

## Linda Wetzel

---

**From:** chpfc-bounces@njcleanenergy.com on behalf of Winka, M <M.Winka@bpu.state.nj.us>  
**Sent:** Wednesday, April 03, 2013 4:37 PM  
**To:** chpfc@njcleanenergy.com  
**Subject:** RE: Revised Staff Straw Proposal - CRA 2014-17  
**Attachments:** CEEEP Avoided Cost Assumptions Oct 2012.pdf; CHP & DG CBA Assumptions Input Request.docx; ATT00001.txt

Also attached are the draft avoided cost assumption CEEEP will be using as part of their CBA for storm response CHP

Please submit any comments within two weeks

---

**From:** Winka, M  
**Sent:** Wednesday, April 03, 2013 4:31 PM  
**To:** [chpfc@njcleanenergy.com](mailto:chpfc@njcleanenergy.com)  
**Subject:** FW: Revised Staff Straw Proposal - CRA 2014-17

Please see the attached revised straw proposal for the both small scale and large scale CHP-FC at \$30M for FY 2014.

Also the Standby proceeding is tentatively being scheduled for Mid May.

---

**From:** [renewables-bounces@njcleanenergy.com](mailto:renewables-bounces@njcleanenergy.com) [<mailto:renewables-bounces@njcleanenergy.com>] **On Behalf Of** Ackerman, Elizabeth  
**Sent:** Thursday, March 28, 2013 5:46 PM  
**To:** [ee@njcleanenergy.com](mailto:ee@njcleanenergy.com); [renewables@njcleanenergy.com](mailto:renewables@njcleanenergy.com)  
**Subject:** Revised Staff Straw Proposal - CRA 2014-17

Today, the New Jersey Board of Public Utilities (BPU) is releasing for stakeholder input the Revised Staff Straw Proposal for NJ's Clean Energy Program (CEP) Comprehensive Resource Analysis (CRA). The proposed funding level will fully fund the core CEP programs that help residents, businesses and local governments reduce energy usage, save money and improve the environment.

The straw CRA proposes extending the current CEP funding level of \$379.25 million for FY2014 and recommends that the funding levels for the outlier years, FY2015-17, be deferred until the contract for new CEP Program Administrator is finalized and a Strategic Plan is developed.

As a CEP stakeholder, you are well aware that the program serves a vital role in enhancing the competitiveness of New Jersey's economy by ensuring that businesses, from a small, family-owned business to Fortune 500 companies, have the opportunity to conserve energy and reduce energy costs, while delivering environmental benefits and supporting job creation. On the residential side of the CEP, the program also serves the vital role of ensuring that residents have the opportunity to conserve energy, reduce energy bills and help the environment, while supporting and creating well-paying jobs.

## **Request for Data Input for New Jersey Cost-benefit Analysis of Combined Heat and Power and Other Distributed Generation**

March 25, 2013

The Center for Energy, Economic and Environmental Policy (CEEPP) has been asked by the New Jersey Board of Public Utilities to conduct a cost-benefit analysis of combined heat and power (CHP) and other distributed generation (DG) options.

As part of its efforts, CEEPP is requesting a variety of information from stakeholders and the public. Note that all provided information will be publicly available; no confidential or proprietary data should be submitted.

1. Comments on the attached October 2012 avoided costs assumptions prepared by CEEPP (previously made available for public comment as part of a different effort) along with supporting documentation, studies and data.
2. All costs (capital, fixed operations and maintenance, variable operations and maintenance, cost of capital, capital debt and equity structure and costs) associated with different CHP and DG technologies and sizes along with supporting documentation studies and data.
3. Emission rates for different CHP and DG technologies and sizes along with supporting documentation, studies and data.
4. Any other information, studies, or data that CEEPP should consider in its analysis including cost-benefit analyses, cost effectiveness studies, or other reports related to CHP and DG.

CEEPP requests this data within two weeks of circulating the request to the NJ BPU CHP Working Group.

Please forward all information to Frank Felder, [ffelder@rci.rutgers.edu](mailto:ffelder@rci.rutgers.edu).

## **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 Charge<sup>1</sup> 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 Prices<sup>2</sup>. 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.

---

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

<sup>2</sup> 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 Charge<sup>3</sup> were also included.

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

<sup>3</sup> 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 load<sup>4</sup> 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.<sup>5</sup>

<sup>4</sup> PJM Reliability Pricing Model User Information. Base Residual Auction Results [www.pjm.com/markets-and-operations/rpm/rpm-auction-user-info.aspx#Item01](http://www.pjm.com/markets-and-operations/rpm/rpm-auction-user-info.aspx#Item01); PJM. Historic Load Data.

<sup>5</sup> U.S. Department of Labor [ftp://ftp.bls.gov/pub/special.requests/cpi/cpiiai.txt](http://ftp.bls.gov/pub/special.requests/cpi/cpiiai.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.<sup>6</sup>

**Avoided Electric and Natural Gas Losses:** Avoided electric transmission losses are assumed to be 7.6%<sup>7</sup> and avoided natural gas losses are assumed to be 1.4%<sup>8</sup> based on data calculations from EnerNOC Utility Solutions<sup>9</sup>. 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.

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

<sup>7</sup> 10 year (2001-2010) Average: "New Jersey Supply and Disposition of Electricity"

<http://www.eia.gov/electricity/state/newjersey>

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

<sup>9</sup> 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)<sup>10,11</sup>**

| 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 SO<sub>2</sub> and NO<sub>x</sub> are already accounted for in energy prices. CEEEP is currently researching reputable sources of SO<sub>2</sub> and NO<sub>x</sub> allowance price projections.

- **Forecasted CO<sub>2</sub> Social Cost:** Values for the Social Cost of Carbon were taken from the Interagency Working Group on Social Cost of Carbon<sup>12</sup>. 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.

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

<sup>11</sup> PA: Potential study, Appendix 1: [http://www.puc.state.pa.us/electric/pdf/Act129/Act129-PA\\_Market\\_Potential\\_Study\\_App1.pdf](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](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>

<sup>12</sup> 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 SO<sub>2</sub> and NO<sub>x</sub> were taken from EIA<sup>13</sup>. All emission permits are in \$/ton.

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

|      | SO <sub>2</sub> | NO <sub>x</sub> |
|------|-----------------|-----------------|
| 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         |

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



**Appendix A: Avoided Costs in Other States**

**Electric Capacity (Nominal \$/kW-yr)**

|      | <b>Met Ed</b> |         | <b>PECO</b> | <b>Penelec</b> |         | <b>Penn Power</b> |         | <b>PPL</b> | <b>West Penn Power</b> |         |
|------|---------------|---------|-------------|----------------|---------|-------------------|---------|------------|------------------------|---------|
|      | 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     |                |         |                   |         |            |                        |         |

|      | <b>Maine</b> | <b>Vermont</b> | <b>New Hampshire</b> | <b>Connecticut</b> | <b>Massachusetts</b> | <b>Rhode Island</b> |
|------|--------------|----------------|----------------------|--------------------|----------------------|---------------------|
| 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)**

|      | <b>PPL</b>  |                 |             |                 |          | <b>West Penn Power</b> |                 |             |                 |          |
|------|-------------|-----------------|-------------|-----------------|----------|------------------------|-----------------|-------------|-----------------|----------|
|      | 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 |

|      | <b>Connecticut</b> |                 |             |                 |         | <b>Massachusetts</b> |                 |             |                 |          |
|------|--------------------|-----------------|-------------|-----------------|---------|----------------------|-----------------|-------------|-----------------|----------|
|      | 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)**

| <b>Southern New England</b> |                           |                              |                              |               |                     |
|-----------------------------|---------------------------|------------------------------|------------------------------|---------------|---------------------|
|                             | <b>Retail Natural Gas</b> |                              | <b>Wholesale Natural Gas</b> |               |                     |
|                             | <b>Residential</b>        | <b>Commercial/Industrial</b> | <b>Winter</b>                | <b>Summer</b> | <b>Annual Avg.*</b> |
| <b>2011</b>                 | 7.46                      | 6.79                         | 6.16                         | 5.37          | 5.37                |
| <b>2012</b>                 | 7.94                      | 7.27                         | 6.63                         | 5.89          | 5.89                |
| <b>2013</b>                 | 8.15                      | 7.49                         | 6.84                         | 6.1           | 6.1                 |
| <b>2014</b>                 | 8.51                      | 7.84                         | 7.23                         | 6.38          | 6.38                |
| <b>2015</b>                 | 9.01                      | 8.34                         | 7.7                          | 6.95          | 6.95                |
| <b>2016</b>                 | 9.04                      | 8.37                         | 7.72                         | 6.99          | 6.99                |
| <b>2017</b>                 | 9.02                      | 8.35                         | 7.71                         | 6.97          | 6.97                |
| <b>2018</b>                 | 9.05                      | 8.38                         | 7.74                         | 6.99          | 6.99                |
| <b>2019</b>                 | 9.1                       | 8.43                         | 7.79                         | 7.03          | 7.03                |
| <b>2020</b>                 | 9.2                       | 8.53                         | 7.89                         | 7.13          | 7.13                |
| <b>2021</b>                 | 9.3                       | 8.63                         | 7.99                         | 7.23          | 7.23                |
| <b>2022</b>                 | 9.46                      | 8.8                          | 8.17                         | 7.36          | 7.36                |
| <b>2023</b>                 | 9.74                      | 9.07                         | 8.45                         | 7.64          | 7.64                |
| <b>2024</b>                 | 9.92                      | 9.25                         | 8.62                         | 7.84          | 7.84                |
| <b>2025</b>                 | 10                        | 9.33                         | 8.7                          | 7.91          | 7.91                |
| <b>2026</b>                 | 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) | <p><b>For Wholesale Electricity Price:</b> recommended using PJM electricity futures market prices through 2015 and escalating long-term prices based on EIA's 2012 Annual Energy Outlook projections</p> <p><b>For Retail Electricity Price:</b> recommended using sector-specific historically-based retail price adders to estimate them, instead of EIA annual growth rates</p> <p><b>For Wholesale Natural Gas Price:</b> recommended acknowledgment of discrepancy between currently-used EIA prices and the "much lower" NYMEX Henry Hub futures</p> <p><b>For Retail Natural Gas Price:</b> recommended estimating annual average prices using residential and industrial monthly price data for 2011, instead of 2010 annual averages</p> <p><b>For Capacity Price:</b> starting price is too high, recommended using a multi-year average as a mid-point (starting in 2016)</p> <p>Use GDP instead of CPI to forecast capacity prices after 2016</p> <p>Explain assumptions used by EnerNOC for its 1.4% natural gas loss factor estimate</p> <p>Use GDP instead of CPI as inflator to project future costs of avoided CO<sub>2</sub> emissions</p> | <p>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.</p> <p>CEEEP is going to continue using EIA growth rates as the difference between CEEEP and Synapse's methodology is less than 2 cents/kWh.</p> <p>In updated document, CEEEP uses finalized AEO 2012 Henry Hub prices.</p> <p>CEEEP updated the analysis to include 2011 residential and industrial retail natural gas prices.</p> <p>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.</p> <p>CEEEP has continued to use CPI because the difference between CEEEP and Synapse estimates has been negligible.</p> <p>The source is noted in the updated document.</p> <p>CEEEP has continued to use CPI because the difference between CEEEP and Synapse estimates has been negligible.</p> |

| <u>Comment Date</u> | <u>Commenter</u>          | <u>Comment</u>   | <u>CEEPP Response</u>  |
|---------------------|---------------------------|--|--|
| June 20, 2012       | New Jersey Natural Gas    | Extend forecast data to 2033<br><br>Develop assumptions for Natural Gas T&D Avoided Costs<br><br>Review, and allow NJ stakeholders to review, how other jurisdictions are estimating/forecasting avoided costs   | Forecast has been extended out to 2035<br><br>CEEPP notes in updated document that reputable sources for Avoided Natural gas T&D are being researched.<br><br>CEEPP has reviewed Pennsylvania and New England avoided costs and presented in Appendix.<br><br>CEEPP 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. |
| August 4, 2012      | Nexant Inc.               | Recommends more disaggregated data on historical and projected costs be developed to permit more precise cost-benefit analysis<br><br>Recommends projected annual average NJ capacity prices be further disaggregated to account for differences of LOLP, both chronologically and by location   | CEEPP reviewed Avoided cost study in Pennsylvania and did note capacity prices were available in summer/winter and by utility.<br><br>A more detailed analysis of avoided costs would be conducted if funding and time are available.  |
| August 6, 2012      | NJ Rate Council (Synapse) | A more detailed analysis should be carried out to develop more reliable forecasts<br><br>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<br><br>Retail electricity prices should account for inflationary increases in non-energy related costs for C&I customers<br><br>Use GDP instead of CPI as inflator | CEEPP will consider these comments in future avoided cost study.<br><br>CEEPP uses historical retail electricity prices and escalates by EIA estimates for the Mid-Atlantic.<br><br>CEEPP has continued to use CPI because the difference between CEEPP and Synapse estimates has been negligible. In the future, CEEPP will use the GDP deflator and will compare to CPI.   |