

BEFORE THE
STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

In the Matter of
Orange and Rockland
Case 07-E-0949
December 2007

Prepared Exhibits of:

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Orange and Rockland
Interrogatory Responses Used in Direct Testimony

<u>DPS Request Number</u>	<u>Response Set</u>	<u>Response Date</u>	<u>Subject</u>
28	DPS3	September 28, 2007	Forecasting Model Data
98	DPS9	November 9, 2007	Macroeconomic Data

Sales models:

Residential Sales per Customer

Dependent Variable: $\log(\text{ORRES_V} / \text{ORRES_C})$

Method: Maximum likelihood (Marquardt)

State Space Model

Sample: 1990Q1 2006Q4

Included observations: 68

Valid observations: 64

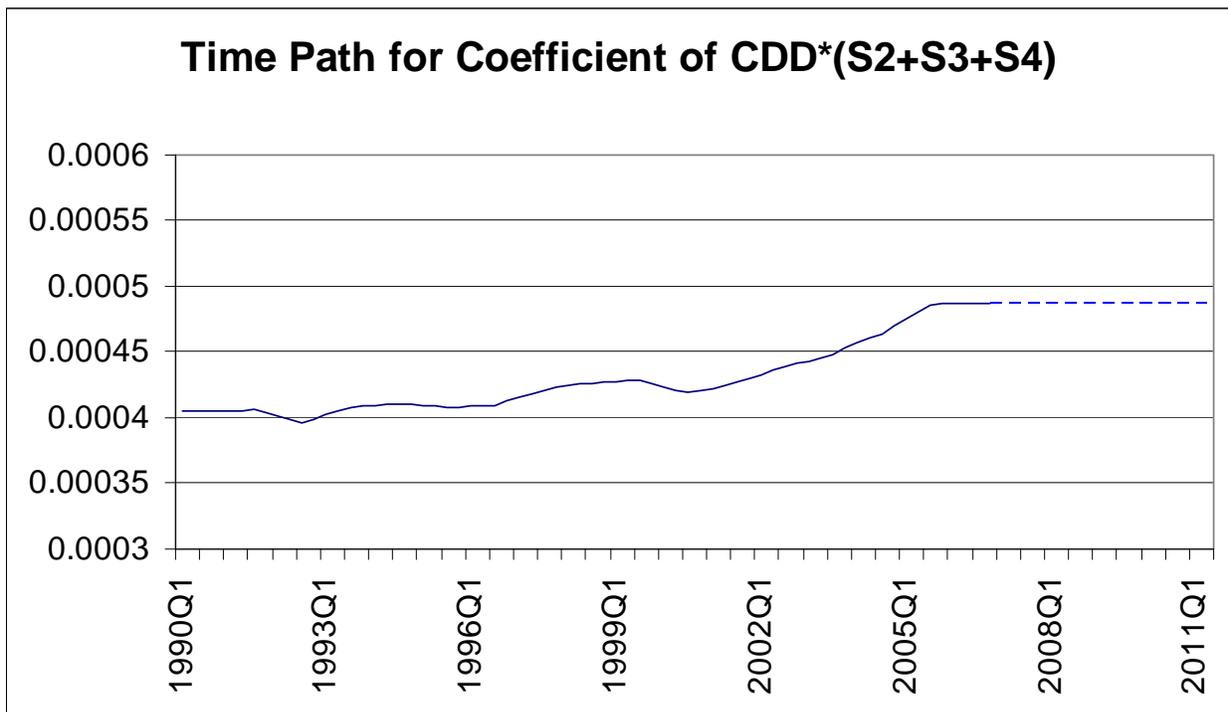
Regressor	Coefficient	Std. Error	z-Statistic	Prob.
Constant	-6.857659	0.661237	-10.37096	0.0000
HDD*(S2+S4)	0.000254	2.74E-05	9.261827	0.0000
HDD*S1	0.000159	1.28E-05	12.48934	0.0000
$\log(\text{Price}) [-2]$	-0.071515	0.053868	-1.327583	0.1843
$\log(\text{Real PI} / \text{Cust.}) [-4]$	0.510765	0.089429	5.711406	0.0000
$\log\{(\text{Res. Use} / \text{Cust.}) [-4]$ $\text{*}(\text{BD} / \text{BD}[-4])\}$	0.332942	0.055765	5.970410	0.0000
	Final State	Root MSE	z-Statistic	Prob.
CDD*(S2+S3+S4)	0.000488*	2.07E-05	23.51247	0.0000
Log likelihood	113.6617*	Akaike info criterion	-3.301927	
Parameters	8	Schwarz criterion	-3.032067	
Diffuse priors	1	Hannan-Quinn criter.	-3.195616	

*The estimated coefficient from the corresponding fixed-parameter regression is 0.000423, and the log likelihood is 109.6205. The statistic for the likelihood ratio test is 8.082, and the critical value at the one percent level is 6.635.

Key to abbreviations:

- S1 – S4 represent quarterly dummy variables - they take on the value 1 in the indicated quarter, and zero otherwise;
- HDD and CDD represent quarterly, billing-cycle based heating and cooling degree days, respectively;

- Price [-2] is the average electric price paid by residential customers, deflated by the Consumer Price Index for All Urban Consumers (NY area), lagged two quarters;
- (Real PI / Cust) [-4] is Economy.com's estimate of real personal income for Newburgh plus Rockland divided by the corresponding number of residential customers (ORRES_C), subsequently lagged four quarters;
- (Res. Use / Cust.) [-4] is the dependent variable lagged four quarters; (BD / BD[-4]) adjusts this usage to account for the current quarter's number of billing days relative to the prior year's quarter;
- The estimated coefficient of $CDD*(S2+S3+S4)$ is allowed to vary over the sample period – it is modeled as a “random walk” - and is projected out at its final value.



(Smoothed State Variable Estimates)

Small Commercial Sales per Customer

Dependent Variable: $\log(\text{ORSECPRI2_V} / \text{ORSECPRI2_C})$

Method: Least Squares

Sample (adjusted): 1990Q3 2007Q2

Included observations: 68 after adjustments

Convergence achieved after 9 iterations

Backcast: 1990Q1 1990Q2

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-9.361646	0.333302	-28.08756	0.0000
S2	0.088660	0.017614	5.033433	0.0000
HDD*(S1+S4)	9.60E-05	6.81E-06	14.09889	0.0000
CDD*(S2+S3+S4)	0.000244	1.17E-05	20.91262	0.0000
$\log(\text{Price}) [-2]$	-0.036281	0.030001	-1.209330	0.2313
$\log(\text{Employment}*\text{BD})$	0.462955	0.029993	15.43545	0.0000
MA(1)	0.486627	0.115024	4.230645	0.0001
MA(2)	-0.509297	0.115590	-4.406054	0.0000
R-squared	0.936843	Mean dependent var	-4.814520	
Adjusted R-squared	0.929475	S.D. dependent var	0.097446	
S.E. of regression	0.025878	Akaike info criterion	-4.360693	
Sum squared resid	0.040181	Schwarz criterion	-4.099574	
Log likelihood	156.2636	F-statistic	127.1449	
Durbin-Watson stat	2.112253	Prob(F-statistic)	0.000000	
Inverted MA Roots	.51	-1.00		

- S1 – S4 represent quarterly dummy variables - they take on the value 1 in the indicated quarter, and zero otherwise;
- HDD and CDD represent quarterly, billing-cycle based heating and cooling degree days, respectively;
- Price [-2] is the average electric price paid by secondary customers, deflated by the GDP Price Deflator, lagged two quarters;
- Employment is the seasonally-unadjusted quarterly employment for Newburgh and Rockland, as calculated by Economy.com, and “BD” is the class-specific number of billing days.
- MA(1) and MA(2) are moving average error terms for one- and two-quarter lags.

Large Primary Sales

Dependent Variable: D{log(ORPRI_V)}

Method: Least Squares

Sample (adjusted): 1991Q1 2007Q2

Included observations: 66 after adjustments

Convergence achieved after 8 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D{CDD*(S2+S3+S4)}	0.000101	1.24E-05	8.208607	0.0000
D{log(Price)} [-1]	-0.038354	0.050425	-0.760612	0.4500
D{log(Employment*BD)}	0.668559	0.189143	3.534669	0.0008
D{log(ORPRI_C)}	0.222364	0.418330	0.531550	0.5971
D{D_2006_Q1}	-0.059757	0.044677	-1.337541	0.1863
D{D_2006_Q2ON}	-0.103688	0.046628	-2.223724	0.0301
AR(1)	-0.273785	0.109404	-2.502521	0.0152
AR(2)	-0.580351	0.109158	-5.316618	0.0000
R-squared	0.841253	Mean dependent var		0.002120
Adjusted R-squared	0.822093	S.D. dependent var		0.105867
S.E. of regression	0.044654	Akaike info criterion		-3.266547
Sum squared resid	0.115649	Schwarz criterion		-3.001134
Log likelihood	115.7961	Durbin-Watson stat		1.787359
Inverted AR Roots	-.14-.75i	-.14+.75i		

• S2 – S4 represent quarterly dummy variables - they take on the value 1 in the indicated quarter, and zero otherwise;

• D{log(ORPRI_V)} is the first difference of sales to large primary-class customers. As there is no linear trend term in the equivalent levels model, a constant term is therefore omitted from the estimated difference equation;

• CDD represents quarterly, billing-cycle based cooling degree days;

• Price [-1] is the average electric price paid by primary customers, deflated by the GDP Price Deflator, lagged one quarter;

• Employment is the seasonally-unadjusted quarterly employment for Newburgh and Rockland, as calculated by Economy.com, and “BD” is the class-specific number of billing days;

• ORPRI_C is the number of customers in the large primary class;

- D_{2006_Q1} is a dummy variable that takes on the value 1 in the first quarter of 2006 and zero otherwise. It is intended to capture the effect on sales of a large primary customer transitioning to self-supply;
- D_{2006_Q2ON} is a dummy variable that takes on the value 1 beginning with the second quarter of 2006, and zero for earlier time periods. It is intended to capture the permanent impact on sales of a large primary customer having switched to self-supply;
- $AR(1)$ and $AR(2)$ are autoregressive error terms for one- and two-quarter lags.

Lighting Sales per Customer

Dependent Variable: $D\{\log(\text{ORLTG_V} * \text{LTG_BDM} / \text{ORLTG_C}),0,4\}$

Method: Least Squares

Sample (adjusted): 1995Q1 2007Q2

Included observations: 50 after adjustments

Convergence achieved after 9 iterations

Backcast: 1994Q1 1994Q4

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SAR(4)	0.305932	0.147778	2.070216	0.0438
SMA(4)	-0.962154	0.040213	-23.92654	0.0000
R-squared	0.319693	Mean dependent var		0.001781
Adjusted R-squared	0.305520	S.D. dependent var		0.076391
S.E. of regression	0.063661	Akaike info criterion		-2.631313
Sum squared resid	0.194530	Schwarz criterion		-2.554832
Log likelihood	67.78282	Durbin-Watson stat		2.189523
Inverted AR Roots	.74	.00+.74i	-.00-.74i	-.74
Inverted MA Roots	.99	-.00+.99i	-.00-.99i	-.99

- $D\{\log(\text{ORLTG_V} * \text{LTG_BDM} / \text{ORLTG_C}),0,4\}$ is the seasonal difference of per-customer lighting sales that have been normalized by a billing day multiplier (“LTG_BDM”, equal to $\text{BDA_BASE} / \text{BDA}$) to the 1990 billing cycle prior to model estimation;
- SAR(4) and SMA(4) are seasonal autoregressive and seasonal moving average error terms.

Public Authority (West Point) Sales

Dependent Variable: log(ORWP_V)

Method: Least Squares

Sample (adjusted): 1994Q1 2007Q2

Included observations: 54 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-5.157144	0.870573	-5.923847	0.0000
CDD*(S2+S4)	0.000280	8.21E-05	3.403228	0.0014
CDD*S3	0.000165	3.15E-05	5.247046	0.0000
HDD*(1-S3)	4.20E-05	1.44E-05	2.918818	0.0053
log{ORWP_V [-4] * (BD/BD [-4])}	0.379647	0.105525	3.597696	0.0008
log(Employment*BD)	0.719546	0.118458	6.074265	0.0000
R-squared	0.947273	Mean dependent var		3.032830
Adjusted R-squared	0.941780	S.D. dependent var		0.152740
S.E. of regression	0.036854	Akaike info criterion		-3.659249
Sum squared resid	0.065196	Schwarz criterion		-3.438251
Log likelihood	104.7997	F-statistic		172.4693
Durbin-Watson stat	1.912996	Prob(F-statistic)		0.000000

- S2 – S4 represent quarterly dummy variables - they take on the value 1 in the indicated quarter, and zero otherwise;
- HDD and CDD represent quarterly, billing-cycle based heating and cooling degree days, respectively;
- ORWP_V[-4] is the dependent variable lagged four quarters; (BD / BD[-4]) adjusts this usage to account for the current quarter's number of billing days relative to the prior year's quarter;
- Employment is the seasonally-unadjusted quarterly employment for Newburgh and Rockland, as calculated by Economy.com, and "BD" is the class-specific number of billing days.

Unbilled Sales

Dependent Variable: UNBILLED

Method: Least Squares

Sample (adjusted): 1997Q1 2007Q2

Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-9.732741	5.007035	-1.943813	0.0592
CDD: May - June	0.170543	0.021617	7.889314	0.0000
CDD: July - Sept.	-0.013564	0.007774	-1.744715	0.0889
R-squared	0.680534	Mean dependent var		4.088119
Adjusted R-squared	0.664151	S.D. dependent var		39.91448
S.E. of regression	23.13143	Akaike info criterion		9.189011
Sum squared resid	20867.45	Schwarz criterion		9.313130
Log likelihood	-189.9692	F-statistic		41.53938
Durbin-Watson stat	1.681800	Prob(F-statistic)		0.000000

• UNBILLED is estimated from company data on a quarterly basis as 94.9% of sendout - i.e., net of losses - less billed sales and the Company's own-use;

• CDD: m1-m2 represents total cooling degree days over the indicated monthly time span.

Customer count models:

Residential Customers

Dependent Variable: $D\{\log(\text{ORRES_C})\}$

Method: Least Squares

Sample (adjusted): 1991Q2 2006Q4

Included observations: 63 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$D\{\log(\text{ORRES_C})\} [-4]$	0.744303	0.078592	9.470449	0.0000
$D\{\log(\text{Population})\}$	0.210493	0.083445	2.522543	0.0143
R-squared	0.555037	Mean dependent var		0.002676
Adjusted R-squared	0.547742	S.D. dependent var		0.001580
S.E. of regression	0.001062	Akaike info criterion		-10.82546
Sum squared resid	6.88E-05	Schwarz criterion		-10.75742
Log likelihood	343.0020	Durbin-Watson stat		2.113772

• $D\{\log(\text{ORRES_C})\}$ is the first difference of the number of residential customers. As there is no linear trend term in the equivalent levels model, a constant term is therefore omitted from the estimated difference equation;

• $D\{\log(\text{ORRES_C})\} [-4]$ is the first difference of the number of residential customers in the prior year's quarter;

• $D\{\log(\text{Population})\}$ is the first difference in Economy.com's estimate of population for Newburgh plus Rockland.

Small Commercial Customers

Dependent Variable: log(ORSECPRI2_C)

Method: Least Squares

Sample (adjusted): 1990Q2 2007Q2

Included observations: 69 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.766834	0.153711	4.988810	0.0000
S4	-0.009381	0.000934	-10.03926	0.0000
log(ORSECPRI2_C) [-1]	0.882817	0.023740	37.18733	0.0000
log(Employment)	0.082598	0.017329	4.766550	0.0000
R-squared	0.998583	Mean dependent var	10.07173	
Adjusted R-squared	0.998517	S.D. dependent var	0.086068	
S.E. of regression	0.003314	Akaike info criterion	-8.525146	
Sum squared resid	0.000714	Schwarz criterion	-8.395633	
Log likelihood	298.1175	F-statistic	15267.70	
Durbin-Watson stat	2.061469	Prob(F-statistic)	0.000000	

- S4 is a dummy variable for the months October-December – it takes on the value 1 during these months and zero otherwise;
- ORSECPRI2_C [-1] is the dependent variable lagged one quarter;
- Employment is the seasonally-unadjusted quarterly employment for Newburgh and Rockland, as calculated by Economy.com.