



Synapse
Energy Economics, Inc.

Avoided Energy Supply Costs in New England:

2007 FINAL REPORT

FINAL - August 10, 2007

AUTHORS

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PREPARED FOR

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Exhibit B-6. Avoided Cost of Gas Delivered to Retail Customers in Northern and Central New England by End Use (Gas Delivered via Tennessee Gas Pipeline) in 2007\$/Dekatherm

Year	RESIDENTIAL				COMMERCIAL & INDUSTRIAL			ALL RETAIL
	Existing Heating	New Heating	Hot Water	All	Non Heating	Heating	All	
	3-mon.	5-mon.	annual	6-mon.	annual	5-mon.	6-mon.	5-mon.
2007	12.88	12.71	11.65	12.39	10.58	11.63	11.32	12.12
2008	13.95	13.77	12.65	13.43	11.57	12.69	12.35	13.18
2009	13.39	13.21	12.13	12.88	11.05	12.14	11.81	12.63
2010	12.81	12.63	11.58	12.31	10.51	11.55	11.24	12.04
2011	12.30	12.12	11.11	11.82	10.03	11.05	10.74	11.54
2012	11.92	11.74	10.75	11.44	9.68	10.67	10.37	11.16
2013	11.21	11.04	10.10	10.76	9.02	9.97	9.68	10.46
2014	11.28	11.11	10.16	10.82	9.08	10.03	9.75	10.52
2015	11.23	11.06	10.11	10.77	9.03	9.98	9.70	10.47
2016	11.38	11.21	10.25	10.92	9.18	10.13	9.85	10.62
2017	11.66	11.49	10.51	11.20	9.44	10.41	10.12	10.90
2018	11.57	11.40	10.43	11.11	9.36	10.33	10.04	10.82
2019	11.52	11.35	10.39	11.06	9.31	10.28	9.99	10.77
2020	11.66	11.49	10.51	11.19	9.44	10.41	10.12	10.90
2021	11.77	11.60	10.62	11.30	9.54	10.52	10.23	11.01
2022	12.05	11.88	10.88	11.58	9.80	10.81	10.51	11.30
2023	12.17	12.00	10.99	11.70	9.90	10.91	10.61	11.41
2024	12.30	12.12	11.10	11.81	10.00	11.02	10.72	11.52
2025	12.42	12.24	11.21	11.93	10.10	11.13	10.82	11.64
2026	12.54	12.36	11.32	12.05	10.20	11.24	10.93	11.75
2027	12.67	12.49	11.43	12.17	10.31	11.36	11.04	11.87
2028	12.80	12.61	11.55	12.29	10.41	11.47	11.15	11.99
2029	12.92	12.74	11.66	12.42	10.51	11.58	11.26	12.11
2030	13.05	12.86	11.78	12.54	10.62	11.70	11.38	12.23
2031	13.18	12.99	11.90	12.67	10.72	11.82	11.49	12.35
2032	13.32	13.12	12.02	12.79	10.83	11.94	11.60	12.48
2033	13.45	13.25	12.14	12.92	10.94	12.05	11.72	12.60
2034	13.58	13.39	12.26	13.05	11.05	12.18	11.84	12.73
2035	13.72	13.52	12.38	13.18	11.16	12.30	11.96	12.86
2036	13.86	13.66	12.51	13.31	11.27	12.42	12.08	12.98
2037	13.99	13.79	12.63	13.44	11.38	12.54	12.20	13.11
2038	14.13	13.93	12.76	13.58	11.50	12.67	12.32	13.24
2039	14.28	14.07	12.89	13.71	11.61	12.80	12.44	13.38
2040	14.42	14.21	13.01	13.85	11.73	12.92	12.57	13.51
Levelized								
(2008-2040)	12.558	12.376	11.334	12.064	10.213	11.255	10.943	11.766
(2009-2040)	12.496	12.315	11.276	12.004	10.153	11.192	10.881	11.704
5 years (2008-12)	12.895	12.717	11.663	12.400	10.588	11.642	11.325	12.132
10 years (2008-17)	12.163	11.989	10.982	11.687	9.907	10.914	10.612	11.404
15 years (2008-22)	12.029	11.855	10.856	11.555	9.781	10.780	10.480	11.270

Real discount rate: 2.2165%

AESC Constant Dollar Avoided Cost Results by Screening Zone

NOTE: All Avoided Costs are in Year 2007 Dollars; Peak hours are: Monday through Friday 6am - 10pm; Off-Peak Hours are: All other hours
 Summer for energy values includes June through September; Winter is all other months

All Costs include losses on the ISO-administered Transmission System. DSM savings should include distribution and local transmission losses

Retail Adder 10%

Real Discount Rate 2.2%

Capacity Losses: Generation to ISO Delivery 3.4%

Zonal On-Peak Summer Load Factor 61%

Formatted for input to DSM screening models

ELECTRIC AVOIDED COSTS

Wholesale Power Price, Constant Dollars														
All of Massachusetts					DRIPE for Installations in 2008					DRIPE for Installations in 2009				
Winter Peak Energy	Winter Off-Peak Energy	Summer Peak Energy	Summer Off-Peak Energy	Annual Market Capacity Value	Winter Peak Energy	Winter Off-Peak Energy	Summer Peak Energy	Summer Off-Peak Energy	Annual Market Capacity Value	Winter Peak Energy	Winter Off-Peak Energy	Summer Peak Energy	Summer Off-Peak Energy	Annual Market Capacity Value
\$/kWh	\$/kWh	\$/kWh	\$/kWh	\$/kW-yr	\$/kWh	\$/kWh	\$/kWh	\$/kWh	\$/kW-yr	\$/kWh	\$/kWh	\$/kWh	\$/kWh	\$/kW-yr

Units:

Period:

2007	0.094	0.069	0.095	0.072	-									
2008	0.105	0.078	0.097	0.074	-	0.016	0.013	0.029	0.012	-	-	-	-	-
2009	0.098	0.075	0.097	0.070	-	0.046	0.037	0.083	0.034	-	0.016	0.013	0.029	0.012
2010	0.097	0.072	0.098	0.067	60.5	0.043	0.035	0.078	0.031	72	0.046	0.037	0.083	0.034
2011	0.093	0.068	0.097	0.065	109.1	0.026	0.021	0.047	0.019	140	0.043	0.035	0.078	0.031
2012	0.094	0.070	0.098	0.068	122.1					90	0.026	0.021	0.047	0.019
2013	0.089	0.065	0.094	0.064	129.6					40				90
2014	0.091	0.065	0.094	0.065	129.6									40
2015	0.090	0.065	0.098	0.065	129.6									
2016	0.092	0.066	0.099	0.068	129.6									
2017	0.094	0.068	0.102	0.067	129.6									
2018	0.092	0.068	0.100	0.068	129.6									
2019	0.092	0.066	0.102	0.067	129.6									
2020	0.093	0.068	0.103	0.067	129.6									
2021	0.094	0.068	0.108	0.068	129.6									
2022	0.097	0.070	0.109	0.069	129.6									
2023	0.098	0.071	0.111	0.070	129.6									
2024	0.100	0.072	0.113	0.071	129.6									
2025	0.101	0.073	0.114	0.072	129.6									
2026	0.103	0.074	0.116	0.073	129.6									
2027	0.104	0.075	0.117	0.074	129.6									
2028	0.106	0.076	0.119	0.075	129.6									
2029	0.107	0.077	0.121	0.077	129.6									
2030	0.109	0.078	0.123	0.078	129.6									
2031	0.110	0.079	0.124	0.079	129.6									
2032	0.112	0.080	0.126	0.080	129.6									
2033	0.114	0.081	0.128	0.081	129.6									
2034	0.115	0.083	0.130	0.082	129.6									
2035	0.117	0.084	0.132	0.083	129.6									
2036	0.119	0.085	0.134	0.085	129.6									
2037	0.120	0.086	0.136	0.086	129.6									
2038	0.122	0.088	0.138	0.087	129.6									
2039	0.124	0.089	0.140	0.088	129.6									
2040	0.126	0.090	0.142	0.090	129.6									

Levelized															
(2008-2040)	0.102	0.074	0.111	0.073	114.9	0.005	0.004	0.010	0.004	13.4	0.005	0.004	0.009	0.004	10.3
(2009-2040)	0.102	0.074	0.112	0.073	120.0	0.005	0.004	0.009	0.004	14.0	0.005	0.004	0.010	0.004	10.7
5 years (2008-12)	0.098	0.073	0.098	0.069	56.8	0.026	0.021	0.048	0.019	59.0	0.026	0.021	0.047	0.019	26.8
10 years (2008-17)	0.095	0.070	0.098	0.068	91.2	0.014	0.011	0.025	0.010	35.1	0.014	0.011	0.025	0.010	26.9
15 years (2008-22)	0.094	0.069	0.100	0.068	102.6	0.010	0.008	0.018	0.007	24.6	0.010	0.008	0.017	0.007	18.9
PV to 2008						0.127	0.102	0.229	0.093	318.3	0.124	0.100	0.224	0.091	243.9
PV to 2009											0.127	0.102	0.229	0.093	249.3

Notes:

- 1) Capacity price converted to \$/kWh at zonal on-peak summer load factor.
- 2) Projected environmental costs represent costs that are not yet internalized. Sustainability Target = Allowance Price (internalized value) + Environmental Cost

AESC Constant Dollar Avoided Cost Results by Screening Zone

NOTE: All Avoided Costs are in Year 2007 Dollars; Peak hours are: Monday through Friday 6am - 10pm; Off-Peak Hours are: All other hours
 Summer for energy values includes June through September; Winter is all other months

All Costs include losses on the ISO-administered Transmission System. DSM savings should include distribution and local transmission losses

FCM phase-in
 2010-11 60%
 2011-12 80%
 2012-13 100%
 2013-14 100%

Formatted for input to DSM screening models

Wholesale Power Price, Constant Dollars													
Additional CO2 Costs (see note below)				FCM Revenue (not an avoided cost; do not add to avoided costs)			Avoided Costs before Adders					REC Costs	ICAP
Winter Peak Energy	Winter Off-Peak Energy	Summer Peak Energy	Summer Off-Peak Energy	Summer: June, July, August	Winter: December, January	On-Peak Summer Capacity Value ¹	Winter Peak Energy	Winter Off-Peak Energy	Summer Peak Energy	Summer Off-Peak Energy	Annual Market Capacity Value	All Energy	
\$/kWh	\$/kWh	\$/kWh	\$/kWh	\$/kWh-month	\$/kWh-month	\$/kWh	\$/kWh	\$/kWh	\$/kWh	\$/kWh	\$/kWh-yr	c/kWh	\$/kWh-yr

Units:

Period:

2007	0.037	0.036	0.041	0.040				0.084	0.061	0.085	0.064		0.150	
2008	0.037	0.036	0.041	0.040	9.3	7.0		0.094	0.070	0.087	0.066		0.156	40.5
2009	0.035	0.035	0.039	0.038	10.4	7.8		0.088	0.067	0.087	0.062		0.156	45.2
2010	0.035	0.035	0.039	0.038	13.5	10.2	0.073	0.087	0.063	0.087	0.059	67	0.167	19.0
2011	0.035	0.034	0.039	0.038	17.9	13.4	0.131	0.083	0.060	0.086	0.058	114	0.181	
2012	0.031	0.030	0.034	0.033	23.1	17.4	0.147	0.083	0.062	0.088	0.060	114	0.189	
2013	0.030	0.029	0.033	0.032	26.2	19.6	0.156	0.079	0.057	0.084	0.057	114	0.191	
2014	0.028	0.028	0.032	0.031	26.2	19.6	0.156	0.081	0.057	0.084	0.058	114	0.187	
2015	0.027	0.027	0.030	0.029	26.2	19.6	0.156	0.080	0.058	0.088	0.057	114	0.176	
2016	0.026	0.025	0.029	0.028	26.2	19.6	0.156	0.082	0.059	0.088	0.060	114	0.155	
2017	0.024	0.024	0.027	0.026	26.2	19.6	0.156	0.084	0.061	0.091	0.060	114	0.127	
2018	0.023	0.023	0.026	0.025	26.2	19.6	0.156	0.083	0.061	0.090	0.061	114	0.092	
2019	0.022	0.022	0.024	0.024	26.2	19.6	0.156	0.083	0.060	0.092	0.060	114	0.049	
2020	0.021	0.020	0.023	0.022	26.2	19.6	0.156	0.084	0.062	0.094	0.061	114	0.000	
2021	0.020	0.020	0.022	0.022	26.2	19.6	0.156	0.086	0.062	0.098	0.062	114	0.000	
2022	0.019	0.019	0.022	0.021	26.2	19.6	0.156	0.088	0.063	0.099	0.063	114	0.000	
2023	0.019	0.019	0.022	0.021	26.2	19.6	0.156	0.089	0.064	0.101	0.064	114		
2024	0.019	0.019	0.022	0.021	26.2	19.6	0.156	0.091	0.065	0.102	0.065	114		
2025	0.019	0.019	0.022	0.021	26.2	19.6	0.156	0.092	0.066	0.104	0.066	114		
2026	0.019	0.019	0.022	0.021	26.2	19.6	0.156	0.093	0.067	0.105	0.067	114		
2027	0.019	0.019	0.022	0.021	26.2	19.6	0.156	0.095	0.068	0.107	0.068	114		
2028	0.019	0.019	0.022	0.021	26.2	19.6	0.156	0.096	0.069	0.108	0.069	114		
2029	0.019	0.019	0.022	0.021	26.2	19.6	0.156	0.098	0.070	0.110	0.070	114		
2030	0.019	0.019	0.022	0.021	26.2	19.6	0.156	0.099	0.071	0.112	0.071	114		
2031	0.019	0.019	0.022	0.021	26.2	19.6	0.156	0.100	0.072	0.113	0.072	114		
2032	0.019	0.019	0.022	0.021	26.2	19.6	0.156	0.102	0.073	0.115	0.073	114		
2033	0.019	0.019	0.022	0.021	26.2	19.6	0.156	0.103	0.074	0.116	0.074	114		
2034	0.019	0.019	0.022	0.021	26.2	19.6	0.156	0.105	0.075	0.118	0.075	114		
2035	0.019	0.019	0.022	0.021	26.2	19.6	0.156	0.106	0.076	0.120	0.076	114		
2036	0.019	0.019	0.022	0.021	26.2	19.6	0.156	0.108	0.077	0.122	0.077	114		
2037	0.019	0.019	0.022	0.021	26.2	19.6	0.156	0.109	0.078	0.123	0.078	114		
2038	0.019	0.019	0.022	0.021	26.2	19.6	0.156	0.111	0.080	0.125	0.079	114		
2039	0.019	0.019	0.022	0.021	26.2	19.6	0.156	0.113	0.081	0.127	0.080	114		
2040	0.019	0.019	0.022	0.021	26.2	19.6	0.156	0.114	0.082	0.129	0.081	114		

Levelized														
(2008-2040)	0.024	0.024	0.027	0.026	23.9	17.9	0.136							
(2009-2040)	0.024	0.023	0.026	0.025	24.5	18.4	0.139							
5 years (2008-12)	0.035	0.034	0.039	0.037	14.7	11.0	0.015							
10 years (2008-17)	0.031	0.031	0.035	0.034	20.1	15.1	0.085							
15 years (2008-22)	0.028	0.028	0.031	0.030	21.9	16.4	0.110							
PV to 2008														
PV to 2009														

Notes:

1) Capacity price converted to \$/kWh at zonal on-peak summer load factor.

2) Projected environmental costs represent costs that are not yet internalized. Sustainability Target = Allowance Price (internalized value) + Environmental Cost

Appendix F - New England Average Price Forecast of Other Fuel Prices by Sector (New as of 8/31/07)

New England Average Price Forecast of Other Fuel Prices by Sector (2007\$)

Fuel	No. 2 Distillate	No. 2 Distillate	No. 6 Residual Fuel <= 1% Sulfur	No. 4 Fuel Oil	Propane	Kerosene	BioFuel	BioFuel	Wood
Market	Retail	Retail	Retail	Retail	Retail	Retail			Retail
Sector	Residential	Commercial	Commercial	Commercial	Residential	Res & Com	B5 Blend	B20 Blend	Residential
Notes	1	1	2	3	4	5	6	6	7
Year	\$/MMBtu	\$/MMBtu	\$/MMBtu	\$/MMBtu	\$/MMBtu	\$/MMBtu	\$/MMBtu	\$/MMBtu	\$/MMBtu
2007	15.84	13.97	9.46	11.71	26.81	16.47	15.84	15.84	5.67
2008	16.43	14.49	9.82	12.15	28.76	17.09	16.43	16.43	5.88
2009	16.05	14.15	9.59	11.87	28.97	16.69	16.05	16.05	5.75
2010	15.58	13.74	9.31	11.52	29.43	16.20	15.58	15.58	5.58
2011	15.10	13.32	9.03	11.17	29.71	15.71	15.10	15.10	5.41
2012	14.67	12.94	8.77	10.85	30.08	15.26	14.67	14.67	5.26
2013	14.22	12.54	8.50	10.52	29.61	14.79	14.22	14.22	5.09
2014	14.03	12.37	8.38	10.38	29.63	14.60	14.03	14.03	5.03
2015	14.10	12.43	8.42	10.43	29.55	14.66	14.10	14.10	5.05
2016	14.16	12.49	8.46	10.47	29.60	14.73	14.16	14.16	5.07
2017	14.29	12.60	8.54	10.57	29.85	14.86	14.29	14.29	5.12
2018	14.42	12.72	8.62	10.67	29.76	15.00	14.42	14.42	5.17
2019	14.55	12.83	8.69	10.76	29.69	15.13	14.55	14.55	5.21
2020	14.68	12.95	8.77	10.86	29.80	15.27	14.68	14.68	5.26
2021	14.88	13.12	8.89	11.00	29.67	15.47	14.88	14.88	5.33
2022	15.07	13.29	9.01	11.15	29.82	15.68	15.07	15.07	5.40
2023	15.27	13.47	9.12	11.30	29.97	15.88	15.27	15.27	5.47
2024	15.46	13.64	9.24	11.44	30.01	16.09	15.46	15.46	5.54
2025	15.66	13.81	9.36	11.58	30.02	16.29	15.66	15.66	5.61
2026	15.79	13.92	9.44	11.68	30.05	16.42	15.79	15.79	5.66
2027	15.92	14.04	9.51	11.78	30.15	16.56	15.92	15.92	5.70
2028	16.05	14.16	9.59	11.87	30.31	16.70	16.05	16.05	5.75
2029	16.18	14.27	9.67	11.97	30.41	16.83	16.18	16.18	5.80
2030	16.31	14.39	9.75	12.07	30.45	16.97	16.31	16.31	5.84
2031	16.48	14.53	9.85	12.19	30.75	17.14	16.48	16.48	5.90
2032	16.64	14.68	9.94	12.31	31.06	17.31	16.64	16.64	5.96
2033	16.81	14.82	10.04	12.43	31.37	17.48	16.81	16.81	6.02
2034	16.98	14.97	10.14	12.56	31.68	17.66	16.98	16.98	6.08
2035	17.15	15.12	10.25	12.68	32.00	17.83	17.15	17.15	6.14
2036	17.32	15.27	10.35	12.81	32.32	18.01	17.32	17.32	6.20
2037	17.49	15.42	10.45	12.94	32.64	18.19	17.49	17.49	6.26
2038	17.67	15.58	10.56	13.07	32.97	18.38	17.67	17.67	6.33
2039	17.84	15.73	10.66	13.20	33.30	18.56	17.84	17.84	6.39
2040	18.02	15.89	10.77	13.33	33.63	18.74	18.02	18.02	6.45
Levelized									
(2008-2040)	15.61	13.77	9.33	11.55	30.29	16.24	15.61	15.61	5.59
(2009-2040)	15.58	13.74	9.31	11.52	30.36	16.20	15.58	15.58	5.58
5 years (2008-12)	15.59	13.74	9.31	11.53	29.37	16.21	15.59	15.59	5.58
10 years (2008-17)	14.91	13.15	8.91	11.03	29.50	15.51	14.91	14.91	5.34
15 years (2008-22)	14.85	13.10	8.87	10.99	29.58	15.45	14.85	14.85	5.32

Notes

- 1 Based on adjusted AEO 2007 forecast for New England.
- 2 Adjusted AEO Electrical sector forecast
- 3 Based on historic price difference relative to Distillate.
- 4 Based on adjusted AEO 2007 forecast for New England.
- 5 Based on historic price difference relative to Distillate.
- 6 No premium or discount assigned for biofuels.
- 7 Based on historic relationship with distillate prices.
Levelized with a real discount rate of: 2.22%