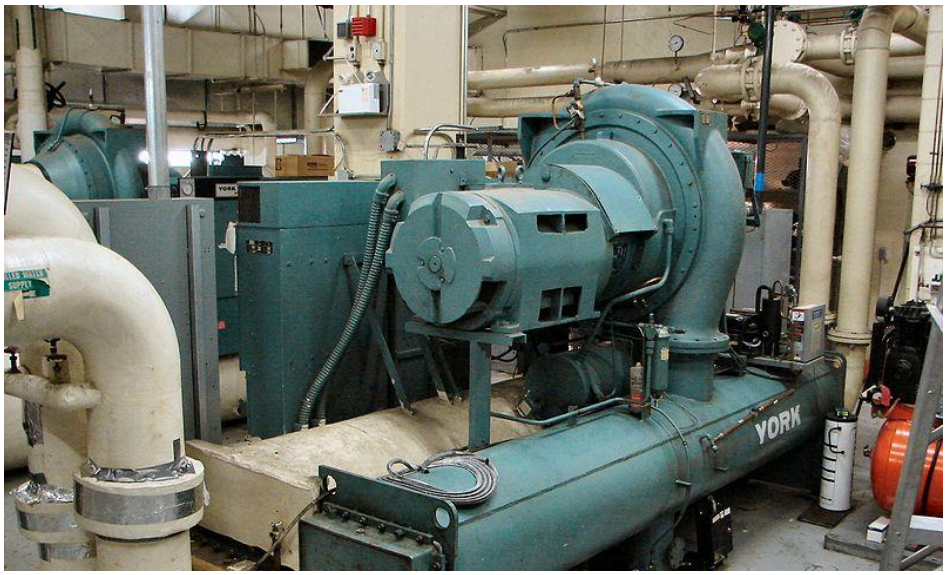
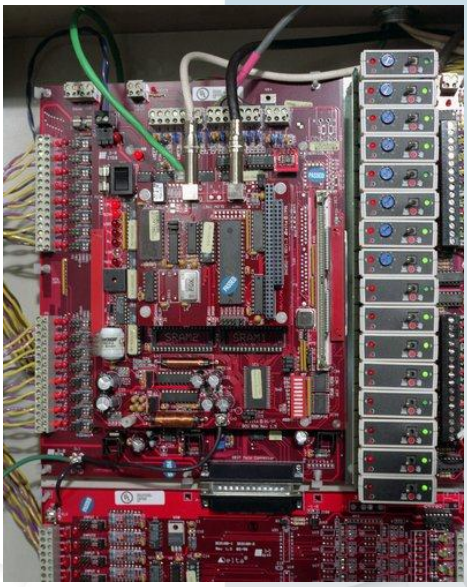
Developed for the:

New Jersey Office of Clean Energy





Evaluation of New Jersey's Clean Energy Programs

Prepared by: Applied Energy Group

June 11, 2012

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Executive Summary

The Office of Clean Energy (OCE) commissioned Applied Energy Group (AEG) to conduct a high level assessment of the performance of New Jersey's Clean Energy Program (NJCEP). This comprehensive study is designed to assist in determining program funding levels going forward and to recommend modifications to existing programs that can improve their overall cost effectiveness.

The AEG analysis was conducted in four major tasks:

1. **Portfolio and Benchmark Analysis**. AEG compared and benchmarked the NJCEP energy efficiency programs on a portfolio and program basis with 25 electric and natural gas programs from areas around the country. The programs included those delivered by both statewide agencies and investor owned utilities in mature markets.
2. **Market Analysis**. AEG interviewed a number of entities directly involved in delivering or supporting the delivery of the Clean Energy Programs. AEG staff met with each market manager and a number of trade allies and market actors who are involved with program delivery or have businesses that can benefit from the programs in the NJCEP portfolio.
3. **Technical Analysis**. AEG reviewed the overall cost-effectiveness of measures and programs offered to both residential and commercial and industrial customers.
4. **Qualitative and Quantitative Assessment of Energy Savings Potential.** AEG reviewed all measures and programs including overall program budgets, cost effectiveness and program participation levels. The analyses performed by AEG were intended to identify any adjustments that may benefit the New Jersey Clean Energy Programs.

General Findings and Recommendations

Benchmark Analysis

The benchmarking analysis addressed the following two questions:

a. How does New Jersey's overall portfolio compare in terms of Demand Side Management (DSM) savings as a percentage of statewide sales and DSM spending?
b. Is the performance of NJ's programs above, below or average with respect to performance and cost for sector-level programs?

The benchmarking analysis shows that, compared to the peer group, the 2010 NJCEP program indicators (First year $/kWh, $/kW, $/MMBtu) vary depending upon the program. The total portfolio and residential sector electric indicators are higher than the average of the peer group while the C&I sector electric indicators are lower than the average of the peer group. The total portfolio and sector natural gas indicators are consistently higher than the average of the peer group.

TABLE 1: 2010 SPENDING PER UNIT ENERGY SAVED BASIS, TOTAL PORTFOLIO AND SECTOR

	Total Portfolio			Residential Sector			C&I Sector		
	$/kWh	$/kW	$/MMBtu	$/kWh	$/kW	$/MMBtu	$/kWh	$/kW	$/MMBtu
Minimum	$0.06	$216	$10	$0.07	$414	$14	$0.05	$131	$6
Average	$0.24	$1,462	$70	$0.33	$1,972	$72	$0.30	$1,720	$82
Maximum	$0.67	$3,869	$198	$1.55	$8,804	$189	$1.37	$5,930	$284
NJCEP	**$0.32**	**$1,738**	**$140**	**$0.40**	**$2,198**	**$162**	**$0.19**	**$1,031**	**$96**

A comparison of spending per unit of energy saved at the individual program level is provided in the Benchmarking section of this report. The benchmarking analysis identifies a number of programs, based on a comparison to similar programs in other states, where there may be opportunities to improve program performance.

Most of the NJCEP programs were found to be cost-effective based on the Total Resource Cost test. The most cost-effective programs were the Residential Energy Efficiency Products, followed by the Commercial Large Energy Users Pilot and New Construction programs. The Residential Home Performance and Commercial Pay for Performance New Construction programs were the two programs that fell significantly below the cost-effective threshold. The following table ranks the NJCEP energy efficiency programs from highest to lowest based on our assessment of cost effectiveness:

TABLE 2: SUMMARY OF TOTAL RESOURCE COST RESULTS

Commercial	TRC
Large Energy Users Pilot	3.15
New Construction	2.03
Direct Install	1.78
Retrocommissioning	1.51
Pay for Performance	1.46
C&I Retrofit	1.22
Combined Heat and Power	1.03
Pay for Performance New Construction	0.25
Residential	
Energy Efficient Products	3.49
New Construction	1.47
HVAC	0.68
Home Performance	0.19

Market Analysis

The NJCEP market actors interviewed for this project indicated that, overall, the programs are successful in delivering energy efficient measures to residential, commercial and industrial customers, with fair incentive levels that effectively cover the incremental costs of switching from standard to energy efficient measures. Since the programs started, many of the market actors' sales have significantly increased. In most cases, market actors reported that Program Managers were responsive and helpful in addressing questions and concerns. However, there were a variety of issues and areas for improvement across the program portfolio.

Not all areas of the program were viewed favorably. There is a great deal of dissatisfaction with the **amount of time rebates take to be processed**. In addition, **Marketing efforts** were found to be **insufficient** and lacking across the board. This forces the trade allies to use their own resources to market the programs, which hasn't consistently been embraced due to customer skepticism.

The biggest reported hindrance of program growth is due to the **uncertainty in the longevity of the program's existence**. Monthly or quarterly contract renewals are very restrictive in the sense that trade allies cannot plan for the long term or commit to any resources or long term projects that would dramatically promote business growth and program participation.

The entities interviewed made several recommendations regarding areas that need to be addressed to improve program performance as follows:

- Increase marketing to generate more leads and enhance overall customer awareness.
- Marketing directly from the State to give the Trade Allies more credibility when promoting the programs.
- Improve incentive application process and communicate application requirements and procedures with Trade Allies to minimize project rejections.
- Improve incentive processing to keep up with program demands.
- Diminish the uncertainty and instability of the programs' existence. It is impossible for Program Managers and Market Actors to create long term business plans, or to invest in people, equipment or projects, without knowing whether or not the programs will be around more than a few months.
- Improve the NJCEP website. Trade allies do not utilize NJCEP's website to refer customers to their respective programs because it is too confusing and difficult to navigate.

Technical Analysis

AEG conducted a detailed review of the residential and C&I energy efficiency measures and programs using standard cost-effectiveness techniques. Two measures of cost-effectiveness were used: Total Resource Cost Test (TRC) and Levelized Cost of Saved Energy.

Table 3 below summarizes the results of the cost effectiveness assessment. Both electric and gas levelized costs of saved energy are well below first-year avoided costs. One of the primary benefits of energy efficiency programs is that they avoid the costs of purchasing electricity and natural gas that would have been used less efficiently. These costs are borne by utility ratepayers since utilities must purchase electricity and natural gas at avoided cost rates to meet their customers' demand. Since the forecast of avoided costs is estimated to increase, when levelized costs of saved energy are below the first-year avoided costs of electricity and natural gas, this indicates that savings are acquired cost-effectively from the standpoint of the State in comparison to acquiring additional electricity and natural gas.

TABLE 3: SUMMARY OF PROGRAM PORTFOLIOS

	Program Administrator Levelized Cost of Saved Electricity ($/kWh)	Program Administrator Levelized Cost of Saved Gas ($/Therm)	Total Resource Cost B/C Ratio		
			Electricity	Natural Gas	All
Residential Portfolio	$0.0097	$0.1367	2.07	0.66	1.30
C&I Portfolio	$0.0269	$0.5332	1.43	1.32	1.40

While New Jersey's residential program portfolio is cost-effective overall, the Technical Analysis identifies a number of measures and programs where there are opportunities for improvement, and changes or removal of individual measures or programs may be justified. However, any changes at the measure or program level need to consider other factors in addition to cost-effectiveness such as:

- Short-term versus long-term focus: Excessive emphasis on cost-effectiveness could bias programs towards short-term savings and result in lost opportunities over the long term. Emphasis on short-term cost-effective savings is already embedded in the portfolio through the lighting markdown program, which accounts for a very large share of the portfolio's savings.

- Comprehensive goals attainment: Even though an individual measure may not be cost-effective, it may help achieve other goals including the development of contractor and supplier infrastructure, long-term market transformation, comprehensive program offerings, economic development, and job creation.
- Non-economic market barriers: In some cases, measures may be highly cost-effective, which means that incentives may not be required to encourage their use. However, there are other barriers to adoption besides cost-effectiveness, and delivery methods and marketing strategies may need to be shifted in order to transform the market. An example of this in the C & I market is the adoption of CFLs in the small business sector. While it may not be necessary to incentivize CFLs broadly, it may be worthwhile to continue subsidizing them in certain market segments or through direct delivery to small businesses.
- Measure bundling: Strategically, it is appropriate to use short-term, cost-effective measures to leverage longer-term savings, especially if they help achieve other goals.

Qualitative and Quantitative Assessment of Energy Savings Potential
AEG reviewed all measures and programs including overall program budgets, cost effectiveness and program participation levels. AEG identified program modifications that could potentially result in significant reductions in budgets with the least amount of impact of energy savings.

Summary of Recommendations
General

New Jersey's programs are heavily weighted towards the inexpensive savings that could be acquired under earlier equipment efficiency standards. With the recent changes in Federal efficiency standards, incremental savings from equipment replacements are more difficult to achieve. Equipment replacement measures have to become much more targeted, and new measures and strategies must be incorporated to continue to acquire meaningful savings. At the programmatic and measure level these actions may include:

- Eliminate stand-alone measures with low incremental savings and high incremental costs.
- Target measures to specific market segments to insure that resources are being applied most efficiently.
- Bundle lower and higher cost measures to improve overall cost-effectiveness.
- Encourage early retirements to accelerate installation of new equipment meeting or exceeding the new federal standards.
- Evaluate new technologies to maximize the performance of new, more efficient technologies.
- Emphasize proper installation to avoid lost opportunities.
- Emphasize maintenance and operations measures to avoid erosion of savings over time.

The following summarizes the high level recommendations for each program. Additional recommendations are included in the various sections of this report:

HVAC Program

- Eliminate incentives for SEER 16 air conditioners and heat pumps as stand-alone measures for "replace on failure" programs. The new Federal minimum efficiency standards significantly reduce the impacts of these measures.
- Eliminate incentives for furnaces as stand-alone measures when the Federal efficiency standards shift to 95% AFUE.

- Due to changes to Federal minimum efficiency standards for air conditioning, heat pumps and furnaces, shifting to an early retirement program may improve cost-effectiveness and reduce incentive budgets.
- Due to the very low participation in ground source heat pumps and solar hot water, they have negligible influence on overall program cost-effectiveness, but have value in helping maintain a comprehensive program.

Energy Efficiency Products Program

- Evaluate new components of the Energy Efficient Products Program, especially new components that will test upstream incentives for appliances and several new products.

Home Performance with Energy Star Program

- New Jersey's Home Performance Program is not currently cost-effective and should be redesigned to capture more cost-effective savings.

C & I Programs

- Since a relatively small percentage of the hundreds of available measures in the C & I program account for the majority of overall savings, all of the currently available measures should be evaluated to determine if participation levels and savings warrant continuation of these measures.
- Program delivery methods should be examined to insure that measures are being properly targeted and effectively delivered. Where appropriate, measures that no longer need incentives in traditional prescriptive programs should be eliminated, and others should be shifted to custom.
- Consider eliminating incentives for pulse start metal halide lighting since the incremental costs are nearly zero.
- CFL replacements for common incandescent lighting may no longer need to be incentivized as incandescent lighting is phased out of the market.
- Eliminate incentives for Unitary HVAC measures since measures for cooling applications are generally not cost-effective.
- Consider eliminating incentives for small gas space heating equipment in the C&I sector.
- Because of the change in the baseline, incentives are no longer required to encourage the use of National Electrical Manufacturers Association (NEMA) Premium Efficiency motors.
- Consider shifting C & I HVAC to early retirement from "replace-on-failure."
- Consider including maintenance, tune-up and control measures, especially in Direct Install program and the proposed Retro-Commissioning Program.

Need for Stability Going Forward

The NJCEP has been hindered by a lack of long term planning and stability in the marketplace. As evidenced in the market analysis section of this study, budget uncertainty and program rule changes create confusion and paralysis from both customers and the program market partners. Creating an efficient program market requires multi-year plans with committed resources. Consistency and stability going forward will be a key in convincing contractors to re-engage in the programs or to make the investments needed to participate in a program. It will also significantly increase the likelihood of programs more fully expensing budgets going forward.

Portfolio and Program Benchmark Analysis

The Benchmarking Analysis includes two components. The first compares New Jersey's portfolio to other statewide entities implementing similar programs. Second, we assess New Jersey's programs on a stand-alone basis. This review assesses NJCEP program results for 2008, 2009, 2010 and 2011 and includes a comparison of:

- Program budgets versus actual expenditures by program and program components
- Projected and actual participation

Comparison to Programs in Other States
AEG benchmarked the New Jersey Clean Energy Program (NJCEP) energy efficiency programs on a portfolio and program basis. The benchmarking analysis answers the following questions:

- How does New Jersey's overall portfolio compare in terms of Demand Side Management (DSM) program savings as a percentage of statewide sales and DSM spending?
- Is the performance of New Jersey's programs above, below or average with respect to performance and cost for sector-level programs?

The benchmarking analysis included a review of 25 electric and/or natural gas DSM programs. The programs include investor-owned utilities and statewide agencies in Northeast and Midwest states with mature DSM programs. The 10 states reviewed have energy efficiency standards that require (or have a goal) to meet a specific percentage of electricity and/or natural gas savings. The savings goals vary from annual targets that ramp up by 0.2% each year in Illinois to cumulative long term goals such as the 15 by 15 (15% by 2015) goal in New York. Table 4 summarizes the different state goals:

TABLE 4: ENERGY EFFICIENCY STANDARDS BY STATE

State	Year	Mandate
Colorado	2007	Public Service Company of Colorado electric savings goals of 1.14% of 2006 sales in 2012, increasing to 1.68% in 2020. Goals may be revisited to account various factors.
Illinois	2007	Annual incremental savings goal of 0.2% prior year sales in 2009, increasing to 2% electric sales in 2015 and 1.5% natural gas sales in 2019.
Iowa	2008	Utility energy savings goal of 1.5%, however goals vary by utility: – Black Hills natural gas goal of 0.82% retail sales in 2009, increasing to 0.94% in 2013. – Interstate Power & Light electric goal of 0.9% retail sales in 2009, up to 1.3% in 2013. Natural gas goal of 0.9% retail sales in 2012, up to 1.2% in 2013. – MidAmerican electric goal of 1.09% average retail sales for 3 prior years in 2009, increasing to 1.5% in 2013. Natural gas goal of 0.64% average retail sales for 3 prior years in 2009, increasing to 0.85% in 2013.
Massachusetts	2010	Statewide 3-year savings goals in 2010 are 1.4% electric retail sales and 0.6% natural gas retail sales, increasing to 2012 with 2.5% electric and 1.15% natural gas. Utility goals vary. Goals accounted for outside influences, such as economic conditions.
Minnesota	2007	1.5% average weather-normalized sales for 3 prior years, beginning in 2010. Interim 2010-2012 natural gas savings goal is 0.75%. Utilities may request to adjust the goal.
New Jersey	2008	2011 Energy Master Plan states that the energy savings goals will be modified.
New York	2008	Statewide electricity savings goal of 15% forecasted usage by 2015 and natural gas savings goal of 14.7% estimated usage by 2020.
Oregon	2010	Energy Trust 2010-2014 savings goals of 256 MW and 22.5 million therms.
Vermont	2008	Efficiency Vermont has a 3-year (2012-2014) cumulative electric savings performance goal of 320 GWh, based on forecasted retail sales.
Wisconsin	2010	2011-2014 savings goals set at 1,816 GWh and 73 million therms. Previous goals were a percentage of forecasted sales (average sales for 3 prior years with 1% annual growth rate) accounting for outside influences, such as economic conditions. Electric goal of 0.75% in 2011, increasing to 1.5% in 2014. Natural gas goal of 0.5% in 2011, increasing to 1% in 2014.

Methodology

AEG reviewed 2010 reported demand-side management (DSM) performance of 25 organizations compared to NJCEP 2010 program results.[1] The selection of organizations included investor-owned utilities and statewide agencies in Northeast and Midwest states with mature electric and/or natural gas DSM programs.

The benchmarking analysis utilized a bottom-up analysis of performance data, including reported energy and demand savings as well as program expenditures by DSM program. DSM program data was aggregated to determine the organization's total sector and portfolio performance.

A set of indicators were developed utilizing the reported savings and expenditures, including:[2]

- Electric expenditures per electricity savings ($/kWh)
- Electric expenditures per peak demand savings ($/kW)

[1] 2010 program data was utilized due to a lack of 2011 DSM program data for some other states.

[2] See **Appendix A. High-Level Portfolio Normalized DSM** Results for total portfolio results by organization.

- Natural gas expenditures per natural gas savings ($/MMBtu)

Electric and natural gas expenditures were reported separately for the 25 organizations. NJCEP expenditures are reported as a total, not separated by electric and natural gas. Therefore, factors provided by the NJCEP market managers were applied to the NJCEP expenditures to allocate costs to electric and natural gas.[3]

The New Jersey Board of Public Utilities approved three-year (2010-2012) energy efficiency stimulus programs funded by New Jersey's investor-owned utilities. A number of the stimulus programs provide incentives, in the form of rebates or interest rate buy-downs to participants, on top of the incentives offered by NJCEP. The additional incentives provided to Residential HVAC, C&I Retrofit and Direct Install participants in specific utility territories are not captured in this analysis. Home Performance with Energy Star utility incentives are included in the program discussion (see Table 5).

Outliers were removed from the review (greater or lesser than two standard deviations from the mean). The indicators were developed for a high-level portfolio and sector review as well as a program-level review. The electric indicators are presented as electric expenditures on a per kWh and kW saved basis and the natural gas indicators are presented as natural gas expenditures on a per MMBtu saved basis. Table 5 presents the 25 organizations included the different benchmark comparisons:

While AEG's efforts to benchmark the performance of the New Jersey Clean Energy Program were strategic, the comparison of NJCEP's performance to other DSM programs is inherently challenged by multiple factors, including data reporting and accounting methodologies. Therefore, the benchmarking analysis serves as an illustration of NJCEP performance relative to a peer group.

[3] Non-residential program expenditures are allocated 80% to electric and 20% to natural gas; Residential HVAC is allocated 47% to electric and 53% to natural gas; Residential New Construction is allocated 63% to electric and 38% to natural gas; Energy Efficiency Products is allocated 100% to electric (natural gas savings are negligible); Home Performance with Energy Star is allocated 39% to electric and 61% to natural gas.

TABLE 5: ORGANIZATIONS REVIEWED

State	Organization	High-Level Review	Program-Level Review
Colorado	Public Service Company of Colorado	x	x
Iowa	Black Hills Energy	x	x
Iowa	Interstate Power & Light	x	x
Iowa	MidAmerican	x	x
Illinois	Ameren	x	x
Illinois	ComEd	x	x
Massachusetts	Berkshire Gas	x	x
Massachusetts	Columbia Gas of Massachusetts	x	x
Massachusetts	Fitchburg Gas & Electric	x	x
Massachusetts	National Grid	x	x
Massachusetts	NSTAR Electric	x	x
Massachusetts	Western Massachusetts Electric	x	x
Minnesota	Centerpoint	x	x
Minnesota	Interstate Power & Light	x	x
Minnesota	MERC	x	x
Minnesota	Minnesota Power	x	
Minnesota	Otter Tail	x	x
Minnesota	Xcel	x	x
New York	LIPA	x	x
New York	NYSEG	x	x
New York	NYSERDA	x	
New York	RGE	x	x
Oregon	Energy Trust of Oregon	x	
Vermont	Efficiency Vermont	x	x
Wisconsin	Focus on Energy	x	

High-level Portfolio and Sector Review

In 2010, the New Jersey Clean Energy Program (NJCEP) spent $106.6 million on the energy efficiency programs included in this analysis.[4] Overall,

- Energy efficiency program spending was 1.7 percent of utility revenue;
- Electricity savings was 0.7 percent of utility sales; and
- Natural gas savings was 0.2 percent of utility sales.

[4] Analysis excluded utility-run programs, such as the low-income program as well as programs that did not have energy savings in 2010 or are not in operation in 2012, including Pay-for-Performance New Construction, Combined Heat and Power, Local Government Energy Audit, marketing, Clean Energy Conference, Community Partners Initiative, Teaching Energy Awareness with Children's Help (TEACH), and Special Studies.

TABLE 6: NJCEP 2010 ENERGY EFFICIENCY PROGRAM

Program	Expenditures	Electricity Savings (MWh)	Peak Demand Savings (kW)	Natural Gas Savings (MMBtu)
TOTAL	**$106,570,411**	**336,913**	**61,309**	**697,261**
Residential	**$81,690,376**	**204,548**	**37,169**	**438,789**
Residential HVAC	$15,167,547	8,087	4,825	259,633
Residential New Construction	$9,059,247	4,379	6,841	79,178
Energy Efficient Products	$16,082,752	191,143	24,688	26,540
Home Performance with Energy Star	$41,380,830	939	815	73,438
Non-Residential	**$24,880,035**	**132,365**	**24,140**	**258,472**
C&I New Construction	$2,446,568	7,062	1,915	104,998
C&I Retrofit	$17,220,583	119,500	20,887	148,987
Pay for Performance	$1,242,724	796	62	-
Direct Install	$3,970,160	5,007	1,276	4,487

Table 7 presents the high-level portfolio and sector DSM spending on a per unit energy saved basis. NJCEP total portfolio and residential sector electric program costs, on both a kWh and kW basis, are higher than the average of the peer group while the non-residential sector costs are lower than the average of the peer group. NJCEP natural gas program costs, on an MMBtu basis, are consistently higher than the average of the peer group.

TABLE 7: 2010 SPENDING PER UNIT ENERGY SAVED BASIS, TOTAL PORTFOLIO AND SECTOR

	Total Portfolio			Residential Sector			Non-Residential Sector		
	$/kWh	$/kW	$/MMBtu	$/kWh	$/kW	$/MMBtu	$/kWh	$/kW	$/MMBtu
Minimum	$0.06	$216	$10	$0.07	$414	$14	$0.05	$131	$6
Average	$0.24	$1,462	$70	$0.33	$1,972	$72	$0.30	$1,720	$82
Maximum	$0.67	$3,869	$198	$1.55	$8,804	$189	$1.37	$5,930	$284
NJCEP	**$0.32**	**$1,738**	**$140**	**$0.40**	**$2,198**	**$162**	**$0.19**	**$1,031**	**$96**

Detailed total portfolio spending on a per unit energy saved basis are shown in Figures 1, 2 and 3.

FIGURE 1. TOTAL PORTFOLIO SPENDING ON A PER KWH SAVED BASIS

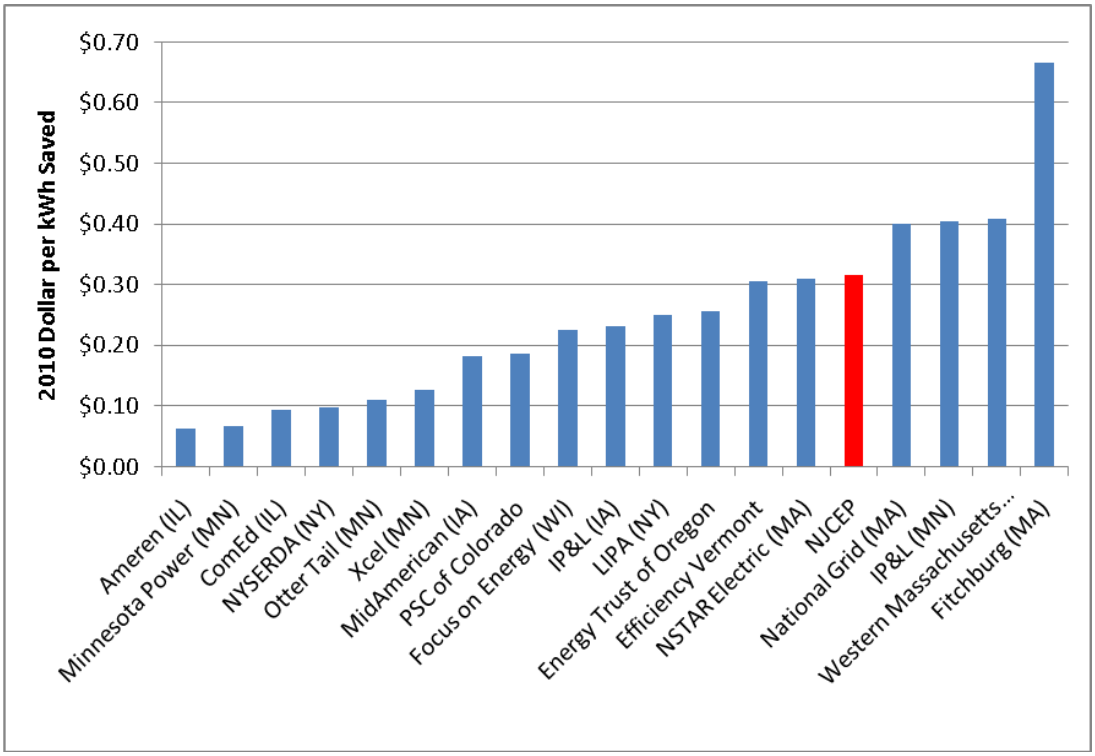


FIGURE 2. TOTAL PORTFOLIO SPENDING ON A PER KW SAVED BASIS

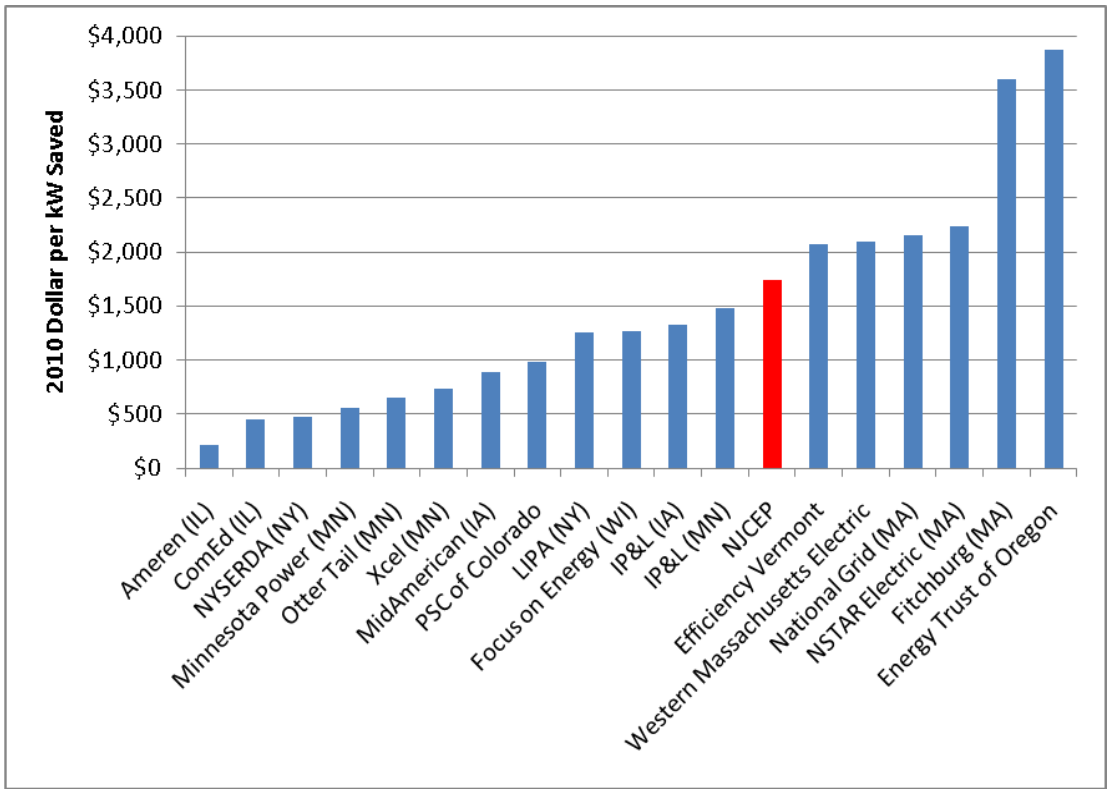
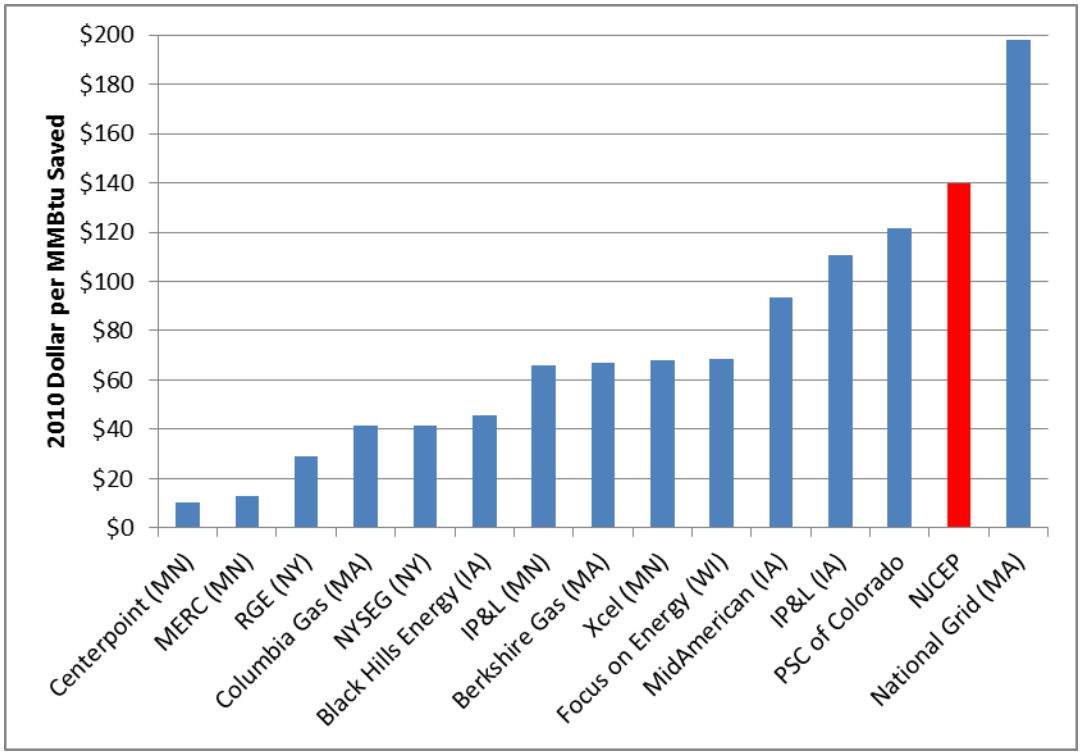


FIGURE 3. TOTAL PORTFOLIO SPENDING PER MMBTU SAVED BASIS



Residential Programs

Table 8 compares each of the NJCEP residential programs to the peer group. New Construction electric energy savings as a function of electric costs are above the average of the peer group while demand energy savings as a function of electric costs and natural gas savings as a function of natural gas costs are below the average of the peer group. Home Performance with Energy Star (HPwES) electric and natural gas indicators are significantly higher than the peer group (in-depth discussion to follow). Residential HVAC electric energy savings as a function of electric costs and natural gas savings as a function of natural gas costs are below the average of the peer group while demand energy savings as a function of electric costs are above average. Residential Efficient Products indicators fall below the average of the peer group.

TABLE 8: 2010 RESIDENTIAL PROGRAM SPENDING ON A PER UNIT SAVED BASIS

	New Construction			Home Performance with Energy Star			Residential HVAC			Efficient Products	
	$/kWh	$/kW	$/MMBtu	$/kWh	$/kW	$/MMBtu	$/kWh	$/kW	$/MMBtu	$/kWh	$/kW
Minimum	$0.12	$397	$7.61	$0.11	$1,577	$69	$0.23	$449	$16	$0.04	$452
Average	$0.81	$5,087	$76	$1.03	$7,063	$83	$1.08	$1,381	$46	$0.12	$922
Maximum	$1.86	$15,070	$177	$1.83	$15,437	$91	$1.72	$2,890	$96	$0.23	$2,116
NJCEP	**$1.28**	**$821**	**$43**	**$17.19**	**$19,802**	**$181**	**$0.88**	**$1,477**	**$31**	**$0.08**	**$651**

The 2010 HPwES electric and natural gas indicators are significantly higher than the peer group. To better understand the HPwES performance data, AEG analyzed the 2011 NJCEP HPwES performance data and the incentive versus non-incentive expenditures. As shown in Table 10, the NJCEP HPwES spending on a per unit basis decreased significantly from 2010 to 2011. Table 10

presents NJCEP performance data with and without the utility stimulus program incentives, including rebates and interest loan buy down incentives. As would be expected, NJCEP indicators are higher with the utility stimulus program incentives.

The 2011 energy savings as a function of electric costs and natural gas savings as a function of natural gas costs are above the average of the peer group while demand energy savings as a function of electric costs are below the average of the peer group.

In both 2010 and 2011, HPwES incentive expenditures on a per unit saved basis are significantly higher than the peer group while the non-incentive expenditures on a per unit saved basis are comparable to the peer group. While NJCEP incentive spending on a per unit saved basis decreased from 2010 to 2011, the data suggest that NJCEP is spending significantly more than their peer group while achieving less energy savings on a per unit basis. However, it could be anticipated that the 2012 indicators follow the trend and spending on a per unit saved basis improve.

TABLE 9: HOME PERFORMANCE WITH ENERGY STAR SPENDING ON A PER UNIT SAVED BASIS

	Total Expenditures			Incentives			Non-Incentives		
	$/kWh	$/kW	$/MMBtu	$/kWh	$/kW	$/MMBtu	$/kWh	$/kW	$/MMBtu
Minimum	$0.11	$1,577	$69	$0.11	$895	$12	$0.25	$630	$47
Average	$1.03	$7,063	$83	$0.46	$2,257	$26	$0.72	$5,720	$57
Maximum	$1.83	$15,437	$91	$0.72	$5,435	$44	$1.72	$14,542	$67
NJCEP (2010)	**$17.19**	**$19,802**	**$181**	**$15.26**	**$17,584**	**$161**	**$1.92**	**$2,217**	**$20**
NJCEP (2011)	**$2.79**	**$6,664**	**$173**	**$2.39**	**$5,694**	**$148**	**$0.41**	**$970**	**$25**
Including Utility Stimulus Program Incentives									
NJCEP (2010)	**$20.19**	**$23,257**	**$213**	**$18.26**	**$21,039**	**$192**	**$1.92**	**$2,217**	**$20**
NJCEP (2011)	**$3.52**	**$8,400**	**$218**	**$3.11**	**$7,430**	**$193**	**$0.41**	**$970**	**$25**

Table 10 presents the 2010 and 2011 NJCEP HPwES participant incentives and Table 11 presents the NJCEP HPwES contractor incentives for 2010. Participant incentives are primarily based upon total energy savings achieved and contractor incentives are based on project completion as well as sizeable training and cooperative (co-op) marketing reimbursements.

The NJCEP HPwES Program incentive structure was modified multiple times during the 2010 program. Participant incentives decreased steadily in 2010, incentives for energy audits and air sealing were eliminated and the maximum incentive for Tier 3 measures lowered. In 2011, participant incentives and requirements were modified with incentives increasing slightly and total energy savings requirements increasing. Contractor incentives were also steadily reduced in 2010; incentives for air sealing and co-op advertising reimbursement were eliminated. In 2011, contractors were eligible to receive a $500 rebate per Tier 2 or Tier 3 project completed and co-op advertising reimbursement. Based on the participant and contractor incentive and requirement modifications, program spending on a per unit saved basis should decrease from 2010 to 2011.

TABLE 10: NJCEP HPWES PARTICIPANT INCENTIVES, 2010 AND 2011

Tier	January 2010	April 2010	June 2010	2011
1. Energy Audit	Discounted cost of $125	None	None	None
2. Air Sealing	$1,000 free	None	None	***10 ≤ 20% savings***: $1,000
3. Air sealing, insulation, HVAC, DHW, other	– ***5 ≤ 25% savings***: 10% rebate up to $2,000 or low interest loan. – ***≥ 25% savings***: 50% rebate up to $10,000 & 0% interest loan	**1 measure & air sealing** – ***5 ≤ 25% savings***: 10% rebate up to $2,000 or low interest loan. – ***≥ 25% savings***: 50% rebate up to $5,000 & 0% interest loan	**1 measure & air sealing** – ***5 ≤ 25% savings***: 10% rebate up to $1,300 or low interest loan. – ***≥ 25% savings***: 50% rebate up to $3,000 & 0% interest loan	**2 measures**[5] – ***20 ≤ 25% savings***: $3,000 & 0% loan up to $10,000 – ***≥ 25% Savings***: $4,000 & 0% loan up to $10,000

TABLE 11: NJCEP HPWES CONTRACTOR INCENTIVES, 2010

Tier	January 2010	April 2010	June 2010
1. Energy Audit	$175	$100	$100
2. Air Sealing	up to $1,000		
3. Air sealing, insulation, HVAC, DHW, other eligible measures	$200 up to 10% of work scope ($1,400)	$200 up to 10% of total scope ($1,000)	$200 up to 7% of total scope ($700)
Free BPI training if certification is achieved.	Yes	Yes	Yes
Co-op marketing reimbursement (25% up to $10,000 per year per location)	Yes	No	No

In 2010, the HPwES peer group offered the following incentives to eligible customers:

- **Public Service Company of Colorado.** Customers are eligible for appliance, HVAC and insulation incentives ranging from $10 to $250. Customers must receive an audit, air sealing/weather stripping, attic insulation and CFLs and install two additional measures.
- **National Grid, NSTAR Electric and Western Massachusetts Electric (MA).** Customers are eligible for a free home assessment as well as appliance, HVAC and insulation incentives. The HEAT Loan program provides qualified customers with zero percent interest loans up to $15,000.
- **Xcel (MN).** Customers are eligible for appliance, HVAC and insulation incentives ranging from $10 to $475. Customers must receive an audit, air sealing/weather stripping, attic insulation and CFLs and install two additional measures.
- **Efficiency Vermont.** Customers are eligible for incentives up to $2,500 for energy efficiency improvements, such as insulation and HVAC upgrades.
- **Ameren (IL).** Customers are eligible for a home diagnostic and improvement service for a $25 fee, during which the auditor installs CFLs and water conservation measures free of charge. Customers are eligible for HVAC and insulation incentives ranging from $150 to $1,200.

[5] Incentives are not to exceed 50% of measure costs associated with the total energy savings calculation.

FIGURE 4. HPWES INCENTIVE SPENDING PER KWH SAVED BASIS

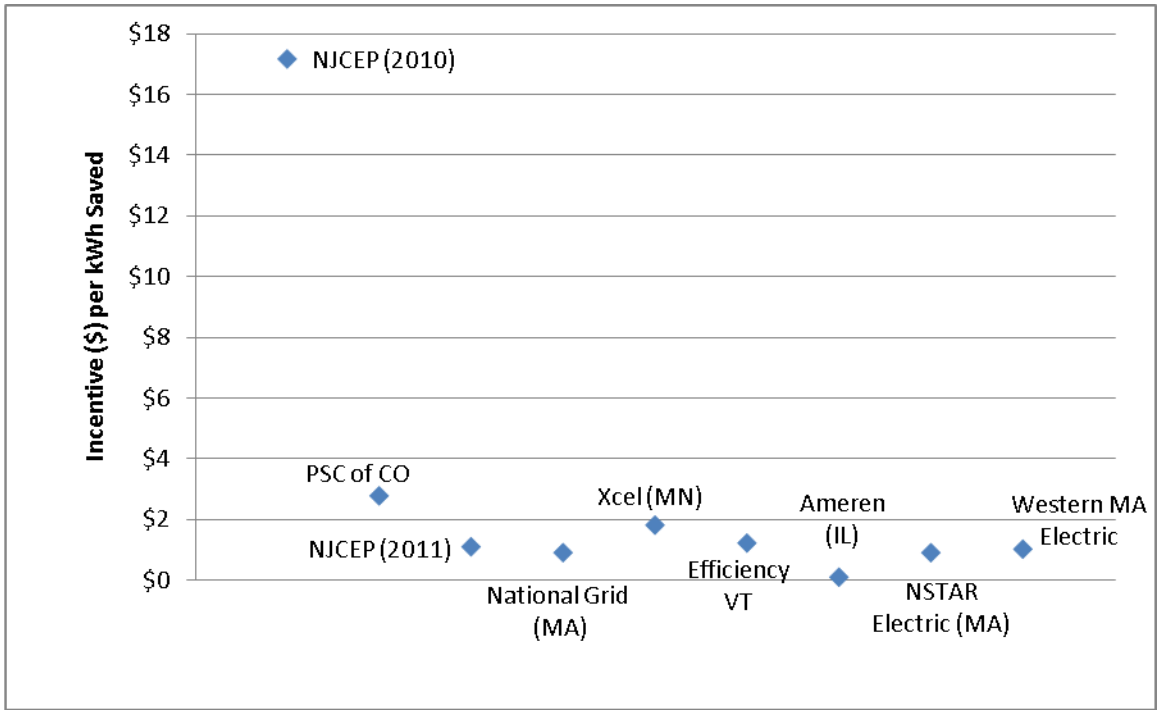


FIGURE 5. HPWES INCENTIVE SPENDING PER KW SAVED BASIS

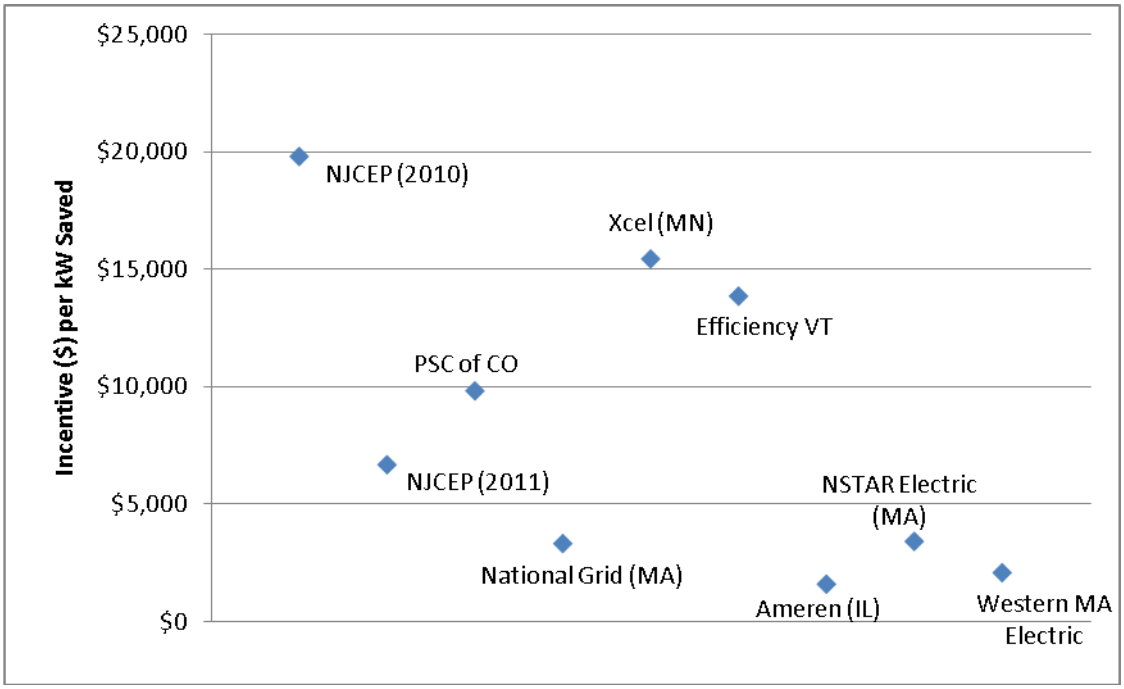
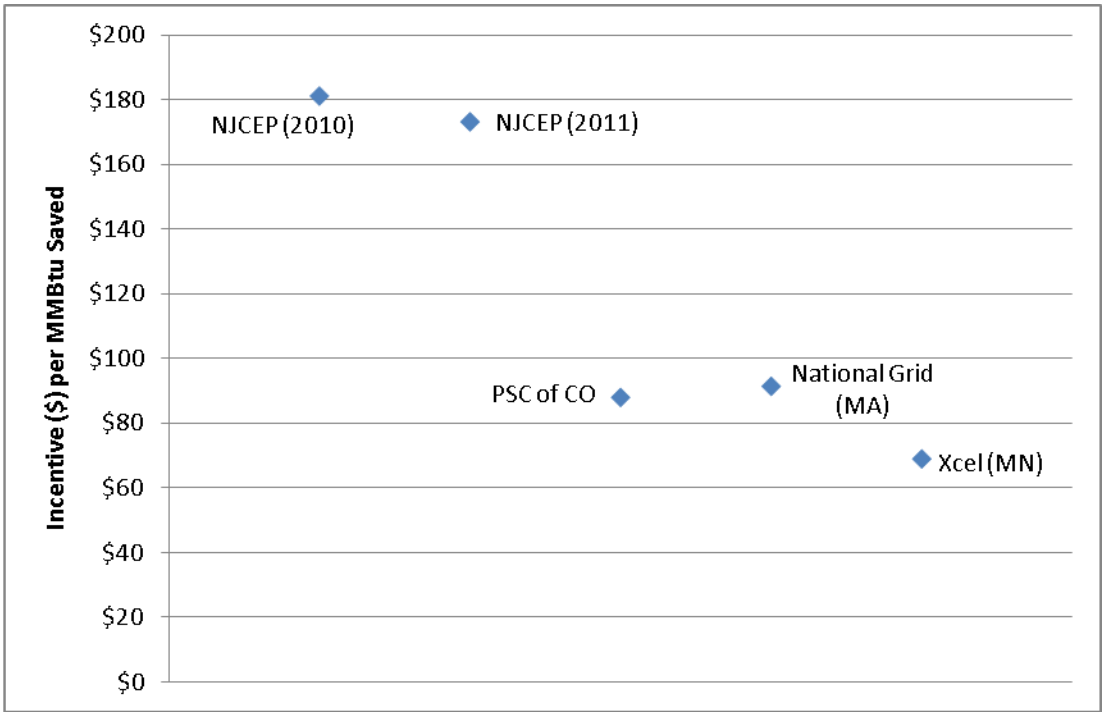


FIGURE 6. HPWES INCENTIVE SPENDING PER MMBTU SAVED BASIS



Non-Residential Programs

Table 12 compares each of the NJCEP non-residential programs to the peer group. The C&I New Construction electric energy savings as a function of electric costs are slightly above the average of the peer group while demand energy savings as a function of electric costs and natural gas savings as a function of natural gas costs are below the average of the peer group. C&I Retrofit electric indicators are less than the average of the peer group while the natural gas indicator is above average.

The Direct Install program was implemented in 2009 and participation ramped-up slowly during 2010. The Pay for Performance program was implemented in 2008 and has slowly ramped-up from 2009 through 2011. New programs typically have higher costs due to increased administrative costs and initial set-up costs during early implementation phases. Therefore, 2011 performance data for the Direct Install and Pay for Performance programs was analyzed.

The 2011 Direct Install electricity savings as a function of electric costs are slightly above the average of the peer group while natural gas savings as a function of natural gas costs are below the average of the peer group. It could be expected that the 2012 electric indicators will improve.

The 2011 Pay for Performance electricity savings as a function of electric costs are above the average of the peer group while natural gas savings as a function of natural gas costs are below the average of the peer group. However, it could be expected that the 2012 spending on a per unit saved basis will improve. Additionally, due to the nature of the program, a project may have begun in 2010 but the savings not realized until 2011.

TABLE 12: NON-RESIDENTIAL PROGRAM SPENDING ON A PER UNIT SAVED BASIS (2010/2011)

	2010 C&I New Construction			2011 Direct Install			2010 C&I Retrofit			2011 Pay for Performance		
	$/kWh	$/kW	$/MMBtu	$/kWh	$/kW	$/MMBtu	$/kWh	$/kW	$/MMBtu	$/kWh	$/kW	$/MMBtu
Minimum	$0.14	$605	$20	$0.34	$1,371	$7.21	$0.05	$129	$5.64	$0.11	$751	$30
Average	$0.27	$1,721	$34	$0.41	$1,627	$19.81	$0.33	$1,633	$18	$0.17	$1,302	$30
Maximum	$0.43	$3,495	$58	$0.54	$1,973	$49.75	$1.75	$7,591	$29	$0.21	$2,196	$30
NJCEP	**$0.28**	**$1,022**	**$4.66**	**$0.42**	**$2,000**	**$4.28**	**$0.12**	**$660**	**$23**	**$0.26**	**$1,599**	**$22**

Conclusions and Recommendations

Overall, the NJCEP program indicators ($/kWh, $/kW, $/MMBtu) as compared to the peer group vary depending upon the program. The total portfolio and residential sector electric indicators are higher than the average of the peer group while the non-residential sector electric indicators are lower than the average of the peer group. The total portfolio and sector natural gas indicators are consistently higher than the average of the peer group.

The Residential Home Performance with Energy Star electric and natural gas indicators are significantly higher than the peer group. Incentive expenditures are significantly higher than the peer group, suggesting that NJCEP is spending significantly more in incentives than their peer group while achieving less energy savings on a per unit basis. However, it could be anticipated that the 2012 indicators follow the trend and spending on a per unit saved basis improve. AEG recommends that NJCEP conduct a thorough examination of the HPwES program offering, particularly the incentives, measures and the associated savings and cost-effectiveness of the overall program.

Direct Install and Pay for Performance are relatively new programs, experiencing slow ramp-up in program implementation. While the electric indicator data suggest that NJCEP is spending more for electric savings on a per unit basis than their peer group, it could be expected that the 2012 program spending on a per-unit saved basis will improve. AEG recommends that NJCEP review the incentives and measures periodically to ensure that costs on a per unit saved basis are decreasing as the programs mature.

Review of New Jersey Program Results

Overall, the NJCEP portfolio spending, defined as the sum of actual and committed expenditures, has increased annually between 2008 and 2011.[6] However, program-specific spending has fluctuated annually. The Home Performance with Energy Star program experienced a significant increase in spending from 2009 to 2010, from $10 million to $52 million, then decreased significantly between 2010 and 2011, dropping down to $20 million. The Pay for Performance and Direct Install programs experienced significant increases in spending from 2009 through 2011 as program implementation ramped-up. Table 14 presents the NJCEP spending and Table 15 presents the NJCEP budgets.

[6] Analysis excluded utility-run programs, such as the low-income program as well as programs that did not have energy savings in 2010 or are not in operation in 2012, including Pay-for-Performance New Construction, Combined Heat and Power, Local Government Energy Audit, marketing, Clean Energy Conference, Community Partners Initiative, Teaching Energy Awareness with Children's Help (TEACH), and Special Studies.

TABLE 13: ANNUAL NJCEP SPENDING PLUS COMMITMENTS BY PROGRAM, 2008 – 2011

	2008	2009	2010	2011
Total Portfolio	**$77,821,705**	**$110,165,300**	**$166,922,088**	**$171,841,805**
Residential	**$52,335,337**	**$65,720,938**	**$105,232,082**	**$73,953,257**
Residential HVAC	$11,387,329	$9,557,605	$15,167,547	$19,923,078
Residential New Construction	$21,429,416	$22,581,186	$18,629,047	$15,494,987
Energy Efficient Products	$14,516,232	$19,623,880	$16,082,752	$16,643,931
Home Performance with Energy Star	$5,002,360	$10,248,144	$52,337,909	$20,779,275
Marketing[7]		$3,710,123	$3,014,827	$1,111,985
Non-Residential	**$25,486,368**	**$44,444,362**	**$61,690,006**	**$97,888,548**
C&I New Construction	$3,450,729	$5,895,029	$4,789,228	$4,817,977
C&I Retrofit	$20,358,272	$31,503,054	$31,543,763	$37,440,662
New School Construction & Retrofit	$1,625,026	$2,383,997		
Pay-for-Performance		$2,990,474	$12,501,154	$31,747,791
Direct Install		$125,000	$11,950,380	$22,819,787
Marketing		$1,546,809	$905,480	$1,062,331

TABLE 14: ANNUAL NJCEP BUDGET BY PROGRAM, 2008 – 2011

	2008	2009	2010	2011
Total Portfolio	**$116,414,000**	**$184,569,290**	**$216,309,567**	**$225,025,522**
Residential	**$85,588,000**	**$109,657,920**	**$116,509,817**	**$91,932,075**
Residential HVAC	$18,476,000	$13,532,501	$16,268,617	$22,724,584
Residential New Construction	$37,141,000	$42,576,218	$20,262,610	$19,943,970
Energy Efficient Products	$20,142,000	$25,315,444	$17,936,074	$18,193,381
Home Performance with Energy Star	$9,829,000	$23,652,927	$58,782,278	$29,760,156
Marketing		$4,580,830	$3,260,239	$1,309,984
Non-Residential	**$30,826,000**	**$74,911,370**	**$99,799,750**	**$133,093,447**
C&I New Construction	$4,503,000	$10,691,720	$6,813,712	$6,867,143
C&I Retrofit	$22,596,000	$22,020,298	$35,109,760	$45,899,451
New School Construction & Retrofit	$3,727,000	$7,103,224		
Pay-for-Performance		$23,245,128	$32,305,103	$43,355,702
Direct Install		$10,295,999	$24,532,977	$35,896,151
Marketing		$1,555,000	$1,038,200	$1,075,000

As shown in Table 15, NJCEP program expenses plus commitments are often below the program budgets. Program budgets are typically established based on participation goals, incentive levels, anticipated program costs and historical program performance. Program spending would ideally be between 75 and 100 percent of the program budgets. However, spending for new programs and programs that have been modified will not necessarily meet the range of program budget. Established programs with few modifications that are consistently below budget should be reevaluated to determine whether program changes may increase participation or budgets should be revised.

[7] Note: Marketing expenses were embedded in the individual program expenses in 2008. Marketing was broken out as a separate expense in 2009-2011.

TABLE 15: NJCEP PROGRAM SPENDING AS A PERCENTAGE OF TOTAL BUDGETS

	2008	2009	2010	2011
Residential	**61%**	**60%**	**90%**	**80%**
Residential HVAC	62%	71%	93%	88%
Residential New Construction	58%	53%	92%	78%
Energy Efficient Products	72%	78%	90%	91%
Home Performance with Energy Star	51%	43%	89%	70%
Marketing		81%	92%	85%
Non-Residential	**83%**	**59%**	**62%**	**74%**
C&I New Construction	77%	55%	70%	70%
C&I Retrofit	90%	143%	90%	82%
New School Construction & Retrofit	44%	34%		
Pay-for-Performance		13%	39%	73%
Direct Install		1%	49%	64%
Marketing		99%	87%	99%

Table 16 demonstrates that in 2010 and 2011, residential and non-residential participation levels exceeded participant goals for a number of programs. Home Performance with Energy Star and Direct Install are the only programs that did not exceed goals in 2011.

TABLE 16: NJCEP PROGRAM PARTICIPATION AS A PERCENTAGE OF PARTICIPATION GOALS

	2008	2009	2010	2011
Residential	**109%**	**91%**	**149%**	**104%**
Residential HVAC	95%	80%	118%	104%
Residential New Construction	80%	79%	111%	195%
Energy Efficient Products	126%	97%	178%	105%
Home Performance with Energy Star	20%	103%	47%	50%
Non-Residential	**81%**	**73%**	**107%**	**103%**
C&I New Construction	98%	100%	129%	189%
New School Construction & Retrofit		70%		
C&I Retrofit	78%	107%	157%	111%
Pay-for-Performance			48%	850%
Direct Install			23%	88%

Figures 7 and 8 present the percentage of actual spending (not including commitments) broken out by program category. Incentives account for the majority of NJCEP program spending, followed by rebate processing and QA/QC and administration. Overall, residential programs have higher administrative costs, particularly the Residential New Construction Program. Evaluation expenditures and performance incentive expenditures are minimal; performance incentives were phased out in 2010. Marketing and rebate processing and QA/QC spending as a percentage of the total budget has decreased from 2008 to 2010,

- Residential marketing decreased from 12 percent of the budget in 2008 to 2 percent in 2011. Non-residential marketing decreased from 8 percent of the budget in 2009 to 2 percent in 2011.
- Residential rebate processing and QA/QC decreased from 15 percent in 2008 to 10 percent in 2011. Non-residential rebate processing and QA/QC decreased from 12 percent in 2008 to 6 percent in 2011.

The reductions in the rebate processing and QA/QC components of the budget resulted from several changes to program procedures implemented in 2010 and 2011 aimed at reducing non-rebate costs.

FIGURE 7. RESIDENTIAL PORTFOLIO SPENDING BY PROGRAM CATEGORY (PERCENTAGE OF TOTAL)

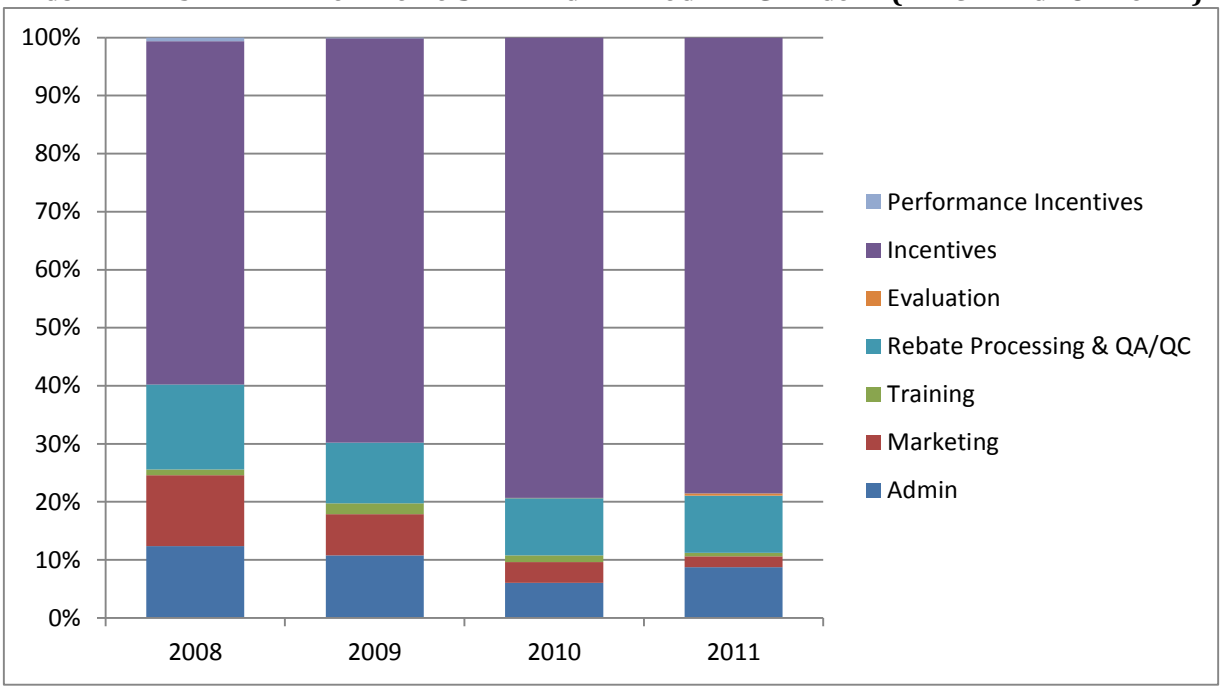
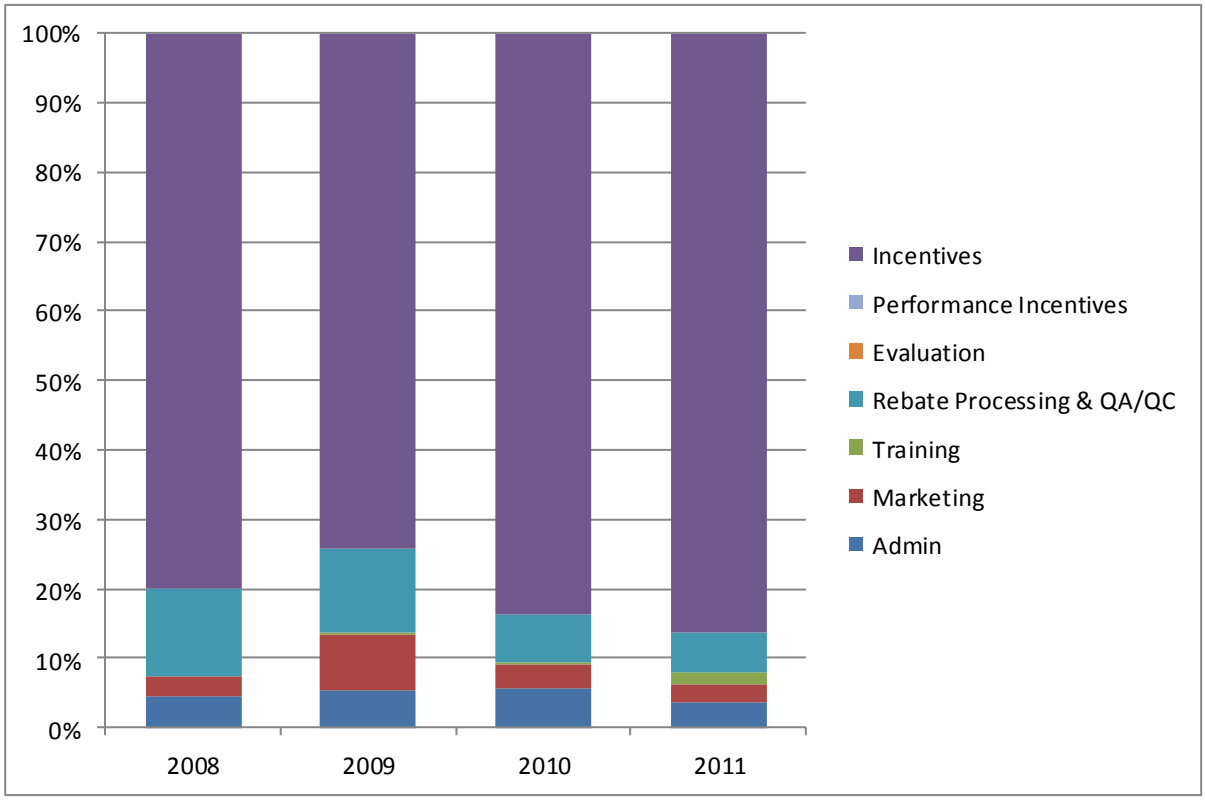


FIGURE 8. NON-RESIDENTIAL PORTFOLIO SPENDING BY PROGRAM CATEGORY (PERCENTAGE OF TOTAL)



Technical Analysis

AEG conducted a detailed review of the measures and programs under both NJCEP's energy efficiency current residential and commercial/industrial (C&I) portfolios. AEG's overall approach to examining cost-effectiveness covered the following areas:

- Identify participation, measure characteristics and annual savings within each program from the proposed plan.
- Within each measure, verify as much as possible that the estimated savings are in compliance with New Jersey's Clean Energy Program Protocols.[8]
- Calculate lifetime savings in MWh and therms, as well as the Net Present Value (NPV) of those savings in dollars.
- Since Market Manager costs are provided only at the program level, non-incentive costs were allocated across individual measures as a pro-rated portion of anticipated incentive expenditures for each measure.
- Calculate measure lives for programs based on the savings weighted averages of individual measures.
- Calculate levelized costs of saved energy in dollars per kWh and dollars per therm, where costs include incentives and program administration at the measure, program and portfolio level.
- Calculate Total Resource Benefit-Cost ratios at the measure, program and portfolio level for electricity and gas individually and combined.

The residential and C&I portfolio were examined at the program and measure level using standard cost-effectiveness techniques. Two measures of cost-effectiveness were used:

- **Total Resource Benefit-Cost Ratio (TRC test)**. This test is one of five benefit-cost tests typically used to evaluate energy efficiency measures, programs and portfolios. The TRC test is described in the California Standard Practice Manual as "the net costs of a demand-side management program as a resource option based on the total costs for the program, including both the participants' and the utility's costs."[9] Benefits include utility avoided costs of electricity and natural gas. Costs include program administration and delivery as well as the incremental costs to the participants. Results of the test are commonly expressed as a benefit-cost ratio, where the net present values of benefits and costs are used.
- **Levelized Cost of Saved Energy**. This metric is used to express the cost of acquiring a unit of saved energy in dollars per physical unit, usually $/kWh or $/Therm. It is similar to the Program Administrator's Test described by the California Standard Manual. Levelized costs usually include program administration and delivery, and incentives.

The residential and C&I analyses were performed from two perspectives – the program administrator's (the State of New Jersey), and the societal perspective. From the State's perspective, the levelized costs of saved energy (electricity or natural gas) are used. Levelized costs of saved energy are most frequently compared to utility avoided costs, and represent the cost of acquiring demand-side resources. These values include incentives and program administration as

[8] NJ BPU, *Protocols to Measure Resource Savings, Revisions to July 2011 Protocols*, April 2012.
[9] California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects. October 2001.

costs, and avoided purchases of electricity and natural gas as benefits. Total Resource Benefit-Cost ratios (TRCs) represent cost effectiveness from a societal standpoint. The TRC incorporates the value of avoided purchases of electricity and natural gas as a benefit. Costs are program administrative and incremental costs of energy efficiency measures. Incentives are not included in the TRC analysis since they are treated as transfers. Overall TRC results indicate that the portfolio meets the requirement for a TRC of 1.0 or higher, although the portfolio appears to be more cost-effective for electric than gas measures.

A description of the investigation and analysis undertaken by AEG for the residential and C&I portfolios is presented below.

Residential Technical Analysis

AEG examined the programs and measures included in Honeywell's Residential Energy Efficiency and Renewable Energy Program Plan Filing for 2012. The filing summarizes budgets at the programmatic level, and impacts for groups of measures within each program. AEG's approach was first to evaluate cost-effectiveness at the most granular level possible under Honeywell's current program, and then to make recommendations for program changes and enhancements to improve cost-effectiveness.

AEG's overall approach to examining cost-effectiveness for the proposed residential plan is summarized below:

- Identify participation, measure characteristics and annual savings within each program from the proposed plan.
- Within each measure, verify as much as possible that the estimated savings are in compliance with New Jersey's Clean Energy Program Protocols.[10]
- Calculate lifetime savings in MWh and therms, as well as the Net Present Value (NPV) of those savings in dollars.
- Since Market Manager costs are provided only at the program level, non-incentive costs were allocated across individual measures as a pro-rated portion of anticipated incentive expenditures for each measure.
- Calculate measure lives for programs based on the savings weighted averages of individual measures.
- Calculate levelized costs of saved energy in dollars per kWh and dollars per therm, where costs include incentives and program administration at the measure, program and portfolio level.
- Calculate Total Resource Benefit-Cost ratios at the measure, program and portfolio level for electricity and gas individually and combined.

Key analytical inputs are shown in Table 17:

[10] NJ BPU, *Protocols to Measure Resource Savings, Revisions to July 2011 Protocols*, April 2012.

TABLE 17: ANALYTICAL INPUTS

Input	Value	Use	Source
Avoided cost of electricity	$0.06696/kWh	Calculation of the value of avoided electricity and gas purchases	Rutgers CEEEP Study[11]
Avoided cost of natural gas	$0.733/therm		
Discount rate	8%	Calculation of levelized costs and NPV of avoided costs	Assumed
General escalation rate	2%	Escalation factor applied to savings	
Electric system loss factor	1.11	Conversion of avoided cost savings to account for T&D losses	Clean Energy Program Protocols
Gas system loss factor	1.00		

Table 18 shows an overall summary of the results for the residential program portfolio. Both electric and gas levelized costs of saved energy are well below first-year avoided costs. One of the primary benefits of energy efficiency programs is that they avoid the costs of purchasing electricity and natural gas that would have been used less efficiently. These costs are borne by utility ratepayers since utilities must purchase electricity and natural gas at avoided cost rates to meet their customers' demand. Since the forecast of avoided costs is estimated to increase, when levelized costs of saved energy are below the first-year avoided costs of electricity and natural gas, this indicates that savings are acquired cost-effectively from the standpoint of the State in comparison to acquiring additional electricity and natural gas.

TABLE 18: SUMMARY OF RESIDENTIAL PROGRAM PORTFOLIO

Program Administrator's Levelized Cost of Saved Electricity ($/kWh)	Program Administrator's Levelized Cost of Saved Gas ($/Therm)	Total Resource Cost B/C Ratio- Electricity	Total Resource Cost B/C Ratio - Gas	Total Resource B/C Ratio - All
$ 0.0097	$ 0.1367	2.07	0.66	1.30

Additional details for each program and measure are provided in Tables 19 through 22. A separate discussion is provided for each.

Energy Efficient Products

New Jersey's program includes direct incentives and markdowns for a variety of products. Programs emphasizing compact fluorescent light bulbs are highly cost-effective. Honeywell's proposal did not account for the shift in baseline as a result of Federal legislation, which means that lifetime savings (and therefore levelized cost and TRC results) will be more favorable in this analysis.[12] If the baseline is adjusted by reducing savings by 30%, the Energy Efficient Products Programs remains very cost-effective, but the overall Residential Program portfolio TRC ratio decreases from 1.30 to 1.15. This indicates the influence that residential lighting has on the overall portfolio. CFLs account for over 75 percent of total annual residential portfolio savings, and about 33 percent of all total residential and C&I efficiency program savings. Advanced Power Strips are

[11] CEEEP, *Cost-Benefit Analysis of the 2008 New Jersey Clean Energy Program Energy Efficiency Programs, Summary Report*, March 2010.

[12] The Federal Energy Independence and Security Act of 2007 mandates an increase in lighting efficiency of about 30% for general purpose light bulbs. As a result of this shift, savings from standard CFLs must be adjusted to account for the new baseline. For example, a standard 100 Watt incandescent bulb is usually the baseline for estimating savings from a CFL providing equivalent output. As of June 2012, the baseline shifts to approximately 70 Watts, and 100 Watt bulbs will no longer be manufactured.

also cost-effective, and in the cases of CFLs and power strips, the favorable cost-effectiveness is the result of relatively high savings per unit and low incremental costs.

Several measures yield TRCs of less than one. In all cases, this is due to the relatively high incremental costs of the measures, which include LED lighting, Tier 2 appliances (clothes washers, refrigerators, some set top boxes), and new technologies such as heat pump water heaters.

TABLE 19: ENERGY EFFICIENT PRODUCTS

Program	Category	Program Administrator's Levelized Cost of Saved Electricity ($/kWh)	Program Administrator's Levelized Cost of Saved Gas ($/Therm)	Total Resource Cost B/C Ratio-Electricity	Total Resource Cost B/C Ratio - Gas	Total Resource B/C Ratio - All
Energy Efficient Products	2012 EE Lighting CFL Markdowns	$ 0.0085		5.14		5.14
	2012 EE Lighting Fixture and SSL Markdowns	$ 0.0937		0.77		0.77
	Creative (lighting)	$ 0.0148		4.80		4.80
	Advanced Power Strips	$ 0.0310		1.19		1.19
	Clotheswasher Tier 2 (MEF 2.2)	$ 0.0348	$ 1.1316	0.57	0.16	0.49
	TOTAL REBATED MEASURES	$ 0.0098	$ 1.1316	4.17	0.16	3.98
	Refrigerator/Freezer Early Retirement	$ 0.0474		2.08		2.08
	Other Upstream Incentives - Clothes Washers	$ 0.0420		0.45		0.45
	Other Upstream Incentives - Heat Pump Dryers	$ 0.0454		0.72		0.72
	Other Upstream Incentives - CEE Tier 2 Refrigerators	$ 0.1020		0.57		0.57
	Energy Efficient Set Top Boxes (EnergyStar Tier 1 & 2)	$ 0.0847		0.47		0.47
	TOTAL NEW PROGRAMS AND PILOTS	$ 0.0347		1.38		1.38
	TOTAL	$ 0.0033	$ 0.1650	3.60	0.17	3.49

Residential New Construction

Table 20 summarizes the Residential New Construction Program, including commitments made in 2011 for payment in 2012. Results indicate that Tier 1 and Tier 2 homes are cost-effective, while Tier 3 is not. This is not surprising since incremental costs increase rapidly at the highest Tier. However, 98 percent of participants in the New Construction Program are in Tier 1 and 2, and participants in Tier 3 have a negligible effect on the overall program. While Tier 3 homes are not currently cost effective, one goal of the program is to push the envelope on building practices so that measures become more cost effective in the future as practices become more common.

TABLE 20: RESIDENTIAL NEW CONSTRUCTION

Program	Category	Program Administrator's Levelized Cost of Saved Electricity ($/kWh)	Program Administrator's Levelized Cost of Saved Gas ($/Therm)	Total Resource Cost B/C Ratio- Electricity	Total Resource Cost B/C Ratio - Gas	Total Resource B/C Ratio - All
Residential New Construction	Tier 2 EnergyStar v 3.0 Committed in 2011	$ 0.0246	$ 0.1066	1.48	1.23	1.27
	Tier 3 CCH Committed in 2011	$ 0.0483	$ 0.2090	0.82	0.64	0.67
	TOTAL - 2011 COMMITMENTS CARRIED FORWARD	$ 0.0261	$ 0.1110	1.41	1.19	1.22
	Tier 1 Committed in 2012	$ 0.0148	$ 0.0640	2.59	2.04	2.11
	Tier 2 EnergyStar v 3.0 Committed in 2012	$ 0.0246	$ 0.1066	1.48	1.23	1.27
	Tier 3 CCH Committed in 2012	$ 0.0482	$ 0.2085	0.82	0.65	0.68
	TOTAL - 2012 ENROLLMENTS/COMMITMENTS	$ 0.0311	$ 0.0848	1.87	1.55	1.59
	TOTAL	$ 0.0333	$ 0.0967	1.78	1.42	1.47

Residential HVAC Program

Most of the measures in this program are not cost-effective due to relatively small savings per unit, high incremental costs, or both. One of the primary drivers of cost-effectiveness has been changes in Federal standards and baselines for efficiency. Recent changes have or will adjust baselines to higher levels, which significantly reduces savings under normal replacement circumstances.

For electric measures, 92 percent of the total budget is targeted at SEER 16 air conditioning units. These units, which are more efficient than the SEER 13 baseline, provide marginal benefits in comparison to their incremental costs. Based on the New Jersey Protocols, a typical 3 ton SEER 16 unit would provide about 500 kWh per year of savings above a SEER 13 unit, which saves about $33 per year based on avoided costs. However, the incremental cost is over $1,000. This single measure yields a TRC of 0.17, and since it accounts for most of the budgeted expenditures, drives the TRC for the electric measures down to this level as well.

Gas measures are generally more cost-effective given the current assumptions in the Honeywell filing. Overall cost-effectiveness for gas measures is 1.13, although individual measures are less than 1.0. Due to changes in ENERGY STAR standards for gas furnaces, most of the emphasis is being placed on furnaces with AFUE ratings of 95% or higher. The New Jersey Protocol stipulates a baseline efficiency for gas furnaces of 80% AFUE, which is the current Federal minimum standard. Honeywell's savings appear to be based on this standard. However, this will shift in July 2012 to comply with new Federal standards, which will require that gas furnaces have a minimum efficiency level of 90% AFUE. By adjusting the baseline from 80% AFUE to 90% AFUE, savings are reduced by approximately 11% and the TRC ratio for 95% gas furnaces declines from 1.10 to 0.98. The overall performance of the HVAC program declines from 0.64 to 0.60.

The Residential HVAC Program also includes ground source heat pumps, solar water heating systems (with both gas and electric back-up), and high efficiency gas water heaters. In all of these cases, the TRC ratio is less than one, however these measures are expected to have low

participation and represent technologies that push the envelope in their respective end-use categories.

Several pilot and test measures are included in the Residential HVAC Program. These are intended to test the market response for upstream incentives for certain electric and gas measures, and to pilot new measures such as drain water heat recovery and improved gas boiler controls. All of these individual measures have TRC ratios less than 1.0, but since they are pilots, participation and impacts are expected to be low.

TABLE 21: RESIDENTIAL HVAC PROGRAM

Program	Category	Program Administrator's Levelized Cost of Saved Electricity ($/kWh)	Program Administrator's Levelized Cost of Saved Gas ($/Therm)	Total Resource Cost B/C Ratio- Electricity	Total Resource Cost B/C Ratio - Gas	Total Resource B/C Ratio - All
Heating Ventilating and Air Conditioning	A/C SEER 16 (with proper sizing)	$ 0.2476		0.20		0.20
	ASHP 16 (with proper sizing)	$ 0.0962		0.45		0.45
	GSHP EnergyStar	$ 0.0261		0.56		0.56
	Solar Domestic Hot Water for Electric Applications	$ 0.0805		0.34		0.34
	TOTAL - ELECTRIC APPLICATIONS	$ 0.2158		0.20		0.20
	Gas Furnace: 92% AFUE		$ 0.0447		2.52	2.52
	Gas Furnace: 92% AFUE w/ ECM	$ 0.0150	$ 0.0894	0.00	1.61	1.38
	Gas Furnace: 95% AFUE and 2% ECM (new EnergyStar)	$ 0.0133	$ 0.0793	0.00	1.22	1.10
	Boiler: 85% AFUE		$ 0.2850		0.75	0.75
	Water Heater: 0.82 EF w/ 90% condensing or 90% TE		$ 0.1854		0.41	0.41
	Solar Domestic Hot Water for Gas Applications		$ 0.2355		0.23	0.23
	TOTAL - GAS APPLICATIONS	$ 0.0067	$ 0.0684	0.00	1.26	1.13
	Upstream Equipment Incentives (electric - HPWH)	$ 0.0123		0.96		0.96
	Upstream Equipment Incentives (electric - CAC)	$ 0.3131		0.09		0.09
	Upstream Incentives (gas)		$ 0.4491		0.25	0.25
	Pilot New Measures (Drain Water Heat Recovery)		$ 0.2539		0.10	0.10
	Pilot New Measures (boiler controls)		$ 0.1726		0.59	0.59
	TOTAL - OTHER	$ 0.0124	$ 0.3397	0.71	0.23	0.44
	TOTAL	$ 0.1584	$ 0.0727	0.21	1.18	0.68

Home Performance with ENERGY STAR

Results for the Home Performance with ENERGY STAR (HPwES) Program are shown in Table 22. In New Jersey, the program includes a limited set of measures focusing on air sealing, duct sealing, insulation, HVAC equipment, and water heating. All of these measures are typically costly in comparison to their savings and have a significant impact of the program's cost-effectiveness. In other HPwES programs, less costly measures such as lighting and appliances are allowed, which helps to improve cost-effectiveness. Not surprisingly, as the Tier level increases, cost-effectiveness decreases due to incremental costs increasing faster than savings.

TABLE 22: HOME PERFORMANCE WITH ENERGY STAR

Program	Category	Program Administrator's Levelized Cost of Saved Electricity ($/kWh)	Program Administrator's Levelized Cost of Saved Gas ($/Therm)	Total Resource Cost B/C Ratio-Electricity	Total Resource Cost B/C Ratio - Gas	Total Resource B/C Ratio - All
Home Performance with ENERGY STAR	Tier 2: Air Sealing and Duct Sealing	$ 0.0544	$ 0.2282	0.37	0.30	0.30
	Tier 2: Multi-Family	$ 0.0217	$ 0.0912	0.78	0.78	0.78
	Tier 3: (Insulation, HVAC, DHW, other eligible measures)	$ 0.1126	$ 0.4726	0.17	0.15	0.15
	Tier 3: Multi-Family	$ 0.0306	$ 0.1285	0.62	0.54	0.56
	TOTAL - HOME PERFORMANCE WITH ENERGYSTAR	$ 0.0898	$ 0.9235	0.22	0.19	0.19
	TOTAL	$ 0.0827	$ 0.9266	0.22	0.19	0.19

Residential Portfolio Observations

The observations of the residential portfolio include:

Energy Efficiency Products

- The Energy Efficient Products Program includes several new components that will test upstream incentives for appliances and several new products. Honeywell's proposed plan did not provide much of the information needed to track and evaluate these pilots. New products did not have supporting incremental cost or market analysis to justify why these products and delivery mechanisms were important.

Residential HVAC

- The Residential HVAC Program's electric measure cost-effectiveness is heavily affected by the emphasis on SEER 16 air conditioning units, and to a much smaller degree by air source heat pumps rated at SEER 16 (in air conditioning mode). The benefits of these units in a traditional "replace on failure" program are marginal compared to the baseline SEER 13 unit which is the Federal minimum efficiency standard. Honeywell estimates average savings per participant of 260 kWh per year for SEER 16 air conditioners. Given the small savings, and the high percentage of the budget for this measure, the Board should consider eliminating incentives for SEER 16 air conditioners and heat pumps as stand-alone measures.
- Due to the very low participation in ground source heat pumps and solar hot water, they have negligible influence on overall program cost-effectiveness, but have value in helping maintain a comprehensive program.

- The highest volume gas measures are cost-effective when compared to the current baseline of 80% AFUE in the New Jersey Protocol. These include 92 and 95% AFUE furnaces, although Honeywell intends to phase out incentives for 92% AFUE furnaces as ENERGY STAR standards shift to 95% AFUE. New federal standards will also shift the baseline for evaluating savings for furnaces. This baseline will change to 90% AFUE in September 2012 when the new standard becomes effective. When 95% AFUE furnaces are compared to the new 90% AFUE standard, savings decline by approximately 70% while incremental costs decline by approximately 40%. This will cause the TRC to go slightly below 1.0 for this measure.
- Other gas measures are not currently cost-effective but could be continued to maintain a comprehensive program.

Home Performance with Energy Star (HPwES)

- HPwES is not currently cost-effective. As previously explained, the program emphasizes measures with high incremental costs in comparison to similar programs.

Commercial/Industrial Technical Analysis

AEG examined the programs included in TRC's Commercial & Industrial Energy Efficiency Program Plan Filing for 2012, and the analysis is intended to be forward-looking rather than retrospective. The overall approach is summarized below:

- Total participation and annual savings at the programmatic level were collected from the TRC 2012 filing.
- Lifetime savings in MWh and therms, as well as the Net Present Value (NPV) of those savings in dollars, were calculated for each program.
- Weighted average measure lives were calculated for each program based on the lifetime and annual savings.
- Levelized costs of saved energy in dollars per kWh and dollars per therm were calculated. Incentives and program administration costs at the program and portfolio levels were included in this analysis.
- Total Resource Benefit-Cost ratios at the program and portfolio levels for electricity and gas, individually and combined, were calculated.

In addition to the program level analysis, AEG evaluated the 45 most common C & I measures individually as described below:

- Using program participation data for 2010 and 2011, AEG identified the most common measures accounting for approximately 90% of annual electricity and natural gas savings.
- Measures were characterized using the New Jersey Protocols to quantify savings and measure lives.
- Incremental costs were evaluated using other sources including technical resource manuals from other programs and regions, the R.S. Means construction cost database, and Internet resources.
- Levelized costs of saved energy and Total Resource Benefit-Cost ratios were calculated individually for each measure.

- Program administration and delivery costs were not included at the individual measure level. This is standard practice since the impacts of these costs are usually evaluated at the program level, and represent a small percentage of the total cost of a single measure.

The analysis was performed using a spreadsheet tool developed for this project. In addition to program- and measure-specific inputs, other key analytical inputs are shown in Table 24:

TABLE 23: KEY ANALYTICAL INPUTS

Input	Value	Use	Source
Avoided cost of electricity	$0.06696/kWh	Calculation of the value of avoided electricity and gas purchases	Rutgers CEEEP Study[13]
Avoided cost of natural gas	$0.733/therm		
Discount rate	8%	Calculation of levelized costs and NPV of avoided costs	
General escalation rate	2%	Escalation factor applied to savings	Assumed
Electric system loss factor	1.11	Conversion of avoided cost savings to account for T&D losses	Clean Energy Program Protocols
Gas system loss factor	1.00		

Table 24 shows an overall summary of the results for the C & I program portfolio. For both electricity and natural gas, the levelized cost of saved energy is below first-year avoided costs. Since avoided costs are projected to escalate in future years, this indicates that the program portfolio is cost-effective from the program administrator's standpoint.

TABLE 24: SUMMARY OF C&I PROGRAM PORTFOLIO

Program Administrator's Levelized Cost of Saved Electricity ($/kWh)	Program Administrator's Levelized Cost of Saved Gas ($/Therm)	Total Resource Cost B/C Ratio- Electricity	Total Resource Cost B/C Ratio - Gas	Total Resource B/C Ratio - All
$ 0.0269	$ 0.5332	1.43	1.32	1.40

Additional details for each program are provided in the following discussion.

Program Level Analysis and Results

Data from TRC's 2012 Program Plan were used to perform a program-level analysis, although the following adjustments were necessary:

- The Pay for Performance Program rebate budget includes incentives that were committed in prior years, as well as estimates of future commitments. Since it is performance based, payments to program participants are made in three steps over a period that can exceed two years. This program is relatively new, having been launched in 2009, and few projects have been through the full cycle. The incentive and program administration budgets were adjusted by TRC to reflect projects that are expected to reach completion in 2012.
- The Direct Install Program rebate budget includes incentives that were committed in prior years and estimates of future commitments. The incentive and program administration budgets were adjusted by TRC to reflect projects that are expected to reach completion in 2012.
- The Large Energy Users Pilot was launched in 2011, and no projects have been through the full program cycle. Like the Pay for Performance Program, adjustments were made to the

[13] CEEEP, *Cost-Benefit Analysis of the 2008 New Jersey Clean Energy Program Energy Efficiency Programs, Summary Report*, March 2010.

incentive budget. In this case, projected electricity and gas savings were used to estimate the portion of the total rebate budget that is expected to be paid in 2012.

- Adjustments were made to the New Construction Program incentive budget. Projected electricity and gas savings were used to estimate the portion of the total rebate budget that is expected to be paid in 2012.
- The Retro-Commissioning Program will not be launched until the new Program Administrator is selected later in 2012. This program shares the approach used in the Pay for Performance and Large Energy Users Pilot. Under this approach, incentive payments may be committed, but not necessarily paid in the same program year. Since TRC's incentive budget includes projected future commitments, an adjustment was made using electricity and gas savings to estimate the incentive payments expected to be made in the current program year. At this point, since the program has an uncertain launch date, the results of the analysis indicate overall cost-effectiveness going forward, but not necessarily for a specific time period.
- In order to calculate a TRC ratio, incremental costs must be included that are representative of the increased costs of equipment and installation for energy efficiency projects. At the program level, total incremental costs are influenced by incremental costs of individual measures and participation rates for each measure. Program-level incremental costs were estimated using each program's incentive budget divided by the maximum percentage of project costs allowed by each program. An underlying assumption in this methodology is that participants attempt to maximize incentives in relation to project size. Since the programs have dollar caps in addition to percentage caps, as long as average incentives are below the dollar caps, this is a reasonable assumption. Table 25 shows how incremental costs were calculated for each program.

TABLE 25: CALCULATION OF INCREMENTAL COSTS FOR PROGRAM LEVEL ANALYSIS

Program	Incremental Cost Calculation
New Construction	Assumes rebate equal to 50% of incremental costs per program plan.
C&I Retrofit	Assumes rebate equal to 50% of incremental costs per program plan.
Pay for Performance New Construction	Assumes rebate equal to 75% of incremental costs per program plan.
Pay for Performance	Assumes rebate equal to 50% of incremental costs per program plan.
CHP	Assumes rebates are equal to a program average of 50% for all eligible technologies.
Direct Install	Estimated at 1.15 times the incentive budget per TRC's 2011 program experience.
Large Energy Users Pilot Program	Assumes rebate equal to 75% of incremental costs per program plan.
Retro commissioning	Assumes rebate equal to 50% of incremental costs per program plan.

Program level results are shown in Table 26. Following the adjustments described above, all of the programs meet or exceed a TRC ratio of 1.0 except for the Pay for Performance New Construction Program. The Pay for Performance New Construction Program has a negligible impact of the overall portfolio since it accounts for slightly over 1 percent of total costs and less than 1 percent of total savings.

TABLE 26: C&I PROGRAM TOTAL RESOURCE BENEFIT-COST TEST RESULTS

Program	Category	Program Administrator's Levelized Cost of Saved Electricity ($/kWh)	Program Administrator's Levelized Cost of Saved Gas ($/Therm)	Total Resource Cost B/C Ratio- Electricity	NPV of Lifetime Gas Savings at Avoided Cost	Total Resource Cost B/C Ratio - Gas	Total Resource B/C Ratio - All
C&I Energy Efficiency Programs	New Construction	$ 0.0211	$ 0.6849	2.05	$ 342,741	1.45	2.03
	C&I Retrofit	$ 0.0308	$ 1.0009	1.22	$ 2,839,617	1.03	1.22
	Pay for Performance New Construction	$ 0.1391	$ 4.5244	0.25	$ 247,282	0.24	0.25
	Pay for Performance	$ 0.0172	$ 0.5596	1.47	$ 9,945,364	1.43	1.46
	CHP	$ 0.0137	$ 0.4459	1.03	$ 33,812,242	1.03	1.03
	Direct Install	$ 0.0306	$ 0.9948	1.79	$ 5,326,845	1.70	1.78
	Large Energy Users Pilot Program	$ 0.0148	$ 0.4821	3.23	$ 10,835,658	3.00	3.15
	Retrocommissioning	$ 0.0304	$ 0.9877	1.66	$ 481,272	1.18	1.51
	TOTAL C/I PROGRAMS	$ 0.0269	$ 0.5332	1.43	$ 67,181,874	1.32	1.40

Measure Level Analysis and Results

In addition to the program-level analysis, AEG also performed a measure level analysis. The New Jersey C & I programs include several hundred individual measures. In addition, there can be numerous variations of equipment sizes and types within individual measures, especially for lighting and HVAC equipment. AEG approached this task by first identifying the measure categories accounting for approximately 90% of the electricity and natural gas savings within the programs. Within each category, the most common individual measures were analyzed. This reduced the list to a total of 45 individual measures.

Each measure was characterized using the New Jersey Clean Energy Program Protocols. Measure characterization included annual estimated savings and measure life as defined by the Protocols. Incremental costs were estimated using several different sources, including technical reference manuals, cost databases, and other sources. This data was entered into a spreadsheet analysis tool to calculate levelized costs of saved energy and TRC ratios for each measure.

Since measure level economic performance was based on estimates of individual measure savings and incremental costs, the results are indicative, but not necessarily definitive, for each measure. For example, linear fluorescent lighting includes a very wide range of potential fixture, lamp and ballast combinations in retrofits and new construction, each having different impacts and incremental costs. For the purpose of this analysis, several of the most common types were examined. Similarly, HVAC equipment was evaluated using assumptions for average equipment size within categories, climate conditions and other variables.

Measure level results are shown in Table 28 below. The analysis of individual measures excludes program administrator's costs since these costs are typically analyzed at the program level as described above in the Methodology section. In all cases, the results are for a single installation of a measure, and should not be directly compared to the program level results. The measures identified below are used in the C&I Retrofit, New Construction and Direct Install Programs. These are primarily prescriptive programs and account for the majority of program activity and savings. The Pay for Performance, Large Energy Users Pilot and Retro commissioning Programs emphasize facility-wide analysis and were not analyzed at the measure level.

TABLE 27: MEASURE LEVEL RESULTS

		Calculated Levelized Costs of Saved Energy		TRC Calculations - Electricity	Total TRC
Measure Category	Measure	Program Administrator's Levelized Cost of Saved Electricity ($/kWh)	Program Administrator's Levelized Cost of Saved Gas ($/Therm)	Total Resource Cost B/C Ratio- Electricity	Total Resource B/C Ratio - All
Prescriptive Lighting Measures	T-12 to T-8 or T-5, New Fixture	$ 0.0074		11.00	11.00
	T-12 to T-8 or T-5, Retrofit Fixture	$ 0.0059		4.22	4.22
	T-8 Delamping and Reflectors with New Ballast	$ 0.0132		1.42	1.42
	T-12 to T-8 with Delamping, Reflectors, and New Ballast	$ 0.0059		3.89	3.89
	T-8 32 Watt to Reduced Wattage T-8 (28 or 25 Watt)	$ 0.0100		0.75	0.75
	LED Recessed Down Lights	$ 0.0171		3.08	3.08
	LED Parking Garage Luminaires	$ 0.0086		3.50	3.50
	LED Pole/Arm Mounted Area and Roadway Luminaires	$ 0.0268		1.31	1.31
	LED High Bay and Low Bay Fixtures for C & I Buildings	$ 0.0314		1.79	1.79
	LED Screw-based & Pin-based and Decorative	$ 0.0142		3.65	3.65
	Pulse Start Metal Halide	$ 0.0097		193.02	193.02
	Screw-In PAR 38 or PAR 30 CFL	$ 0.0037		47.86	47.86
Lighting Controls	Remote Mounted Occupancy Sensors	$ 0.0070		5.78	5.78
	Wall Mounted Occupancy Sensors	$ 0.0100		3.63	3.63
	HI-Lo Controls, High Bay Fluorescent or HID	$ 0.0376		1.22	1.22
Electric Chillers	Water Cooled < 70 Tons	$ 0.0160		1.40	1.40
	Water Cooled 70 to < 150 Tons	$ 0.0186		1.40	1.40
	Water Cooled 150 to < 300 Tons, Full Load	$ 0.0255		4.28	4.28
	Water Cooled 150 to < 300 Tons, Part Load	$ 0.0250		3.59	3.59
	Water Cooled >= 300 Tons, Full Load	$ 0.0104		6.38	6.38
	Water Cooled >= 300 Tons, Part Load	$ 0.0108		4.59	4.59
	Air Cooled < 150 tons	$ 0.0135		1.57	1.57
	Air Cooled >= 150 tons	$ 0.0328		0.53	0.53

		Calculated Levelized Costs of Saved Energy		TRC Calculations - Electricity	Total TRC
Measure Category	Measure	Program Administrator's Levelized Cost of Saved Electricity ($/kWh)	Program Administrator's Levelized Cost of Saved Gas ($/Therm)	Total Resource Cost B/C Ratio- Electricity	Total Resource B/C Ratio - All
Unitary Electric HVAC	Unitary or Split System <5.4 Tons	$ 0.1299		0.53	0.53
	Unitary or Split System >=5.4 Tons to <11.25 Tons	$ 0.1432		0.38	0.38
	Unitary or Split System >=11.25 Tons to <20 Tons	$ 0.1087		0.55	0.55
	Unitary or Split System >=20 Tons to <30 Tons	$ 0.0901		0.66	0.66
	Air-to-Air Heat Pump System <5.4 Tons	$ 0.1069		0.65	0.65
	Air-to-Air Heat Pump System >=5.4 Tons to <11.25 Tons	$ 0.0209		2.63	2.63
	Air-to-Air Heat Pump System >=11.25 Tons to <20 Tons	$ 0.0191		3.10	3.10
	Air-to-Air Heat Pump System >=20 Tons to <30 Tons	$ 0.0174		3.40	3.40
	Central DX AC Systems >30 to 63 Tons	$ 0.0963		0.31	0.31
	Central DX AC Systems >63 Tons	$ 0.1733		0.31	0.31
	Occupancy Controlled Thermostats	$ 0.0047	$ 0.1522	1.22	1.96
Variable Frequency Drives	VAV HVAC Fan Applications, 10 to <20 HP	$ 0.0107		5.04	5.04
	Chilled Water Pump Motors, 20+ HP	$ 0.0033		8.97	8.97
	Rotary Screw Air Compressors, 60 to 199 HP	$ 0.0035		12.85	12.85
Gas Heating Equipment	Gas Hot Water Boilers, <300 MBH		$ 0.2755		0.64
	Gas Hot Water Boilers, >=300 MBH to 1500 MBH		$ 0.2412		1.58
	Gas Hot Water Boilers, >1500 MBH to <=4000 MBH		$ 0.1413		1.54
	Gas Steam Boilers, <300 MBH		$ 0.2755		0.64
	Gas Steam Boilers, >=300 MBH to 1500 MBH		$ 0.2473		1.54
	Gas Steam Boilers, >1500 MBH to <=4000 MBH		$ 0.1861		1.17
	Gas Furnaces		$ 0.5210		0.86
Gas Hot Water	Gas Hot Water Booster Heaters, <=100 MBH	$ 0.0150		3.17	3.17
	Gas Hot Water Booster Heaters, >100 MBH	$ 0.0109		5.27	5.27

Several observations can be made from the measure level analysis:

- Within the lighting measures, only standard T-8 to high performance T-8 lighting does not pass the TRC test. This is because the savings from this type of conversion are relatively small in comparison to the incremental costs.
- T-12 lighting measures are generally very cost-effective at this time. Given the expected shifts in baseline from T-12 to standard 32 Watt T-8 lighting beginning in 2012, savings will decline, but the individual measures are expected to remain cost-effective. At this time, the New Jersey Protocols do not account for this baseline shift.
- Pulse start metal halide lighting has an extremely high TRC benefit-cost ratio. This is because the incremental cost of pulse start technology is nearly zero in most cases. Consideration should be given to eliminating incentives for this measure.
- Like pulse start metal halide, CFL replacements for common incandescent lighting may no longer need to be incentivized. They are already highly cost-effective in the C & I sector, and the same baseline shift that applies to T-12 lighting will also take effect this year for incandescent lighting. The new baseline will become CFLs, although some specialty lighting could still be included in the program.
- High efficiency water- and air-cooled electric chillers are mostly cost-effective, although larger air-cooled chillers do not appear to be cost-effective due to the lower avoided cost benefits, and the higher incremental costs of these chillers.
- Unitary HVAC equipment measures for cooling applications are generally not cost-effective. Unitary heat pumps are cost-effective, except for the smallest systems. Cooling-only applications yield savings only during the cooling season, while heat pumps accumulate savings throughout the year. Since the incremental costs for these systems are basically the same, the higher savings from heat pumps help to offset the incremental costs. In addition, the differences between larger high efficiency and standard efficiency unitary HVAC equipment are typically small, making it more difficult to acquire meaningful savings within this group of measures.
- Gas space heating equipment is cost-effective except for small furnaces and boilers. In the case of furnaces, the new federal standard of 90% AFUE was applied, which reduces the potential savings in comparison to the old standard of 78% AFUE.
- Motors were not specifically analyzed since they account for a very small portion of overall program savings. However, federal legislation has made the NEMA Premium Efficiency standard the new baseline for the most common induction motors. The current program provides an incentive for upgrading from the former NEMA Standard Efficiency to Premium Efficiency. Because of the change in the baseline, incentives are no longer required to encourage the use of NEMA Premium Efficiency motors.

C&I Program Observations

The following observations combine the results of the C&I program and measure level analyses:

- The cost effectiveness of the C & I Retrofit program is highly influenced by lighting measures, which account for approximately 50% of total electricity savings. If a baseline shift is incorporated for T-12 lighting, overall savings will decline, and will have an effect on the overall portfolio.
- Although many unitary electric HVAC equipment measures are not cost-effective, they account for less than 5% of program savings. While these measures have a relatively small impact on savings, the overall costs of incentivizing and managing this part of the C & I program should be examined more closely. While it may be desirable to include these measures in order to provide comprehensive offerings, they should not consume

disproportionate resources. These measures appear in the C & I Retrofit, New Construction and Direct Install programs. Cost-effectiveness in this analysis assumes that the units are "replace-on-failure." One way to improve cost-effectiveness is to encourage early retirements of unitary HVAC equipment, which increases the savings that can be claimed without additional cost. Since differences in equipment efficiency are generally small, reconfiguration of the HVAC program should also consider emphasizing better controls, operations and maintenance.

Qualitative and Quantitative Assessment of Energy Savings Potential

The analyses performed by AEG indicate that adjustments may be necessary in the New Jersey Clean Energy Programs. The programs are currently cost-effective at the portfolio level, but some changes are probably warranted to account for shifts in baselines and market conditions. In addition, program implementation strategies, marketing approaches and other aspects of program administration and delivery may be ready for modifications. However, any changes should be part of an overall strategic review that includes, but is not limited to, cost-effectiveness.

Program portfolio planning can be viewed as a sequence of steps beginning with a review of fundamental statutory and regulatory requirements and strategic priorities. Once these are established, other constraints can be applied leading to more detailed program selection, program design, measure selection, marketing, and finally implementation.

The strategic framework is necessary to insure that individual programs and measures are balanced in a way that supports key objectives. The following table is an illustration of how different types of programs address different strategic priorities. For example, if short-term cost-effective energy and demand savings are the top priority, emphasis can be placed on residential lighting and C&I programs. On the other hand, market transformation may require including programs and measures that are not necessarily cost-effective in the short run, but can be justified by longer term changes. Strategic planning is also not static. As programs help to transform the market, periodic evaluation of priorities, program designs, measures, and delivery should be done.

TABLE 28: ILLUSTRATION OF RELATIONSHIP BETWEEN STRATEGIC PROPERTIES AND PROGRAMS

Strategic Priority	"Whole House" Residential Program	Residential Lighting	Appliance Recycling	Appliance Rebates	C&I Prescriptive and Custom	Financing	Education and Awareness
Energy and Demand Savings	Medium	High	High	Medium	High	*	Low
Breadth of Participation	Medium	High	Medium	High	Low	Medium	High
Self-Sustaining Funding	*	Low	Low	Low	*	High	Low
Job Creation	High	Low	Low	Low	Medium	*	Low
Market Transformation	*	Medium	Low	Low	*	*	Low
Brand Identity and Awareness	Medium	High	Low	High	Low	*	Medium

* Indicates a range of potential depending on design

The program and measure level analyses provide a "snapshot" of the estimated economic performance of the residential and C & I energy efficiency portfolios based on 2012 program plans submitted by Honeywell and TRC. The current program plans represent the accumulated experience and expansion of programs that were originally designed several years ago, and are not necessarily optimized for current conditions. While they are cost-effective at the portfolio level there is room to improve them.

From a strategic planning perspective, several points should be considered in the proper context before programs or measures are modified:

- Excessive emphasis on cost-effectiveness could bias programs towards short-term savings and result in lost opportunities over the long term. Emphasis on short-term cost-effective savings is already embedded in the portfolio through residential and C & I lighting incentives, which account for a very large share of portfolio savings.

- Cost-effectiveness is only one consideration for participants. Participants rarely view cost-effectiveness in the same way as policy-makers and program administrators. For this reason, it is important to keep in mind that measures that are not currently cost-effective may address other participant needs. Similarly, measures that are highly cost-effective, and do not appear to require incentives, may face other barriers that prevent their adoption, and delivery methods and marketing strategies may need to be shifted in order to transform the market.
- Even though an individual measure may not be cost-effective, it may help achieve other strategic goals and policy objectives, including the development of contractor and supplier infrastructure, long-term market transformation, comprehensive program offerings, economic development, and job creation.
- Strategically, it is appropriate to use short-term, cost-effective measures to leverage longer-term savings, especially if they help achieve other goals.

Approach to Scenario Analysis

AEG conducted a set of scenario analyses estimating potential savings from a variety of future energy efficiency programs and activities. AEG's approach to planning is summarized in the following points:

1. **Compare Programs against Strategic Priorities**: Since the current program portfolio has evolved over several years, it is important to first evaluate the portfolio at a high level against strategic priorities as described above.
2. **Protocol Revisions**: Cost-effectiveness and program design are influenced by policies and statutory requirements at the federal level. The current New Jersey Protocols do not yet address significant changes in baselines for common lighting and HVAC measures that are about to be implemented nationally. In these two instances, a majority of the portfolio savings for both gas and electricity come from these measures. Premium Efficiency motors have also become the new baseline for energy efficient motors. With the possible exception of early retirements, incentives may no longer be needed for Premium Efficiency motors. The first step in addressing program and measure adjustments is to ensure that the Protocols reflect the most current standards[14].
3. **Detailed Participation and Impact Review**: New Jersey's incentive programs are heavily weighted toward prescriptive rebates. AEG's analysis indicates that a relatively small percentage of the hundreds of available measures, especially in the C & I sector, account for the majority of overall savings. There are also individual measures have little or no participation. We recommend evaluating all of the currently available measures to determine if participation levels and savings warrant continuation of these measures.
4. **Evaluate Program and Measure Delivery**: New Jersey's efficiency programs are organized along traditional lines of delivery. Most of the impacts and participation occur in the traditional rebate programs for individual measures implemented by participants or their contractors. Program delivery methods should be examined to insure that measures are being properly targeted and effectively delivered. For example, measures such as CFLs are offered under a rebate program in the C & I sector. CFLs have been widely adopted in the C & I sector, are already highly cost-effective, and in many applications do not need to be incentivized. However, within the C & I sector, there are many small businesses that have not adopted the technology in spite of its cost-effectiveness. In this case it may make sense

[14] The protocols are in the process of being updated to reflect the forthcoming changes in federal standards.

to discontinue incentives for CFLs under the traditional rebate program, but allow them to be included in the Direct Install Program to target small businesses. Another example is related to measures with low participation rates. Variable speed drive air compressors appear to be highly cost-effective, and many applications may not need incentives. However, a prescriptive incentive may not be the best approach to incentivizing efficient compressor systems. Instead, a custom analysis would provide appropriate incentives when economically justified, but avoid paying incentives when they aren't necessary.

5. **Residential HVAC Program Redesign**: The current Residential HVAC program emphasizes incentives for equipment replacements upon failure. In the residential sector, the strong emphasis is on SEER 16 or higher air conditioning units and 95% AFUE furnaces. These measures also account for large portions of the Residential Program budget. Shifts in the federal baselines mentioned above significantly reduce the savings from these measures in comparison to the incremental costs – essentially, the market has been transformed through federal action. Program adjustments should be considered including shifting to an early retirement program that offers incentives for the removal of functioning inefficient equipment. Early retirement programs allow capturing savings that would ordinarily be lost when equipment is replaced upon failure. Other changes could include bundling more cost-effective measures with unit replacements. As air conditioning and heating equipment efficiency standards have increased, incremental savings are becoming smaller and less cost-effective. Measures that encourage maintaining savings over the long term through better installation and maintenance practices can help to partially offset savings lost due to shifts in baseline equipment standards. Other measures such as ventilation heat recovery may also warrant consideration. In addition, two-way broadband communications technologies have made it possible to optimize efficient equipment operation remotely, and offer significant potential in the residential sector.
6. **C & I HVAC Program Redesign**: The challenges facing the Residential HVAC program also face the C & I HVAC program, and similar recommendations apply. However, there are two opportunities to emphasize controls, maintenance and other non-equipment measures by integrating these measures more completely into the Direct Install program and the proposed Retro commissioning Program. In the case of the Direct Install Program, it would have to be redesigned to emphasize these types of measures.
7. **Home Performance Program Redesign**: New Jersey's Home Performance Program is not currently cost-effective and should be redesigned to capture more cost-effective savings. First, the program is structured in two tiers based on the level of energy savings. The highest tier is much less cost-effective than the lower tier since incremental costs increases rapidly but yield marginal benefits. The program also emphasizes measures with high marginal costs, and excludes many high-impact, low-cost measures. We believe that the program should be reevaluated to find opportunities to include high impact, low cost measures that can be cost-effectively delivered and can be used to help leverage other more costly measures.

Proposed Modifications

Based on the above, AEG incorporated the following suggested program modifications to determine the overall impact of costs and savings:

- Eliminate Tier 2 clothes washers in both markdown and upstream incentive programs.
- Convert SEER 16 A/C and heat pump units to an early retirement program. Reduce participation goals by approximately half.
- Eliminate ground source heat pumps.

- Eliminate solar DHW for both electric and gas applications.
- Covert 95% AFUE gas furnaces to an early retirement program and reduce participation goals by half. Adjust savings to account for the new federal baseline.
- Eliminate water heaters.
- Eliminate drain water heat recovery.
- Increase participation in the boiler controls program by a factor of ten and reduce incremental costs to scale the program up and to piggyback on the existing boiler incentive program which could quickly incorporate additional boiler controls cost-effectively.
- Add a Tier 1 Direct Install program to the HPwES Program, including measures such as CFLs, shower heads, and other low cost/high impact measures. The measures can be delivered free-of-charge to HPwES participants. Additional costs would be measure costs since contractors would already be visiting the homes to promote the Tier 2 program.
- Eliminate the Tier 3 HPwES program since its cost-effectiveness is poor and the budget was large.

The following table summarizes the impacts that the proposed modifications have on program budgets, savings and the overall cost effectiveness of the programs. Of note, program cost effectiveness, based on the above suggested modifications increases from a TRC of 1.30 to 2.06 for the residential portfolio. No proposed modifications for the Commercial/Industrial programs were analyzed since the program portfolio is already reasonably cost effective.

TABLE 29: POTENTIAL IMPACT OF PROPOSED MODIFICATIONS

Program	RESIDENTIAL		COMMERCIAL/INDUSTRIAL
	Current Program	Reduced Program	Current Program
MWh	280,971	275,715	355,673
MMBTU	598,785	518,937	963,062
Lifetime MWh	1,942,062	1,812,481	5,584,392
Lifetime MMBTU	11,759,893	10,191,118	13,493,409
Incentives Budget	$73,224,456	$42,381,816	$129,495,486
Total Program Delivery Costs	$15,890,702	$16,490,702	$ 8,325,501
Program Administrator's Levelized Cost of Saved Electricity ($/kWh)	$0.0097	$0.0071	$0.0269
Program Administrator's Levelized Cost of Saved Gas ($/Therm)	$0.1367	$0.1564	$0.5332
NPV of Lifetime Electricity Savings at Avoided Cost	$131,010,413	$116,059,835	$264,860,987
Participant Incremental Cost Electric Measures	$55,224,570	$32,497,400	$179,165,510
Total Resource Cost B/C Ratio-Electricity	2.07	2.86	1.43
NPV of Lifetime Gas Savings at Avoided Cost	$50,010,169	$42,838,986	$67,181,874
Participant Incremental Cost Gas Measures	$68,256,650	$28,315,900	$49,073,595
Total Resource Cost B/C Ratio - Gas	0.66	1.19	1.32
Total Resource B/C Ratio - All	1.30	2.06	1.40

Recommendations

New Jersey's programs were built on a strategy of targeting specific equipment components and paying incentives for exceeding baseline efficiency standards. "Cheap" savings from incandescent lighting and low efficiency furnaces, for example, made it easier accumulate savings quickly and to support less cost-effective measures at the program and portfolio levels.

But, baselines for common equipment, especially for lighting, air conditioners and furnaces, have changed recently or will change significantly in the very near future. In essence, new federal standards displace incentive programs for market transformation for the affected measures.

New Jersey's programs are heavily weighted towards the inexpensive savings that could be acquired under earlier equipment efficiency standards. With the changes in standards, incremental savings from equipment replacements are more difficult to achieve. Equipment replacement measures have to become much more targeted, and new measures and strategies must be incorporated to continue to acquire meaningful savings. At the programmatic and measure level these actions may include:

- Cutting stand-alone measures with low incremental savings and high incremental costs.
- Targeting measures to specific market segments to insure that resources are being applied most efficiently.
- Bundling lower and higher cost measures to improve overall cost-effectiveness.
- Encouraging early retirements to accelerate installation of new equipment meeting or exceeding the new federal standards.
- Evaluating new technologies to maximize the performance of new, more efficient technologies.
- Emphasizing proper installation to avoid lost opportunities.
- Emphasizing maintenance and operations measures to avoid erosion of savings over time.

In addition to these possible actions, the ideas of "market transformation" and cost-effectiveness should be re-evaluated to ensure that measures, programs, goals and budgets are in alignment.

Residential Portfolio Recommendations:

- **Evaluate new components of the Energy Efficient Products Program**. The Energy Efficient Products Program includes several new components that will test upstream incentives for appliances and several new products. While these account for a relatively small portion of the budget (approximately 15%), we recommend better analysis and support for these pilot programs and measures. Honeywell's proposed plan did not provide much of the information needed to track and evaluate these pilots. New products did not have supporting incremental cost or market analysis to justify why these new products and delivery mechanisms were important.
- **Convert the Residential HVAC Program's largest electric and gas measures to early retirement rather than replace on failure**. Changes to Federal minimum efficiency standards for air conditioning, heat pumps and furnaces make incremental savings small in comparison to the old baselines. Shifting to an early retirement program may improve cost-effectiveness and reduce incentive budgets by reducing participation.

- **Bundle HVAC incentives with low-cost/non-cost measures to improve cost-effectiveness**. Bundling low-cost/no-cost measures such as air-sealing, Quality Installation Verification, and other measures could be required as a way to improve cost-effectiveness in the HVAC program. Participants would be required to include these measures if they wish to take advantage of a rebate. This will create some additional barriers to participation, but may improve overall economics.
- **Include maintenance, tune-up and controls measures**. Residential HVAC tune-up measures may help to capture savings at much lower costs and de-emphasize equipment component replacements.
- **Review the remainder of the Residential HVAC portfolio and eliminate pilot or test measures that cannot pass the TRC**. These measures may be needed to maintain a comprehensive program, but low participation may not justify including them. Upstream incentives and other pilot measures should be reconsidered until the HVAC Program can be reconfigured to achieve overall cost-effectiveness.
- **Consider a direct install component in the Home Performance with ENERGY STAR Program**. This program is not currently cost-effective because it emphasizes measures with high incremental costs in comparison to similar programs. We recommend that the HPwES Program consider including a first tier of high impact, low cost measures, such as lighting and measures that conserve both water and energy that could be delivered as a direct install component of the program and help leverage down the costs of more expensive envelope and mechanical measures in other tiers. The third tier of the program should also be considered for elimination since participation is low and incremental costs increase rapidly at this level. Overall incentive levels in New Jersey are also high in relation to other programs and should be reviewed.
- **Consider other measures that could improve cost-effectiveness using new technologies**. New programs should be explored that take advantage of two way communications capabilities over the Internet to control thermostat settings for energy efficiency purposes. Programs like this are being run on a pilot basis and are promising as relatively low-cost ways to save energy.

C&I Portfolio Recommendations:

- **Detailed participation and impact review**: A relatively small percentage of the hundreds of available measures in the C & I account for the majority of overall savings. All of the currently available measures should be evaluated to determine if participation levels and savings warrant continuation of these measures.
- **Evaluate program and measure delivery**: New Jersey's efficiency programs are organized along traditional lines of delivery. Most of the impacts and participation occur in the traditional rebate programs for individual measures implemented by participants or their contractors. Program delivery methods should be examined to insure that measures are being properly targeted and effectively delivered. Where appropriate, measures that no longer need incentives in tradition prescriptive programs should be eliminated, and others should be shifted to custom.
- **Re-evaluate the C & I HVAC measures and program**. Many unitary electric HVAC equipment measures are not cost-effective. They account for less than 5% of program savings, but the overall costs of incentivizing and managing this part of the C & I program should be examined more closely. While it may be desirable to include these measures in

order to provide comprehensive offerings, they should not consume disproportionate resources. These measures appear in the C & I retrofit, new construction and direct install programs.

- **Consider shifting C & I HVAC to early retirement**. Cost-effectiveness in this analysis assumes that the units are "replace-on-failure." One way to improve cost-effectiveness is to encourage early retirements of unitary HVAC equipment, which increases the savings that can be claimed without additional cost.
- **Include maintenance, tune-up and control measures**. There are two opportunities to emphasize controls, maintenance and other non-equipment measures by integrating these measures more completely into the Direct Install program and the proposed Retro commissioning Program.

Market Analysis

The market analysis provides the perceptions of the interviewed market actors concerning how effective each program is in meeting its' goals and will aid in improving market uptake by addressing specific market actor concerns. Market actors are companies that deliver program related services, including Program Managers, contractors, distributors, equipment manufacturers and retailers who focus on market-driven activities. By becoming aware of the current issues and concerns that these respective market actors have, corrective action and improvements that can be made across the program portfolio in order to better target customers, increase participation and improve the overall impact of each energy efficiency program.

The analysis consisted of interviews with a diverse group of market actors that focus on market driven activities for the NJCEP. The assessment includes an analysis of the following programs:

- Direct Install (DI)
- Home performance with Energy Star (HPwES)
- Residential New Construction
- SmartStart Buildings (Commercial/Industrial – New Construction & Retrofit)
- Local Government Energy Audit (LGEA)
- Pay-for-Performance (P4P)
- Energy Star Products
- Residential HVAC – Warm and Cool Advantage

Methodology
A representative group of 28 Market Actors were selected for on-site interviews. Of that group, a total of 16 on-site and 12 telephone interviews were scheduled and conducted. Appointments were scheduled and confirmed prior to interview dates. Two separate interview guides were created using open-ended questions that facilitated discussions (See

Appendix B: Program and Trade Ally Interview Guides – Program Manager and Trade Ally Guide). The responses to the interviews are summarized in this report. Topics addressed include overall satisfaction, marketing efforts, delivery, concerns, and improvements.

General Conclusions
Most of the Market Actor responses trended toward the following conclusions:

- Believe that the programs are successful in delivering energy efficient measures.
- Programs have helped their companies grow.
- Measures are fairly incentivized.
- Uncertainty of programs' longevity is preventing them from creating long-term business plans.
- State marketing efforts are insufficient, resulting in the use of their own resources to market the programs.
- Rebate payment processing time is excessive.
- Burdensome and/or redundant paperwork processes increase cost to the contractors, since they have to hire more resources to handle it.
- Electric wholesale distributors participate in the SmartStart Buildings program. However, they felt the program structure favored consumer delivery channels rather than distributors. They cited no interaction with market managers and indicated that any knowledge they have of the NJCEP is self-obtained via the internet.

Interview Results

Program Managers
Program managers are responsible for the implementation of the programs administered and created by the Office of Clean Energy. In general, the Program Managers were pleased with the programs; however, they agreed that certain processes could be enhanced to improve their efficiency. Uncertainty in the market hurts programs. More consistency is the key to the programs' success.

Since their inception in 2006, the programs have vastly improved. The State has been successful in implementing effective programs, and where measures haven't been effective, they have been changed or eliminated. The State has done a great job in reaching Renewable goals. New Jersey has introduced some of the best programs; however there are some systemic "tweaks" that could be made in order to help the processes run more efficiently. Program-wide studies would help evaluate how to better use State funding. With further research, the State might find that some programs are more effective than others.

The Direct Install program is more successful than the others because of the incentives offered. The program is designed for the customer, not the trade allies. Last year, it was highly successful since ARRA money allowed for free jobs to be performed for municipalities. SmartStart programs are consistently more successful for the Trade Allies. They applaud the State for being nationally recognized in what they do with energy efficiency. They believe there is a great interest in the programs and they do not see them going away. Participation has been steadily increasing, and they do not foresee any decreases. At some point in time, some programs might go away because there will be no more customers to serve, for example, Local Government and Pay-For-Performance - New Construction. There is not a lot of New Construction which is a function of the economic climate.

According to one of the Program Managers, "a simplified accounting system to transfer funds from one entity to another would make for a quicker and easier payment process." The current structure does not allow for any flexibility with payment and can take up to several months to receive payment. For larger companies, this is not as big of an issue; however, small companies may not have the financial means to wait so long for payment. Having such a long rebate process time might put some of the trades out of business, or prevent them from participating at all. Second, it is difficult to plan and budget the programs on an annual or month to month basis. The programs were designed to get the trades involved, and in this, they have succeeded. The Program Managers and trade allies would be able to create better business plans if the contract had more longevity. By implementing a long term contract, it would be easier to allocate money for better marketing and hiring more staff.

Customer satisfaction is overall very good, but the processes take too long. Customers end up having to wait too long for inspections and paperwork is difficult for them to fill out. The required amount of paperwork for the trades is a "double edged sword". In most cases, additional employees had to be brought on board just to process the paperwork. Paperwork ensures that the program's money is being spent properly; but there should be more efficient ways to deal with it. Perhaps this could be accomplished through online enrollment, electronic communication, scanning documentation versus sending hard copies and creating a contractor portal to view the status of rebates.

The State currently has a much smaller marketing budget than in previous years. Marketing of the programs is imperative for continued success. The Board of Public Utilities (BPU) should market the overall brand and identities of the New Jersey Clean Energy Programs through the website, brochures, radio and speaking engagements. Tactical marketing should flow down to the Market Actors in order to educate the population and meet program participant goals. This can be done through:

- Outreach and education
- The NJCEP website
- E-mails
- Direct mail
- Radio
- Networking and trade shows

Program Managers have found that referrals tend to be the best way to get the word out; and direct mail alone is generally ineffective. "One-size does not fit all" when it comes to motivation. Different sectors have different needs and they need to be reached in different ways; for example, schools and pharmaceutical companies.

The Program Managers are very dependent on the trades to market the programs. Trades have proved to be extremely active and successful in promoting their respective programs. There are always early adopters of the programs; however it is imperative to provide education for the large percentage of people who are still not aware. Joining forces with the utilities in order to get the word out on the programs would be the most effective way to increase program participants.

In addition to consumer education, there needs to be more customer and trade motivation. According to the Program Managers, the programs are fairly incentivized. The incentives are successful in covering the incremental cost from making the switch from standard to energy efficient equipment. If the programs were made easier to get into, it would be better for customers, but at the same time the Program Managers understand the need for rules and requirements. There is word that the State wants to move away from rebates and move toward financing. Customers do not have an "appetite" for financing, and in the current economy, many might not even qualify. If financing is implemented, it needs to be carefully done or it could lead to a decrease in the marketplace.

The number of participating Trade Allies is increasing, but there are more out there that need to be reached. If they were made aware of the available State funds, it would benefit them, but they need more education on how to participate. Smaller trade allies don't have the resources to commit to the amount of paperwork that needs to be submitted for each job. The Program Managers encourage communication with the trades and provide them with updates to the program and updated tools. There is also a fair amount of training provided for the trades. Some of them are also very involved in BPI and BPI standards and offer training courses. Honeywell offers free training courses and sends out representatives to train on the benefits of Energy Star products. There are seminars that educate municipalities in the programs.

The Program Managers believe that if there was more certainty in the market, they would be able to put together a more efficient long term plan. The program process could be simplified, but they have learned to streamline the amount of paperwork into a system that works for them. The Quality Control system is redundant, since their work is often being double checked and, according to them, it should be modified.

The biggest concern of the Program Managers interviewed is the issuance of the new Request for Proposals (RFP) that the State plans to put out. It has led to uncertainty in the marketplace that has both the Program Managers and Trade Allies worrying whether or not the programs will still exist in the future. If they had more consistency, it would lead to better planning by both the Program Managers and the trade allies.

Home Performance with Energy Star (HPwES)

The Home Performance with Energy Star program offers residential customers a comprehensive, whole-house energy saving opportunity via a home energy audit and post-assessment recommendations. Customers can then take advantage of different incentive levels including rebates and zero-interest financing options, depending on what recommendations or measures are implemented. Although there are a few important issues that may need to be addressed, the overall outlook of the participating trade allies interviewed is that HPwES is in fact successful and contributes to a considerable portion of their business.

Overall, the trade allies are satisfied with the current state and progress that the HPwES program has made. Two of the five trade allies interviewed stated that the HPwES program accounts for 60% and 80% of their business, respectively. Some of the program's strengths include:

- Its effectiveness in a whole-house approach to saving energy.
- The zero-interest financing options.
- The comprehensive and measure inclusive structure of the program.

In addition, all trade ally interviewees were very satisfied with the ease of communication and responsiveness received from the program implementation staff. All questions and concerns have been immediately answered and no trade ally reported any major problems getting their issues addressed.

In regard to contractor training, interviewees reported that they were generally satisfied but that there was definitely room for improvement. Webinars and sales training has proven to be helpful in the past, but some trade allies felt that more or better training is necessary while others felt it is more than adequate and sufficient.

Although there were a number of improvement suggestions and issues with the program, the primary grievance reported by all interviewees is the slow payment schedule and extended amount of time it takes for them to receive rebate payments. Many reported specific instances where a large sum of money was owed as a result of a compiled amount of projects that they never received payment for. One trade ally claims that there is a lack of program participation because most contractors do not want to wait to receive such slow payments. Another stated that in the instance of several simultaneous projects being worked on, the slow turnaround can affect their cash flow and overall business. Generally, everyone interviewed was dissatisfied with the payment schedule.

The level of marketing and customer awareness was also a major concern and source of dissatisfaction brought up by all interviewees. All felt that there was a significant lack of customer awareness and marketing being done to support and increase the participation of the HPwES program. More than one trade ally reported that they constantly need to ask for brochures, all of them do their own marketing and advertising and little to none of their customers actually result from any type of marketing done by the NJCEP, including the website. Leads are generated through customer referrals or their own marketing strategies. Also, with the exception of one trade ally who felt the website was user-friendly, all others stated that the NJCEP website was too complicated, poorly structured and difficult to navigate or find information in.

The lack of marketing has led trade allies to categorize it as a barrier to customer participation. In addition, the following were also listed as barriers:

- A lack of program understanding and the significance of pursuing a whole-house approach.
- The requirement for BPI Accreditation - many contractors don't want to pay the associated fees to become accredited.
- The extensive paperwork required for project processing.
- Credit approval for financing – no flexibility for untraditional customers.

When asked for improvement suggestions or things that needed to be addressed, all of the interviewees had useful recommendations such as:

- The need for more effective program advertising through newspapers, television, direct mail, newsletters, etc.
- Simplify the application process and lessen the amount of paperwork.
- Improve website navigation and user interface.
- Although incentive levels were reported as being fair, increasing them and eliminating out of pocket customer expenses will increase participation.
- Expand measure scope by including appliances, LEDs or CFLs.
- Improve rebate processing procedure for faster turnaround.

Direct Install (DI)
NJCEP's Direct Install program is geared toward helping small to medium-sized business customers save energy by replacing inefficient lighting, HVAC, refrigeration and other operational equipment. The program covers up to 70% of the retrofit costs with a $75,000 cap per project. Overall, all of the trade allies interviewed were either satisfied or very satisfied with the NJCEP Direct Install program, reporting that the program has contributed to a large part of their business growth. The program's strengths include:

- The 70% project incentive which greatly reduces the payback period for projects.
- Ease of customer participation.
- Turnkey program.
- Program accomplishes what it intends to do, saves energy for small business customers.

The DI program has become extremely effective as contractors are able to easily explain the provisions of the program to customers, convince them of the benefits, perform an assessment and immediately start the implementation process.

When asked about training, most trade allies reported that they have either done no training or there is very little training offered. This may or may not be due to the simplicity of the program. In regard to communication, however, all were very satisfied with the level of communication and responsiveness received from the Program Manager. One trade ally had a concern with the Program Manager, stating that project approval time was too long (3-4 weeks), yet no other interviewees' reported this as being an issue.

The lack of customer awareness and marketing continues to be an area of concern for the trade allies. They often do their own marketing ranging from newspapers to the door-to-door approach, which isn't always very effective due to customer skepticism. If the state improved their marketing,

the resulting customer leads would be much more likely to follow through and participate in the program. The website was also unanimously reported as being difficult to navigate, complaints have resulted from customers not being able to find information and there is no explanation for the benefits of installing lighting, HVAC or other energy efficiency equipment. One trade ally specifically suggested that the T12 mandate be posted on the website to inform and influence customers to replace their current lighting measures.

According to the trade allies that were interviewed, there are a variety of areas where the program could use some improvement. For example, many pointed out that there are no exceptions for missing equipment sizes, downsizing or certain lighting fixtures that don't fall under the program scope, which in reality should be "no brainers." Other trade allies wish to replace fixtures but are restricted by the program to re-lamp and re-ballast only. Other issues for concern brought forth by the trade allies include:

- There is a direct conflict with the PSE&G Direct Install program which offers customers an 80% project cost incentive.
- The ability to perform oil to gas conversions.
- The 150 kW cutoff creates a gap between the customers who are too big for DI but not willing to participate in the P4P which is too costly/burdensome.
- The need to obtain a 12 month billing history can delay a sale and become a burden.
- Tax clearance forms often expire before rebates are issued.
- Although it is required by law, Prevailing Wage significantly increases the cost for the contractors.

The biggest reported hindrance of program growth is due to the uncertainty in the longevity of the program's existence. Monthly or quarterly contract renewals are very restrictive in the sense that trade allies cannot plan for the long term or commit to any resources or long term projects that would dramatically promote business growth and program participation.

There were several suggestions for program improvements including:

- Simplifying or decreasing the amount of paperwork would be helpful for smaller entities that are unable to hire additional staff members to keep up with it (i.e. 6 months of utility bills instead of 12.
- State or utility provided customer list would be a tremendous help for targeting potential leads.
- Improve rebate processing procedure for faster turnaround.
- Direct mail and emails to customers are very effective marketing strategies that should be utilized.
- At an 80% incentive level, the trade allies were successful with almost every lead, they received an overwhelming response and everyone was willing to participate.
- Financing for the 30% would be extremely helpful for customers who cannot afford to pay the costs upfront – further increasing participation.
- Missing measure suggestions: LEDs, 2-lamp fixtures, option to downsize oversized equipment, gas heating measures.

Residential New Construction

Two companies were interviewed on the Residential New Construction program. Generally, they were satisfied with the program and what it does from an efficiency standpoint. They agree that

the programs are fairly incentivized, but would like higher incentives for higher performance. A majority of one companies' work comes from the NJCEP while the other receives about 10-20% of their work from them. The Residential New Construction program's strengths come from the:

- Incentives it provides.
- Energy savings.
- Energy Star product requirements.
- Quality assurance from the Program Managers.

While much of their business is derived from the NJCEP, the first company reported some flaws in the system that they would like to have addressed. Due to the Program Manager's disorganization, they were forced to re-submit 75% of their paperwork. Out of approximately 1,200 rebate applications, over 1,000 are still unpaid from 2011. They have had no response after inquiring several times on the status. Turnaround time for rebates needs to be much faster. In addition, constant program changes cause inconsistency and thwart maturity of the market. A smooth, clear system should be implemented to address program additions and changes. Marketing for the program is also insufficient. The site signs and brochures handed out by the State have not helped their business. In order to educate consumers and increase participation, they need to be educated and aware of what programs are out there. They use their own marketing techniques which includes, joining builders associations, networking and word of mouth.

The program can be improved in several ways.

1. Simplify the overly burdensome paperwork process.
2. Minimize the redundancies in the QA/QC process.
3. Eliminate the requirement that Energy Star homes be built in a "Smart Growth area" in order to receive rebates.

The second company had minimal contact with the Program Manager, but when the need was there, an answer was easy to attain within one or two phone calls. The paperwork needed from them is reasonable; however they suggest adding an online portal to eliminate physical paperwork.

Both companies agree that without the Residential New Construction program, their sales would be significantly lower. Overall, the program offers great incentives and energy savings, but could be significantly better if some processes were improved. The main issues they encountered had to do with the new requirements (Version 3) that commenced in January 2012. Prior versions had fewer requirements and were easier to work with. Since starting the new version, customers don't always break even with incentives. Some examples of the changed requirements mandated by the EPA are:

- Supply air level
- Extensive reports
- Additional checklist items per unit
- Additional level of insulation (in their opinion, this is not a necessary measure)

The builders are complaining that per unit costs of the energy efficient requirements from Energy Star are causing an increase in their costs. The earlier requirements cost builders less money. Higher incentives for higher performance of equipment would also be beneficial.

Both companies have had sufficient training to become certified. One of the contractors offers BPI training that competes with the NJCEP training. They also participate in monthly EE meetings

where they offer opinions as to the direction of the program options. Training was made available to the other company to become an open rater. The two companies are BPI certified.

Overall, the Residential New Construction program is effective. With the implementation of an easier and more efficient process, the market for customer participation would increase. As the market improves, more affordable green projects will be available.

SmartStart Buildings (Commercial/Industrial – New Construction & Retrofit)
Three contractors interviewed on the SmartStart Buildings program had generally positive feedback regarding the program. They view the program as beneficial overall, especially for ratepayers. The program's simplicity gives it a competitive edge over the other NJCEP programs, while making buildings more efficient. Program Managers have been responsive in addressing questions and concerns. If marketing efforts were increased, customer awareness and participation would increase. All three agree there are some procedural issues that hinder the completion of projects.

These companies reported having excellent communication with the Program Managers. They feel that they are always available to address questions and concerns. When possible, they are willing to change, but there are some situations they cannot bend on.

One of the companies referred to themselves as a "one man show". They rely on repeat and large customers to keep them busy. Since marketing from the State is minimal, they take matters into their own hands. Some marketing tactics used are:

- Word of mouth
- Advertising brochures
- Email blasts
- Sales calls

The companies agree sales have increased; however, there is no evidence that they have received new business because of the SmartStart programs. Two of the three companies consider the paperwork burdensome, but they've learned to manage it.

The companies agree that customers will replace equipment with or without incentives, but feel that the programs are fairly incentivized. One of the main issues seen by the companies is the length of time it takes for customers to receive their rebates. It can take anywhere from 2 to 6 months to receive the rebates. Tax clearance certificates are also a significant barrier in customer participation. The customer has to apply for a certificate ($75) through the state to certify that they do not owe taxes before they can receive a rebate. This process takes up a lot of time and expires after 90 days; which often times is not enough time to get through the entire rebate process. Tax rebate forms can sometimes be a deal breaker. If the process could be simplified, more customers would participate in the SmartStart programs.

Two electric wholesale distributors were interviewed. Both companies focus their business on commercial and industrial customers and electrical contractors. Both distributors were aware of the NJCEP programs in general and have more detailed knowledge of the SmartStart initiative. Both companies do not participate directly in the program; rather they use the program to "upsell" to customers and assist customers in completing paperwork for rebates. Both distributors indicated that they have been able to convince customers to convert T-12 systems to T-8 systems rather than replace existing lamps with like products.

Both distributors also participate with one lamp manufacturer to receive CFLs at a cost that already reflects rebates. However, they felt significantly disadvantaged by the special pricing that large retail chains are able to obtain product at – specifically for CFLs and specialty lamps from other manufacturers, LED lamps and retrofit kits and fixtures. Both believe that their customers have by-passed them and have purchased product directly from The Home Depot and other consumer outlets. Both distributors interviewed believe that commercial customers are overly burdened by the SmartStart program participation requirements versus consumers who simply purchase their lighting at a participating retailer.

The distributors indicated that they have had no contact with the C&I market manager. Further, both indicated that they would benefit from some training on program details and procedures. Instead both rely on the NJCEP website for specific information about the SmartStart program rebates. In addition, they have not seen, nor are they aware of, any marketing that promotes the distribution channel.

One contractor primarily works on prescriptive rebates for compressors. About 75% of their business is the installation of compressors. According to them, the custom rebates are much too complicated to bother with for the following reasons:

- Engineering study needs to be submitted with each custom rebate.
- Case review – often, the reviewer is inexperienced and doesn't understand what they are reviewing.
- Paperwork is excessive.

With regard to the actual process, they feel as though the pre-inspection is a waste of their time and the customer's time. It can take upwards of 8 weeks simply to get the inspector to the building site. In some cases, the Program Manager waived pre-inspections for work that needed to be expedited. Communication between them and the Program Manager is lacking. It is very difficult for them to get the status of customer rebates, and the Program Managers lower level staff has limited capabilities to answer questions. They feel as though the need to "cry wolf" to get answers.

There are no unique marketing activities that promote compressors. The SmartStart program has been more successful in promoting lighting; meanwhile, 90% of customer compressors are running inefficiently. In order to market themselves, they focus on promoting energy efficiency, not the SmartStart program. The company gets their foot in the door by offering energy audits and convincing the customer of how much they can save with a more efficient compressor. Better marketing, specifically for compressors would help increase participation. The NJCEP should also promote their partners better so customers know where to turn when they want a job done.

Of the companies interviewed, only one was highly dissatisfied with the program. They believe the SmartStart program is a weak program with little customer awareness. Their sales have not increased as a result.

Pay-for-Performance (P4P)

After interviewing companies on the Pay-for-Performance program, it became apparent that they agree it is not worth the effort to participate in. According to one company, the initial audit process by a certain entity is too time consuming and expensive. The P4P program does not make it easy for the customer to save energy. In addition, the paperwork is overly burdensome. Small business owners would like to reduce their energy costs, but they cannot sacrifice their day-to-day business to make their building energy efficient. The program application process is "onerous" and everyone ends up losing.

There have been very few Pay-for-Performance projects completed, and only one of them was completed in South Jersey. In theory, the program is great, but when it comes to implementation the State is lacking. The system does not work because of too much bureaucracy. The main focus is not on creating a successful program, but on lengthy processes. The second company felt that it was not worth the effort and was uncertain if there would even be enough savings to, "deal with the aggravation." In addition, the P4P program competes with a PSE&G program which further confuses customers.

Although there were many issues discussed, two main strengths of the program included:

1. The amount of money that could potentially be received (up to 50% of the project).
2. Having prescriptive and custom measures as options gives contractors some flexibility to, "think outside of the box."

The Pay-for-Performance program has the right idea in mind, but the process is so convoluted that it makes it impossible for the program to be easily implemented.

Local Government Energy Audit (LGEA)
Initially, nothing could be done in the program without first going through the Program Manager. This made it impossible to get any work done. The State was paying for processes and not the success of the program. Overall, it has the potential to be a good program because it educates on energy efficiency which many people don't know a lot about.

If the audit is done properly, the local governments are given good information to make an educated decision. Some companies (not the company interviewed) improperly push and over-inflate the benefits of renewable energy. In their opinion, this should not be allowed since there are other areas that would significantly lower the cost of energy. There are insufficient resources at the BPU who have the authority to stop companies doing these things.

Local governments are slowly catching on to what the program has to offer, however it is still difficult to "sell," even with 100% grant. The main issue is that many local governments have not heard of the programs, so credibility of companies promoting the work is low. Local governments are currently "strangled" and don't have the financial means to pay attention to energy savings. The company interviewed does their own marketing since initial marketing attempts by the State were unsuccessful. A few possible reasons why State marketing attempts failed are:

- The website is difficult to navigate and difficult for laymen to understand.
- Did not have their "finger on the pulse of NJ" – completely out of touch. Spent 98% of time and money pushing solar, causing some contracts to have increased costs.
- Schools were in code red and budgets were being cut.

Only a small percentage of the issue is solar energy. The State should focus on the real issues; meet with school boards, officials and contractors at a grassroots level. The initial marketing approach never reached out to new participants because it is not a program you can explain through a brochure and a phone call. If the website was easy to navigate through and wasn't difficult to understand, it could be a good resource for people to learn about the program.

EnergyStar Products
Overall satisfaction with Energy Star Products Program is high since the program is driven by incentives. The program would benefit from increased marketing efforts; faster payment for

partners, retailers and manufacturers; and more program stability. In general, the program is effective, but processes could be improved by ensuring partners are paid in a timely manner.

Marketing for the program is lacking and the best way to increase motivation and awareness in customers is through the use of point of purchase advertising and fact sheets. Customers replacing a measure may choose to take advantage of the rebates, but cannot make an educated choice if the information is not readily available to them.

Communication between the Program Managers and Market Actors is excellent; however, increased trade ally training would be beneficial. The training currently in place is limited to a specific number of trade allies, but they have been successful. Program changes are updated regularly through the NJCEP's website. Feedback from the trade allies is positive since customers are satisfied with the rebates.

Overall, the program is successful in delivering fairly incentivized and energy efficient products to customers. If improvements to the payment of partners were implemented, it would be better. It is also difficult to promote the program since policies and inclusions change a good deal in a short period of time. Having more certainty would make it easier to promote the program.

Three manufacturers who participate in the Energy Star Products program were interviewed. Two have direct distribution channels to consumers through The Home Depot and one has a direct distribution channel through Walmart. All three manufacturers receive rebates directly from the market manager. The manufacturers dealing with The Home Depot ranked New Jersey's programs on par with what they perceive to be the best programs in the country. The third manufacturer stated that New Jersey's rebates were considerably lower than other areas of the country; and that while product sales are growing, they are growing at approximately one-half the rate as in other areas. All manufacturers felt that in-store product buy downs lead to greater product penetration in the market and to quicker market transformation. All manufacturers suggested, as an improvement to the program, that marketing dollars be made available to them for the development of cooperative advertising campaigns.

All three manufacturers categorized communication with the market manager as excellent and were pleased with the level of effort required to report on sales and to claim rebates.

Residential HVAC – Warm and CoolAdvantage

Program participation is very close to the goals set by the State. In New Jersey, the program has been very successful in that over 3,000+ contractors participate. This year in particular has been rewarding since the Federal Tax Credits have expired causing an increase in participation for the Warm and CoolAdvantage programs. There was only one main concern, the uncertainty of the program longevity. Uncertainty causes the inability to look into the future for.

The BPU sponsors training through the Eastern Heating and Cooling Council. The training usually consists of a 4-5 hour session where trade allies are given tips on how to become better technicians in addition to teaching them about the program. The session is voluntary with a small co-pay; yet it is still highly subscribed to. Everyone could benefit from more training. Most contractors are aware and take advantage of the programs; however, it is not always easy to reach them via mailings since there are so many. In the future, it would be beneficial to have emails on file for all trade allies so it is easier to get program news out to them.

According to one of the trade allies who participate in the CoolAdvantage program, they are very satisfied with the program and what it has to offer. It is reliable, the paperwork is easy and rebates

get processed more efficiently than in other programs. The Program Manager is responsive to all of their questions and concerns. Sales have increased because the rebates allow energy efficient equipment to be more affordable.

Some measures are not as well subscribed as others; for example, there aren't as many boilers and heat pumps as there are furnaces and central air conditioning units. Other measures have less up-take because of their cost and conflictions with the Federal Tax Credits; for example, geothermal measures are given a 30% tax credit and don't come close to the incentives provided by the State. There is uncertainty across all programs, including Residential HVAC and that hinders forward looking and planning. However, participation will not decrease as long as new technologies keep being added.

Conclusions

Overall, the programs are successful in delivering energy efficient measures to Residential, Commercial and Industrial customers with fair incentive levels that effectively cover the incremental costs of switching from standard to energy efficient measures. Since the programs started, many of the Market Actors' sales have significantly increased. In most cases, market actors reported that Program Managers were responsive and helpful in addressing questions and concerns. However, there were a variety of issues and areas for improvement across the program portfolio.

There is a great deal of dissatisfaction with the amount of time rebates take to be processed. Marketing efforts by the State have been found to be insufficient and lacking across the board. This forces the trade allies to use their own resources to market the programs, which hasn't consistently been embraced due to customer skepticism. Trade allies can't utilize the NJCEP's website to refer customers to their respective programs because it is too confusing and difficult to navigate. Training varies across the portfolio; some programs are being represented more than others. The lack of certainty in the market and the impending issuance of a new RFP does not allow for the Program Managers or the Trade Allies to create a long-term business plan. This considerably hinders the trade allies from promoting the programs and increasing customer participation.

In order to improve the New Jersey Clean Energy Programs, there are several areas that need to be addressed. Marketing needs to be significantly improved in order to generate more leads and enhance overall customer awareness. Marketing directly from the State will give the Trade Allies more credibility when promoting the programs. The processing and paperwork procedure also need to be considerably improved in order to provide faster turnarounds and keep up with program demands. There is often disconnect between the measure specifications necessary for certain projects and what is required in the application form. According to the Trade Allies, their submittals are often rejected due to a lack of training and understanding on behalf of the Program Manager staff.

Programs need to be more flexible when addressing certain measures that don't always fall under the program scope but are necessary and applicable to the specific project. For example, when replacing oversized HVAC units, contractors should be able to install a smaller more efficient unit. HVAC units today are much more efficient and do not need to be as large as they were 20-30 years ago. Gas heating measures should also be changed to ensure that all energy savings opportunities are being addressed. Finally, new and emerging technologies such as LEDs need to be considered for future inclusion into the Direct Install program since many customers request them.

The biggest deterrent expressed by all Program Managers and Market Actors was the uncertainty and instability of programs' existence. It is impossible for them to create long term business plans without knowing whether or not the programs will be around more than a month at a time. Most companies interviewed, expressed that they could significantly increase participation with a 2-4 year contract. They can accomplish this by increasing the resources they allocate for the program; however, they have refrained from doing so due to a lack of long term contracts.

Appendix A. High-Level Portfolio Normalized DSM Results

State	Organization	Total Portfolio			Residential Sector			Non-Residential Sector		
		$/kWh	$/kW	$/MMBtu	$/kWh	$/kW	$/MMBtu	$/kWh	$/kW	$/MMBtu
NJ	NJCEP	$0.32	$1,738	$153	$0.40	$2,198	$186	$0.19	$1,031	$96
CO	Public Service Company of Colorado	$0.19	$982	$122	$0.20	$1,096	$53	$0.18	$932	n/a
IA	Black Hills Energy	n/a	n/a	$46	n/a	n/a	$53	n/a	n/a	$14
IA	Interstate Power & Light	$0.23	$1,329	$111	$0.27	$1,536	$101	$0.20	$1,178	$122
IA	MidAmerican	$0.18	$890	$94	$0.27	$1,053	$72	$0.13	$745	$147
IL	Ameren	$0.06	$216	n/a	$0.09	$732	n/a	$0.05	$131	n/a
IL	ComEd	$0.09	$448	n/a	$0.08	$512	n/a	$0.11	$406	n/a
MA	Berkshire Gas	n/a	n/a	$67	n/a	n/a	$98	n/a	n/a	$32
MA	Columbia Gas of Massachusetts	n/a	n/a	$41	n/a	n/a	$83	n/a	n/a	$22
MA	Fitchburg Gas & Electric	$0.67	$3,597	n/a	$1.55	$8,804	n/a	$0.48	$2,573	n/a
MA	National Grid	$0.40	$2,159	$198	$0.56	$2,401	$189	$0.32	$1,976	$207
MA	NSTAR Electric	$0.31	$2,236	n/a	$0.52	$3,142	n/a	$0.26	$1,981	n/a
MA	Western Massachusetts Electric	$0.41	$2,101	n/a	$0.51	$2,126	n/a	$0.36	$2,086	n/a
MN	Centerpoint	n/a	n/a	$10	n/a	n/a	$29	n/a	n/a	$6
MN	Interstate Power & Light	$0.40	$1,485	$66	$0.26	$756	$58	$0.65	$4,468	$73
MN	MERC	n/a	n/a	$13	n/a	n/a	$14	n/a	n/a	$12
MN	Minnesota Power	$0.07	$555	n/a	$0.09	$997	n/a	$0.06	$457	n/a
MN	Otter Tail	$0.11	$649	n/a	$0.14	$414	n/a	$0.11	$712	n/a
MN	Xcel	$0.13	$739	$68	$0.12	$704	$72	$0.13	$754	$67
NY	LIPA	$0.25	$1,256	n/a	$0.21	$1,206	n/a	$0.30	$1,308	n/a
NY	NYSEG	n/a	n/a	$42	n/a	n/a	$41	n/a	n/a	$55
NY	NYSERDA	$0.10	$474	n/a	$0.07	$756	n/a	$0.12	$399	n/a
NY	RGE	n/a	n/a	$29	n/a	n/a	$29	$1.37	$5,930	$43
OR	Energy Trust of Oregon	$0.26	$3,869	n/a	$0.39	$4,654	n/a	$0.21	$3,475	$284
VT	Efficiency Vermont	$0.31	$2,070	n/a	$0.22	$1,918	n/a	$0.39	$2,165	n/a
WI	Focus on Energy	$0.22	$1,267	$69	$0.35	$2,681	$113	$0.19	$999	$57

Appendix B: Program and Trade Ally Interview Guides

New Jersey Clean Energy Program Market Analysis
Program Manager Interview Guide

Contact Name: _____ **Date:** _____

Address: _____

Role: _____

General:

- What programs do you manage?
- Describe your overall satisfaction with each of the programs you manage.
- Do you feel that the programs have been successful for the trade allies?

Marketing efforts:

- How are the program(s) marketed to your customers?
- What is your opinion of the program(s) marketing efforts?
- What marketing strategies work best?
- What marketing strategies are most cost effective?
- What do you think the customer awareness level is for the program(s)?
- What types of marketing strategies are the trade allies using?
- What do you believe would be the most effective methods to promote the program(s)?
- What do you feel would motivate customers to participate in the program(s)?
- Are your trade allies using the marketing funds available from the State? If no, why?

Trade Allies:

- Do you feel that trade ally participation is adequate?
- How would you describe the level of communication you have with the trade allies?
- What is your opinion of the trade ally training?
- How do trade allies hear about the program updates and changes?
- What type of feedback have you heard from the trade allies?

Delivery:

- What is your opinion of the effectiveness of the program(s) policies?
- What are the barriers to customer participation?
- Are there any specific measures in particular that are not successful? Why?
    - Do you feel that these measures are not energy efficient?
    - Are the customer costs too high therefore preventing participation?
- In your opinion is the amount of paperwork required reasonable?
- What do you see as the market potential for the program(s)?
- Do you feel that the customer incentives are adequate? Why?
- Explain the quality control inspection process. Is there anything you would change?

Concerns:

- Do you have any concerns? Please specify.
- What part of the program(s) (if any) do you feel have not been effective? Why?
- Do you feel the market for customer participation will increase, decrease or remain the same in the near future?

Improvements:

- How can we improve the overall quality of the program(s)?
- Do you have any additional comments on how the program(s) could be improved?

Next steps:
We will evaluate your responses and suggestions to improve the programs. Thank you for your time.

New Jersey Clean Energy Program Market Analysis
Trade Ally Interview Guide

Contact Name: _____ **Date:** _____

Address: _____

Role: _____

General:
- What program(s) do you participate in?
- Describe your overall satisfaction with the program(s).
- What do you think are the main strengths of the program(s)?
- Do you feel that the program(s) is effective in regard to your sales profit?

Interaction with NJCEP:
- Describe your satisfaction with the contractor training.
- How would you describe the level of communication you have with NJCEP?
- How responsive has the program(s) staff been in addressing your questions and concerns?

Marketing efforts:
- How effectively do you feel NJCEP has been promoting the program(s) to its customers?
- What do you think the customer awareness level is for the program(s)?
- What types of marketing strategies does your business use?
- What do you believe would be the most effective methods to promote the program(s)?
- What do you feel would motivate customers to participate in the program(s)?
- Are you using the marketing funds available from the State? If no, why?

Delivery:
- What positive effects has the program(s) had on your business? Have your sales increased as a direct result of the program(s)?
- What are the barriers to customer participation?
- Are there any specific measures in particular that are not successful? Why?
    - Do you feel that these measures are not energy efficient?
    - Are the customer costs too high therefore preventing participation?
- Are any measures not available?
- Should some other measures be included?
- Should some measures be dropped?
- Is the amount of paperwork required reasonable?
- Do you feel the program(s) incentive levels are adequate?
- What is the process for customer complaint and problem resolution? What type of complaints do customers have?

Concerns:
- Do you have any concerns? Please specify.
- What part of the program(s) (if any) has not been effective for your business? Why?

- Do you feel the market for customer participation will increase, decrease or remain the same in the near future?

Improvements:

- How can we improve the overall quality of the program(s)?
- Do you have any additional comments on how the program(s) could be improved?

Next steps:
We will evaluate your responses and suggestions to improve the programs. Thank you for your time.