

**Cost-Benefit Analysis of the New Jersey Clean Energy Program  
Energy Efficiency Programs:**

FY 2013 Retrospective (January 1, 2012 – June 30, 2013)

FY 2014 Retrospective (July 1, 2013 – June 30, 2014)

FY 2015 (July 1, 2014 – June 30, 2015)

**SUMMARY REPORT**

January 27, 2016

Center for Energy, Economic and Environmental Policy  
Edward J. Bloustein School of Planning and Public Policy  
Rutgers, the State University of New Jersey

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**I. Executive Summary**

The Center for Energy, Economic and Environmental Policy (CEEEP) of the Edward J. Bloustein School of Planning and Public Policy at Rutgers University was asked by the New Jersey Board of Public Utilities (NJBP) to conduct a cost-benefit analysis (CBA) of the fiscal years (FY) 2013, FY 2014, and FY 2015 for residential, commercial, and industrial New Jersey Clean Energy Program (NJCEP) energy efficiency programs. CEEEP has conducted cost-benefit analysis of NJ ratepayer funded energy efficiency and renewable energy programs since 2003.<sup>1</sup>

The purpose of this report is to summarize the CBA evaluation of the NJCEP energy efficiency programs and to compare the FY 2013, FY 2014 and FY 2015 cost-benefit test results to prior year test results. These CBAs were provided to the Program Administrator, Market Managers, and NJBP Staff on January 15, 2015 and discussed with the same group during the Leadership Team meeting held at the Bloustein School on August 6, 2015. A draft of this report was also provided to this group for review and comment on October 14, 2015. Additionally data transition from existing market managers was discussed to ensure all data recorded and required is available for future evaluation purposes.

Cost-benefit tests have been conducted for nine NJCEP energy efficiency programs (Table 1) available to New Jersey’s residential, commercial, and industrial customers.

**Table 1: NJCEP Energy Efficiency Programs**

<b>Residential</b>	<b>Commercial &amp; Industrial</b>
Residential HVAC	C&I New Construction
Residential New Construction	C&I Retrofit
Residential Low Income	Direct Install
EE Products	Pay for Performance
Home Performance with Energy Star	

This report provides the various assumptions, data and approach used for conducting cost-benefit analysis. Several important observations, as identified below, should be noted:

- A. FY 2013 covers the time period from January 1, 2012 through June 30, 2013 (eighteen months), while FY 2014 covers the period from July 1, 2013 through June 30, 2014 (twelve months) and FY 2015 covers the period from July 1, 2014 through June 30, 2015 (twelve months).
- B. Non-energy impacts, such as reductions in water usage and improved health and safety have not been included in this analysis. These types of impacts should be investigated and quantified in the future.
- C. At the time when the analysis for this report was being prepared, there was no budget or energy savings data available for the FY 2015 residential programs.
- D. Additionally, in order to calculate incremental costs for residential programs, CEEEP used program data available on the NJCEP website to determine which specific measures were eligible

<sup>1</sup> Reports of CBA conducted by CEEEP in previous years can be accessed at <http://ceeep.rutgers.edu/publications/>

## CBA of NJCEP Energy Efficiency Programs

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for rebates. In the future, more accurate measure level data from the Program Manager needs to be provided in order to have reliable CBAs.

- E. For commercial and industrial (C&I), FY 2014 and FY 2015 data were provided directly by TRC, whereas the FY 2013 data was provided by NJCEP and AEG (as noted in Table 12). Data for CBAs prior to 2013 was provided by NJCEP and AEG. Note that CEEEP was not able to complete CBAs for a few of the C&I programs in FY 2014 and FY 2015 due to a lack of adequate measure-level data for those programs.
- F. Additionally, due to a lack of a detailed mix of measures available for C&I programs (encompassing both the efficiency level of installed measures as well as the building types that the measures are being installed in), it is difficult for CEEEP to calculate an incremental cost. These CBA results use the best estimate of incremental costs that can be developed at this time.

Table 2 below provides an overview of the Total Resource Cost (TRC) test results over the years starting FY2006.

**Table 2: 2006 to 2015 Total Resource Cost Test Ratios**

		2006	2007	2008	2009	2010	2011	2013	2014	2015
<b>Residential Programs</b>										
	Low Income <sup>2</sup>				0.4	0.3	0.4	0.3	0.3	
	HVAC	2.7	3.5	4.1	1.8	1.1	0.9	0.7	0.4	
	Home Performance with Energy Star			0.2	0.5	0.4	0.7	0.4	0.5	
	Energy Star Products	0.5	1.9	1.9	4.7	3.0	1.4	2.1	1.5	
	New Construction	1.5	1.5	2.2	1.5	1.0	0.9	1.2	1.2	
<b>Commercial &amp; Industrial Programs</b>										
	CHP	1.1	7.5	1.4		0.8				1.4
	New Construction	8.6	5.1	10.1	7.9	6.8	5.3	4.4	0.3	10.1
	Retrofit	5.0	1.7	4.7	3.3	3.7	6.2	13.4	10.3	4.7
	Schools	3.1	3.1	2.3	2.7					2.3
	Direct Install					1.5	3.8	10.1		

As the New Jersey Clean Energy Program transitions to its new structure, the NJBPU and the existing program administrator and program managers are working to systematically collect and compile the necessary data for evaluation purposes in general and for CBAs in particular. CEEEP has provided these entities a template for collecting information required to conduct CBAs and to gather incremental cost and savings related data for each individual measure installed under the various ratepayer funded programs in New Jersey.

<sup>2</sup> The Low Income values for 2006 through 2008 were initially calculated using an incorrect incremental cost and therefore are not provided in this table.

## II. Introduction

### A. Description of Cost-Benefit Tests

Five costs tests are utilized for the cost-benefit analysis: Participant Cost Test, Program Administrator Cost Test, Ratepayer Impact Measure Test, Total Resource Cost Test, and Societal Cost Test.<sup>3</sup>

**Participant Cost Test:** This test measures the quantifiable benefits and costs to the customer attributed to participation in a program. The participant benefits are equal to the sum of any participant incentives paid, any reductions in bills, and any federal or state tax deductions or credits. Participant costs include any out-of-pocket costs associated with the program.

**Program Administrator Cost Test:** This measures the costs of a program as a resource option based on the costs incurred by the program administrator (including incentive costs), excluding any costs incurred by the participant. The benefits are the avoided supply costs of energy, avoided transmission and distribution costs, and the reduction in capacity valued at marginal costs for the periods when there is a load reduction. The costs are the program costs incurred by the administrator, the incentives paid to the customers, and the increased supply costs for the periods during which load is increased.

**Ratepayer Impact Measure Test:** This measures what happens to customer bills or rates due to changes in revenues and operating costs caused by the program. The benefits equal the savings from avoided supply costs, including the reduction in capacity costs for periods when load has been reduced, as well as the increase in revenues for periods in which load has increased. The costs are the program costs incurred by program administration, the incentives paid to participants, decreased revenues for any periods in which load has been decreased, and increased supply costs for any periods when load has increased.

**Total Resource Cost Test:** This test measures the costs of a program as a resource option based on the total costs of the program, including both the participants' and the utility's costs. This test represents the combination of the effects of a program on both the participating and non-participating customers. The benefits are the avoided supply costs, federal tax credits, and the reduction in generation and capacity costs valued at marginal cost for the periods when there is a load reduction. The costs are the program costs paid by the utility and participants plus the increase in supply costs for the periods during which load is increased.

**Societal Cost Test:** This test attempts to quantify the change in the total resource cost to society as a whole rather than only to the utility and its ratepayers. Costs include all consumer, utility, and program expenses. Benefits associated with the societal perspective include avoided power supply costs, capacity benefits, avoided transmission and distribution costs, and emissions savings.

Table 3 provides a very thorough list of all types of costs and benefits attributable to energy efficiency measures as identified by the Regulatory Assistance Project in its September 2013 study report.<sup>4</sup> This list is for illustration purpose only.

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<sup>3</sup> CPUC, 2001.

<sup>4</sup> RAP, 2013.

## CBA of NJCEP Energy Efficiency Programs

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**Table 3: Components of Energy Efficiency Cost-Effectiveness Tests**

	Participant Test	RIM Test	PAC Test	TRC Test	Societal Cost Test
<b>Energy Efficiency Program Costs</b>					
Program Administration Costs (including EM&V)	-	X	X	X	X
EE Measure Costs: Program Incentives	-	X	X	X	X
EE Measure Costs: Participant Contribution	X	-	-	X	X
EE Measure Costs: Third-Party Contribution	-	-	-	X	X
Other EE Costs	X	-	X	X	X
Lost Revenues to the Utilities	-	X	-	-	-
<b>Utility System Benefits</b>					
Avoided Production Capacity Costs	-	X	X	X	X
Avoided Production Energy Costs	-	X	X	X	X
Avoided Costs of Existing Environmental Regulations	-	X	X	X	X
Avoided Costs of Future Environmental Regulations	-	X	X	X	X
Avoided Transmission Capacity Costs	-	X	X	X	X
Avoided Distribution Capacity Costs	-	X	X	X	X
Avoided Line Losses	-	X	X	X	X
Avoided Reserves	-	X	X	X	X
Avoided Risk	-	X	X	X	X
Displacement of Renewable Resource Obligation	-	X	X	X	X
Reduced Credit and Collection Costs	-	X	X	X	X
Demand Response Induced Price Effect (DRIPE)	-	X	X	X	X
<b>Benefits to Participants</b>					
Other Utility Benefits to Participants	X	-	-	X	X
Other Energy Savings (fuel oil, propane, natural gas)	X	-	-	X	X
Reduced Future Energy Bills	X	-	-	-	-
Other Resource Savings (septic, well pumping etc.)	X	-	-	X	X
<b>Non-Energy Benefits to Participants</b>					
O&M Cost Savings	X	-	-	X	X
Participant Health Impacts	X	-	-	X	X
Employee Productivity	X	-	-	X	X
Property Values	X	-	-	-	-
Benefits Unique to Low-Income Consumers	X	-	-	-	X
Comfort	X	-	-	X	X
Other	X	-	-	X	X
<b>Societal Non-Energy Benefits to Participants</b>					
Air Quality Impacts	-	-	-	-	X
Water Quantity and Quality Impacts	-	X	X	X	X
Coal Ash Ponds and Coal Combustion Residuals	-	-	-	-	X
Employment Impacts	-	-	-	-	X
Economic Development	-	-	-	-	X
Other Economic Considerations	-	X	X	X	X
Societal Risk and Energy Security	-	-	-	-	X
Reduction of Effects of Termination of Service	-	X	X	X	X
Avoidance of Uncollectable Bills for Utilities	-	X	X	X	X

CEEEP’s approach for quantification of various costs and benefits and calculation of cost-benefit tests is discussed in CEEEP’s Cost-Benefit Model Manual (CEEEP, 2008).

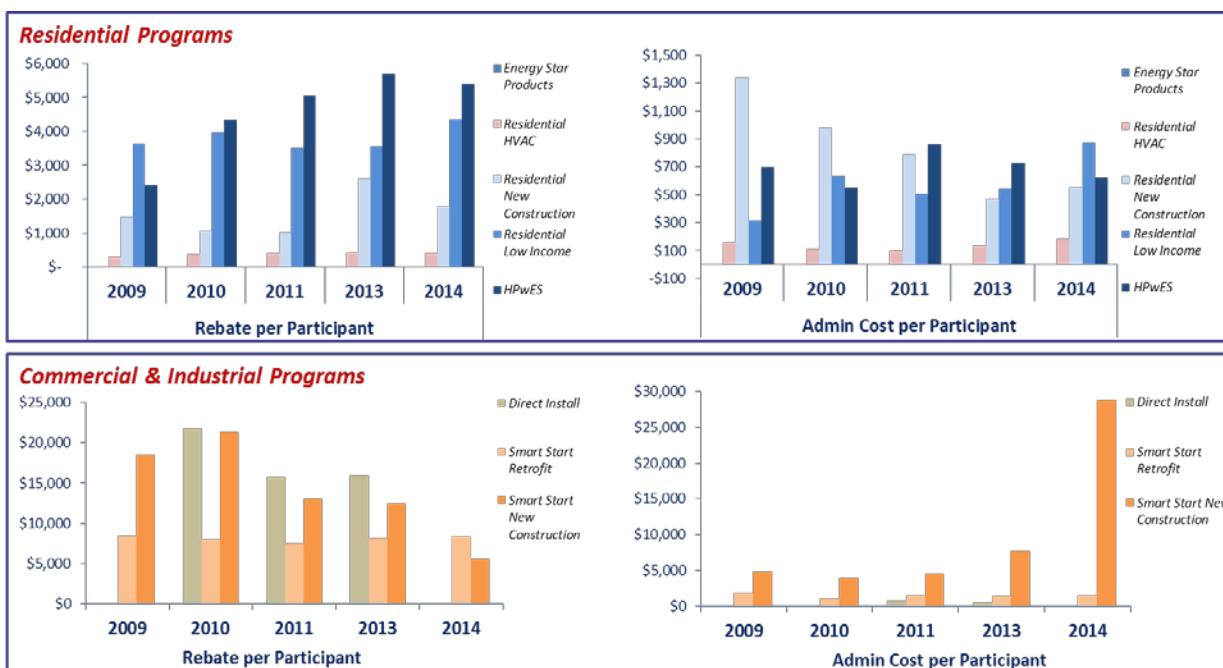
**B. CBA in the Context of Energy Efficiency Programs**

Cost-effectiveness tests are used by State Commissions and utilities to make decisions about which programs should receive ratepayer funding and how much. Most states have developed their own versions of the California Standard Practice Manual to determine the nuances of conducting a particular test and approach to inform decisions on the basis of test results. There is no clear cut one standard practice and each state has its own approach for calculating avoided costs, discount rates etc. as well as guidance on which test result to follow.

Each year since 2004, CEEEP prepares a NJCEP Evaluation and Research Plan through extensive stakeholder consultations and which lists the various evaluation activities to be conducted in the succeeding year. The FY2016 Evaluation and Research Plan envisages retrospective and prospective CBA analysis for all ratepayer funded energy efficiency and renewable energy programs.<sup>5</sup> The plan also proposes a detailed incremental cost research study and protocols update to be conducted in FY2016.

CEEEP has conducted cost-benefit analysis of NJ ratepayer funded energy efficiency and renewable energy programs since 2003. These include the programs managed by the Office of Clean Energy, the market managers (Honeywell and TRC) and utility programs. This report presents the CBA analysis for nine NJCEP energy efficiency programs available to New Jersey’s residential, commercial, and industrial customers in 2013. Brief description of these nine programs is included in Appendix A.

**Figure 1: Yearly Trend of Program Expenditure**

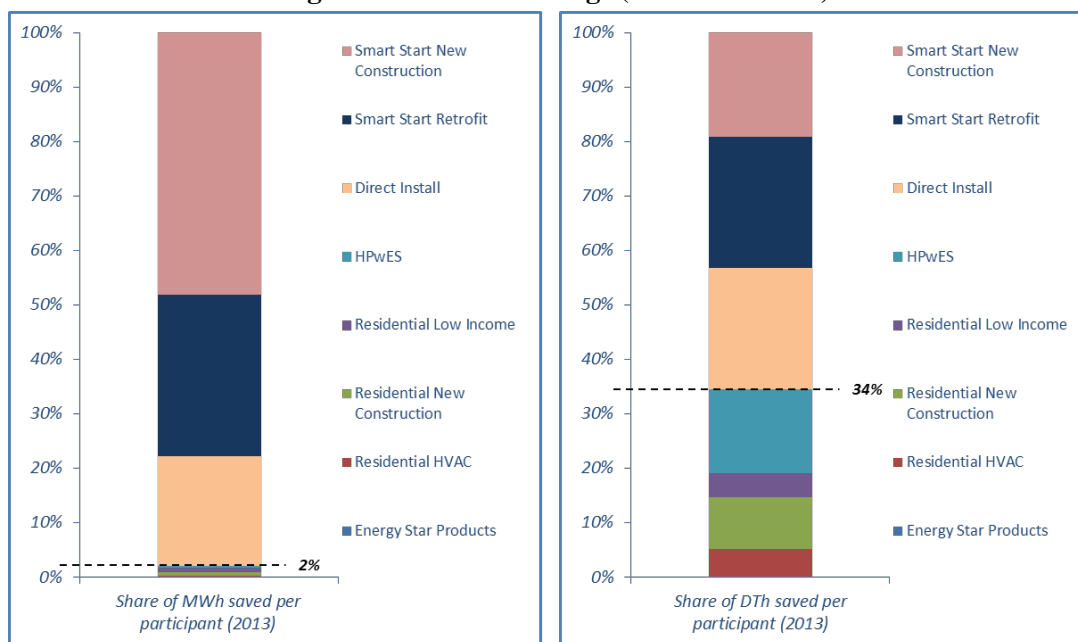


<sup>5</sup> Refer Table 7, Proposed 3 Year Evaluation Timeline (FY2016 – FY2018), NJBPU Order (June 2015).



Trend of yearly rebate and admin costs per participant for these programs is presented in Figure 1, and Figure 2 provides a comparison of the share of electricity and natural gas savings from these programs.

**Figure 2: Share of Savings (MWh and DTh)**



### III. Assumptions and Data

#### A. CBA Assumptions

The avoided cost assumptions for the energy efficiency cost-benefit analysis are discussed below, along with the data sources and processes for determining these components. Avoided costs presented here are developed for the sole purpose of conducting these CBAs and should not be considered forecasts or predictions into the future.

On August 3, 2015, the U.S. Environmental Protection Agency released the Clean Power Plan to reduce carbon emissions from existing power plants.<sup>6</sup> How New Jersey decides to comply with the Clean Power Plan is likely to impact many of these assumptions going forward. In addition, there have been major changes in PJM’s capacity market<sup>7</sup> and a pending Supreme Court decision regarding demand response<sup>8</sup>, both of which have the potential, depending on their resolution, to affect future wholesale market prices. The assumptions below were developed prior to both the release of the Clean Power Plan and the unfolding changes to PJM market rules.

<sup>6</sup> <http://www2.epa.gov/cleanpowerplan/clean-power-plan-existing-power-plants#CPP-final>

<sup>7</sup> <http://www.natlawreview.com/article/ferc-accepts-pjm-capacity-performance-proposal>

<sup>8</sup> <http://www.utilitydive.com/news/epa-other-demand-response-opponents-file-supreme-court-brief/404907/>

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- i) **Wholesale Electricity Prices:** Historic 2013 New Jersey wholesale electric prices from PJM were escalated based on the annual percent change in the EIA 2014 Annual Energy Outlook Reliability First Corporation/East Electricity Generation Prices. The annual average percent change was about 2.8%. The seasonal peak and off-peak factors were derived using historic 2013 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.
- ii) **Retail Electricity Prices:** Historic 2013 U.S. Energy Information Administration (EIA) New Jersey retail electricity prices were escalated using an annual price growth rate derived from the EIA Annual Energy Outlook 2014 for the Mid-Atlantic Region. On average, the annual growth rate was about 2.2%. The NJ Clean Energy Programs do not distinguish between commercial and industrial sectors, therefore the commercial and industrial prices were averaged based on historic 2013 New Jersey retail electricity sales. Retail electricity prices reported to the EIA include the Societal Benefits Charge (SBC)<sup>9</sup>, but not the 7% Sales and Use Tax, which CEEEP added.
- iii) **Wholesale (Henry Hub) Natural Gas Prices:** Wholesale natural gas prices are taken from the EIA Annual Energy Outlook 2014. The winter and summer prices were derived from the 1994 to 2013 historic average ratio of summer and winter prices to Henry Hub. The summer average ratio was 96.8% and the winter average ratio was 103.2%.
- iv) **Retail Natural Gas Prices:** Historic 2013 EIA New Jersey retail natural gas prices were escalated using an annual growth rate derived from the Mid-Atlantic Region EIA Annual Energy Outlook 2014 natural gas price forecasts. On average, the annual growth rate was about 3.2%. The average of the March and May 2013 residential gas prices was used because the April 2013 numbers were missing from the EIA data. The average of the December 2012 and February 2013 industrial gas prices was used because the January 2013 numbers were missing. Retail natural gas prices reported to the EIA include the Societal Benefits Charge (SBC)<sup>10</sup>, but not the 7% Sales and Use Tax, which CEEEP added.

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<sup>9</sup> The Societal Benefits Charge for electric customers of 3.6% for residential and 4.8% for C&I is included in retail prices reported to EIA by the utilities.

<sup>10</sup> The Societal Benefits Charge for natural gas customers of 4.1% for residential and 5.0% for C&I is included in the retail prices.

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**Table 4: Retail and Wholesale Electricity Prices**

	Retail (\$/kWh)			Wholesale (\$/MWh)			
	Residential	Commercial & Industrial	Average Price	Summer Peak	Summer Off-Peak	Non-Summer Peak	Non-Summer Off-Peak
<b>2013</b>	\$0.17	\$0.14	\$40.81	\$52.17	\$33.50	\$47.49	\$36.82
<b>2014</b>	\$0.17	\$0.14	\$41.74	\$53.36	\$34.27	\$48.57	\$37.66
<b>2015</b>	\$0.17	\$0.14	\$42.69	\$54.57	\$35.05	\$49.67	\$38.51
<b>2016</b>	\$0.18	\$0.14	\$41.52	\$53.08	\$34.09	\$48.31	\$37.46
<b>2017</b>	\$0.18	\$0.15	\$42.97	\$54.93	\$35.27	\$50.00	\$38.77
<b>2018</b>	\$0.18	\$0.15	\$43.18	\$55.20	\$35.45	\$50.24	\$38.96
<b>2019</b>	\$0.19	\$0.15	\$45.24	\$57.83	\$37.14	\$52.64	\$40.82
<b>2020</b>	\$0.19	\$0.16	\$46.03	\$58.85	\$37.79	\$53.56	\$41.53
<b>2021</b>	\$0.19	\$0.16	\$49.55	\$63.34	\$40.68	\$57.66	\$44.71
<b>2022</b>	\$0.19	\$0.16	\$51.30	\$65.58	\$42.11	\$59.69	\$46.28
<b>2023</b>	\$0.20	\$0.16	\$53.34	\$68.19	\$43.79	\$62.07	\$48.13
<b>2024</b>	\$0.20	\$0.17	\$56.46	\$72.17	\$46.35	\$65.69	\$50.94
<b>2025</b>	\$0.21	\$0.17	\$58.50	\$74.78	\$48.03	\$68.07	\$52.78
<b>2026</b>	\$0.22	\$0.17	\$60.58	\$77.44	\$49.74	\$70.49	\$54.66
<b>2027</b>	\$0.22	\$0.17	\$63.07	\$80.63	\$51.78	\$73.39	\$56.91
<b>2028</b>	\$0.23	\$0.18	\$65.38	\$83.59	\$53.68	\$76.08	\$58.99
<b>2029</b>	\$0.23	\$0.18	\$67.08	\$85.75	\$55.07	\$78.05	\$60.52
<b>2030</b>	\$0.24	\$0.19	\$69.30	\$88.59	\$56.89	\$80.64	\$62.53
<b>2031</b>	\$0.25	\$0.19	\$71.42	\$91.30	\$58.63	\$83.10	\$64.44
<b>2032</b>	\$0.25	\$0.19	\$74.16	\$94.81	\$60.89	\$86.29	\$66.91
<b>2033</b>	\$0.26	\$0.20	\$76.21	\$97.43	\$62.57	\$88.68	\$68.76
<b>2034</b>	\$0.26	\$0.21	\$78.32	\$100.12	\$64.30	\$91.13	\$70.66
<b>2035</b>	\$0.27	\$0.22	\$80.70	\$103.17	\$66.25	\$93.90	\$72.81
<b>2036</b>	\$0.28	\$0.22	\$84.04	\$107.43	\$68.99	\$97.78	\$75.82
<b>2037</b>	\$0.29	\$0.23	\$88.83	\$113.56	\$72.93	\$103.37	\$80.15

Table 5: Retail and Wholesale Natural Gas Prices

	Retail Prices (\$/MMBtu)			Henry Hub Wholesale Prices (\$/MMBtu)		
	Residential	Commercial	Industrial	Average Price	Summer	Winter
2013	\$12.23	\$9.91	\$8.78	\$3.66	\$3.54	\$3.77
2014	\$12.23	\$9.77	\$8.68	\$3.86	\$3.74	\$3.99
2015	\$12.23	\$9.75	\$8.84	\$3.93	\$3.80	\$4.06
2016	\$12.88	\$10.34	\$9.51	\$4.41	\$4.27	\$4.55
2017	\$13.32	\$10.69	\$9.84	\$4.76	\$4.61	\$4.91
2018	\$13.91	\$11.19	\$10.39	\$5.27	\$5.10	\$5.44
2019	\$14.32	\$11.51	\$10.70	\$5.19	\$5.03	\$5.36
2020	\$14.73	\$11.82	\$11.01	\$4.96	\$4.80	\$5.12
2021	\$15.12	\$12.10	\$11.27	\$5.37	\$5.20	\$5.55
2022	\$15.66	\$12.54	\$11.75	\$5.64	\$5.46	\$5.83
2023	\$16.17	\$12.95	\$12.18	\$5.90	\$5.71	\$6.09
2024	\$16.65	\$13.33	\$12.58	\$6.20	\$6.00	\$6.40
2025	\$17.09	\$13.65	\$12.90	\$6.45	\$6.24	\$6.66
2026	\$17.76	\$14.22	\$13.55	\$6.72	\$6.50	\$6.93
2027	\$18.18	\$14.50	\$13.82	\$7.00	\$6.77	\$7.22
2028	\$18.71	\$14.91	\$14.23	\$7.26	\$7.02	\$7.49
2029	\$19.25	\$15.31	\$14.65	\$7.63	\$7.39	\$7.88
2030	\$19.79	\$15.71	\$15.06	\$8.12	\$7.86	\$8.39
2031	\$20.42	\$16.21	\$15.60	\$8.47	\$8.19	\$8.74
2032	\$21.00	\$16.64	\$16.03	\$8.91	\$8.62	\$9.19
2033	\$21.65	\$17.14	\$16.56	\$9.41	\$9.11	\$9.72
2034	\$22.43	\$17.78	\$17.26	\$9.83	\$9.51	\$10.15
2035	\$23.25	\$18.45	\$17.99	\$10.31	\$9.98	\$10.65
2036	\$24.25	\$19.32	\$18.98	\$10.93	\$10.58	\$11.28
2037	\$25.09	\$20.01	\$19.72	\$11.23	\$10.87	\$11.60

- v) **Avoided Electric and Natural Gas Losses:** Avoided electric transmission and distribution losses are assumed to be 7.6% on average.<sup>11</sup> This is based on data calculations from EnerNOC Utility Solutions.<sup>12</sup> Avoided natural gas losses are assumed to be 1% based on the 2014 New Jersey protocols (NJCEP, 2014).
- vi) **Avoided Electric and Natural Gas Transmission and Distribution (T&D):** EnerNOC has recommended that CEEEP use an Avoided Electric T&D cost of \$30/kW-yr. Further research should

<sup>11</sup> 10 year (2001-2010) Average: "New Jersey Supply and Disposition of Electricity"  
<http://www.eia.gov/electricity/state/newjersey>

<sup>12</sup> EnerNOC Utility Solutions performed the calculations as part of the 2012 Energy Efficiency Market Potential Study for the New Jersey Clean Energy Program (EnerNOC, 2012). The line losses are derived from EIA data referenced above.

be undertaken to develop an estimate of avoided T&D costs for New Jersey. CEEEP is currently researching reputable sources for avoided Natural Gas T&D costs.

- vii) **Capacity Prices:** New Jersey Utility PJM Reliability Pricing Model (RPM) prices for the four electric utilities (AE, JCP&L, PSE&G, and RECO) for 2010 to 2017 were weighted by each utility’s historic 2013 peak load<sup>13</sup> to estimate an average New Jersey capacity price. From 2018 to 2030, the capacity prices were escalated based on the EIA projected annual change in U.S. GDP chain-type price index, which is reported in Table 10.

**Table 6: Capacity Price (\$/KW-year)**

\$/kW- year	
2013	\$75.38
2014	\$70.92
2015	\$59.41
2016	\$61.67
2017	\$62.12
2018	\$63.26
2019	\$64.44
2020	\$65.66
2021	\$66.92
2022	\$68.22
2023	\$69.57
2024	\$70.97
2025	\$72.36
2026	\$73.79
2027	\$75.27
2028	\$76.77
2029	\$78.36
2030	\$80.02
2031	\$81.79
2032	\$83.63
2033	\$85.55
2034	\$87.57
2035	\$89.64
2036	\$91.83
2037	\$94.05

- viii) **PJM Marginal Units:** Table 7 shows the type of fuel used by marginal resources in the PJM Real-Time Energy Market in year 2013 and 2014.<sup>14</sup>

<sup>13</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>14</sup> PJM State of the Market – 2014, Section 3 – Energy Market, pg. 76.

**Table 7: PJM Marginal Units by Type of Fuel Used**

Fuel Type	2013	2014
Coal	56.94%	52.90%
Gas	34.72%	35.80%
Oil	3.27%	7.45%
Wind	4.76%	3.29%
Other	0.20%	0.43%
Municipal Waste	0.07%	0.05%
Uranium	0.02%	0.04%
Emergency DR	0.02%	0.04%

- ix) **Power Plant Emission Rates:** Power plant emission rates for CO<sub>2</sub>, NO<sub>x</sub>, and SO<sub>x</sub> are shown in Table 8. Emission rates are in pounds per MWh. CEEEP is currently researching externality values and emission rates for mercury.

**Table 8: Power Plant Emission Rates (lbs/MWh)**

	CO <sub>2</sub>	NO <sub>x</sub>	Sox
Coal <sup>15</sup>	2,249	6	13
Natural Gas <sup>16</sup>	1,135	1.7	0.1
Oil <sup>17</sup>	1,672	4	12
Wind	0	0	0
Other	0	0	0
Municipal Waste <sup>18</sup>	2,988	5.4	0.8

- x) **Emission Factors:** Emission factors are presented for 2014 and for 2008-2013 in Table 9. In the past, CEEEP and the Applied Energy Group (AEG), the Program Administrator for the NJ Clean Energy programs, have used average emission rates to calculate avoided emissions. Going forward, given the EPA's issuance of its Clean Power Plan regulations, it is likely (but still unknown at this time) that the percent of the time natural gas is the marginal fuel will increase and the percent for coal will decrease. As a result, the avoided emissions due to energy efficiency programs may shift from avoiding emissions of coal fired power plants to those using natural gas. CEEEP will monitor the New Jersey plan to comply with the Clean Power Plan and will adjust emission rates accordingly wherever possible.

<sup>15</sup> U.S. EPA, eGRID 2000.

<sup>16</sup> Ibid.

<sup>17</sup> Ibid.

<sup>18</sup> U.S. EPA, Compilation of Air Pollutant Emission Factors (AP-42).

**Table 9: Emission Factors**

	2014		2009-2011	
	Electricity (lbs/MWh)	NG (lbs/MMBtu)	Electricity (lbs/MWh)	NG (lbs/MMBtu)
CO2	1,814	117	1,814	117
NOx	1.50	0.092	1.50	0.092
SO2	4.70		4.70	
Hg	0.0000356		0.0000356	
Source: NJDEP email (via Craig Moran) EIA Natural Gas 1998: Issues and Trends			Source: PJM Average Discloser Label 2006 EIA Natural Gas 1998: Issues and Trends	

- xi) **Environmental Externality Benefits:** Avoided emission savings are calculated by multiplying the emission permit prices by the energy savings. CEEEP is currently researching reputable sources for determining a value for avoided mercury emissions.
- xii) **Forecasted Carbon Dioxide (CO2) Social Cost:** Values for the Social Cost of Carbon were taken from the U.S. Government Interagency Working Group on Social Cost of Carbon.<sup>19</sup> Values were reported in 2007\$/metric ton, and were converted to nominal dollars using the EIA projected U.S. GDP Price Index.<sup>20</sup> 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>19</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, May 2013.

<sup>20</sup> EIA Annual Energy Outlook 2014. 2005=1.0

**Table 10: Social Cost of Carbon (Nominal \$/metric ton) and U.S. GDP Chain-type Price Index**

	Social Cost of CO <sub>2</sub>	GDP Chain-type Price Index
2013	\$39.69	1.17
2014	\$41.53	1.19
2015	\$43.32	1.21
2016	\$45.14	1.23
2017	\$46.98	1.25
2018	\$48.89	1.27
2019	\$50.86	1.29
2020	\$52.90	1.31
2021	\$55.02	1.33
2022	\$57.21	1.35
2023	\$59.48	1.37
2024	\$61.82	1.40
2025	\$64.22	1.42
2026	\$66.70	1.45
2027	\$67.86	1.47
2028	\$70.48	1.50
2029	\$73.20	1.52
2030	\$76.04	1.55
2031	\$79.04	1.58
2032	\$82.14	1.62
2033	\$85.38	1.65
2034	\$88.74	1.68
2035	\$92.22	1.72
2036	\$95.85	1.76
2037	\$99.60	1.79

xiii) **Historical Emissions Permit Price:** Historical emission permit prices for sulfur dioxide (SO<sub>2</sub>) and nitrogen oxide (NO<sub>x</sub>) in Table 11 were taken from the National Research Council’s 2010 study - Hidden Costs of Energy (NRC, 2010). All emission permits are in \$/short ton.

**Table 11: Mean Damages per Short Ton of Criteria-Pollutant Forming Emissions (2007 \$/short ton)**

From Coal-fired Power Plants	Unit	2007 \$
SO <sub>2</sub>	\$/Short Ton	5,800
NO <sub>x</sub>	\$/Short Ton	1,600
From Gas-fired Power Plants	Unit	2007 \$
SO <sub>2</sub>	\$/Short Ton	13,000
NO <sub>x</sub>	\$/Short Ton	2,200

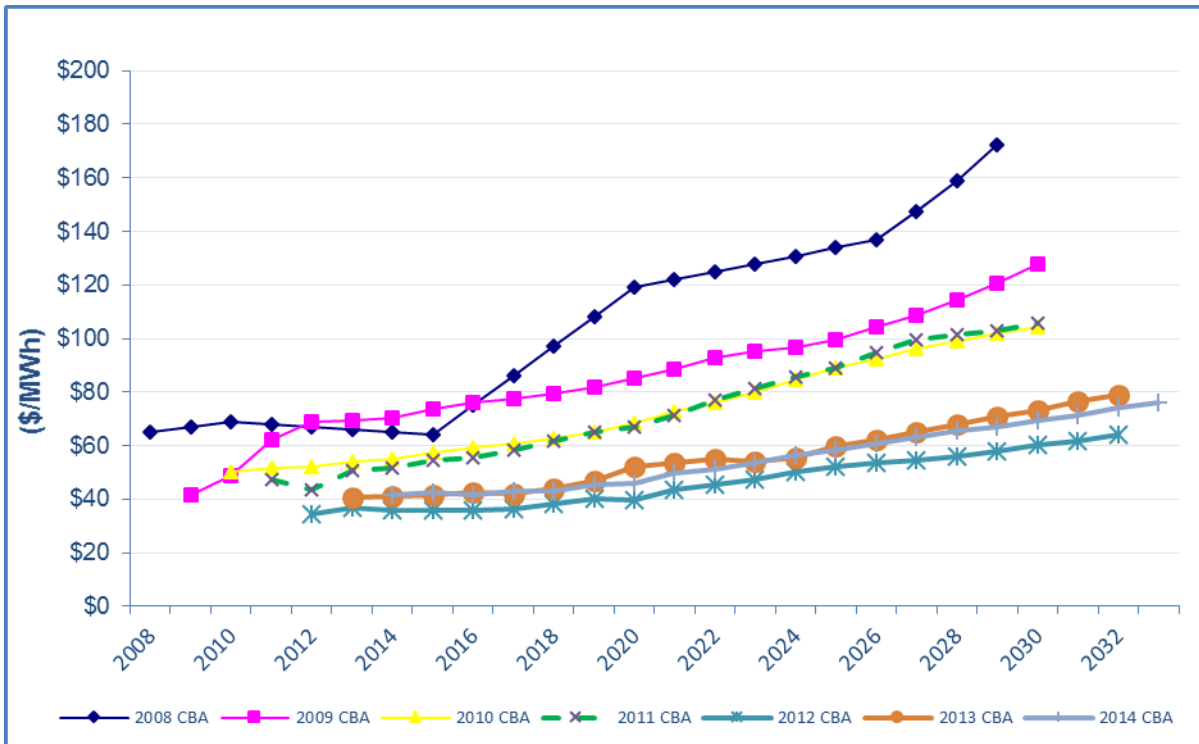


xiv) **Environmental Externality Benefits:** Avoided emission savings are calculated by multiplying the emission permit prices by the energy savings. CEEEP is currently researching reputable sources for determining a value for avoided mercury emissions.

**B. Avoided Costs Trend**

Each year CEEEP publishes a memo with key avoided costs assumptions for energy efficiency cost-benefit analysis. Stakeholder comments on the memo are discussed and incorporated into the final version. This section provides an overview of how the avoided costs have changed over time, from 2008 through 2014. As evident from Figure 3 the projected wholesale electricity prices were highest in 2008 and lowest in 2012.

**Figure 3: Wholesale Electricity Prices**

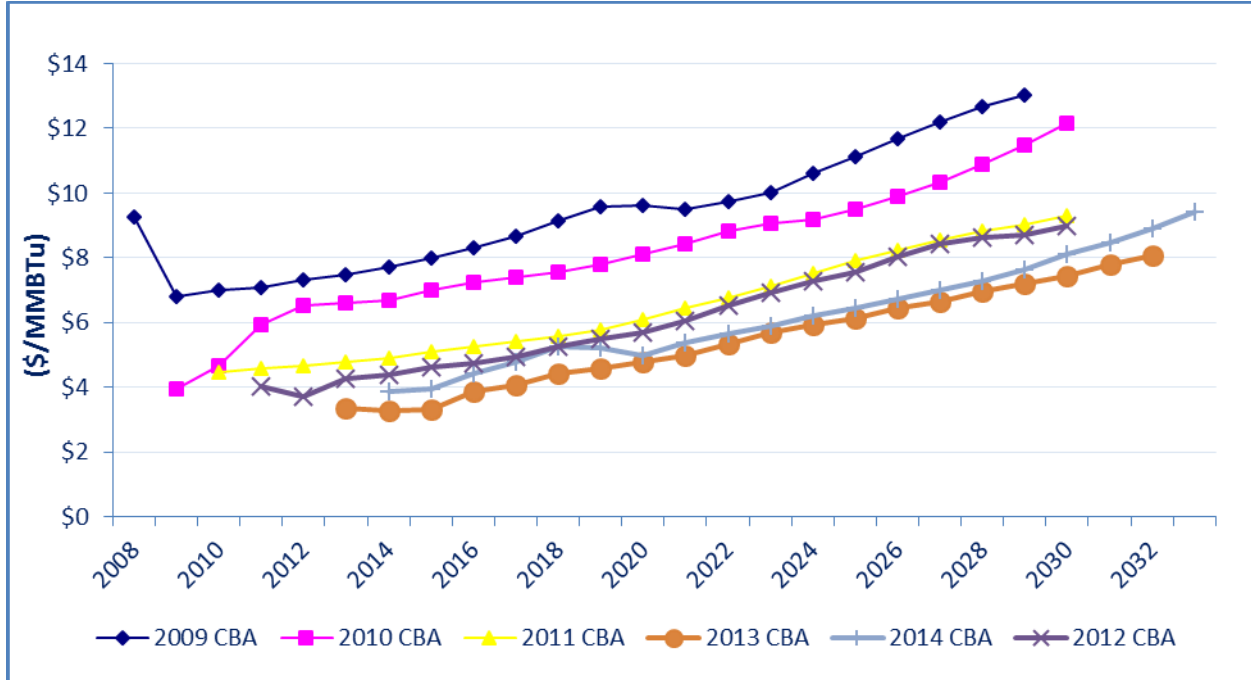


Similarly Figure 4 and Figure 5 show the projections of Henry Hub (natural gas wholesale) prices and electricity capacity prices over time. The highest projected Henry Hub prices were in 2009, while the lowest projected prices were in 2013. 2008 had the highest projected capacity prices, while the projected prices in 2012/2013/2014 have been much lower.

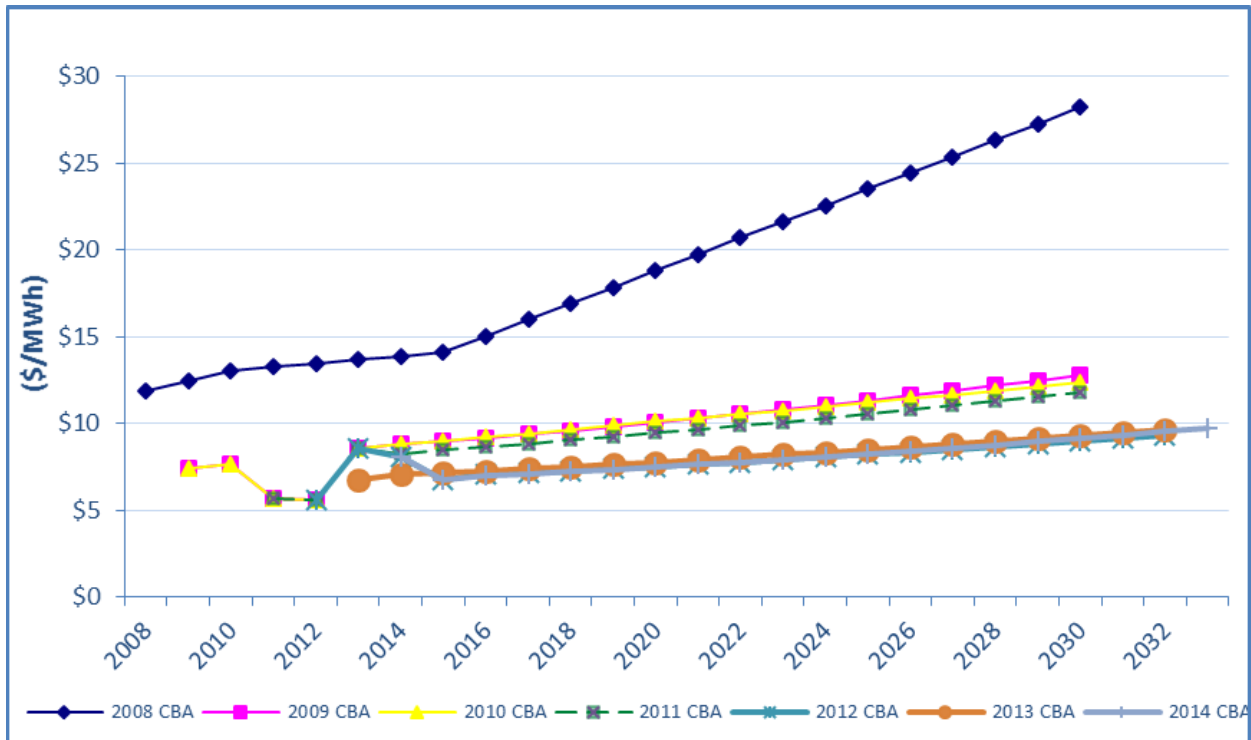
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**Figure 4: Henry Hub Prices**



**Figure 5: Capacity Prices**



### C. Incremental Cost Analysis

**Referred Studies:** Incremental cost is the additional cost of purchasing an energy efficient product instead of a standard product, or the full cost of weatherization and insulation products. In the absence of complete information on measure-level incremental cost data from market managers, this CBA analysis has used incremental cost data from EnerNOC's 2012 New Jersey Market Potential study (EnerNOC, 2012) where possible. Incremental costs from NEEP's Mid-Atlantic TRM (NEEP, 2014) are used in all other cases. For C&I programs, TRC provided the incremental cost data to CEEEP (for year FY2014 and FY2015) which was used for CBA analysis as presented in this report. Brief description of these and other incremental costs studies looked at is as follows.

***EnerNOC 2012 New Jersey Energy Efficiency Market Potential Assessment:*** In 2012, the New Jersey Board of Public Utilities (NJBPU) contacted energy services provider EnerNOC to complete a market assessment and energy efficiency potential study. This study was scheduled to both satisfy the Electric Discount and Energy Competition Act's requirement for annual, comprehensive resource analyses and also inform the funding appropriation process for New Jersey's energy efficiency programs. The market potential assessment provided detail market information on residential, commercial and industrial electricity and natural gas consumption with a base year of 2010 and consequently offered detail baseline forecasts for 2013-2024. Additionally, the report characterized hundreds of energy efficiency measures, grouped them in terms of their economic, technical, low/high achievable potential, and offered study-based recommendations for changes to existing NJCEP programs.

***NEEP Mid Atlantic TRM V4:*** Technical reference manuals (TRMs) are created to provide a measure-level framework that details the inputs and assumptions associated with energy saving measures that can be implemented in a residential, commercial or industrial setting. Although not required, many states create or borrow TRMs to develop an informed idea of where investments in an energy efficiency portfolio will be the highest yielding in terms of energy or cost savings. TRMs are also used for cost-effectiveness screening, regulatory comparisons and benchmarking, and efficiency resource valuations. Northeast Energy Efficiency Partnerships, Inc. solicited VEIC for the construction of a TRM to be used by all of the Mid-Atlantic states. The TRM also includes change in energy demand that results from switching baseline equipment for 'efficient' equipment.

***ITRON 2010-2012 Ex-Ante Measure Cost Study:*** The California Public Utility Commission (CPUC) and related Investor Owned Utilities (IOUs) contracted Itron, Inc. for the creation of an ex-ante measure cost study and report. This 2012 report, informed by a standalone measure cost study and related EM&V reports is used to determine portfolio-level cost-effectiveness by providing detailed, measure-level incremental costs of each measure in the California Database of Energy Efficiency Resources as well as a number of deemed measures from IOU work papers. Residential measure data largely came from retail-shelf surveys and third-party-originating point-of-sale data while C&I measure information was created from 75 hedonic pricing models and carefully developed price estimates that accounted for factors like bulk discounts, contractor mark-ups and warranties.

***California Measure Cost Database- READI/DEER:*** The CPUC and IOUs rely heavily on a proprietary Database of Energy Efficiency Resources (DEER) to inform their energy efficiency program decisions. A

substantial amount of DEER's measure-level data can be accessed through their Remote Ex-Ante Database Interface (READI), a downloadable, SQL-driven software with a user-friendly GUI. READI contains energy impacts for 1881 measures, general, labor and material costs for 211 measures, dozens of tech categories and sub-classifications for measures, measure specific technological parameters and a comprehensive glossary. READI is limited in its lack of explicit mention of sources ('IOU Work Paper' is cited often but there are hundreds of such documents), baseline measure information, and it's disconnect between sources for measures in multiple sections (one is able to collect energy impacts or costs for a measure, but never both).

**Source Data for CBA:** The Residential HVAC, Low Income, Home Performance with Energy Star, and Energy Star Products' incremental costs were estimated based on the weighted average of measures actually installed under the programs. Specific measure types installed under the residential programs are determined from the program information published on the NJCEP website. The Commercial & Industrial New Construction, Retrofit, and Direct Install program participant costs were computed using a list of measures that were installed under the program as well. In the case of C&I, specific measure data installed under the programs was not available on the NJCEP website.

The mix of measure types for each program is reported from the IMS system, which is the data management system for NJ ratepayer funded clean energy programs and maintained by the current program administrator. Measure Lives is the number of years that an energy efficient product will accrue energy savings. The measure life of each program was calculated using the same method as the incremental cost, using data from EnerNOC's Market Potential study, NEEP's Mid-Atlantic TRM, and the New Jersey Protocols.<sup>21</sup>

The Clean Energy Program Reports include installed, committed, and total savings for all programs. For the purposes of this cost-benefit analysis, CEEEP only used the installed savings. CEEEP reports energy savings and budget data for the total program, but determined per unit cost and savings.

Table 12.a and 12.b shows the data sources used for energy savings, administrative, and incremental costs, the mix of measures, incremental costs, and measure lives. CEEEP was not able to obtain data on the specific types of measures that are being installed under the C&I programs (i.e. the efficiency levels) and thus was not able to determine an accurate incremental cost for these programs. Cost-benefit ratios for these programs are not being reported at this time.

Program-specific incentives are obtained from the NJCEP Annual Reports. In a recently conducted benchmarking study, it was noted that incentives provided by NJCEP are relatively high as compared to comparable program administrators who run similar programs (ERS, 2015).

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<sup>21</sup> NJCEP. New Jersey Clean Energy Program Protocols to Measure Resource Savings. (December 2007).

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**Table 12.a: Source of Data Inputs into CBAs (Residential Programs)**

Residential Programs	Energy Savings	Program Costs	Incremental Costs	Measure Lives	Mix of Measures	Notes
Residential HVAC	NJCEP Annual Report	NJCEP Annual Report	EnerNOC/NEEP	EnerNOC/N EEP/NJ Protocols	AEG IMS & NJCEP Program Documents	See footnote <sup>22</sup>
Comfort Partners	NJCEP Annual Report	NJCEP Annual Report	EnerNOC/NEEP	EnerNOC/N EEP/NJ Protocols	AEG IMS & NJCEP Program Documents	
EE Products	NJCEP Annual Report	NJCEP Annual Report	EnerNOC/NEEP	EnerNOC/N EEP/NJ Protocols	AEG IMS & NJCEP Program Documents	
Home Performance with Energy Star <sup>23</sup>	NJCEP Annual Report	NJCEP Annual Report	EnerNOC/NEEP	EnerNOC/N EEP/NJ Protocols	AEG IMS & NJCEP Program Documents	
Residential New Construction	NJCEP Annual Report	NJCEP Annual Report	NJ Protocols	NJ Protocols		

**Table 12.b: Source of Data Inputs into CBAs (Commercial & Industrial Programs)**

Commercial & Industrial Programs	Energy Savings	Program Costs	Incremental Costs <sup>24</sup>	Measure Lives	Mix of Measures	Notes
C&I New Construction	NJCEP Annual Report	NJCEP Annual Report	EnerNOC/NEEP	EnerNOC/NEEP /NJ Protocols	AEG IMS	See footnote <sup>25</sup>
C&I Retrofit	NJCEP Annual Report	NJCEP Annual Report	EnerNOC/NEEP	EnerNOC/NEEP /NJ Protocols	AEG IMS	
Direct Install	NJCEP Annual Report	NJCEP Annual Report	EnerNOC/NEEP	EnerNOC/NEEP /NJ Protocols	AEG IMS	
Pay for Performance	NJCEP Annual Report	NJCEP Annual Report	EnerNOC/NEEP	EnerNOC/NEEP /NJ Protocols	AEG IMS	

<sup>22</sup> CEEEP was able to determine the specific measures that were eligible for rebates through the program website and thus was able to calculate incremental costs.

<sup>23</sup> Fuel switching benefits are not taken into account in the present analysis because the data was not available to CEEEP.

<sup>24</sup> For C&I programs, for year FY2014 and FY2015, TRC provided the incremental cost data to CEEEP which was used for CBA analysis.

<sup>25</sup> CEEEP was not able to determine incremental cost for C&I programs because the specific measures that were eligible for rebates were not provided.

Table 13 shows a timeline of when CEEEP receives key data related to the NJCEP in relation to when the program year ends. In general, energy savings and program cost data is available about 3 to 4 months after a program ends (in recent years). Data from the IMS system, such as the mix of measures installed, is typically available within a week of when CEEEP makes a request to AEG.

**Table 13: Source of Data Inputs into CBAs**

End of Fiscal Year	June 30
Energy Savings Report Available	3-4 months
Mix of Measures from IMS	1 week
Other data requests that require input from Market Managers	1-3 months

As part of data transition efforts, CEEEP had circulated a template<sup>26</sup> in December 2014, for data gathering for evaluation purposes from market managers and utilities. Based on inputs of various stakeholders and discussions during the leadership meeting on August 6, 2015, the template was further revised and was circulated to market managers on September 2, 2015. So far CEEEP has received detailed response from TRC, which provides program-level detail on currently collected data and the format in which it is stored - hard copy, electronic, part of database records (see Appendix B, information provided herein for one program only).

#### **IV. CBA Results and Summary**

The cost-benefit analysis results for FY 2013, FY 2014, and FY 2015 energy efficiency programs are presented in Tables 14 through 17. Wholesale electricity prices accounted for the national sulfur dioxide and nitrogen oxide allowance programs as well as the Regional Greenhouse Gas Initiative carbon dioxide program (until New Jersey withdrew from the program in May 2011). Therefore, the societal cost test does not differ from the total resource cost test because emissions savings are not accounted for separately for the 2011 cost-benefit model societal cost test. Federal tax credits are not included.

<sup>26</sup> Measure and Program Data Template <http://ceep.rutgers.edu/publications/>

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**Table 14: FY2013 Residential Programs CBA Results**

	Low Income	HVAC	EE Products	New Construction	Home Performance
<b>Participant</b>	\$37,130,996	\$51,693,530	\$285,332,042	\$24,772,955	\$34,971,716
<b>Ratio</b>	2.0	2.1	6.5	3.0	2.5
<b>Program Administration</b>	(\$37,633,838)	\$14,178,786	\$91,450,298	\$2,550,492	(\$24,448,083)
<b>Ratio</b>	0.2	1.6	5.3	1.2	0.3
<b>Ratepayer Impact Measure</b>	(\$48,715,130)	(\$6,505,088)	(\$61,966,107)	(\$4,830,099)	(\$30,684,947)
<b>Ratio</b>	0.2	0.8	0.6	0.8	0.3
<b>Total Resource</b>	(\$31,176,446)	(\$15,634,206)	\$58,008,636	\$3,040,261	(\$17,144,470)
<b>Ratio</b>	0.3	0.7	2.1	1.2	0.4

**Table 15: FY2013 Commercial & Industrial Programs CBA Results**

	C&I New Construction	C&I Retrofit	Direct Install
<b>Participant</b>	\$9,706,149	\$235,178,742	\$101,857,438
<b>Ratio</b>	77.0	88.2	42.2
<b>Program Administration</b>	\$2,068,315	\$67,259,245	\$1,942,873
<b>Ratio</b>	1.9	3.0	1.1
<b>Ratepayer Impact Measure</b>	(\$1,935,009)	(\$29,477,181)	(\$30,523,676)
<b>Ratio</b>	0.7	0.8	0.5
<b>Total Resource</b>	\$3,305,347	\$93,196,399	\$32,569,954
<b>Ratio</b>	4.4	13.4	10.1

**Table 16: FY2014 Residential Programs CBA Results**

Low Income	HVAC	EE Products	New	Home
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<b>Participant Ratio</b>				<b>Construction</b>	<b>Performance</b>
	\$30,185,605	\$12,995,665	\$277,623,703	\$17,277,371	\$29,512,928
	2.6	1.5	4.8	3.3	2.4
<b>Program Administration Ratio</b>					
	(\$23,616,476)	(\$35,267)	\$90,451,990	\$4,310,381	(\$22,998,658)
	0.3	1.0	5.5	1.6	0.3
<b>Ratepayer Impact Measure Ratio</b>					
	(\$30,614,249)	(\$8,157,828)	(\$69,634,848)	(\$2,084,317)	(\$29,097,900)
	0.2	0.6	0.6	0.8	0.2
<b>Total Resource Ratio</b>					
	(\$15,484,213)	(\$17,546,568)	\$35,283,505	\$2,127,337	(\$14,905,420)
	0.3	0.4	1.5	1.2	0.4

**Table 17: FY2014/15 Commercial & Industrial Programs CBA Results**

	<b>C&amp;I New Construction (FY2014)</b>	<b>C&amp;I New Construction (FY2015)</b>	<b>C&amp;I Retrofit (FY2014)</b>	<b>C&amp;I Retrofit (FY2015)</b>
<b>Participant Ratio</b>	\$265,632.27	\$2,975,027.72	\$166,622,021	\$109,338,565
	1.9	4.2	43.6	72.6
<b>Program Administration Ratio</b>	(\$366,299.01)	\$783,259.75	\$52,434,191	\$35,697,549
	0.4	2.1	3.4	3.6
<b>Ratepayer Impact Measure Ratio</b>	(\$584,717.13)	(\$839,000.56)	(\$19,576,923)	(\$12,561,478)
	0.3	0.6	0.8	0.8
<b>Total Resource Ratio<sup>27</sup></b>	(\$552,878.17)	\$399,570.49	\$66,966,529	\$44,506,083
	0.3	1.4	10.3	10.2

<sup>27</sup> Benefits for TRC and PAC tests are essentially the same (since CEEEP does not currently include tax benefits in the TRC). While TRC test includes incremental costs and administration costs, the PAC test includes incentive costs and administration costs. For some of the NJCEP programs, the incentives are quite high, thereby leading to a lower PAC ratio as compared to TRC ratio.



## V. Appendix A: NJCEP Energy Efficiency Programs

The *NJCEP Residential New Construction Program* is designed to maximize participation and increase the energy efficiency and environmental performance of residential new construction in New Jersey. The program relies on builders and raters to use national home energy programs like the Energy Star Certified New Homes Program and DOE Zero Energy Ready Home Program to provide guidelines for the creation of an NJ-tailored market and baseline oriented construction program.

The *NJCEP Residential Gas & Electric Heating, Ventilation, and Air Conditioning (HVAC) Program* promotes the availability, selection and purchase of efficient home heating, cooling and water heating equipment, and the quality installation of such equipment. Its long-term goal is to use incentives, supply chain support, and customer outreach and education to make the selection and quality installation of high efficiency residential HVAC equipment the norm in the NJ market. For this program, the market is considered transformed when rebates can be reduced or eliminated without a decrease in market penetration for targeted HVAC equipment or products.

*Home Performance with Energy Star (HPwES)* is a national home performance improvement program developed by the Environmental Protection Agency (EPA) and the Department of Energy (DOE). HPwES helps qualified contractors offer comprehensive energy efficiency improvement packages for existing homes based on sound building science principles that produce predictable savings and improve energy efficiency, comfort, safety, and durability.

The *Energy Efficient Products Program* promotes the sale and purchase of ENERGY STAR qualified and other energy efficient products including lighting, appliances and consumer electronics, while also supporting the “early retirement” and recycling of existing inefficient products in New Jersey households. The program employs targeted rebates and messaging to consumers, community partners, manufacturers, and retailers for the purchase/sale of selected energy efficient products. The long-term goal of the Energy Efficient Products Program is to transform the market for energy-efficient products in New Jersey by removing barriers to new technologies and providing participants with the knowledge and motivation they need to make cost-effective purchases.

The *New Jersey Comfort Partners Program* is a free energy saving and energy education program for qualified low-income customers. If eligible, participants receive installation of cost-effective energy efficiency measures in the home (determined on a home-specific basis) which can include: efficient lighting products; hot water conservation measures (water heater insulation, water heater pipe insulation and energy-saving showerheads and aerators); replacement of inefficient refrigerators; thermostats; insulation upgrades (attic, wall, etc.); blower-door guided air sealing; duct sealing and repair; heating/cooling equipment maintenance and other measures. They also receive comprehensive, personalized energy education and counseling. All efficiency measures and energy education services provided through the program are provided free of charge.

The *NJCEP's Pay for Performance Program* takes a comprehensive, whole-building approach to saving energy in planned buildings and offers incentives that are directly linked to participant savings. Pay for Performance relies on a network of program partners who provide technical services under direct contract to the participant. Program partners act as clients' energy experts, helping to develop an energy reduction

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plan for each project by developing a simulated computer model of the planned building and helping design it to perform 15% better than a minimally code-compliant building. Eligibility is typically limited to new construction projects exceeding 50,000 square feet or major building reconstructions/repurposing efforts.

Created specifically for existing small to medium-sized facilities, the *NJCEP Direct Install Program* is a turnkey solution that makes it easy and affordable to upgrade to high efficiency equipment. The program is designed to cut facility-wide energy costs by replacing lighting, HVAC and other outdated operational equipment with energy efficient alternatives. The program pays up to 70% of retrofit costs, dramatically improving customer payback on the project. There is a \$125,000 incentive cap on each project, and projects are limited to commercial or industrial facilities that have not exceeded 200 kW in peak electric demand in the previous twelve months.

The *NJCEP C&I New Construction Program* offers incentives and technical support for new construction projects.

The *NJCEP C&I Retrofit Program* provides incentives for replacing standard equipment with high efficiency alternatives. The program also offers custom measure incentives.

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**VI. Appendix B: Data Transition (Program-level data available with TRC)**

<b>Program Name:</b>	Retrofit/New Construction				
<b>Program Manager:</b>	Brian DeLuca				
Type of Study	Data Category	Required Data Points	Collected ?	Electronic ?	In Database?
<b>A. Baseline Evaluation Study*</b>	<i>Existing Equipment Data</i>	Equipment Description	Yes	Yes	Yes
		Quantity	Yes	Yes	Yes
		Age or Year of Installation	No	N/A	N/A
		Energy Efficiency Rating/Metric	No	N/A	N/A
		Manufacturer	No	N/A	N/A
		Model Name/Number	No	N/A	N/A
		Location (EDC Area)	Yes	Yes	Yes
		Building Type	Yes	Yes	Yes
	<i>Proposed Equipment Data</i>	Equipment Description	Yes	Yes	Yes
		Quantity	Yes	Yes	Yes
		Age or Year of Installation	No	N/A	N/A
		Energy Efficiency Rating/Metric	Yes	Yes	Yes
		Manufacturer	Yes	Partial	Partial
		Model Name/Number	Yes	Partial	Partial
		Location (EDC Area)	Yes	Yes	Yes
		Building Type	Yes	Yes	Yes
	<i>Other</i>	Energy Audits	No	N/A	N/A
		Program Participation	Yes	Yes	Yes
		Contact Information	Yes	Yes	Yes
		Utility Account Number	Yes	Yes	Yes
<b>B. Technical, Economic and Market Potential Study*</b>	<i>Existing Equipment Data</i>	Equipment Description	Yes	Yes	Yes
		Quantity	Yes	Yes	Yes
		Age or Year of Installation	No	N/A	N/A
		Energy Efficiency Rating	No	N/A	N/A
		Manufacturer	No	N/A	N/A
		Model Name/Number	No	N/A	N/A
		Location (EDC Area)	Yes	Yes	Yes
		Building Type	Yes	Yes	Yes
		Installation Cost	No	N/A	N/A
		Monthly Electric Usage	No	N/A	N/A
		Monthly Fuel Usage	No	N/A	N/A

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	<i>Proposed Equipment Data</i>	Measure Life	No	N/A	N/A
		Equipment Description	Yes	Yes	Yes
		Quantity	Yes	Yes	Yes
		Age or Year of Installation	Yes	No	Yes
		Energy Efficiency Rating	Yes	Yes	Yes
		Manufacturer	Yes	Partial	Partial
		Model Name/Number	Yes	Partial	Partial
		Location (EDC Area)	Yes	Yes	Yes
		Building Type	Yes	Yes	Yes
		Installation Cost	Yes	Partial	Partial
		Monthly Electric Usage	No	N/A	N/A
		Monthly Fuel Usage	No	N/A	N/A
	Measure Life	Partial	Yes	Yes	
	<i>Other</i>	Energy Audits	No	N/A	N/A
		Program Participation Figures	Yes	Yes	Yes
		Contact Information	Yes	Yes	Yes
		Utility Account Number	Yes	Yes	Yes
		Utility & Rate Class	Partial	Partial	Yes
		SIC/NAICS Codes	Yes	No	Yes
Incremental Cost		Partial	No	No	
Incremental Savings		Partial	No	No	
<b>C. Market Assessment Study*</b>	PM/Utility Marketing Budgets	No	N/A	N/A	
	Reasons for Equipment Replacement	No	N/A	N/A	
	Project Decision Maker	No	No	No	
	Measure Incentive	Yes	Yes	Yes	
<b>D. Code Compliance Study (All data points addressed in sections A - C)</b>					
<b>E. Impact Evaluation Study</b>	<i>Consumption Data</i>	Pre-Installation 12 Month Electric Bills	Partial	Yes	No
		Pre-Installation 12 Month Gas Bills	Partial	Yes	No
		Post- Installation 12 Month Electric Bills	Partial	Yes	No
		Post- Installation 12 Month Gas Bills	Partial	Yes	No
		Verification of Measure Installation	Yes	Yes	Partial
<b>F. Benchmarking Study</b>	<i>Consumption Data</i>	Pre-Installation 12 Month Electric Bills	Partial	Yes	No
		Pre-Installation 12 Month Gas	Partial	Yes	No

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		Bills			
		Post- Installation 12 Month Electric Bills	Partial	Yes	No
		Post- Installation 12 Month Gas Bills	Partial	Yes	No
<b>G. Process Evaluation Study</b>	<i><u>Implementation/Operational Efficiency</u></i>	Project Milestone Dates	Yes	No	Yes
		Scrub Rates	Yes	No	Yes
		Partial Project Data	Yes	Partial	No
		QA/QC Data	No	N/A	N/A
<b>H. Cost-Benefit Analysis Study</b>	<i><u>Existing Equipment Data</u></i>	Equipment Description	Yes	Yes	Yes
		Quantity	Yes	Yes	Yes
		Age or Year of Installation	No	N/A	N/A
		Energy Efficiency Rating	No	N/A	N/A
		Manufacturer	No	N/A	N/A
		Model Name/Number	No	N/A	N/A
		Location (EDC Area)	Yes	Yes	Yes
		Building Type	Yes	Yes	Yes
		Installation Cost	No	N/A	N/A
		Monthly Electric Usage	No	N/A	N/A
		Monthly Fuel Usage	No	N/A	N/A
		Measure Life	No	N/A	N/A
	<i><u>Proposed Equipment Data</u></i>	Equipment Description	Yes	Yes	Yes
		Quantity	Yes	Yes	Yes
		Age or Year of Installation	Yes	No	Yes
		Energy Efficiency Rating	Yes	Yes	Yes
		Manufacturer	Yes	Partial	Partial
		Model Name/Number	Yes	Partial	Partial
		Location (EDC Area)	Yes	Yes	Yes
		Building Type	Yes	Yes	Yes
		Installation Cost	Yes	Partial	Partial
		Monthly Electric Usage	No	N/A	N/A
		Monthly Fuel Usage	No	N/A	N/A
		Measure Life	Partial	Yes	Yes
	<i><u>Other</u></i>	Energy Audits	No	N/A	N/A
		Program Participation	Yes	Yes	Yes
		Contact Information	Yes	Yes	Yes
Utility Account Number		Yes	Yes	Yes	
Utility & Rate Class		Partial	Partial	Yes	

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<b>K. Clean Energy Economic Impact</b>	<i>Clean Energy Program Information</i>	SIC/NAICS Codes	Yes	No	Yes	
		Incremental Cost	Partial	No	No	
		Incremental Savings	No	N/A	N/A	
		Administrative Budget	Yes	Yes	Yes	
		Vendor/Contractor Contact Information	Yes	No	Yes	
		NAICS Code for Vendors/Contractors	No	N/A	N/A	
		Vendor/Contractor Revenue in NJ	No	N/A	N/A	
		Vendor/Contractor Employment Details in NJ	No	N/A	N/A	
		Number of Employees in Clean Energy	No	N/A	N/A	
		Percent of Time Spent on Clean Energy Jobs	No	N/A	N/A	
		Total Wages (or percent) in Clean Energy	No	N/A	N/A	
		Occupations of Clean Energy Employees	No	N/A	N/A	
		<i>Clean Energy Project Information</i>	Project Hours	No	N/A	N/A
			Project Wages	No	N/A	N/A
Types of Employees for Project	No		N/A	N/A		
Material Costs	Yes		Partial	Partial		
Costs of Wages	No		N/A	N/A		
<b>L. Marketing Evaluation</b>		How Participants Hear Of Program	Yes	No	Partial	

\* - Also relevant for Code Compliance Study

**VII. Appendix C: Comments Received on CBA and Avoided Costs Memo**

<b>Commenter</b>	<b>Comment</b>	<b>CEEEP Response</b>
<b>CBA</b>		
TRC	We recently conducted a CBA of the DI program. Our analysis included emissions savings from natural gas, avoided natural gas T&D costs, we used measure level summer and winter on/off peak savings allocation factors rather than an average for all measures, and we updated the measure lives for all measures which on average gave us an additional six years of benefits. Also, having more time to perform the analysis allowed us to use actual program measure level data.	TRC's DI program lifetime was assumed to be 20 years while CEEEP assumed it to be 14 years (based on the weighted average of the measures included). CEEEP agrees that the inclusion of emission savings and T&D costs contributed to the difference in CBA results.
	For SmartStart, when comparing the FY13 results vs the FY14 results we noticed some glaring differences (TRC 0.5 vs TRC 8.7). We found the measure and incremental costs to be extremely different. Incremental costs seemed to be ~28 times higher in the 2013 analysis when compared to 2014.	The FY13 data is data assembled from various studies (mostly the EnerNOC market potential study in 2012). The FY14 and FY15 CBA's were based on data TRC provided to us. The list of measures provided for FY14/FY15 did not include everything that was installed in the FY13 program (it was more of a high level list of measure types), and so we couldn't use that data for prior year cba's. We also didn't get the source of TRC incremental measure cost data.
Honeywell	The Rutgers tool uses a 7% discount rate. We believe that a lower rate, closer to 2% is more appropriate (10 year Treasury Rate)	CEEEP will consult the study and will discuss with the BPU whether changing the discount rate is appropriate.
	The incremental costs are definitely out of date.	CEEEP is currently developing an RFP to study incremental costs for NJ.

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	<p>Using either more recent or projected incremental costs (e.g., from DOE rulemakings) and defining incremental costs (market price or preferably incremental cost of the specific efficiency improvement – avoid efficiency bundled with other expensive features) would be improvements.</p>	<p>CEEEP is using the 2012 NJ Market Potential study and a 2014 NEEP Mid-Atlantic TRM for incremental costs. CEEEP is tracking down recent incremental cost studies and is currently developing an RFP to study incremental costs for NJ.</p>
	<p>As this is not a benchmarking study, it is unclear why the measure life and savings were not based on the NJ protocols as the standard approach unless clear justification was given. It appears that the savings were based on reported savings and older protocols, which does not align with evaluation of future program filings.</p>	<p>Measure life was taken from the 2012 NJ Market Potential Study since that is more comprehensive than the Protocols. Energy savings are provided by the NJ Clean Energy Program, which likely use the Protocols to calculate energy savings. CEEEP is tracking down recent incremental cost studies and is currently developing an RFP to study incremental costs for NJ.</p>
	<p>At least in Products (non-fridge retirement) the key inputs for individual measures were weighted into a blended average for the CBA based on participation numbers. As the individual savings and associated costs can be wildly different between a CFL and a washer, it would be likely be a better approach to screen individual measures and then roll up to a weighted average, or to screen at a high level, so that measures that don't screen can be helped by ones that screen easily.</p>	<p>CEEEP will consult with the BPU as the whether the methodology for conducting CBA should be updated.</p>
	<p>Evaluations of cost-effectiveness are now often reflecting the additional value to the ratepayers with additional components (environmental, health, low-income, etc.).</p>	<p>CEEEP has begun to investigate non-energy benefits and will consult with the BPU as to how they wish to proceed.</p>
	<p>The home performance CBA did not include oil and propane savings, which are substantial (about half of all program savings). By including those savings, the cost effectiveness of the program increases dramatically.</p>	<p>As of FY2014 the BPU was not reporting oil/propane savings. These savings will be reported as they become available</p>



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	<p>The home performance results also used incremental costs (average of ~\$4000 per project) rather than full retrofit costs (\$15,000 per project). Using the higher retrofit project costs is more typical for a home performance program.</p>	<p>CEEEP has not seen research indicating the use of full retrofit costs for the Home Performance program. We would welcome any studies that make the CBA assumptions more accurate.</p>
<p><b>2014 Avoided Costs</b></p>		
<p>PSEG</p>	<p>You didn't include gas transportation cost from Henry Hub to the City Gate. It's been in the forecast document in other years.</p>	<p>Previously reported transportation costs by CEEEP were numbers agreed upon between utilities and the rate counsel and not from any publicly available source which gets updated from time to time. CEEEP can include the gas transportation costs from Henry Hub to City Gate as and when the same is provided by the utilities to the Board and the Rate Counsel.</p>
<p>Rate Counsel</p>	<p>The retail prices in Table 1, as noted, are based on the AEO 2014 Reference case results for the Mid-Atlantic region which is reasonable. However, AEO prices do not reflect the possible impacts of future regulations such as those related to greenhouse gases, which may result in higher prices. The wholesale prices are likewise based on AEO 2014 for the Reliability First/East electricity modeling region that includes NJ. However CEEEP cites an average nominal annual price change of 2.8%, while the wholesale values in Table I actually show a compound average growth rate of 3.29%. The relevant Table 81 from AEO 2014 shows an average rate of 3.43% for the same period. Rate Counsel also notes that the AEO generation prices include some capital costs and thus may over represent wholesale energy costs, but the use of the general trend rather than absolute values is reasonable. Use of the historical 2013 PJM LMP data for developing the seasonal prices is also reasonable, although various factors related to load changes, generation mix and fuel prices may cause those relationships to change in the future.</p>	<p>CEEEP has updated the report to reflect an annual change of 3.04%, which was what we calculated it to be.</p>

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	<p>Wholesale natural gas prices have been extremely volatile in the previous decade, although the current consensus is for them to be relatively low and fairly stable in the foreseeable future. Thus, the use of the AEO 2014 Henry Hub forecast is reasonable. Retail natural gas prices represent the addition of various fixed and variable costs such as transportation on top of the wholesale price. The approach that was used to project the retail prices is generally reasonable. However, there is a possible inconsistency between the sector prices where the increase in the commercial prices is less than that of the residential prices and the commercial price is almost the same as the industrial price in 2037. It would be more reasonable to expect commercial prices to continue to be modestly above industrial prices.</p>	<p>The numbers in the Avoided Cost memo are correct.</p>
	<p>CEEEP proposes to use values for the Social Cost of Carbon taken from the Interagency Working Group (“IWG”) on the Social Cost of Carbon. CEEEP proposes to convert the reported values (2007\$/metric ton) to nominal dollars using the AEO 2014 projected U.S. GDP Price Index. Rate Counsel’s consultant, Synapse, has stated that the long-term marginal abatement cost of carbon dioxide emissions is \$100 (2013\$)/short ton.’ While Rate Counsel does not agree that the value provided by the IWG is the appropriate “social cost” of carbon emissions, Rate Counsel agrees that the IWG value is not an unreasonable assumption (or a starting point) as a proxy for future carbon reduction compliance at this time. Rate Counsel recommends that future reduction compliance takes into account: (1) New Jersey’s goal to reach 80 percent reduction from 2006 levels by 2050 under the Global Warming Response Act of 2007 and (2) a requirement to meet proposed US EPA Clean Power Plan national target to reduce carbon dioxide emissions by 30 percent from 2005 levels by 2030. There is some inconsistency about the criteria pollutant prices. The sub section title indicates “emissions permit price” but Table 4 indicates “mean damages per short ton”. To be consistent with the CO2 prices, it should probably be the latter.</p>	<p>Agreed. The sub-section title to be changed to “mean damages per short ton of criteria-pollutant-forming emissions”.</p>

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	<p><u>Capacity Prices:</u> The approach described seems reasonable. However, Rate Counsel recommends that CEEEP provide additional details about how the prices were calculated since the early year values do not appear to correspond consistently with the PJM-RPM auction results, e.g. 2014 capacity prices should be higher than those of 2013 capacity prices.</p>	<p>We used Base Residual Auction Preliminary Results for each utility, weighted by PJM peak load. The values in the memo are correct.</p>
	<p><u>Discount Rate:</u> A nominal value of 8% may be too high. For the New England AESC projects, Rate Counsel’s consultant, Synapse, used US T-bills as the societal rate. In 2013, the rate for 30 year bills was 3.39%, and the CBO projected rate for 10-year T-bills was 5.2%. Rate Counsel recommends further consideration of the appropriate rate to use for avoided costs in New Jersey.</p>	<p>CEEEP welcomes any supporting studies. Once received and reviewed, CEEEP will confer with the BPU as to whether a change to the CBA assumptions are warranted.</p>
	<p><u>Avoided T&amp;D Losses:</u> Avoided natural gas losses should include the GHG impacts of methane emissions which on volumetric basis are about 25 times that of CO2.</p>	<p>CEEEP will investigate appropriate potential values of avoided methane emissions and will confer with the BPU as to whether they should be included in the CBA.</p>
	<p><u>Avoided T&amp;D Costs:</u> Rate Counsel recommends that the utilities should provide CEEEP with utility-specific avoided T&amp;D values.</p>	<p>CEEEP can include utility-specific avoided T&amp;D values, as and when the same is provided.</p>
	<p><u>Power Plant Emission Rates:</u> The use of eGRID 2000 for the emission rates likely does not represent current and projected rates. Rate Counsel recommends that CEEEP should also indicate the geographic region represented by those rates.</p>	<p>The memo has been updated with the geographic region.</p>
	<p><u>Dollar Values:</u> Rate Counsel recommends that CEEEP note whether the values are in nominal or real dollars in each table and calculation.</p>	<p>All values are in nominal dollars and the memo has been updated.</p>

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NJNG	<p>NJNG strongly supports CEEEP's efforts to develop appropriate sources for Avoided Gas Transmission and Distribution (T&amp;D) costs. While it may be a challenge to find the appropriate way to value these avoided costs, it is critical to ensure that there is an attempt to capture the current value of the benefit from these costs. This will ensure that CBA calculations are able to properly value the benefits of energy efficiency programs.</p>	<p>CEEEP can include utility-specific avoided T&amp;D values, as and when the same is provided.</p>
	<p>Also while not specifically referenced within this draft, NJNG encourages CEEEP and the Board to consider how the CBA process currently used in New Jersey proceedings adheres to the principles of the Resource Value Framework (RVF). Robin LeBaron from the Home Performance Coalition provided an overview of this approach at the November 2014 New Jersey's Clean Energy Program Energy Efficiency Committee meeting. The RVF was developed as part of the National Efficiency Screening Project that counts dozen of leading energy-efficiency organizations, companies and stakeholders as members. The RVF is not a mandated approach to CBAs but rather a framework of principles and recommendations to provide guidance for states to develop and implement tests that are consistent with sound principles and best practices. Evaluating New Jersey's approach to CBAs under the RVF would ensure that the process is focused on a balanced approach for evaluating costs and benefits for energy-efficiency programs.</p>	<p>Recommending changes to the approach in conducting cost-benefit analysis is beyond the scope of the avoided cost assumptions memo, and as such these requests should be forwarded to the Board for further considerations.</p>
Sierra Club	<p>How, if at all, will the historically low price of oil and its effect on natural gas impact the assumptions?</p>	<p>The assumptions for future electric and natural gas, retail and wholesale prices are based on EIA's Annual Energy Outlook. EIA's forecasts takes into account several considerations including predictions of future fuel prices and policy directions.</p>
	<p>Have you taken the EPA's clean power plan regulations into account?</p>	<p>The assumptions for future electric and natural gas, retail and wholesale prices are based on EIA's Annual Energy Outlook. EIA's forecasts takes into account several considerations including predictions of future fuel prices and</p>

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		policy directions.
	Why did you go with the discounted rate of 3% for the social cost of carbon, as opposed to the higher level of 5%?	CEEEP used 3% because it was the middle scenario presented (2.5%, 3%, 5%)
Opower	<p>In order to properly apply cost-benefit analysis for energy efficiency programs, Opower Recommends the inclusion of a comprehensive list of avoided and retail cost assumptions. Specifically, we support the inclusion of the following avoided and retail cost assumptions:</p> <p>Electric</p> <ul style="list-style-type: none"> <li>• Avoided energy cost (\$ per MWh)</li> <li>• Avoided cost of generation capacity (\$ per kW-yr)</li> <li>• Avoided cost of transmission and distribution (T&amp;D) capacity (\$ per kW-yr)</li> <li>• Avoided cost of environmental externalities (\$ per MWh), including both avoided emissions permit costs and avoided societal costs</li> <li>• Retail cost (\$ per kWh) for residential, commercial, and industrial customer classes</li> <li>• Avoided T&amp;D losses (%)</li> </ul> <p>Natural Gas</p> <ul style="list-style-type: none"> <li>• Avoided energy cost (\$ per MMBtu)</li> <li>• Avoided cost of T&amp;D capacity (\$ per MMBtu)</li> <li>• Avoided cost of environmental externalities (\$ per MMBtu), including both avoided emissions permit costs and avoided societal costs</li> <li>• Retail cost (\$ per MMBtu) for residential, commercial, and industrial customer classes</li> <li>• Avoided T&amp;D losses (%)</li> </ul>	All assumptions for electricity and natural gas avoided costs have been included in the draft.
	Opower supports CEEEP’s determination to research and develop an estimate of the avoided electric and natural gas T&D cost. By publishing recommendations for these avoided costs, CEEEP will appropriately capture the value of the benefit from these costs. Opower recommends that CEEEP use the \$30/kW-yr	CEEEP can include utility-specific avoided T&D values, as and when the same is provided. The avoided electric T&D cost proposed is indeed \$30/kW-yr as recommended by EnerNOC.

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	avoided electric T&D cost calculated by EnerNOC.	
Home Performance Coalition	HPC commends CEEEP for a thoughtful, comprehensive analysis of avoided costs. We suggest that consideration of the Resource Value Framework recommendations might enrich CEEEP’s avoided cost recommendations in several areas. Specifically, CEEEP may want to consider or address the Demand Reduction Induced Price Effect (DRIPE) and utility-perspective non-energy benefits, such as reduced utility arrearages, as avoided costs. Some energy efficiency measures may also be associated with water savings, which are increasingly being recognized as a benefit from energy efficiency programs (although these savings may be considered a non-energy benefit rather than an avoided cost).	As of now the cost-benefit analysis carried out (which makes use of the avoided cost input assumptions) do not quantify for avoided water, waste etc. In future the same can be included if the benefits of avoided water and waste are proposed to be made a part of the cost-benefit analysis. Additionally, Recommending changes to the approach in conducting cost-benefit analysis is beyond the scope of the avoided cost assumptions memo, and as such these requests should be forwarded to the Board for further considerations.
NJDEP	Regarding Table 4, Mean Damages per Short Ton of Criteria-Pollutant-Forming Emissions, we note that your estimates are based on permit prices. EPA uses an alternative method in their regulatory impact analysis based on modeled health impacts. The following EPA website provides values for both SOx and NOx: <a href="http://www.epa.gov/airquality/benmap/bpt.html">http://www.epa.gov/airquality/benmap/bpt.html</a> . Based on the health effects modeling, EPA estimates are mostly higher than those from the NRC report used in your Table 4. We suggest using the EPA values.	CEEEP is conferring with the BPU as to whether the CBA assumptions should be updated.
	The same EPA website also provides values for avoided health impacts from direct emissions of PM2.5 (listed as “carbon” in the EPA tables), as well as ammonia (NH3) and volatile organic compounds (VOCs). We believe the avoided impacts related to emissions of these compounds should also be included in an analysis of avoided costs.	CEEEP is conferring with the BPU as to whether PM2.5 and PM10 should be included in the CBA assumptions.

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	Other potential avoided costs not in the Rutgers December 8, 2014 draft include avoided solid waste disposal (average tipping fees about \$84/ton of waste) and hazardous waste disposal costs, also avoided water use/cost (average cost per thousand gallons delivered about \$5.40) and location marginal price impacts.	As of now the cost-benefit analysis carried out (which makes use of the avoided cost input assumptions) do not quantify for avoided water, waste etc. In future the same can be included if the benefits of avoided water and waste are proposed to be made a part of the cost-benefit analysis.
<b>2012 Avoided Costs</b>		
<b>Commentor</b>	<b>Comment</b>	<b>CEEEP Response</b>
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.

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	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 <sub>2</sub> emissions	CEEEP has continued to use CPI because the difference between CEEEP and Synapse estimates has been negligible.
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.
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.



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NJ Rate Council (Synapse)	A more detailed analysis should be carried out to develop more reliable forecasts	CEEEP agrees that a more detailed analysis of avoided costs would provide a more reliable forecast.
	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 agrees that these should be included in any 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.
	Conduct more detailed analysis of the future operation of PJM RPM construct, including projections of peak demand and capacity to develop a more exact estimate of capacity prices	CEEEP agrees that a more detailed analysis of capacity prices could be included in any future avoided cost studies.

## VIII. References

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