

Energy Efficiency Cost-Benefit Analysis Avoided Cost Assumptions

Revised October 22, 2012

The key avoided cost assumptions for the energy efficiency cost-benefit analysis and the data sources and processes for determining these components are discussed below. The avoided costs presented here are assumptions and should not be considered forecasts or projections into the future. Additionally, these assumptions are intended to be used for Energy Efficiency cost-benefit analysis only.

This is an update of the June 5, 2012 draft report. This report reflects the recent EIA release of the Annual Energy Outlook 2012 final report and also corrects minor calculation errors in the Capacity Price forecast. CEEEP also updated the escalator for wholesale electricity based on comments from Rate Counsel and extended the avoided cost projections out to 2035 based on comments from New Jersey Natural Gas.

Retail Electricity Prices: Historic 2011 U.S. Energy Information Administration (EIA) New Jersey retail electricity prices were escalated using an annual growth rate derived from the EIA Annual Energy Outlook 2012 for the Mid-Atlantic region. On average, the annual growth rate was about 2.1%. The NJ Clean Energy Programs do not distinguish between commercial and industrial sectors, therefore the commercial and industrial prices were averaged based on historic 2011 New Jersey retail electricity sales. The 7% Sales and Use Tax and Societal Benefits Charge¹ were also included.

Wholesale Electricity Prices: Historic 2011 New Jersey wholesale electric prices from PJM were escalated based on the annual percent change in the Annual Energy Outlook Reliability First Corporation/East Electricity Generation Prices². The annual percent change was, on average, about 2.2%. The seasonal peak and off-peak factors were derived using historic 2011 PJM LMP data. Summer is defined as May through September, winter is defined as October through April, on-peak is defined as Monday through Friday 8am-8pm, and off-peak is defined as Monday-Friday 8pm-8am and weekends and holidays.

¹ The Societal Benefits Charge for electric customers was assumed to be 3.6% for residential and 4.8% for C&I.

² The RFCE Electricity Generation prices are approximately 16% higher than the wholesale electricity price assumptions CEEEP presents in Table 1.

Table 1: Retail and Wholesale Electricity

	<i>Retail (\$/kWh)</i>		<i>Wholesale (\$/MWh)</i>				
	Residential	Commercial & Industrial	Average Price	Summer Peak	Summer Off-Peak	Non-Summer Peak	Non-Summer Off-Peak
2011	\$0.18	\$0.15	\$47.39	\$64.09	\$37.03	\$49.40	\$40.80
2012	\$0.18	\$0.14	\$50.67	\$68.53	\$39.59	\$52.82	\$43.63
2013	\$0.18	\$0.14	\$49.36	\$66.75	\$38.56	\$51.45	\$42.49
2014	\$0.19	\$0.14	\$49.64	\$67.14	\$38.79	\$51.75	\$42.74
2015	\$0.19	\$0.14	\$49.48	\$66.93	\$38.66	\$51.58	\$42.60
2016	\$0.19	\$0.15	\$49.92	\$67.51	\$39.00	\$52.04	\$42.98
2017	\$0.20	\$0.15	\$52.92	\$71.58	\$41.35	\$55.17	\$45.56
2018	\$0.20	\$0.15	\$55.67	\$75.29	\$43.49	\$58.03	\$47.93
2019	\$0.20	\$0.15	\$54.51	\$73.73	\$42.59	\$56.83	\$46.93
2020	\$0.20	\$0.16	\$59.78	\$80.85	\$46.71	\$62.31	\$51.47
2021	\$0.21	\$0.16	\$62.79	\$84.92	\$49.06	\$65.45	\$54.06
2022	\$0.21	\$0.16	\$65.55	\$88.66	\$51.22	\$68.34	\$56.44
2023	\$0.22	\$0.17	\$68.99	\$93.31	\$53.91	\$71.92	\$59.40
2024	\$0.22	\$0.17	\$72.11	\$97.53	\$56.34	\$75.17	\$62.08
2025	\$0.23	\$0.17	\$74.03	\$100.12	\$57.84	\$77.17	\$63.74
2026	\$0.23	\$0.17	\$75.49	\$102.09	\$58.98	\$78.69	\$64.99
2027	\$0.24	\$0.17	\$77.37	\$104.65	\$60.45	\$80.66	\$66.62
2028	\$0.25	\$0.18	\$79.97	\$108.16	\$62.49	\$83.37	\$68.86
2029	\$0.25	\$0.18	\$82.86	\$112.07	\$64.74	\$86.38	\$71.34
2030	\$0.26	\$0.19	\$84.83	\$114.73	\$66.28	\$88.43	\$73.03
2031	\$0.27	\$0.19	\$88.13	\$119.20	\$68.86	\$91.87	\$75.88
2032	\$0.27	\$0.20	\$90.37	\$122.23	\$70.61	\$94.21	\$77.81
2033	\$0.28	\$0.20	\$94.00	\$127.14	\$73.45	\$97.99	\$80.93
2034	\$0.29	\$0.21	\$99.44	\$134.49	\$77.70	\$103.66	\$85.62
2035	\$0.30	\$0.22	\$104.78	\$141.71	\$81.87	\$109.22	\$90.21

Retail Natural Gas Prices: Historic 2011 EIA New Jersey retail natural gas prices were escalated using an annual growth rate derived from the Mid-Atlantic Region EIA Annual Energy Outlook 2012 electric price forecasts. On average, the annual growth rate was about 2.9%. Missing monthly Residential and Industrial Retail Natural Gas prices were estimated using a linear interpolation. The 7% Sales and Use Tax and Societal Benefits Charge³ were also included.

Wholesale (Henry Hub) Natural Gas Prices: Wholesale natural gas prices are taken from the EIA Annual Energy Outlook 2012.

³ The Societal Benefits Charge for natural gas customers was assumed to be 4.1% for residential and 5.0% for C&I.

Table 2: Retail and Wholesale Natural Gas (\$/MMBtu)

	<i>Retail Prices</i>			<i>Henry Hub Wholesale Prices</i>		
	Residential	Commercial	Industrial	Average Price	Summer	Winter
2011	\$13.68	\$10.44	\$9.95	\$4.02	\$3.89	\$4.15
2012	\$13.85	\$10.66	\$9.36	\$3.70	\$3.58	\$3.82
2013	\$13.88	\$10.62	\$9.65	\$4.24	\$4.10	\$4.37
2014	\$13.77	\$10.60	\$10.00	\$4.41	\$4.27	\$4.56
2015	\$14.16	\$10.87	\$10.32	\$4.62	\$4.47	\$4.78
2016	\$14.39	\$10.99	\$10.37	\$4.67	\$4.52	\$4.82
2017	\$14.67	\$11.15	\$10.51	\$4.79	\$4.63	\$4.95
2018	\$15.06	\$11.44	\$10.80	\$4.93	\$4.77	\$5.10
2019	\$15.50	\$11.76	\$11.15	\$5.16	\$4.99	\$5.33
2020	\$15.98	\$12.12	\$11.56	\$5.39	\$5.21	\$5.56
2021	\$16.59	\$12.61	\$12.12	\$5.77	\$5.58	\$5.95
2022	\$17.24	\$13.13	\$12.73	\$6.22	\$6.01	\$6.42
2023	\$17.82	\$13.57	\$13.24	\$6.58	\$6.37	\$6.80
2024	\$18.32	\$13.94	\$13.64	\$6.88	\$6.65	\$7.10
2025	\$18.94	\$14.43	\$14.21	\$7.23	\$6.99	\$7.47
2026	\$19.54	\$14.88	\$14.74	\$7.56	\$7.31	\$7.80
2027	\$20.14	\$15.33	\$15.25	\$7.93	\$7.67	\$8.19
2028	\$20.74	\$15.76	\$15.74	\$8.22	\$7.95	\$8.49
2029	\$21.38	\$16.24	\$16.27	\$8.57	\$8.29	\$8.85
2030	\$22.11	\$16.79	\$16.91	\$8.95	\$8.66	\$9.25
2031	\$22.96	\$17.43	\$17.67	\$9.35	\$9.04	\$9.66
2032	\$23.81	\$18.09	\$18.42	\$9.81	\$9.49	\$10.13
2033	\$24.54	\$18.63	\$19.04	\$10.19	\$9.85	\$10.52
2034	\$25.60	\$19.48	\$20.08	\$10.94	\$10.59	\$11.30
2035	\$26.63	\$20.29	\$21.05	\$11.67	\$11.28	\$12.05

Capacity Prices: New Jersey Utility PJM Reliability Pricing Model (RPM) prices for the 4-utilities (AE, JCP&L, PSE&G and RECO) for 2010 to 2015 were weighted by each utility's historic 2011 peak load⁴ to estimate an average New Jersey capacity price. From 2016 to 2030, the capacity prices were escalated based on the EIA projected annual change in U.S. Consumer Price Index (CPI), which is also reported.⁵

⁴ PJM Reliability Pricing Model User Information. Base Residual Auction Results www.pjm.com/markets-and-operations/rpm/rpm-auction-user-info.aspx#Item01; PJM. Historic Load Data.

⁵ U.S. Department of Labor [ftp://ftp.bls.gov/pub/special.requests/cpi/cpi.txt](http://ftp.bls.gov/pub/special.requests/cpi/cpi.txt); EIA Annual Energy Outlook 2010.

Table 3: Capacity Price (\$/kW-year) and U.S. Consumer Price Index

	\$/kW-year	CPI
2011	\$49.87	2.25
2012	\$49.11	2.28
2013	\$75.38	2.31
2014	\$70.93	2.36
2015	\$59.41	2.42
2016	\$60.64	2.47
2017	\$61.62	2.51
2018	\$63.10	2.57
2019	\$64.32	2.62
2020	\$65.55	2.67
2021	\$66.78	2.72
2022	\$68.25	2.78
2023	\$69.48	2.83
2024	\$70.95	2.89
2025	\$72.42	2.95
2026	\$73.90	3.01
2027	\$75.62	3.08
2028	\$77.33	3.15
2029	\$79.30	3.23
2030	\$81.02	3.30
2031	\$83.23	3.39
2032	\$85.44	3.48
2033	\$87.16	3.55
2034	\$89.12	3.63
2035	\$91.33	3.72

Discount Rate: Discount rates are used to convert future economic values into present day dollars. A nominal discount rate of 8% is used.⁶

Avoided Electric and Natural Gas Losses: Avoided electric transmission losses are assumed to be 7.6%⁷ and avoided natural gas losses are assumed to be 1.4%⁸ based on data calculations from EnerNOC Utility Solutions⁹. The unreferenced New Jersey Protocols assume 11% and 1% respectively. The updated avoided loss estimates have been submitted to Applied Energy Group to update the New Jersey Protocols in the future.

Avoided Electric and Natural Gas Transmission and Distribution (T&D): Estimated Electric T&D costs from various studies have been compiled and are presented in Table 4.

⁶ Levitan & Associates, Inc. Long-term Capacity Agreement Pilot Program (March 2011).

⁷ 10 year (2001-2010) Average: "New Jersey Supply and Disposition of Electricity"
<http://www.eia.gov/electricity/state/newjersey>

⁸ Energy Information Administration natural Gas Transmission: <http://www.eia.gov/pub/itg/ghgp9.htm>

⁹ EnerNOC Utility Solutions performed the calculations as part of the 2012 Energy Efficiency Market Potential Study for the New Jersey Clean Energy Program. The line losses are derived from EIA data referenced above.

Table 4: Avoided Electric T&D Cost Estimates (\$/kW-yr)^{10,11}

Company/Area	State	Transmission	Distribution	Total
NStar	MA	\$14.41	\$85.28	\$99.69
CL&P	CT	\$1.25	\$29.74	\$30.99
WMECo	ME	\$20.30	\$60.87	\$81.17
National Grid MA	MA	\$19.95	\$109.25	\$129.20
National Grid RI	RI	\$19.95	\$87.13	\$107.08
UI	CT	\$2.54	\$45.96	\$48.50
CL&P	CT			\$29.20
Statewide	WI			\$30
Upstate	NY			\$33.50
SCE	CA			\$54.60
SDG&E	CA			\$74.80
PG&E	CA			\$76.60
Con Edison	NY			\$100

Based on the estimates presented in Table 4, EnerNOC has recommended that CEEEP use an Avoided Electric T&D cost of \$30/kW-yr.

CEEEP is currently researching reputable sources for Avoided Natural Gas T&D costs.

Environmental Externality Benefits: Avoided emission savings are calculated by multiplying the emission permit prices by the energy savings. In the cost benefit analysis, CEEEP assumes that the emission allowance prices for SO₂ and NO_x are already accounted for in energy prices. CEEEP is currently researching reputable sources of SO₂ and NO_x allowance price projections.

- **Forecasted CO₂ Social Cost:** Values for the Social Cost of Carbon were taken from the Interagency Working Group on Social Cost of Carbon¹². Values were reported in 2007\$/metric ton, and were converted to nominal dollars using the EIA projected U.S. CPI (Table 3). The study presented three values for the social cost of carbon, using a discount rate of 2.5%, 3%, and 5%. The scenario using a discount rate of 3% is presented here.

¹⁰ Avoided Energy Supply Costs in New England: 2011 Report. Prepared for Avoided Energy Supply Component Study Group by Synapse Energy Economics, Inc.

¹¹ PA: Potential study, Appendix 1: http://www.puc.state.pa.us/electric/pdf/Act129/Act129-PA_Market_Potential_Study_App1.pdf

WI: Page EE-13 of study: <http://psc.wi.gov/reports/documents/wipotentialfinal.pdf>

CA: Page 37 of Word Doc at: http://docs.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/128594.htm#P84_2869

NY: Appendix 2, Table 2 at: <http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7B329FD000-D108-47AC-ADAF-9E37730B68CA%7D>

¹² Interagency Working Group on Social Cost of Carbon, "Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866", United States Government, February 2010.

Table 5: Social Cost of Carbon (Nominal \$/ton)

	CO2
2011	\$23.77
2012	\$24.63
2013	\$25.40
2014	\$26.52
2015	\$27.66
2016	\$28.95
2017	\$30.14
2018	\$31.48
2019	\$32.85
2020	\$34.25
2021	\$35.94
2022	\$37.54
2023	\$39.31
2024	\$41.12
2025	\$43.11
2026	\$45.01
2027	\$47.09
2028	\$48.92
2029	\$51.09
2030	\$53.31
2031	\$55.41
2032	\$57.73
2033	\$60.08
2034	\$62.49
2035	\$64.94

- **Historical Emissions Permit Prices:** Historical emission permit prices for SO₂ and NO_x were taken from EIA¹³. All emission permits are in \$/ton.

Table 6: Historical SO₂ and NO_x Emissions Allowance Prices (Nominal \$/ton)

	SO₂	NO_x
2007	\$534.43	\$776.04
2008	\$278.50	\$807.33
2009	\$81.11	\$304.33
2010	\$16.52	\$44.66
2011	\$2.12	\$15.89

¹³ <http://www.eia.gov/todayinenergy/detail.cfm?id=4830>

Appendix A: Avoided Costs in Other States

Electric Capacity (Nominal \$/kW-yr)

	Met Ed		PECO	Penelec		Penn Power		PPL	West Penn Power	
	Summer	Winter	Summer	Summer	Winter	Summer	Winter	Summer	Summer	Winter
2012	\$48.71	\$48.71	\$48.71	\$48.71	\$48.71	\$7.47	\$7.47	\$42.51	\$6.01	\$6.01
2013	\$82.60	\$82.60	\$74.93	\$82.60	\$82.60	\$10.13	\$10.13	\$44.51	\$10.13	\$10.13
2014	\$49.86	\$49.86	\$66.48	\$49.86	\$49.86	\$46.02	\$46.02	\$46.60	\$46.02	\$46.02
2015	\$51.12	\$49.86	\$50.64	\$51.12	\$49.86	\$47.19	\$49.86	\$48.79	\$47.19	\$49.86
2016	\$52.42	\$51.12	\$52.88	\$52.42	\$51.12	\$48.38	\$51.12	\$51.08	\$48.38	\$51.12
2017	\$53.75	\$52.42	\$55.22	\$53.75	\$52.42	\$49.61	\$52.42	\$53.48	\$49.61	\$52.42
2018	\$55.11	\$53.75	\$57.67	\$55.11	\$53.75	\$50.87	\$53.75	\$56.00	\$50.87	\$53.75
2019	\$56.51	\$55.11	\$60.22	\$56.51	\$55.11	\$52.16	\$55.11	\$58.63	\$52.16	\$51.11
2020	\$57.95	\$56.51	\$62.88	\$57.95	\$56.51	\$53.49	\$56.51	\$61.39	\$53.49	\$56.51
2021	\$59.42	\$57.95	\$65.67	\$59.42	\$57.95	\$54.84	\$57.95	\$64.27	\$54.84	\$57.95
2022			\$68.57					\$67.29		
2023			\$71.61							
2024			\$74.78							
2025			\$78.09							
2026			\$81.54							

	Maine	Vermont	New Hampshire	Connecticut	Massachusetts	Rhode Island
2011	\$48.09	\$48.09	\$48.09	\$48.09	\$48.09	\$48.09
2012				\$37.50		
2013				\$36.76		
2014				\$36.76		
2015				\$36.76		
2016				\$15.09		
2017				\$22.21		
2018				\$31.01		
2019				\$34.80		
2020				\$48.69		
2021				\$49.61		
2022				\$74.46		
2023				\$89.72		
2024				\$98.16		
2025				\$101.86		
2026				\$104.09		
2027				\$104.98		
2028				\$105.49		
2029				\$105.62		
2030				\$105.75		

Wholesale Electric Avoided Cost (\$/MWh)

	Met Ed					PECO				
	Summer Peak	Summer Off-Peak	Winter Peak	Winter Off Peak	Avg	Summer Peak	Summer Off-Peak	Winter Peak	Winter Off Peak	Avg
2012	\$44.30	\$29.80	\$35.20	\$28.10	\$34.35	\$45.70	\$32.40	\$45.70	\$32.40	\$39.05
2013	\$47.20	\$31.20	\$42.80	\$32.40	\$38.40	\$47.40	\$34.70	\$47.40	\$34.70	\$41.05
2014	\$45.60	\$340.00	\$46.90	\$35.10	\$116.90	\$49.70	\$36.80	\$49.70	\$36.80	\$43.25
2015	\$48.20	\$36.20	\$48.20	\$37.50	\$42.53	\$520.00	\$38.70	\$52.00	\$38.70	\$162.35
2016	\$48.20	\$38.70	\$48.20	\$19.40	\$38.63	\$54.50	\$40.90	\$54.50	\$40.90	\$47.70
2017	\$52.90	\$52.90	\$55.80	\$55.80	\$54.35	\$59.00	\$44.30	\$509.00	\$44.30	\$164.15
2018	\$55.90	\$55.90	\$58.90	\$58.90	\$57.40	\$63.60	\$477.00	\$63.60	\$47.70	\$162.98
2019	\$58.70	\$58.70	\$61.80	\$61.80	\$60.25	\$68.10	\$51.10	\$68.10	\$51.10	\$59.60
2020	\$61.50	\$61.50	\$64.80	\$64.80	\$63.15	\$72.50	\$54.50	\$72.50	\$54.50	\$63.50
2021	\$644.00	\$64.40	\$67.80	\$67.80	\$211.00	\$76.90	\$57.70	\$76.90	\$57.70	\$67.30
2022	\$123.70	\$123.70	\$125.10	\$125.10	\$124.40	\$72.90	\$54.70	\$72.90	\$54.70	\$63.80
2023	\$125.90	\$125.90	\$127.30	\$127.30	\$126.60	\$76.50	\$57.50	\$76.50	\$57.50	\$67.00
2024	\$128.20	\$128.20	\$129.90	\$129.90	\$129.05	\$79.60	\$59.80	\$79.60	\$59.80	\$69.70
2025	\$130.90	\$130.90	\$132.40	\$132.40	\$131.65	\$81.60	\$61.30	\$81.60	\$61.30	\$71.45
2026	\$133.30	\$133.30	\$134.80	\$134.80	\$134.05	\$86.10	\$64.70	\$86.10	\$64.70	\$75.40

	Penelec					Penn Power				
	Summer Peak	Summer Off-Peak	Winter Peak	Winter Off Peak	Avg	Summer Peak	Summer Off-Peak	Winter Peak	Winter Off Peak	Avg
2012	\$44.30	\$29.80	\$35.20	\$28.10	\$34.35	\$44.30	\$29.80	\$35.20	\$28.10	\$34.35
2013	\$47.20	\$31.20	\$42.80	\$32.40	\$38.40	\$47.20	\$31.20	\$42.80	\$32.40	\$38.40
2014	\$45.60	\$34.00	\$46.90	\$35.10	\$40.40	\$45.60	\$34.00	\$46.90	\$35.10	\$40.40
2015	\$48.20	\$36.20	\$48.20	\$37.50	\$42.53	\$48.20	\$36.20	\$48.20	\$37.50	\$42.53
2016	\$48.20	\$38.70	\$48.20	\$19.40	\$38.63	\$48.20	\$38.70	\$48.20	\$19.40	\$38.63
2017	\$52.90	\$52.90	\$55.80	\$55.80	\$54.35	\$52.90	\$52.90	\$55.80	\$55.80	\$54.35
2018	\$55.90	\$55.90	\$58.90	\$58.90	\$57.40	\$55.90	\$55.90	\$58.90	\$58.90	\$57.40
2019	\$58.70	\$58.70	\$61.80	\$61.80	\$60.25	\$58.70	\$58.70	\$61.80	\$61.80	\$60.25
2020	\$61.50	\$61.50	\$64.80	\$64.80	\$63.15	\$61.50	\$61.50	\$64.80	\$64.80	\$63.15
2021	\$64.40	\$64.40	\$67.80	\$67.80	\$66.10	\$64.40	\$64.40	\$67.80	\$67.80	\$66.10
2022	\$123.70	\$123.70	\$125.20	\$125.10	\$124.43	\$123.70	\$123.70	\$125.10	\$125.10	\$124.40
2023	\$125.90	\$125.90	\$127.30	\$127.30	\$126.60	\$125.90	\$125.90	\$127.30	\$127.30	\$126.60
2024	\$128.20	\$128.20	\$129.90	\$129.90	\$129.05	\$128.20	\$128.20	\$129.90	\$129.90	\$129.05
2025	\$130.90	\$130.90	\$132.40	\$132.40	\$131.65	\$130.90	\$130.90	\$132.40	\$132.40	\$131.65
2026	\$133.30	\$133.30	\$134.80	\$134.80	\$134.05	\$133.30	\$133.30	\$134.80	\$134.80	\$134.05

**Wholesale Electric Avoided Cost (\$/MWh)
(con't)**

	PPL					West Penn Power				
	Summer Peak	Summer Off-Peak	Winter Peak	Winter Off Peak	Avg	Summer Peak	Summer Off-Peak	Winter Peak	Winter Off Peak	Avg
2012	\$76.00	\$56.10	\$62.10	\$52.80	\$61.75	\$44.30	\$29.80	\$35.20	\$28.10	\$34.35
2013	\$65.90	\$50.50	\$61.40	\$52.90	\$57.68	\$47.20	\$31.20	\$42.80	\$32.40	\$38.40
2014	\$96.00	\$52.90	\$65.80	\$55.30	\$67.50	\$45.60	\$34.00	\$43.60	\$35.10	\$39.58
2015	\$68.40	\$56.80	\$70.60	\$58.70	\$63.63	\$48.20	\$36.20	\$48.20	\$37.50	\$42.53
2016	\$72.00	\$59.90	\$74.40	\$61.90	\$67.05	\$48.20	\$38.70	\$48.20	\$19.40	\$38.63
2017	\$77.30	\$77.30	\$85.20	\$85.20	\$81.25	\$52.90	\$52.90	\$55.80	\$55.80	\$54.35
2018	\$81.30	\$81.30	\$89.30	\$89.40	\$85.33	\$55.90	\$55.90	\$58.90	\$58.90	\$57.40
2019	\$85.30	\$85.30	\$93.50	\$93.60	\$89.43	\$58.70	\$58.70	\$61.80	\$61.80	\$60.25
2020	\$89.20	\$89.10	\$97.50	\$97.50	\$93.33	\$61.50	\$61.50	\$64.80	\$64.80	\$63.15
2021	\$93.20	\$93.20	\$101.70	\$101.70	\$97.45	\$64.40	\$64.40	\$67.80	\$67.80	\$66.10
2022	\$94.30	\$94.30	\$96.30	\$96.30	\$95.30	\$123.70	\$123.70	\$125.10	\$125.10	\$124.40
2023	\$97.60	\$97.60	\$99.80	\$99.80	\$98.70	\$125.90	\$125.90	\$127.30	\$127.30	\$126.60
2024	\$101.10	\$101.10	\$103.30	\$103.30	\$102.20	\$128.20	\$128.20	\$129.90	\$129.90	\$129.05
2025	\$104.60	\$14.60	\$106.90	\$106.90	\$83.25	\$130.90	\$130.90	\$132.40	\$132.40	\$131.65
2026	\$108.30	\$108.30	\$110.60	\$110.60	\$109.45	\$133.30	\$133.30	\$134.80	\$134.80	\$134.05

	Connecticut					Massachusetts				
	Summer Peak	Summer Off-Peak	Winter Peak	Winter Off Peak	Avg	Summer Peak	Summer Off-Peak	Winter Peak	Winter Off Peak	Avg
2011	\$57.00	\$41.00	\$51.00	\$43.00	\$48.00	\$56.00	\$40.00	\$50.00	\$42.00	\$47.00
2012	\$63.00	\$44.00	\$52.00	\$44.00	\$50.75	\$61.00	\$43.00	\$51.00	\$43.00	\$49.50
2013	\$65.00	\$45.00	\$53.00	\$46.00	\$52.25	\$63.00	\$45.00	\$52.00	\$45.00	\$51.25
2014	\$66.00	\$46.00	\$55.00	\$47.00	\$53.50	\$650.00	\$45.00	\$54.00	\$47.00	\$199.00
2015	\$71.00	\$50.00	\$60.00	\$51.00	\$58.00	\$70.00	\$50.00	\$59.00	\$51.00	\$57.50
2016	\$77.00	\$51.00	\$60.00	\$51.00	\$59.75	\$76.00	\$50.00	\$60.00	\$51.00	\$59.25
2017	\$77.00	\$50.00	\$61.00	\$52.00	\$60.00	\$76.00	\$50.00	\$60.00	\$52.00	\$59.50
2018	\$86.00	\$57.00	\$67.00	\$59.00	\$67.25	\$86.00	\$57.00	\$66.00	\$59.00	\$67.00
2019	\$85.00	\$58.00	\$68.00	\$61.00	\$68.00	\$84.00	\$58.00	\$67.00	\$60.00	\$67.25
2020	\$81.00	\$59.00	\$70.00	\$60.00	\$67.50	\$80.00	\$58.00	\$68.00	\$59.00	\$66.25
2021	\$83.00	\$61.00	\$71.00	\$63.00	\$69.50	\$81.00	\$60.00	\$70.00	\$62.00	\$68.25
2022	\$84.00	\$63.00	\$73.00	\$64.00	\$71.00	\$83.00	\$62.00	\$72.00	\$63.00	\$70.00
2023	\$88.00	\$66.00	\$77.00	\$67.00	\$74.50	\$87.00	\$65.00	\$76.00	\$66.00	\$73.50
2024	\$90.00	\$68.00	\$80.00	\$69.00	\$76.75	\$88.00	\$67.00	\$79.00	\$68.00	\$75.50
2025	\$91.00	\$70.00	\$81.00	\$70.00	\$78.00	\$90.00	\$69.00	\$80.00	\$69.00	\$77.00
2026	\$95.00	\$71.00	\$83.00	\$72.00	\$80.25	\$94.00	\$70.00	\$82.00	\$71.00	\$79.25
2027	\$98.00	\$73.00	\$86.00	\$74.00	\$82.75	\$97.00	\$72.00	\$85.00	\$73.00	\$81.75
2028	\$101.00	\$75.00	\$89.00	\$76.00	\$85.25	\$99.00	\$75.00	\$87.00	\$75.00	\$84.00
2029	\$104.00	\$78.00	\$91.00	\$78.00	\$87.75	\$102.00	\$77.00	\$90.00	\$77.00	\$86.50
2030	\$107.00	\$80.00	\$94.00	\$80.00	\$90.25	\$105.00	\$79.00	\$93.00	\$79.00	\$89.00

Wholesale Electric Avoided Cost (\$/MWh)
(con't)

	Maine					New Hampshire				
	Summer Peak	Summer Off-Peak	Winter Peak	Winter Off Peak	Avg	Summer Peak	Summer Off-Peak	Winter Peak	Winter Off Peak	Avg
2011	\$49.00	\$38.00	\$47.00	\$42.00	\$44.00	\$53.00	\$39.00	\$49.00	\$42.00	\$45.75
2012	\$53.00	\$41.00	\$49.00	\$43.00	\$46.50	\$57.00	\$42.00	\$50.00	\$43.00	\$48.00
2013	\$52.00	\$42.00	\$50.00	\$44.00	\$47.00	\$56.00	\$44.00	\$51.00	\$45.00	\$49.00
2014	\$53.00	\$43.00	\$50.00	\$44.00	\$47.50	\$57.00	\$45.00	\$53.00	\$46.00	\$50.25
2015	\$55.70	\$46.00	\$54.00	\$48.00	\$50.93	\$62.00	\$48.00	\$58.00	\$50.00	\$54.50
2016	\$60.00	\$47.00	\$54.00	\$47.00	\$52.00	\$64.00	\$49.00	\$58.00	\$50.00	\$55.25
2017	\$59.00	\$46.00	\$55.00	\$48.00	\$52.00	\$63.00	\$49.00	\$58.00	\$51.00	\$55.25
2018	\$65.00	\$52.00	\$60.00	\$54.00	\$57.75	\$70.00	\$55.00	\$64.00	\$57.00	\$61.50
2019	\$66.00	\$54.00	\$61.00	\$56.00	\$59.25	\$72.00	\$57.00	\$65.00	\$59.00	\$63.25
2020	\$68.00	\$55.00	\$63.00	\$55.00	\$60.25	\$73.00	\$57.00	\$67.00	\$59.00	\$64.00
2021	\$70.00	\$56.00	\$65.00	\$58.00	\$62.25	\$76.00	\$59.00	\$69.00	\$61.00	\$66.25
2022	\$72.00	\$59.00	\$67.00	\$59.00	\$64.25	\$77.00	\$61.00	\$71.00	\$63.00	\$68.00
2023	\$76.00	\$61.00	\$71.00	\$62.00	\$67.50	\$82.00	\$64.00	\$75.00	\$65.00	\$71.50
2024	\$78.00	\$64.00	\$74.00	\$64.00	\$70.00	\$83.00	\$66.00	\$78.00	\$67.00	\$73.50
2025	\$79.00	\$65.00	\$75.00	\$65.00	\$71.00	\$84.00	\$68.00	\$79.00	\$68.00	\$74.75
2026	\$79.00	\$65.00	\$76.00	\$66.00	\$71.50	\$84.00	\$68.00	\$80.00	\$69.00	\$75.25
2027	\$81.00	\$67.00	\$78.00	\$68.00	\$73.50	\$86.00	\$70.00	\$82.00	\$71.00	\$77.25
2028	\$83.00	\$69.00	\$81.00	\$69.00	\$75.50	\$88.00	\$73.00	\$85.00	\$73.00	\$79.75
2029	\$85.00	\$71.00	\$83.00	\$71.00	\$77.50	\$90.00	\$74.00	\$88.00	\$74.00	\$81.50
2030	\$87.00	\$73.00	\$86.00	\$73.00	\$79.75	\$91.00	\$77.00	\$90.00	\$76.00	\$83.50

Wholesale Electric Avoided Cost (\$/MWh)
(con't)

	Rhode Island					Vermont				
	Summer Peak	Summer Off-Peak	Winter Peak	Winter Off Peak	Avg	Summer Peak	Summer Off-Peak	Winter Peak	Winter Off Peak	Avg
2011	\$54.00	\$39.00	\$49.00	\$42.00	\$46.00	\$56.00	\$40.00	\$50.00	\$42.00	\$47.00
2012	\$60.00	\$42.00	\$50.00	\$43.00	\$48.75	\$61.00	\$43.00	\$52.00	\$44.00	\$50.00
2013	\$61.00	\$44.00	\$51.00	\$45.00	\$50.25	\$63.00	\$45.00	\$53.00	\$46.00	\$51.75
2014	\$64.00	\$45.00	\$53.00	\$46.00	\$52.00	\$66.00	\$46.00	\$54.00	\$47.00	\$53.25
2015	\$68.00	\$49.00	\$58.00	\$51.00	\$56.50	\$70.00	\$50.00	\$59.00	\$51.00	\$57.50
2016	\$74.00	\$50.00	\$58.00	\$51.00	\$58.25	\$76.00	\$50.00	\$60.00	\$51.00	\$59.25
2017	\$74.00	\$49.00	\$59.00	\$52.00	\$58.50	\$76.00	\$50.00	\$60.00	\$52.00	\$59.50
2018	\$76.00	\$50.00	\$59.00	\$51.00	\$59.00	\$85.00	\$57.00	\$66.00	\$58.00	\$66.50
2019	\$74.00	\$50.00	\$58.00	\$52.00	\$58.50	\$84.00	\$58.00	\$67.00	\$60.00	\$67.25
2020	\$67.00	\$49.00	\$58.00	\$49.00	\$55.75	\$80.00	\$59.00	\$69.00	\$60.00	\$67.00
2021	\$68.00	\$50.00	\$59.00	\$50.00	\$56.75	\$82.00	\$60.00	\$71.00	\$62.00	\$68.75
2022	\$67.00	\$50.00	\$59.00	\$49.00	\$56.25	\$83.00	\$62.00	\$73.00	\$64.00	\$70.50
2023	\$69.00	\$51.00	\$62.00	\$51.00	\$58.25	\$87.00	\$66.00	\$77.00	\$67.00	\$74.25
2024	\$70.00	\$52.00	\$63.00	\$51.00	\$59.00	\$89.00	\$67.00	\$79.00	\$68.00	\$75.75
2025	\$70.00	\$53.00	\$63.00	\$50.00	\$59.00	\$90.00	\$69.00	\$80.00	\$69.00	\$77.00
2026	\$72.00	\$53.00	\$64.00	\$51.00	\$60.00	\$94.00	\$70.00	\$82.00	\$71.00	\$79.25
2027	\$74.00	\$55.00	\$66.00	\$52.00	\$61.75	\$96.00	\$72.00	\$85.00	\$73.00	\$81.50
2028	\$76.00	\$56.00	\$68.00	\$54.00	\$63.50	\$99.00	\$75.00	\$87.00	\$75.00	\$84.00
2029	\$79.00	\$58.00	\$70.00	\$55.00	\$65.50	\$102.00	\$77.00	\$90.00	\$77.00	\$86.50
2030	\$81.00	\$60.00	\$72.00	\$57.00	\$67.50	\$105.00	\$79.00	\$93.00	\$79.00	\$89.00

Natural Gas Avoided Costs (\$/MMBtu)

Southern New England					
	Retail Natural Gas		Wholesale Natural Gas		
	Residential	Commercial/Industrial	Winter	Summer	Annual Avg.*
2011	7.46	6.79	6.16	5.37	5.37
2012	7.94	7.27	6.63	5.89	5.89
2013	8.15	7.49	6.84	6.1	6.1
2014	8.51	7.84	7.23	6.38	6.38
2015	9.01	8.34	7.7	6.95	6.95
2016	9.04	8.37	7.72	6.99	6.99
2017	9.02	8.35	7.71	6.97	6.97
2018	9.05	8.38	7.74	6.99	6.99
2019	9.1	8.43	7.79	7.03	7.03
2020	9.2	8.53	7.89	7.13	7.13
2021	9.3	8.63	7.99	7.23	7.23
2022	9.46	8.8	8.17	7.36	7.36
2023	9.74	9.07	8.45	7.64	7.64
2024	9.92	9.25	8.62	7.84	7.84
2025	10	9.33	8.7	7.91	7.91
2026	10.14	9.47	8.84	8.04	8.04

*Annual Averages were written as same as summer heating costs; see page 4-27 of AESC

Appendix B: Stakeholder Comments and CEEEP Responses

<u>Comment Date</u>	<u>Commenter</u>	<u>Comment</u>	<u>CEEEP Response</u>
June 20, 2012	NJ Rate Council (Synapse)	For Wholesale Electricity Price: recommended using PJM electricity futures market prices through 2015 and escalating long-term prices based on EIA's 2012 Annual Energy Outlook projections	CEEEP will continue to use historic PJM LMP data for 2011, but is using Annual Energy Outlook Reliability First Corporation/East Electricity Generation Prices for escalation.
		For Retail Electricity Price: recommended using sector-specific historically-based retail price adders to estimate them, instead of EIA annual growth rates	CEEEP is going to continue using EIA growth rates as the difference between CEEEP and Synapse's methodology is less than 2 cents/kWh.
		For Wholesale Natural Gas Price: recommended acknowledgment of discrepancy between currently-used EIA prices and the "much lower" NYMEX Henry Hub futures	In updated document, CEEEP uses finalized AEO 2012 Henry Hub prices.
		For Retail Natural Gas Price: recommended estimating annual average prices using residential and industrial monthly price data for 2011, instead of 2010 annual averages	CEEEP updated the analysis to include 2011 residential and industrial retail natural gas prices.
		For Capacity Price: starting price is too high, recommended using a multi-year average as a mid-point (starting in 2016)	Due to an error in CEEEP's 2015 capacity price, the forecast was too high. After correcting the error, CEEEP's forecast is within 1.3% of Synapse's forecast.
		Use GDP instead of CPI to forecast capacity prices after 2016	CEEEP has continued to use CPI because the difference between CEEEP and Synapse estimates has been negligible.
		Explain assumptions used by EnerNOC for its 1.4% natural gas loss factor estimate	The source is noted in the updated document.
		Use GDP instead of CPI as inflator to project future costs of avoided CO ₂ emissions	CEEEP has continued to use CPI because the difference between CEEEP and Synapse estimates has been negligible.

<u>Comment Date</u>	<u>Commenter</u>	<u>Comment</u>	<u>CEEEP Response</u>
June 20, 2012	New Jersey Natural Gas	Extend forecast data to 2033	Forecast has been extended out to 2035
		Develop assumptions for Natural Gas T&D Avoided Costs	CEEEP notes in updated document that reputable sources for Avoided Natural gas T&D are being researched.
		Review, and allow NJ stakeholders to review, how other jurisdictions are estimating/forecasting avoided costs	CEEEP has reviewed Pennsylvania and New England avoided costs and presented in Appendix.
August 4, 2012	Nexant Inc.	Recommends more disaggregated data on historical and projected costs be developed to permit more precise cost-benefit analysis	CEEEP reviewed Avoided cost studies in Pennsylvania and New England and did not find that data was more disaggregated than in this analysis for retail and wholesale prices.
		Recommends projected annual average NJ capacity prices be further disaggregated to account for differences of LOLP, both chronologically and by location	CEEEP reviewed Avoided cost study in Pennsylvania and did note capacity prices were available in summer/winter and by utility.
August 6, 2012	NJ Rate Council (Synapse)	A more detailed analysis should be carried out to develop more reliable forecasts	A more detailed analysis of avoided costs would be conducted if funding and time are available.
		Avoided cost study should include estimates of: NJ-specific avoided T&D costs, the effect of reduced demand from EE programs on market prices, and reduced REC payments based on reduced load from EE programs	CEEEP will consider these comments in future avoided cost study.
		Retail electricity prices should account for inflationary increases in non-energy related costs for C&I customers	CEEEP uses historical retail electricity prices and escalates by EIA estimates for the Mid-Atlantic.
		Use GDP instead of CPI as inflator	CEEEP has continued to use CPI because the difference between CEEEP and Synapse estimates has been negligible. In the future, CEEEP will use the GDP deflator and will compare to CPI.