%
48	22-Jan-07	19	22334	86.8%
49	10-Jan-07	18	22295	86.6%
50	6-Dec-07	18	22290	86.6%

d) We would expect that Hydro One would request approval of its revenue requirement for the prospective two years, with actual rates calculated once customer demand information was known. This would reduce the risk that changing demand would result in a transmitter receiving something other than its revenue requirement.

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Interrogatory #18

Reference: Page 13

a) For those industrial customers whose Network Charges are based on 85% of their non-coincident peak demand (in the peak period), please confirm that the current rate design will encourage such customers to:

- Reduce their non-coincident peak demand (in the peak period) through shifting load either within the peak period or to the off peak period

- Manage their coincident peak demand so that it continues to be below 85% of their non-coincident peak demand

- If not confirmed, please explain why not.

Response:

- Slightly over half of the load that is billed on the ratchet is in LDCs (refer to Ex H1/Tab 2/Sch, tables 1&2) and AMCPO does not have specific expertise in how LDCs view transmission rate incentives. For industrial customers, the current design produces an incentive to move to the hours that re not subject to the ratchet. However, because the ratchet applies to all working days between 7:00am and 7:00pm, the cost of achieving significant savings becomes prohibitive if not impossible for any realistic production operation.

- The current design does provide a limited incentive to reduce peak demand, but only to the 85% level. The fact that the incentive disappears at peak periods once the 85% threshold is reached is the basic problem with the current design.

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Interrogatory #19

Reference: Page 13, lines 18-28

a) Is it AMPCO's view that under its proposed rate design both working capital allowances and allowed ROE values could be reduced?

b) If the response to part (a) is yes, please provide AMPCO's estimate as to the reduction that could made in each case?

c) Under the AMPCO proposal transmission charges to industrial customers will be based on loads in the previous year. To the extent loads vary from year to year due to economic conditions and overall production levels, this means that there will be a disconnect between a industrial users transmission charge and the level of production in the same year. Does AMPCO or its members have any concerns regarding the impact this disconnect could have on the customers' reported financial results in a given year? (For example, if a high production year was followed by a low production year, the transmission charges in the second year would be reflect the higher production levels and deflate the reported earnings in the second year)

Response:

a) The proposed rate design would provide transmitters with a predictable revenue stream. In principle this should enable reductions in working capital. Also, since customers will pay a pre-determined billing amount, billing lag (meter-to-cash) could be reduced. The revenue surety that follows from AMPCO's proposal should also reduce risk for the transmitter, but it is difficult to project this specifically to ROE.

b) AMPCO has not calculated specific effects on working capital or ROE.

c) There is a risk that declining demand will result in higher than expected costs in the future year. This may be aggravated by conservation measures that all industries pursue to reduce their energy use overall. However, the offsetting benefit is predictability of input cost, which is important for most companies.

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Interrogatory #20

Reference: Pages 14-16

a) With respect to Table #7, please provide a schedule that indicates for each year (2003 - 2008) the number of hours the Ontario demand was higher than the peak on the 5th highest day.

b) Please confirm that, under the AMPCO proposal, a customer has no incentive to manage its load (from a transmission pricing perspective) over the balance of the day once it knows the peak demand for the day has passed. If not confirmed, please explain why.

c) If the objective is simply to avoid the system peak, then can a customer avoid the transmission price simply by shifting load to an hour in the peak period when the system peak will not occur?

d) The strategies outlined on pages 14-15 would appear to work best when the customer can react (and change demand) in real time (i.e., in response to the observed demand on day in question).

- How many of the industrial customers in the five sectors analyzed are dispatchable loads and therefore have demonstrated such a capability?

- What percentage of the total load in each sector is "dispatchable"?

e) Has AMPCO reviewed accuracy of the IESO's day ahead load forecasts to determine the extent to which they can be used to identify system peak days and what level of confidence can be attached to such forecasts?

f) Would relying on the day ahead load forecast increase the number days (and/or hours) over which load curtailment would have to occur in order to reduce demand during the 5 "peak days"? If not, please explain why not.

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Response:

a) Requested data:

Year	2003	2004	2005	2006	2007	2008
Peak 5th day	23891	23976	25816	24857	25003	23309
Hrs greater	15	13	9	32	18	17

In 2005, one of the 9 hours counted was equal to the peak on the fifth highest day.

b) Confirmed, with caveat that "knowing" the peak has passed will normally require extending demand response beyond the actual peak, which can only be known retrospectively.

c) If the customer could know exactly when the peak would actually occur, this might be possible. However, the actual time of the peak is already difficult to predict, since weather and market behaviour by other participants can cause the peak to shift. Moreover, implementation of AMPCO's proposal will result in additional uncertainty about the timing of the peak, as the exercise of peak hunting by multiple participants should make timing more volatile.

d) AMPCO does not have exact data on which of its members are currently dispatchable and which are actively dispatchable. Moreover, dispatchability does not automatically imply that a load is always able to respond to a dispatch instruction or other market signal. Some types of load are inherently more flexible than others. Within AMPCO, members do not normally share data on their level of dispatchability, as this is regarded as competitive information.

e) AMPCO has not conducted its own analysis on day ahead demand forecasts. Since the highest peak demands in the year are quite sensitive to weather influences, the IESO forecasts can be assumed to be useful primarily as a type of "heads up" forecast that would guide a customer to prepare for possible action the following day. The Market Surveillance Panel (MSP) does check the accuracy of the three hour pre-dispatch demand forecast and these reports can be found at :
http://www.oeb.gov.on.ca/OEB/Industry+Relations/Market+Surveillance+Panel/Market+Surveillance+Panel+Reports .

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Indications from the MSP reports are that the 3 hour predispatch peak demand forecast has a daily mean error of less than 2%. It is not known at this time if the error is greater on peak days.

f) Relying on the day ahead forecast would logically increase the number of days that a customer would have to take response measures, since the uncertainty of peak demand increases with the forecast horizon.

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Interrogatory #21

Reference: Pages 16-17

a) With respect to page 17 (lines 6-8), the projects set out in Tables 4 & 5 (Exhibit D1/Tab 3/Schedule 3) appear to be customer and generator connection projects. Is it AMPCO's contention that the cost of these projects will be recovered through the Transmission Network Charge?

Response:

a) No. With the exception of part of the Lower Mattagami Extensions (D38), these are all enhancements to connection facilities. It is AMPCO's contention that these projects are being driven primarily by growth in demand and that its proposal will act to incent behaviour that will moderate growth in demand. While AMPCO's proposal is focussed on energy cost and the cost of network service, it is also recognized that the requirement for new assets downstream of the network will be moderated by any behaviour that reduces growth in peak demand.