2010-2011 Evaluation and Research Plan

New Jersey's Clean Energy Program
Energy Efficiency and Renewable Energy Programs

Final Report

January 27, 2010

Table of Contents

Introduction

This report is the fifth evaluation and research plan prepared by the Center for Energy, Economic and Environmental Policy (CEEEP) since 2004. It sets out a proposed process for establishing and executing a detailed evaluation and research plan for New Jersey's Clean Energy Program. The four previous plans issued by CEEEP include:

- The 2004-2005 Evaluation and Research Plan Phase 1 Report[1] which set out general strategies to be employed in evaluating programs and identified evaluation activities with a high priority that should be initiated in 2005.
- The 2004-2005 Evaluation and Research Plan Phase 2 Report[2] which identified specific evaluation and research activities proposed for 2005 for each program and a timeline for implementing the recommended activities.
- The 2006 Evaluation and Research Plan[3] which identified specific evaluation and research activities proposed for 2006.
- The Draft 2007 Evaluation and Research Plan[4] which identified specific evaluation and research activities proposed for 2007. This report was not publicly released.

There have been several evaluation studies completed since the last Evaluation Plan, including:

- **Renewable Energy Market Assessment:** Summit Blue submitted a final renewable energy market assessment report which included a number of recommended modifications to the renewable energy programs.[5]
- **Market Potential Study Update:** CEEEP and Applied Energy Group (AEG) completed an update of the 2004 KEMA Market Potential Study.[6] The study found that there should be a new Market Potential study conducted before the next Comprehensive Resource Analysis (CRA) proceeding in 2011 to take advantage of new technologies and constantly changing energy prices.
- **Impact Evaluation:** KEMA Inc. has submitted an impact evaluation[7] of the energy efficiency and renewable energy programs. The impact evaluation

---

[1] "New Jersey Clean Energy Program 2004-2005 Evaluation and Research Plan, Phase I: Activities to be Initiated 2004", Center for Energy, Economic and Environmental Policy, August 5, 2004.
[2] "New Jersey Clean Energy Program 2004-2005 Evaluation and Research Plan, Phase 2: Activities to be Initiated 2005", Center for Energy, Economic and Environmental Policy, February 4, 2005.
[3] "2006 Evaluation and Research Plan, New Jersey's Clean Energy Program, Energy Efficiency and Renewable Energy Programs", Center for Energy, Economic and Environmental Policy, February 4, 2005.
[4] "Draft 2007 Evaluation and Research Plan, New Jersey's Clean Energy Program, Energy Efficiency and Renewable Energy Programs", Center for Energy, Economic and Environmental Policy, February 9, 2007.
[5] "Assessment of the New Jersey Renewable Energy Market", Summit Blue Consulting, LLC, March 24, 2008
[6] "Review and Update of Energy Efficiency Market Assessment for the State of New Jersey", Center for Energy, Economic, and Environmental Policy and Applied Energy Group, June 2008.

[7] "New Jersey's Clean Energy Program Energy Impact Evaluation and Protocol Review", KEMA, September 30, 2009

includes seven sub-reports on Residential HVAC, Residential New Construction, Combined Heat and Power, Energy Star Compact Fluorescents, Customer On-site Renewable Energy, and SmartStart Protocols.

Table 3 and Appendix A of this report includes a full list of previous evaluation plans and reports.

Also shaping the planning of evaluation activities are several major policy initiatives that may impact energy efficiency and renewable energy programs. These initiatives include:

- Implementing the recommendations set out in the State Energy Master Plan dated October 2008, including:
  - Consideration of transitioning the management of the energy efficiency and renewable energy programs back to the utilities
  - Significantly increasing the levels of energy efficiency and renewable energy currently delivered through New Jersey's Clean Energy Program
- Implementing additional utility managed energy efficiency and renewable energy programs as provided for in the Regional Greenhouse Gas Initiative legislation
- Implementing additional utility managed energy efficiency programs as directed by Governor Corzine as part of the New Jersey Economic Stimulus Plan
- Implementing additional energy efficiency and renewable energy programs utilizing federal funding made available as a result of the American Recovery and Reinvestment Act

This evaluation plan was developed taking into consideration studies that will be needed to support these policy initiatives. For example, updating market potential studies will support the Board's future funding level proceedings and the energy efficiency and renewable energy market assessments will support the Board's development of programs needed to meet the goals of the State Energy Master Plan.

Evaluation and research activities are intended to provide a continual feedback loop to policymakers, program administrators and program managers. This report summarizes evaluation activities recently completed or currently underway, identifies major issues facing the Board related to New Jersey's Clean Energy Program and how the evaluation activities proposed in this and past plans will support the Board's decision making process as it addresses these issues.

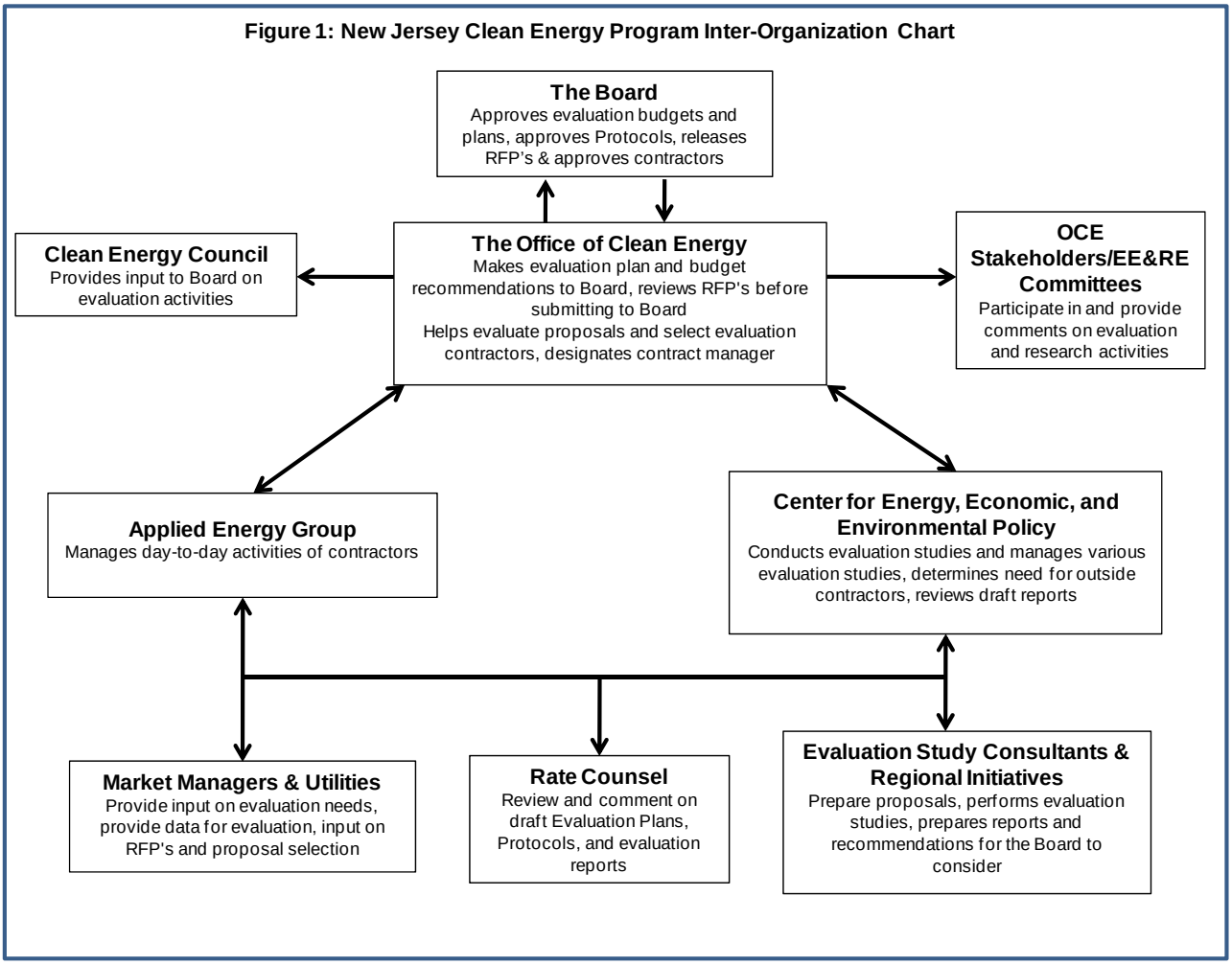
Several entities that are involved in the oversight, delivery, evaluation and management of New Jersey's Clean Energy program will have a role in implementing this evaluation plan including:

- The Board of Public Utilities (the Board)
- The Office of Clean Energy (OCE)
- Rutgers Center for Energy, Economic and Environmental Policy (CEEEP)
- Applied Energy Group (AEG) in its role as Program Coordinator
- Honeywell in its role as the residential energy efficiency and renewable energy Market Manager
- TRC in its role as C&I energy efficiency Market Manager

- The utilities in their role as manager of the New Jersey Economic Stimulus Plan energy efficiency programs and the Comfort Partners program
- Rate Counsel in its role of participating in the development of the evaluation plan, reviewing and commenting on draft evaluation plans and proposed modifications to the Protocols, and reviewing and commenting on evaluation reports
- Regional Partners, including Northeast Energy Efficiency Partnership and Consortium for Energy Efficiency, in their role of providing additional evaluation support at regional and national levels, and
- Other stakeholders in their role of participating in and providing feedback on evaluation activities.

The specific role of each of these entities in implementing the evaluation plan is described more fully in Section IIIa below and is shown pictorially in Figure 1.

Figure 1: New Jersey Clean Energy Program Inter-Organization Chart



II. Framework for Program Evaluation

New Jersey's Clean Energy Program, one of the nation's most ambitious energy efficiency and renewable energy initiatives, requires a significant commitment to transparent, accurate, and timely evaluation. The need for a commitment to evaluation is based on several factors, including:

- The need for regulatory accountability given the significant and increasing level of public funds dedicated to energy efficiency and renewable energy programs
- The need to track progress toward New Jersey's goals as stated in the newly released Energy Master Plan
- The increased role of energy efficiency and renewable energy in deferring generation, transmission and distribution infrastructure upgrades
- The increased role of energy efficiency and renewable energy in meeting green house gas goals
- The potential for incentive payments related to the successful implementation of energy efficiency and renewable energy programs
- The potential for efficiency savings and distributed renewables to be bid into the new PJM Reliability Pricing Market
- The need to ensure that energy efficiency and renewable energy programs are designed and administered to achieve the desired goals in a cost-effective manner.

Purposes of Evaluation

Program evaluation can have a number of different purposes and can be either backward looking or forward looking. Both of these perspectives are valuable and important. Although the goals of evaluation can be articulated in a number of different ways, they generally fall under one of the following categories:

Retrospective:

- Quantifying the historical impacts of programs – in energy, environmental and/or economic terms – to assess whether goals have been achieved
- Assessing whether the performance of the organizations delivering programs were good enough to warrant payment of performance incentives (i.e. for achieving goals)

Prospective:

- Identifying keys to program successes and/or failures so that the program elements associated with such successes are continued, emphasized even more and/or applied to other initiatives where appropriate, and elements associated with failures are changed
- Assessing whether programs can be improved to be more effective – whether in attracting participants, obtaining more system savings, increasing participant satisfaction, and/or improving the efficiency of service delivery
- Assessing which historically pursued opportunities warrant continued attention and which do not (e.g. if the market is sufficiently transformed, or if new lower estimates of savings potential cannot justify market interventions)
- Identifying new opportunities for cost-effective savings
- Estimating the economic impacts of future initiatives to determine whether they should be pursued (i.e. whether the benefits exceed the costs)

- Establishing market benchmarks (e.g. market share for a particular efficient product) and/or performance indicators against which future program progress can be measured

Types of Evaluation Activities

The main types of evaluation activities include:

- Cost Benefit Analysis
- Market Potential Studies
- Market Assessments
- Baseline Studies
- Impact Evaluations
- Process Evaluations
- Tracking System Assessments
- Protocols for Estimating Program Impacts

Table 1 shows the studies that have been conducted in New Jersey since 1999 and some of the anticipated studies from 2010 through 2012. For more details on these studies, see Table 3, Table 4, and Appendix A. A description of the various types of evaluations follows.

Table 1: New Jersey Evaluation Timeline: 1999-2012

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
BPU Proceedings			CRA Funding Cycle 2001-2004				CRA Funding Cycle 2005-2008				CRA Funding Cycle 2009-2012			
EDECA														
CRA Proceeding														
EMP														
Major Evaluation Studies														
Evaluation Plan														
Cost-Benefit Analysis														
Retrospective							EE			EE	EE	EE/RE	EE/RE	EE/RE
Prospective											EE	EE/RE	EE/RE	EE/RE
Market Potential	EE/RE					EE/RE				EE			EE/RE	
Market Assessment								EE		RE		RE		
Baseline Study		EE	EE									EE	EE	
Impact Evaluation											EE/RE	EE	EE	
Process Evaluation						RE						EE/RE	EE	
Tracking System Assessment														
Protocols						EE/RE			EE/RE		EE/RE	EE/RE	EE/RE	EE/RE
Economic Impact Study						RE					RE			
Survey & Focus Group									EE/RE	EE/RE				

Completed Study
Proposed Study

EE = Energy Efficiency
RE = Renewable Energy

Cost Benefit Analysis should assess the costs and benefits of individual programs and measures as well as the overall portfolio of programs. Costs should include both the costs of implementing the programs as well as any contributions made by participants or

others. Benefits should include both resource savings and environmental, health and other savings. CEEEP uses the cost tests described in the California Standard Practice Manual.[8]

CEEEP has developed a cost-benefit model for estimating the costs and benefits of New Jersey's Clean Energy Programs[9]. This tool has been used for calculating the costs and benefits of historic programs. As the transition from the current program model to a new model is occurring, there are three important tasks with regards to cost-benefit modeling that should occur. First, a process for developing OCE/BPU approval on inputs to the models such as avoided transmission and distribution costs, externalities, etc. should be developed. Second, a standardized cost-benefit test should be adopted in coordination with the OCE and codified. Finally, CEEEP should explore consideration of non-energy benefits such as increased comfort levels or increased home values that could result from measures installed under programs such as the Home Performance with Energy Star program. Cost-benefit analyses have been conducted in 2004, 2005, and 2008, and will be conducted annually from 2009 through 2012.

Market potential studies assess the technical, economic and market potential for energy efficiency and renewable energy measures. Technical potential is an estimate of the total level of energy efficiency or renewable energy resources available unrestrained by economics. Economic potential screens for available energy efficiency and renewable energy resources that are economically viable compared to other available alternatives, and, market potential estimates the realistic level of economic resources that can be developed taking into consideration other market factors. Market potential studies were conducted in 1999, 2004, and 2008, and should be conducted in 2011 before the next Office of Clean Energy funding cycle.

Market assessments address specified market attributes such as customer or market actor awareness and attitudes, market barriers to efficiency and/or renewable energy investments, product and service availability, common practice, prices, new products, and market share of energy efficient products and services. They can also provide insight into key aspects of program impacts, including estimated free rider and spillover effects. Market assessments should identify barriers to program participation and strategies to remove or reduce such barriers. Market assessments may also be necessary to estimate savings from programs such as the Energy Star Products program since these estimates rely on assessments of market penetration rates of different measures. Market assessments should be performed every three to five years to help gauge the success of the programs and to provide updated market information to inform changes to programs. Honeywell and TRC have incorporated some of the recommendations of the assessments performed in July 2006 and March 2008 into their respective 2008 and 2009 programs.

---

[8] California Standard Practice Manual: Economic Analysis of Demand-side Programs and Projects, California Public Utilities Commission, October 2001.
[9] CEEEP's Cost-Benefit Model Manual, Center for Energy, Economic, and Environmental Policy, 2006.

Baseline studies are a type of market assessment that provide a snapshot in time of the state of a market. These studies define what the state of the market is at the beginning of a particular program as a means of comparison for future results. The last baseline studies were performed in New Jersey by the utilities in 2000. Summit Blue updated some baseline studies as part of the energy efficiency market assessment. Baseline studies are being suggested in 2010 and 2011 for several programs.

Impact evaluations support the measurement of energy savings, the amount and distribution of savings, and the appropriateness and comprehensiveness of measures. Impact evaluations test the assumptions used to estimate the level of energy savings or renewable energy delivered by the installation of various technologies. Impact analyses should employ industry-accepted methods of analysis that rely on well-developed engineering and statistical analysis techniques including the possibility of energy-use simulation models, multivariate regression models, and/or other analytic tools. In addition to leveraging data collected through the course of program implementation, the analyses may employ billing analysis, end-use metering, site visits, customer surveys, or other data development studies as needed. KEMA has just submitted a comprehensive impact evaluation for several programs in 2009, and one for the Home Performance with Energy Star program and overall Clean Energy Program has been suggested for 2010 and 2011.

Process evaluations address implementation effectiveness, operational efficiency, and customer and market actor satisfaction, attitudes, and awareness related to specified programs. Process evaluations also seek to find ways to improve the efficiency of the delivery of programs and to identify critical road blocks and opportunities to increase the availability of efficient measures and qualified trade allies to support customer adoption. A renewable energy process evaluation was conducted in 2004, and a process evaluation of the Clean Energy Program has been suggested for 2011.

Tracking system assessments review the tracking systems to ensure consistent tracking and reporting, and collection of all necessary data. This step is critical in determining what level of detail is available for all other analyses related to the established programs. Stakeholders should have an opportunity to provide feedback on what data is necessary and data should be available for the public to evaluate and use taking into consideration protection of confidential customer information. A tracking system assessment has not been conducted in New Jersey, and there are none currently planned.

Protocols are used in New Jersey to estimate program savings. The Protocols use measured and customer data as input values into measure specific algorithms. The savings algorithms for NJCEP are a combination of results from various impact evaluations (primarily in the Northeast) and engineering estimates of savings that have been developed based on manufacturer data, program monitoring and evaluation data, and information from other programs. The data and input values for the protocol algorithms come from the program application forms and tracking systems, or from standard values. These Protocols are updated and approved by the Board on an annual basis.

Economic Impact Analyses, or rate impact analyses, are employed to determine the potential changes to energy rates that will result from a proposed policy. The analysis includes an estimation of project costs and benefits, and estimates of future energy prices. In 2009, economic impact analyses of proposed off-shore wind and renewable portfolio changes will be conducted, and in 2010 an assessment of avoided cost estimates used in the various studies will be conducted.

Surveys and focus groups are conducted to determine the perceptions of, and interest in, current and new programs. These studies have several major uses including:

- Aid in program design by measuring customer receptiveness to alternative program designs/attributes and identifying roadblocks to participation.
- Aid in communication planning by measuring customer preferences for various media, methods of communication, and value propositions.
- Understand the effectiveness - strengths and weaknesses - of New Jersey's efforts to date to increase consumer awareness, interest, and participation.
- Track some of the key perceptions measured in prior surveys in order to measure changes in awareness, media/communications preferences, interest, attitudes, and behaviors relevant to energy efficiency, clean power, and the State's programs designed to promote them.
- Understand more fully consumers' multiple motivations for getting involved with energy efficiency and clean energy.

Surveys and focus groups are alternated for Residential and Business programs each year, with the Business survey conducted in 2009. In addition, a study of climate and energy related attitudes will be performed in 2009 or 2010.

Responsibilities for Performing Evaluation Activities

Several entities that are involved in the oversight, delivery, evaluation and management of New Jersey's Clean Energy program will have a role in implementing this evaluation plan including:

- The Board of Public Utilities (the Board)
- The Office of Clean Energy (OCE)
- Rutgers Center for Energy, Economic and Environmental Policy (CEEEP)
- Applied Energy Group (AEG) in its role as Program Coordinator, and
- Program Managers (currently Honeywell, TRC, and the utilities)
- Rate Counsel
- Other Stakeholders

This section will discuss the respective roles of each of these entities in developing, approving and implementing this evaluation plan. Table 2 provides an overview of the responsibilities of each party involved in evaluation.

Table 2: Evaluation Activity Responsibilities

	Overall Responsibility	Evaluation Plans	Evaluation Contracting	Measurement & Analysis	Regional Initiatives
Board	Sets overall program goals	Approves budgets and plans annually	Releases RFP's and approves contractors	Approves Protocols	
OCE	Oversees all evaluation activities	Make evaluation plan and budget recommendations to Board	Reviews and approves RFP's before submitting to Board, Helps evaluate proposals and select contractors, designates contract manager	Makes recommendations on Protcols	Makes recommendations on activities to participate in
CEEEP	Provides overall program evaluation services	Prepare & manage plans, determine evaluation study need and budget	Prepare RFP, evaluate proposals, manage contractors, track results	Perform CBA's, update Protocols and avoided cost estimates	Participates and periodically updates OCE on activities. ID's initiatives that support NJ's efforts
AEG	Supports evaluation activities	Assist in development of plans and budgets	Prepare RFP's and manage day-to day activities of contractors	Review and provide CBA input, Assist in Protocol revisions	
Program Managers (Honeywell, TRC, Utilities)	Provide input on program goals, customers of evaluation studies	provide input on priorities & budgets, review evaluation plans	Assist in scope of works and contractor selection, provide input on data collection instruments, provide needed program data	Make recommendations on policy issues related to evaluation activities, Utilities provide supporting data and usage data	
Rate Counsel	Review and comment on evaluation documents	Assist in development of plan, Provide feedback	Review and comment on evaluation papers	Review and comment on Protocols	
Evaluation Study Consultants	Perform major evaluation studies			Carry out measurement and analysis as necessary for studies	Perform studies on a regional or national level

The Board
The Board approves program budgets and plans on an annual basis. As part of the annual program and budget approval process the OCE will submit proposed evaluation budgets and activities to the Board for consideration. The Board authorizes the release of RFPs for evaluation services and approves the selection of contractors to provide evaluation services. The Board approves the protocols used for estimating energy savings.

The OCE
The OCE oversees all evaluation activities including:

- Development of evaluation plans and budgets and preparing recommendations for consideration by the Board
- Review and approval of RFPs for evaluation services prior to submitting to the Board for approval
- Participate as a member of any team put together to evaluate proposals submitted and to select evaluation contractors
- The OCE designates a Contract Manager for each evaluation contractor that has responsibility for reviewing and approving all invoices and any final reports
- Making recommendations on Protocols

CEEEP
CEEEP has entered into a multi-year Memorandum of Understanding (MOU) with the Board to provide program evaluation services. As set out in the MOU, CEEEP is responsible for formal evaluation of the effectiveness of the programs. CEEEP has overall responsibility for managing evaluation activities including:

- Preparation of annual and multi-year evaluation plans
- Managing the implementation of the plans
- Performing cost benefit analyses and updating avoided cost estimates used to perform cost benefit analysis
- Maintaining and updating the Protocols for Measuring Resource Savings
- Managing Market Potential Studies, Baseline Studies, Market Assessments (except R&D activities as note below), Process Evaluations, and Impact Evaluations. For each of these types of evaluations CEEEP will:
    - Develop sections of the annual evaluation plan indicating when these types of evaluations should be performed and any specific issues the evaluation will assess
    - Coordinate with AEG to ensure that the annual budgets approved by the Board include funding for any recommended evaluation activities
    - Determine whether the evaluations can be performed in-house at Rutgers or if an RFP will be issued for an outside contractor
    - Assist with the preparation of RFPs
    - Either issue the RFP or coordinate with AEG if the RFP is to be issued by Treasury
    - Participate on the team that evaluates any proposals received in response to RFPs
    - Review any draft reports issued by evaluation contractors

    - Track implementation of recommendations included in evaluation reports
- Monitor national and regional evaluation activities including NEEP, CESA and CEE
    - Participate as a member of evaluation committees
    - Provide OCE with periodic reports concerning activities
    - Provide recommendations regarding benefits of continuing support for these activities
    - Identify national and regional evaluation activities that can support NJ's evaluation efforts. Such activities should be specifically identified in the annual evaluation plan.

AEG

In its role as Program Coordinator, AEG will support evaluation activities as follows:

- Assist in the development of annual and multi-year evaluation plans
- Assist in drafting the scope of work for evaluation RFPs
- Coordinate the development of annual evaluation plans with the development of annual programs and budgets for consideration by the Board
- Manage day-to-day activities of selected outside evaluation contractors including:
    - Assist with the collection of data needed to perform evaluations
    - Review of draft and final reports
    - Ensuring work is performed in accordance with work plans and on schedule
    - Provide recommendations regarding payment of invoices
    - Provide OCE with updates regarding status of evaluation projects
    - Coordinate approval of work plans, invoices, final reports and other documents with the designated BPU Contract Manager
- Coordinate with CEEEP and program managers regarding implementation of recommendations
- Review and provide input into cost benefit analyses
- Coordinate with CEEEP and the program managers to develop proposed revisions to protocols, coordinate soliciting comments on proposed changes and coordinate with OCE to develop draft Board Orders and present proposed changes to the protocols to the Board for consideration

Program Managers (Honeywell, TRC, Utilities)

The Program Managers are responsible for supporting formal evaluation activities in the following ways:

- Providing input to OCE, AEG and CEEEP on evaluation plans, priorities and budgets, based both on their experience and needs delivering programs in New Jersey and their awareness of leading evaluation efforts in other jurisdictions across the continent;
- Providing input on the scopes of work for prioritized studies that will be undertaken;
- Providing input on the selection of evaluation contractors when appropriate (e.g. more so for market assessments, not for impact evaluations);

- Reviewing and providing input on draft evaluation surveys or other data collection instruments;
- Supporting evaluation contractors, CEEEP and/or AEG in accessing program data necessary for evaluation studies;
- Reviewing and providing input on draft evaluation reports; and
- Making recommendations to OCE, AEG, and CEEEP on policies issues related to evaluation activities (e.g. how cost-effectiveness tests should be applied to measure or program screening).

Though not a formal evaluation activity, Program Managers have an on-going responsibility to continually re-assess their operations and programs based on informal market feedback. They also may lead research and development activities (once approved by the OCE), including the hiring of contractors to carry out such work. Finally, they are also obvious "customers" for the more formal evaluation work to be managed by CEEEP. All of that information – from informal market feedback, R&D work and formal evaluation studies – should inform the Program Managers in carrying out of their program design responsibilities.

Previous and Recurring Evaluation Activities

This section of the evaluation plan highlights the evaluation studies performed since 1999 and discusses major evaluation activities that will be performed annually. Table 3 shows a timeline of evaluation studies that have been completed from 1999 through 2009. Links to these studies can be found in Appendix A. Since 2004, at least one major evaluation study has been solicited each year.

Table 3: Completed New Jersey Evaluation Studies			
Year	Study	Conducted by	Date
1999	EE & RE Maket Potential	XENERGY	August 19, 1999
2000	O&M Baseline Study	Pacific Energy	May 25, 2000
	Chiller Baseline Study	Pacific Energy	September 26, 2000
2001	Compressed Air Baseline	Aspen	May 2001
	Residential New Construstion Baseline	XENERGY/Roper-Starch	June 2001
	Residential HVAC Baseline	XENERGY	November 16, 2001
2004	Final Evaluation of Home Energy Audit Tools	CEEEP	February 19, 2004
	LIWAP/Comfort Partners Evaluation	Apprise	June 2004
	NJCEP 2003 Program Evaluation (EE & RE)	CEEEP	July 30, 2004
	EE Maket Potential Study	KEMA	August 2004
	RE Market Potential Study	Navigant	August 2, 2004
	NJCEP 2004-2005 Evaluation and Research Plan (Phase 1)	CEEEP	August 5, 2004
	Protocols to Measure Resource Savings		September 2004
	RE Environmental Impacts Study	CEEEP	October 7, 2004
	RE Process Evaluation	Aspen	November 2004
	RPS Economic Impact Evaluation	CEEEP	December 8, 2004
2005	2004-2005 Evaluation Plan Phase 2: Activities to be Initiated in 2005	CEEEP	February 4, 2005
	2003 EE Program Cost-Benefit Analysis	CEEEP	July 28, 2005
	Appliance Cycling Evaluation	CEEEP	September 2, 2005
2006	2006 Evaluation Plan	CEEEP	February 15, 2006
	EE Market Assessment	Summit Blue	July 20, 2006
2007	Renewable Energy Market Transition	Summit Blue	March 15, 2007
	Business RE/EE Survey and Focus Group	Market Strategies/Grafica	November 6, 2007
	Protocols to Measure Resource Savings	CEEEP	December 2007
2008	2006 EE Program Cost-Benefit Analysis	CEEEP	January 9, 2008
	RE Market Assessment	Summit Blue	March 24, 2008
	Residential RE/EE Survey and Focus Group	Market Strategies/Grafica	March 24, 2008
	Review and Update of EE Market Potential	CEEEP/AEG	June 2008
	CEEEP Cost-benefit Model Manual	CEEEP	November 18, 2008
2009	CHP Impact Evaluation	KEMA	June 10, 2009
	Res HVAC Impact Evaluation	KEMA	June 11, 2009
	Res New Construction Impact Evaluation	KEMA	June 17, 2009
	Energy Star CFL Impact Evaluation	KEMA	July 9, 2009
	SmartStart Protocol Review	KEMA	July 10, 2009
	Customer On-Site Renewable Energy Impact Evaluation	KEMA	July 13, 2009
	SmartStart Impact Evaluation	KEMA	July 29, 2009

In addition to the major evaluation studies that are undertaken every few years or as they are needed, there are several types of studies that occur on an annual basis. These studies include:

Update Evaluation Plan

This evaluation plan should be updated annually as part of the program and budget planning process. The current process results in the Program Managers and the OCE submitting a compliance filing by October 1 each year that includes program descriptions and budgets for the proposed programs to be implemented in the following calendar year. An updated evaluation plan that identifies the major evaluation activities proposed for the following year and budgets necessary to perform those activities should be submitted coincident with the compliance filings.

CEEEP will coordinate with the OCE, AEG and the Program Managers to develop the annual evaluation plan. Draft plans should be presented to the Clean Energy Council and its committees for comment prior to submitting a final plan to the OCE. The evaluation plan will describe major evaluation activities proposed for the following year, identify the entity responsible for implementing each component of the plan and proposed budgets for performing the evaluation activities.

Update Protocols

The current New Jersey Clean Energy Protocols to Measure Resource Savings (the Protocols) were approved by the Board in August 2009 [10]. The Protocols were developed to measure resource savings, including energy, capacity, and other resource savings. The Protocols are also used in determining energy and cost savings associated with the Energy Savings Improvement Program.

The Protocols should be updated annually, or as new programs or measures are added, coincident with the Board's approval of annual program plans and budgets. Compliance filings submitted by any program manager should include proposed protocols for any new programs or program components.

The Program Managers shall include any proposed modifications to the Protocols as part of their compliance filings due by October 1 each year. CEEEP will compile the proposed changes to the Protocols and prepare a redlined version that includes all of the proposed changes. CEEEP will coordinate with OCE and AEG to circulate the proposed changes for comment, review and assess the comments, and prepare a final draft for submittal to the OCE for consideration by the Board.

Modifications to the current Protocols are required to add new algorithms and inputs for new programs and program components that were approved for 2009. The Program Managers are developing proposed additions to the Protocols to address new programs

[10] In the Matter of NJ Clean Energy Program Revision to December 2007 Protocols to Measure Resource Savings; Docket No. EO09070460, Order dated August 7,2009.

and program components. CEEEP will compile proposed additions to the protocols, review for reasonableness and prepare a redlined version of the current Protocols. The redlined version will be circulated to the Clean Energy Council and its committees for comment. CEEEP will review and assess any comments received and make additional changes as it deems appropriate. CEEEP will submit a clean and redlined version of the proposed changes to the Protocols to OCE and AEG for review.

KEMA was engaged to perform an impact evaluation of the NJCEP, and the final report was issued in September 2009. CEEEP reviewed KEMA's final impact evaluation report and identified additional changes to the Protocols required to implement the changes recommended by KEMA. CEEEP, in coordination with the Program Managers and other stakeholders, is preparing a redlined version of the Protocols incorporating many of the proposed changes recommended by KEMA. Any changes that result from the KEMA impact evaluation will be included with any other proposed changes proposed for implementation commencing January 1, 2010.

Additional Protocols for energy savings and to calculate cost have also been developed for the Energy Savings Improvement Program.

AEG will coordinate with the OCE to prepare documents required for consideration by the Board of any proposed changes to the Protocols and CEEEP will submit proposed changes to the Protocols to the OCE for consideration by the Board by December 1 each year.

Cost Benefit Analysis

Cost benefit analysis should assess the costs and benefits of individual programs and measures as well as the overall portfolio of programs. Costs should include both the costs of implementing the programs as well as any contributions made by participants or others. Benefits should include both resource savings and environmental, health and other savings as deemed appropriate and documented with supporting justification. In addition, rate and bill impact analyses should be performed. The cost benefit analysis should take a multi-year view of the programs taking into consideration that new programs may have high start up costs

CEEEP believes that the Board should formally approve the methodology to be used to assess the costs and benefits of the programs. CEEEP will work with the Office of Clean Energy and the Clean Energy Council to facilitate a coordinated review of proposed cost benefit analysis methodologies and develop recommendations for consideration by the Board.

CEEEP's approach to cost-benefit analysis is very quantitative and, in general, does not take into account qualitative characteristics of the various programs and measures. The model simply measures how a program or measure's costs relate to its benefits. The model is very dependent on quality information from the program implementers who propose various programs and measures. Program implementers will be asked to

complete a small spreadsheet of requested information that will become input for the model.

The model is a fairly simple input-output model where a portion of the inputs come from program administrators (electricity savings estimates, tax credits, etc), a portion of inputs come from data sources such as PJM or EIA (electricity or natural gas prices), and a portion of the inputs come from CEEEP (discount rate, transmission and distribution costs, etc.). The model takes these inputs and produces specific outputs such as emission savings, program participant benefits, participant costs, etc.

CEEEP will perform cost-benefit analyses on both completed and proposed energy efficiency programs. The purpose of performing the analysis on completed programs is to determine how cost-effective the programs were to determine if the programs should be continued in the future. The purpose of performing the analyses on proposed programs is to project how cost-effective the proposed programs are and to have a common point of comparison to compare the various programs and measures.

CEEEP will perform a cost benefit analysis of the programs by August 31 each year.

Proposed Evaluation Activities

The proposed evaluation activities for 2010 and 2011 are described below and are summarized in Table 4.

Table 4: Proposed New Jersey Evaluation Studies	
Year	Study
2010	Residential Appliance Saturation Survey Avoided Cost Assessment C&I Equipment Saturation Survey NJ Renewable Energy Portfolio Standards Evaluation NJ HVAC Baseline Update Home Performance w Energy Star Impact Evaluation GNJRT Process Evaluation SmartStart Buildings Process Evaluation Low Income Program Assessment Impact Evaluation (follow up on KEMA 2009 studies) Estimate EE Impact on Advancing Energy Building Codes EE and RE Program Cost benefit Analysis Protocol Update Evaluation Plan Update
2011	Market Potential Study SmartStart Buildings Impact Evaluation Res New Construction Baseline Study C&I New Construction Baseline Study Pay for Performance Process Evaluation TEACH Process Evaluation Local Government Energy Audit Impact Evaluation EE and RE Program Cost benefit Analysis Protocol Update Evaluation Plan Update
	Proposed NEEP & CEE Studies Common EM&V Approaches/Emerging Technologies Guidelines for Incorporating EE into Systems planning NAESB Wholesale EM&V standards Incremental Cost Assumptions for Priority Measures/Sectors Loadshape Data Research CEE Energy Star Survey

a. 2010 Evaluation Activities

1. Market Assessment

Summary Description: Residential Appliance Saturation Survey.

Purpose and Rationale: The purpose is to gather statistically significant information on the penetrations of a wide range of home energy consuming devices, and the use of different heating fuels in NJ homes (both primary and secondary), ownership (central vs. individual) and systems (boiler, furnace, heat pump, etc.); central cooling, laundry equipment, consumer electronic devices, pools, etc. Sufficient data should be gathered to

permit assessment of differences by building type, owner vs. renter, age of building and region within the state. A portion of the customers surveyed remotely (i.e. phone or mail) should also received on-site assessments during which more detailed assessments of such things as refrigerator efficiency, numbers of lighting sockets with non-standard lamps (e.g. candelabra, 3-way, dimmable), levels of attic insulation, location of ducts, etc. could be collected. This study could be modeled after a recent study conducted for Vermont (though with more data collection in certain areas).

No appliance saturation survey has ever been conducted statewide; nor is there even a utility study within the past 15 years which is publicly available. Even those studies done years ago did not provide the kind of detail one can get from on-sites. Such a study would provide invaluable information for better understanding home energy use and estimating the size of the market for efficiency and on-site renewable energy measures.

Responsible Parties: AEG will coordinate with CEEEP, with support from Honeywell and the utilities, to develop an RFP for an outside contractor to perform this study.

2. Avoided Cost Assessment

Summary Description: Study of avoided energy costs.

Purpose and Rationale: Purpose: This study would develop a set of avoided costs that would be used for screening of all efficiency measures and programs, and to accurately characterize the benefits from renewable generation and capacity through the use of an electric system dispatch model that encompasses PJM. That would include an assessment of avoided transmission and distribution costs, demand reduction induced price effects (DRIPE), and environmental externalities – to the extent they are not internalized into the market, and risks associated with relying solely on supply-side alternatives to meeting energy needs. Recent work done for New England would be a good example from which to start.

Avoided costs assumptions are perhaps the most critical of all assumptions in assessing the cost-effectiveness of programs because they affect screening of every measure and program. Energy markets are very complex and warrant an independent assessment by outside experts who do such work in numerous jurisdictions. Where such work is not done, there is a tendency to rely on market data that significantly understate key components of avoided costs (see LBL study showing EIA gas price forecasts are routinely under-estimated) and/or do not address effects such as DRIPE and the risk-mitigating benefits of demand-side investments that can also significantly affect cost-effectiveness screening.

Responsible Parties: AEG will coordinate with CEEEP, with support from Honeywell and the utilities, to develop an RFP for an outside contractor to perform this study.

3. Market Assessment

Summary Description: Commercial and Industrial Equipment Saturation Survey.

Purpose & Rationale: The purpose is to gather statistically significant, on-site information on the penetrations of a wide range of commercial and industrial energy consuming devices, and the use of different heating fuels in NJ businesses and facilities (both primary and secondary), ownership (central vs. individual) and systems (boiler, furnace, heat pump, etc.); lighting, central cooling, motors and drives, refrigeration, plug loads, etc. Sufficient data should be gathered to permit assessment of differences by building type, owner vs. renter, age of building, and region within the state.

To the best of our knowledge, no C&I equipment saturation survey has ever been conducted statewide; nor is there a utility study within the past 15 years which is publicly available. Such a study would provide invaluable information for better understanding business and facility energy use and estimating the size of the market for efficiency and on-site renewable energy measures.

Responsible Parties: AEG will coordinate with CEEEP, TRC and the utilities, to develop an RFP for an outside contractor to perform this study.

4. Market Assessment

Summary Description: NJ Renewable Energy Portfolio Standards.

Purpose and Rationale: This study would examine and quantify the progress and barriers to market development required to meet New Jersey'**s** Renewable Portfolio Standard goals, for solar and non-solar resources. It would serve as an update to the 2008 Summit Blue Market Assessment.

New Jersey has emerged as leading state in the development and implementation of the Solar Renewable Energy Credit (SREC) market. Since the 2008 study, there have been significant market changes including in federal tax incentives for solar. There is also a need for continued attention on the barriers and strategies to accelerate in state non-solar resource development.

Responsible Parties: AEG will coordinate with CEEEP, with support from Honeywell and the utilities, to develop an RFP for an outside contractor to perform this study.

5. Market Assessment or Baseline Study

Summary Description: NJ Heating, Ventilating and Air Conditioning (HVAC) baseline update.

Purpose and Rationale: This study would define current residential HVAC technology and installation practice baseline, for both gas and electric heating and cooling systems. It would serve as an update to the 2001 NJ statewide study.

Much has changed since the 2001 study was completed, including adoption of new federal efficiency standards.

Responsible Parties: AEG will coordinate with CEEEP, with support from Honeywell and the utilities, to develop an RFP for an outside contractor to perform this study.

6. Impact Evaluation

Summary Description: Home Performance w/ENERGY STAR impact evaluation.

Purpose and Rationale: This study would assess actual energy bill savings from program participants. A comparison of pre- and post-treatment energy bills for a statistically-valid, random sample of participating and non-participating (for a comparison group) homes would be one way to achieve that end. Ideally, the evaluation would have a large and diverse enough sample to assess impacts of the different participation tiers of the current program. The evaluation would also allow for further calibration – if needed – of current software used to prospectively estimate program savings.

This program has become a central focus of the residential efficiency portfolio because it addresses the largest untapped efficiency market: retrofitting of thermal envelope and HVAC systems. As such it is important that an assessment of impacts of the program be conducted. Such an assessment would ideally wait until there is a large enough pool of participants at different program tiers with at least a year of post-treatment energy bills to analyze.

Responsible Parties: AEG will coordinate with CEEEP, with support from Honeywell and the utilities, to develop an RFP for an outside contractor to perform this study. Though this study is expected to commence in 2010, much of the work will likely be done in 2011.

7. Process Evaluation

Summary Description: GNJRT process evaluation.

Purpose and Rationale: The Green New Jersey Resource Team ("GNJRT") initiative is designed, in part, to reach customers who have never used CFLs before and change their attitudes regarding CFLs and efficiency or conservation more generally. This study would assess the initiative's effectiveness in achieving those objectives. It should also inform the program on what elements of the initiative work well and which should be reconsidered.

Community social marketing initiatives are increasingly being put forward as key components to strategies for achieving much broader and deeper energy savings. Thus, assessments of current initiatives that enable better understanding of what is working and what may not be, particularly in the NJ context, can be vitally important (and probably not very expensive).

Responsible Parties: AEG will coordinate with CEEEP, with support from Honeywell, to develop an RFP for an outside contractor to perform this study.

8. Process Evaluation

Summary Description: SmartStart Buildings Program Process Evaluation

Purpose & Rationale: This study would assess program processes to determine effectiveness and recommend improvements. Interviews will be conducted with participants and market actors involved in these projects (such as contractors, engineers, ESCOs, distributors) to gather process-related feedback on the program. Also, interviews will be conducted with participants to gather process related feedback, including the use and persistence of measures that can feed into the impact assessment, as well as process-related information.

Additionally, an incentivized panel of upstream market actors will be developed, such as lighting engineers, HVAC contractors, refrigeration contractors, etc. Market actor interviews will provide an understanding of how the program can cost-effectively improve the energy efficiency of various measures. Upstream market actor interviews will be used to ask about equipment and practices in both existing and new C&I buildings. Interviews will include both participants and non-participants. Also, available program materials and databases will be examined, in-depth interviews conducted with program implementers.

Responsible Parties: TRC to assist Program Coordinator and CEEEP to develop an RFP for a consultant to complete this process evaluation.

9. Low Income Program Assessment

Summary Description: Assessment of Low Income Program.

Purpose and Rationale: The purpose of this evaluation is to conduct an electric and gas use impact analysis of the program. The effectiveness of individual energy conservation measures, energy education, health and safety measures will be evaluated, and the study will include a field assessment of contractor work in participants' homes.

Responsible Parties: The utilities will assist Program Coordinator and CEEEP to develop an RFP for a consultant to complete this process evaluation.

10. Impact Evaluation

Summary Description: Follow up to 2009 KEMA impact evaluation studies

Purpose and Rationale: Studies should be conducted following up on three elements of the KEMA impact evaluations:
1. Focused research to develop attribution factors (net-to-gross ratios) for application in the 2011 Protocols;

2. Research to develop appropriate "baselines" for use in the 2011 Protocols' calculations of savings (i.e. where should the baseline be code or standard new equipment, where existing conditions, and where some hybrid approach); and
3. Work on other more specific KEMA recommendations in its 2009 Summary report. Table 1-1 in KEMA's Sept 2009 Summary notes a number of items (additional to 1 and 2 above). This 3rd area consists of work on these specific items, as prioritized by CEEEP or a consultant. Items include:

- Evaluate additional efforts on residential HVAC QIV
- SmartStart: Research on electric motor operating hours by climate & sector
- SmartStart electric HVAC: research on EFLH and CF by climate
- SmartStart electric chiller research (e.g., EFLH/CF)
- SmartStart VFDs -- research on DSF and ESF
- SmartStart gas water heater boosters -- usage research
- SmartStart Time Period Allocation Factors -- research these for several
- technologies
- CORE (now REIP) program -- review utility load curves to improve calculation of kW impact of solar PV

11. Impact Evaluation

Summary Description: Estimate EE Impact on Advancing Energy Building Codes

Purpose and Rationale: The purpose of this project is to develop common strategies and approaches for evaluating savings associated with improved codes and standards and, still more challenging, approaches to estimating savings from efficiency program administrators' activities to advance codes and standards. California currently claims savings from activities to advance codes, and Massachusetts has already begun some preliminary investigation of this issue with respect to residential new construction only. This overall project will consist of two parts: 1) the white paper/scoping effort that will provide recommendations for common strategies, and 2) an implementation of recommendations.

Responsible Parties: Northeast Energy Efficiency Partnerships

b. 2011 Evaluation Activities

1. Market Assessment or Baseline Study

Summary Description: NJ Residential New Construction (RNC) baseline study.

Purpose and Rationale: This study would assess current residential construction practices in order to both define the baseline against which efficiency improvements should be measured and assess past program estimated free ridership and spillover. It would have two data collection components.

The first would be data collection from a statistically valid sample of homes built in 2007 or 2008 to identify typical characteristics regarding size, window area, insulation levels, air leakage levels, duct leakage levels, HVAC efficiency, appliance efficiency and use of efficient lighting. It should also estimate the percent of homes meeting code as well as different efficiency levels beyond code through the assessment of the distribution of home energy ratings. Ideally, it should also be paired with an assessment of at least a year of post occupancy billing data from which future assessments of energy savings using *calibrated* (to the billing data) building simulation models can be made. Both the mid-1990s PSE&G study and a more recent LIPA study would be good examples of what might be done (though neither of those had a billing analysis component). The second would be a survey of builders of both participating and non-participating homes to understand how the program had affected their construction practices over the years.

No technical baseline study has ever been conducted statewide. No utility assessment has been conducted since the mid-1990s. Construction practices have likely changed a great deal since then, making an update to the construction practices important. The billing analysis would allow better estimates of future program savings by allowing calibration of models to actual usage data. The focus on homes constructed before the current economic crisis would both allow for a less skewed look at new homes and allow for enough months of occupancy to permit the billing analysis. The builder survey could also be very important because it is often argued that one of the key benefits of RNC programs is their long-term market transformation impacts.

Responsible Parties: AEG will coordinate with CEEEP, with support from Honeywell and the utilities, to develop an RFP for an outside contractor to perform this study.

2. Baseline Study

Summary Description: Commercial and Industrial New Construction Baseline Study.

Purpose & Rationale: This study would assess current commercial and industrial construction practices in order to both define the baseline against which efficiency improvements should be measured. It would have two data collection components, as follows:

1. The first would be data collection from a statistically valid sample of buildings built in 2007 or 2008 to identify typical characteristics regarding size, window area, insulation levels, HVAC efficiency, equipment efficiency and use of efficient lighting, motors and drives, refrigeration, etc. It should also estimate the percent of buildings meeting code as well as different efficiency levels beyond code. Ideally, it should also be paired with an assessment of at least a year of post occupancy billing data from which future assessments of energy savings using *calibrated* (to the billing data) building simulation models can be made.
2. The second would be a survey of designers and owners of both participating and non-participating buildings to understand how the program had affected their design and construction practices over the years.

No utility assessment has been conducted since the mid-1990s. Construction practices have likely changed a great deal since then, making an update to the construction practices important. The billing analysis would allow better estimates of future program savings by allowing calibration of models to actual usage data. The focus on buildings constructed before the current economic crisis would both allow for a less skewed look at new buildings and allow for enough months of occupancy to permit the billing analysis. The designer and owner surveys could also be very important because it is often argued that one of the key benefits or C&I NC programs is their long-term market transformation impacts.

Responsible Parties: AEG will coordinate with CEEEP, with support from TRC and the utilities, to develop an RFP for an outside contractor to perform this study.

3. Market Potential Study

Summary Description: NJ Market Potential Study.

Purpose and Rationale: This study should provide an updated assessment of cost-effective, achievable energy efficiency and renewable energy potential. It should look not just at existing measures, but at emerging technologies, the potential implications of a "smart grid" on consumers ability to better manage energy use and the application of distributed renewables, and the potential for significant future penetrations of plug-in hybrid vehicles (e.g. could there be a future DSM program promoting the most efficient plug-ins).

As in the past, this study would be a key input to a 2012 BPU decision on the next 4-year funding cycle for the clean energy initiative.

Responsible Parties: AEG will coordinate with CEEEP, along with the Program Managers, to prepare a scope of work for an outside contractor(s) to perform an energy efficiency and renewable energy market potential study by January 1, 2011.

4. Impact Evaluation

Summary Description: SmartStart Buildings Program Impact Evaluation

Purpose & Rationale: This study would assess and calibrate the savings assumptions associated with the various SmartStart equipment incentive offerings.

A thorough verification of default assumptions concerning equipment run-times and efficiency of new equipment. Run-time hour data logging will be conducted to confirm various equipment operating schedules, and selected use of spot power measurements will be used to confirm the performance of key equipment components.

Responsible Parties: AEG will coordinate with CEEEP, with support from the C&I Program Manager, to develop an RFP for an outside contractor to perform this study.

5. Impact Evaluation

Summary Description: Local Government Energy Audit Program Impact Evaluation

Purpose & Rationale: This study would assess program energy savings impact in order to assess the effectiveness of the program in promoting energy audits as an energy management tool that results in actual energy savings based on actions taken by program participants.

The use of calibrated hourly building energy simulation models and/or post-retrofit benchmarking approach is recommended to compare pre-existing conditions or technology. The impact evaluation of this program will rely substantially on on-site inspections and data collection with a focus on collecting accurate information on efficiency measures undertaken, building construction features and energy systems design, control and operational characteristics. In addition, run-time hour data logging will be conducted to confirm equipment operating schedules, and selected use of spot power measurements will be used to confirm the performance of key equipment components.

Responsible Parties: AEG will coordinate with CEEEP, with support from the C&I Program Manager, to develop an RFP for an outside contractor to perform this study.

6. Process Evaluation

Summary Description: Pay for Performance Program Process Evaluation

Purpose & Rationale: Pay for Performance is a unique program offering that relies on a network of Program Partners to market and deliver energy efficiency services. This study would assess the initiative's effectiveness in achieving cost effective energy savings. It should also inform the program on what elements of the initiative work well and which should be reconsidered.

Interviews will be conducted with participants, non-participants and Program Partners to gather process-related feedback on the program. Also, interviews will be conducted with participants to gather process related feedback, including the use and persistence of measures that can feed into the impact assessment, as well as process-related information. (These can be done on a rolling schedule if deemed necessary to gather information on net-to-gross effects.)

Also, available program materials, databases, and training will be examined, in-depth interviews conducted with program implementers.

Responsible Parties: AEG will coordinate with CEEEP, with support from the C&I Program Manager, to develop an RFP for an outside contractor to perform this study.

7. Process Evaluation

Summary Description: TEACH Program Process Evaluation

Purpose & Rationale: TEACH is designed to provide information to schools with a wide array of services offered. This study would assess the initiative's effectiveness in achieving those objectives. It should also inform the program on what elements of the initiative work well and which should be reconsidered.

Education and awareness initiatives are increasingly being put forward as key components to strategies for achieving much broader understanding of energy efficiency. Thus, assessments of current initiatives that enable better understanding of what is working and what may not be, particularly in the NJ context, can be vitally important (and probably not very expensive). An interview survey of program participants would be conducted.

Responsible Parties: AEG will coordinate with CEEEP, with support from the C&I Program Manager, to develop an RFP for an outside contractor to perform this study.

Appendix A: Previous Evaluation Plans and Studies

Evaluation Plans

1. "New Jersey Clean Energy Program, 2004-2005 Evaluation and Research Plan Phase 1: Activities to be Initiated 2004", Center for Energy, Economic, and Environmental Policy, August 5, 2004.

2. "2004 – 2005 Evaluation and Research Plan Phase 2: Activities to be Initiated 2005", Center for Energy, Economic, and Environmental Policy, February 4, 2005**.**

3. "2006 Evaluation and Research Plan", Center for Energy, Economic, and Environmental Policy, February 15, 2006.

Evaluation Studies

4. "New Jersey Comprehensive Resources Analysis Market Assessment", XENERGY, Inc., August 19, 1999.

5. "The Market for Operations and Maintenance Training in New Jersey", Pacific Energy Associates, May 25, 2000.

6. "Commercial/Industrial Chiller Market Database Report", Pacific Energy Associates, September 26, 2000.

7. "Residential New Construction Attitude and Awareness Baseline Study", Roper Starch Worldwide, June 2001.

8. "Compressed Air Systems Market Assessment In the Public Service Electric and Gas Service Territory", Aspen Systems Corporation, May 2001.

9. "New Jersey Residential HVAC Baseline Study", XENERGY, Inc., November, 16, 2001.

10. "Evaluation of Home Energy Audit Tools", Center for Energy, Economic, and Environmental Policy, February 19, 2004.

11. "New Jersey LIWAP and NJ Comfort Partners Comparison of Programs and Evaluation Findings", Apprise, June 2004.

12. "New Jersey Clean Energy Program, 2003 Program Evaluation - Energy Efficiency and Renewable Energy Programs", Center for Energy, Economic, and Environmental Policy, July 30, 2004.

13. "New Jersey Energy Efficiency and Distributed Generation Market Assessment", KEMA Inc., August 2004.

14. "New Jersey Renewable Energy Market Assessment", Navigant Consulting Inc., August 2, 2004.

15. "Protocols to Measure Resource Savings ",Center for Energy, Economic, and Environmental Policy, September 2004

16. "Impacts of Environmental Externalities Upon Relative Costs of Renewable Technology & Impact of The Deployment of Renewable Generation On The market Price of Electricity", Center for Energy, Economic, and Environmental Policy, October 7, 2004.

17. "Process Evaluation of the Renewable Energy Programs Administered and Managed by the New Jersey Board of Public Utilities, Office of Clean Energy", Aspen Systems Corporation, November 2004.

18. "Economic Impact Analysis of a 20% New Jersey Renewable Portfolio Standard", Center for Energy, Economic, and Environmental Policy, December 8, 2004.

19. "Program Cost-benefit Analysis of 2003 New Jersey Clean Energy Council Energy Efficiency Programs", Center for Energy, Economic, and Environmental Policy, July 28, 2005.

20. "Appliance Cycling Evaluation", Center for Energy, Economic, and Environmental Policy, September 2, 2005.

21. "Energy Efficiency Market Assessment of New Jersey Clean Energy Programs", Summit Blue Consulting, LLC., July 20, 2006.

22. "Preliminary Review of Alternatives for Transitioning the New Jersey Solar Market from Rebates to Market-Based Incentives", Summit Blue Consulting and Rocky Mountain Institute, March 15, 2007.

23. "NJCEP 2007 Business Survey Report", Market Strategies, November 6, 2007.

24. "Protocols to Measure Resource Savings ",Center for Energy, Economic, and Environmental Policy, December 2007.

25. "Cost-benefit Analysis of the New Jersey Clean Energy Program Energy Efficiency Programs", Center for Energy, Economic, and Environmental Policy, January 9, 2008.

26. "Assessment of the New Jersey Renewable Energy Market", Summit Blue Consulting, March 24, 2008.

27. "Review and Update of Energy Efficiency Market Assessment For the State of New Jersey", Center for Energy, Economic, and Environmental Policy, June 2008.

28. "NJCEP 2008 Residential Survey Report", Market Strategies, August 22, 2008.

29. "CEEEP's Cost-Benefit Model Manual", Center for Energy, Economic, and Environmental Policy, November 18, 2008.

30. "Combined Heat & Power (CHP) Program Impact Evaluation", KEMA, Inc., June 10, 2009.

31. "New Jersey's Clean Energy Program Residential HVAC Impact Evaluation and Protocol Review", KEMA, Inc., June 11, 2009.

32. "Residential New Construction Program Impact Evaluation", KEMA, Inc., June 17, 2009.

33. "New Jersey's Clean Energy Program Residential CFL Impact Evaluation and Protocol Review", KEMA, Inc., July 9, 2009.

34. "New Jersey's Clean Energy Program Energy Impact Evaluation and Protocol Review: SmartStart Program Protocol Review", KEMA, Inc., July 10, 2009.

35. "New Jersey's Clean Energy Program Energy Impact Evaluation: Customer On-site Renewable Energy Program (CORE)", KEMA, Inc., July 13, 2009.

36. "New Jersey's Clean Energy Program Energy Impact Evaluation: SmartStart Program Impact Evaluation", KEMA, Inc., July 29, 2009.

Appendix B: Evaluation Activity Definitions

The following definitions of evaluation activities are included in the Glossary of Terms and Acronyms prepared for the Regional Evaluation, Measurement and Verification Forum[11] that are applicable to the evaluation activities described in this report:

Achievable Potential - The amount of energy or demand savings within a defined geographical area or population that can be achieved in response to specific energy efficiency program designs, delivery approaches, program funding, and measure incentive levels. Achievable potential studies are sometimes referred to as Market Potential studies.

Avoided Costs - In the context of energy efficiency, these are the costs that are avoided by the implementation of an energy efficiency measure, program, or practice. Such costs are used in benefit cost analyses of energy efficiency measures and programs. Because efficiency activity reduces the need for electric generation, these costs include those associated with the cost of electric generation, transmission, distribution, and reliability. Typically, costs associated with avoided energy and capacity are calculated. Other costs avoided by the efficiency activity can also be included, among them the value of avoided emissions not already embedded in the generation cost, impact of the demand reduction on the overall market price for electricity, avoided fuel or water, etc. For natural gas efficiency programs, avoided costs include components of the production, transportation, storage, and service that are variable to the amount of natural gas delivered to customers.

Baseline - Conditions, including energy consumption and related emissions that would have occurred without implementation of the subject measure or project. Baseline conditions are sometimes referred to as "business-as-usual" conditions and are used to calculate program related efficiency or emissions savings. Baselines can be defined as either project-specific baselines or performance standard baselines (e.g. building codes).

Baseline Data - The baseline conditions of the facilities, market segment, generating equipment, or other area of focus of the subject project or program.

Benchmarking - A process that compares the energy, emissions, and other resource-related conditions of a facility against industry best practices.

Benefit-Cost Ratio - The mathematical relationship between the benefits and costs associated with the implementation of energy efficiency measures, programs, practices, or emissions reductions. The benefits and costs are typically expressed in dollars. Also see Benefit Cost Test and Avoided Cost.

---

[11] Glossary of Terms and Acronyms, Version 1.0, Prepared for the Regional Evaluation, Measurement and Verification Forum by Paul A. Horowitz, PAH Associates, March 2009

Benefit Cost Test - Also called Cost-Effectiveness Test. The methodology used to compare the benefits of an investment with the costs. Five key benefit-cost tests have, with minor updates, been used for over 20 years as the principal approaches for energy efficiency program evaluation. These five cost-effectiveness tests are the participant cost test (PCT), the utility/program administrator cost test (PACT), the ratepayer impact measure test (RIM), the total resource cost test (TRC), and the societal cost test (SCT).

Cost-Benefit and Cost-Effectiveness Analysis - Analysis that compares the benefits associated with a program or measure's outputs or outcomes with the costs (resources expended) to produce them. Cost-benefit analysis is typically conducted to determine the relationship of the program's benefits and costs, as a ratio, once the decision has been made to implement or design the program; programs with benefit-cost ratios greater than 1.0 provide overall ratepayer benefits. Cost-effectiveness analysis is generally undertaken to compare one program or program approach to other approaches, or options for the use of funds, to determine the relationship among the options. The terms are often interchanged in evaluation discussions.

Cost-Effectiveness - An indicator of the relative performance or economic attractiveness of any energy efficiency investment or practice. In the energy efficiency field, the present value of the estimated benefits produced by an energy efficiency program is compared to the estimated total costs to determine if the proposed investment or measure is desirable from a variety of perspectives (e.g. whether the estimated benefits exceed the estimated costs from a societal perspective).

Economic Potential - The amount of savings opportunities that can be acquired cost-effectively.

Evaluation - The conduct of any of a wide range of assessment studies and other activities aimed at determining the effects of a program, understanding or documenting program performance, program or program-related markets and market operations, program-induced changes in energy efficiency markets, levels of demand or energy savings, or program cost effectiveness. Market assessment, monitoring and evaluation (M&E), and measurement and verification (M&V) are aspects of evaluation.

Impact Evaluation - An evaluation of the program-specific directly induced quantitative changes (e.g. kWh, kW, and therms) attributable to an energy efficiency program.

Market Assessment - An analysis that provides an assessment of how and how well a specific market or market segment is functioning with respect to the definition of well-functioning markets or with respect to other specific policy objectives. Generally includes a characterization or description of the specific market or market segments, including a description of the types and number of buyers and sellers in the market, the key actors that influence the market, the type and number of transactions that occur on an annual basis, and the extent to which market participants consider energy efficiency as an important part of these transactions. This analysis may also include an assessment of whether a market has been sufficiently transformed to justify a reduction or elimination

of specific program interventions. Market assessment can be blended with strategic planning analysis to produce recommended program designs or budgets. One particular kind of market assessment effort is a baseline study, or the characterization of a market before the commencement of a specific intervention in the market, for the purpose of guiding the intervention and/or assessing its effectiveness later.

Net-to-Gross Ratio (NTGR) - A factor representing net program savings divided by gross program savings that is applied to gross program impacts to convert them into net program load impacts. The factor itself may be made up of a variety of factors that create differences between gross and net savings, commonly including estimated free riders and spillover. Other adjustments may include a correction factor to account for errors within the project tracking data, breakage, and other factors that may be estimated which relate the gross savings to the net effect of the program. Can be applied separately to either energy or demand savings.

Potential Studies - Studies conducted to assess market baselines and future savings that may be expected for different technologies and customer markets over a specified time horizon. Potential is typically defined in terms of 1) technical potential - savings estimate based solely on currently and anticipated available technology; 2) achievable potential - savings estimate based on market forces, codes and standards, equipment efficiency, and energy efficiency programs; and 3) economic potential - estimate of savings limited by only those found to be cost-effective.

Process Evaluation - A systematic assessment of an energy efficiency program for the purposes of documenting program operations at the time of the examination and identifying and recommending improvements to increase the program's efficiency or effectiveness for acquiring energy resources, while maintaining high levels of participant satisfaction.

Technical Potential - An estimate of energy savings based on the assumption that all existing equipment or measures will be replaced with the most efficient equipment or measure that is technically feasible over a defined time horizon, without regard to cost or market acceptance.