

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
PUBLIC UTILITIES COMMISSION

IN RE: REVIEW OF PROPOSED TOWN OF :  
NEW SHOREHAM PROJECT :  
PURSUANT TO R.I. GEN. LAWS : DOCKET NO. 4111

MAGGIE DELIA AND MICHAEL DELIA'S RESPONSE  
TO PUBLIC UTILITIES COMMISSION FIRST SET OF DATA  
REQUESTS

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January 29, 2010

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
PUBLIC UTILITIES COMMISSION

IN RE: REVIEW OF PROPOSED :  
TOWN OF NEW SHOREHAM :  
PROJECT PURSUANT TO : DOCKET NO. 4111  
R.I. GEN. LAWS § 39-26.1-7 :

COMMISSION'S FIRST SET OF DATA REQUESTS  
TO MICHAEL AND MAGGIE DELIA  
(Issued January 22, 2010)

1-1. (To Mr. Short): Mr. Hashway of EDC argues that "Stability in pricing provides a hedge against upward fluctuations in price, which can spur investment and economic development." How much would energy prices have to fluctuate upwards in order for the PPA pricing to provide a hedge against upward fluctuations in price that would be to the benefit of customers?

I analyzed three scenarios in the preparation of my answer:

- National Grid Base Case, using various parts of testimony filed by National Grid employees or its consultants;
- Low Spot Energy Price Case, using a constant \$20 per MWh reduction in the energy prices used in the National Grid Base Case and my forecast of REC prices; and
- High Spot Energy Price Case, using a constant \$15 per MWh reduction in the energy prices used in the National Grid Base Case and my forecast of REC prices.

In this answer, in each case, the breakeven energy prices were calculated which would reduce the above-market cost of the Project to zero for each year of operations (2012-2032); thus, making the ratepayer indifferent as to whether the Project is built or not. A detailed explanation of the methodology used to calculate this answer follows. This explanation is helpful to understand the magnitude by which the forecasted market value of energy must rise in order for the Project not to produce adverse ratepayer impacts.

**Explanation of Methodology Used To Calculate Breakeven Prices**

The two documents filed as part of National Grid testimony were used as the basis to calculate breakeven energy prices. The first document is Page 1 of 3 of Attachment DIV 1-16-6 to National Grid responses to the first set of data requests. That document is attached and is marked as Exhibit A. The second document is page 1 of 2 of Attachment

DIV 1-16-7 to National Grid responses to the first set of data requests. That document is attached and is marked as Exhibit B.

Using the first document (DIV 1-16-6), I “back-calculated” the following:

- the contract payments due to the Project;
- the market value of the bundled energy<sup>1</sup> produced by the Project;
- the market value of the bundled energy in dollars per megawatt-hour (hereinafter referred to as MWh) produced by the Project;
- the above-market cost in dollars per MWh; and
- the percent that the above-market cost exceeds the market value of the Project.

This analysis is attached as Exhibit C. The above-market cost in dollars per MWh is marked in yellow and the column is titled “Above-Market Cost.”

Since National Grid redacted the components of the Energy Security and Analysis, Inc. (hereinafter referred to as ESAI) Rhode Island Forecast, it is impossible to determine the energy component of its above-market analysis. I, instead, used the Synapse Energy Economics, Inc. (hereinafter referred to as Synapse) Rhode Island Forecast (DIV 1-16-7) and “back-calculated” the energy price for the National Grid Base Case, assuming that both the ESAI and Synapse forecasts use the same REC and capacity prices. This analysis is attached as Exhibit D. The energy prices are marked in blue and the column is titled “Revised Synapse RI Energy Price.”

In order to check the accuracy of this assumption, the difference between the Synapse energy price forecast and the energy price forecast used as a substitute for the ESAI Rhode Island Forecast was calculated. This energy price forecast was on the average within approximately \$3.10 per MWh and 3.61% of the Synapse Rhode Island Forecast. Consequently, I believe that this energy price forecast used as a substitute for the ESAI Rhode Island Forecast is an accurate calculation of the forecasted energy prices used in the ESAI Rhode Island Forecast that National Grid redacted. This analysis is also shown on Exhibit D.

Regarding the National Grid Base Case, the breakeven energy price was calculated by adding together the column titled “Above-Market Cost” from Exhibit C and the column titled “Revised Synapse RI Energy Price” from Exhibit D. The percentage by which that the “Above-Market Cost” exceeds the “Revised Synapse RI Energy Price Forecast” was also calculated. This analysis is shown on Exhibit E.

The column titled “National GRID Above-Market Cost” is the price increase that would have to occur in forecasted energy prices in order for the Project contract to have no adverse ratepayer impact. For nearly the life of the Project, these price increases would have to average over \$190.00/MWh above the forecasted market value of the energy produced. The column titled “Percent Breakeven Energy Cost Exceed Revised Synapse RI Energy Price” is percentage by which the Project energy costs would have to exceed

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<sup>1</sup> National Grid refers to the combination of energy, capacity and renewable energy certificates (hereinafter referred to as REC) as “bundled energy” and uses dollars per MWh to price it.

DIV 1-16-7 to National Grid responses to the first set of data requests. That document is attached and is marked as Exhibit B.

Using the first document (DIV 1-16-6), I “back-calculated” the following:

- the contract payments due to the Project;
- the market value of the bundled energy<sup>1</sup> produced by the Project;
- the market value of the bundled energy in dollars per megawatt-hour (hereinafter referred to as MWh) produced by the Project;
- the above-market cost in dollars per MWh; and
- the percent that the above-market cost exceeds the market value of the Project.

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Regarding the National Grid Base Case, the breakeven energy price was calculated by adding together the column titled “Above-Market Cost” from Exhibit C and the column titled “Revised Synapse RI Energy Price” from Exhibit D. The percentage by which that the “Above-Market Cost” exceeds the “Revised Synapse RI Energy Price Forecast” was also calculated. This analysis is shown on Exhibit E.

The column titled “National GRID Above-Market Cost” is the price increase that would have to occur in forecasted energy prices in order for the Project contract to have no adverse ratepayer impact. For nearly the life of the Project, these price increases would have to average over \$190.00/MWh above the forecasted market value of the energy produced. The column titled “Percent Breakeven Energy Cost Exceed Revised Synapse RI Energy Price” is percentage by which the Project energy costs would have to exceed

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<sup>1</sup> National Grid refers to the combination of energy, capacity and renewable energy certificates (hereinafter referred to as REC) as “bundled energy” and uses dollars per MWh to price it.

the forecasted market prices of the energy produced. For nearly the life of the Project, these percentages would nearly have to average of 160% above the forecasted market value of the energy produced.

The various energy and REC inputs used in the "Low Spot Energy Price Case" and "High Spot Energy Price Case" were next calculated. For the Low Spot Energy Price Case, a constant \$20 per MWh was subtracted from the column titled "Revised Synapse RI Energy Price Forecast." For the High Spot Energy Price Case, a constant \$15 per MWh was subtracted from the column titled "Revised Synapse RI Energy Price Forecast." This analysis is shown on Exhibit F. The Low Spot Energy Price Case energy numbers are marked in light brown and the High Spot Energy Price Case numbers are marked in green. Also on this exhibit, the REC forecast prepared by Synapse and shown on Exhibit B and my REC price forecast are listed. My REC price forecast was incorporated into both the Low and High Spot Energy Price Case analysis.

Using the \$20/MWh constant downward adjustment to the energy price (Low Spot Energy Price Breakeven Analysis, Exhibit G), the breakeven energy price and the breakeven energy price difference both in MWh as well as a percentage of the forecasted market value of energy were next calculated and analyzed.

The column titled "Breakeven Energy Price Difference" is the price increase that would have to occur in forecasted energy prices in order for the Project contract to have no adverse ratepayer impact. For nearly the life of the Project, these price increases would have to average over \$235.00/MWh above the forecasted market value of the energy produced. The column titled "Percent Breakeven Energy Price Difference" is percentage by which Project energy costs would exceed the forecasted market prices of the energy produced. For nearly the life of the Project, these percentages would nearly have to average 250% above the forecasted market value of the energy produced.

Using the \$15/MWh constant downward adjustment to the energy price (High Spot Energy Price Breakeven Analysis, Exhibit H), the breakeven energy price and the breakeven energy price difference both in MWh as well as a percentage of the forecasted market value of energy were next calculated and then analyzed.

The column titled "Breakeven Energy Price Difference" is the price increase that would have to occur in forecasted energy prices in order for the Project contract to have no adverse ratepayer impact. For nearly the life of the Project, these price increases would have to average over \$230.00/MWh above the forecasted market value of the energy produced. The column titled "Percent Breakeven Energy Price Difference" is percentage by which Project energy costs would exceed the forecasted market prices of the energy produced. For nearly the life of the Project, these percentages would nearly have to average 230% above the forecasted market value of the energy produced.

## **Conclusions**

For the National Grid Base Case, the average market value price of energy for the Project was calculated as \$116.81/MWh, the average above market value price of energy for the Project was calculated as \$192.50/MWh, the average breakeven price of energy for the Project was calculated as \$309.32/MWh and the percentage the average market value of energy for the Project would have to increase to for the Project not to have above-market costs was calculated as 163.01%. Thus, for the Project, the energy prices would have to fluctuate upward by \$192.50/MWh or 163.01% for the power purchase agreement (hereinafter defined as the PPA) pricing to provide a hedge against upward fluctuations in price that would be to the benefit of customers.

For the Low Spot Energy Price case, the average market value price of energy for the Project was calculated as \$96.81/MWh, the average above market value price of energy for the Project was calculated as \$236.03/MWh, the average breakeven price of energy for the Project was calculated as \$332.84/MWh and the percentage the average market value of energy for the Project would have to increase to for the Project not to have above-market costs was calculated as 248.25%. Thus, for the Project, the energy prices would have to fluctuate upward by \$236.03/MWh or 248.25% for the PPA pricing to provide a hedge against upward fluctuations in price that would be to the benefit of customers.

For the High Spot Energy Price case, the average market value price of energy for the Project was calculated as \$101.81/MWh, the average above market value price of energy for the Project was calculated as \$231.03/MWh, the average breakeven price of energy for the Project was calculated as \$332.84/MWh and the percentage the average market value of energy for the Project would have to increase to in for the Project not to have above-market costs was calculated as 229.59%. Thus, for the Project, the energy prices would have to fluctuate upward by \$231.03/MWh or 229.59% for the PPA pricing to provide a hedge against upward fluctuations in price that would be to the benefit of customers.

An analogy may help to explain what is being proposed here. Assume that instead of the electricity market, we are discussing the home heating oil market. The cash price for home heating oil is \$2.00-\$2.25 a gallon, the 2013 futures price is \$2.75 per gallon and the 2032 futures price is \$5.50 per gallon. My answer of subtracting a constant amount from the futures prices supports a cash market price in 2013 of \$2.00 to \$2.25 per gallon and a 2032 price of \$4.75 to \$5.00 per gallon. The National Grid testimony supports a 2013 price of home heating oil of \$2.75 per gallon and a 2032 price of \$5.50 per gallon. On the other hand, the contract for the Project calls for a price for home heating oil of \$5.50 per gallon in 2013 (a price double the 2013 futures price) and a price of \$16.00 per gallon in 2032 (a price nearly triple the 2032 futures price). Accordingly, it is evident that the cost of the Project represents sizeable cost increases, both in dollars per MWh and percent, over what both National Grid and I have forecast, with my analysis being the one to occur.

**CERTIFICATE OF SERVICE**

In accordance with Rule 1.7D of the Rules of Practice and Procedure of the Public Utilities Commission, I hereby certify that on the 29<sup>th</sup> day of January, 2010, a copy of the within was mailed electronically to the attached service list.

Danielle Deely

National Grid -- Review of Proposed Town of New Shoreham Project  
Docket No. 4111 - Service List Updated 1/14/2010

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REDACTED VERSION

Attachment DIV 1-16-6  
Docket No. 4111  
Responses to Division - Set 1

EXHIBIT A

ESAI Rhode Island Forecast					8 WTG Project 11.52 MW: 20 year contract term				
	Energy 7x24	RI REC Forecast	Energy & RECs	Capacity \$/kW-mo	Delivered Energy MWh	Bundled Energy Rate \$/MWh	Above Market Cost	Monthly Summary (from below)	% over 24x7 forecast
2009					N/A	\$ 212.63			
2010									
2011									
2012					17,660	\$ 235.75	\$ 1,934,724	\$ 1,274,587	
2013					100,915	\$ 244.00	\$ 12,377,137	\$ 12,174,342	
2014					100,915	\$ 252.54	\$ 13,731,628	\$ 13,521,057	
2015					100,915	\$ 261.38	\$ 13,725,001	\$ 13,506,278	98.4%
2016					100,915	\$ 270.52	\$ 13,418,825	\$ 13,190,914	98.3%
2017					100,915	\$ 279.99	\$ 13,620,891	\$ 13,405,258	98.4%
2018					100,915	\$ 289.79	\$ 13,948,124	\$ 13,727,197	98.4%
2019					100,915	\$ 299.94	\$ 14,302,924	\$ 14,077,476	98.4%
2020					100,915	\$ 310.43	\$ 14,804,580		
2021					100,915	\$ 321.30	\$ 15,978,725		
2022					100,915	\$ 332.54	\$ 17,059,630		
2023					100,915	\$ 344.18	\$ 18,356,944		
2024					100,915	\$ 356.23	\$ 19,998,948		
2025					100,915	\$ 368.70	\$ 21,765,986		
2026					100,915	\$ 381.60	\$ 23,318,612		
2027					100,915	\$ 394.96	\$ 24,290,747		
2028					100,915	\$ 408.78	\$ 25,309,776		
2029					100,915	\$ 423.09	\$ 26,378,181		
2030					100,915	\$ 437.90	\$ 27,498,586		
2031					100,915	\$ 453.22	\$ 28,693,036		
2032					100,915	\$ 469.09	\$ 29,946,727		
							\$ 390,459,730		
NPV @ 7%							\$ 173,871,638		

Eight 3.6 MW Siemens wind turbine generators for a combined  
Capacity Factor for FCM 28%

28.8 MW

# EXHIBIT B

Attachment DIV 1-16-7  
Docket No. 4111  
Responses to Division - Set 1

SYNAPSE

Synapse Rhode Island Forecast					6 WTG Project 6.64 MW, 15 year contract term					6 WTG Project 6.64 MW, 20 year contract term				
	Energy TWh	Rt REC Forecast	Energy & REC's	Capacity \$/MWh	Delivered Energy MWh	Bundled Energy Rate \$/MWh	Above Market Cost	Seasonal Summary (Synapse)	Delivered Energy MWh	Bundled Energy Rate \$/MWh	Above Market Cost	% over ERAI 24x7 forecast	Seasonal Summary (Synapse)	% over ERAI 24x7 forecast
2008	\$ 58.25	\$ 37.50	\$ 98.75		N/A	\$ 308.55			N/A	\$ 268.00				
2010	\$ 64.67	\$ 36.80	\$ 101.47											
2011	\$ 70.83	\$ 36.10	\$ 107.02	32.93	13245.1	\$ 353.23	\$ 3,783,620	\$ 3,185,443	13245.1	\$ 307.13	\$ 2,305,471	101.8%	\$ 2,871,953	119.0%
2012	\$ 75.48	\$ 41.30	\$ 116.88	\$1.41	75688.4	\$ 344.80	\$ 17,173,890	\$ 17,102,133	75688.4	\$ 307.53	\$ 14,344,489	101.8%	\$ 14,288,805	101.3%
2013	\$ 77.53	\$ 44.00	\$ 123.48	\$1.44	75688.4	\$ 358.97	\$ 17,645,391	\$ 17,670,971	75688.4	\$ 318.30	\$ 14,718,808	99.4%	\$ 14,639,076	98.8%
2014	\$ 80.21	\$ 44.00	\$ 124.81	\$1.58	75688.4	\$ 360.46	\$ 18,402,402	\$ 18,355,490	75688.4	\$ 320.44	\$ 15,373,432	99.5%	\$ 15,301,360	98.1%
2015	\$ 83.14	\$ 46.00	\$ 129.74	\$1.72	75688.4	\$ 382.30	\$ 18,966,854	\$ 18,944,073	75688.4	\$ 340.97	\$ 15,861,929	103.0%	\$ 15,804,261	102.7%
2016	\$ 87.14	\$ 54.70	\$ 141.88	\$1.75	75688.4	\$ 385.78	\$ 19,061,720	\$ 19,043,701	75688.4	\$ 352.90	\$ 15,846,288	103.7%	\$ 15,782,618	100.4%
2017	\$ 81.00	\$ 57.01	\$ 148.01	\$1.91	75688.4	\$ 408.63	\$ 19,594,404	\$ 19,530,547	75688.4	\$ 365.28	\$ 16,238,832	100.4%	\$ 16,174,733	100.0%
2018	\$ 88.57	\$ 52.10	\$ 148.67	\$1.95	75688.4	\$ 423.07	\$ 20,694,706	\$ 20,640,670	75688.4	\$ 378.04	\$ 17,218,820	103.5%	\$ 17,156,346	103.1%
2019	\$ 98.41	\$ 58.29	\$ 148.60	\$2.11	75688.4	\$ 436.80	\$ 21,810,067	\$ 21,770,791	75688.4	\$ 381.27	\$ 18,213,282	105.8%	\$ 18,167,136	105.5%
2020	\$ 99.66	\$ 45.10	\$ 144.75	\$2.28	75688.4	\$ 454.16	\$ 23,252,147	\$ 23,232,309	75688.4	\$ 404.86	\$ 19,529,376	106.6%	\$ 19,502,300	106.5%
2021	\$ 103.66	\$ 42.00	\$ 146.55	\$2.46	75688.4	\$ 470.06	\$ 24,306,629	\$ 24,281,189	75688.4	\$ 418.14	\$ 20,452,677	108.7%	\$ 20,430,533	108.6%
2022	\$ 108.21	\$ 37.80	\$ 147.03	\$2.64	75688.4	\$ 486.51	\$ 25,503,442	\$ 25,484,399	75688.4	\$ 433.80	\$ 21,514,012	104.7%	\$ 21,405,050	104.6%
2023	\$ 118.39	\$ 28.51	\$ 146.80	\$2.83	75688.4	\$ 503.54	\$ 26,795,215	\$ 26,770,752	75688.4	\$ 448.88	\$ 22,686,529	102.6%	\$ 22,634,960	102.6%
2024	\$ 123.40	\$ 38.61	\$ 144.07	\$3.00	75688.4	\$ 521.16	\$ 28,322,483	\$ 28,305,571	75688.4	\$ 464.70	\$ 24,048,251		\$ 24,026,172	
2025	\$ 128.96	\$ 30.08	\$ 146.92	\$3.00	75688.4	\$ 538.40	\$ 29,314,193	\$ 29,314,852	75688.4	\$ 480.87	\$ 24,913,936		\$ 24,884,202	
2026	\$ 134.49	\$ 19.52	\$ 154.01	\$3.00	75688.4	\$ 555.28	\$ 30,370,600	\$ 30,363,651	75688.4	\$ 497.80	\$ 25,405,176		\$ 25,368,163	
2027	\$ 140.37	\$ 18.08	\$ 158.36	\$3.00					75688.4	\$ 515.22	\$ 26,714,737		\$ 26,675,723	
2028	\$ 146.51	\$ 16.48	\$ 162.99	\$3.00					75688.4	\$ 533.55	\$ 27,655,210		\$ 27,611,214	
2029	\$ 152.82	\$ 17.90	\$ 170.61	\$3.00					75688.4	\$ 551.82	\$ 28,616,741		\$ 28,570,776	
2030	\$ 159.60	\$ 17.51	\$ 177.11	\$3.00					75688.4	\$ 571.24	\$ 29,612,230		\$ 29,568,353	
2031	\$ 166.58	\$ 17.04	\$ 183.62	\$3.00					75688.4	\$ 591.23	\$ 30,632,468		\$ 30,573,621	
SUM						\$ 344,095,045	\$ 341,607,838			\$ 452,270,603			\$ 451,716,001	
NPV @ 7%						\$ 188,130,003	\$ 186,139,321			\$ 196,626,947			\$ 195,477,834	

6x 3.0 MW Sierraville wind turbine generators for a combined  
Capacity Factor for FOM 38%

21.6 MW



# EXHIBIT C

## COMMISSION'S FIRST SET OF DATA REQUESTS TO MICHAEL AND MAGGIE DELIA (Issued January 22, 2010)

### Calculations of National Grid Above-Market Costs

Year	Bundled Energy Rate (\$/MWh)	Delivered Energy (MWh)	Contract Payments (\$)	Market Value (\$)	Market Value (\$/MWh)	Above- Market Cost (\$)	Above- Market Cost (\$/MWh)	Percent Above- Market Cost Exceeds Market Value (%)
2012	235.75	17,660	4,163,345	2,228,621	126.20	1,934,724	109.55	86.8%
2013	244.00	100,915	24,623,386	12,246,249	121.35	12,377,137	122.65	101.1%
2014	252.54	100,915	25,485,205	11,753,579	116.47	13,731,626	136.07	116.8%
2015	261.38	100,915	26,377,187	12,652,186	125.37	13,725,001	136.01	108.5%
2016	270.53	100,915	27,300,388	13,881,563	137.56	13,418,825	132.97	96.7%
2017	280.00	100,915	28,255,902	14,635,011	145.02	13,620,891	134.97	93.1%
2018	289.80	100,915	29,244,859	15,296,735	151.58	13,948,124	138.22	91.2%
2019	299.94	100,915	30,268,429	15,965,505	158.21	14,302,924	141.73	89.6%
2020	310.44	100,915	31,327,824	16,523,244	163.73	14,804,580	146.70	89.6%
2021	321.30	100,915	32,424,297	16,445,572	162.96	15,978,725	158.34	97.2%
2022	332.55	100,915	33,559,148	16,499,518	163.50	17,059,630	169.05	103.4%
2023	344.19	100,915	34,733,718	16,376,774	162.28	18,356,944	181.91	112.1%
2024	356.23	100,915	35,949,398	15,950,450	158.06	19,998,948	198.18	125.4%
2025	368.70	100,915	37,207,627	15,441,641	153.02	21,765,986	215.69	141.0%
2026	381.61	100,915	38,509,894	15,191,282	150.54	23,318,612	231.07	153.5%
2027	394.96	100,915	39,857,740	15,566,993	154.26	24,290,747	240.71	156.0%
2028	408.79	100,915	41,252,761	15,942,985	157.98	25,309,776	250.80	158.8%
2029	423.09	100,915	42,696,608	16,318,427	161.70	26,378,181	261.39	161.6%
2030	437.90	100,915	44,190,989	16,692,403	165.41	27,498,586	272.49	164.7%
2031	453.23	100,915	45,737,674	17,044,635	168.90	28,693,039	284.33	168.3%
2032	469.09	100,915	47,338,492	17,391,765	172.34	29,946,727	296.75	172.2%
Totals			700,504,870	310,045,137		390,459,733		
Average (2013-2032)							192.50	
NPV (@7%)			323,305,112	149,433,473		173,871,639		

# EXHIBIT D

## COMMISSION'S FIRST SET OF DATA REQUESTS TO MICHAEL AND MAGGIE DELIA (Issued January 22, 2010)

### Calculation of National Grid Rhode Island Energy Price For 2012-2032

Year	Synapse RI Energy Price (\$/MWh)	Synapse RI REC Price (\$/MWh)	Synapse RI Capacity Price \$/KW-Month	Synapse Rhode Island Price (\$/MWh)	Revised Synapse RI Energy Price (\$/MWh)	Revised Synapse RI REC Price (\$/MWh)	Revised Synapse RI Capacity Price \$/KW-Month	Revised Synapse Rhode Island Price (\$/MWh)	Energy Price Difference (\$/MWh)	Energy Price Difference (%)
2012	70.92	36.10	2.93	108.14	88.97	36.10	2.93	126.20	18.05	25.45%
2013	75.46	41.20	1.41	117.20	79.61	41.20	1.41	121.35	4.15	5.50%
2014	77.55	44.90	1.44	123.00	71.02	44.90	1.44	116.47	-6.53	-8.42%
2015	80.21	44.60	1.58	125.42	80.17	44.60	1.58	125.37	-0.04	-0.05%
2016	83.14	46.60	1.72	130.40	90.30	46.60	1.72	137.56	7.16	8.61%
2017	87.14	54.70	1.78	142.52	89.64	54.70	1.78	145.02	2.50	2.87%
2018	91.90	57.01	1.91	149.64	93.84	57.01	1.91	151.58	1.94	2.11%
2019	96.57	52.10	1.95	149.42	105.36	52.10	1.95	158.21	8.79	9.10%
2020	98.41	50.20	2.11	149.42	112.72	50.20	2.11	163.73	14.31	14.55%
2021	99.66	45.10	2.28	145.63	116.99	45.10	2.28	162.96	17.33	17.39%
2022	103.96	42.60	2.46	147.50	119.96	42.60	2.46	163.50	16.00	15.39%
2023	109.21	37.80	2.64	148.02	123.47	37.80	2.64	162.28	14.26	13.06%
2024	118.29	28.51	2.83	147.89	128.46	28.51	2.83	158.06	10.17	8.60%
2025	123.48	20.61	3.00	145.24	131.26	20.61	3.00	153.02	7.78	6.30%
2026	128.86	20.06	3.00	150.07	129.32	20.06	3.00	150.54	0.46	0.36%
2027	134.49	19.52	3.00	155.16	133.59	19.52	3.00	154.26	-0.90	-0.67%
2028	140.37	18.99	3.00	160.51	137.84	18.99	3.00	157.98	-2.53	-1.80%
2029	146.51	18.48	3.00	166.14	142.07	18.48	3.00	161.70	-4.44	-3.03%
2030	152.92	17.99	3.00	172.06	146.27	17.99	3.00	165.41	-6.65	-4.35%
2031	159.60	17.51	3.00	178.26	150.24	17.51	3.00	168.90	-9.36	-5.86%
2032	166.58	17.04	3.00	184.77	154.15	17.04	3.00	172.34	-12.43	-7.46%
Average (2013-2032)	113.72			149.41	116.81			152.51	3.10	3.61%

## EXHIBIT E

### COMMISSION'S FIRST SET OF DATA REQUESTS TO MICHAEL AND MAGGIE DELIA (Issued January 22, 2010)

#### National Grid Breakeven Cost Analysis

<u>Year</u>	<u>Revised Synapse RI Energy Prices (\$/MWh)</u>	<u>National Grid Above- Market Cost (\$/MWh)</u>	<u>Breakeven Energy Cost (\$/MWh)</u>	<u>Percent Breakeven Energy Cost Exceeds Revised Synapse RI Energy Price (%)</u>
2012	88.97	109.55	198.53	123.14%
2013	79.61	122.65	202.26	154.06%
2014	71.02	136.07	207.09	191.59%
2015	80.17	136.01	216.17	169.64%
2016	90.30	132.97	223.27	147.25%
2017	89.64	134.97	224.61	150.57%
2018	93.84	138.22	232.05	147.28%
2019	105.36	141.73	247.09	134.52%
2020	112.72	146.70	259.43	130.15%
2021	116.99	158.34	275.33	135.34%
2022	119.96	169.05	289.01	140.92%
2023	123.47	181.91	305.38	147.33%
2024	128.46	198.18	326.64	154.27%
2025	131.26	215.69	346.94	164.32%
2026	129.32	231.07	360.40	178.69%
2027	133.59	240.71	374.29	180.18%
2028	137.84	250.80	388.65	181.96%
2029	142.07	261.39	403.46	183.99%
2030	146.27	272.49	418.76	186.29%
2031	150.24	284.33	434.57	189.25%
2032	154.15	296.75	450.90	192.51%
Average (2013-2032)	116.81	192.50	309.32	163.01%



## EXHIBIT F

### COMMISSION'S FIRST SET OF DATA REQUESTS TO MICHAEL AND MAGGIE DELIA (Issued January 22, 2010)

#### Energy Price Calculations

<u>Year</u>	<u>Revised Synapse RI Energy Forecast (\$/MWh)</u>	<u>Synapse RI REC Forecast (\$/MWh)</u>	<u>High Spot Energy Price Adjustment (\$/MWh)</u>	<u>Low Spot Energy Price Adjustment (\$/MWh)</u>	<u>REC Price Forecast (\$/MWh)</u>	<u>Low Spot Energy Price Forecast (\$/MWh)</u>	<u>High Spot Energy Price Forecast (\$/MWh)</u>
2012	88.97	36.10	20.00	15.00	30.00	68.97	73.97
2013	79.61	41.20	20.00	15.00	30.00	59.61	64.61
2014	71.02	44.90	20.00	15.00	28.00	51.02	56.02
2015	80.17	44.60	20.00	15.00	26.00	60.17	65.17
2016	90.30	46.60	20.00	15.00	24.00	70.30	75.30
2017	89.64	54.70	20.00	15.00	22.00	69.64	74.64
2018	93.84	57.01	20.00	15.00	20.00	73.84	78.84
2019	105.36	52.10	20.00	15.00	10.00	85.36	90.36
2020	112.72	50.20	20.00	15.00	5.00	92.72	97.72
2021	116.99	45.10	20.00	15.00	5.00	96.99	101.99
2022	119.96	42.60	20.00	15.00	5.00	99.96	104.96
2023	123.47	37.80	20.00	15.00	5.00	103.47	108.47
2024	128.46	28.51	20.00	15.00	5.00	108.46	113.46
2025	131.26	20.61	20.00	15.00	5.00	111.26	116.26
2026	129.32	20.06	20.00	15.00	5.00	109.32	114.32
2027	133.59	19.52	20.00	15.00	5.00	113.59	118.59
2028	137.84	18.99	20.00	15.00	5.00	117.84	122.84
2029	142.07	18.48	20.00	15.00	5.00	122.07	127.07
2030	146.27	17.99	20.00	15.00	5.00	126.27	131.27
2031	150.24	17.51	20.00	15.00	5.00	130.24	135.24
2032	154.15	17.04	20.00	15.00	5.00	134.15	139.15
Average	116.81					96.81	101.81

## EXHIBIT G

### COMMISSION'S FIRST SET OF DATA REQUESTS TO MICHAEL AND MAGGIE DELIA (Issued January 22, 2010)

#### Low Spot Energy Price Breakeven Analysis

<u>Year</u>	<u>Low Spot Energy Price Forecast (\$/MWh)</u>	<u>Breakeven Energy Price Difference (\$/MWh)</u>	<u>Breakeven Energy Price (\$/MWh)</u>	<u>REC Value (\$/MWh)</u>	<u>Capacity Value (\$/KW-Month)</u>	<u>Contract Price (\$/MWh)</u>	<u>Percent Breakeven Energy Price Difference (%)</u>
2012	68.97	135.65	204.63	30.00	2.93	235.75	196.68%
2013	59.61	153.85	213.46	30.00	1.41	244.00	258.09%
2014	51.02	172.97	223.99	28.00	1.44	252.54	339.04%
2015	60.17	174.61	234.77	26.00	1.58	261.38	290.19%
2016	70.30	175.57	245.87	24.00	1.72	270.53	249.76%
2017	69.64	187.67	257.31	22.00	1.78	280.00	269.49%
2018	73.84	195.23	269.06	20.00	1.91	289.80	264.40%
2019	85.36	203.83	289.19	10.00	1.95	299.94	238.79%
2020	92.72	211.90	304.63	5.00	2.11	310.44	228.53%
2021	96.99	218.44	315.43	5.00	2.28	321.30	225.22%
2022	99.96	226.65	326.61	5.00	2.46	332.55	226.75%
2023	103.47	234.71	338.18	5.00	2.64	344.19	226.83%
2024	108.46	241.69	350.15	5.00	2.83	356.23	222.83%
2025	111.26	251.30	362.55	5.00	3.00	368.70	225.87%
2026	109.32	266.13	375.46	5.00	3.00	381.61	243.43%
2027	113.59	275.23	388.81	5.00	3.00	394.96	242.30%
2028	117.84	284.79	402.64	5.00	3.00	408.79	241.67%
2029	122.07	294.87	416.94	5.00	3.00	423.09	241.55%
2030	126.27	305.48	431.75	5.00	3.00	437.90	241.93%
2031	130.24	316.84	447.08	5.00	3.00	453.23	243.27%
2032	134.15	328.79	462.94	5.00	3.00	469.09	245.09%
Average (2013-2032)	96.81	236.03	332.84			345.01	248.25%



## EXHIBIT H

### COMMISSION'S FIRST SET OF DATA REQUESTS TO MICHAEL AND MAGGIE DELIA (Issued January 22, 2010)

#### High Spot Energy Price Breakeven Analysis

<u>Year</u>	<u>High Spot Energy Price Forecast (\$/MWh)</u>	<u>Breakeven Energy Price Difference (\$/MWh)</u>	<u>Breakeven Energy Price (\$/MWh)</u>	<u>REC Value (\$/MWh)</u>	<u>Capacity Value (\$/KW-Month)</u>	<u>Contract Price (\$/MWh)</u>	<u>Percent Breakeven Energy Price Difference (%)</u>
2012	73.97	130.65	204.63	30.00	2.93	235.75	176.63%
2013	64.61	148.85	213.46	30.00	1.41	244.00	230.38%
2014	56.02	167.97	223.99	28.00	1.44	252.54	299.85%
2015	65.17	169.61	234.77	26.00	1.58	261.38	260.26%
2016	75.30	170.57	245.87	24.00	1.72	270.53	226.53%
2017	74.64	182.67	257.31	22.00	1.78	280.00	244.74%
2018	78.84	190.23	269.06	20.00	1.91	289.80	241.29%
2019	90.36	198.83	289.19	10.00	1.95	299.94	220.05%
2020	97.72	206.90	304.63	5.00	2.11	310.44	211.72%
2021	101.99	213.44	315.43	5.00	2.28	321.30	209.27%
2022	104.96	221.65	326.61	5.00	2.46	332.55	211.18%
2023	108.47	229.71	338.18	5.00	2.64	344.19	211.77%
2024	113.46	236.69	350.15	5.00	2.83	356.23	208.60%
2025	116.26	246.30	362.55	5.00	3.00	368.70	211.86%
2026	114.32	261.13	375.46	5.00	3.00	381.61	228.41%
2027	118.59	270.23	388.81	5.00	3.00	394.96	227.87%
2028	122.84	279.79	402.64	5.00	3.00	408.79	227.76%
2029	127.07	289.87	416.94	5.00	3.00	423.09	228.11%
2030	131.27	300.48	431.75	5.00	3.00	437.90	228.90%
2031	135.24	311.84	447.08	5.00	3.00	453.23	230.58%
2032	139.15	323.79	462.94	5.00	3.00	469.09	232.69%
Average (2013-2032)	101.81	231.03	332.84			345.01	229.59%