

## **New Jersey Clean Energy Program**

### **Honeywell Residential Efficiency and Renewable Energy Program Plans for 2008**

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# **Honeywell NJCEP Program Plan for 2008**

## **Introduction**

This Program Plan provides program descriptions, marketing plans, goals and budgets for the five residential efficiency and four renewable energy programs to be managed and/or supported by Honeywell in 2008:

- Residential New Construction (New Jersey ENERGY STAR® Homes)
- Residential HVAC (Cool and Warm Advantage)
- Energy Efficient Products
- Home Performance with ENERGY STAR
- Community-Based Efficiency
- Customer On-Site Renewable Energy (CORE)
- Clean Power Choice
- Renewable Energy Development Initiative (REDI)
- Renewable Energy Credits (REC)

Six of these programs are continuations of existing initiatives Honeywell began managing in 2007, though often with substantial proposed changes. Two other programs represent evolutions and/or consolidations of 2007 programs. REDI is an evolution of a portion of the Renewable Energy Grants and Financing Program administered by EDA. The REC program is a consolidation of what was previously referred to as the RECS facilitation initiative and the SREC Only Pilot program, both run by the Honeywell team in 2007. The Community-Based Efficiency program is brand new. It is not fully developed in this proposal. Development will take place in early 2008. Details of the program design will be part of a future regulatory filing. However, resources likely to be necessary to for the program have been included in the 2008 program budget provided in this filing.

The following Program Plans begin with narrative descriptions of each program, including the overall strategy, marketing plan summaries, key activities for the year and goals. The program designs detailed in the narratives are an outgrowth of months of exploration of various options for enhancing the effectiveness of both individual programs and the portfolio efficiency and renewable energy programs as a whole.

In many cases, we propose substantial changes and/or additions to programs or program portfolios to better enable New Jersey to get on a path to achieving aggressive clean energy goals. However, the schedule for the implementation of many of these changes and additions is dependent upon the approval of the proposed contract modifications that allow us to support new initiatives. In addition, we must also take into account the need to provide adequate notification to program contractors and other allies. Thus, for several of the programs we expect at least elements of the current 2007 program designs

to remain in effect for some portion of the first part of 2008. Details on 2007 to 2008 transitions are provided in each program narrative.

Several iterations of our thinking on new directions were presented to key stakeholders at public meetings in June through November. Based on review of the comments received and input from OCE, many of the comments are incorporated in our program proposals.

Following the program descriptions are a series of Appendices. **Appendix A** is a summary of the projected allocation of marketing budgets to specific marketing activities.

**Appendix B** is a summary of total 2008 program costs, broken down by cost category.

**Appendix C** presents our proposed performance incentive mechanism and summarizes specific goals and the incentive dollars that would be attached to those goals for calendar year 2008. These “performance incentive goals” are a subset of the program goals identified in the individual program narratives. They also include sector level goals that are not tied to any individual program. **Appendix D** presents the savings algorithms that we propose for use in 2008. These algorithms were used in developing the savings goals presented in Appendix C. These new algorithms include several revisions to the existing algorithms.

It is important to note that all of the various components of this filing are intimately linked. For example, goals presented in Appendix C are appropriate only if the program design changes captured in the program narratives, marketing strategies outlined in Appendix A, budgets presented in Appendix B and savings algorithms in Appendix D are approved. In addition, most of the goals in Appendix C presume that contract modifications necessary for Honeywell to implement program changes are in place in early January 2008. If they are not in place in early January 2008, several goals will need to be revised downward.

## **2008 Residential New Construction Program**

### **“New Jersey ENERGY STAR® Homes”**

#### **Description**

The Residential New Construction Program is designed to increase the energy efficiency and environmental performance of residential new construction in New Jersey.

The Program has the long-term objective of transforming the market to one in which a majority of residential new construction in the state is “net zero-energy”. In the mid-term, the Program supports the transition to a residential new construction energy code that is at least equivalent to the current EPA ENERGY STAR Homes standard. New home energy performance under the code would be verified through a market-based energy rating infrastructure. In the near term the program will offer reduced builder incentives (by lowering direct rebates and shifting elements of the verification cost to builders) while continuing to grow program participation (market share) and per-home savings through an increased emphasis on marketing.

There are a number of market barriers to efficiency investments in new construction in New Jersey. Key among these are: (1) split incentives (i.e. builders who make design and procurement decisions will not pay the homeowner operating costs associated with those decisions); (2) lack of information regarding the benefits of efficiency and environmental performance on the part of consumers, builders, lenders, appraisers, realtors and others; (3) limited technical skills on the part of builders and their subcontractors to address key elements of efficiency; and (4) inability of consumers, lenders, appraisers and others to differentiate between efficient and standard homes. This program employs several key strategies to overcome these barriers:

- Direct incentives to builders for homes that meet program standards.
- Marketing assistance to builders to promote the energy and environmental benefits of NJ ENERGY STAR Homes participating projects.
- A comprehensive consumer marketing campaign designed to drive homebuyer demand for NJ ENERGY STAR Homes as direct incentives to builders are reduced.
- Technical assistance to builders and their subcontractors on energy efficient construction and installation practices.
- Verification (inspections and testing) and program certification of qualified homes.
- Technical support/training on residential energy code updates and implementation.

## **Target Market and Eligibility**

Single family, multi-single (“townhome”) and low/mid-rise multi-family buildings are fully eligible for program benefits if:

- 1) The home is heated or cooled using natural gas and/or electricity supplied by a New Jersey public utility (This is a change from previous years of the Program when a reduced incentive was provided to new homes that were supplied by either natural gas or electricity, but not both); and
- 2) Each unit has its own gas or electric heating system and/or central air conditioning system. Master-metered multifamily buildings with sub-metering of individual units may participate provided each unit has its own gas or electric heating system and/or central air conditioning system.

In order to ensure a single statewide technical standard and statewide brand for energy efficiency (under New Jersey’s **Clean Energy** Program™), the program will offer free certification services (including a limited number of verification inspections) for any new home or existing home undergoing substantial (“gut”) renovation or remodeling that meets the above criteria, regardless of its location in the state. However, consistent with the State’s policy initiative to support development and redevelopment in Smart Growth areas and not subsidize growth outside of these areas, rebate incentives for new construction, including those offered under this program, are limited to buildings constructed in a State designated “Smart Growth” area (defined as Planning Areas I and II and the Designated Centers using the “Policy Map of the New Jersey State Development and Redevelopment Plan” found at

<http://www.nj.gov/dca/osg/resources/maps/index.shtml> and described in NJAC 14:3-8.2). The only exception to this Smart Growth limitation is for (1) state funded “Affordable Housing” projects which may qualify for rebate incentives regardless of their location and/or (2) “exemptions from cost limits on areas not designated for growth.” Such projects must be eligible for an exemption from “designated growth area: limits as provided for in N.J.A.C 14:3-8.8 as these rules now specify or as they may be amended in the future.”

In order not to promote the design and construction of larger homes that inherently use more energy, homes that are over 4000 square feet of conditioned floor area will be required to meet Tier 2 performance criteria (see definitions below) in order to qualify for direct incentives and marketing support, even when located in a qualifying Smart Growth location.

Homes that participate in the Residential New Construction Program are not eligible for participation or incentives under the Residential Gas and Electric HVAC program (Cool Advantage/Warm Advantage). Homes may participate in one program or the other, but not both. However, homes participating in the Residential New Construction Program may participate in the HVAC Program’s Quality Installation and Verification (QIV) protocol, which provides technical assistance and incentives for correctly installing and testing central cooling equipment in order to optimize efficiency.

## **Offerings and Customer Incentives**

For units enrolling as of January 1, 2008, the program will offer increasing incentives across three efficiency tier levels, plus supplemental incentives for lighting and participation in a Quality Installation Verification protocol for central air conditioning.

To meet the Tier 1 level, a new home must:

1. Meet either the EPA ENERGY STAR Homes performance standard (currently a HERS index of 85 or lower in NJ) or the alternative prescriptive EPA National Builder Option Package (climate zone specific “BOP”). Multifamily buildings over 3 floors may be required to demonstrate compliance through the newly expanded EPA ENERGY STAR for High-Rise Multifamily Buildings pilot;
2. Comply with the EPA Thermal Bypass Inspection Checklist, as applicable;
3. Comply with EPA’s mandatory additional requirements (including proper HVAC sizing and duct leakage limits), as applicable;
4. Install ENERGY STAR qualified HVAC equipment (or highest available alternative);
5. Fully duct all HVAC supplies and returns and fully seal all duct system joints and seams with mastic compound (no tapes), as applicable;
6. Install ENERGY STAR qualified mechanical ventilation with automatic 24-hour control; and
7. Install at least 3 ENERGY STAR labeled hard-wired light fixtures and/or ENERGY STAR labeled screw-based CFL bulbs in at least 50% of all light fixtures (including exterior fixtures).

To meet the Tier 2 level, a home must:

1. Meet all of the Tier 1 requirements, and
2. Achieve an energy rating HERS index of 65 or less (approximately equivalent to the federal tax credit efficiency level) or equivalent High-Rise Multifamily Pilot performance.

A limited number of Tier 3 “NJ Microload Home” projects will be initiated in coordination with the Department of Community Affairs (Division of Codes and Standards) and the New Jersey Institute of Technology. The program will leverage any Microload Home technical criteria, procedures, expertise and relationships already developed by DCA and NJIT over the past several years. Funding is allocated for additional program development and technical support to fully launch and implement this new “high performance” tier. However, incremental inspections and testing will be addressed within the current structure for those activities (i.e., by providing additional pre-drywall, intermediate and final inspections as necessary).

Direct incentive levels are reduced significantly from 2007, as shown in Table 1. Note that these incentives will be available for any qualifying home that uses natural gas and/or electricity supplied by a public utility, regardless of whether one fuel is supplied by an entity other than a public utility.

Builders have been expecting a stepped reduction in incentives over time since 2004. In 2008 incentives will be reduced by approximately 20 to 40% at Tier 1, compared to 2007 levels. The significantly more energy efficient Tier 2 will offer incentives at approximately the same level as the Program did in 2007. Tier 3 will provide substantially increased incentives on a customized basis. Incentives will also be simplified, single amount per certified unit (by building type) rather than being variable based on house size and equipment.

At each Tier level, the program will provide at no charge a sufficient number of screw-based CFLs to meet the required minimum for qualification, as an alternative (or in addition) to the previous requirement and direct incentive for ENERGY STAR light fixtures.

**Table 1: Financial (“Direct”) Builder Incentives per Unit<sup>1</sup>**

Building Type	“Old” 2007	2008 Tier 1	2008 Tier 2 <sup>2</sup>	2008 Tier 3	
Single Family	\$2,780 <sup>3</sup>	\$1,800	\$2,800	Custom (est. avg. \$17,500)	
Multiple Single Family (“Townhouse”)	\$1,830 <sup>4</sup>	\$1,300	\$1,800		
Multiple-Family Building (“Multifamily”)	\$1,200 <sup>5</sup>	\$1,000	\$1,200		
<b>Supplemental Incentives</b>	<b>“Old” 2007</b>	<b>All 2008 Tiers</b>			
ENERGY STAR Lighting	\$20/fixture or \$30/can (over 3)	\$20/fixture (surface mount or recessed) over 3 AND/OR screw based CFL lighting supplied free of charge for builder installation in more than 50% of sockets			
HVAC QIV <sup>6</sup> (ResHVAC Program)	N/A	\$100 per system for participation in an approved central air conditioning Quality Installation Verification protocol			
ENERGY STAR Appliances <sup>7</sup>	\$175/washer	N/A			

<sup>1</sup> Homes over 4000 square feet of conditioned floor area are required to meet Tier 2 performance criteria in order to qualify for direct incentives and marketing support; If no ENERGY STAR rated HVAC equipment is available for the specific configuration, proposed equipment specifications must be submitted for approval (generally highest available alternative); For each inspection type, re-inspection costs beyond those associated with an initial re-inspection are deducted from the rebate.

<sup>2</sup> Tier 2&3 incentives are supplemental to available Federal Energy Tax Credits, if applicable.

<sup>3</sup> Example 2007 incentive based on a 2800 sq. ft. Single Family home at \$500 + \$1680 (\$0.60/sq.ft.) + \$300 (90% AFUE furnace) + \$300 (SEER 14 Central A/C) = \$2780

<sup>4</sup> Example 2007 incentive based on a 1800 sq. ft. Multiple Single home at \$150 + \$1080 (\$0.60/sq.ft.) + \$300 (90% AFUE furnace) + \$300 (SEER 14 Central A/C) = \$1830

<sup>5</sup> Example 2007 incentive based on a 1000 sq. ft. Multifamily home at \$0 + \$600 (\$0.60/sq.ft.) + \$300 (90% AFUE furnace) + \$300 (SEER 14 Central A/C) = \$1200

<sup>6</sup> The HVAC contractor is also eligible to receive an incentive of \$250 per system through the Residential HVAC program.

<sup>7</sup> Washer rebates are available for retail purchases through the Energy Star Products program.

Through the Residential HVAC Program, an additional incentive is offered to

promote voluntary participation in the Quality Installation Verification protocol. An incentive of \$100 is available to the builder to facilitate their contractor's commitment and follow-through, and \$250 is available to the HVAC contractor to compensate for the additional time, training, equipment and tasks involved in commissioning the equipment at time of installation.

In order to maximize savings potential, participation in both the CFL lighting offer and the QIV protocol will be available to all homes completed in 2008, regardless of enrollment date.

A cooperative marketing offer for participating builders will drive homebuyer demand for qualifying homes, and act as an indirect incentive to help offset the reduction in direct rebates to builders. This co-op marketing offer will supplement a Residential New Construction component within the overall marketing campaign of New Jersey's **Clean Energy** Program™, in order to further raise consumer demand. An aggressive consumer focused marketing campaign will be essential to the program's ability to maintain builder participation (and therefore market share) at the same time as incentives are reduced and requirements are increased.

Note that the Tier 2 incentive level is intended to complement the Federal Energy Tax Credit for new home construction (currently \$2,000) in order to encourage participation at this advanced level (in 2006, fewer than 1% of new homes in New Jersey met this level of performance). In the event that the Federal Energy Tax Credits expire at the end of 2008, as currently planned, the NJ ENERGY STAR Homes Program will consider raising its incentive at this Tier level accordingly. The incentives identified above may be modified with the approval of the Office of Clean Energy.

New program requirements, procedures and incentives will take effect 60 days from written notification to program participants (i.e. builders, developers, etc.). Any application after the 60 day notification period will be subject to new program rules. For applications submitted before or during the notification period, builders will have the option of either (1) enrolling in the new program; or (2) for only those units projected for completion by December 31, 2008, enrolling in the existing (i.e. 2007) program. Any unit that has not passed final inspection by 12/31/2008, regardless of when or under which program rules it signed-in, must re-enroll under the then-current guidelines in order to remain eligible for applicable program services and incentives.

## **Planned Program Implementation Activities for 2008**

The following program implementation activities will be undertaken in 2008:

- Train builders, developers, trade subcontractors, design professionals and real estate and code enforcement personnel on program requirements and benefits.
- Expand the number of projects participating in verification inspection sampling based on results of the 2007 pilot.
- Develop a plan for 2009 program revisions. This will include consideration of (1) changes made necessary by updated state energy code; (2) revisions to rebate levels,

efficiency tiers and marketing efforts; (3), alternative approaches to service delivery (including the potential for any certified HERS Rater and/or accredited HERS Rating Provider to qualify and perform program verification services for builders), along with the necessary administrative and quality control processes; and (4) an increasing focus on homes that deliver enhanced levels of efficiency, comfort and sustainable (“green”) features.

Revisions will be designed to reflect changes in code, incremental costs, market barriers, and other relevant market factors, climate change impacts and goals. The start date(s) for new incentives, marketing strategies and/or approaches to service delivery will be such that there is sufficient time to conduct analysis of needed changes, get input from the industry, provide notice of changes to industry, maintain high standards for quality of program services, and to pilot the introduction of changes, as appropriate.

- Participate in the U.S. Environmental Protection Agency’s ENERGY STAR for Multifamily Buildings (new construction) pilot for eligible buildings over three floors (based on the ASHRAE 90.1 modeling methodology rather than the Home Energy Rating System), with corresponding adjustments to qualification criteria and implementation services (project review and verification).
- Work with DCA to provide technical assistance on the code update process.
- Develop and implement a carbon footprint label (or utilize a label anticipated to be available from RESNET and/or EPA).

## **Marketing and Communications Plan**

Target Audience: Residential Homebuyers and Builders

Key Consumer Message: NJ ENERGY STAR Homes provide a lifetime of savings, comfort and value.

Key Builder Message: Differentiate yourself in the marketplace by building high performance homes that are tested and certified to use less energy and provide greater value.

To meet the challenges of a slow new construction housing market, increased standards, reduced incentives, and proposed efficiency/incentive tiers to reward high performance homes, the following program strategies and tactics are being proposed:

- Integrated consumer marketing program, including advertising, public relations, special events and online promotion to build awareness and consumer demand;
- Builder financial incentives and co-op marketing program;
- Carbon footprint label for high performance homes.

Creating consumer awareness and demand will be critical in 2008 to:

- Encourage builders to meet and exceed ENERGY STAR guidelines based on consumer demand and incentivizing of higher tiers;

- Differentiate builders in the growing “green building” consciousness of consumers;
- Increase consumer awareness and demand of high performance homes for both economic and environmental benefit.

#### Consumer Marketing Tactics:

- Advertising: Real estate, lifestyle focused print (magazine and newspaper) and on line advertising timed in early spring, summer and fall. Incorporate new home construction message in any new television production;
- Public Relations/Media Outreach: Press releases and feature stories regarding home-building how-to’s for smart building, including financial and environmental features and benefits to showcase higher tier homes;
- Demonstration Home Tours Events of champion builders and homes in the state that meet each tier level (using actual home and on-line virtual tour) to create greater consumer awareness and garner media attention. This may involve being part of a “Green Homes Tour”;
- Displays: Support integration of ENERGY STAR products (appliances and lighting), as well as ENERGY STAR Homes features, in the Design centers and model homes of major builder. This will include development of museum boards and signage;
- Designate ENERGY STAR Homes with brass plaques to recognize ENERGY STAR achievement;
- Collateral Materials: Updated customer and builder education materials based on program changes;
- Distribution of homeowner kit to help ensure consumer is aware of ENERGY STAR Home purchase, includes educational materials, brass plaque, customer survey, energy usage release, and promotional items;
- Direct Mail to Eco-Realtors and Consumers;
- Web: Update web site with new program information; include virtual home tour highlighting key features and benefits;
- Call Center: Provide information about ENERGY STAR Homes on call center “on hold” messaging.

#### Builder Marketing Tactics:

- Advertising: Sponsorship and advertising with Home Builders Associations, regional and national; Journal of Light Construction, Builder/Architect;
- Public Relations/Media Outreach: Feature stories in association newsletters, Builder/Architect, Journal of Light Construction;

- Awards Program: Recognizing significant energy savings and technology advancements;
- Sponsorship of home builder association events including Atlantic Builders Convention, Builder's League of South Jersey, Builder and Remodeler's Association of Northern Jersey, Community Builders Association, Shore Builders Association of Central New Jersey, state events, including Governor's Conference on Housing and Development, Clean Energy Conference, and industry events, such as ACI;
- Co-op advertising program and financial incentives for builders to support increased consumer awareness and market differentiation.

**Table 2: New Jersey ENERGY STAR Homes Program and Marketing Goals**

<b>Program Goals</b>	<b>Communications Outreach Strategy</b>	<b>Marketing Collateral</b>	<b>Website</b>
Outreach to consumers, about the benefits of an energy efficiency home and the importance of "green building".	Advertising: real estate, lifestyle focused print (magazine and newspaper), online timed in early spring, summer and fall. Incorporate new home construction message in any new television production;  Public Relations: press releases and feature stories regarding home-building how-to's for smart building, including financial and environmental features and benefits to showcase higher tier homes;  Demonstration Home Tours Events of champion builders and homes in the state that meet each tier level (using actual home and on-line virtual tour) to create greater consumer awareness and garner media attention;  Conduct direct mail outreach to target consumers and realtors;  Provide a homeowner kit to consumers so that they are aware of ENERGY STAR Home purchase, include educational materials, brass plaque, customer survey, energy usage release, and promotional items.	Update existing marketing collateral educating the consumer and builder on new program changes.	Add virtual home tour to website;  Include press releases and feature stories on New Jersey ENERGY STAR Homes Section of website.
Builder Outreach.	Advertising: Sponsorship and advertising with Home Builders Associations, regional and national; Journal of Light Construction, Builder/Architect;  Public Relations: Feature stories in association newsletters, Builder/Architect, Journal of Light Construction;  Awards Program: Recognizing significant energy savings and technology advancements;  Sponsorship of home builder association events including Atlantic Builders Convention, Builder's League of South Jersey, Builder and Remodeler's Association of North Jersey, Community Builders Association, Shore Builders Association of Central New Jersey, state events, including Governor's Conference	Update co-op advertising templates as needed;  Update existing builder brochure, forms and materials with new program changes.	Place builder feature stories and case studies on website;  Update new program information on the website.

<b>Program Goals</b>	<b>Communications Outreach Strategy</b>	<b>Marketing Collateral</b>	<b>Website</b>
	on Housing and Development, Clean Energy Conference, and industry events, such as ACI;  Co-op advertising program and financial incentives for builders to support increased consumer awareness and market differentiation.		
Realtor Outreach.	Conduct a direct mail to eco-realtors about New Jersey ENERGY STAR Homes.		
Integrate ENERGY STAR products (appliances and lighting), as well as ENERGY STAR Homes features in the Design centers of major builders.	Conduct meetings with large builders such as K. Hovnanian, D.R. Horton, etc. and present ideas to them about including appliances and lighting in their design centers;  Provide museum boards for model homes that call out features and benefits.		
Designate ENERGY STAR Homes with brass plaques to recognize ENERGY STAR achievement.	Provide homeowner with the brass plaque in the homeowner kit they receive.		

## **Quality Control Provisions**

The RNC program utilizes both on-site inspections and in-house technical review to ensure that the homes participating in the program meet all program requirements. Quality control in the field includes, at a minimum, a mandatory pre-drywall inspection and a final inspection with testing (unless participating in an approved final inspection sampling protocol). Re-inspections and additional mid-construction inspections are performed when necessary based on initial results. The final inspection, when completed, includes testing with blower door and “Duct Blaster™” equipment, among other procedures.

In-house technical review occurs at both the front and back ends of the process. Builder plans are analyzed as proposed prior to construction to determine upgrades necessary to meet either the EPA performance or prescriptive (BOP) compliance path as well as New Jersey program specific requirements. Final results are analyzed after construction based on final inspection and testing to confirm qualification for certification.

In anticipation of moving to a market-based HERS delivery infrastructure, development of a quality control and oversight process will be initiated in order to manage and monitor multiple independent verification providers.

## **Budget**

A detailed budget for this program for 2008 is attached in Appendix B.

A change from previous years is the plan to include in the 2008 budget (and each subsequent annual budget) both the projected direct incentive and program implementation costs for units expected to be built in the current year (2008), as well as the projected value of direct incentives and program implementation costs for homes committed prior to the end of the current year that will not be completed until subsequent year(s), for the duration of their enrollment prior to expiration. As a result, the program will revert to the previous practice of enrolling up to two years of units per project, provided the total budget is not exceeded on an annual basis without approval.

## **Goals and Energy Savings**

### *Goals*

Performance incentives will be associated with two program goals for 2008:

- the percentage of the total New Jersey permits issued for qualifying residential new construction types in the current year (i.e. single family, townhouse and multi-family buildings eligible to participate in the Program) with commitments to build to the NJ ENERGY STAR Homes program standard within two years of enrollment.
- the percentage of total New Jersey Certificates of Occupancy for qualifying residential new construction types (single family, townhouse and multi-family) certified to the NJ ENERGY STAR Homes program standard in the current year.

Details on these goals can be found in Appendix C. Additional program goals are as follows:

- Train at least 150 builders, subcontractors, architects and/or other key trade allies on program elements and aspects that will improve the energy efficiency, performance and sales of homes they design and build.

### *Energy Savings*

Energy savings will be calculated consistent with the latest Board approved protocols. Savings estimated for this program are included in residential sector savings goals shown in Appendix C.

Several modifications proposed for the 2008 Program specifically require the approval of complementary contract modifications before they can be implemented:

- Micro-load home incremental technical implementation and program development
- High-rise multifamily incremental technical implementation
- CFL purchase, direct-installation and inventory management

In addition, the Program participation goal for 2008 assumes the approval of the proposed increase in the variable marketing budget. If approval is delayed beyond January 1, 2008, lower program and/or sector savings goals will likely be necessary for 2008.

## **2008 Residential Gas & Electric HVAC Program**

**“New Jersey Warm Advantage & Cool Advantage”**

### **Description**

The New Jersey Residential Gas & Electric HVAC Program promotes the purchase of efficient home heating, cooling and water heating equipment, and the quality installation of such equipment. Its long-term goal is to make the high quality installation of high efficiency residential HVAC equipment the norm in the NJ market. For this program the market is considered transformed when rebates can be reduced or eliminated without a decrease in market penetration for targeted HVAC equipment or products.

The program must overcome several market barriers to achieve its goals. Key among these are: (1) consumers' inability to differentiate, and therefore value, the difference between good and poor quality HVAC installation; (2) consumers' lack of information on the benefits (both energy and non-energy) of efficient equipment and quality installations; (3) lack of training for HVAC contractors on key installation issues and approaches to “selling” energy efficiency, and; (4) split incentives (between builders and homebuyers and between owners and renters).

The program employs several key strategies to address these barriers:

- Financial incentives for the purchase of ENERGY STAR-qualified gas heating equipment and energy-efficient water heaters. These incentives will decline over time as the installations of energy-efficient equipment become commonplace;
- Financial incentives for the purchase of high efficiency electric HVAC heating & cooling equipment. These incentives will decline over time as the installations of energy-efficient equipment become commonplace;
- Financial incentives and program support for the accurate analysis of building cooling and heating loads, the proper sizing and selection of cooling and heating equipment according to established industry standards;
- Financial incentives and program support for quality installation that confirms appropriate system refrigerant charging and air flow across the interior coil at time of installation;
- Outreach and education for HVAC manufacturers, distributors and contractors;
- ENERGY STAR sales training for contractors (i.e. how to sell efficiency);
- Technical training for HVAC contractors on the proper sizing, selection and installation of HVAC equipment and;
- Promotion of HVAC technician certification through NATE certification testing.

The New Jersey Clean Energy Program will continue to support efforts, where technically and economically justifiable, to upgrade federal appliance efficiency standards and state building codes. This includes participation in regional and national efforts coordinated by organizations such as NEEP and CEE, and also includes

submitting letters in support of efficiency standards and building codes. The program also provides, when necessary, technical support for the development of such upgrades, tracking of activities and monitoring developments, and review and modification of program designs to integrate changes to the standards and codes.

## **Target Market and Eligibility**

The program promotes the installation of new, energy efficient, electric air conditioners, and heat pumps. Cool Advantage covers both conventional, centrally ducted air conditioning systems and “ductless mini-split” systems. The program also covers both air-source and ground-source heat pumps. Warm Advantage promotes gas furnaces, boilers and water heaters for use in residential buildings. Incentives are available for the installation of qualified HVAC equipment in all existing residential homes (retrofit), as well as in new homes constructed in a State designated “Smart Growth” area (defined as Planning Areas I and II and the Designated Centers using the “Policy Map of the New Jersey State Development and Redevelopment Plan” found at <http://www.nj.gov/dca/osg/resources/maps/index.shtml> and described in NJAC 14:3-8.2)). The only exceptions to this Smart Growth limitation are for (1) state funded “Affordable Housing” projects which may qualify for rebate incentives regardless of their location and/or (2) “exemptions from cost limits on areas not designated for growth.” Such projects must be eligible for an exemption from “designated growth area: limits as provided for in N.J.A.C 14:3-8.8 as these rules now specify or as they may be amended in the future.” Builders or home purchasers constructing new homes may participate in either the Gas and Electric HVAC program or the New Jersey ENERGY STAR Homes program, but not both.

## **Offerings and Customer Incentives**

### *Cool Advantage*

This proposal includes significant changes to the structure of incentives offered under the 2007 Cool Advantage program. Starting in 2008, Cool Advantage will offer separate incentives for correct sizing, efficient equipment and Quality Installation Verification (QIV).

There will be two paths to receiving incentives for installations of new central air conditioning or heat pump equipment. The first is to install equipment with high efficiency ratings (i.e. SEER, EER and – in the case of air source heat pumps – HSPF). The second is to provide documentation of proper charge and airflow through a program-approved, third-party quality installation verification (QIV) system.

Both paths require documentation of proper sizing.<sup>1</sup> Specifically, all applications must include both inputs and outputs of a cooling load calculation performed using an ACCA accredited software package compliant with Manual J v. 8 and an equipment selection

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<sup>1</sup> This requirement does not apply to ductless mini-split systems in 2008 while we gather data on their use in the field.

calculation compliant with ACCA manual S.<sup>2</sup> These new parameters constitute a strengthening of the prior correct sizing requirement.

Participants may choose and receive incentives for either or both paths. For example, efficient equipment rebates will be provided for SEER 14 central air conditioners that are properly sized, but have not gone through a QIV system (\$100 to consumer for the efficient equipment plus \$100 to contractor for proper sizing). Conversely, QIV rebates will be provided for SEER 13 central air conditioners or heat pumps that have been properly sized and gone through QIV for charge and airflow (\$250 to contractor for proper sizing and QIV). A maximum incentive of \$400 will be paid for SEER 15 central air conditioners and heat pumps that are proper sized and have gone through QIV (\$150 to the customer for the equipment, plus \$250 to the contractor for proper sizing and QIV).

This incentive structure is summarized in Table 1 below. Note that ductless mini-split (DMS) systems are eligible to participate under the same requirements as central air conditioners or heat pumps, except as noted below. For equipment incentive purposes, ground source heat pumps (GSHPs) that are ENERGY STAR qualified will be treated as Tier 2 equipment (i.e. analogous to SEER 15, EER 12.5, HSPF 8.5).

This new incentive structure is a major departure from previous program years and reflects the impact of the increased federal minimum efficiency standard on the baseline efficiency of residential cooling equipment. Since that standard went into effect, the savings potential from proper sizing and installation have become greater than from increased equipment efficiency ratings.

Table 1: New Central A/C and Heat Pump Incentives

Requirement	Qualifying Level	Documentation	Incentive Amount <sup>3</sup>
Efficient Equipment 1 <sup>4</sup> (must also meet correct sizing requirement except DMS)	Compressor and coil combination that yield >= SEER 14 and EER 12 or (in the case of heat pumps) HSPF 8.5	Confirmation of Compressor/ coil combination rating from CEE-ARI directory <sup>5</sup>	\$100 (to customer) \$100 (to contractor)
Efficient Equipment 2 <sup>3</sup> (must also meet correct sizing requirement except DMS)	Compressor and coil combination that yield >= SEER 15 and EER 12.5 and (in the case of heat pumps) HSPF 8.5	Confirmation of Compressor/ coil combination rating from CEE-ARI directory <sup>4</sup>	\$150 (to customer) \$100 (to contractor)
Quality Installation Verification (must also meet correct sizing requirement except DMS)	Correct refrigerant charge and Airflow	CheckMe record indicating acceptable charge & air-flow, downloaded Service Assistant record showing acceptable charge & air-flow, or equivalent as determined by program management. <sup>6</sup>	\$250 (to contractor)

<sup>2</sup> In recognition that the enhanced sizing requirements may require many contractors to change load calculation software, the program will work to reduce the cost of new software and training.

<sup>3</sup> Incentives are additive. For a properly sized, SEER 15 CAC system with QIV the contractor would receive \$350 and the customer would receive \$150.

<sup>4</sup> Contractors would qualify for EITHER option 1 or 2 depending upon the efficiency of the equipment

<sup>5</sup> GSHP systems must be ENERGY STAR qualified to be eligible for incentives.

<sup>6</sup> Allowances for inadequate airflow due to existing ductwork deficiencies may be made in the case of systems installed in existing homes.

In 2008 all homes with electric central air conditioning or heat pumps will be eligible to participate in an equipment maintenance initiative designed to optimize the operating efficiency of existing (often older) central air conditioners and heat pumps. Field studies have repeatedly shown that the typical new residential air conditioner or heat pump is either improperly charged with refrigerant, has improper air flow across the indoor coil, or both. Although many HVAC contractors offer annual maintenance services, these are usually limited to checking that the system is operating and that the coil and filter are clean. Such services usually do not attempt to correct installation errors. The 2008 HVAC maintenance initiative will offer homeowners who have existing, operating central air conditioners or heat pumps the same kind of field testing of charge and airflow described as QIV above, as well as corrections to any problems discovered.

**Table 2: Existing Central A/C and Heat Pump Maintenance Initiative**

Requirement	Documentation	Incentive Amount
Corrected refrigerant charge and air-flow	Completed CheckMe record indicating both initial and corrected charge and air-flow, downloaded Service Assistant record showing both initial and corrected charge and air-flow, or equivalent as determined by program management.	\$250

#### *Warm Advantage*

The Warm Advantage program promotes gas heating equipment meeting the ENERGY STAR efficiency standard (i.e., minimum AFUE of 90% for furnaces and 85% for boilers). In 2008 the program will offer incentives for two tiers of efficient gas water heaters with an Energy Factor of at least 0.62 and 0.82 (the second tier is intended to include tankless water heating technologies.)

Table 3 below details applicable efficiency levels and corresponding incentives for high efficiency gas equipment.

**Table 3: Gas Equipment Incentives**

Equipment	Minimum Efficiency	Incentive Levels
Furnace	90% AFUE or greater, ENERGY STAR	\$300
Furnace with Electronically Commutated Motor (ECM) or equivalent	92% AFUE or greater, ENERGY STAR	\$400
Boiler	85% AFUE or greater, ENERGY STAR	\$300
Water Heater, Tier 1	0.62 Energy Factor or greater	\$25
Water Heater, Tier 2	0.82 Energy Factor or greater	\$300

At the customer's request, incentives may be payable to the consumer, the HVAC contractor or the builder of the new home that the HVAC system is installed in. Incentive levels may be adjusted in future years for all eligible equipment based upon market assessments as program market barriers are overcome.

### *Cool Advantage and Warm Advantage*

In 2008 the program will also experiment with the use of upstream incentives in partnership with HVAC manufacturers (and/or possibly distributors or other “upstream” market actors) to increase sales of efficient HVAC equipment and/or the quality of the installations of HVAC equipment. Such efforts will be coordinated with regional efforts led by NEEP to the extent practical and appropriate. Promotions could be for either central cooling equipment, heating equipment, or both.

In 2008 both Cool and Warm Advantage participants will be eligible to participate in a pilot designed to reduce the loss of conditioned air through residential ductwork, the “Duct Sealing Pilot”. Because duct sealing is not currently offered as a service in New Jersey, and because both the necessary skills and equipment are rare, incentives during 2008 have been set to cover the entire projected cost. This will allow interested contractors to offer duct sealing as a free service, and will generate a database of costs and benefits that can be used to establish future incentive levels.

**Table 4: Duct Sealing Pilot Incentive**

Requirement	Documentation	Incentive Amount <sup>7</sup>
Residential ductwork must achieve significant measured reduction in leakage and not leak more than a target percentage of conditioned air carried	Ductblaster® or equivalent test to be determined by program management.	\$500 (to contractor)

All new program requirements, procedures and incentives will take effect 60 days from written notification to the HVAC industry. Any application for an installation made after the 60 day notification period will be subject to new program rules. For applications addressing installations made before or during the notification period, consumers and HVAC contractors will have the option of either (1) enrolling in the new program; or (2) enrolling in the existing (i.e. 2007) program.

### **Planned Program Implementation Activities for 2008**

The following program implementation activities will be undertaken in 2008:

- Increase program marketing efforts to increase program participation. In 2008 the program will begin direct marketing to homeowners, in addition to continuing marketing to HVAC contractors. The program will also pursue opportunities for enhancing cross-marketing with other programs, particularly Home Performance with Energy Star.
- Introduce a voluntary quality installation verification (QIV) component, involving “real-time”, third-party, in-field verification of proper refrigerant charge and airflow using qualified diagnostic tools. This component will also be available to participants under the Residential New Construction and Home Performance with ENERGY STAR programs.

<sup>7</sup> Incentives are additive. For a properly sized, SEER 15 CAC system with QIV the contractor would receive \$350 and the customer would receive \$150.

- Pilot a central A/C and heat pump maintenance initiative – with financial incentives, marketing and other support – using QIV to correct charge and airflow for older central A/C and heat pump units. The program will explore opportunities for integrating this effort with related activities under the Home Performance with ENERGY STAR program.
- Pilot a residential duct sealing program designed to optimize the performance of conditioned air distribution systems in homes.
- Explore the potential inclusion of solar water heating as a future program measure.
- Train HVAC technicians on the proper calculation of heating and cooling loads using ACCA Manual J v.8 and Manual S compliant software, on proper A/C refrigerant charging and how to achieve proper airflow across the indoor coil, on the use of approved QIV systems, on technical material that must be understood to pass the North American Technician Excellence (NATE) certification tests and/or Building Performance Institute (BPI) certification tests, proper duct sealing, duct design using ACCA Manual D, ENERGY STAR sales techniques, high efficiency gas heating system installation and selection practices and/or any other substantial form of training that is directly related to the promotion of energy efficiency and quality equipment installation.
- Support ENERGY STAR sales training for sales representatives of HVAC contractors.
- Continue to perform outreach activities to explain the program offerings (e.g. rebates, sales and technical training) with the State's HVAC contractors.
- Develop joint upstream promotions with HVAC manufacturers (and/or possibly distributors or contractors). This may be done either through regional effort led by NEEP or independently. Effort may include financial incentives or co-op marketing to support sales of efficient equipment and or documented quality installations. Promotions could be for either central A/C or heating equipment or both.

## **Marketing and Communications Plan**

Consumer Target Audience: Homeowners

Trade Target Audience: HVAC Contractors

Key Consumer Message: Correctly sized and properly installed high efficiency systems connected to well designed and sealed duct systems will save energy and perform better for greater comfort and savings for years to come. Routine maintenance is an important factor in keeping your HVAC system running properly.

Key Contractor Message: Increase sales, reduce call backs, differentiate your company, and build long-term relationships with customers by offering financial incentives, quality installations, and maintenance service programs to maintain system performance.

In 2008, new program initiatives for air conditioning include:

1. Quality Installation Verification (QIV) system for new central air conditioning systems to help ensure that high efficiency equipment is installed properly by an independent third-party. Contractors benefit from assurance that technicians installed equipment properly, helping to reduce customer call-backs. QIV increases customer satisfaction, provides contractors with market differentiation, and provides peace of mind to customers that equipment is operating at optimal performance levels for greater comfort and savings.
2. Maintenance Program for existing central air conditioning systems to optimize efficiency (correct probable improper installation) and to secure long-term system performance and savings.
3. Duct sealing to maximize the performance, efficiency and comfort of the entire residential HVAC system.

*Consumer Marketing Tactics:*

1. Incorporate HVAC program quality installation process and consumer and contractor messaging under the Home Performance with ENERGY STAR umbrella, i.e. make sure your system is tested for performance and safety by a participating, qualified contractor.
2. Advertising: Print advertising (select newspaper and yellow pages), online, and radio advertising; point-of-purchase displays at home improvement centers providing HVAC equipment sales and contractor referrals.
3. Public Relations/Media Outreach: Seasonal heating/cooling features with how-to's for buying a system and hiring a contractor to perform quality installations, along with "Hot Days" promotion during high-temperature periods in the summer, with specific broadcast and public relations messaging in peak temperature periods
4. Industry Networking: Trade sales promotion/communication with manufacturers, distributors, and supply centers. We will look at co-op advertising opportunities between participating utilities and equipment mfrs, i.e. gas equipment mfr. working with gas utility to promote incentives. This may include contacting equipment manufacturers for a list of 2008 incentives that OCE can promote as part of the Warm Advantage/Cool Advantage programs.
5. Point-of-purchase and education tip sheets on purchasing/maintaining equipment at home improvement retailers, supply centers, as well as through contractor distribution to consumers
6. Incorporation of Clean Power Community Partner participation in pilot programs and awareness of Warm Advantage/Cool Advantage incentives and participating contractors.
7. Web: Update web site with buyer's guide information about how to purchase new equipment, select a contractor, and access available rebates. Use the On-Line Home Analyzer tool to direct customers to HVAC offerings

8. Call Center: Cross market and promote HVAC program to customers inquiring about Home Performance with ENERGY STAR or ENERGY STAR Homes. Include information in “on hold” messaging.
9. Direct Mail: Provide HVAC offerings to customers using On-Line Analyzer.
10. Collateral: Development of updated educational materials and application forms for WarmAdvantage, CoolAdvantage, QIV, Duct Sealing and Maintenance programs.

*Contractor Marketing Tactics:*

1. Contractor recruitment for participation in QIV, Maintenance and Duct Sealing programs will include provision of educational literature and participation in training workshops through Home Performance with ENERGY STAR, and industry events, such as ACI technical workshops and conferences.
2. Regular contractor and trade ally communications through trade ally newsletters and email postings.
3. Special training events, trade ally meetings, and educational workshops.
4. Direct mail outreach through contractor associations.

**Table 3: Marketing Goals and Strategies**

<b>Program Goals</b>	<b>Communications Outreach Strategy</b>	<b>Marketing Collateral</b>	<b>Website Strategy</b>
Promote program to homeowners	<p>Direct marketing through print advertising (newspaper and yellow pages, online, radio advertising; and point-of-purchase displays at home improvement centers</p> <p>Prepare seasonal press releases during cooling and heating seasons. Seasonal heating/ cooling features with how-to's for buying a system and hiring a contractor to perform quality installations, along with "Hot Days" promotion during high-temperature periods in the summer.</p> <p>Include outreach to CleanPower Community Partners.</p>	<p>Improve look and feel of COOLAdvantage and WARMAdvantage brochures to reflect New Jersey's Clean Energy Program.</p> <p>Create new educational materials for QIV, duct sealing and maintenance programs</p>	Design the COOLAdvantage and WARMAdvantage as more "user-friendly" sites as an easy-to-understand buying guide for consumers
Outreach to contractors about QIV and its relevance to their business for increased sales,	<p>Train existing contractors about QIV through workshops and industry events, such as ACI technical workshops and conference.</p> <p>Communicate QIV information to new contractor prospects.</p> <p>Develop quarterly newsletter specifically for contractors.</p> <p>Direct mail to contractors conducted by EHCC</p>		Include QIV Information on contractor portion of the Home Performance and RNC websites.

<b>Program Goals</b>	<b>Communications Outreach Strategy</b>	<b>Marketing Collateral</b>	<b>Website Strategy</b>
Incorporate HVAC program quality installation process and consumer and contractor messaging under the Home Performance with ENERGY STAR and Residential New Construction umbrella,	Incorporate messaging of QIV Pilot in Home Performance with ENERGY STAR and Residential New Construction program information.  Include outreach to CleanPower Community Partners.	Update Home Performance and Residential New Construction collateral to reflect QIV pilot.  Create a brochure specific to the QIV Installation  Point-of-purchase materials and education tip sheets on purchasing/maintaining equipment at home improvement retailers, supply centers, as well as through contractor distribution to consumer.	Create a website geared to the QIV Program. Describe its purpose and benefits to the consumer.
Begin a central A/C and heat pump maintenance initiative – with financial incentives, marketing and other support	Work with Home Performance with ENERGY STAR contractors to train them in the A/C and heat pump maintenance initiative.  Include outreach to CleanPower Community Partners.		Include maintenance page under a website geared to the QIV Program. Describe its purpose and benefits to the consumer.
Pilot a residential duct sealing program designed to optimize the performance of conditioned air distribution systems in homes.	Communicate the duct sealing program to existing HVAC and Home Performance with ENERGY STAR. Do this through trainings and/or workshops.	Create a brochure specifically geared to the residential duct sealing program.	Create a separate section on the website geared to the residential duct sealing pilot.
Develop joint upstream promotions with HVAC manufacturers (and/or possibly distributors or contractors). Promotions could be for either central A/C or heating equipment or both.	Conduct through regional effort led by NEEP or independently. Effort may include financial incentives or co-op marketing to support sales of efficient equipment and or documented quality installations.		Link NJCEP site to manufacturer, utility site offering special promotions, for both contractors and consumers.

## **Quality Control Provisions**

### *Electric HVAC Quality Assurance*

Documented policies and procedures provide proper guidelines to ensure consistency in the processing and quality control for all incentive program participants. All applications are reviewed as they are processed for verification of the documentation of qualifying equipment efficiency rating, proper sizing and proper installation. Qualifying equipment efficiency levels are verified with the ARI/CEE directory of air conditioning and heat pump equipment. Each application and its information are entered into a database which checks for duplicate applicants through an equipment serial number comparison. The use of third-party quality installation verification systems is being piloted in 2008 to provide an additional level of assurance that proper installation has been achieved.

On an ongoing basis, 10% of all rebate applications are selected for a quality assurance review and inspection. Assurance includes a paperwork review of the application and a field inspection to verify qualifying equipment installations and proper installation. A field inspection report is prepared for each inspection.

### *Gas HVAC Quality Assurance*

Documented policies and procedures provide proper guidelines to ensure consistency in the processing and quality control for all rebate program participants. All applications are reviewed as they are processed for verification of proper documentation. Qualifying equipment efficiency levels are verified with the GAMA directory of gas heating equipment. Each application and its information are entered into a database, which checks for duplicate applicants through an equipment serial number comparison. There are no field inspections/verifications performed.

## **Budget**

A detailed budget for this program for 2008 is attached in Appendix B

## **Goals and Energy Savings**

Performance incentives will be associated with the number of QIV or AC/HP maintenance participants in 2008. Details on this goal can be found in Appendix C. Additional program goals are as follows:

- Process 6500 central air conditioner and heat pump equipment correct sizing and efficient equipment incentive applications statewide.
- Process 14,700 energy efficient gas space heating and/or water heating equipment incentive applications statewide.
- At least 80 participants in a pilot of a new program component to offer duct sealing services
- Train at least 1,100 HVAC technicians on either Manual J load calculations (including use of software applications), Manual S equipment selection, proper charging and airflow, technical material that must be understood to pass the North American Technician Excellence (NATE) and/or Building Performance Institute

(BPI) certification tests, duct sealing, duct design using ACCA Manual D, ENERGY STAR sales techniques, high efficiency gas heating system installation and selection practices, and any other substantial form of training that is directly related to program goals. Any training conducted using the same curricula provided by the program, including training provided by industry allies, shall count towards the goal.

#### *Energy Savings*

Energy savings will be calculated consistent with Board approved protocols. Savings estimated for this program are included in residential sector savings goals shown in Appendix C.

Several modifications proposed for the 2008 Program specifically require the approval of complementary contract modifications before they can be implemented:

- Institution of quality installation verification (QIV)
- CAC and HP maintenance initiative
- Duct sealing pilot

In addition, the Program participation goal for 2008 assumes the approval of the proposed increase in the variable marketing budget. If approval is delayed beyond January 1, 2008, lower or different program goals will likely be necessary for 2008.

## **2008 Existing Homes Program**

### **"NJ Home Performance with ENERGY STAR®"**

#### **Program Description**

Home Performance with ENERGY STAR (HPwES) is a national home performance improvement program developed by the Environmental Protection Agency (EPA) and Department of Energy (DOE). It is intended to help contractors offer comprehensive improvement packages that are based on sound building science principles, produce predictable savings and improve the energy efficiency, comfort, safety and durability of customers' homes. The program is built on two parallel delivery strategies. The program encourages contractors (insulation contractors, HVAC contractors and remodelers, primarily) to develop a business model that integrates energy efficiency and provides a comprehensive approach to home improvement. Participating contractors are also encouraged to adequately train their staffs through the program requirement of Building Performance Institute (BPI) credentials, in order to deliver maximum impact and persistence of savings. In a parallel, coordinated effort, the program markets directly to consumers, encouraging them to undertake significant energy efficiency improvements for their homes and identifying contractors who are properly trained and accredited to provide these services. The contractor recruitment and training element of the program is designed to ensure an adequate supply of qualified contractors to meet the demand for program services created by the marketing and public education elements.

#### **Target Market / Eligibility**

Home Performance with ENERGY STAR is designed to serve existing residences in all household income categories, and in particular the broad market not eligible for qualified low-income program services. Existing one, two, three and four-family homes, either attached or detached, which are served by an investor-owned natural gas or electric utility, are targeted by the program. Small multi-family buildings without elevators are also eligible but require specialized handling and contractor training. Within the eligible customer base, the program targets those who wish to improve the comfort, durability, energy efficiency and operating cost of their home, and is aimed at a large and traditionally underserved market for comprehensive energy efficiency improvements.

#### **Program Offerings and Customer Incentives**

Contractors accredited to participate in the program can offer homeowners a customized, comprehensive treatment package for their home. Among the measures the package may include are HVAC upgrades, insulation, air infiltration reduction, duct sealing, window replacement, lighting retrofits, efficient appliances, domestic hot water system replacement and associated repairs. Homeowners will also be offered an electricity consumption feed back monitor to help them track, and reduce, their electricity use. Both building performance diagnosis services and efficiency measure installation services will be provided by BPI certified contractors. The work is guaranteed, and the contracting firm agrees to abide by BPI standards governing health and safety, work quality,

insurance coverage, customer service and complaint resolution.

Program contractors can offer “one stop shopping” for these comprehensive packages. This means that a program contractor may either directly provide a wide range of home improvement services or may operate as a general contractor, overseeing other firms that provide the desired services. The lead contractor must employ staff who have been properly trained and who have been certified by BPI, provide quality assurance, and be subject to inspection by program staff to ensure that all measures are properly installed and all safety precautions are met. For 2008, to help “jump start” this process, the Team will use its own BPI certified technical staff, to conduct a number of initial assessments (and generate additional leads to augment those created by leading contractors) and provide the recommended work scope to the approved contractor.

#### *Contractor Incentives*

The program offers a variety of incentives to contractors. Training is free; contractors must pay \$500 up front, but are reimbursed once certified by BPI. 75% of the BPI certification, accreditation and QA fees is reimbursed, and participating contractors are reimbursed for 50% of the cost of one set of qualifying new equipment that they must buy to participate in the program (primarily blower doors, duct blasters and various combustion safety testing devices.).

If the work is initiated by the Team through its initial assessments described above, the contractor who performs the work will be paid \$200 to follow-through and report the job. Should a contractor initiate the work, the Program will pay the greater of \$200 or 5% of the cost of each job, up to a maximum of \$1,000 if the work scope includes a minimum of 2 eligible measures but the package does not meet the SIR of 1.0 or above. To encourage comprehensive work scope at a cost effective price, contractors who initiate the work, install a minimum of 3 eligible measures and the package meets an SIR of 1.0 or above will receive the greater of \$200 or 7% of the total work scope, up to \$1,400. This structure is summarized in the table below. Note that Tiers 1, 2, and 3 align (in terms of measure install requirements) with the consumer incentive tiers shown further below.

**Table 1: NJ HPwES Contractor Incentive Tiers and Requirements**

INCENTIVE TIER	REQUIREMENTS	CONTRACTOR INCENTIVE
Tier 0	Program does a comprehensive home assessment and provides the lead to contractors	\$200
Tier 1	Contractor does the comprehensive home assessment and installs at least 2 eligible measures, but package does not have SIR $\geq 1.0$	The greater of \$200 or 5% of the total work scope, up to \$1,000
Tier 2	Contractor does the comprehensive home assessment, installs a minimum of 3 eligible measures and the package has an SIR of $\geq 1.0$	The greater of \$200 or 7% of the total work scope, up to \$1,400
Tier 3	Contractor does the comprehensive home assessment and installs a comprehensive package that includes all cost-effective measures	The greater of \$200 or 7% of the total work scope, up to \$1,400

During the first year of becoming BPI accredited, contractors who advertise their participation in the program can be reimbursed 25% of the cost of approved marketing materials, up to a maximum of \$10,000 annually per contractor location (e.g. a larger contractor with two locations in the state would be eligible for up to \$20,000 in co-op marketing support). In their second year of participating in the program, the co-op marketing incentive will be available to contractors who report a minimum of 10 jobs during the 12 month period subsequent to their first anniversary. Contractors who have a record of significantly exceeding this minimum may be given increased incentives to encourage and reward higher performance. The same will apply to BPI accreditation and certification renewal fees. Contractors will continue to receive at least 75% reimbursement for those fees, provided they produce a minimum of 10 jobs in the years following their first anniversary. NJ HPwES HVAC contractors will also be eligible to participate in (and receive incentives through) the new QIV and maintenance component under the Cool Advantage program (see HVAC program narrative).

Non-performing contractors (not meeting program standards or not reporting qualifying work done) will be denied use of any program marketing materials, including logos and program references, as well as receipt of any incentives.

#### *Customer Incentives*

The program provides Home Performance contractors the ability to offer reduced rate financing to their customers. This financing encourages contractors to join the Home Performance network and propose effective, comprehensive projects. The loan product offered is a program-subsidized loan currently initiated by the Energy Finance Solutions of Wisconsin Energy Conservation Corporation (EFS-WECC). A straight cash incentive option is also offered. This “Homeowner Financing Incentive” (HFI) equals 10% or 20% of the value of qualifying Home Performance measures, paid to the homeowner upon completion of the project, if they directly pay for it with their own financing source. That cash incentive is increased to 50% if the customer installs all recommended cost-effective measures with projected heating savings of at least 25%. The table below

summarizes the Customer Incentive packages.

**Table 2: NJ HPwES Customer Incentive Tiers and Requirements**

INCENTIVE TIER	REQUIREMENTS	CUSTOMER INCENTIVE
Tier 1	Install at least 2 eligible measures and package does not meet SIR 1.0	5.99% loan or 10% cash to consumers, up to \$2,000
Tier 2	Install at least 3 eligible measures and package has $SIR \geq 1.0$	3.99% loan or 20% cash to consumer, up to \$4,000
Tier 3	Install all recommended cost-effective efficiency measures, with projected heating energy savings of at least 25%	50% cash rebate, up to \$5000

Income-eligible customers (family income is 300% or less of the New Jersey statewide poverty level) are eligible for a 50% subsidy incentive regardless of comprehensiveness of package up to a \$5,000 maximum, as long as the package meets an SIR or 1.0 or above. The program will inform customers who have incomes equal to or less than 175% of the New Jersey statewide poverty level that they may be eligible to receive federal weatherization services at no cost, and will explain to such customers how to contact their local weatherization agency.

The program in 2008 will work with the OCE and other parties to create additional loan products including secured loans that can be offered by Home Performance Contractors at a lower cost to the program.

The projected Savings to Investment Ratio (SIR) will be calculated by HomeCheck software analysis, comparing the present value of the savings to the initial cost of an efficiency measure and the present value of any maintenance required for the lifetime of the measure or measures. A positive SIR indicates that over the lifetime of the measure or measures the benefits will exceed the costs; i.e., that there will be a positive net present value. For purposes of customer incentive calculation, the contractor shall use the cost of the eligible measures, minus any available incentives for the installation of high efficiency equipment and appliances.

Customers replacing heating and/or central cooling systems will be eligible for either incentives under the Home Performance program or those available under the HVAC program, but not both.

#### *CORE Program Special Incentives*

The CORE Program will offer an additional \$0.25 per installed Watt for qualified residential installations of photovoltaic systems on homes that participate in the Home Performance with ENERGY STAR program and meet the Tier 3 Customer Incentive requirements. However, photovoltaic systems that receive an incentive under the CORE program will not be eligible for subsidized loans or Homeowner Financing Incentives from HPwES. HPwES participants will be issued a Certificate of Completion when the

work is done and any required inspections performed. The Certificate of Completion can be used as proof of program participation in order to qualify for the additional CORE Program rebate.

## **Planned Program Implementation Activities for 2008**

Among the program implementation activities to be undertaken in 2008 are:

- Target market a reduced cost audit (discounted to \$250) conducted by Team staff, with the audit cost refunded if the recommended work is done by an approved contractor. This is to help “jump start” the market and assist contractors in transitioning to their full program role including generation of their own leads.
- Enlarge the pilot concept tested in 2007 of developing a pre-approved price list for prescriptive measures as a means of pre-selling basic services, with more comprehensive and custom measures to be marketed by the responding approved contractor, again to help “jump start” the market and assist contractors in transitioning to their full program role including generating their own leads.
- Allow reporting of small multi-family building work by qualified contractors, provided they meet EPA standards for HPwES.
- Integrate the HVAC QIV promotion into HPwES activities through specialized training for participating contractors, utilizing the same incentive structure provided under HVAC program pilot initiative, and conducting sample inspections to assure quality and performance.
- Expand marketing efforts, both in scope and in frequency, including cross-marketing among all the residential programs – both to contractors who may serve multiple programs as well as to consumers.
- Continue technician training, certification and contractor mentoring efforts.

## **Marketing and Communications Plan**

Target Consumer Audience: Homeowners of 1-4 family residences

Target Trade Audience: Insulation, HVAC and Remodeling Contractors

This program is still in its infancy, both in New Jersey and nationally. While the contractor network is steadily being built in New Jersey, consumer awareness and demand remains a much needed, critical component. As with any market transformation program, it takes a significant investment in education, awareness-building, training and marketing over several years to secure motivation and action by consumers and trade allies.

To continue to build and maintain contractor participation, customer leads and requests that lead to work being done are essential.

Key Consumer Messages:

1. greater energy/money savings with whole-house solutions
2. awareness of climate change solutions that can be made in every home
3. prevention of healthy/safety/problems (threat of carbon monoxide poisoning in homes due to improperly installed/maintained fuel-burning equipment and appliances)
4. greater peace of mind and confidence in knowing that services are provided by trained, certified Building Performance Institute Accredited contractors

**Key Contractor Messages:**

1. competitive advantage; differentiation and distinction of BPI accreditation in marketplace
2. platform for business and services expansion, offering technical training and support
3. financial incentives and marketing assistance

**Consumer/Contractor Marketing Tactics:**

1. Advertising: Broadcast (radio and TV), print (newspaper), on line, as well as contractor co-op advertising program
2. Public Relations: Case studies, events and feature stories showcasing energy/money savings, climate footprint reduction, as well as health/safety benefits.
3. Clean Power Community Partner Outreach—The goal is to recruit a significant number of model homes in each community annually to participate in order to help support New Jersey's 20/20 goal. Community success stories are highlighted and tracked in case studies for use in broadcast, web and word-of-mouth advertising.
4. Home Shows and Community Events—Attendance at community energy, environmental and civic events; review opportunities for educational outreach at malls.
5. Web: Update web with virtual home tour, customer case studies and testimonials, list of participating contractors, more in-depth educational information, carbon footprint reduction chart based on energy savings
6. Sponsorship and participation in technical training conference and workshops, including trade events, such as ACI and internal training workshops.
7. Database marketing: Targeted mailing to participants of On-line Home Energy Analyzer that show need for whole house solutions
8. Call Center Communications: Engage residential customers that contact call center with one to three questions to identify any other potential home problems that could be solved by Home Performance.
9. Cross-marketing: Integrate HVAC, Products and Renewable program offerings as part of Home Performance with ENERGY STAR.

**Table 3: Home Performance with ENERGY STAR Program and Marketing Goals**

<b>Program Goals</b>	<b>Communications Outreach Strategy</b>	<b>Marketing Collateral</b>	<b>Website Strategy</b>
Integrate HVAC QIV and maintenance promotion into HPwES activities.	Direct mail and e-mail to participating contractors about QIV and maintenance programs	Include QIV and maintenance program in updated HP with ES materials	Cross market the HVAC QIV and maintenance program on the HP section of the website.
Increase consumer awareness and demand; increase contractor participation	Conduct increased advertising: broadcast (radio and TV), print advertising, online, as well as support contractor co-op advertising program  Engage call center to promote Home Performance on all residential inquiries	Update consumer and contractor brochures and materials with new incentives.	Add any new commercials and print advertising to website.
Generate customer leads for program through community-based outreach.	Increase customer leads for contractors using the Community Partners as Program awareness and recruitment builders. The goal is to recruit 100 model homes in each community over the next year to participate in order to help reach New Jersey's 2020 goal.  Present the program to communities to increase awareness and participation  Highlight community success stories in case studies. Use them in broadcast and word-of-mouth advertising.	Develop community based approach plan for Clean Power Community Partners, starting with several of the leading communities and then delivery to all	Use the case studies for the web  Include virtual home tour of Home Performance

<b>Program Goals</b>	<b>Communications Outreach Strategy</b>	<b>Marketing Collateral</b>	<b>Website Strategy</b>
Increase media attention to communicate benefits of program.	Public Relations Outreach: case studies and feature stories showcasing energy/money savings, climate footprint reduction, as well as health/safety benefits.	Create B-roll footage of Home Performance testing for video news release distribution	Feature case studies on the website.
Expand participation in relevant, well attended home show events	Continue commitments of successful past events; seek new venues for grass-roots outreach, i.e. malls		List sponsorship and attendance at community events on website.
Cross market all residential and renewable programs.	Educate contractors about additional ENERGY STAR Products, WARMAdvantage and COOLAdvantage Programs, Clean Power Choices and relevant Renewable opportunities. Conduct trainings on these programs as needed.  Direct Mail to other residential and renewable program participants	Create fact sheet for contractors about additional residential and renewable programs.	Add cross marketing links to Home Performance section of the website.
Maintain and build contractor network	Continue account management and communications support for contractor network with bi-annual newsletter  Sponsor trade events and training workshops, including ACI		Continue to update web site with participating contractors; allow site for contractor testimonials/case studies  Post technical information and training guides

## **Quality Control Provisions**

It is very important that the integrity of the Home Performance with ENERGY STAR brand be protected. The standards for becoming a HPwES Contractor are quite demanding, even with the incentives provided. HPwES Contractors must be able to offer

services that unqualified contractors cannot; otherwise contractors will not go through the training and quality assurance requirements of Home Performance with ENERGY STAR.

CSG will conduct Quality Assurance Inspections of at least 10% of all jobs completed. Typically, there is a 100% inspection rate for the first 10 jobs that each contractor performs, followed by dropping the percentage in inverse proportion to the level of contractor performance. These inspections guard against misuse of the funds. If a job, or an important aspect of the job, fails, a *Follow-up Work Order* will be given to the contractor which details the necessary corrective action that must be taken. Once the corrective work is done, a *Declaration of Completion* must be signed by the contractor and customer and sent to CSG, which will schedule a re-inspection to ensure compliance.

## **Budget**

A detailed budget for this program is attached in Appendix B.

## **Goals and Energy Savings**

### *Goals*

Performance incentives will be associated with the number of completed home performance jobs completed in 2008. Details on this goal can be found in Appendix C. Additional program goals are as follows:

- 65 BPI Accredited contractors
- 120 BPI Certified technicians

### *Savings*

Energy savings will be calculated consistent with Board approved protocols. Savings estimated for this program are included in residential sector savings goals shown in Appendix C.

Several modifications proposed for the 2008 Program specifically require the approval of complementary contract modifications before they can be implemented:

- Lead generation by program staff through direct auditing and recruitment
- Direct install of compact fluorescent lighting
- Inclusion of residential, real-time electricity use monitoring

If approval of the lead generation item is delayed beyond January 1, 2008, lower program goals will likely be necessary for 2008.

## **2008 Energy Efficient Products Program**

### **Description**

The Energy Efficient Products Program promotes the sale and purchase of ENERGY STAR qualified and other energy efficient products including lighting, appliances and windows. The long-term goal of the Program is to transform the New Jersey market into one in which targeted energy efficient products are readily available, sought after by consumers, and enjoy large market shares. The program employs several key strategies to accomplish this goal, including:

- Educating consumers on their energy usage and the role that energy efficiency can play in reducing their home energy consumption.
- Providing a retail infrastructure that offers a range of energy efficient qualified product choices to consumers.
- Marketing and training support for retailers, manufacturers and contractors selling energy efficient products.
- Working with community based initiatives and other innovative approaches that bring energy efficient technologies to target populations that do not respond to conventional, retail-based marketing approaches.
- Offering consumer access to energy efficient products through an online NJCEP “store.”
- Supporting the development of NJ State appliance standards, minimum federal appliance efficiency standards and ENERGYSTAR appliance specifications, as appropriate.
- Leveraging national energy efficient programs, promotions, marketing materials, and advertising as appropriate.
- Targeted rebates or other incentives to reduce first cost barriers of energy efficient lighting, appliances, and windows.

### **Target Market and Eligibility**

The program will provide targeted rebates/incentives to consumers for the purchase of select energy efficient products through retail. The program will also offer marketing and training support to new retailers, manufacturers and contractors while continuing to maintain existing partner relationships.

### **Offerings and Customer Incentives**

In 2008 the Energy Efficient Products program will offer incentives on qualified lighting products, room air conditioners, clothes washers and dehumidifiers. The program will employ a variety of promotional approaches, including leveraging EPA/DOE national ENERGY STAR campaigns. The proposed 2008 Products program budget anticipates that energy efficient lighting, clothes washers and other appliances will be promoted year round.

*Incentives for ENERGY STAR qualified lighting products*

The program will provide incentives to manufacturers and/or retailers to mark down the retail price of various lighting products. Those incentives will be provided for targeted products (up to a mutually negotiated volume) sold from the participating New Jersey retail stores during promotional periods. Incentives will vary by type of product, and based on negotiations with manufacturers and/or retailers.

The program will also work with municipally-based organizations (such as the Clean Power Choice communities) to develop local initiatives to promote energy efficient lighting to non-participants in the above retail campaign.

*Other Incentives*

In 2008 the incentive for ENERGY STAR Room Air Conditioners will be \$20 for eligible equipment purchased between May 14 and August 31, 2008. There will also be a rebate of up to \$75 offered for energy and water efficient clothes washers in two tiers, one at a minimum modified energy factor (MEF) of 2.0 and one at an MEF of 2.2<sup>8</sup>.

*On-line or Mail in Energy Audit*

In 2008 the program will continue to offer NJ customers the Home Energy Analysis customized energy audit.

*New Products*

In 2008 the Products program will offer a \$25 rebate for ENERGY STAR qualified dehumidifiers.

In early 2008, the program will explore cost-effective options for an old, inefficient refrigerator/freezer early retirement initiative, possibly for launch later in 2008. Details will be part of a future regulatory filing. However, resources likely to be necessary to for such an initiative have been included in the 2008 program budget provided in Appendix B, as well as in the marketing plan provided in Appendix A.

The program will also investigate the potential for future promotions of ENERGY STAR qualified televisions, personal computers and other consumer electronics technologies.

**Planned Program Implementation Activities for 2008**

The Products program will be offered on a consistent program design and implementation basis to ensure retailer support statewide. The following program implementation activities will be undertaken in 2008:

*General Activities*

Maintain existing retailer base and recruit new retailers. Update and distribute collateral and POP materials for product groups, continue retail associate training, and promote the Program on an as needed basis at NJ Clean Energy sponsored events

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<sup>8</sup> The minimum MEF level for ENERGY STAR qualification is 1.72, but a large percentage of washers sold in NJ already meet this level of performance.

### *ENERGY STAR Windows*

Sponsor additional dedicated window training classes in 2008 based on energy efficiency saving opportunities created by the installation of energy efficient windows (as identified in the KEMA market assessment).

### *ENERGY STAR National Appliance Promotions*

In 2008, the Honeywell team will review the marketing templates created by the ENERGY STAR and, as appropriate, use them to update collateral to retailers, and enhance program information on njcleanenergy.com.

### *Cool Your World*

The 2008 national ENERGY STAR campaign will run from May through September. The Honeywell team will review the national marketing templates created and as appropriate use them to update collateral to retailers and enhance program information on the njcleanenergy.com website.

### *Change-A-Light*

In 2007 the Program submitted a successful proposal to host a visit of the ENERGY STAR Change A Light bus to NJ. The 2008 Change-A-Light program will include more focused and intense versions of lighting promotions which will be running all year, including CFL retail price markdowns with select retailers, co-op advertising, brochures, promotion of the national Change-A-Light Pledge, and special energy education and lighting events at major retail locations throughout the State.

### *On-line Store*

Most energy efficiency programs in the northeast offer customers the opportunity to purchase energy efficient lighting on-line through internet portals such as [www.myenergystar.com](http://www.myenergystar.com). By extending this opportunity to NJ residents as well NJCEP would expand the availability of high quality, energy efficient lighting and other products, some of which can still be challenging to find at retail locally.

### *Audit Program*

Continue to maintain the existing on-line audit program, update information as needed, and improve integration with the rest of the njcleanenergy.com website. Also, enhance referrals from the program to other clean energy programs, particularly the Home Performance with ENERGY STAR program.

### *Special Events*

Participate in at least one NJ based Earth Day event.

### *National Meetings*

Honeywell team members will attend the National Lighting and Appliance Partner Meetings.

## **Marketing and Communications Plan**

Target Audience: Consumers

Target Trade Audience: Retailers, Manufacturers and Distributors

Key Messages for Consumers:

1. Best choice - Buy energy efficient products to save money, energy and the environment
2. Best price now – incentives available on select products during seasonal promotions

Key Message for Trade:

1. Increase sales and market share—customers are looking for products, need source
2. Differentiation in marketplace—be the “go-to” place for energy-efficient products
3. Improve customer service by educating customers and reinforcing good buying decisions.

Consumer/Trade Ally Marketing Tactics:

1. Point-of-Purchase Displays; Refresh and update retailer in-store materials for appliances and lighting to educate consumers of climate change savings in addition to economic benefit at the retail level. Revise rebate applications, retailer educational literature, and store signage for offers on sale of ENERGY STAR qualified room air conditioners, clothes washers, and dehumidifiers (and possibly early retirement of older, inefficient refrigerators and freezers).
2. Advertising: Print/ advertising to promote offers for appliances and lighting. Develop quarterly “sweeps” for promotion of lighting offers (economy purchases) at retail level, highlighted during national Change A Light effort in fall.
3. Public Relations/Media Outreach: outreach through press releases and events to support consumer awareness of lighting and appliance offers to drive retail store traffic
4. Special Promotional Offers: Seasonal promotional appliance offers to increase multiple ENERGY STAR purchases. For example, buy 2 or more ENERGY STAR appliances, get 5% cash back; buy 3 or more, get 10% cash back.
5. Call Center Communications: Promotion of retail incentive offers in all residential incentive checks; promotion of offers through “message on hold”, inclusion of “Just so you know” message about retail appliance offers in call center service scripts and rebate incentive checks.
6. Trade Ally Networking Events—Participation in Appliance and Lighting EPA conferences; ACI Conference, and other relevant trade ally events.
7. Web: Update site with promotional offers, lighting pledge drives, product promotions, testimonials, and listing of participating retailers
8. Special Events: Retail events to promote appliance and lighting offerings
9. Database Marketing: Any customers participating in On-Line Analyzer receive information about products to their relevant home needs.
10. Community Partnerships: Development of community outreach plan to promote specific product offerings.

**Table 1: Energy Efficient Products Offerings and Marketing Goals**

<b>Program Goals</b>	<b>Communications Outreach</b>	<b>Marketing Collateral</b>	<b>Website Strategy</b>
Recruit new retailers	Send letters to retailers currently not participating in the program.	Update and distribute collateral and Point-of-Purchase materials for products groups.	
Promote ENERGY STAR Windows.		Update Windows brochures for 2008.	Include updated information on the website.
ENERGY STAR National Appliance Promotions		Revise the ENERGY STAR brochures appliance(lighting, windows, etc.) to properly reflect New Jersey's Clean Energy Program.	Update the ENERGY STAR Products information on website.
Cool Your World	Create a press release about COOLAdvantage and summer energy savings.  Develop case study on a customer who has received a rebate through COOLAdvantage.	Update the "Cool Your World" brochure to be distributed and used for retailers between May through September 2008.  Include QIV and maintenance information.	Feature the COOLAdvantage case study on the website.

<b>Program Goals</b>	<b>Communications Outreach</b>	<b>Marketing Collateral</b>	<b>Website Strategy</b>
Change a Light – promote the program throughout the year.	Select a CleanPower Community Partner participant who has changed out all of their incandescent light bulbs. Create a case study on the participant to calculate their energy savings.  Continue outreach with CleanPower Community Partners regarding Change a Light. Also, communicate on a regular basis with trade allies, colleagues, utility companies, etc. about the Change a Light pledge.  Create incentives for CleanPower Community Partners to participate in Change a Light program.  Host special energy education and lighting events at major retail locations throughout the State.	Update Change a Light brochures and pledge cards. Include return address on pledge cards.  Provide additional point-of-purchase materials regarding Change a Light to retailers.	Maintain and update the Change a Light page on the website. List New Jersey's goal and where we are to date.
On-line Store	Send e-mail and/or letters to all listservs, trade allies, partners, etc. about the on-line store.	Include mention of on-line store in future Products brochures.	Link to on-line portals from the NJCEP website, so that ENERGY STAR products are easily accessible for New Jersey consumers.
Audit Program (Online energy audit) – work with Nexus to update the online audit program. Have the system cross-market other New Jersey Clean Energy Programs.	Once the on-line audit is enhanced, send an e-mail to the listservs, trade allies, New Jersey customers, etc. making them aware that the system has been improved.		Provide Nexus any program information they need to fully integrate all of New Jersey's Clean Energy Programs.

<b>Program Goals</b>	<b>Communications Outreach</b>	<b>Marketing Collateral</b>	<b>Website Strategy</b>
Participate in special events such as Earth Day.	Send e-mails to listserv and/or customers, trade allies, etc. making them aware of the event.		List the event on the website
Produce at least 10% more kilowatt hours in savings per rebate dollar spent on lighting promotions.	Communicate all lighting promotions via e-mail and letters to potential customers, trade allies, etc.	Update all lighting-related materials as needed (pledge cards, lighting brochure, FAQ sheets about mercury and proper disposal, etc.)	List all lighting promotions on website. Update the Change a Light retailers search function as needed.
Provide at least 17,000 rebates for clothes washers.	Send e-mail and/or letters to potential customers about clothes washer rebate.	Update clothes washer brochures and other retailer Point-of-Purchase materials (bag stuffers, displays, posters, hang tags, etc.) as needed.	Update and maintain the Clothes Washer site on the website.
Provide at least 10,750 rebates for room ACs.	Send communication out to listservs and potential customers regarding the room A/C rebate.	Update the brochure and retailer Point-of Purchase materials as needed.	Update and maintain the room AC section of the website.
50% of retail store-fronts (i.e. at least 750 stores) participate in either co-op advertising or product incentive offerings.	Have Account Managers meet with stores about the co-op advertising or product incentive offerings. Send letters to them about this offer.		
Hold 3 window trainings.	Have Account Managers hold window trainings with retailers.		

## **Quality Control Provisions**

For promotions featuring customer rebates, documented policies and procedures provide proper guidelines to ensure consistency in the processing and quality control for all rebate program participants. All applications are reviewed as they are processed for verification of the documentation that the equipment meets program requirements.

Each application and its information are entered into a database that allows checking for duplicate applicants through an equipment serial number comparison. On an ongoing basis, 5-10% of all rebate applications are selected for a quality assurance review and follow-up telephone customer survey to verify the information on the application and to confirm that the rebate was received. For co-op marketing promotions with manufacturers, distributors and retailers, payments are made to the co-op participant when the required proof of performance is received, which may include copies of invoices, packing slips, photos or samples of product bearing buy-down program identification, copies of delivery receipts, etc.

In addition to the above, the Energy Efficient Product program field representatives visit the participating storefronts to verify that Energy Efficient Product products have been received and have been displayed properly according to program requirements. If necessary they will unpack the products, put them on display and place the required program materials. Performance reports are provided to the program managers to assist in developing future promotions and selecting the most effective co-op marketing proposals.

## **Budget**

A detailed budget for this program for 2008 is attached in Appendix B.

## **Goals and Energy Savings**

### *Goals*

Performance incentives will be associated with the number of clothes washer rebate applications processed in 2008. Details on this goal can be found in Appendix C. Additional program goals are as follows:

- Achieve sales in excess of 4 million CFLs in NJ in 2008.
- Provide at least 17,000 rebates for clothes washers.
- Provide at least 10,750 rebates for room A/Cs (No change from 2007).
- 50% of retail store-fronts (i.e. at least 750 stores) participate in either co-op advertising or product incentive offerings.
- Hold 3 window trainings

### *Energy Savings*

Following approval of the above goals, energy savings will be calculated consistent with Board approved protocols. Savings estimated for this program are included in residential sector savings goals shown in Appendix C.

Several modifications proposed for the 2008 Program specifically require the approval of

complementary contract modifications before they can be implemented:

- Increased marketing to support year-round lighting promotions.

If approval of this item is delayed beyond January 1, 2008, lower program goals will likely be necessary for 2008.

## **2008 Community-Based Efficiency Initiative**

### **Description**

Historically, most efficiency programs both in New Jersey and across the country have been designed around markets for particular types of efficient products or services (e.g. HVAC program designed to influence HVAC contractors, distributors and manufacturers; lighting program designed to influence manufacturers and retailers; etc.). Although not well known or well publicized, several very successful efforts designed to influence consumers as much through their *communities* as through trade allies, suggest another parallel approach worthy of consideration. The community-based approach may be particularly valuable in contexts – such as with current New Jersey Master Plan draft goals – in which policy makers are seeking deeper levels of savings.

The Honeywell team will work with the OCE to develop a community-based approach to promoting efficiency that complements the other statewide programs, possibly for launch later in 2008. Details will be part of a future regulatory filing. However, resources likely to be necessary to for such an initiative have been included in the 2008 program budget provided in Appendix B.

## **2008 Customer On-Site Renewable Program**

### **“CORE Program”**

#### **Description**

The Customer Onsite Renewable Energy Program offers incentives to New Jersey public utility customers investing in eligible on-site renewable electricity generation using photovoltaic, wind, biomass, and fuel cell systems. The overarching objective of the CORE program is to support the sustained and orderly development of vibrant markets for distributed renewable electric generation in New Jersey.

There are a number of market barriers to investments in on-site renewable energy systems. These include:

- (1) Renewable energy systems require a high initial capital investment;
- (2) Lack of information and familiarity with the technologies, benefits, and performance of renewable on-site generation;
- (3) A limited, although growing, installation infrastructure and technical skills to address key elements of renewable on-site generation systems; and
- (4) Uncertainty in the market and financial system on the long term support structures that will be in place to support increased renewable on-site generation.

The CORE program strategies to reduce these market barriers include rebates to make renewable energy investments more cost-effective by offsetting a portion of the initial installation cost. The program also offers a number of market support services, including consumer education and outreach, technical training, inspections, and the facilitation of registration for renewable energy credits.

Program year 2008 is the fourth year of funding for the CORE and other programs authorized by the State of New Jersey Board of Public Utilities in December 2004. The CORE program has achieved remarkable success in establishing the New Jersey market for on site solar electric systems, and created a foundation for future growth. During 2007 there has been significant progress on defining a framework for a solar market transition and the initiatives and policy mechanisms that will support continued growth.

Due to high participation rates portions of the CORE program have been over-subscribed, requiring queues for rebate funding since early 2006. Consequently, for some budget categories, the number of applications in queue will fully subscribe, or even exceed, the availability of new rebate funds for 2008. The following table summarizes the situation for potential new CORE program applicants in Program Year 2008.

**Table 1: CORE Program - New Rebate Application Summary**

<u>System Type</u>	<u>Budget Categories</u>	<u>Accept New Applications for 2008 Funding?</u>	<u>Transition Strategies</u>
Photovoltaic	Private <=10kW	No	Help new applicants understand 2009-2012 Rebate Program – Develop program - Start accepting new applications for 2009-2012 program.
Photovoltaic	Private>10kW	No	Help market understand financial incentives available through the SREC-SACP market – Accept registrations to the SREC-Only Pilot Program.
Photovoltaic	Public: Other than K-12 Schools	Yes, Until Budget is fully committed	Help market understand financial incentives available through the SREC-SACP market – Accept registrations to the SREC-Only Pilot Program. Encourage Power Purchase Agreements to leverage tax benefits.
Photovoltaic	Public Schools K-12	Yes, Until Budget is fully committed	Encourage Power Purchase Agreements to leverage tax benefits. Educate participants about SREC/SACP market
Photovoltaic	Sun-Lit	Yes, Until Budget is fully committed	Encourage Power Purchase Agreements to leverage tax benefits. Educate participants about SREC/SACP market
Wind, Biomass, and Fuel Cell	New Budget Category	Yes, Until \$\$4.75 million of new rebate funds are committed	Incorporate non-solar technologies into planning for the Renewable Market Development Initiative, and 2009-2012 Programs

As illustrated, the program will not be accepting new applications for 2008 program rebate funding for some combinations of system type and budget categories. Program support will focus on completing projects that are already approved and/or in queue, and on transition strategies for new applicants.

## **Target Market and Eligibility<sup>9</sup>**

The CORE program serves residential, commercial, institutional and industrial market

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<sup>9</sup> To qualify for a rebate under the CORE program, both the consumer and the renewable energy system must satisfy a number of requirements. This section provides a high level overview of these requirements. Detailed program procedures and guidelines are provided in the 2008 Program Guidebook.

segments, and is available to private and public customers in all rate classes. To be eligible for a CORE rebate, an applicant must be a ratepayer of a New Jersey Board of Public Utilities-regulated electric and/or natural gas utility.

Four types of renewable energy systems eligible to receive CORE rebates.

1. Photovoltaic – Systems that utilize semi-conductor technologies to produce electricity directly from sunlight
2. Sustainable Biomass – Systems that use a sustainable and renewable supply of organic material to produce electricity
3. Wind Generation – Generators that convert the kinetic energy of wind into electricity.
4. Fuel Cell – A fuel cell is an electrochemical energy conversion device. It produces electricity from external supplies of fuel (hydrogen) and an oxidant. To be eligible for participation in the CORE Program the Fuel Cell must use a renewable source to produce the hydrogen fuel.

The CORE program provides support for systems that serve to off-set the customer's own on-site electric consumption, and do not produce net excess generation from the site on an annual basis. These are typically net-metered systems. Dependent upon the customer's annual electric consumption, CORE program rebates are available to support photovoltaic systems up to 700 kW and non-solar systems of up to 1 MW of rated capacity. Eligible systems should be sized to produce *no more* than 100% of the historical or expected amount of electricity consumed at the site of installation. New construction projects are also eligible, provided they provide documentation of projected annual electric consumption to demonstrate the proposed system will not produce more than 100% of their annual consumption.

Residential rebates are limited to 10 kW of rated capacity. An exemption to this limit is available for farms and non-profits (including houses of worship) on residential rates. To be eligible for this exemption farms must submit tax forms demonstrating that they spend \$1200 or more on electricity; churches and non-profits must submit 501c forms. Multi-family residential installations are not subject to the 10 kW cap, but must be sized so that total output is less than annual site consumption.

All systems must be installed in accordance with manufacturer specifications and the provisions of the National Electrical Code. The program requires an on-site inspection for every project to verify these standards have been met and that the system as installed matches the system proposed in the application.

Eligible systems must be covered by a warranty on all major components of the system against breakdown or degradation in electrical output by more than 10% from their originally rated production during the five-year period. An owner's manual, including the warranty documentation, must be delivered to the customer on completion of the installation.

## **Offerings and Customer Incentives**

Rebates are approved and allocated from six separate budget categories (see following table).

**Table 2: CORE Program - Budget Categories**

<u>Budget Category Name</u>	<u>Projects Assigned to this Budget Category</u>
<b>Private: Less than or equal to 10 kW</b>	All private projects less than or equal to 10 kW of rated capacity. This category includes all single-family residential projects. Any public project that uses tax-advantaged financing is also assigned to the appropriate private rebate category (depending on size). Non-profit organizations, which are eligible for the public/non-profit rebate levels, are also charged against the appropriate private budget category.
<b>Private: Greater than 10 kW</b>	All private projects greater than 10 kW of rated capacity. This category includes some residential projects that were given approval letters before the residential 10kW limit was established. Any public project that uses tax-advantaged financing is also assigned to the appropriate private rebate category (depending on size). Non-profit organizations, which are eligible for the public/non profit rebate levels, are also charged against the appropriate private budget category.
<b>Public: Other</b>	This category includes municipalities, public colleges and universities, and other government installations regardless of project size.
<b>Public: Schools K-12</b>	Includes any public school (K-12) regardless of project size.
<b>SUNLIT</b>	Includes projects forwarded to the program by the New Jersey Housing and Mortgage Finance Agency regardless of project size.
<b>Wind. Biomass and Fuel Cell</b>	All new non-solar applications will be assigned and funded through this budget category. (The Market Managers are proposing creating this as a new budget category as part of the 2008 program plan)

Due to the number and dollar value of rebate applications in queues, new solar CORE rebate applications will not be accepted during 2008 for two budget categories (Private LTE 10kW, Private GT 10kW). New solar rebate applications will continue to be accepted for the Sunlit budget and public budget categories until funds are fully committed.

In addition, for 2008, a separate budget category to support non-solar installations is being established. New applications for wind, biomass and fuel cell projects will continue to be accepted across all customer types and classes until the available funds are fully committed.

A number of factors, including current market prices, program budgets, electricity costs, and the availability of other rebates (including federal tax credits) contribute to overall system economics, and therefore influence program rebate levels.

CORE rebates are not intended to cover the entire system cost. Rather, they are intended to reduce installation costs of a renewable energy system to enable cost-effective investments for as wide an array of ratepayers as possible. Rebate levels are calculated on a per site basis and are dictated by the type of applicant and the size of the system installed.

The CORE rebates available for new PV applications are listed in the Table below. These rebate levels became effective September 1, 2007. Note that new private solar applications for CORE program funding cannot be accepted in 2008, and therefore the private entity column for rebate levels is market NA.

**Table 3: CORE Program - Solar Electric Rebate Schedule –  
applicable September 1, 2007 for new applications for 2008 funds**

	<b>Column A - Private Entities – Public and Non-Profit Entities Using Tax Advantaged Financing</b>	<b>Column B - Public and Non-Profit Entities (Non tax advantaged financing)</b>
0 to 10,000 watts	NA	\$4.10/Watt
10,001 to 40,000 watts	NA	\$3.15/Watt
40,001 to 100,000 watts	NA	\$2.50/Watt
100,001 to 500,000 watts	NA	\$2.30/Watt
500,001 to 700,000 watts	NA	\$1.85/Watt

Once the funds for any budget category are fully committed the Market Managers will help potential new applicants understand their options under the new solar initiatives, and support their participation in these offerings. This will include registration in the SREC-Only Pilot Program, and the 2009-2012 Rebate Program.

The 2008 CORE Program rebate levels for wind projects are presented in Table 4. The wind rebates are the same for private and public/non profit entities. For 2008, starting with all new applications received after January 1<sup>st</sup>, the CORE Program wind rebate will be based on an Expected Performance Based Buy-down (EPBB). The EPBB for wind accounts for factors impacting the annual expected generation for each installation and site. For wind, these factors are estimated annual wind speed at 50 meters, the proposed tower height, and the performance curve for the proposed turbine.

The estimated performance based buy down calculation method is designed to provide incentive levels comparable to the previous rebates for systems installed at sites with a good, ~11 MPH, average annual wind speed. The EPBB rebate is calculated according to the first year estimated annual output, providing greater incentives to systems expected to have higher energy output. The required inputs from new applicants include the site's wind resource at fifty meters (from the three available wind resource maps), the proposed hub height for the turbine, and the turbine being proposed. Turbines eligible for incentives will be listed on the New Jersey Clean Energy Program Website. With this information, program staff will estimate the annual output and calculate the incentive amount. The incentive methodology and rebate levels are designed to provide attractive customer economics for wind energy systems up to one megawatt.

**Table 4: CORE Wind Rebate Schedule – applicable to new applications for 2008 funds**

<b>Wind Systems</b>	
<b>Estimated Annual Energy Production</b>	<b>Rebate Level</b>
1-16,000 kWh	\$3.20/Annual kWh
16,000 – 750,000 kWh	\$.50/Annual kWh
There is a cap on the maximum allowable incentive. Maximum incentive amount is based on system specific production at 120% of reference wind speed (11.4 MPH X 120% = 13.7 MPH)	

The Market Managers have two wind technical training sessions scheduled for the fall of 2007, to provide detailed instructions and examples on the new rebate calculation methods and to review the new program forms and application requirements. All new applications submitted after January 1, 2008 will be required to participate under the new EPBB rebate structure.

The rebate structure and levels for sustainable biomass and fuel cells are being maintained at the same levels offered in 2007.

**Table 5: New Jersey Clean Energy Program Biomass and Fuel Cell Rebates**

<b>Fuel Cell and Sustainable Biomass Systems</b>	
<b>Systems Up to 10 kW</b>	
<b>Watts</b>	<b>Rebate Level</b>
1-10,000 watts	\$5.00/watt
Maximum rebate as percentage of eligible system costs	50%
<b>Systems Greater than 10 kW</b>	
<b>Watts</b>	<b>Rebate Level</b>
1 – 10,000 watts	\$3.00/watt
10,001 to 100,000 watts	\$2.00/watt
100,001 to 500,000 watts	\$1.50/watt
500,000 watts, up to 1,000,000 watts	\$0.15/watt
Maximum rebate as percentage of eligible system costs	30%

Rebate levels for all system types are calculated on a per site basis. The definition of a site for the purposes of rebate eligibility and calculation is a parcel of real property including any

adjacent or contiguous property under common ownership. A rebate request for multiple systems to be installed on one site, regardless of the number of meters, should be contained in one application, and the rebate commitment should be calculated as if it is one system in aggregate.

CORE rebates are calculated incrementally based upon the size of a system. All phases of system installation will be considered as a whole system and subject to “per site” limits. Any additional output capacity added to that same system or “site” will be considered an extension of the previously existing system or capacity.

To ensure that the CORE rebate program achieves its goals as equitably and efficiently as possible, the New Jersey Board of Public Utilities has established maximum per entity annual rebate caps. An *entity* is defined for the purposes of rebate cap calculations as follows:

- For public sector applicants, an entity is defined by the existence of a distinct and separate budgetary authority
- For private sector applicants, an entity is defined by a corporate parent or holding company and includes all related subsidiaries and affiliates regardless of separate EIN numbers or locations within New Jersey.

For public sector applicants, there is a rebate cap of \$2.5 million per year and an aggregate limit of \$5 million over two years. After this limit is met in an annual rebate commitment, no additional rebate approvals will be issued to that same entity for that year. This rebate limit applies even if a public entity has multiple sites. The public sector entity cap applies to government facilities, and municipalities.

For private sector applicants, there is a rebate cap of \$5 million per year and an aggregate limit of \$20 million over four years. After such limit is met, no additional rebate approvals will be issued to that same entity for the time period of one year.

Public K-12 school districts are considered distinct entities subject to a different “per entity” rebate cap. The maximum annual CORE rebate commitment is adjusted for public school districts to allocate CORE funds to districts with the greatest need. The tables necessary to calculate a school incentive are included with the Customer On-Site Renewable Energy Program Public School Application Addendum.

Additional rebate amounts are available to encourage applications that use New Jersey manufactured products and that have participated in the NJ Home Performance with Energy Star program. An additional \$0.25 per watt will be applied to the CORE rebate for projects using solar PV modules manufactured in New Jersey. An additional \$0.25 per watt will be applied for residential projects less than 10 kW in size that participate in the NJ Home Performance with ENERGY STAR program.

The incentives identified above may be modified with the approval of the Office of Clean Energy.

## **Planned Program Implementation Activities for 2008**

Program year 2008 represents a clear transition to the new solar market initiatives. Both new market entrants, and those in the queue, that are ultimately not able to be funded with existing CORE program budgets will rely on the new market initiatives. Pending final policy determination and directives from the Board the new market initiatives are expected to include

the SREC/SACP market, and some continuation of rebates for smaller projects. Sound communications and outreach to existing customers will be critical to provide access of information and options for participation in renewable and energy efficiency programs available through the NJCEP.

The Market Manager Team has identified 5 major focal areas for CORE program operations in 2008.

- First, approve and complete the highest possible volume of CORE projects subject to available budget in each category.
- Second, program year 2008 represents a transition to the new solar market initiatives. CORE program participants, new market entrants, and those in the queue that are ultimately not able to be funded will all be impacted by the new market initiatives. Pending final policy determination and directives from the Board the new market initiatives are expected to include the Solar Renewable Energy Certificate (SREC) market supported by an eight year rolling forward solar alternative compliance payment (SACP) schedule, and the continuation of rebates (2009-2012) for smaller projects. The Market Manager Team will develop program support and administrative services for these new market initiatives, and help current and future market participants understand their options.
- Third, photovoltaic (PV) systems have accounted for roughly 96% of total program rebates and close to 90% of the capacity installed. While the dominant share of PV as compared to the other eligible technologies will continue in 2008, this year's plan includes specific rebate funds and enhanced market development activities designed to increase wind and biomass participation.
- Fourth, the Market Managers will continue efforts to increase the level of integration between the renewable energy and energy efficiency components of the New Jersey Clean Energy Program portfolio. This includes setting specific targets for cross-program participation for the commercial industrial and residential markets.
- Fifth, the training and workforce development components of the program will be expanded and increased. Failing to meet the growing demand for a qualified workforce can reduce the program's overall economic benefits, negatively impact the quality of systems, and drive the system delivered energy costs higher.

The following program implementation activities will support these areas of focus in 2008:

- Provide new funding approval for projects as available funding permits. This includes projects that are currently in queue and new applications for those budget categories and technologies that are not over-subscribed.
- Conduct 24 training/technical workshops designed to address most critical training needs based on market conditions and inspection results. Topics for 2008 are expected to

include: Expected Performance Based Buy-down and future solar rebate structure; working in the SREC/SACP market; training for taking North American Board of Certified Energy Practitioner (NABCEP) certification tests; and workshops to address workforce training with local colleges and/or other training programs and institutions.

- Support SREC-Only Pilot Program participation and support transition to full SREC/SACP model. CORE program operations, including new project registration and inspections will continue to be coordinated with the REC Program to provide market continuity and administrative efficiency.
- Develop recommended Rebate Program Design for 2009 to 2012. Present draft program concepts to the Office of Clean Energy and Advisory Committees for review and feedback. Based on Board approval, develop the necessary program materials and processes to allow accepting new applications by September 1, 2008. Program design concepts will include capacity block declining incentive structure with Expected Performance Based Buy-downs.
- Actively promote and support development of non-solar CORE projects utilizing \$4.75 million of new 2008 rebate funding (final funding to be determined by Board Order on Funding Allocation).
- Actively work with existing projects in the Private <10 kW Queue to encourage participation in the Home Performance with ENERGY STAR Program.
- Implement information system enhancements to:
  - Enable electronic application and inspection forms for the 2009 rebate program;
  - Allow web-enabled application status tracking for program participants and contractors;
  - Provide a platform for enhanced market reporting on installations and new solar generation for both the CORE and REC programs;
  - Develop and implement capability to accommodate performance based incentive structures (for 2009 rebate applications) and;
  - Provide web-enabled market data (e.g. installed costs, manufacturer market shares; geographic portrait of installation activity)

Note: The development and implementation of the proposed IT system enhancements is contingent upon approval of proposed contract modifications submitted by the Honeywell Team with the 2008 program plans. To the degree that approval of the proposed contract modifications is delayed beyond January 1, 2008 the associated target dates for development and implementation of the IT system enhancements (as specified in the proposed contract modifications) will be adjusted.

- Provide 100% inspection of all completed projects.
- Present program and market information on the CORE program at regional and national renewable energy forums.

- Maintain communications with stakeholders through monthly renewable energy committee meetings, proactive program communications and information dissemination through web.

### **Proposed Program Design Changes for 2008**

- The OCE staff has recommended to the Board that the CORE program stop accepting new applications for solar projects in the private less than 10kW and private greater than 10kW budget categories. The Market Manger team will implement suspension of new application processing as directed by the Board.
- No new applications processed for Sunlit projects after this budget category is fully subscribed.
- Adopt expected performance-based buy-down for wind for all new applications after 1/1/08.
- Increased technical and market development support for biomass projects to help overcome non-financial market barriers.
- Development of new rebate program for 2009 (pending approval of rebate based program through 2009-2012 CRA Proceeding)
- Emphasis on facilitating transition for market participants who don't get funded through CORE 2008 funds to other opportunities in 2008 and/or to new 2009 programs:
  - Provide information on how to enroll and participate in the SREC/SACP market
  - Develop mechanism for priority enrollment in 2009 program offerings.

### **CORE Program Marketing and Communications Plan**

Reflecting the market and program changes identified above, the CORE Program marketing and communications plan proposes to increase the quality and quantity of information available through a number of channels and in a variety of formats. The following section highlights specific marketing changes and tactics, followed by a table summarizing CORE program marketing goals, strategies and activities for 2008.

### **Marketing Changes for 2008**

- New communications efforts to help market actors understand new SREC/SACP market structure and other options (e.g. 2009 rebate program for small projects –if approved). Detailed communications with customers and trade allies by mail, phone, workshops, presentations, and web-based information sharing.
- Provide an enhanced, outward facing, web-based interface for select components of program operations (status tracking and inquiry) and reporting. This IT infrastructure

will also support the new Expected Performance Based Buydown (EPBB) rebate structure.

- Support for cross-program initiatives including outreach and communications to Clean Power Community Partners, cross-marketing of Home Performance with ENERGY STAR and commercial/industrial energy efficiency services to expand all opportunities for energy savings with existing CORE customers.
- Increase market development, education and training activities to increase participation of wind and biomass.
- Increase technical/training workshops to address critical training needs based on market and inspection results. This includes workforce training with local colleges and/or other training programs and institutions.

### **Marketing and Communications Tactics**

1. Collateral/Educational literature: Develop fact sheets and case studies for CORE program (solar, wind, biomass, fuel cell technologies) to showcase technologies, project economics and environmental benefits.
2. Direct Mail Outreach: Conduct direct mail outreach to customers, trade allies and municipalities, as well as commercial/industrial customers providing information regarding transition and opportunities to participate in energy efficiency programs, including Home Performance with ENERGY STAR and commercial/industrial retrofit programs. Conduct follow-up telemarketing as appropriate.
3. Special Training Events/Educational Communications: Initiate and conduct meetings, workshops, and trainings with trade allies, as well as workforce trainings for schools and other educational institutions. Trainings will be promoted by email, direct mail, web postings and trade association networking.
4. Sponsorships: Sponsor and participate in trade events that relate to renewable energy market, including New Jersey State League of Municipalities, Small Business Administration, Jr. Solar Spring, National Green Power Marketing, ACORE, and NESEA Green Building Tour.
5. Public Relations/Media Outreach: Continue to conduct “ribbon cutting” event for high-profile, high visibility locations throughout the state. This will include development of press release, talking points and press kit to showcase project and explain current market offerings to the public to increase awareness, encourage greater participation and build recognition of the value of renewable energy for the future of New Jersey.
6. Web Strategy/Communications: Provide an enhanced level of customer service and market information through the proposed CORE IT System Enhancement that will allow select external access to “real-time” query and reporting on information (e.g. queue status,

completed installations, and pending applications) that are constantly changing. The web content and design will also more actively cross-market appropriate energy efficiency programs, i.e. Home Performance with ENERGY STAR.

7. Educational Video—Develop a “virtual solar” tour for use in renewable presentations, workshops and web to illustrate solar technology, environmental benefits, the installation process, and the economics of both large and small projects.

8. Cross-marketing: Promotion of residential and commercial/industrial energy efficiency services and programs to leverage program awareness and increase participation of current customers predisposed to energy-related issues and technologies. Home Performance with ENERGY STAR will be promoted to customers through direct mail and follow-up telemarketing. Commercial/industrial customers will be referred to TRC for direct sales contact.

**Table 6: CORE Program Marketing Goals**

<b>Program Goals</b>	<b>Target Audience</b>	<b>Communications Outreach Strategy</b>	<b>Mktg. Collateral</b>	<b>Medium/Web Strategy</b>
Excellent communications and program information available to market	Includes current and potential future participants across technologies (solar, wind, biomass, fuel cell). Also includes those who may participate in SREC Only Pilot.	Provide web access to status for existing projects. Offer select query based access to program and market data.	Web based and training workshop presentations on new IT system capacities	Front end to program database system that allows select access (password protected) to reports and individual project status (Proposed under CORE IT Enhancement). Audience will be given access to timely information.
Support Transition for those not able to receive CORE Rebate in 2008.	Existing applications that do not receive 08 CORE program rebate funding. Existing and future projects that will be supported by the SREC-Only Pilot or the 2009-2012 rebate funds	Once the 08 CORE Program funds are fully committed and expended, New Jersey continues to provide support for project development that will sustain market growth.	Develop a fact about the SREC-Only Pilot Program.	Direct outreach through account manager and other program staff, presentations to Committees and installer industry workshops, web-site and newsletter information, trade journal articles.  Hold workshops to these groups and recommend the SREC-Only Pilot Program as an option. Explain how the SREC-SACP market works.  Develop a press release about the SREC-Only Pilot Program as an option to people not receiving a rebate.
Increase Non-Solar Participation in the CORE program	Sites with good biomass and or wind resources for on-site generation. Includes municipalities, food processing industries, wastewater treatment facilities.	CORE program is not just solar. At good sites the economics and environmental benefits for wind and sustainable biomass projects can be quite	Create separate fact sheets for wind and biomass technologies.	Direct outreach through non-solar specialist and other staff, participation in community events, participation in appropriate associations, assistance, articles and information for local press.

Program Goals	Target Audience	Communications Outreach Strategy	Mktg. Collateral	Medium/Web Strategy
		favorable.		Host workshops to address and explain non-solar technologies.  Develop press release to explain market offerings to the public.
Increase cross participation between NJCEP efficiency and renewable energy programs	For 08 particular focus on residential projects in the CORE queue that are eligible to participate in the Home Performance with ENERGY STAR	It can be very beneficial to consider increasing home performance and efficiency savings at the time when you are investing in solar	Marketing collateral for installers who are participants in both the HPES and CORE programs, marketing and sales training	Include Home Performance with ENERGY STAR \$ .25 per watt offering for residential projects less than 10kW in size on website. Feature on both Renewable and HP sections of the website.
Provide increased support for workforce training to meet future needs for expanding industry activity.	Technical high school and colleges and workforce training programs, apprenticeship programs.	The need for a trained workforce to meet New Jersey's goals for distributed renewable generation is growing. The sector represents good job and economic growth opportunities for the state.	Develop an education and workforce development portion of the website. Includes information for students as to where they can obtain information, workshops, and training on renewable industry activity.	Participation in and sponsorship of training and technical workforce activities and institutions. Trade journal articles, web content, invitations to programs to participate in awards or annual program conference events.
Participate in major solar ribbon cuttings, e.g. greater than 10kW projects that are businesses, schools, or state buildings.	Businesses, municipalities, schools, etc. considering installing solar or that have had solar installed.	Develop press releases and work with media to cover these events.		Feature solar ribbon cuttings on the renewable section of website.  Develop case studies on the solar ribbon cuttings.
Virtual tour of a solar installation project.	Anyone considering solar.			Use the web as a photo gallery of residential and commercial projects. Develop a case study to be included in the photo gallery of the projects. Use several examples.

## Quality Control Provisions

The CORE program utilizes both on-site inspections and in-house technical review to ensure that the systems participating in the program meet all program requirements. Field

inspections include review for compliance with program technical requirements and interconnection requirements as well as proper system design and installation practices.

In-house technical review occurs when applications are first submitted, and when final project documentation is provided. These include review of projected electric consumption for new construction.

## **Budget**

The total CORE program budget for 2008 is \$143.9 million. This includes new funding allocations of roughly \$57 million with the remainder coming from carry-forward commitments and a small amount of uncommitted funds. A detailed budget for this program for 2008 is attached in Appendix B.

## **Goals and Renewable Generation**

### *Goals*

Performance incentives will be associated with three program goals for 2008:

- More than 5,300 MWh of expected first year generation from completed non-solar projects (including those awaiting inspection and final rebate payment) in 2008;
- More than 17,530 MWh of expected first year generation from newly approved non-solar projects in 2008; and
- Approve more than \$42 million of new projects from the private LT10kW, Private GT10kW, Public Other and Public Schools K-12 budget categories before April 30, 2008.

Details on these goals can be found in Appendix C. Additional program goals are as follows:

- complete the 2009 Rebate program design and have supporting materials procedures and guidelines available and ready to accept new applications starting September 1, 2008;
- 1,050 CORE rebate checks issued;
- Provide technical training and outreach for at least 200 participants, through twenty-four training and workshop sessions, and;
- 150+ projects qualify for Home Performance with ENERGY STAR rebate supplement.

## **2008 Clean Power Choice Program**

### **Program Description**

The Clean Power Choice Program is designed to give all New Jersey utility customers a voluntary opportunity to purchase renewable electric generation. Customers can choose between 4 state-licensed renewable energy products, which offer either a 15% or 100% renewable mix, by agreeing to pay a small premium on their regular electric bills. The renewable generation purchased by customers in the Clean Power Choice Program is not used to meet the state's Renewable Portfolio Standard (RPS) requirements. Key elements of the 2008 program include:

- A rule-making process to formally adopt the program (which has been operating under a board order but without formal rules since its inception);
- A competitive solicitation for Clean Power Marketers (CPMs) and their offerings of renewable power products;
- Continued growth of the Community Partnership program, which enlists local communities in promoting the CPC program to its residents and businesses.

### **Target Market/Eligibility**

The program targets all retail electric customers of the State's four investor-owned electric utilities. Clean power sales in the voluntary program must be renewable energy that is not otherwise used to meet a supplier's RPS requirements and includes full disclosure of the power supply mix utilized by the suppliers participating in the program.

### **Program Offerings and Customer Incentives**

Since its launch in 2006, the voluntary program has allowed customers to select one of four products. Currently, two of these have 100% renewable energy content, which cost approximately \$9.10 extra per month, and two have 15% renewable content at an estimated additional cost of \$4.94-\$5.78 per month, compared to the customer's basic generation service.

### **Program Delivery**

The program is delivered collaboratively by the clean power marketers, the Office of Clean Energy, the Market Managers, and the four investor owned electric utilities. The clean power marketers provide renewable resource products that can be purchases as an add-on subscription to a customer's basic electric service. The utilities provide a delivery platform to enable enrollment and billing, with oversight by the Office of Clean Energy. The Office of Clean Energy has also played a strong supporting role in marketing the program to customers in cooperation with electric and gas utilities and clean power marketers. The OCE manages the marketing budget for the CPC program, and the OCE and its public relations contractor recruit communities into the community partnership program.

The Market Managers provide program administration, including the development of solicitations for clean power marketers, and coordinated reporting. The CPMs are required to provide the market managers with an annual verification report showing the number of participating customers (by utility territory), the CPC renewable energy obligation by territory

and the retirement of RECs necessary to meet their total obligations. The Market Managers also provide policy advice, and support to OCE staff on specific marketing and outreach activities.

The Market Managers also support the community partnership component of the program. Once communities have committed to the community partnership, the Market Managers serve as the main contact and source of support for communities on technical, reporting and other program-related issues.

The OCE has historically played a larger role in the CPC program management, particularly with regards to marketing, in comparison to the CORE and other renewable energy programs. In 2008, if the OCE wishes to implement a more integrated model for program marketing and management the Market Managers are prepared to assume a greater role in coordinating this approach.

## **Planned Program Implementation Activities for 2008**

Although there has been some promising initial growth, the market for voluntary clean power sales in New Jersey is still relatively new. The challenges have been to increase awareness and educate customers of the program offerings. This has been done through utilities (primarily through 2 annual bill inserts), limited direct marketing by clean power marketers, some broad-based advertising from the Office of Clean Energy, and through direct promotion by Clean Power Community Partners. These efforts have produced some results with 6,000 projected new participants in 2007 (cumulative total of 15,000 by year end). Looking forward the marketing and outreach efforts will need to have higher impact to help meet the target of 1% participation. Opportunities exist to leverage the promotion of CleanPower Choice through integration with other NJCEP programs.

The Market Managers will undertake the following program implementation activities in 2008:

- Assist the OCE in developing a rule to formalize the CPC program and clarify guidance missing from the current program description. This may include any or all of the following:
  - Requiring utilities to provide customer account look-up (with provisions to protect customer privacy, provide cost recovery, and prohibit slamming)
  - CPM licensing and renewal procedures, including requiring marketers to submit marketing plans and notifications for changes in offerings
  - Revising the program's market structure, with provisions for a competitive solicitation aimed at increasing the attractiveness of clean power products available
  - Amending product standards to encourage affordable, 'resource-rich' (e.g. in-state solar or wind) options
  - Clarifying eligibility guidelines to permit participation by commercial customers that do not receive basic generation services (BGS) from the utilities
  - Establishing a performance-based marketer incentive program, which pays a bounty to marketers for each sign-up;
  - Review of utility provisions that may be barriers to participation (e.g. dropping a customer who misses one bill payment from the program)

- Complete a new solicitation for clean power marketers, incorporating any new elements from the program's formal rule-making.
- Provide management, support and reporting for community partnerships that promote the program through enrollments at community based events and initiatives.
- Identify methods to increase the enrollment of business and industrial customers.
- Develop and implement a process for annual verification of renewable (energy certificate) resources purchased by marketers to meet program demand in coordination with similar "compliance" market verification.
- Continue to develop enhanced analysis and reporting, including support for communities in the partnership coalition wishing to identify CPC impacts on baseline 'carbon footprint' metrics and progress toward goals.
- Coordinate with other NJCEP renewable energy programs to provide data and analysis on activity in the voluntary clean power market.

### **CleanPower Choice Program Marketing and Communications Plan**

The target audience for the CPC program consists of all New Jersey electric utility ratepayers who want to invest in renewable energy by paying a small premium on their electric bill, which is used to buy renewable energy certificates (RECs) from projects producing renewable energy.

### **Proposed Marketing Changes for 2008**

- Assist OCE in the development and implementation of marketing plans and outreach efforts; manage marketing initiatives as delegated by OCE
- Consult with communities participating in the CPC community partnership on local program promotions and status of each community; consider development of customer referral program increase word-of-mouth advertising.
- Identify methods to increase the enrollment of business and industrial customers in the CPC program through the commercial/industrial program client network

### **Marketing Tactics**

1. Partnerships/Outreach: Promote CPC services through similar organizations and initiatives such as the US Conference of Mayors Climate Partners and Sierra Cool Cities Program; seek to create mutually reinforcing services, create reciprocal marketing (events, web-site links) and strategic alliances to build all programs.
2. Collateral: Develop fact sheets and signage explaining the benefits of participating in CleanPower Choice, especially for business and industrial customers to demonstrate their companies' environmental stewardship and seek support and participation of employees.
3. Public Relations/Media Outreach: Engage local and non-local media to place articles/editorials; despite reduced budget, identify if there are any affordable print/electronic media options used in previous years; prepare press kit, releases and

frequently asked questions to explain the benefits of the program to the ratepayer/consumer while at the same time addressing the extra cost to participate in the program.

4. Special Events/Community Partners: Community Partner meetings-including periodic/annual-separately or at the NJ Annual Energy Conference and training session(s). Create Clean Power Community Partner competition whereby the winner has the opportunity to have a case study about their hometown or be rewarded with other community incentive. Success stories to be featured on the website and in the OCE newsletter. Use and compensate community networks, i.e. Boy Scouts, Girl Scouts, to help drive sign-ups as part of civic outreach and environmental merit awards.
5. Utility Communications: Since bill inserts continue to be the most effective outreach tool, continue at least twice per year bill inserts; if possible, examine redesign and other options to lower cost (e.g. fewer panels/colors); examine potential to budget a third insert.
6. Point-of-Purchase Displays and Signage: Create easel-back signage and other point of purchase displays to encourage and promote year round recruitment and sign up of new customers. Develop “source coded” labels for use by Clean Power Community Partners, and participating retailers and trade allies with counter-top displays. (these tactics have been used successfully in SmartPower’s Pennsylvania and Connecticut campaigns)
7. Web Site Strategy: Update web site with graphics on program participation statistics to help increase awareness, promote sense of contribution towards larger effort, and increase the sales of product offering. Develop links with active Community Partners, program participants and trade allies, related businesses, and organizations such as Sierra Club and Union of Concerned Scientists.
8. Direct Mail: Include Clean Power Choice offering in the rebate check packets sent by the Market Managers to participants in the other efficiency and renewable energy programs.
9. Call Center Communications: Include information on CleanPower Choice as part of service representative’s script for customer inquiries; include information on “hold message.”
10. Customer Referral Incentive: Provide customer incentive for customer referrals, using a “friends and family” approach to encourage word-of-mouth advertising.
11. Advertising: Investigate on-line advertising and search engine optimization to direct customers to CleanPower Choice when seeking information regarding clean power.
12. Corporate Alliance Communications: Solicit support of participating businesses of the CORE and commercial/industrial energy efficiency programs to promote CleanPower Choice through company newsletters, web sites, payroll checks
13. CleanPower Marketers Communications—Develop new solicitation for clean power marketer participation that will include plan for marketing and incentive bounty for each participant.
14. Special Events: Promote CleanPower Choice at all OCE-sponsored training events, trade and consumer events.

**Table 1: Clean Power Choice Program Marketing Goals and Activities**

<b>Program Goals</b>	<b>Target Audience</b>	<b>Communications Outreach Strategy</b>	<b>Marketing Collateral</b>	<b>Medium/Web Strategy</b>
Encourage more comprehensive and attractive product offerings.	All New Jersey electric utility ratepayers who want to invest in renewable energy by paying a small premium on their electric bill.	Conduct competitive solicitation for new product offerings  Draft a press release explaining the new products offerings and their benefits. Address the extra cost to participate in the program in the fact sheet.	Reprints of bill inserts; brochures; updated press kit; frequently asked questions	Add the new product offerings to the website.  Include participation counter “ticker” or table to increase awareness and encourage participation
Implement block product offerings to customers (in-state solar or wind options).	All New Jersey electric utility ratepayers who want to invest in renewable energy by paying a small premium on their electric bill.	Conduct competitive solicitation for new product offerings  Send e-mails to CleanPower Community Partners so they may communicate the new options of the program.		Add new “resource-rich” options as separate section under CPC website.
Increase participation by non-BGS commercial customers.	Non- BGS commercial customers.	Send an e-mail to listserv about the non-BGS commercial customer eligibility.	Create a fact sheet specifically for non-BGS commercial customers explaining the benefits of participating in the program.	Include message on website stating non-BGS commercial customer eligibility.
Increase the enrollment of business and industrial customers in the CPC Program.	Business and industrial customers.	Send letters and/or e-mails to business and industrial customer leads about the CPC Program. Emphasize the importance of achieving and strengthening companies’ environmental stewardship activities and support of NJ’s clean Energy Programs. Select a case study for this group and use it as an example.	Create Clean Energy Leader Award Winner competition to solicit sign-ups from award winners’ networks.	Have a special site geared to businesses and industry companies to drive company-sponsored sign-ups
Enroll at least 6,000 new CPC customers in 2008.	All New Jersey electric utility ratepayers who want to invest in renewable energy by paying a small premium on their electric bill.	Train CleanPower Community Partners in conducting outreach in their own communities.  Suggest they form a team captain structure. Each captain is responsible for a specific area (streets or section of town) in conducting outreach about CPC.  Create a CleanPower Community Partner competition, case study for town with the most enrollments. Feature the case study on web and in newsletter.		Feature case studies about the CleanPower Community Partners on the website.  Show status of each community partners and progress to statewide goals.

## **Quality Control Provisions**

The products offered by the Clean Power Marketers must be verifiable as renewable energy that is not otherwise used to meet a supplier's RPS requirements, and must also include full disclosure of the power supply mix utilized by the suppliers participating in the program. Verification ensures that each CPM has purchased sufficient quantities and eligible types of RECs to meet its program obligations to customers. New Jersey's Solar Renewable Energy Certificate (SREC) program is used for verification of New Jersey solar RECs. PJM-Environmental Information Services (EIS) Generation Attribute Tracking System (GATS) is used for verification of non-solar Class I and II RECs.

CPMs will be required to provide the market managers with an annual verification report showing the number of participating customers (by utility territory), the CPC renewable energy obligation by territory and the retirement of RECs necessary to meet their total obligations. These reports are verified with the GATS and/or Clean Power Market reports and utility records.

## **Program Budget**

Program activity and budgets for 2008 are consistent with experience from the past year. The proposed program budget for 2008 is \$982,167. A detailed budget for this program for 2008 is attached in Appendix B.

## **Program Goals**

The Clean Power Choice program is designed to contribute to the development of the voluntary market for renewable energy – additional renewably generated electricity over and above the levels utilities are required to procure to meet mandatory RPS obligations.

In 2007, the OCE established a program goal of 1% of electric utility customers participating in the program, or about 36,000 participants.

At the beginning of 2007, there were about 9,000 enrollments (representing about 1.5 years of program activity, however several CPMs and EDCs did not participate until second quarter 2006, when all firms started participating). To date this year, enrollments are up by about 4,000, for a total of about 13,000. Based on adoption trends this year, the increase in enrollment in 2007 is expected to be about 6,000, for a cumulative program total by the end of the year of about 15,000.

Based on the current program structure, a conservative goal for 2008 is an additional 6,000 enrollments, and an aggressive goal is about 12,000, or about twice current enrollment levels. If aggressive goals are met, total enrollment by the end of 2008 would be about 27,000.

If the program structure is altered in the upcoming rule-making, and/or if the community partners program is widely adopted throughout the state, higher enrollment targets may be feasible. The 1% goal, or 36,000 enrollments, is an achievable goal, although it will take some months for the program to respond to the regulatory changes that may take effect in 2008.

## **2008 Renewable Energy Development Initiative**

### **Program Description**

The Renewable Energy Development Initiative (REDI) is new for program year 2008. The goal of REDI is to leverage public and private funding for the purpose of building capacity of Class 1 renewable resources in New Jersey. It will target the rapid deployment of non solar Class I renewable resources in New Jersey, particularly those that are not eligible to participate in the Customer On-Site Renewable Energy (CORE) or SREC-Only Pilot programs. The Market Managers are proposing the REDI for 2008, as an evolution of the Renewable Energy Grants and Financing Program, with the intention that it will provide complementary services to the initiatives that will continue to be offered and managed by the Economic Development Authority (EDA).

In 2007, the Office of Clean Energy (OCE) worked in partnership with the EDA to provide funding and financing support for three programs to provide assistance to clean energy businesses:

- The Manufacturing Incentive program was designed to assist clean energy manufacturers site and develop manufacturing facilities in New Jersey.
- The Renewable Energy Business Venture Assistance Program (REBVAP) provided loans and grants to New Jersey renewable energy businesses for commercialization of renewable technologies.
- The Renewable Energy Grants and Financing Program providing support for development of large behind-the-meter and grid supply renewable energy generation facilities.

In past years, The OCE managed solicitations and initial proposal review, and referred approved projects to EDA for financial review and financing administration. Under this model, participation over the last several years has been stagnant. The Renewable Energy Grants & Financing Program has been suspended and is not currently accepting applications. The Manufacturing Incentive program has not funded any projects since its inception, and is also currently dormant. The REBVAP is currently accepting applications only for recoverable grants (loans), but had not received any applications through the first three quarters of 2007. Several projects from older solicitations in this suite of programs continue to move through review and financing processes. The OCE is currently negotiating a Memorandum of Agreement to turn over management of the Manufacturing Incentive and REBVAP programs to EDA.

Looking forward, the REDI is designed to be an evolution of the Renewable Energy Projects Grants and Financing Program. As proposed, the REDI will be managed by the Market Manager team. The REDI services will include developing and running a competitive solicitation process in 2008. We propose that grants made available through this solicitation be delivered through the market managers, using mechanisms already developed for the CORE program to pay rebates. We do not propose including a loan/recoverable grant as part of the 2008 solicitation. In addition, the REDI will also generate a portfolio of market services – delivered by the Market Manager team and by industry – that we believe are necessary to supplement the direct financial support in fostering rapid project development and accelerating the pace with which new Class I renewable generation is built.

## **Target Market/Eligibility**

The Renewable Energy Development Initiative will target renewable market segments not being served by current NJCEP programs. The eligible technologies include photovoltaics, wind energy, fuel cells, wave, tidal, renewably generated hydrogen, and sustainably harvested biomass. The solicitation will be open to the following market segments although in the first year it is not likely that funds will be distributed to projects in each of the eligible categories.

Non-solar renewable energy projects greater than 700 kW. The CORE program provides service to net metered solar projects up to 700 kW and net metered wind and sustainable biomass projects up to 1 MW. The SREC-Only Pilot serves the market for larger solar projects, but there is a gap in what is offered to non-solar, large-scale behind-the-meter renewable energy projects.

We expect during the first year and solicitation round, the REDI will focus particularly on sustainably harvested biomass and wind. The Market Development Initiative can work in tandem with the CORE program to develop technical standards and application processes, form strategic relationships with other state agencies and stakeholders, and work with market players to stimulate interest in launching projects. There may be some issues, such as environmental permitting or local zoning, that will affect larger projects differently or to a greater degree than in the CORE program.

Grid-Supply Projects. The SRECs pilot program supports large behind-the-meter solar projects, but there is no provision for services to facilitate development of utility-scale projects that are not net-metered. For both the solar and Class 1 renewable markets, grid supply projects can help substantially in meeting RPS goals in the future.

Community Energy. The solar transition calls for the development of a community solar program, which would enable large projects to serve multiple meters. Changes in the net metering and interconnection rules required to enable this type of project are planned to be made by late 2008. The market managers can support OCE in researching other states' approaches to community energy projects, and begin planning for a CEP initiative to launch in 2009.

We can also begin work in 2008 on setting the stage for a community energy program. One promising opportunity is provided by the Solar City Awards offered through the U.S. Department of Energy's Solar America Initiative (SAI), which supports local communities' efforts to build solar generation. The market managers can build on our current relationships with local communities fostered through the CORE and RECs programs. Those programs create leveraging opportunities for communities that want to participate in the SAI, which requires matching funding. We can also help by supporting communities' efforts to submit proposals (due January 2008), and facilitating and coordinating activities between local officials, developers, the state, and the national program.

## **Program Offerings and Customer Incentives**

The REDI will consist of activities and strategies designed to reduce or overcome the following market barriers to greater in-state development of Class I renewable energy resources:

- proper economics;
- long-term REC contracts, and
- permitting

Specifically, a competitive solicitation will be issued to provide direct financial incentives to help improve project economics, with a specific focus on identifying and supporting projects that are able to propose rapid development and start-up. This solicitation will identify benchmarks (e.g. maximum \$ of support requested per first year MWh) that will establish thresholds for project eligibility. In addition to MWh production, the main criteria for the solicitation will be development schedule, and proposed market enhancements (such as development of workshops, financing models, resource data, and/or workforce development) that will help foster future market growth.

The incentives would be split into two main components:

- Start-up grants, limited to \$50,000, to support project design, feasibility studies and permitting processes required for project development.
- Incentives for the rapid development and construction of projects. Payments and solicitation milestones will be structured to include some up front distributions (to encourage participation and invigorate the market) with further payment schedules based on project milestones such as generated MWh, and other specific deliverables tied to the proposed market enhancement activities.

The REDI incentives will supplement other sources of support that contribute to favorable project economics. For example, in addition to REDI incentives, completed projects would also be eligible to create and sell Class I RECs, and/or be eligible for federal tax incentives. The development of new projects (assisted by REDI) will help to prompt and promote the further evolution of long-term contracts or other means of securitization for in state Class I RECs.

## **Program Delivery**

The market managers will develop and manage the REDI, by building upon the administrative, technical, and financial infrastructure that serves the CORE, RECs and CPC programs.

The market manager activities in REDI will support the development and maturation of markets that have not received as much attention as solar markets over the last several years. These include market development workshops, resource assessments, research on financing models, and coordination with other regional and national organizations such as the Solar America Initiative, the NJ DEP, NJ EDA, NJ DCA, RGGI and PJM-GATs.

## **Planned Program Implementation Activities for 2008**

- Develop and manage a competitive solicitation with 2008 program funding. Criteria for the solicitation will include:
  - Minimum targets for MW of capacity, annual MWh of production, and required level of support \$/MWh of first year production
  - Timeliness of project development
  - Additional market enhancement activities undertaken by the project owners and developers, such as high visibility promotion of projects, development of educational materials and events, or workforce training.

- Building on the current renewable resource assessment, conduct follow-up research on the biopower and wind market bases, market segmentation and characterization, and study of barriers and opportunities in three to five target industries (e.g. food processing, wastewater treatment, agriculture).
- Develop and distribute awareness building, educational and promotional materials (including fact sheets on technologies and specific industry opportunities and barriers).
- Sponsor and host educational and networking workshops and meetings with industry stakeholders and potential participants. These activities and other market support services would be designed to supplement those provided by industry players under the REDI solicitation.

The activities listed in this section are based on the approval of the contract modifications that have been submitted by the Honeywell team along with the 2008 Program Plan filings. If the proposed contract modifications are not accepted, or if approval is delayed beyond the beginning of January, 2008 then the activities and associated program goals will need to be modified.

## **Marketing and Communications Plan**

As proposed, the REDI will target renewable energy market segments that are not being served by current NJCEP programs. The REDI incentives will improve project economics for a portfolio of competitively selected projects. Priority will be given to projects that can be developed rapidly and meet program funding thresholds. Initiative offerings will include upfront assistance to support project design, feasibility studies and permitting processes required for project development, and incentives for the rapid development and construction of projects in 2008.

The program's communication and outreach activities will develop familiarity with the new initiative, encourage participation in the competitive solicitation, and build understanding of how REDI will support the broader targets and objectives of New Jersey's Renewable Portfolio Standards and the Energy Master Plan. Showcasing selected projects through public relations media outreach and special events will increase visibility if this new program.

### **Marketing Activities**

- Develop a communications and educational outreach effort to identify key market segments including, but not limited to, waste water treatment facilities and food processors, to encourage biomass project development.
- Develop and distribute educational and promotional materials (including fact sheets on technologies and specific industry opportunities and participation guidelines).
- Sponsor and host educational and networking workshops and meetings with industry stakeholders and potential participants. These activities and other market support services would be designed to supplement those provided by industry players under the REDI solicitation.

## **Marketing Tactics**

- Produce a Market Characterization Report that identifies target market, key decision makers, sites, needs, opportunities and barriers.
- Direct Outreach: Research and purchase contact list of target market for direct mail and sales follow up to key market segments with information about the initiative and the process to participate.
- Educational Collateral Materials: This will include fact sheets on biomass, wind and other technologies (approximately 5); as well as case studies on any projects that can be developed in 2008 and serve as a model for other entities considering similar projects.
- Public Relations/Media Outreach: Press release and trade media outreach to announce the program launch and the release of the competitive solicitation, as well as results of solicitation.
- Sponsorships/Trade Shows – Attendance and participation at relevant industry trade groups, such as municipal waste water treatment or food processing associations to identify facilities managers and key decision makers.
- Web Strategy: Update web site with special page to introduce program, post solicitation and generate inquiries and participation.

**Table 1: REDI Program and Marketing Goals**

<b>Program Goals</b>	<b>Target Audience</b>	<b>Communications Outreach Strategy</b>	<b>Marketing Collateral</b>	<b>Medium/Web Strategy</b>
Develop a communications and educational outreach effort to key market segments (including, but not limited to, waste water treatment facilities and food processors) to encourage biomass project development.	Commercial or industrial customers developing non-solar projects between 700kW and 2MW, with a focus on wind and biomass facilities.	<p>Write press release and frequently asked questions to announce the program launch and the release of the competitive solicitation.</p> <p>Direct mail to key market segments with information about the initiative and the process to participate. Stress in messaging that it is a new initiative. Goal for the communications and outreach will be to develop familiarity with the program's goals and objectives, and how it relates to the broader objectives of the OCE and NJ RPS in general.</p>	<p>Create a fact sheet explaining the initiative.</p> <p>Also include fact sheets specifically concerning wind and biomass technologies.</p> <p>Develop case studies on specific 2008 projects that may serve as a model for other entities considering similar projects.</p>	Create separate section of Renewable Energy website specifically about this program.
Develop and distribute awareness building, educational and promotional materials (including fact sheets on technologies and specific industry opportunities and barriers).	Commercial or industrial customers developing non-solar projects between 700kW and 2MW, with a focus on wind and biomass facilities.	Sponsor or participate in trade shows as it relates to relevant industry groups, such as municipal waste or food processing associations.		
Sponsor and host educational and networking workshops and meetings with industry stakeholders and potential participants. These activities and other market support services would be designed to supplement those provided by industry players under the RMDI solicitation.	Commercial or industrial customers developing non-solar projects between 700kW and 2MW, with a focus on wind and biomass facilities.	Conduct workshops to present information about the initiative to key groups, such as municipal waste water treatment facilities managers.		

## **Quality Control Provisions**

The market managers will employ quality control provisions already implemented in programs they already manage, including fiscal controls, file review, and technical analysis. The initiative rules will require project developers to report on key milestones in project development, and the market managers will inspect projects upon completion.

For the competitive solicitation, the market managers will conduct the initial review of solicitation applications to insure compliance with the requirements of the solicitation and merits of the proposal. An evaluation team with expertise in renewable energy will be recruited (with at least half the members from outside the market manager program team) to assist in the evaluation of proposals and to provide an independent assessment of the merits of applications.

The evaluation team may consist of the market managers, OCE staff, and representatives from DEP, USDOE, EDA and the Commission on Science and Technology (or appropriate substitutes). After review, the market managers will provide customer service, oversight, and account management functions as projects move through the development process.

## **Program Budget**

The market managers propose a \$4.1 million budget for the REDI, with roughly \$3.5 million for incentives to be provided through the competitive solicitation, and the market development educational and promotional activities. A detailed budget for this program for 2008 is attached in Appendix B.

The NJCEP renewable energy budget proposes a total of \$41 million for non-CORE program activities. The proposed budget should be sufficient to fund the REDI proposal, and to meet existing commitments in the EDA-managed financing programs, assist the Edison Innovation Fund and Clean Energy Technology Fund for economic development, and support the offshore wind solicitation.

## **Program Goals**

The REDI is a new program initiative. A specific set of contract modifications have been developed and submitted by the Honeywell Team as part of the 2008 program plan filing. The program goals discussed below and the program activities outlined above are contingent on approval of the proposed contract modifications by the beginning of January, 2008. To the degree that the contract modifications are delayed, or not approved modifications to the proposed goals and activities will be necessary.

Program performance incentives will be associated with two program goals for 2008:

- Achieve more than 13,800 MWh of expected first year generation from the projects completed (including those awaiting inspection and final incentive payment) in 2008; and
- Obtain more than 55,000 MWh of expected first year generation from the projects approved in 2008;

Details on these goals can be found in Appendix C. Additional program specific goals for 2008 are:

- Launch the initiative with market manager staff; transition any reporting or other relevant activities from OCE staff to the market managers.
- Develop and administer a competitive solicitation for grants to support development of renewable energy projects.

- Provide upfront financial support and/or capital incentives for approximately 20 renewable energy generation projects, focusing primarily on non-solar and particularly biomass technologies.
- Develop market-based activities to build the information base on technologies and financing mechanisms for larger scale projects.
- Establish collaborative relationships with industry, regulatory, financial and local communities that can be further developed as the initiative matures.

## 2008 Renewable Energy Certificate Program

### Program Description

The New Jersey Renewable Energy Certificates (RECs) program: 1) enables renewable energy generators in New Jersey to create, sell, and track RECs from their generation assets; 2) provides a mechanism for owners of renewable generating systems to earn revenue from REC sales; and 3) accounts for the contributions of these generators toward fulfillment of New Jersey RPS obligations.

New Jersey's Renewable Energy Portfolio Standards (N.J.A.C. 14:4-8) implement provisions of the New Jersey Electric Discount and Competition Act. The RPS rules require each electric power supplier or basic generation service provider that sells electricity to retail customers in New Jersey to include a percentage of its portfolio from renewable energy sources. In 2008, the following RPS percentage targets are listed in Table 1.

**Table 1: RPS Percentage Requirements for 2008**

<b>Energy Year</b>	<b>Solar Electric</b>	<b>Class I Renewable Energy</b>	<b>Class II Renewable Energy</b>	<b>Total Renewable Energy</b>
June 1, 2007-May 31, 2008	.0817%	2.924%	2.5%	5.5057%
June 1, 2008-May 31, 2009	.16%	3.84%	2.5%	6.5%

Based on estimated annual retail sales of approximately 86,000 GWh, the requirements for the June 07 to May 08 energy year are expected to be more than 70,000 SRECs and more than 4.7 million total RECs. Market conditions will establish the price for the SRECs and RECs that are used to meet these requirements. Alternative compliance payments – which establish a ceiling price that an obligated entity needs to pay for an SREC or a REC – have been set at \$711 for SRECs starting in Energy Year 2009, and at \$50 MWh for Class I RECs.

As a brief example of how the market operates, for the SREC market, the process begins with the setup of SREC accounts for generators and other account holders who have participated in the CORE program (through the final inspection), or who have applied to the Market Managers under the SREC-Only Pilot Program. Production data is either automatically entered using deemed production estimates (only for systems less than 10 kW), or is entered manually via a web interface by registered PV system owners. After production data is entered, SRECs are created, each representing 1,000 kWh of production from a qualified generating facility, and deposited into the generator's account. The trading administrator (Clean Power Markets) then tracks transfers of SRECs by the generator to other SREC account holders.

For 2008, the Market Managers are proposing to combine the activities of the SREC-Only Pilot Program and the REC Facilitation Program. This will improve administrative efficiency,

simplify requirements for participants, and improve market transparency. The consolidated REC Program will help market participants register projects for both Solar Renewable Energy Certificates (SRECs) and non-solar Renewable Energy Certificates (RECs), providing registration, inspection services (for SRECs), sample based verification of existing projects, and market data to help promote transparent and efficient trading. The Market Managers will also help potential market entrants understand the structure of the REC and SREC markets, and how they can be used to support new project development.

Currently there are two platforms for REC and SREC registration and trading. Clean Power Markets operates the database and trading platform for SRECs. The Generation Attribute System (GATS) operated by PJM Environmental Information Services is used for the tracking and trading of non-solar Class I and Class II RECs.

## **Target Market/Eligibility**

The energy types that are eligible as renewable energy sources are defined in the New Jersey Renewable Energy Portfolio Standards (N.J.A.C. 14:4-8.5 and 14:4-8.6).

**Table 2: Classification of Resources for Renewable Energy Certificates**

<b>Solar Renewable Energy Certificates</b>	<b>Class I Renewable Energy Certificates</b>	<b>Class II Renewable Energy Certificates</b>
Net metered photovoltaic system up to 2 MW of capacity, connected to New Jersey Distribution System	<ul style="list-style-type: none"><li>▪ Solar electric generation</li><li>▪ Electricity derived from wind</li><li>▪ Electricity derived from wave or tidal action</li><li>▪ Electricity derived from geothermal energy as defined in NJAC 14:4-8.2</li><li>▪ Electricity generated by combustion of methane gas captured from a landfill</li><li>▪ Electricity generated by a fuel cell powered by methanol, ethanol, landfill gas, digester gas, biomass gas, or other renewable fuel</li><li>▪ Electricity generated by the combustion of gas from the anaerobic digestion of food waste and sewage sludge</li><li>▪ Electricity generated through a Class I renewable energy project funded by the societal benefits charge as defined at NJAC 14: 4-8.2</li><li>▪ Electricity generated through a project funded by the Board's Clean Energy Program</li><li>▪ Electricity produced from combustion of sustainable biomass (must meet NJDEP criteria for determination of sustainability)</li></ul>	All Class I renewable resources  Electricity generated by a hydro-electric facility with a rated capacity of 30 MW or less  Electricity generated by a resource recovery facility located in New Jersey, covered by all NJDEP approvals and in compliance with all NJ environmental laws.

Note: The following are not eligible to qualify as Class I Renewable Energy resources:  
Combustion of treated, painted or chemically coated wood; municipal solid waste; tires, sewage sludge, wood waste (including demolition waste and construction waste); old growth timber, and wood harvested from a standing forest except for a forest that is part of a bio-energy plantation.

The target market for the program is composed of sellers, buyers, aggregators and brokers of RECs. This includes projects and market actors located inside New Jersey and from other states in the PJM service territory. The market participants also include utility scale/grid supply projects that use a qualified resource, and distributed renewable generation projects that are installed on the customer's side of the utility meter. Providers in voluntary market (e.g. New Jersey's Clean Power Choice Program) may also be active in the SREC and REC markets.

## **Program Services**

The proposed REC program services encompass an expansion of scope and activity for the Market Manager team that are required to support the solar market transition. A specific set of contract modifications have been developed and submitted by the Honeywell Team as part of the 2008 program plan filing. The program activities and goals discussed below are contingent on approval of the proposed contract modifications by the beginning of January, 2008. To the degree that the contract modifications are delayed, or not approved, modifications to the proposed goals and activities will be necessary.

The program serves New Jersey regulators and market stakeholders by providing the following services:

- Information on the number of projected REC and SREC requirements in each year, and the number of new certificates created and traded, and retired over time;
- Registration for SREC-Only Pilot and SREC-Only projects. The Market Manager will track and regularly report on the number and capacity of new applicants. The Market Manager will also track and report on the status regarding any caps or limits that may be established by the Board on the capacity of new SREC Only registrations that can be accepted over a given time horizon.
- Initial inspection and verification of new SREC resources – in the past this has been provided through the CORE program inspections. The Market Managers will continue to offer inspection and initial project verification for projects wishing to participate in the SREC-Only market;
- As an independent third party, the Market Manager proposes to provide ongoing analysis and regular reporting on SREC and REC market activity and trends. Market transparency and ready access to data will help create an efficient market for certificates and should lower the ultimate costs for compliance with the Renewable Energy Portfolio Standard requirements.
- Starting in 2008 the Market Manager proposes to provide initial review and/or registration for new Class I and Class II renewable resources. This would include a regular (monthly) review and report of newly registered resources into the PJM/GATs system and reporting on the amount of new resources available to meet the NJ RPS requirements;
- The market managers recommend establishing metering and reporting protocols and requirements for all project and size classes that will be implemented during 2008. Technical

training and outreach to support these requirements will be provided.

- Starting in 2008, the Market Manager is also proposing to administer the annual collection of Renewable Energy Compliance Certification Forms for the State of New Jersey. The New Jersey Renewable Portfolio Standards require electricity suppliers/providers and Class I and Class II renewable energy generation facility operators to file an annual affidavit with the Board of Public Utilities. The Market Manager proposes to provide this administrative service starting in 2008. In addition to the existing filing of the required affidavit forms, the Market Manager propose to develop and implement a sample based verification protocol that will be developed and tested during 2008.
- Continue to monitor and inform the market about key outstanding questions and decisions (e.g. additional securitization of REC revenue streams, or changes to eligibility requirements or entity caps for the SREC market).

## **Program Delivery**

The Market Manager team will provide the services listed above, as well as providing technical, policy and strategic planning support to the REC Administrators and the Office of Clean Energy. The Market Manager will continue to help CORE program participants set up new customer accounts, respond to customer inquiries, provide technical assistance to streamline the SREC account creation process, automate the transfer of CORE data to the SREC program database, and facilitate coordination of the CORE and SREC program databases.

The Market Manager anticipates that Clean Power Markets (for SRECs) and the PJM/GATS systems (for Class I and Class II RECs) will continue to be used as the certification databases and trading platforms for 2008. As the administrators of the certification database and trading platforms, Clean Power Markets and PJM/GATs are responsible the maintenance and operations of their systems and for data integrity.

## **Planned Program Implementation Activities for 2008**

- Process ~400 new project applications for the SREC-Only Pilot;
- Process and conduct inspections for ~250 final project registrations for the SREC-Only Pilot;
- Facilitate the registration of ~ 1,050 completed CORE projects into the SREC trading system.
- Perform a sample based annual site verification visits of about 300 projects (including CORE, SREC-Only Pilot) to read meters and identify issues in system performance;
- Coordinate REC program IT infrastructure with the CORE program database, in order to facilitate REC account setup and ensure data consistency between the two programs;
- Evaluate and recommend strategies to coordinate and/or integrate the REC program with PJM's Generation Attribute Tracking System (GATS), in order to unify REC tracking processes and requirements for all New Jersey RECs.
- Facilitate transition for SREC tracking and trading from Clean Power Markets to PJM-GATS system. It is anticipated that during 2008 the tracking and trading of both SREC's and RECs will be transitioned to the GATS system;
- The Market Managers can provide verification services for out of state Class I eligible

projects to enable certification for RPS compliance.

## **Proposed Program Changes for 2008**

- Consolidate REC/SREC activities into a single program set.
- Provide market support for projects wishing to participate in the SREC market, including projects that had applied for CORE rebates, but for which rebate funding will not be available. This support may include outreach, registration, inspection/verification, and tracking/reporting services.
- Develop a function in the market manager team to assemble, analyze and disseminate information on RECs/SRECs market activities; coordinate with other renewable energy programs (CORE, CPC, etc.) in this effort.
  - Develop regular reporting across all RE market activity that contributes to meeting SREC and Class I REC RPS targets.
- Assist the OCE in policy and rules development to support the market transition. Monitor and inform the market about key questions and decisions (e.g. additional securitization of REC revenue streams, entity caps for the SREC market).
- Establish metering, reporting, and verification protocols and requirements for all project and size classes that will be implemented during 2008.
  - Transition from estimated production values for smaller systems to metering and reporting protocols.
- Training and technical support related to new metering, reporting and verification protocols and requirements.

## **Renewable Energy Certificate Marketing and Communications Plan**

Education and communications will be critical to encourage project development under the new SREC/SACP model, as well as provide information to those projects that may be stranded in the CORE queue and need assistance during the transition.

The target audience for the SREC-Only Pilot consists of residential, commercial or industrial customers who are willing to build a solar energy system without a CORE rebate, and who intend to sell the SRECs from the system. Many, but not all, of the systems will be large-scale, between 700 kW and 2 MW, which exceeds the limits of the CORE program eligibility. The target audience will also include projects that are not able to receive rebate funds due to queue position.

## **Marketing Changes for 2008**

- We anticipate a need for increased communications, training and educational outreach to encourage project development under the new SREC/SACP model. Some of this will be

targeted to provide information to those projects that may be stranded in the CORE queue.

- Compilation, analysis and reporting on market activity that will aid the BPU in providing necessary monitoring and guidance on progress and costs associated with building the SRECs market.
- Presentations participation in national renewable and/or solar forums (e.g. ASES, SEPA) providing information on the solar market transition, is an important mechanism for building and maintaining market attention and to encourage future project development.

### Marketing Tactics:

1. Collateral: Develop educational fact sheets of the new SREC/SACP model and how to participate; create case studies to illustrate options for project development and finance based on SREC only support.
2. Sponsorships/Special Events: Sponsor and participate in renewable and/or solar forums and workshops.
3. Public Relations/Media Outreach: Press release and frequently asked questions distribution to increase awareness of new SREC model offering. Conduct press events to highlight successful projects that have gone forward based on the SREC-Only Pilot Program model to illustrate viability of this model.
4. Direct Outreach: Direct mail to CORE participants and other potential customer groups to introduce offering and explain how to participate.
5. Web Strategy: Update web site with program status and participation guidelines, maintain links that support market actors including sellers, buyers, aggregators and brokers of RECs and SRECs.

**Table 3: Renewable Energy Certificate Program and Marketing Goals**

<b>Program Goals</b>	<b>Target Audience</b>	<b>Communications Outreach Strategy</b>	<b>Marketing Collateral</b>	<b>Medium/Website Strategy</b>
Increase communications and educational outreach to encourage project development under the new SREC/SACP model.	Existing applications that do not receive 08 CORE program rebate funding. Existing and future projects that will be supported by the SREC-Only Pilot or the 2009-2012 rebate funds	Send e-mails and letters to individuals still in the CORE queue as well as other groups. The letter will explain the new SREC/SACP model.	Develop fact sheet about the new SREC/SACP model.	Update the website to include information about this new model. Include a section regarding the benefits of participating in the program.
Increased marketing and educational outreach to foster active participation in REC and SREC markets.	Possible SREC-Only Pilot Program participants and anyone participating in non-solar technologies.	Create case studies to illustrate the benefits of participating in the REC program.	Develop a fact sheet specifically about the REC Program as a whole.	Have a specific section on website devoted to overall Renewable Energy Certificate market and the importance of Class I RECs and Solar RECs towards meeting Energy Master Plan and RPS Goals.
Presentations and participation in national renewable and/or solar forums (e.g. ACORE, ASES, SEPA) providing information on the solar market transition		Hold workshops, presentations, and trainings to educate people about the new SREC/SACP model.		
Participate in solar ribbon cuttings that have used the SREC-Only Pilot model.	Any business, municipality, school, etc. considering having solar installed and may use the SREC-Only Pilot.	Develop press releases about the ribbon cuttings. Work with media to have a presence at the events.		Feature these SREC-Only Pilot participant solar ribbon cuttings on the renewable section of website.  Develop case studies on the solar ribbon cuttings.
Select a major solar installation that used the SREC-Only Pilot model and host a press event on this installation.	Any business, municipality, school, etc. considering having solar installed and may use the SREC-Only Pilot.	Have a press release about the event. Send notices out to media to participate in the event.		Feature these SREC-Only Pilot participant solar ribbon cuttings on the renewable section of website.  Develop case studies on the solar ribbon cuttings.

## **Quality Control Provisions**

The rapidly developing RECs market requires increasing the current sampling rate of REC inspections, updating the deemed production calculations to account for actual program-wide measured generation, helping transition to the use of ANSI-certified metering, and/or facilitating the use of automated meter reading technologies. The Market Managers will increase activities across these areas in 2008, to help further the quality and timeliness of REC data that is available to the market. Data integrity and quality control for REC trading data will remain the responsibility of Clean Power Markets and PJM-GATS.

## **Program Budget**

Program activity and budgets for 2008 reflect an increase in the importance of the SREC/SACP model, and build upon the experience gained from the SREC-Only Pilot during the past year. The total proposed program budget for 2008 is roughly \$1.7 million. A detailed budget is attached in Appendix B.

## **Program Goals**

Program performance incentives will be associated with the following goal for 2008:

- Complete (including those awaiting final inspection) more than 250 final SREC-Only registrations;

Details on these goals can be found in Appendix C. Additional program specific goals for 2008 are:

- Provide consolidated monthly reporting across all market segments for year to date progress on goals for SREC, Class I and Class II resources;
- Define and implement new measuring, reporting and metering protocols for all participants in the REC markets; and
- Conduct at least 200 verification site visits.

## **Appendix A: Residential Efficiency and Renewable Marketing Plan Budgets**

Detailed marketing plans are provided as part of the program design narratives in the main body of this filing. This appendix provides additional detail regarding the budgeting for those plans. What follows are brief definitions of what is included in “fixed” marketing costs and what is included in “variable” marketing costs, as well as detail – by program – regarding the allocations of fixed and variable market costs to specific marketing functions for each program.

### **Definition of Fixed Costs:**

To provide marketing services for the Residential Energy Efficiency and Renewable Energy programs under the New Jersey Clean Energy Program™, the following personnel/overhead functions are provided for delivery of communications services to meet program goals:

#### **Staffing:**

- Marketing Strategic Planning
- Marketing Plan Execution and Management
- Account Service and Communications with Programs
- Account Service and Communications with OCE and BPU
- Web Updates and Maintenance
- Call Center Briefings for Marketing Activities
- Creative Services/Production (creative concept, copy, art direction, layout, editing, proofing) of Program Educational Collateral Materials/Program Stationery, Forms, Case Studies, Fact Sheets, Brochures, Promotional Materials, Special Event Signage, Trade Show Booth
- Creative Services/Production of Advertising Materials (creative concept, copy, art direction, photography, layout, editing)—Print, broadcast, online
- Public Relations Publicity/Media Outreach—Media event planning and execution for programs, includes development of press kits, press releases, talking points, media distribution, media follow up, clipping service, public relations reporting of media hits.
- Media Buying, Traffic, and Reporting
- Trade and Home Show Event Support—Coordination and registration of select program events, provision of marketing materials, and attendance at select shows.
- Financial Administration and Reporting
- General Office Administration

**Overhead:**

- Travel Expenses
- Office/Space Expenses
- Corporate Services
- Phones/Computers
- Fax/Copying
- Postage

**Definition of Variable Costs:**

Variable costs vary by program based on target market, program goals, objectives, appropriate communications vehicles and budget. The variable items relate to collateral printing costs, production costs of hard materials (promotional items), materials delivery cost, media purchase (print, broadcast and online), advertising production sponsorship and event fees, trade event displays.

## Renewable Energy Program Marketing Budget

Program/Activity	Total Fixed Cost	Current Contract Variable Cost	Proposed Variable Additions	Total Variable Cost	Grand Total Marketing Cost
<b>Fixed Costs</b>					
<b>CORE</b>	<b>\$18,312</b>	<b>\$39,128</b>			
Marketing Management	\$3,662				
Account Service/Communications Admin.	\$3,662				
Web Maintenance/Updates	\$10,987				
<b>REC</b>	<b>\$73,260</b>	<b>\$84,127</b>			
Marketing Management	\$12,454				
Account Service/Communication Admin.	\$13,187				
Creative Services/Production	\$14,652				
Public Relations/Media Outreach	\$25,641				
Web Maintenance/Updates	\$7,326				
<b>CPC</b>	<b>\$73,260</b>	<b>\$84,127</b>			
Marketing Management	\$10,989				
Account Service/Communications Admin.	\$16,117				
Creative Services/Production	\$14,652				
Public Relations/Media Outreach	\$20,513				
Event Support	\$7,326				
Web Maintenance/Updates	\$3,663				
<b>REDI</b>	<b>\$98,494</b>	<b>\$70,432</b>			
Marketing Management	\$32,503				
Account Service/Communications Admin.	\$21,669				
Creative Services/Production	\$19,699				
Public Relations/Media Outreach	\$9,849				
Event Support	\$9,849				
Web Maintenance/Update	\$4,925				
<b>Variable Costs</b>					
Program Presentation/Event Materials		\$7,100			
Stationery		\$7,100			
Fact Sheets (technical writing, production, printing)		\$51,404			
Case Studies (technical writing, production, printing)		\$49,700			
Trade Shows/Conference Sponsorships/Events		\$49,700			
Educational Work Shops/Room Fees/Set-up		\$42,600			
CPC Bill Insert/Application Reprints		\$41,810			
Direct Outreach/Direct Mail Postage/List Purchase		\$28,400			
<b>Renewable Energy Totals</b>	<b>\$263,326</b>	<b>\$277,814</b>	\$ -	<b>\$277,814</b>	<b>\$541,140</b>

**Home Performance with Energy Star Marketing Budget**

Program/Activity	Total Fixed Cost	Current Contract Variable Cost	Proposed Variable Additions	Total Variable Cost	Grand Total Marketing Cost
<b>Fixed Costs</b>					
Marketing Management	\$45,112				
Account Service/Communications Admin.	\$67,667				
Creative Services/Advertising Production	\$225,558				
Public Relations/Media Outreach	\$67,667				
Consumer and Trade Event Implementation	\$22,556				
Web Maintenance/Update	\$22,556				
<b>Variable Costs</b>					
Consumer Brochures		\$10,000			
Contractor Recruitment Brochures		\$5,000			
Educational Fact Sheets		\$10,000			
Co-op Advertising Templates		\$5,000			
Home Show Event Display		\$5,000			
Trade Event Display		\$2,000			
Training/Educational Materials		\$5,000			
Promotional Items		\$5,000			
Program Stationery		\$5,000			
Program Apparel		\$5,000			
Special Event Sponsorship and Fees (ACI)		\$40,768			
Video News Release		\$10,000			
Web Enhancements; Consumer Video		\$20,000			
Awards and Recognition Expenses		\$5,000			
Print Advertising		\$200,000			
Online Advertising		\$17,000			
Broadcast Advertising		\$800,000			
Consumer Direct Mail (community partners)		\$85,000			
Media Production House/Studio/Talent Fees		\$270,000			
<b>HPwES Totals</b>	<b>\$451,116</b>	<b>\$1,504,768</b>	<b>\$0</b>	<b>\$1,504,768</b>	<b>\$1,955,884</b>

**ENERGY STAR Products**

Program/Activity	Total Fixed Cost	Current Contract Variable Cost	Proposed Variable Additions	Total Variable Cost	Grand Total Marketing Cost
<b>Fixed Costs</b>					
Marketing Management	\$37,584				
Account Service/Communications Admin.	\$28,188				
Creative Services/Advertising Production	\$65,772				
Public Relations/Media Outreach	\$28,188				
Consumer and Trade Event Support	\$18,792				
Web Maintenance/Update	\$9,396				
<b>Variable Costs</b>					
Lighting Brochure		\$15,000			
Lighting Signage (labels, banners, easel backs)		\$15,000			
Lighting Retail Advertising (print)				\$115,000	
General Appliance Signage		\$15,000			
Dehumidifier Applications		\$5,000			
Room Air Conditioner Application		\$15,000			
Room Air Conditioner Signage		\$10,000			
Pilot Project Support Contingency (Blue Line, other)		\$16,000			
Clothes Washer Application		\$20,000			
Clothes Washer Signage		\$15,000			
Clothes Washer Advertising		\$50,000			
Refrigerator Application/Forms				\$15,000	
Refrigerator Signage				\$10,000	
Print Advertising				\$275,000	
Web Enhancements		\$3,000			
Promotional Items		\$2,959			
Sponsorships/Events (ACI)		\$20,000			
<b>ENERGY STAR Totals</b>	<b>\$187,920</b>	<b>\$201,959</b>	<b>\$415,000</b>	<b>\$616,959</b>	<b>\$804,879</b>

(current variable includes \$89,000 "new product promotion" for clothes washer)

### New Jersey ENERGY STAR Homes Marketing Budget

Program/Activity	Total Fixed Cost	Current Contract Variable Cost	Proposed Variable Additions	Total Variable Cost	Grand Total Marketing Cost
<b>Fixed Cost</b>					
Marketing Management	\$56,993				
Account Service/Communications Admin.	\$51,294				
Creative Services/Advertising Production	\$99,737				
Public Relations/Media Outreach	\$42,745				
Consumer and Trade Event Support	\$25,647				
Web Maintenance/Update	\$8,549				
<b>Variable Cost</b>					
Stationery		\$5,000			
Sales Collateral Materials (Consumer and Builder)		\$22,233			
Homeowner Kits (includes brass plaques)		\$50,000			
Awards and Recognition Program (Carbon Reduction)		\$10,000			
Sponsorship and Events (includes ACI)		\$75,000			
Demonstration Home Promotion/Open House Events		\$50,000			
Point-of-purchase Displays for Builder Design Centers		\$10,000			
Promotional Items		\$10,000			
Signage (lawn signs/banners/museum boards)		\$17,075			
<u>Consumer Advertising</u>					
Print (Newspaper and Magazine)	\$119,775		\$130,000		
Online	\$48,150				
Direct Mail--Eco Realtors and Consumers		\$10,000			
Web Enhancements		\$5,000			
Co-op Advertising Templates		\$5,000			
<b>ENERGY STAR HOMES Totals</b>	<b>\$284,964</b>	<b>\$437,233</b>	<b>\$130,000</b>	<b>\$567,233</b>	<b>\$852,197</b>

**HVAC Program Marketing Budget**

Program/Activity	Total Fixed Cost	Current Contract Variable Cost		Proposed Variable Additions	Total Variable Cost	Grand Total Marketing Cost
		Contract Variable Cost	Total Variable Cost			
<b>Fixed Cost</b>						
Marketing Management	\$27,540					
Account Service/Communications Admin.A28	\$30,600					
Creative Services/Advertising Production	\$53,550					
Public Relations/Media Outreach	\$22,950					
Consumer and Trade Event Support	\$13,770					
Web Maintenance/Update	\$4,590					
<b>Variable Cost</b>						
Program Forms		\$5,000				
Cool Advantage Rebate Applications		\$10,000				
Warm Advantage Rebate Applications		\$10,000				
Retail Point-of-Purchase Displays (Supply/Home Improvement Centers)		\$12,000				
<b>New Programs</b>						
QIV Program Sales Brochures, Fact Sheets and Forms			\$15,000			
Duct Sealing Brochures, Fact Sheets and and Forms			\$13,900			
Maintenance Program Brochures, Fact Sheets and Forms			\$15,000			
Point-of-Purchase Displays and Signage			\$20,000			
Targeted Consumer Direct Mail	\$47,395					
<b>Consumer Advertising</b>						
Print (newspaper)			\$250,000			
Radio (spring/fall)			\$480,000			
Yellow Pages (Pilot)			\$49,000			
OnLine Advertising			\$37,100			
Web Enhancements	\$3,000					
Event Sponsorships (ACI)		\$25,000				
<b>Sub-total</b>	<b>\$153,000</b>	<b>\$112,395</b>	<b>\$880,000</b>	<b>\$992,395</b>	<b>\$1,145,395</b>	

## **Appendix B: Residential Efficiency and Renewable Budgets**

This appendix presents detailed 2008 Budgets for the programs for which Honeywell has management or support responsibilities. Two tables follow this summary narrative.

### **Residential Efficiency Programs**

The first table (B1) addresses residential efficiency programs. It provides a break-down of budgets for five programs, showing both the total budget for each program and the portion of each program budget associated with administration, sales and marketing, training, rebates or other forms of financial incentives (including free direct measure installation in some programs), rebate processing and other quality control costs, and performance incentives.

The total budget of \$81.8 million represents a \$16.9 million (26%) increase over the residential efficiency budgets approved for 2007. Almost all of that increase is in two programs: Efficient Products and Residential New Construction. The Efficient Products budget is \$8.1 million (73%) higher than in 2007. This increase is driven primarily by a switch from seasonal to year-round promotion of efficient lighting and efficient clothes washers. The Residential New Construction budget is \$8.0 million higher than in 2007. This increase is entirely due to a change in approach to budgeting requested by the OCE, from cash accounting to accrual accounting. Thus, the 2008 budget has two key components: (1) the money necessary to pay rebates and conduct inspections for new homes completed in 2008 (most of which will have been enrolled in the program in 2007 or 2006); and (2) money accrued to pay rebates and conduct inspections of new homes that are enrolled in the program in 2008, but which won't complete until 2009 or 2010. Almost \$15 million (more than 40%) of the Residential New Construction budget is associated such accruals. In other words, the Residential New Construction budget would actually be nearly \$7 million (25%) lower than 2007 if we were using the same cash accounting approach used in that year. The Residential New Construction accruals also account for the vast majority (88%) of the increase in the total residential efficiency budget. Were it not for those accruals, the total proposed 2008 residential efficiency budget would be only \$2.1 million (3%) higher than in 2007.

The switch to accrual accounting has one other smaller impact on the budget. That relates to the accrual of possible performance incentives. Specifically, the performance incentives included in the 2008 budget are sufficient to cover both possible payments for 2007 performance (any such payments which would take place in 2008) and accrual of possible payments for 2008 performance (any such payments would take place in 2009). That accounts for about another \$467,000 of the proposed increase in residential budgets.

It is also worth noting that the energy savings projected from the 2008 residential efficiency programs are greater than in 2007. The increases in savings are greater (far greater in the case of electricity savings) in percent terms than the increase in budget for items other than accruals. This is reflected in the performance goals described in Appendix C.

**Table B1: 2008 Honeywell Residential Efficiency Budget**

Program	Total	Administration and Program Developmt	Sales, Call Centers, Marketing and Website	Training	Rebates, Grants, and Other Direct Incentives	Rebate Processing, Inspections and Other Quality Control	Performance Incentives	Evaluation and Related Research
Residential HVAC - Electric & Gas	\$17,369,836	\$1,449,660	\$1,145,695	\$406,740	\$11,254,365	\$2,908,757	\$204,619	n/a
Residential New Construction	\$35,628,846	\$725,592	\$852,197	\$38,700	\$23,387,447	\$10,377,062	\$247,848	n/a
ENERGY STAR Products	\$19,200,026	\$1,282,998	\$2,657,995	\$18,000	\$14,590,849	\$448,160	\$202,025	n/a
Home Performance with Energy Star	\$9,255,981	\$1,784,856	\$4,171,691	\$0	\$2,885,340	\$210,340	\$203,755	n/a
Community Initiative	\$345,311	\$345,311	\$0	\$0	\$0	\$0	\$0	n/a
<b>Sub Total Residential EE Programs</b>	<b>\$81,800,000</b>	<b>\$5,588,417</b>	<b>\$8,827,577</b>	<b>\$463,440</b>	<b>\$52,118,001</b>	<b>\$13,944,319</b>	<b>\$858,246</b>	<b>n/a</b>

## Renewable Energy Programs

The second table (B2) presents the 2008 Honeywell Team budgets for the CORE, CPC, REC and REDI programs, which are the four areas where the market manager team delivers services. The Honeywell Team budgets are broken out by the same functional sub-categories used for the presentation of the energy efficiency budget (Administration, Sales, Training, Rebates, Processing, Performance Incentives, and Evaluation).

There are a couple of important things to note about these budgets.

- The total renewable budget for 2008 is \$185,456,000. This represents just under a 7% increase from the total 2007 budget of \$173,394,000. The majority of the budget for both years is devoted to the CORE program, although the relative share has decreased from ~87% of the 2007 budget to ~78% of the 2008 total budget.
- The Honeywell Team budget is \$149,958,920. The difference between the total renewable energy budget and the Honeywell team budget includes \$32.6 million for EDA programs, \$2 million for the DEP ecological baseline study, and \$834,000 of OCE costs for the Clean Power Choice and Renewable Energy Certificate programs.
- The proposed 2008 budget includes carry-forward of funds that have been committed in previous years. For example, the total CORE budget for 2008 includes \$57 million of new funds, and an expected \$83 million of commitments that are carried forward from program activity in previous years.
- The allocation of 2008 funds to the individual CORE Budget Categories is based on OCE staff recommendation to the Board.

**Table B2: 2008 Renewable Energy Program Budgets**

	Totals	Administration and Program Developmt	Sales, Call Centers, Marketing and Website	Training	Rebates, Grants, and Other Direct Incentives	Rebate Processing, Inspections and Other Quality Control	Performance Incentives	Evaluation and Related Research
<b>A: Honeywell Expenditures</b>								
Customer On Site Renewable (CORE)	\$143,989,173	\$1,331,416	\$57,440	\$193,200	\$140,587,000	\$1,373,900	\$446,218	\$0
Clean Power Choice	\$668,087	\$425,805	\$189,115	\$0	\$0	\$0	\$53,167	\$0
Renewable Energy Credit Program	\$1,138,659	\$207,115	\$157,387	\$0	\$0	\$476,274	\$55,565	\$242,319
Renewable Energy Development Initiative	\$4,163,000	\$238,410	\$168,926	\$32,200	\$3,576,148	\$0	\$114,193	\$33,124
Total	\$149,958,920	\$2,202,745	\$572,868	\$225,400	\$144,163,148	\$1,850,174	\$669,143	\$275,443

## **Appendix C: Honeywell Performance Incentives**

### **Overview**

The Market Manager RFP made clear that the winning bidders would be eligible to earn modest financial incentives for good performance. However, the specific goals articulated in the RFP were only appropriate in the program context in which they were developed (i.e. for the programs as they existed in 2005). A revised set of goals was established, filed and approved by the BPU for 2007. This Appendix presents an updated performance incentive structure and goals for 2008.

### **Incentive Levels**

The maximum total dollar values of the financial incentives that Honeywell would be eligible to receive for its first year performance were established in the Market Manager RFP. Those values were used for our 2007 filing, with adjustments to reflect the fact that Honeywell will not have managed the programs for a full 12 months in 2007. For 2008, we have used the values in the Market Manager RFP, adjusted up by 3% to account for inflation between 2007 and 2008. The resulting maximum value of 2008 performance incentives is \$466,590 for residential efficiency programs and \$339,516 for renewable energy programs.

These values are lower, as a percent of total spending on programs, than other Northeastern states and provinces that provide performance incentives.

### **Incentive Structure**

The approach taken to structure of the goals is a little different between the residential efficiency and renewable energy sectors. In the residential efficiency sector, 67% of the total incentive dollars are allocated cross program goals related to electricity savings (MWh) and gas savings (DTh) to which all programs contribute. The remaining 33% was allocated to a variety of individual program goals, with each of the four existing residential programs being allocated one-quarter of the program specific dollars. Particular emphasis was placed on success in launch of new program initiatives.

In contrast, there are no sector specific goals proposed for the renewable energy sector. Instead there are six program-specific goals split among three programs. There is a particular emphasis in the goals on (1) development of non-solar renewable energy projects (in both CORE and REDI); and (2) transition to the new market-based mechanisms for promoting solar.

We also adopted the three-tier incentive structure identified in the RFP, with Honeywell eligible to earn 60% of the maximum incentive for achieving 100% to 119% of a goal, 80% of the maximum incentive for achieving 120 to 139% of a goal, and 100% of the incentive for achieving at least 140% of the goal.

Finally, we have proposed a set of minimum requirements necessary to earn *any* performance incentives. Those minimum requirements apply at the sector level. That is, if any of the minimum requirements for the residential efficiency programs are not met, no residential efficiency performance incentives can be earned. Similarly, if any of the minimum requirements for the renewable energy programs are not met, no renewable energy performance incentives can be earned. However, missing a minimum requirement on a residential efficiency program will not have any impact on the ability to earn incentives for the renewable energy programs; nor will missing a minimum requirement on a renewable energy program have any impact on incentives for residential efficiency programs.

## **Defining Goal Achievement**

With the exception of new approvals for the CORE program, all goals are expressed as 2008 calendar year goals. Thus, all savings, generation and participants occurring between January 1, 2008 and December 31, 2008 count toward goal achievement. Goals were set with that period in mind. In the Renewable sector approvals of new 2008 CORE funds that are made before the end of the calendar year 2007 will be counted towards meeting the 2008 goal. The goals for efficiency and renewable programs were based largely on past program experience in New Jersey and experience in other leading states, with adjustments made to account for significant changes in either market conditions or program design.

Savings, renewable generation and participants are counted towards goals only for projects that are processed by the relevant programs during the 2008 calendar year.<sup>10</sup>

Efficiency savings and renewable energy generation goals are based on the algorithms included in Appendix D to this filing. Any changes to those algorithms would necessitate changes to the performance goals in this Appendix.

## **Specific Goals**

Specific residential efficiency program goals and the performance incentives associated with them are shown in Table C1. Minimum requirements for the residential efficiency programs are provided in Table C2.

Specific renewable energy program goals and the performance incentives associated with them are shown in Table C3. Minimum requirements for the renewable energy programs are provided in Table C4.

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<sup>10</sup> Participants with either rebates paid or which are processed to the point of Honeywell submitting a rebate funding request to the Program Coordinator prior to December 31<sup>st</sup> are counted towards the goals. This ensures that Honeywell is measured only on elements of performance over which it has control (i.e. we do not control the turn-around time between when funding requests are sent to the Program Coordinator and funds are ultimately made available by the state for Honeywell to send a rebate check).

**Table C1: 2008 Performance Incentives for Residential Programs**

Program	Performance Indicator	Performance Goals and Incentives					
		Tier 1		Tier 2		Tier 3	
		100% Goal	Incentive	120% Goal	Incentive	140% Goal	Incentive
All	1 Lifetime Electric MWh avoided	1,900,000	\$131,078	2,280,000	\$174,770	2,660,000	\$218,463
All	2 Lifetime Gas DTh avoided	7,000,000	\$56,176	8,400,000	\$74,902	9,800,000	\$93,627
HVAC	3 QIV & Maintenance participants	800	\$23,175	960	\$30,900	1,120	\$38,625
RNC	4 Enrollments as % of new permits	23%	\$11,588	25%	\$15,450	27%	\$19,313
RNC	5 Completions as % of CO's	22%	\$11,588	25%	\$15,450	28%	\$19,313
Products	6 Washer rebates	17,000	\$23,175	20,400	\$30,900	23,800	\$38,625
HP w/ES	7 Completed jobs	800	\$23,175	960	\$30,900	1,120	\$38,625
						Maximum:	\$466,590

**Notes:**

- 1 Savings and participants counted only for projects that are completed and processed by relevant programs. This includes both projects for which rebates have been provided and those for which rebate funding requests have been submitted to Program Coordinator.
- 2 Savings goals are at the generator level (i.e. include 11% line loss adjustment).
- 3 Savings goals represent lifetime savings expected from projects that complete during 2008, not the savings that will accrue from those projects during the 2008 calendar year (e.g. savings from project completed in December count the same as for one completed in January).
- 4 All goals assume other elements of this filing are approved, particularly budgets, program designs and savings algorithms.
- 5 Maximum incentive dollars are same as in RFP, adjusted upward by annual escalation rate.

That escalation rate is: 3.0%

- 6 Incentive payment for each performance indicator is based on the highest tier goal achieved for that indicator. No payment is made for a particular performance indicator if the lowest Tier goal for that indicator is not met.

**Table C2: Minimum Requirements for Receiving Residential Efficiency Performance Incentives**

Program	Performance Indicator	Performance Goal or Requirement
All	1 Lifetime Electric MWh avoided	1,520,000
All	2 Lifetime Gas DTh avoided	5,600,000
HVAC	3 QIV & Maintenance participants	400
HVAC	Req Support regional discussions on collaboration with manufacturers	Required
HVAC	Req Hold outreach meetings with HVAC contractors	Required
HVAC	Req Support training on equipment sizing & installation	Required
RNC	4 Enrollments as % of new permits	18.4%
RNC	5 Completions as % of CO's	17.6%
RNC	Req Provide technical training to builders, subcontractors and architects	Required
Products	6 Washer rebates	8,500
Products	Req Develop consumer promotions	Required
Products	Req Hold retailer site visits to coordinate promotions	Required
HP w/ES	7 Completed jobs	400
HP w/ES	Req Provide BPU certification training to contractors	Required
HP w/ES	Req Offer in-field mentoring to certified contractors	Required

**Notes:**

- 1 Minimum requirements for long-standing performance indicators 1, 2, 4 and 5 are set at 80% of the goal. For indicators that are related to fundamentally new services or approaches (e.g. numbers 3, 6 and 7), where there is significantly higher uncertainty about performance, minimum requirements are set at 50% of the goal.

**Table C3: 2008 Performance Incentives for Renewable Energy Programs**

Program Performance Indicator	Performance Goals and Incentives					
	Tier 1		Tier 2		Tier 3	
	100% Goal	Incentive	120% Goal	Incentive	140% Goal	Incentive
CORE 1. CORE Non-Solar MWh - Completions	5,328	\$34,190	6,394	\$42,930	7,460	\$57,097
CORE 2. CORE Non-Solar MWh - Approvals	17,530	\$34,190	21,035	\$42,930	24,541	\$57,097
REDI 3. REDI Non-Solar MWh - Completions	13,830	\$22,793	16,596	\$28,620	19,362	\$38,064
REDI 4. REDI Non-Solar MWh - Approvals	55,321	\$45,586	66,385	\$57,240	77,449	\$76,129
5. Dollar Value of Queue Approvals complete by 4/30/08	\$42,160,387	\$33,272	\$44,640,410	\$41,778	\$47,120,432	\$55,565
REC 6. SREC-Only Pilot Final Registrations	250	\$33,272	300	\$41,778	350	\$55,565
					Maximum:	\$339,516

**Notes:**

- 1 The CORE non-Solar MWh -Completions is based on the first year generation estimate for projects completed (including those submitting final inspection request) during calendar year 08
- 2 CORE Non Solar Approvals includes estimated first year output for all non-solar CORE rebates approved with 08 funds (including those approved in 07 w 08 funds)
- 3 Goal #3 is based on the first year generation estimate for non solar REDI projects completed (including those submitting final inspection request) during calendar year 08
- 4 Goal #4 is based on the first year generation estimate for non solar REDI projects approved through solicitation during calendar year 08
- 5 Goal #5 includes all new approvals from the Private LT 10kW, Private GT10kW, Public School k-12, and Public Other Budget Categories (including any 08 funds approved in 07). Approvals completed by MM and pending Board Order will be counted as complete.
- 6 Goal #6 includes all SREC-Only Pilot completions (including those submitting final inspection request) during caledar year 08

**Table C4: Minimum Requirements for Receiving Residential Efficiency Performance Incentives**

Program	Performance Indicator	Performance Goal or Requirement	
CORE	1 Non-Solar First Year MWh completions		2,664
CORE	2 Non-Solar First Year MWh approvals		8,765
REDI	3 Non-Solar First Year MWh completions		6,915
REDI	4 Non-Solar First Year MWh approvals		27,660
CORE	5 Queue Approvals by 4/30		\$33,728,309
REC	6 SREC Final Registrations		125
CORE	req	Technical training/outreach workshops	required
CORE	req	Inspections for all complete projects	required
All	req	Maintain documentation on program requirements	required

**Note:**

- 1 The minimum requirement for #5 is set at 80% of the goal. For the other indictors that are related to new services or approaches there is significantly higher uncertainty about performance, minimum requirements are set at 50% of the goal.

## **Appendix D: Protocols to Measure Resource Savings**

**New Jersey Clean Energy Program**

**Revisions to  
September 2004 Protocols**

**December 2007**

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## New Jersey's Clean Energy Program Protocols to Measure Resource Savings

### **Introduction**

These protocols have been developed to measure resource savings, including electric energy and capacity, natural gas, and other resource savings, and to measure electric energy and capacity from renewable energy and distributed generation systems. Specific protocols for determination of the resource savings or generation from each program are presented for each eligible measure and technology.

These protocols use measured and customer data as input values in industry-accepted algorithms. The data and input values for the algorithms come from the program application forms or from standard values. The standard input values are based on the best available measured or industry data applicable for the New Jersey programs.

The standard values for most commercial and industrial (C&I) measures are supported by end use metering for key parameters for a sample of facilities and circuits, based on the metered data from past programs. These C&I standard values are based on five years of data for most measures and two years of data for lighting.

Some electric and gas input values were derived from a review of literature from various industry organizations, equipment manufacturers, and suppliers. These input values are updated to reflect changes in code, federal standards and recent program evaluations.

### **Purpose**

These protocols were developed for the purpose of determining energy and resource savings for technologies and measures supported by New Jersey's Clean Energy Program. The Protocols will be updated from time-to-time to reflect the addition of new programs, modifications to existing programs, and the results of future program evaluations. The protocols will be used consistently statewide to assess program impacts and calculate energy and resource savings to:

1. Report to the Board of Public Utilities (the Board) on program performance
2. Provide inputs for planning and cost-effectiveness calculations
3. Calculate lost margin revenue recovery (to the extent that lost margin revenue recovery is approved by the Board)
4. Provide information to regulators and program administrators for determining eligibility for performance incentives (to the extent that such incentives are approved by the Board)
5. Assess the environmental benefits of program implementation

Resource savings to be measured include electric energy (kWh) and capacity (kW) savings, natural gas savings (therms), and savings of other resources (oil, propane, water,

and maintenance), where applicable. In turn, these resource savings will be used to determine avoided environmental emissions. The Protocols are also utilized to support preliminary estimates of the electric energy and capacity from renewable energy and distributed generation systems and the associated environmental benefits. Note, however, that renewable energy protocols are different from those required for REC certification in the state of New Jersey.

The protocols in this document focus on the determination of the per unit savings for the energy efficiency measures, and the per unit generation for the renewable energy or distributed generation measures, included in the current programs approved by the Board. The number of adopted units to which these per unit savings or avoided generation apply are captured in the program tracking and reporting process, supported by market assessments for some programs. The unit count will reflect the direct participation and, through market assessments, the number of units due to market effects in comparison to a baseline level of adoptions. Free riders and free drivers will be captured implicitly on a net basis through this approach to counting adoption of units. Further, the net of free riders and free drivers are assumed to be zero in the counting of units from direct program participation.<sup>11</sup>

The outputs of the Protocols are used to support:

- Regulatory Reporting
- Cost Effectiveness Analysis
- Program Evaluation
- Performance Incentives for the Market Managers

These Protocols provide the methods to measure per unit savings or generation for program tracking and reporting. An annual evaluation plan prepared by the Center for Energy, Economic and Environmental Policy (CEEEP) outlines the plans for assessing markets including program progress in transforming markets, and to update key assumptions used in the Protocols to assess program energy impacts. Reporting provides formats and definitions to be used to document program expenditures, participation rates, and program impacts, including energy and resource savings. The program tracking systems, that support program evaluation and reporting, will track and record the number of units adopted due to the program, and assist in documenting the resource savings using the per unit savings values in the Protocols. Cost benefit analyses prepared by CEEEP and other evaluation contractors assess the impact of programs, including market effects, and their relationship to costs in a multi-year analysis.

### ***Types of Protocols***

In general, energy and demand savings, or renewable or distributed generation, will be estimated using measured and customer data as input values in algorithms in the

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<sup>11</sup> Net impacts, including free riders and free drivers, will be assessed as part of an impact evaluation of the programs anticipated to commence in early 2007.

Protocols, tracking systems, and information from the program application forms, worksheets, and field tools.

The following table summarizes the spectrum of protocols and approaches to be used for measuring energy and resource savings. No one protocol approach will serve all programs and measures.

## Summary of Protocols and Approaches

Type of Measure	Type of Protocol	General Approach	Examples
1. Standard prescriptive measures	Standard formula and standard input values	Number of installed units times standard savings/unit	Residential lighting (number of units installed times standard savings/unit)
2. Measures with important variations in one or more input values (e.g., delta watts, efficiency level, capacity, load, etc.)	Standard formula with one or more site-specific input values	Standard formula in the protocols with one or more input values coming from the application form, worksheet, or field tool (e.g., delta watts, efficiency levels, unit capacity, site-specific load)	Some prescriptive lighting measures (delta watts on the application form times standard operating hours in the protocols)  Residential Electric HVAC (change in efficiency level times site-specific capacity times standard operating hours)  Field screening tools that use site-specific input values  Customer On-Site Renewable Energy (site specific capacity times standard MWh per kW factor)
3. Custom or site-specific measures, or measures in complex comprehensive jobs	Site-specific analysis	Greater degree of site-specific analysis, either in the number of site-specific input values, or in the use of special engineering algorithms	Custom  Industrial process  Complex comprehensive jobs  CHP

Three or four systems will work together to ensure accurate data on a given measure:

1. The application form that the customer or customer's agent submits with basic information.
2. Application worksheets and field tools with more detailed site-specific data, input values, and calculations (for some programs).
3. Program tracking systems that compile data and may do some calculations.
4. Protocols that contain algorithms and rely on standard or site-specific input values based on measured data. Parts or all of the protocols may ultimately be implemented within the tracking system, the application forms and worksheets, and the field tools.

## **Algorithms**

The algorithms that have been developed to calculate the energy and or demand savings are driven by a change in efficiency level for the installed measure compared to a baseline level of efficiency. This change in efficiency is reflected in both demand and energy savings for electric measures and energy savings for gas. Following are the basic algorithms.

Electric Demand Savings =  $\Delta \text{kW} = \text{kW}_{\text{baseline}} - \text{kW}_{\text{energy efficient measure}}$

Electric Energy Savings =  $\Delta \text{kW} \times \text{EFLH}$

Electric Peak Coincident Demand Savings =  $\Delta \text{kW} \times \text{Coincidence Factor}$

Gas Energy Savings =  $\Delta \text{Btuh} \times \text{EFLH}$

Where:

EFLH = Equivalent Full Load Hours of operation for the installed measure.

$\Delta \text{Btuh} = \text{Btuh}_{\text{baseline input}} - \text{Btuh}_{\text{energy efficient measure input}}$

Other resource savings will be calculated as appropriate.

Specific algorithms for each of the program measures may incorporate additional factors to reflect specific conditions associated with a program or measure. This may include factors to account for coincidence of multiple installations, or interaction between different measures.

The algorithms for renewable energy and distributed generation systems are driven by installed capacity and assumed capacity factors. For renewable energy systems standard capacity factors are utilized. For example, for photovoltaic systems the protocols estimate that approximately 1,200 kWh of electricity is generated per year per kW of installed capacity. Capacity factors for distributed generation systems are based upon individual project operating assumptions.

## **Data and Input Values**

The input values and algorithms in the protocols and on the program application forms are based on the best available and applicable data for the New Jersey programs. The input values for the algorithms come from the program application forms or from standard values based on measured or industry data.

Many input values, including site-specific data, come directly from the program application forms, worksheets, and field tools. Site-specific data on the application forms are used for measures with important variations in one or more input values (e.g., delta watts, efficiency level, capacity, etc.).

Standard input values are based on the best available measured or industry data, including metered data, measured data from evaluations (applied prospectively), field data and program results, and standards from industry associations. The standard values for most commercial and industrial measures are supported by end use metering for key parameters for a sample of facilities and circuits. These standard values are based on five years of metered data for most measures<sup>12</sup>. Data that were metered over that time period are from measures that were installed over an eight-year period. Many input values are based on program evaluations of prior New Jersey programs or similar programs in other regions.

For the standard input assumptions for which metered or measured data were not available, the input values (e.g., delta watts, delta efficiency, equipment capacity, operating hours, coincidence factors) were based on the best available industry data or standards. These input values were based on a review of literature from various industry organizations, equipment manufacturers, and suppliers.

Program evaluation will be used to assess key data and input values to either confirm that current values should continue to be used or update the values going forward.

## **Baseline Estimates**

For most efficiency programs and measures, the  $\Delta$  kW and  $\Delta$  kWh values are based on the energy use of standard new products vs. the high efficiency products promoted through the programs. This baseline may be different than the baseline estimates used in previous programs such as the Standard Offer in which the baseline assumptions were based on either the existing equipment for retrofits or current code or practice for new construction. The approach used for the new programs encourages residential and business consumers to purchase and install high efficiency equipment vs. new standard efficiency equipment. The baseline estimates used in the protocols are documented in the baseline studies or other market information. Baselines will be updated to reflect changing codes, practices and market transformation effects.

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<sup>12</sup> Values for lighting, air conditioners, chillers, and motors are based on measured usage from a large sample of participants from 1995 through 1999. Values for heat pumps reflect metered usage from 1996 through 1998, and variable speed drives reflect metered usage from 1995 through 1998.

Renewable energy and distributed generation program protocols assume that any electric energy or capacity produced by a renewable energy or distributed generation system displaces electric energy and capacity from the PJM grid.

### ***Resource Savings in Current and Future Program Years***

The Protocols support tracking and reporting the following categories of energy and resource savings:

1. Savings or generation from installations that were completed in the program year and prior program years due to the program's direct participation and documented market effects.
2. Savings or generation from program participant future adoptions due to program commitments.
3. Savings or generation from future adoptions due to market effects.

### ***Prospective Application of the Protocols***

The protocols will be applied prospectively. The input values are from the program application forms and standard input values (based on measured data including metered data and evaluation results). The protocols will be updated periodically based on evaluation results and available data, and then applied prospectively for future program years.

### ***Resource Savings***

#### **Electric**

Protocols have been developed to determine the electric energy and coincident peak demand savings.

Annual Electric energy savings are calculated and then allocated separately by season (summer and winter) and time of day (on-peak and off-peak). Summer coincident peak demand savings are calculated using a demand savings protocol for each measure that includes a coincidence factor. Application of this coincidence factor converts the demand savings of the measure, which may not occur at time of system peak, to demand savings that is expected to occur during the Summer On-Peak period. These periods for energy savings and coincident peak demand savings are defined as:

	Energy Savings	Coincident Peak Demand Savings
Summer	May through September	June through August
Winter	October through April	NA
On Peak (Monday - Friday)	8:00 a.m. to 8:00 p.m.	12:00 p.m. to 8:00 p.m.
Off Peak (Weekends and Holidays)	8:00 p.m. to 8:00 a.m.	NA

The time periods for energy savings and coincident peak demand savings were chosen to best fit the seasonal avoided cost patterns for electric energy and capacity that were used for the energy efficiency program cost effectiveness purposes. For energy, the summer period May through September was selected based on the pattern of avoided costs for energy at the PJM level. In order to keep the complexity of the process for calculating energy savings benefits to a reasonable level by using two time periods, the knee periods for spring and fall were split approximately evenly between the summer and winter periods.

For capacity, the summer period June through August was selected to match the highest avoided costs time period for capacity. The experience in PJM and New Jersey has been that nearly all system peak events occur during these three months. Coincidence factors are used to energy efficiency factors on peak demand. Renewable energy and distributed generation systems are assumed to be operating coincident with the PJM system peak. This assumption will be assessed in the impact evaluation.

## Natural Gas

Protocols have been developed to determine the natural gas energy savings on a seasonal basis. The gas energy savings are tracked by rate schedule. The seasonal periods are defined as:

Summer - April through September  
Winter - October through March

The time periods for gas savings were chosen to best fit the seasonal avoided gas cost pattern that was used for calculating energy efficiency program benefits for cost effectiveness purposes. However, given the changing seasonal cost patterns for gas supply, different time periods may be more appropriate to reflect a current outlook for the seasonal pattern, if any, at the time that the avoided cost benefits are calculated. The seasonal factors used in the following protocols that correspond to the above time periods reflect either base load or heating load usage. In the case of base load, one twelfth of the

annual use is allocated to each month. In the case of heating load, the usage is prorated to each month based on the number of normal degree-days in each month. This approach makes it relatively easy to calculate new seasonal factors to best match different avoided cost patterns.

## **Other Resources**

Some of the energy savings measures also result in environmental benefits and the saving of other resources. Environmental impacts are quantified based on statewide conversion factors supplied by the NJDEP for electric and gas energy savings. Where identifiable and quantifiable these other key resource savings, such as water, will be estimated. Water, oil, propane and maintenance savings are the major resources that have been identified. If other resources are significantly impacted, they will be included in the resource savings estimates.

## ***Post-Implementation Review***

Program managers will review application forms and tracking systems for all measures and conduct field inspections on a sample of installations. For some programs and jobs (e.g., custom, large process, large and complex comprehensive design), post-installation review and on-site verification of a sample of application forms and installations will be used to ensure the reliability of site-specific savings estimates.

## ***Adjustments to Energy and Resource Savings***

### **Coincidence with Electric System Peak**

Coincidence factors are used to reflect the portion of the connected load savings or generation that is coincident with the electric system peak.

### **Measure Retention and Persistence of Savings**

The combined effect of measure retention and persistence is the ability of installed measures to maintain the initial level of energy savings or generation over the measure life. Measure retention and persistence effects were accounted for in the metered data that were based on C&I installations over an eight-year period. As a result, some protocols incorporate retention and persistence effects in the other input values. For other measures, if the measure is subject to a reduction in savings or generation over time, the reduction in retention or persistence is accounted for using factors in the calculation of resource savings or generation (e.g., in-service rates for residential lighting measures, degradation of photovoltaic systems).

### **Interaction of Energy Savings**

Interaction of energy savings is accounted for in certain programs as appropriate. For all other programs and measures, interaction of energy savings is zero.

For the Residential New Construction program, the interaction of energy savings is accounted for in the home energy rating tool that compares the efficient building to the baseline or reference building and calculates savings.

For the Commercial and Industrial Efficient Construction program, the energy savings for lighting is increased by an amount specified in the protocol to account for HVAC interaction.

For commercial and industrial custom measures, interaction where relevant is accounted for in the site-specific analysis.

### ***Calculation of the Value of Resource Savings***

The calculation of the value of the resources saved is not part of this Protocols. The protocols are limited to the determination of the per unit resource savings in physical terms.

In order to calculate the value of the energy savings for reporting and other purposes, the energy savings are determined at the customer level and then increased by the amount of the transmission and distribution losses to reflect the energy savings at the system level. The energy savings at the system level are then multiplied by the appropriate avoided costs to calculate the value of the benefits.

System Savings = (Savings at Customer) X (T&D Loss Factor)

Value of Resource Savings = (System Savings) X (System Avoided Costs + Environmental Adder) + (Value of Other Resource Savings)

The value of the benefits for a particular measure will also include the value of the water, oil, maintenance and other resource savings where appropriate. Maintenance savings will be estimated in annual dollars leveled over the life of the measure.

### ***Transmission and Distribution System Losses***

The protocols calculate the energy savings at the customer level. These savings need to be increased by the amount of transmission and distribution system losses in order to determine the energy savings at the system level. The following loss factors multiplied by the savings calculated from the protocols will result in savings at the supply level.

### ***Electric Loss Factor***

The electric loss factor applied to savings at the customer meter is 1.11 for both energy and demand. The electric system loss factor was developed to be applicable to statewide programs. Therefore, average system losses at the margin based on PJM data were utilized. This reflects a mix of different losses that occur related to delivery at different voltage levels. The 1.11 factor used for both energy and capacity is a weighted average loss factor and was adopted by consensus.

## Gas Loss Factor

The gas loss factor is 1.0. The gas system does not have losses in the same sense that the electric system does. All of the gas gets from the “city gate” (delivery point to the distribution system) to the point of use except for unaccounted for gas (such as theft), gas lost due to system leakage or loss of gas that is purged when necessary to make system repairs. Since none of these types of “losses” is affected by a decrease in gas use due to energy efficiency at the customer, there are no losses for which to make any adjustment. Therefore, a system loss factor of 1.0 is appropriate for gas energy efficiency savings.

These electric and gas loss factors reflect losses at the margin and are a consensus of the electric and gas utilities.

## ***Calculation of Clean Air Impacts***

The amount of air emission reductions resulting from the energy savings are calculated using the energy savings at the system level and multiplying them by factors developed by the New Jersey Department of Environmental Protection (NJDEP).

System average air emissions reduction factors provided by the NJDEP are:

Electric Emissions Factors

Emissions Product	Jan 2001-June 2002	July 2003-Present
CO <sub>2</sub>	1.1 lbs per kWh saved	1,520 lbs per MWh saved
NOx	6.42 lbs per metric ton of CO <sub>2</sub> saved	2.8 lbs per MWh saved
SO <sub>2</sub>	10.26 lbs per metric ton of CO <sub>2</sub> saved	6.5 lbs per MWh saved
Hg	0.00005 lbs per metric ton of CO <sub>2</sub> saved	0.0000356 lbs per MWh saved

Gas Emissions Factors

Emissions Product	Jan 2001-June 2002	July 2003-Present
CO <sub>2</sub>	NA	11.7 lbs per therm saved
NOx	NA	0.0092 lbs per therm saved

All factors are provided by the NJ Department of Environmental Protection and are on an average system basis. They will be updated as new factors become available.

## ***Measure Lives***

Measure lives are provided in Appendix A for informational purposes and for use in other applications such as reporting lifetime savings or in benefit cost studies that span more than one year. For regulatory reporting, the following are the average lives that relate lifetime savings to annual savings for each program reporting savings.

Program	Measure Life (Years)	
	Electric	Gas
Residential HVAC	15	20
Residential Low Income	16	20
Energy Star Homes	20	20
C&I Construction	15	15
Customer Sited Generation		
PV	20	
Wind	15	
Fuel Cell		10

## ***Protocols for Program Measures***

The following pages present measure-specific protocols.

## Residential HVAC Program: Electric Measures

### **Protocols**

The measurement plan for residential high efficiency cooling and heating equipment is based on algorithms that determine a central air conditioner's or heat pump's cooling/heating energy use and peak demand. Input data is based both on fixed assumptions and data supplied from the high efficiency equipment rebate application form. The algorithms also include the calculation of additional energy and demand savings due to the required proper sizing of high efficiency units.

The savings will be allocated to summer/winter and on-peak/off-peak time periods based on load shapes from measured data and industry sources. The allocation factors are documented below in the input value table.

The protocols applicable for this program measure the energy savings directly related to the more efficient hardware installation. Estimates of energy savings due to the proper sizing of the equipment are also included.

The following is an explanation of the algorithms used and the nature and source of all required input data.

### Algorithms

#### **Central Air Conditioner (A/C) & Air Source Heat Pump (ASHP)**

*Cooling Energy Consumption and Peak Demand Savings – Central A/C & ASHP  
(High Efficiency Equipment only)*

$$\text{Energy Impact (kWh)} = \text{CAPY}/1000 \times (1/\text{SEER}_b - 1/\text{SEER}_q) \times \text{EFLH}$$

$$\text{Peak Demand Impact (kW)} = \text{CAPY}/1000 \times (1/\text{EER}_b - 1/\text{EER}_q) \times \text{CF}$$

*Heating Energy Savings – ASHP*

$$\text{Energy Impact (kWh)} = \text{CAPY}/1000 \times (1/\text{HSPF}_b - 1/\text{HSPF}_q) \times \text{EFLH}$$

*Cooling Energy Consumption and Demand Savings – Central A/C & ASHP  
(Proper Sizing)*

$$\text{Energy Impact (kWh)} = (\text{CAPY}/(\text{SEER}_q \times 1000)) \times \text{EFLH} \times \text{PSF}$$

$$\text{Peak Demand Impact (kW)} = ((\text{CAPY}/(\text{EER}_q \times 1000)) \times \text{CF}) \times \text{PSF}$$

*Cooling Energy Consumption and Demand Savings – Central A/C & ASHP  
(QIV)*

Energy Impact (kWh) = (((CAPY/(1000 X SEERq)) X EFLH) X (1-PSF) X QIF

Peak Demand Impact (kW) = ((CAPY/(1000 X EERq)) X CF) X (1-PSF) X QIF

*Cooling Energy Consumption and Demand Savings – Central A/C & ASHP  
(Maintenance)*

Energy Impact (kWh) = ((CAPY/(1000 X SEERm)) X EFLH) X MF

Peak Demand Impact (kW) = ((CAPY/(1000 X EERm)) X CF) X MF

*Cooling Energy Consumption and Demand Savings – Central A/C & ASHP  
(Duct Sealing)*

Energy Impact (kWh) = (CAPY/(1000 X SEERq)) X EFLH X DuctSF

Peak Demand Impact (kW) = ((CAPY/(1000 X EERq)) X CF) X DuctSF

## **Ground Source Heat Pumps (GSHP)**

Cooling Energy (kWh) Savings = CAPY/1000 X (1/SEER<sub>b</sub> - (1/(EER<sub>g</sub> X GSER))) X EFLH

Heating Energy (kWh) Savings = CAPY/1000 X (1/HSPF<sub>b</sub> - (1/(COP<sub>g</sub> X GSOP))) X EFLH

Peak Demand Impact (kW) = CAPY/1000 X (1/EER<sub>b</sub> - (1/(EER<sub>g</sub> X GSPK))) X CF

## **GSHP Desuperheater**

Energy (kWh) Savings = EDSH

Peak Demand Impact (kW) = PDSH

## **Furnace High Efficiency Fan**

Heating Energy (kWh) Savings = ((Cap<sub>t</sub> X EFLH<sub>HT</sub>)/100,000 BTU/therm) X FFS<sub>HT</sub>

Cooling Energy (kWh) Savings = FFS<sub>CL</sub>

## Definition of Terms

CAPY = The cooling capacity (output) of the central air conditioner or heat pump being installed. This data is obtained from the Application Form based on the model number.

SEER<sub>b</sub> = The Seasonal Energy Efficiency Ratio of the Baseline Unit.

SEER<sub>q</sub> = The Seasonal Energy Efficiency Ratio of the qualifying unit being installed. This data is obtained from the Application Form based on the model number.

SEER<sub>m</sub> = The Seasonal Energy Efficiency Ratio of the Unit receiving maintenance

EER<sub>b</sub> = The Energy Efficiency Ratio of the Baseline Unit.

EER<sub>q</sub> = The Energy Efficiency Ratio of the unit being installed. This data is obtained from the Application Form based on the model number.

EER<sub>g</sub> = The EER of the ground source heat pump being installed. Note that EERs of GSHPs are measured differently than EERs of air source heat pumps (focusing on entering water temperatures rather than ambient air temperatures). The equivalent SEER of a GSHP can be estimated by multiplying EER<sub>g</sub> by 1.02.

GSER = The factor to determine the SEER of a GSHP based on its EER<sub>g</sub>.

EFLH = The Equivalent Full Load Hours of operation for the average unit.

ESF = The Energy Sizing Factor or the assumed saving due to proper sizing and proper installation.

PSF = The Proper Sizing Factor or the assumed savings due to proper sizing of cooling equipment

QIF = The Quality Installation factor or assumed savings due to a verified quality installation of cooling equipment

MF = The Maintenance Factor or assumed savings due to completing recommended maintenance on installed cooling equipment

DuctSF = The Duct Sealing Factor or the assumed savings due to proper sealing of all cooling ducts

CF = The coincidence factor which equates the installed unit's connected load to its demand at time of system peak.

DSF = The Demand Sizing Factor or the assumed peak demand capacity saved due to proper sizing and proper installation.

HSPF<sub>b</sub> = The Heating Seasonal Performance Factor of the Baseline Unit.

HSPF<sub>q</sub> = The Heating Seasonal Performance Factor of the unit being installed. This data is obtained from the Application Form.

COP<sub>g</sub> = Coefficient of Performance. This is a measure of the efficiency of a heat pump.

GSOP = The factor to determine the HSPF of a GSHP based on its COP<sub>g</sub>.

GSPK = The factor to convert EER<sub>g</sub> to the equivalent EER of an air conditioner to enable comparisons to the baseline unit.

EDSH = Assumed savings per desuperheater.

PDSH = Assumed peak demand savings per desuperheater.

Capy<sub>q</sub> = Output capacity of the qualifying heating unit in BTUs/hour

EFLH<sub>HT</sub> = The Equivalent Full Load Hours of operation for the average heating unit

FFS<sub>HT</sub> = Furnace fan savings (heating mode)

FFS<sub>CL</sub> = Furnace fan savings (cooling mode)

The 1000 used in the denominator is used to convert watts to kilowatts.

A summary of the input values and their data sources follows:

### **Residential Electric HVAC**

<b>Component</b>	<b>Type</b>	<b>Value</b>	<b>Sources</b>
CAPY	Variable		Rebate Application
SEER <sub>b</sub>	Fixed	Baseline = 13	1
SEER <sub>q</sub>	Variable		Rebate Application
SEER <sub>m</sub>	Fixed	10	15
EER <sub>b</sub>	Fixed	Baseline = 11.3	2
EER <sub>q</sub>	Fixed	= (11.3/13) X SEER <sub>q</sub>	2
EER <sub>g</sub>	Variable		Rebate Application

<b>Component</b>	<b>Type</b>	<b>Value</b>	<b>Sources</b>
EER <sub>m</sub>	Fixed	8.69	19
GSER	Fixed	1.02	3
EFLH	Fixed	Cooling = 600 Hours Heating = 2250 Hours	4
ESF	Fixed	2.9%	5
PSF	Fixed	5%	14
QIF	Fixed	15%	14
MF	Fixed	10%	20
DuctSF	Fixed	18%	14
CF	Fixed	70%	6
DSF	Fixed	2.9%	7
HSPF <sub>b</sub>	Fixed	Baseline = 7.7	8
HSPF <sub>q</sub>	Variable		Rebate Application
COP <sub>g</sub>	Variable		Rebate Application
GSOP	Fixed	3.413	9
GSPK	Fixed	0.8416	10
EDSH	Fixed	1842 kWh	11
PDSH	Fixed	0.34 kW	12
Cooling - CAC Time Period Allocation Factors	Fixed	Summer/On-Peak 64.9% Summer/Off-Peak 35.1% Winter/On-Peak 0% Winter/Off-Peak 0%	13
Cooling – ASHP Time Period Allocation Factors	Fixed	Summer/On-Peak 59.8% Summer/Off-Peak 40.2% Winter/On-Peak 0% Winter/Off-Peak 0%	13
Cooling – GSHP Time Period Allocation Factors	Fixed	Summer/On-Peak 51.7% Summer/Off-Peak 48.3% Winter/On-Peak 0% Winter/Off-Peak 0%	13
Heating – ASHP & GSHP Time Period Allocation Factors	Fixed	Summer/On-Peak 0.0% Summer/Off-Peak 0.0% Winter/On-Peak 47.9% Winter/Off-Peak 52.1%	13
GSHP Desuperheater Time Period Allocation Factors	Fixed	Summer/On-Peak 4.5% Summer/Off-Peak 4.2% Winter/On-Peak 43.7% Winter/Off-Peak 47.6%	13
Capy <sub>q</sub>	Variable		Rebate Application
EFLH <sub>HT</sub>	Fixed	965 hours	16

Component	Type	Value	Sources
FFS <sub>HT</sub>	Fixed	0.5 kWh	17
FFS <sub>CL</sub>	Fixed	105 kWh	18

Sources:

1. Federal Register, Vol. 66, No. 14, Monday, January 22, 2001/Rules and Regulations, p. 7170-7200.
2. Average EER for SEER 13 units.
3. VEIC estimate. Extrapolation of manufacturer data.
4. VEIC estimate. Consistent with analysis of PEPCo and LIPA, and conservative relative to ARI.
5. Xenergy, "New Jersey Residential HVAC Baseline Study", (Xenergy, Washington, D.C., November 16, 2001).
6. Based on an analysis of 6 different utilities by Proctor Engineering.
7. Xenergy, "New Jersey Residential HVAC Baseline Study", (Xenergy, Washington, D.C., November 16, 2001)
8. Federal Register, Vol. 66, No. 14, Monday, January 22, 2001/Rules and Regulations, p. 7170-7200.
9. Engineering calculation, HSPF/COP=3.413
10. VEIC Estimate. Extrapolation of manufacturer data.
11. VEIC estimate, based on PEPCo assumptions.
12. VEIC estimate, based on PEPCo assumptions.
13. Time period allocation factors used in cost-effectiveness analysis.
14. Northeast Energy Efficiency Partnerships, Inc., "Benefits of HVAC Contractor Training", (February 2006): Appendix C Benefits of HVAC Contractor Training: Field Research Results 03-STAC-01
15. Minimum Federal Standard for new Central Air Conditioners between 1990 and 2006
16. NJ utility analysis of heating customers, annual gas heating usage
17. Scott Pigg (Energy Center of Wisconsin), "Electricity Use by New Furnaces: A Wisconsin Field Study", Technical Report 230-1, October 2003.
18. Ibid., p. 34. ARI charts suggest there are about 20% more full load cooling hours in NJ than southern WI. Thus, average cooling savings in NJ are estimated at 95 to 115
19. The same EER to SEER ratio used for SEER 13 units applied to SEER 10 units.  
$$EER_m = (11.3/13) * 10$$
20. VEIC estimate. Conservatively assumes less savings than for QIV because of the retrofit context

# Residential HVAC Program: Gas Measures

## ***Protocols***

The following two algorithms detail savings for gas heating and water heating equipment. They are to be used to determine gas energy savings between baseline standard units and the high efficiency units promoted in the program. The input values are based on data on typical customers supplied by the gas utilities, an analysis by the Federal Energy Management Program (FEMP), and customer information on the application form, confirmed with manufacturer data. The energy values are in therms.

## **Space Heaters**

### Algorithms

$$\text{Gas Savings} = (\text{Cap}_{y_t}/\text{AFUE}_b - \text{Cap}_{y_q}/\text{AFUE}_q) * \text{EFLH} / 100,000 \text{ BTUs/therm}$$

$$\text{Gas Savings due to duct sealing} = \text{CAPY}_t * \text{EFLH} * (\text{DuctSF}_h/100,000)$$

$$\text{Average Heating Use (therms)} = (\text{Cap}_{avg} / \text{AFUE}_{avg}) * \text{EFLH} / 100,000 \text{ BTUs/therm}$$

$$\text{EFLH} = (\text{Average Heating Use} * \text{AFUE}_{avg} * 100,000 \text{ BTUs/therm}) / \text{Cap}_{avg}$$

### Definition of Variables

$\text{Cap}_{y_q}$  = Actual output capacity of the qualifying heating system in Btus/hour

$\text{Cap}_{y_t}$  = Output capacity of the typical heating unit output in Btus/hour

$\text{Cap}_{avg}$  = Output capacity of the average heating unit output in Btus/hour

$\text{EFLH}$  = The Equivalent Full Load Hours of operation for the average unit.

$\text{DuctSF}_h$  = The Duct Sealing Factor or the assumed savings due to proper sealing of all heating ducts

$\text{AFUE}_{avg}$  = Annual Fuel Utilization Efficiency of the average furnace or boiler

$\text{AFUE}_q$  = Annual Fuel Utilization Efficiency of the qualifying energy efficient furnace or boiler

$\text{AFUE}_b$  = Annual Fuel Utilization Efficiency of the baseline furnace or boiler

Average Heating Usage = The weighted average annual heating usage (therms) of typical New Jersey heating customers

## Space Heating

Component	Type	Value	Source
Cap <sub>q</sub>	Variable		Application Form, confirmed with Manufacturer Data
Cap <sub>t</sub>	Fixed	91,000	1
DuctSF <sub>h</sub>	Fixed	13%	5
AFUE <sub>q</sub>	Variable		Application Form, confirmed with Manufacturer Data
AFUE <sub>b</sub>	Fixed	Furnaces: 80% Boilers: 83%	2
<sup>13</sup> EFLH <sup>14</sup>	Fixed	965 hours	3
Time Period Allocation Factors	Fixed	Summer = 12% Winter = 88%	4

Sources:

1. NJ Residential HVAC Baseline Study
2. Based on the quantity of models available by efficiency ratings as listed in the April 2003 Gamma Consumers Directory of Certified Efficiency Ratings.
3. NJ utility analysis of heating customers, annual gas heating usage.
4. Prorated based on 12% of the annual degree days falling in the summer period and 88% of the annual degree days falling in the winter period.
5. Northeast Energy Efficiency Partnerships, Inc., "Benefits of HVAC Contractor Training", (February 2006): Appendix C Benefits of HVAC Contractor Training: Field Research Results 03-STAC-01

## Water Heaters

### Algorithms

$$\text{Gas Savings} = ((\text{EF}_q - \text{EF}_b)/\text{EF}_q) \times \text{Baseline Water Heater Usage}$$

### Definition of Variables

$\text{EF}_q$  = Energy factor of the qualifying energy efficient water heater.

$\text{EF}_b = 0.67 - (0.0019 * \text{Gallons of Capacity})$

Baseline Water Heater Usage = Annual usage of the baseline water heater, in therms.

<sup>13</sup> Residential Gas Measures EFLH are subject to change barring the results of impact evaluations.

<sup>14</sup> Residential Gas Measures EFLH are subject to change barring the results of impact evaluations.

## Water Heaters

Component	Type	Value	Source
Ef <sub>q</sub>	Variable		Application Form, confirmed with Manufacturer Data
Ef <sub>b</sub>	Variable		Application Form, confirmed with Manufacturer Data
Baseline Water Heater Usage	Fixed	212	2
Time Period Allocation Factors	Fixed	Summer = 50% Winter = 50%	3

Sources:

1. Federal EPACT Standard for a 40 gallon gas water heater. Calculated as 0.62 – (0.0019 X gallons of capacity).
2. Federal Register, Vol. 66, No. 11, Wednesday, January 17, 2001/Rules and Regulations, p. 4474-4497.
3. Prorated based on 6 months in the summer period and 6 months in the winter period.

# Residential Low Income Program

## ***Protocols***

The Protocols set out below are applicable to both the Comfort Partners component of the Low-income Program currently implemented by the State's electric and gas utilities and the Weatherization Assistance component of the Low-income Program implemented by the New Jersey Department of Community Affairs (DCA).

The savings protocols for the low-income program are based upon estimated per unit installed savings. In some cases, such as lighting and refrigerators, the savings per unit estimate is based on direct observation or monitoring of the existing equipment being replaced. For other measures, for example air sealing and insulation, the protocols calculation is based on an average % savings of pre-treatment consumption. The protocols for space heating measures were established considering the non-additive nature of individual measures. Further, (for protocol reporting only) the cumulative savings from space conditioning measures is capped at 10% of pre-treatment electric space conditioning consumption and 15% of pre-treatment natural gas space conditioning consumption.

## **Base Load Measures**

### **Efficient Lighting**

Savings from installation of screw-in CFLs, high performance fixtures and fluorescent torchieres are based on a straightforward algorithm that calculates the difference between existing and new wattage, and the average daily hours of usage for the lighting unit being replaced.

### **Algorithm**

#### **Compact Fluorescent Screw In Lamp**

$$\text{Electricity Impact (kWh)} = ((\text{CFL}_{\text{watts}}) \times (\text{CFL}_{\text{hours}} \times 365)) / 1000$$

$$\text{Peak Demand Impact (kW)} = (\text{CFL}_{\text{watts}}) \times \text{Light CF}$$

#### **Efficient Fixtures**

$$\text{Electricity Impact (kWh)} = ((\text{Fixt}_{\text{watts}}) \times (\text{Fixt}_{\text{hours}} \times 365)) / 1000$$

$$\text{Peak Demand Impact (kW)} = (\text{Fixt}_{\text{watts}}) \times \text{Light CF}$$

#### **Efficient Torchieres**

$$\text{Electricity Impact (kWh)} = ((\text{Torch}_{\text{watts}}) \times (\text{Torch}_{\text{hours}} \times 365)) / 1000$$

$$\text{Peak Demand Impact (kW)} = (\text{Torch}_{\text{watts}}) \times \text{Light CF}$$

## **Hot Water Conservation Measures**

The protocols savings estimates are based on an average package of domestic hot water measures typically installed by low-income programs.

### **Algorithm**

$$\text{Electricity Impact (kWh)} = \text{HW}_{\text{eavg}}$$

$$\text{Gas Savings (MMBtu)} = \text{HW}_{\text{gavg}}$$

$$\text{Peak Demand Impact (kW)} = \text{HW}_{\text{watts}} \times \text{HW CF}$$

$$\text{Water Savings (gallons)} = \text{WS}$$

## **Efficient Refrigerators**

The eligibility for refrigerator replacement is determined by comparing monitored consumption for the existing refrigerator with the rated consumption of the eligible replacement. Estimated savings are directly calculated based on the difference between these two values. Note that in the case where an under-utilized or unneeded refrigerator unit is removed, and no replacement is installed, the Ref<sub>new</sub> term of the equation will be zero.

### **Algorithm**

$$\text{Electricity Impact (kWh)} = \text{Ref}_{\text{old}} - \text{Ref}_{\text{new}}$$

$$\text{Peak Demand Impact (kW)} = (\text{Ref}_{\text{old}} - \text{Ref}_{\text{new}}) * (\text{Ref DF})$$

## **Space Conditioning Measures**

Savings from individual space conditioning measures are affected by any other measures that also are being installed; i.e., such savings are not cumulative. Further, technical reasons dictate prioritizing certain measures over others. The savings algorithms for all space conditioning measures accommodate these considerations by presuming a fixed sequence of measure installation for the purpose of projecting savings and by limiting total estimated electric space conditioning savings to 10% of electric space conditioning pre-treatment usage. Fossil fuel heated houses typically have more substantial opportunities for space conditioning savings than electrically heated houses. Further, there are greater opportunities for interaction between measure types. For protocol reporting, these savings estimates will be capped at 15% of pre-treatment space heating consumption. When available, gas heat measure savings will be based on heating use. If only total gas use is known, heating use will be estimated as total use less 300 therms.

## Air Sealing

It is assumed that air sealing is the first priority among candidate space conditioning measures. Expected percentage savings is based on previous experiences with measured savings from similar programs. Note there are no summer coincident electric peak demand savings estimated at this time.

### Algorithm

$$\text{Electricity Impact (kWh)} = \text{ESC}_{\text{pre}} \times 0.05$$

$$\text{MMBtu savings} = (\text{GHpre} \times 0.05)$$

## *Furnace/Boiler Replacement*

Quantification of savings due to furnace and boiler replacements implemented under the low-income program will be based on the algorithms presented in the Residential Gas HVAC section of these Protocols.

## Duct Sealing and Repair

The second priority for homes with either Central Air Conditioning (CAC) or some other form of ducted distribution of electric space conditioning (electric furnace, gas furnace or heat pump) is ensuring integrity and effectiveness of the ducted distribution system.

### Algorithm

#### With CAC

$$\text{Electricity Impact (kWh)} = (\text{ECool}_{\text{pre}}) \times 0.10$$

$$\text{Peak Demand Impact (kW)} = (\text{Ecool}_{\text{pre}} \times 0.10) / \text{EFLH} \times \text{AC CF}$$

$$\text{MMBtu savings} = (\text{GHpre} \times 0.02)$$

#### No CAC

$$\text{Electricity Impact (kWh)} = (\text{ESC}_{\text{pre}}) \times 0.02$$

$$\text{MMBtu savings} = (\text{GHpre} \times 0.02)$$

## Insulation Up-Grades

For savings calculations, it is assumed that any applicable air sealing and duct sealing/repair have been done, thereby reducing the space conditioning load, before consideration of upgrading insulation. Attic insulation savings are then projected on the

basis of the “new” load. Gas savings are somewhat greater, as homes with gas heat generally have less insulation.

### Algorithm

$$\text{Electricity Impact (kWh)} = (\text{ESC}_{\text{pre}}) \times 0.08$$

$$\text{MMBtu savings} = (\text{GH}_{\text{pre}}) \times 0.13$$

### **Thermostat Replacement**

Thermostats are eligible for consideration as an electric space conditioning measure only after the first three priority items. Savings projections are based on a conservative 3% of the “new” load after installation of any of the top three priority measures.

### Algorithm

$$\text{Electricity Impact (kWh)} = (\text{ESC}_{\text{pre}}) \times 0.03$$

$$\text{MMBtu savings} = (\text{GH}_{\text{pre}}) \times 0.03$$

### **Heating and Cooling Equipment Maintenance Repair/Replacement**

Savings projections for heat pump charge and air flow correction. Protocol savings account for shell measures having been installed that reduce the pre-existing load.

### Algorithm

$$\text{Electricity Impact (kWh)} = (\text{ESC}_{\text{pre}}) \times 0.17$$

$$\text{Peak Demand Impact (kW)} = (\text{Cap}_y/\text{EER} \times 1000) \times \text{HP CF} \times \text{DSF}$$

### **Total Space Conditioning Savings**

### Algorithm

$$\text{Maximum Electricity Impact (kWh)} \leq (\text{ESC}_{\text{pre}} \times 0.10)$$

$$\text{Maximum MMBtu savings} = (\text{GH}_{\text{pre}}) \times 0.15$$

## Other “Custom” Measures

In addition to the typical measures for which savings algorithms have been developed, it is assumed that there will be niche opportunities that should be identified and addressed. The savings for these custom measures will be reported based on the individual calculations supplied with the reporting. As necessary the program working group will develop specific guidelines for frequent custom measures for use in reporting and contractor tracking.

## Definition of Terms

CFL<sub>watts</sub> = Average watts replaced for a CFL installation.

CFL<sub>hours</sub> = Average daily burn time for CFL replacements.

Fixt<sub>watts</sub> = Average watts replaced for an efficient fixture installation.

Fixt<sub>hours</sub> = Average daily burn time for CFL replacements.

Torch<sub>watts</sub> = Average watts replaced for a Torchiere replacement.

Torch<sub>hours</sub> = Average daily burn time for a Torchiere replacements.

Light CF = Summer demand coincidence factor for all lighting measures. Currently fixed at 5%.

HW<sub>eavg</sub> = Average electricity savings from typical electric hot water measure package.

HW<sub>gavg</sub> = Average natural gas savings from typical electric hot water measure package.

HW<sub>watts</sub> = Connected load reduction for typical hot water efficiency measures

HW CF = Summer demand coincidence factor for electric hot water measure package. Currently fixed at 75%.

Ref<sub>old</sub> = Annual energy consumption of existing refrigerator based on on-site monitoring.

Ref<sub>new</sub> = Rated annual energy consumption of the new refrigerator.

Ref DF = kW /kWh of savings. Refrigerator demand savings factor.

Ref CF = Summer demand coincidence factor for refrigeration. Currently 100%, diversity accounted for in the Ref DF factor.

ESC<sub>pre</sub> = Pre-treatment electric space conditioning consumption.

ECool<sub>pre</sub> = Pre-treatment electric cooling consumption.

EFLH = Equivalent full load hours of operation for the average unit. This value is currently fixed at 650 hours.

AC CF = Summer demand coincidence factor for air conditioning. Currently 85%.

Capy = Capacity of Heat Pump in Btuh

EER = Energy Efficiency Ratio of average heat pump receiving charge and air flow service. Fixed at 9.2

HP CF = Summer demand coincidence factor for heat pump. Currently fixed at 70%.

DSF = Demand savings factor for charge and air flow correction. Currently fixed at 7%.

GC<sub>pre</sub> = Pre treatment gas consumption.

GH<sub>pre</sub> = Pre treatment gas space heat consumption (=GC<sub>pre</sub> less 300 therms if only total gas use is known).

WS = Water Savings associated with water conservation measures. Currently fixed at 3,640 gallons per year per home receiving low flow showerheads, plus 730 gallons saved per year per aerator installed.

### **Residential Low Income**

<b>Component</b>	<b>Type</b>	<b>Value</b>	<b>Sources</b>
CFL <sub>Watts</sub>	Fixed	42 Watts	1
CFL <sub>Hours</sub>	Fixed	2.5 hours	1
Fixt <sub>Watts</sub>	Fixed	100-120 Watts	1
Fixt <sub>Hours</sub>	Fixed	3.5 hours	1
Torch <sub>Watts</sub>	Fixed	245 Watts	1
Torch <sub>Hours</sub>	Fixed	3.5 hours	1
Light CF	Fixed	5%	2
Elec. Water Heating Savings	Fixed	178 kWh	3
Gas Water Heating Savings	Fixed	1.01 MMBTU	3
WS Water Savings	Fixed	3,640 gal/year per home receiving low flow shower heads, plus 1,460 gal/year per home receiving aerators.	12
HW <sub>watts</sub>	Fixed	0.022 kW	4

<b>Component</b>	<b>Type</b>	<b>Value</b>	<b>Sources</b>
HW CF	Fixed	75%	4
Ref <sub>old</sub>	Variable		Contractor Tracking
Ref <sub>new</sub>	Variable		Contractor Tracking and Manufacturer data
Ref DF	Fixed	0.000139 kW/kWh savings	5
RefCF	Fixed	100%	6
ESC <sub>pre</sub>	Variable		7
Ecool <sub>pre</sub>	Variable		7
ELFH	Fixed	650 hours	8
AC CF	Fixed	85%	4
Capy	Fixed	33,000 Btu/hr	1
EER	Fixed	11.3	8
HP CF	Fixed	70%	9
DSF	Fixed	7%	10
GC <sub>pre</sub>	Variable		7
GH <sub>pre</sub>	Variable		7
Time Period Allocation Factors - Electric	Fixed	Summer/On-Peak 21% Summer/Off-Peak 22% Winter/On-Peak 28% Winter/Off-Peak 29%	11
Time Period Allocation Factors - Gas	Fixed	Heating: Summer 12% Winter 88%  Non-Heating: Summer 50% Winter 50%	13

Sources/Notes:

1. Working group expected averages for product specific measures.
2. Efficiency Vermont Reference Manual – average for lighting products.
3. Experience with average hot water measure savings from low income and direct install programs.
4. VEIC estimate.
5. UI Refrigerator Load Data profile, .16 kW (5pm July) and 1,147 kWh annual consumption.
6. Diversity accounted for by Ref DF.
7. Billing histories and (for electricity) contractor calculations based on program procedures for estimating space conditioning and cooling consumption.
8. Average EER for SEER 13 units.
9. Analysis of data from 6 utilities by Proctor Engineering

10. From Neme, Proctor and Nadel, 1999.
11. These allocations may change with actual penetration numbers are available.
12. VEIC estimate, assuming 1 GPM reduction for 14 five minute showers per week for shower heads, and 4 gallons saved per day for aerators.
13. Heating: Prorated based on 12% of the annual degree days falling in the summer period and 88% of the annual degree days falling in the winter period.  
Non-Heating: Prorated based on 6 months in the summer period and 6 months in the winter period.

## **Residential New Construction Program**

### ***Protocols***

#### ***Insulation Up-Grades, Efficient Windows, Air Sealing, Efficient HVAC Equipment, and Duct Sealing***

The energy savings due to the Residential New Construction Program will be a direct output of the home energy rating software. This software has a module that compares the energy characteristics of the energy efficient home to the baseline/reference home and calculates savings.

The system peak electric demand savings will be calculated from the software output with the following algorithms then applied:

Peak demand of the baseline home =  $(PL_b \times OF_b) / (SEER_b \times BLEER \times 1,000)$

Peak demand of the qualifying home =  $(PL_q \times OF_q) / (EER_q \times 1,000)$

Coincident system peak electric demand savings = (Peak demand of the baseline home – Peak demand of the qualifying home) X CF

### **Definition of Terms**

$PL_b$  = Peak load of the baseline home in Btuh.

$OF_b$  = The oversizing factor for the HVAC unit in the baseline home.

$SEER_b$  = The Seasonal Energy Efficiency Ratio of the baseline unit.

$BLEER$  = Factor to convert baseline  $SEER_b$  to  $EER_b$ .

$PL_q$  = The actual predicted peak load for the program qualifying home constructed, in Btuh.

$OF_q$  = The oversizing factor for the HVAC unit in the program qualifying home.

$EER_q$  = The EER associated with the HVAC system in the qualifying home.

$CF$  = The coincidence factor which equates the installed HVAC system's demand to its demand at time of system peak.

In July 2002 energy code changes took place with the adoption of MEC 95. This code change affects baselines for variables used in the protocols. Therefore, to reflect these New Jersey Clean Energy Program  
Protocols to Measure Resource Savings

changes, tables and or values are identified as needed for installations completed during 2001 through March 2003 and for installations completed in April 2003 through the present. The application of the code changes to completions starting in April allows for the time lag between when the permits are issued and when a home would reasonably be expected to be completed.

A summary of the input values and their data sources follows:

Applicable to building completions from January 2001 through March 2003

Component	Type	Value	Sources
$PL_b$	Variable		1
$OF_b$	Fixed	1.6	2
$SEER_b$	<b>Fixed</b>	13	3
BLEER	Fixed	0.92	4
$PL_q$	Variable		REM Output
$OF_q$	Fixed	1.15	5
$EER_q$	Variable		Program Application
CF	Fixed	0.70	6

Sources:

1. Calculation of peak load of baseline home from the home energy rating tool, based on the reference home energy characteristics.
2. PSE&G 1997 Residential New Construction baseline study.
3. Federal Register, Vol. 66, No. 14, Monday, January 22, 2001/Rules and Regulations, p. 7170-7200
4. Engineering calculation.
5. Program guideline for qualifying home.
6. Based on an analysis of six different utilities by Proctor Engineering.

Applicable to building completions from April 2003 to present

Component	Type	Value	Sources
$PL_b$	Variable		1
$OF_b$	Fixed	1.6	2
$SEER_b$	<b>Fixed</b>	13	3
BLEER	Fixed	0.92	4
$PL_q$	Variable		REM Output
$OF_q$	Fixed	1.15	5
$EER_q$	Variable		Program Application
CF	Fixed	0.70	6

Sources:

1. Calculation of peak load of baseline home from the home energy rating tool, based on the reference home energy characteristics.
2. PSE&G 1997 Residential New Construction baseline study.

3. Federal Register, Vol. 66, No. 14, Monday, January 22, 2001/Rules and Regulations, p. 7170-7200
4. Engineering calculation.
5. Program guideline for qualifying home.
6. Based on an analysis of six different utilities by Proctor Engineering.

## **Lighting and Appliances**

Quantification of additional saving due to the addition of high efficiency lighting and clothes washers will be based on the algorithms presented for these appliances in the Energy Star Lighting Protocols and the Energy Star Appliances Protocols, respectively. These protocols are found in the Energy Star Products Program.

## **Ventilation Equipment**

Additional energy savings of 175 kWh and peak demand saving of 60 Watts will be added to the output of the home energy rating software to account for the installation of high efficiency ventilation equipment. These values are based on a baseline fan of 80 Watts and an efficient fan of 20 Watts running for 8 hours per day.

The following table describes the characteristics of the three reference homes.

**New Jersey ENERGY STAR Homes**

**REMRate User Defined Reference Homes -- Applicable to building completions from January 2001 through March 2003**

Data Point	Single Family	Multiple Single Family	Multifamily
Active Solar	None	None	None
Ceiling Insulation	R-30	R-30	R-30
Radiant Barrier	None	None	None
Rim/Band Joist	R-13	R-13	R-13
Exterior Walls - Wood	R-13	R-13	R-13
Exterior Walls - Steel	R-7 effective	R-7 effective	R-7 effective
Foundation Walls	R-0	R-0	R-0
Doors	<b>R-2.6</b>	<b>R-2.6</b>	<b>R-2.6</b>
Windows	U=0.50, SHGC=0.60	U=0.50, SHGC=0.60	U=0.50, SHGC=0.60
Glass Doors	U=0.50, SHGC=0.60	U=0.50, SHGC=0.60	U=0.50, SHGC=0.60
Skylights	U=0.50, SHGC=0.60	U=0.50, SHGC=0.60	U=0.50, SHGC=0.60
Floor over Garage	R-19	R-19	R-19
Floor over Unheated Basement	R-0	R-0	R-0
Floor over Crawlspace	R-19	R-19	R-19
Floor over Outdoor Air	R-19	R-19	R-19
Unheated Slab on Grade	<i>R-0 edge/R-5 under</i>	<i>R-0 edge/R-5 under</i>	<i>R-0 edge/R-5 under</i>
Heated Slab on Grade	<i>R-0 edge/R-7 under</i>	<i>R-0 edge/R-7 under</i>	<i>R-0 edge/R-7 under</i>
Air Infiltration Rate	0.56 ACH winter/0.28 ACH summer	0.56 ACH winter/0.28 ACH summer	0.56 ACH winter/0.28 ACH summer
Duct Leakage	<i>Observable Duct Leakage</i>	<i>Observable Duct Leakage</i>	<i>Observable Duct Leakage</i>
Mechanical Ventilation	None	None	None
Lights and Appliances	Use Default	Use Default	Use Default
Setback Thermostat	Yes	No	No
Heating Efficiency			
Furnace	80% AFUE	80% AFUE	80% AFUE
Boiler	<b>80% AFUE</b>	<b>80% AFUE</b>	<b>80% AFUE</b>
Combo Water Heater	76% AFUE ( <i>recovery efficiency</i> )	76% AFUE ( <i>recovery efficiency</i> )	76% AFUE ( <i>recovery efficiency</i> )
Air Source Heat Pump	<b>7.7 HSPF</b>	<b>7.7 HSPF</b>	<b>7.7 HSPF</b>
Geothermal Heat Pump	<b>2.8 COP open/3.0 COP closed</b>	<b>2.8 COP open/3.0 COP closed</b>	<b>2.8 COP open/3.0 COP closed</b>

Data Point	Single Family	Multiple Single Family	Multifamily
PTAC / PTHP Cooling Efficiency	<i>3.0 COP</i>	<i>3.0 COP</i>	<i>3.0 COP</i>
Central Air Conditioning	13.0 SEER	13.0 SEER	13.0 SEER
Air Source Heat Pump	13.0 SEER	13.0 SEER	13.0 SEER
Geothermal Heat Pump	<b>11.3 EER open/12.0 EER closed</b>	<b>11.3 EER open/12.0 EER closed</b>	<b>11.3 EER open/12.0 EER closed</b>
PTAC / PTHP	<i>9.5 EER</i>	<i>9.5 EER</i>	<i>9.5 EER</i>
Window Air Conditioners	<b>11.3 EER</b>	<b>11.3 EER</b>	<b>11.3 EER</b>
Domestic WH Efficiency			
Electric	<b>0.88 EF</b>	<b>0.88 EF</b>	<b>0.88 EF</b>
Natural Gas	0.53 EF	0.53 EF	0.53 EF
Water Heater Tank Insulation	<i>None</i>	<i>None</i>	<i>None</i>
Duct Insulation	R-4.8	R-4.8	R-4.8

Data points listed in normal type have been obtained from the Incentive Analysis Assumptions for the associated building type.

Data points listed in **bold** have been obtained from the New Jersey Energy Star Homes Operations Manual.

Data points listed in *italics* were not identified in the Incentive Analysis or the Operations Manual. Values were assigned by MaGrann Associates.

An asterisk (\*) indicates the value is more stringent than code.

**New Jersey ENERGY STAR Homes****REMRate User Defined Reference Homes -- Applicable to building completions from April 2003 to present -- Reflects MEC 95**

Data Point	Single and Multiple Family Except as Noted.		
Active Solar	None		
Ceiling Insulation	U=0.031 (1)		
Radiant Barrier	None		
Rim/Band Joist	U=0.141 Type A-1, U=0.215 Type A-2 (1)		
Exterior Walls - Wood	U=0.141 Type A-1, U=0.215 Type A-2 (1)		
Exterior Walls - Steel	U=0.141 Type A-1, U=0.215 Type A-2 (1)		
Foundation Walls	U=0.99		
Doors	U=0.141 Type A-1, U=0.215 Type A-2 (1) U=0.141 Type A-1, U=0.215 Type A-2 (1), No SHGC req.		
Windows	U=0.141 Type A-1, U=0.215 Type A-2 (1), No SHGC req.		
Glass Doors			
Skylights	U=0.031 (1), No SHGC req.		
Floor over Garage	U=0.050 (1)		
Floor over Unheated Basement	U=0.050 (1)		
Floor over Crawlspace	U=0.050 (1)		
Floor over Outdoor Air	U=0.031 (1)		
Unheated Slab on Grade	R-0 edge/R-4.3 under		
Heated Slab on Grade	R-0 edge/R-6.4 under		
Air Infiltration Rate	0.51 ACH winter/0.51 ACH summer		
Duct Leakage	No Observable Duct Leakage		
Mechanical Ventilation	None		
Lights and Appliances	Use Default		
Setback Thermostat	Yes for heating, no for cooling		
Heating Efficiency			
Furnace	80% AFUE (3)		
Boiler	80% AFUE		
Combo Water Heater	76% AFUE (recovery efficiency)		
Air Source Heat Pump	6.8 HSPF		

Data Point	Single and Multiple Family Except as Noted.		
Geothermal Heat Pump	Open not modeled, 3.0 COP closed		
PTAC / PTHP Cooling Efficiency	Not differentiated from air source HP		
Central Air Conditioning	13.0 SEER		
Air Source Heat Pump	13.0 SEER		
Geothermal Heat Pump	3.4 COP (11.6 EER)		
PTAC / PTHP	Not differentiated from central AC		
Window Air Conditioners	Not differentiated from central AC		
Domestic WH Efficiency			
Electric	0.86 EF (4)		
Natural Gas	0.53 EF (4)		
Water Heater Tank Insulation	None		
Duct Insulation	N/A		

Notes:

- (1) Varies with heating degree-days ("HDD"). Above value reflects 5000 HDD average for New Jersey.  
U values represent total wall system U value, including all components (i.e., clear wall, windows, doors).  
Type A-1 - Detached one and two family dwellings.  
Type A-2 - All other residential buildings, three stories in height or less.
- (2) Closest approximation to MEC 95 requirements given the limitations of REM/Rate UDRH scripting language.
- (3) MEC 95 minimum requirement is 78 AFUE. However, 80 AFUE is adopted for New Jersey based on typical minimum availability and practice.
- (4) Size dependent. 50 gallon assumed.

**New Jersey ENERGY STAR Homes**

**REMRate User Defined Reference Homes -- Applicable to building completions from January 2008 to present**

<b>Data Point</b>	<b>Single and Multiple Family Except as Noted.</b>		
Domestic WH Efficiency Electric Natural Gas	EF = 0.97 - (0.00132 * gallons) (1) EF = 0.67 - (0.0019 * gallons) (1)		

Notes:

- (1) Federal Government standard for calculating EF

## **ENERGY STAR Products Program**

### **ENERGY STAR Appliances, ENERGY STAR Lighting, ENERGY STAR Windows, and ENERGY STAR Audit**

#### ***ENERGY STAR Appliances***

##### ***Protocols***

The general form of the equation for the ENERGY STAR Appliance Program measure savings algorithms is:

Number of Units X Savings per Unit

To determine resource savings, the per unit estimates in the protocols will be multiplied by the number of appliance units. The number of units will be determined using market assessments and market tracking. Some of these market tracking mechanisms are under development. Per unit savings estimates are derived primarily from a 2000 Market Update Report by RLW for National Grid's appliance program and from previous NEEP screening tool assumptions (clothes washers).

Note that the pre-July 2001 refrigerator measure has been deleted given the timing of program implementation. As no field results are expected until July 2001, there was no need to quantify savings relative to the pre-July 2001 efficiency standards improvement for refrigerators.

#### **ENERGY STAR Refrigerators**

Electricity Impact (kWh) = ESav<sub>REF</sub>

Demand Impact (kW) = DSav<sub>REF</sub> x CF<sub>REF</sub>

#### **ENERGY STAR Clothes Washers – Tier 2 (MEF of 2.00 to 2.19)**

Electricity Impact (kWh) = ESav<sub>CW2</sub>

Demand Impact (kW) = DSav<sub>CW2</sub> x CF<sub>CW</sub>

Gas Impact (Therms) = EGsav<sub>CW2</sub>

Water Impact (gallons) = WSav<sub>CW2</sub>

#### **ENERGY STAR Clothes Washers – Tier 3 (MEF of 2.20 or greater)**

Electricity Impact (kWh) = ESav<sub>CW3</sub>

Demand Impact (kW) = DSav<sub>CW3</sub> x CF<sub>CW</sub>

Gas Impact (Therms) = GSav<sub>CW3</sub>

Water Impact (gallons) = WSav<sub>CW3</sub>

### **ENERGY STAR Dishwashers**

Electricity Impact (kWh) = ESav<sub>DW</sub>

Demand Impact (kW) = DSav<sub>REF</sub> x CF<sub>DW</sub>

Gas Impact (MMBtu) = EGSav<sub>DW</sub>

Oil Impact (MMBtu) = Osav<sub>DW</sub>

Water Impact (gallons) = WSav<sub>DW</sub>

### **ENERGY STAR Dehumidifiers**

Electricity Impact (kWh) = ESav<sub>DH</sub>

Demand Impact (kW) = DSav<sub>DH</sub> x CF<sub>DH</sub>

### **ENERGY STAR Room Air Conditioners**

Electricity Impact (kWh) = ESav<sub>RAC</sub>

Demand Impact (kW) = DSav<sub>RAC</sub> x CF<sub>RAC</sub>

## **Definition of Terms**

ESav<sub>REF</sub> = Electricity savings per purchased ENERGY STAR refrigerator.

DSav<sub>REF</sub> = Summer demand savings per purchased ENERGY STAR refrigerator.

ESav<sub>CW2</sub> = Electricity savings per purchased ENERGY STAR clothes washer - Tier 2

DSav<sub>CW2</sub> = Summer demand savings per purchased ENERGY STAR clothes washer - Tier 2.

GSav<sub>CW2</sub> = Gas savings per purchased clothes washer - Tier 2

WSav<sub>CW2</sub> = Water savings per purchased clothes washer – Tier 2

ESav<sub>CW3</sub> = Electricity savings per purchased ENERGY STAR clothes washer - Tier 3

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$DSav_{CW3}$  = Summer demand savings per purchased ENERGY STAR clothes washer - Tier 3

$GSav_{CW3}$  = Gas savings per purchased clothes washer - Tier 3

$WSav_{CW3}$  = Water savings per purchased clothes washer – Tier 3

$ESav_{DW}$  = Electricity savings per purchased ENERGY STAR dishwasher.

$DSav_{DW}$  = Summer demand savings per purchased ENERGY STAR dishwasher.

$Wsav_{DW}$  = Water savings per purchased dishwasher.

$ESav_{DH}$  = Electricity savings per purchased ENERGY STAR dehumidifier

$DSav_{DH}$  = Summer demand savings per purchased ENERGY STAR dehumidifier

$ESav_{RAC}$  = Electricity savings per purchased ENERGY STAR room AC.

$DSav_{RAC}$  = Summer demand savings per purchased ENERGY STAR room AC.

$CF_{REF}$ ,  $CF_{CW}$ ,  $CF_{DW}$ ,  $CF_{DH}$ ,  $CF_{RAC}$  = Summer demand coincidence factor. The coincidence of average appliance demand to summer system peak equals 1 for demand impacts for all appliances reflecting embedded coincidence in the  $DSav$  factor except for room air conditioners where the CF is 58%.

#### **ENERGY STAR Appliances**

<b>Component</b>	<b>Type</b>	<b>Value</b>	<b>Sources</b>
$ESav_{REF}$	Fixed	91 kWh	1
$DSav_{REF}$	Fixed	0.0125 kW	1
REF Time Period Allocation Factors	Fixed	Summer/On-Peak 20.9% Summer/Off-Peak 21.7% Winter/On-Peak 28.0% Winter/Off-Peak 29.4%	2
$ESav_{CW2}$	Fixed	111 kWh	3
$Gsav_{CW2}$	Fixed	7.94 therms	3
$DSav_{CW2}$	Fixed	0.0147 kW	3
$WSav_{CW2}$	Fixed	7693 gallons	3
$ESav_{CW3}$	Fixed	128 kWh	3
$Gsav_{CW3}$	Fixed	9.00 therms	3
$DSav_{CW3}$	Fixed	0.0170 kW	3
$WSav_{CW3}$	Fixed	9433 gallons	3

Component	Type	Value	Sources
CW Electricity Time Period Allocation Factors	Fixed	Summer/On-Peak 24.5% Summer/Off-Peak 12.8% Winter/On-Peak 41.7% Winter/Off-Peak 21.0%	2
CW Gas Time Period Allocation Factors	Fixed	Summer 50% Winter 50%	
ESav <sub>DW</sub>	Fixed	82 kWh	4
Gsav <sub>DW</sub>	Fixed	0.0754 kW	4
Osav <sub>DW</sub>	Fixed	1.0	4
DSav <sub>DW</sub>	Fixed	0.0225	4
Wsav <sub>DW</sub>	Fixed	159 gallons	4
DW Electricity Time Period Allocation Factors	Fixed	19.8%, 21.8%, 27.8%, 30.6%	2
DW Gas Time Period Allocation Factors	Fixed	Summer 50% Winter 50%	8
ESav <sub>DH</sub>	Fixed	71 kWh	9
DSav <sub>DH</sub>	Fixed	.0098 kW	10
ESav <sub>RAC</sub>	Fixed	56.4 kWh	5
DSav <sub>RAC</sub>	Fixed	0.1018 kW	6
CF <sub>REF</sub> , CF <sub>CW</sub> , CF <sub>DW</sub> , CF <sub>DH</sub> , CF <sub>RAC</sub>	Fixed	1.0, 1.0, 1.0, 1.0, 0.58	7
RAC Time Period Allocation Factors	Fixed	65.1%, 34.9%, 0.0%, 0.0%	2

## Sources:

1. Energy Star Refrigerator Savings Calculator (Calculator updated: 2/15/05; Constants updated 05/07). Demand savings derived using refrigerator load shape.
2. Time period allocation factors used in cost-effectiveness analysis. From residential appliance load shapes.
3. Energy and water savings based on Consortium for Energy Efficiency estimates. Assumes 75% of participants have gas water heating and 60% have gas drying (the balance being electric). Demand savings derived using NEEP screening clothes washer load shape
4. Energy and water savings from RLW Market Update. Assumes 37% electric hot water market share and 63% gas hot water market share. Demand savings derived using dishwasher load shape.
5. Energy and demand savings from engineering estimate based on 600 hours of use. Based on delta watts for ENERGY STAR and non-ENERGY STAR units in five different size (cooling capacity) categories. Category weights from LBNL *Technical Support Document for ENERGY STAR Conservation Standards for Room Air Conditioners*.
6. Average demand savings based on engineering estimate.

7. Coincidence factors already embedded in summer peak demand reduction estimates with the exception of RAC. RAC CF is based on data from PEPCO.
8. Prorated based on 6 months in the summer period and 6 months in the winter period.
9. Energy Star Dehumidifier Savings Calculator (Calculator updated: 2/15/05; Constants updated 05/07). A weighted average based on the distribution of available ENERGY STAR products was used to determine savings.
10. Conservatively assumes same kW/kWh ratio as Refrigerators

## ***Residential ENERGY STAR Lighting***

### ***Protocols***

Savings from installation of screw-in ENERGY STAR CFLs, ENERGY STAR fluorescent torchieres, ENERGY STAR indoor fixtures and ENERGY STAR outdoor fixtures are based on a straightforward algorithm that calculates the difference between existing and new wattage, and the average daily hours of usage for the lighting unit being replaced. An “in-service” rate is used to reflect the fact that not all lighting products purchased are actually installed.

The general form of the equation for the ENERGY STAR or other high efficiency lighting energy savings algorithm is:

Number of Units X Savings per Unit

Per unit savings estimates are derived primarily from a 2004 Nexus Market Research report evaluating similar retail lighting programs in New England (MA, RI and VT)

### **ENERGY STAR CFL Bulbs**

$$\text{Electricity Impact (kWh)} = ((\text{CFL}_{\text{watts}} \times (\text{CFL}_{\text{hours}} \times 365)) / 1000) \times \text{ISR}_{\text{CFL}}$$

$$\text{Peak Demand Impact (kW)} = (\text{CFL}_{\text{watts}}) \times \text{Light CF}$$

### **ENERGY STAR Torchieres**

$$\text{Electricity Impact (kWh)} = ((\text{Torch}_{\text{watts}} \times (\text{Torch}_{\text{hours}} \times 365)) / 1000) \times \text{ISR}_{\text{Torch}}$$

$$\text{Peak Demand Impact (kW)} = (\text{Torch}_{\text{watts}}) \times \text{Light CF}$$

## ENERGY STAR Indoor Fixture

Electricity Impact (kWh) = ((IF<sub>watts</sub> X (IF<sub>hours</sub> X 365))/1000) X ISR<sub>IF</sub>

Peak Demand Impact (kW) = (IF<sub>watts</sub>) X Light CF

## ENERGY STAR Outdoor Fixture

Electricity Impact (kWh) = ((OF<sub>watts</sub> X (OF<sub>hours</sub> X 365))/1000) X ISR<sub>OF</sub>

Peak Demand Impact (kW) = (OF<sub>watts</sub>) X Light CF

### *Definition of Terms*

CFL<sub>watts</sub> = Average delta watts per purchased ENERGY STAR CFL

CFL<sub>hours</sub> = Average hours of use per day per CFL

ISR<sub>CFL</sub> = In-service rate per CFL

Torch<sub>watts</sub> = Average delta watts per purchased ENERGY STAR torchiere

Torch<sub>hours</sub> = Average hours of use per day per torchiere

ISR<sub>Torch</sub> = In-service rate per Torchier

IF<sub>watts</sub> = Average delta watts per purchased ENERGY STAR Indoor Fixture

IF<sub>hours</sub> = Average hours of use per day per Indoor Fixture

ISR<sub>IF</sub> = In-service rate per Indoor Fixture

OF<sub>watts</sub> = Average delta watts per purchased ENERGY STAR Outdoor Fixture

OF<sub>hours</sub> = Average hours of use per day per Outdoor Fixture

ISR<sub>OF</sub> = In-service rate per Outdoor Fixture

Light CF = Summer demand coincidence factor.

### **ENERGY STAR Lighting**

<b>Component</b>	<b>Type</b>	<b>Value</b>	<b>Sources</b>
CFL <sub>watts</sub>	Fixed	48.7	1
CFL <sub>hours</sub>	Fixed	3.4	2
ISR <sub>CFL</sub>	Fixed	84%	3
Torch <sub>watts</sub>	Fixed	115.8	1
Torch <sub>hours</sub>	Fixed	3.0	2
ISR <sub>Torch</sub>	Fixed	83%	3
IF <sub>watts</sub>	Fixed	48.7	1
IF <sub>hours</sub>	Fixed	2.6	2
ISR <sub>IF</sub>	Fixed	95%	3
OF <sub>watts</sub>	Fixed	94.7	1
OF <sub>hours</sub>	Fixed	4.5	2
ISR <sub>OF</sub>	Fixed	87%	3
Light CF	Fixed	5%	4

Sources:

1. Nexus Market Research, "Impact Evaluation of the Massachusetts, Rhode Island and Vermont 2003 Residential Lighting Programs", Final Report, October 1, 2004, p. 43 (Table 4-9)
2. Ibid., p. 104 (Table 9-7). This table adjusts for differences between logged sample and the much larger telephone survey sample and should, therefore, have less bias.
3. Ibid., p. 42 (Table 4-7). These values reflect both actual installations and the % of units planned to be installed within a year from the logged sample. The logged % is used because the adjusted values (i.e to account for differences between logging and telephone survey samples) were not available for both installs and planned installs. However, this seems appropriate because the the % actual installed in the logged sample from this table is essentially identical to the % after adjusting for differences between the logged group and the telephone sample (p. 100, Table 9-3).
4. RLW Analytics, "Development of Common Demand Impacts for Energy Efficiency Measures/Programs for the ISO Forward Capacity Market (FCM)", prepared for the New England State Program Working Group (SPWG), March 25, 2007, p. IV.

### **ENERGY STAR Windows**

#### **Protocols**

The general form of the equation for the ENERGY STAR or other high efficiency windows energy savings algorithms is:

## Square Feet of Window Area X Savings per Square Foot

To determine resource savings, the per square foot estimates in the protocols will be multiplied by the number of square feet of window area. The number of square feet of window area will be determined using market assessments and market tracking. Some of these market tracking mechanisms are under development. The per unit energy and demand savings estimates are based on prior building simulations of windows.

### **ENERGY STAR Windows**

Savings estimates for ENERGY STAR Windows are based on modeling a typical 2,500 square foot home using REM Rate, the home energy rating tool. Savings are per square foot of qualifying window area. Savings will vary based on heating and cooling system type and fuel. These fuel and HVAC system market shares will need to be estimated from prior market research efforts or from future program evaluation results.

### **Heat Pump**

Electricity Impact (kWh) = ESav<sub>HP</sub>

Demand Impact (kW) = DSav<sub>HP</sub> x CF

### **Gas Heat/CAC**

Electricity Impact (kWh) = ESav<sub>GAS/CAC</sub>

Demand Impact (kW) = DSav<sub>CAC</sub> x CF

Gas Impact (therms) = GSav<sub>GAS</sub>

### **Gas Heat/No CAC**

Electricity Impact (kWh) = ESav<sub>GAS/NOCAC</sub>

Demand Impact (kW) = DSav<sub>NOCAC</sub> x CF

Gas Impact (therms) = GSav<sub>GAS</sub>

### **Oil Heat/CAC**

Electricity Impact (kWh) = ESav<sub>OIL/CAC</sub>

Demand Impact (kW) = DSav<sub>CAC</sub> x CF

Oil Impact (MMBtu) = OSav<sub>OIL</sub>

## Oil Heat/No CAC

Electricity Impact (kWh) = ESav<sub>OIL/NOCAC</sub>

Demand Impact (kW) = DSav<sub>NOCAC</sub> x CF

Oil Impact (MMBtu) = OSav<sub>OIL</sub>

## Electric Heat/CAC

Electricity Impact (kWh) = ESav<sub>RES/CAC</sub>

Demand Impact (kW) = DSav<sub>CAC</sub> x CF

## Electric Heat/No CAC

Electricity Impact (kWh) = ESav<sub>RES/NOCAC</sub>

Demand Impact (kW) = DSav<sub>NOCAC</sub> x CF

## Definition of Terms

ESav<sub>HP</sub> = Electricity savings (heating and cooling) with heat pump installed.

ESav<sub>GAS/CAC</sub> = Electricity savings with gas heating and central AC installed.

ESav<sub>GAS/NOCAC</sub> = Electricity savings with gas heating and no central AC installed.

ESav<sub>OIL/CAC</sub> = Electricity savings with oil heating and central AC installed.

ESav<sub>OIL/NOCAC</sub> = Electricity savings with oil heating and no central AC installed.

ESav<sub>RES/CAC</sub> = Electricity savings with electric resistance heating and central AC installed.

ESav<sub>RES/NOCAC</sub> = Electricity savings with electric resistance heating and no central AC installed.

DSav<sub>HP</sub> = Summer demand savings with heat pump installed.

DSav<sub>CAC</sub> = Summer demand savings with central AC installed.

DSav<sub>NOCAC</sub> = Summer demand savings with no central AC installed.

CF = System peak demand coincidence factor. Coincidence of building cooling demand to summer system peak.

GSav<sub>GAS</sub> = Gas savings with gas heating installed.

OSav<sub>OIL</sub> = Oil savings with oil heating installed.

### **ENERGY STAR Windows**

<b>Component</b>	<b>Type</b>	<b>Value</b>	<b>Sources</b>
ESav <sub>HP</sub>	Fixed	2.2395 kWh	1
HP Time Period Allocation Factors	Fixed	Summer/On-Peak 10% Summer/Off-Peak 7% Winter/On-Peak 40% Winter/Off-Peak 44%	2
ESav <sub>GAS/CAC</sub>	Fixed	0.2462 kWh	1
Gas/CAC Electricity Time Period Allocation Factors	Fixed	Summer/On-Peak 65% Summer/Off-Peak 35% Winter/On-Peak 0% Winter/Off-Peak 0%	2
ESav <sub>GAS/NOCAC</sub>	Fixed	0.00 kWh	1
Gas/No CAC Electricity Time Period Allocation Factors	Fixed	Summer/On-Peak 3% Summer/Off-Peak 3% Winter/On-Peak 45% Winter/Off-Peak 49%	2
Gas Heating Gas Time Period Allocation Factors	Fixed	Summer = 12% Winter = 88%	4
ESav <sub>OIL/CAC</sub>	Fixed	0.2462 kWh	1
Oil/CAC Time Period Allocation Factors	Fixed	Summer/On-Peak 65% Summer/Off-Peak 35% Winter/On-Peak 0% Winter/Off-Peak 0%	2
ESav <sub>OIL/NOCAC</sub>	Fixed	0.00 kWh	1
Oil/No CAC Time Period Allocation Factors	Fixed	Summer/On-Peak 3% Summer/Off-Peak 3% Winter/On-Peak 45% Winter/Off-Peak 49%	2
ESav <sub>RES/CAC</sub>	Fixed	4.0 kWh	1
Res/CAC Time Period Allocation Factors	Fixed	Summer/On-Peak 10% Summer/Off-Peak 7% Winter/On-Peak 40% Winter/Off-Peak 44%	2
ESav <sub>RES/NOCAC</sub>	Fixed	3.97 kWh	1

Component	Type	Value	Sources
Res/No CAC Time Period Allocation Factors	Fixed	Summer/On-Peak 3% Summer/Off-Peak 3% Winter/On-Peak 45% Winter/Off-Peak 49%	2
DSav <sub>HP</sub>	Fixed	0.000602 kW	1
DSav <sub>CAC</sub>	Fixed	0.000602 kW	1
DSav <sub>NOCAC</sub>	Fixed	0.00 kW	1
GSav <sub>GAS</sub>	Fixed	0.169 therms	1
OSav <sub>OIL</sub>	Fixed	0.0169 MMBtu	1
CF	Fixed	0.75	3

Sources:

1. From REMRATE Modeling of a typical 2,500 sq. ft. NJ home. Savings expressed on a per sq. ft. of window area basis. New Brunswick climate data.
2. Time period allocation factors used in cost-effectiveness analysis.
3. Based on reduction in peak cooling load.
4. Prorated based on 12% of the annual degree days falling in the summer period and 88% of the annual degree days falling in the winter period.

## ***ENERGY STAR Audit***

### ***Protocols***

No protocol was developed to measure energy savings for this program. The purpose of the program is to provide information and tools that residential customers can use to make decisions about what actions to take to improve energy efficiency in their homes. Many measure installations that are likely to produce significant energy savings are covered in other programs. These savings are captured in the measured savings for those programs. The savings produced by this program that are not captured in other programs would be difficult to isolate and relatively expensive to measure.

## ***Refrigerator/Freezer Retirement Program***

### ***Protocols***

The general form of the equation for the Refrigerator/Freezer Retirement Program savings algorithm is:

Number of Units X Savings per Unit

To determine resource savings, the per unit estimates in the protocols will be multiplied by the number of appliance units.

Unit savings are the product of average fridge/freezer consumption (gross annual savings), and a net to gross ratio that adjusts for both free ridership and the portion of retired units that are replaced with more efficient new units.

### Algorithm

$$\text{Electricity Impact (kWh)} = \text{ESav}_{\text{RetFridge}} * \text{NTG}$$

$$\text{Demand Impact (kW)} = \text{DSav}_{\text{RetFridge}} \times \text{CF}_{\text{RetFridge}}$$

### Definition of Terms

$\text{ESav}_{\text{RetFridge}}$  = Gross annual energy savings per unit retired appliance

NTG = Net-to-Gross Adjustment factor.

$\text{DSav}_{\text{RetFridge}}$  = Summer demand savings per retired refrigerator/freezer

$\text{CF}_{\text{RetFridge}}$  = Summer demand coincidence factor.

### **REFRIGERATOR/FREEZER RECYCLING**

<b>Component</b>	<b>Type</b>	<b>Value</b>	<b>Sources</b>
$\text{ESav}_{\text{RetFridge}}$	Fixed	1,728 kWh	1
NTG	Fixed	55%	2
$\text{DSav}_{\text{RetFridge}}$	Fixed	.2376 kW	3
$\text{CF}_{\text{RetFridge}}$	Fixed	1	4

#### Sources:

1. The average power consumption of units retired under similar recent programs:
  - a. Fort Collins Utilities, February 2005. Refrigerator and Freezer Recycling Program 2004 Evaluation Report.
  - b. Midwest Energy Efficiency Alliance, 2005. 2005 Missouri Energy Star Refrigerator Rebate and Recycling Program Final Report
  - c. Pacific Gas and Electric, 2007. PGE ARP 2006-2008 Climate Change Impacts Model (spreadsheet)
  - d. Quantec, Aug 2005. Evaluation of the Utah Refrigerator and Freezer Recycling Program (Draft Final Report).
  - e. CPUC DEER website, <http://cega.cpuc.ca.gov/deer/measure.asp?s=1&c=2&sc=7&m=389059>
  - f. Snohomish PUD, February 2007. 2006 Refrigerator/Freezer Recycling Program Evaluation.
  - g. Ontario Energy Board, 2006. Total Resource Cost Guide.
2. The average net to gross ratios estimated for several recent programs
  - a. Fort Collins Utilities, February 2005. Refrigerator and Freezer Recycling Program 2004 Evaluation Report.
  - b. SCE, 2001. The Multi-Megawatt Refrigerator/Freezer Recycling Summer Initiative Program Final Report.
  - c. Pacific Gas and Electric, 2007. PGE ARP 2006-2008 Climate Change Impacts Model (spreadsheet)
  - d. Quantec, Aug 2005. Evaluation of the Utah Refrigerator and Freezer Recycling Program (Draft Final Report).
  - e. Snohomish PUD, February 2007. 2006 Refrigerator/Freezer Recycling Program Evaluation.
  - f. Ontario Energy Board, 2006. Total Resource Cost Guide.
3. Applied the kW to kWh ratio derived from Refrigerator savings in the ENERGY STAR Appliances Program.
4. Coincidence factor already embedded in summer peak demand reduction estimates

# **Home Performance with ENERGY STAR Program**

## ***Protocols***

Conservation Services Group (CSG) implements the Home Performance with Energy Star Program in New Jersey and in several other states. CSG has developed proprietary software known as HomeCheck which is designed to enable an energy auditor to collect information about a customer's site, and, based on what is found through the energy audit, recommend energy savings measures and demonstrate the costs and savings associated with those recommendations. The HomeCheck software is also used to estimate the energy savings that are reported for this program.

CSG has provided a description of the methods and inputs utilized in the HomeCheck software to estimate energy savings. CSG has also provided a copy of an evaluation report prepared by Nexant which assessed the energy savings from participants in the Home Performance with Energy Star Program managed by the New York State Energy Research and Development Authority (NYSERDA)<sup>15</sup>. The report concluded that the savings estimated by HomeCheck and reported to NYSERDA were in general agreement with the savings estimates that resulted from the evaluation.

These protocols incorporate the HomeCheck software by reference which will be utilized for estimating energy savings for the Home Performance with Energy Star Program. The Board intends to assess the savings reported from time to time and will make adjustments as necessary. The following is a summary of the HomeCheck software which was provided by CSG:

CSG's HomeCheck software was designed to streamline the delivery of energy efficiency programs. The software provides the energy efficiency specialist with an easy-to-use guide for data collection, site and HVAC testing protocols, eligible efficiency measures, and estimated energy savings. The software is designed to enable an auditor to collect information about customers' sites and then, based on what he/she finds through the audit, recommend energy-saving measures, demonstrate the costs and savings associated with those recommendations. It also enables an auditor/technician to track the delivery of services and installation of measures at a site.

This software is a part of an end-to-end solution for delivering high-volume retrofit programs, covering administrative functions such as customer relationship management, inspection scheduling, sub-contractor arranging, invoicing and reporting. The range of existing components of the site that can be assessed for potential upgrades is extensive and incorporates potential modifications to almost all energy using aspects of the home. The incorporation of building shell, equipment, distribution systems, lighting, appliances,

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<sup>15</sup> M&V Evaluation, Home Performance with Energy Star Program, Final Report, Prepared for the New York State Energy Research and Development Authority, Nexant, June 2005.

diagnostic testing and indoor air quality represents a very broad and comprehensive ability to view the needs of a home.

The software is designed to combine two approaches to assessing energy savings opportunities at the site. One is a measure specific energy loss calculation, identifying the change in use of BTU's achieved by modifying a component of the site. Second, is the correlation between energy savings from various building improvements, and existing energy use patterns at a site. The use of both calculated savings and the analysis of existing energy use patterns, when possible, provides the most accurate prescription of the impact of changes at the site for an existing customer considering improvements on a retrofit basis.

This software is not designed to provide a load calculation for new equipment or a HERS rating to compare a site to a standard reference site. It is designed to guide facilities in planning improvements at the site with the goal of improved economics, comfort and safety. The software calculates various economic evaluations such as first year savings, simple payback, measure life cost-effectiveness, and Savings-to-Investment ratio (SIR).

### **Site-Level Parameters and Calculations**

There are a number of calculations and methodologies that apply across measures and form the basis for calculating savings potentials at a site.

#### **Heating Degree Days and Cooling Degree Hours**

Heat transfer calculations depend fundamentally on the temperature difference between inside and outside temperature. This temperature difference is often summarized on a seasonal basis using fixed heating degree-days (HDD) and cooling degree-hours (CDH). The standard reference temperature for calculating HDD (the outside temperature at which the heating system is required), for example, has historically been 65°F. Modern houses have larger internal gains and more efficient thermal building envelopes than houses did when the 65°F standard was developed, leading to lower effective reference temperatures. This fact has been recognized in ASHRAE Fundamentals, which provides a variable-based degree-day method for calculating energy usage. CSG's Building Model calculates both HDD and CDH based on the specific characteristics and location of the site being treated.

#### **Building Loads, Other Parameters, and the Building Model**

CSG is of the opinion that, in practice, detailed building load simulation tools are quite limited in their potential to improve upon simpler approaches due to their reliance on many factors that are not measurable or known, as well as limitations to the actual models themselves. Key to these limitations is the Human Factor (e.g., sleeping with the windows open; extensive use of high-volume extractor fans, etc.) that is virtually impossible to model. As such, the basic concept behind the model was to develop a series of location specific lookup tables that would take the place of performing hourly calculations while allowing the model to perform for any location. The data in these

tables would then be used along with a minimum set of technical data to calculate heating and cooling building loads.

In summary, the model uses:

- Lookup tables for various parameters that contain the following values for each of the 239 TMY2 weather stations:
  - Various heating and cooling infiltration factors
  - Heating degree days and heating hours for a temperature range of 40 to 72°F
  - Cooling degree hours and cooling hours for a temperature range of 68 to 84°F
  - Heating and cooling season solar gain factors
- Simple engineering algorithms based on accepted thermodynamic principles, adjusted to reflect known errors, the latest research and measured results
- Heating season iterative calculations to account for the feedback loop between conditioned hours, degree days, average “system on” indoor and outdoor temperatures and the building
- The thermal behavior of homes is complex and commonly accepted algorithms will on occasion predict unreasonably high savings, HomeCheck uses a proprietary methodology to identify and adjust these cases. This methodology imposes limits on savings projected by industry standard calculations, to account for interactivities and other factors that are difficult to model. These limits are based on CSG’s measured experience in a wide variety of actual installations.

### **Usage Analysis**

The estimation of robust building loads through the modeling of a building is not always reliable. Thus, in addition to modeling the building, HomeCheck calculates a normalized annual consumption for heating and cooling, calculated from actual fuel consumption and weather data using a Seasonal Swing methodology. This methodology uses historic local weather data and site-specific usage to calculate heating and cooling loads. The methodology uses 30-year weather data to determine spring and fall shoulder periods when no heating or cooling is likely to be in use. The entered billing history is broken out into daily fuel consumption, and these daily consumption data along with the shoulder periods is used to calculate base load usage, and summer and winter seasonal swing fuel consumption.

### **Multiple HVAC Systems**

HVAC system and distribution seasonal efficiencies are used in all thermal shell measure algorithms. HVAC system and distribution seasonal efficiencies and thermostat load reduction adjustments are used when calculating the effect of interactivity between mechanical and architectural measures. If a site has multiple HVAC systems, weighted average seasonal efficiencies and thermostat load reduction adjustments are calculated based on the relative contributions (in terms of percent of total load) of each system.

## **Multiple Heating Fuels**

It is not unusual to find homes with multiple HVAC systems using different fuel types. In these cases it is necessary to aggregate the NACs for all fuel sources for use in shell savings algorithms. This is achieved by assigning a percentage contribution to total NAC for each system, converting this into BTU's, and aggregating the result. Estimated first year savings for thermal shell measures are then disaggregated into the component fuel types based on the pre-retrofit relative contributions of fuel types.

## **Interactivity**

To account for interactivity between architectural and mechanical measures, CSG's HomeCheck employs the following methodology, in order:

- Non interacted first year savings are calculated for each individual measure
- Non-interacted SIR (RawSIR) is calculated for each measure
- Measures are ranked in descending order of RawSIR
- Starting with the most cost-effective measure (as defined by RawSIR), first year savings are adjusted for each measure as follows:
  - Mechanical measures (such as thermostats, HVAC system upgrades or distribution system upgrades) are adjusted to account for the load reduction from measures with a higher RawSIR
  - Architectural measures are adjusted to account for overall HVAC system efficiency changes and thermostat load reduction changes. Architectural measures with a higher RawSIR than that of HVAC system measures are calculated using the existing efficiencies. Those with RawSIR's lower than that of heating equipment use the new heating efficiencies.
- Interacted SIR is then calculated for each measure, along with cumulative SIR for the entire job.
- All measures are then re-ranked in descending order of SIR
- The process is repeated, replacing RawSIR with SIR until the order of measures does not change

## **Lighting**

Quantification of additional saving due to the addition of high efficiency lighting will be based on the algorithms presented for these appliances in the Energy Star Lighting Protocols found in the Energy Star Products Program.

## **Blue Line Innovations – PowerCost Monitor<sup>TM</sup>**

For homes with a PowerCost Monitor<sup>TM</sup> installed, a fixed annual electric savings of 320 kWh is estimated. These savings estimates are based on the following study: Mountain D, 2006, "The Impact of Real-Time Feedback on Residential Electricity Consumption: The Hyrdo One Pilot," Mountain Economic Consulting and Associated Inc., Ontario.

Savings have been adjusted to account for the percentage of homes with non-electric space heating and/or non-electric DHW vs. homes with electric space heating and/or

electric DHW. The following grid outlines the savings observed in the Mountain study by fuel type and the correlating estimated NJ population of that fuel type.

	Reduction in electricity consumption per Mountain Study	NJ Population
Non-electric water heating and non-electric space heating	5.1%	70%
Homes with electric water heating and non-electric space heating	16.7%	20%
Homes with electric space heating and electric water heating	1.2%	10%

Savings were further adjusted by a 50% conservatism adjustment factor until more NJ specific data has been gathered.

# **Commercial and Industrial Energy Efficient Construction Program**

## ***C&I Electric Protocols***

### **Baselines and Code Changes**

All baselines are designed to reflect an improvement over market practice defined by baselines, which are generally the higher of code or available equipment, that are updated periodically to reflect upgrades in code, or information from evaluation results.

Baseline data reflect ASHRAE 90.1 1989 for program commitments made prior to July 16, 2002 and ASHRAE 90.1 1999 for commitments starting on July 16, 2002.

### **Lighting Equipment**

With the exception of small commercial lighting, and T-5 and T-8 fixtures replacing HID, 250 watt or greater T-12 fluorescent, or 250 watt or greater incandescent fixtures, savings are calculated using market-driven assumptions for new construction, renovation, remodeling, or equipment replacement that presume a decision to upgrade the lighting system. For small commercial lighting, the most efficient T-12 lamp and magnetic ballast fixture serves as the baseline. For T-5 and T-8 fixtures replacing HID, 250 watt or greater T-12 fluorescent, or 250 watt or greater incandescent fixtures savings are calculated referencing pre-existing connected lighting load.

Lighting equipment includes fluorescent fixtures, ballasts, compact fluorescent fixtures, exit signs, and metal halide lamps. The measurement of energy savings is based on algorithms with measurement of key variables (i.e., Coincidence Factor and Operating Hours) through end-use metering data accumulated from a large sample of participating facilities from 1995 through 1999.

### **Algorithms**

$$\text{Demand Savings} = \Delta\text{kW} \times \text{CF} \times (1+\text{IF})$$

$$\text{Energy Savings} = \Delta\text{kW} \times \text{EFLH} \times (1+\text{IF})$$

$\Delta\text{kW}$  is calculated from example worksheet below (For T-5 and T-8 fixtures replacing HID, 250 watt or greater T-12 fluorescent, or 250 watt or greater incandescent fixtures  $\Delta\text{kW}$  is calculated using the formula below):

This worksheet is an example and does not represent that present stage of improvement to the worksheets presently being used and updated in the field.

Code and Program Limits						G Composite Program Limit [ sum F / sum B ]
A	B	C	D	E	F	
Building Type or Space Activity	Gross Lighted Area (sf)	Unit Lighting Power Allowance (Watts/sf)	Lighting Power Allowance (W) [ B x C ]	Program Limit (Watts/sf) [ C x .07 ]	Lighting Power Limit (W) [ B x E ]	
#1 Dorm Bed/Study	42,752	1.40	59,853	0.98	41,897	
#2 Dorm Bath	7,936	1.20	9,523	0.84	6,666	
#3 Stairs	9,216	0.60	5,530	0.42	3,871	
	59,904		74,906		52,434	0.875299145
Installed Lighting Levels						
H	I	J	K	L	M	
Space ID	Luminaire Tag # if applicable	Luminaire Description	Number of Luminaires	Watts per Luminaire	Connected Watts [ K x L ]	
#1		32w T8	384	27	10,368	
#1&2		26W plt	128	61	7,808	
#1&#2		26w Quad	192	27	5,184	
#3		26w plt	24	27	648	
#3		13w plc	16	30	480	
	Other Wattage not applicable listed below				9,600	
			744		34,088	
N. Composite Connected Watts/Square Foot [ sum M / sum B ]						0.57

## Definition of Variables

$\Delta kW$  = Change in connected load from baseline to efficient lighting level. The baseline value is expressed in watts/square foot calculated as: (Watts/Sq.Ft. - Watts/Sq.Ft. (qualified equipment by same area))\*Area Sq.Ft./1000 (see table above).

There is a lighting table used that is to be periodically updated by the program administrator(s) in the State that shows standardized values of fixture wattages for common lighting systems. These tables are based on evaluations of several manufacturers' wattage ratings for a given fixture type, and have been used in measuring energy and demand savings. The program administrator(s), in a cooperative effort will be responsible for the lighting tables.

For T-5 and T-8 fixtures replacing HID, 250 watt or greater T-12 fluorescent, or 250 watt or greater incandescent fixtures  $\Delta kW$  = Change in connected load from pre-existing lighting to efficient lighting level calculated as: (Pre-existing watts per fixture \* number of fixtures – New lighting watts per fixture \* number of fixtures)

**CF** = Coincidence Factor – This value represents the percentage of the total lighting connected load which is on during electric system's Peak Window. The Peak Window covers the time period from 12 noon to 8 p.m. These values are based on measured usage in the JCP&L service territory.

**IF** = Interactive Factor – This applies to C&I interior lighting only. This represents the secondary demand and energy savings in reduced HVAC consumption resulting from decreased indoor lighting wattage. This value will be fixed at 5%.

**EFLH** = Equivalent Full Load Hours – This represents the annual operating hours and is computed based on JCP&L metered data and divided into Large (facilities with over 50 kW of reduced load) and other size and building types.

## **Lighting Verification Summary**

Component	Type	Value	Source																																	
$\Delta kW$	Fixed	Change in connected load from baseline.	<ul style="list-style-type: none"> <li>• Installed load is based on standard wattage tables and verified watts/sq.ft.</li> <li>• For commitments prior to 7/16/2002, baseline is 30% better than ASHRAE 90.1-1989 by space.</li> <li>• For commitments after 7/16/2002, baseline is 5 percent better than ASHRAE 90.1-<u>1999</u> by space.</li> </ul>																																	
CF	Fixed	<table> <tbody> <tr> <td>Large Office*</td> <td>65%</td> <td>JCP&amp;L metered data<sup>16</sup></td> </tr> <tr> <td>Large Retail</td> <td>81%</td> <td></td> </tr> <tr> <td>Large Schools</td> <td>41%</td> <td></td> </tr> <tr> <td>Large All Other</td> <td>63%</td> <td></td> </tr> <tr> <td>All Hospitals</td> <td>67%</td> <td></td> </tr> <tr> <td>All Other Office</td> <td>71%</td> <td></td> </tr> <tr> <td>All Other Retail</td> <td>84%</td> <td></td> </tr> <tr> <td>Other Schools</td> <td>40%</td> <td></td> </tr> <tr> <td>All Other</td> <td>69%</td> <td>Cost effectiveness study</td> </tr> <tr> <td>Industrial</td> <td>71%</td> <td>Estimate</td> </tr> <tr> <td>Continuous</td> <td>90%</td> <td></td> </tr> </tbody> </table>	Large Office*	65%	JCP&L metered data <sup>16</sup>	Large Retail	81%		Large Schools	41%		Large All Other	63%		All Hospitals	67%		All Other Office	71%		All Other Retail	84%		Other Schools	40%		All Other	69%	Cost effectiveness study	Industrial	71%	Estimate	Continuous	90%		
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Industrial	71%	Estimate																																		
Continuous	90%																																			

<sup>16</sup> Results reflect metered use from 1995 – 1999.

<b>Component</b>	<b>Type</b>	<b>Value</b>		<b>Source</b>
IF	Fixed	5%		Impact of lighting watt reduction on air-conditioning load used in previous lighting savings.
EFLH	Fixed	Large Office	3309	JCP&L metered data <sup>17</sup>  Cost effectiveness study Estimate
		Large Retail	5291	
		Large Schools	2289	
		Large All Other	3677	
		All Hospitals	4439	
		All Other Office	2864	
		All Other Retail	4490	
		Other Schools	2628	
		All Other	2864	
		Industrial	4818	
		Continuous	7000	
Time Period Allocation Factors	Fixed	Summer/On-Peak 26%		
		Summer/Off-Peak 16%		
		Winter/On-Peak 36%		
		Winter/Off-Peak 22%		

\* For facility with greater than 50kW reduction in load.

\*\* For facilities that operate at or near 24 hours, 7 days per week.

## Traffic Signals (data from NJDOT)

### Traffic Signals

Type of Fixture	kW Reduced	EFLH Total	Summer on-peak	Summer off-peak	Winter on-peak	Winter off-peak
8" red	0.052	5257	636	1125	1246	2250
12" red	0.120	5257	636	1125	1246	2250
8" green	0.051	3066	371	656	727	1312
12"green	0.117	3066	371	656	727	1312

Pedestrian Walk Sign 8" or 12", kW reduced = 0.068, kWh per year = 550.

<sup>17</sup> Results reflect metered use from 1995 – 1999.

Coincidence factor for demand savings = 60% for red and 35% for green.

## **Prescriptive Lighting for Small Commercial Customers**

This is a fixture replacement program for new and existing small commercial customers which is targeted at facilities the following facilities:

- Existing small commercial and industrial (up to 50 kW average twelve month metered demand through 2001, up to 75 kW average twelve month metered demand beginning 1/1/2002)
- New/renovated/change-of-use small commercial and industrial <= 10,000 s.f. of conditioned space

The baseline is existing T-12 fixtures with energy efficient lamps and magnetic ballast.

The baseline for compact fluorescent is that the fixture replaced was 4 times the wattage of the replacement compact fluorescent.

## **Algorithms**

$$\text{Demand Savings} = \Delta\text{kW} \times \text{CF}$$

$$\text{Energy Savings} = \Delta\text{kW} \times \text{EFLH}$$

$\Delta\text{kW}$ =Number of fixtures installed X (baseline wattage for fixture type(from above baseline))-number of replaced fixtures X (wattage from table)

### *Prescriptive Lighting for Small Commercial Customers*

<b>Component</b>	<b>Type</b>	<b>Value</b>	<b>Source</b>
$\Delta\text{kW}$	Fixed	See Prescriptive Lighting Savings Table (below)	From NJ lighting tables
CF	Fixed	Average of the small retail and office from lighting verification summary table, 77.5%.	JCP&L metered data <sup>18</sup>
EFLH	Fixed	Average of small retail and office from lighting verification summary 3,677.	JCP&L metered data

<sup>18</sup> Results reflect metered use from 1995 – 1999.

<b>Component</b>	<b>Type</b>	<b>Value</b>	<b>Source</b>
Time Period Allocation Factors	Fixed	Summer/On-Peak 21% Summer/Off-Peak 22% Winter/On-Peak 28% Winter/Off-Peak 29%	

### ***Prescriptive Lighting Savings Table***

<b>Fixture Type</b>	<b>Type</b>	<b>New Watts (w/fixture)</b>	<b>Baseline (w/fixture)</b>	<b>Savings (w/fixture)</b>
COMPACT FLUORESCENT (2) 11W CF/HW	CFL2	26	104	78
COMPACT FLUORESCENT (2) 13W CF/HW	CFL2	30	120	90
COMPACT FLUORESCENT (2) 18W CF/HW	CFL2	36	144	108
COMPACT FLUORESCENT (2) 18W QD/ELEC	CFL2	38	152	114
COMPACT FLUORESCENT (3) 18W	CFL2	54	225	171
COMPACT FLUORESCENT (2) 26W CF/HW	CFL2	53	212	159
COMPACT FLUORESCENT (2) 26W QD/ELEC	CFL2	54	216	162
COMPACT FLUORESCENT (2) 5W CF/HW	CFL2	14	56	42
COMPACT FLUORESCENT (2) 7W CF/HW	CFL2	18	72	54
COMPACT FLUORESCENT (2) 9W CF/HW	CFL2	22	88	66
COMPACT FLUORESCENT 11W CF/HW	CFL1	13	52	39
COMPACT FLUORESCENT 13W CF/HW	CFL1	15	60	45
COMPACT FLUORESCENT 18W CF/HW	CFL1	19	76	57
COMPACT FLUORESCENT 18W QD/ELEC	CFL1	22	88	66
COMPACT FLUORESCENT 20W CF/HW	CFL1	22	88	66
COMPACT FLUORESCENT 22W QD/ELEC	CFL1	26	104	78
COMPACT FLUORESCENT 26W CF/HW	CFL1	28	112	84
COMPACT FLUORESCENT 26W QD/ELEC	CFL1	27	108	81
COMPACT FLUORESCENT 28W CF/HW	CFL1	30	120	90
COMPACT FLUORESCENT 32W CF/HW	CFL1	34	136	102
COMPACT FLUORESCENT 36W CF/HW	CFL1	41	164	123
COMPACT FLUORESCENT 40W CF/HW	CFL1	45	180	135
COMPACT FLUORESCENT (2) 40W CF/HW	CFL2	71	180	109
COMPACT FLUORESCENT 5W CF/HW	CFL1	7	28	21
COMPACT FLUORESCENT 7W CF/HW	CFL1	10	40	30
COMPACT FLUORESCENT 9W CF/HW	CFL1	11	44	33
Low Bay T-5 2L FP54/T5/Elec/Ho	LOBA	117	250	133
Low Bay T-5 3L FP54/T5/Elec/Ho	LOBA	179	290	111
Low Bay T-5 4L FP54/T5/Elec/Ho	LOBA	234	409	175
Low Bay T-5 6L FP54/T5/Elec/Ho	LOBA	351	992	641
Low Bay T-8 2L4	LOBA	55	73	18
Low Bay T-8 2L8	LOBA	118	158	40
Low Bay T-8 3L4	LOBA	79	105	26
Low Bay T-8 4L4	LOBA	110	146	36
Low Bay T-8 4L8	LOBA	233	316	83

Fixture Type	Type	New Watts (w/fixture)	Baseline (w/fixture)	Savings (w/fixture)
Low Bay T-8 6L4	LOBA	224	454	230
High Bay T-5 3L FP54/T5/Elec/Ho	HIBA	179	290	111
High Bay T-5 4L FP54/T5/Elec/Ho	HIBA	234	409	175
High Bay T-5 6L FP54/T5/Elec/Ho	HIBA	351	992	641
High Bay T-8 8L4 FP54/T5/Elec/Ho	HIBA	468	1080	612
High Bay T-8 3L4	HIBA	79	105	26
High Bay T-8 4L4	HIBA	110	146	36
High Bay T-8 4L8	HIBA	233	316	83
High Bay T-8 6L4	HIBA	224	454	230
High Efficiency Fluorescent 1L2 (1) FO17T8/Elec	HEF	18	32	14
High Efficiency Fluorescent 1L2 (2) FO17T8/Elec	HEF	34	56	22
High Efficiency Fluorescent 1L2 (3) FO17T8/Elec	HEF	50	78	28
High Efficiency Fluorescent 1L2 (4) FO17T8/Elec	HEF	62	112	50
High Efficiency Fluorescent 1L3 (1) FO25T8/Elec	HEF	30	46	16
High Efficiency Fluorescent 1L3 (2) FO25T8/Elec	HEF	48	80	32
High Efficiency Fluorescent 1L3 (3) FO25T8/Elec	HEF	68	126	58
High Efficiency Fluorescent 1L3 (4) FO25T8/Elec	HEF	90	160	70
High Efficiency Fluorescent T-5 3L FP54/T5/Elec/Ho	HEF	179	290	111
High Efficiency Fluorescent T-5 4L FP54/T5/Elec/Ho	HEF	234	409	175
High Efficiency Fluorescent T-5 6L FP54/T5/Elec/Ho	HEF	351	992	641
High Efficiency Fluorescent T-8 1L4	HEF	28	42	14
High Efficiency Fluorescent T-8 1L8	HEF	67	78	11
High Efficiency Fluorescent T-8 2L2	HEF	62	94	32
High Efficiency Fluorescent T-8 2L4	HEF	55	73	18
High Efficiency Fluorescent T-8 2L8	HEF	118	158	40
High Efficiency Fluorescent T-8 3L4	HEF	79	105	26
High Efficiency Fluorescent T-8 4L4	HEF	110	146	36
High Efficiency Fluorescent T-8 4L8	HEF	233	316	83
LED Exit Sign	EXIT	20	18	2
PULSE START METAL HALIDE 1000 W	PSMH	1075	1080	5
PULSE START METAL HALIDE 150 W	PSMH	185	200	15
PULSE START METAL HALIDE 175 W	PSMH	208	285	77
PULSE START METAL HALIDE 200 W	PSMH	235	285	50
PULSE START METAL HALIDE 250 W	PSMH	288	454	166
PULSE START METAL HALIDE 300 W	PSMH	342	454	112
PULSE START METAL HALIDE 320 W	PSMH	368	454	86
PULSE START METAL HALIDE 350 W	PSMH	400	454	54
PULSE START METAL HALIDE 400 W	PSMH	450	454	4
PULSE START METAL HALIDE 750 W	PSMH	815	1075	260

## Lighting Controls

Lighting controls include occupancy sensors, daylight dimmer systems, and occupancy controlled hi-low controls for fluorescent, and HID controls. The measurement of energy savings is based on algorithms with key variables (i.e., coincidence factor, equivalent full

load hours) provided through existing end-use metering of a sample of facilities or from other utility programs with experience with these measures (i.e., % of annual lighting energy saved by lighting control). For lighting controls, the baseline is a manual switch, based on the findings of the New Jersey Commercial Energy Efficient Construction Baseline Study.

## Algorithms

$$\text{Demand Savings} = \text{kW}_c \times \text{SVG} \times \text{CF}$$

$$\text{Energy Savings} = \text{kW}_c \times \text{SVG} \times \text{EFLH} \times (1+\text{IF})$$

## Definition of Variables

SVG = % of annual lighting energy saved by lighting control; refer to table by control type

$\text{kW}_c$  = kW lighting load connected to control

IF = Interactive Factor – This applies to C&I interior lighting only. This represents the secondary demand and energy savings in reduced HVAC consumption resulting from decreased indoor lighting wattage. This value will be fixed at 5%.

CF = Coincidence Factor – This value represents the percentage of the total load which is on during electric system's peak window.

EFLH = Equivalent full load hours.

## *Lighting Controls*

Component	Type	Value	Source
$\text{kW}_c$	Variable	Load connected to control	Application
SVG	Fixed	Occupancy Sensor, Controlled Hi-Low Fluorescent Control and controlled HID = 30% Daylight Dimmer System=50%	See sources below
CF	Fixed	By building type and size see lighting verification summary table	Assumes same as JCP&L metered data
EFLH	Fixed	By building type and size see lighting verification summary table	JCP&L metered data

<b>Component</b>	<b>Type</b>	<b>Value</b>	<b>Source</b>
Time Period Allocation Factors	Fixed	Summer/On-Peak 26% Summer/Off-Peak 16% Winter/On-Peak 36% Winter/Off-Peak 22%	

Sources:

- Northeast Utilities, *Determination of Energy Savings Document*, 1992
- Levine, M., Geller, H., Koomey, J., Nadel S., Price, L., "Electricity Energy Use Efficiency: Experience with Technologies, Markets and Policies" ACEEE, 1992
- Lighting control savings fractions consistent with current programs offered by National Grid, Northeast Utilities, Long Island Power Authority, NYSERDA, and Energy Efficient Vermont.

## Motors

### Algorithms

From application form calculate  $\Delta\text{kW}$  where:

$$\Delta\text{kW} = 0.746 * [(\text{hp}_{\text{base}} * \text{RLF}_{\text{base}})/\eta_{\text{base}} - (\text{hp}_{\text{ee}} * \text{RLF}_{\text{ee}})/\eta_{\text{ee}}]$$

Demand Savings =  $(\Delta\text{kW}) \times \text{CF}$

Energy Savings =  $(\Delta\text{kW}) * \text{EFLH}$

### Definition of Variables

$\text{hp}_{\text{base}}$  = Rated horsepower of the baseline motor

$\text{hp}_{\text{ee}}$  = Rate horsepower of the energy-efficient motor

$\text{RLF}_{\text{base}}$  = Rated load factor of the baseline motor

$\text{RLF}_{\text{ee}}$  = Rated load factor of the energy-efficient motor

$\eta_{\text{base}}$  = Efficiency of the baseline motor

$\eta_{\text{ee}}$  = Efficiency of the energy-efficient motor

### Motors

<b>Component</b>	<b>Type</b>	<b>Value</b>	<b>Source</b>
Motor kW	Variable	Based on horsepower and efficiency	Application
EFLH	Fixed	Commercial 2,502	JCP&L metered

		Industrial 4,599	data <sup>19</sup> and PSEG audit data for industrial
hp <sub>base</sub>	Fixed	Comparable EPACT Motor	EPACT Directory
hp <sub>ee</sub>	Variable	Nameplate	Application
RLF <sub>base</sub>	Fixed	0.70-0.80	Industry Data
RLF <sub>ee</sub>	Variable	Nameplate	Application
Efficiency - η <sub>base</sub>	Fixed	Comparable EPACT Motor	From EPACT directory.
Efficiency - η <sub>ee</sub>	Variable	Nameplate	Application
CF	Fixed	35%	JCP&L metered data
Time Period Allocation Factors	Fixed	Summer/On-Peak 25% Summer/Off-Peak 16% Winter/On-Peak 36% Winter/Off-Peak 23%	

## HVAC Systems

The measurement of energy and demand savings for C/I Efficient HVAC program for Room AC, Central AC, and air cooled DX is based on algorithms. (Includes split systems, air to air heat pumps, packaged terminal systems, water source heat pumps, central DX AC systems, ground water or ground source heat pumps)

## Algorithms

Air Conditioning Algorithms:

$$\text{Demand Savings} = (\text{BtuH}/1000) \times (1/\text{EER}_b - 1/\text{EER}_q) \times \text{CF}$$

$$\text{Energy Savings} = (\text{BtuH}/1000) \times (1/\text{EER}_b - 1/\text{EER}_q) \times \text{EFLH}$$

Heat Pump Algorithms

$$\text{Energy Savings-Cooling} = (\text{BtuH}_c/1000) \times (1/\text{EER}_b - 1/\text{EER}_q) \times \text{EFLH}_c$$

$$\text{Energy Savings-Heating} = \text{BtuH}_h/1000 \times (1/\text{EER}_b - 1/\text{EER}_q) \times \text{EFLH}_h$$

Where <sub>c</sub> is for cooling and <sub>h</sub> is for heating.

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<sup>19</sup> Results reflect metered use from 1995 – 1999.

## Definition of Variables

BtuH = Cooling capacity in Btu/Hour – This value comes from ARI or AHAM rating or manufacturer data.

EER<sub>b</sub> = Efficiency rating of the baseline unit. This data is found in the HVAC and Heat Pump verification summary table. For units < 65,000, SEER and HSPF should be used for cooling and heating savings, respectively.

EER<sub>q</sub> = Efficiency rating of the High Efficiency unit – This value comes from the ARI or AHAM directories or manufacturer data. For units < 65,000, SEER and HSPF should be used for cooling and heating savings, respectively.

CF = Coincidence Factor – This value represents the percentage of the total load which is on during electric system's Peak Window. This value will be based on existing measured usage and determined as the average number of operating hours during the peak window period.

EFLH = Equivalent Full Load Hours – This represents a measure of energy use by season during the on-peak and off peak periods. This value will be determined by existing measured data of kWh during the period divided by kW at design conditions.

### *HVAC and Heat Pumps*

Component	Type	Value	Source
BtuH	Variable	ARI or AHAM or Manufacturer Data	Application
EER <sub>b</sub>	Variable	See Table below	Collaborative agreement and C/I baseline study
EER <sub>q</sub>	Variable	ARI or AHAM Values	Application
CF	Fixed	67%	Engineering estimate
EFLH	Fixed	HVAC 1,131 HP cooling 381 HP heating 800	JCP&L metered data <sup>20</sup>
Cooling Time Period Allocation Factors	Fixed	Summer/On-Peak 45% Summer/Off-Peak 39% Winter/On-Peak 7% Winter/Off-Peak 9%	
Heating Time	Fixed	Summer/On-Peak 0% Summer/Off-Peak 0%	

<sup>20</sup> Results reflect metered use from 1995 – 1999.

Component	Type	Value	Source
Period Allocation Factors		Winter/On-Peak 41% Winter/Off-Peak 58%	

*HVAC Baseline Table*

Equipment Type	Baseline	ASHRAE Std. 90.1 – 1989	ASHRAE Std. 90.1 – 1999
Unitary HVAC/Split Systems · <=5.4 tons: · >5.4 to 11.25 tons · >11.25 to 30 tons	13 SEER 8.9 EER 8.5 EER	13 SEER 8.9 EER 8.5 EER up to 20 tons 8.2 EER above 30 tons	13 SEER 10.3 EER 9.7 EER up to 20 tons 9.7 EER above 30 tons
Air-Air Heat Pump Systems · <=5.4 tons: · >5.4 to 11.25 tons · >11.25 to 30 tons	6.8 HSPF & 13.0 SEER 8.9 EER 8.5 EER	13 SEER 8.9 EER 8.5 EER up to 20 tons 8.2 EER above 30 tons	13 SEER 10.1 EER 9.3 EER up to 20 tons 9.0 EER above 30 tons
Package Terminal Systems	9 EER	10 – [0.91 * cap/1000]	10.9 – [0.213 * cap/1000] EER
Water Source Heat Pumps <=30 tons >30 tons	10.5 EER 10.5 EER	up to 5.4 tons– 9.3 EER >5.4 Tons 10.5 10.5 EER	up to 5.4 tons– 12.0 EER >5.4 Tons 12.0 EER 12.0 EER
Central DX AC Systems · >30 to 63 tons · > 63 tons	8.5 EER 8.5 EER	8.5 EER 8.2 EER	9.5 EER 9.5 EER
GWSHPs	11 EER		3.1 COP

## Electric Chillers

The measurement of energy and demand savings for C/I Chillers program is based on algorithms with key variables (i.e., kW/ton, Coincidence Factor, Equivalent Full Load Hours) measured through existing end-use metering of a sample of facilities.

## Algorithms

$$\text{Demand Savings} = \text{Tons} \times (\text{kW/ton}_b - \text{kW/ton}_q) \times \text{CF}$$

$$\text{Energy Savings} = \text{Tons} \times (\text{kW/ton}_b - \text{kW/ton}_q) \times \text{EFLH}$$

## Definition of Variables

Tons = The capacity of the chiller (in tons) at site design conditions accepted by the program.

kW/ton<sub>b</sub> = This data is the baseline and is found in the Chiller verification summary table.

kW/ton<sub>q</sub> = This is the manufacturer data and equipment ratings in accordance with ARI Standard 550/590 latest edition.

CF = Coincidence Factor – This value represents the percentage of the total load which is on during electric system's Peak Window derived from JCP&L metered data.

EFLH = Equivalent Full Load Hours – This represents a measure of chiller use by season determined by measured kWh during the period divided by kW at design conditions from JCP&L measurement data.

### *Electric Chillers*

Component	Type	Value	Source
Tons	Variable	From Rebate Application	
kW/ton <sub>b</sub>	Fixed	<p><b>Water Cooled Chillers (&lt;70 tons)</b></p> <p><i>Baseline:..... 0.79 kW/Ton</i>  <i>ASHRAE Std 90.1-1999....0.84 kW/Ton</i></p> <p><b>Water Cooled Chillers (70 to &lt;150 tons)</b></p> <p><i>Baseline:..... 0.79 kW/Ton</i>  <i>ASHRAE Std 90.1-1999....0.84 kW/Ton</i></p> <p><b>Water Cooled Chillers (150 to &lt;300 tons)</b></p> <p><i>Baseline:..... 0.718 kW/Ton</i>  <i>ASHRAE Std 90.1-1999....0.718 kW/Ton</i></p> <p><b>Water Cooled Chillers (=&gt;300 tons)</b></p> <p><i>Baseline:..... 0.639 kW/Ton</i>  <i>ASHRAE Std 90.1-1999....0.639 kW/Ton</i></p> <p><b>Air Cooled Chillers (&lt;150 tons)</b></p> <p><i>Baseline:..... 1.256 kW/Ton</i>  <i>ASHRAE Std 90.1-1999....1.256 kW/Ton</i></p> <p><b>Air Cooled Chillers (+150 tons)</b></p> <p><i>Baseline:..... 1.256 kW/Ton</i>  <i>ASHRAE Std 90.1-1999....1.256 kW/Ton</i></p>	Collaborative agreement, C/I baseline study, E-Cube Inc. Study, May 2003
kW/ton <sub>g</sub>	Variable	ARI Standards 550/590-Latest edition	Application

<b>Component</b>	<b>Type</b>	<b>Value</b>	<b>Source</b>
CF	Fixed	67%	Engineering estimate
EFLH	Fixed	1,360	JCP&L metered data <sup>21</sup>
Time Period Allocation Factors	Fixed	Summer/On-Peak 45% Summer/Off-Peak 39% Winter/On-Peak 7% Winter/Off-Peak 9%	

For certain fixed components, studies and surveys developed by the utilities in the State or based on a review of manufacturer's data, other utilities, regulatory commissions or consultant's reports will be used to update the values for future filings.

## **Variable Frequency Drives**

The measurement of energy and demand savings for C/I Variable Frequency Drive for VFD applications is for HVAC fans and water pumps only. VFD applications for other than this use should follow the custom path.

## **Algorithms**

$$\text{Energy Savings (kWh)} = 0.746 * \text{HP} * \text{RLF} / \eta_{\text{motor}} * \text{ESF} * \text{FLH}_{\text{base}}$$

$$\text{Demand Savings (kW)} = 0.746 * \text{HP} * \text{RLF} / \eta_{\text{motor}} * \text{DSF}$$

## **Definitions of Variables**

HP = nameplate motor horsepower

RLF = Rated Load Factor. This is the ratio of the peak running load to the nameplate rating of the motor

$\eta_{\text{motor}}$  = Motor efficiency at the peak load. Motor efficiency varies with load. At low loads of relative to the rated hp (usually below 50%) efficiency often drops dramatically.

ESF = Energy Savings Factor. The energy savings factor is equal to  $1 - \text{FLH}_{\text{asd}} / \text{FLH}_{\text{base}}$ . This factor can also be computed according to fan and pump laws assuming an average flow reduction and a cubic relationship between flow rate reduction and power draw savings

FLH<sub>asd</sub> = Full Load Hours of the fan/pump with the VSD

FLH<sub>base</sub> = Full Load Hours of the fan/pump with baseline drive

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<sup>21</sup> Results reflect metered use from 1995 – 1999.

DSF = Demand Savings Factor. The demand savings factor is calculated by determining the ratio of the power requirement for baseline and VFD control at peak conditions

$$DSF = 1 - (kW_{asd}/kW_{base})_{peak}$$

$kW_{asd}$  = peak demand of the motor under the variable control conditions

$kW_{base}$  = peak demand of the motor under the base operating conditions

### *Variable Frequency Drives*

<b>Component</b>	<b>Type</b>	<b>Value</b>	<b>Source</b>
<i>Motor HP</i>	Variable	Nameplate	Application
<i>kWh/motor HP</i>	Fixed	1,653 for VAV air handle systems. 1,360 for chilled water pumps.	JCP&L metered data for VFD's <sup>22</sup> and chillers <sup>23</sup> .
RLF	Variable	Dependent on HP and peak running load	
$\eta_{motor}$	Variable	Nameplate or Manufacturer specs	Application
ESF	Variable	Dependent on full load of base and VFD	
$FLH_{asd}$	Variable	Nameplate	Application
$FLH_{base}$	Fixed		Manufacturer Data
DSF	Variable	Dependent on base and variable peak demand	
$kW_{asd}$	Variable	Nameplate	Application
$kW_{base}$	Fixed		Manufacturer Data
Time Period Allocation Factors	Fixed	Summer/On-Peak 22% Summer/Off-Peak 10% Winter/On-Peak 47% Winter/Off-Peak 21%	

<sup>22</sup> Results reflect metered use from 1995 – 1998.

<sup>23</sup> Results reflect metered use from 1995 – 1999.

## Air Compressors with Variable Frequency Drives

The measurement of energy and demand savings for variable frequency drive (VFD) air compressors.

### Algorithms

$$\text{Energy Savings (kWh)} = 774 * \text{HP}$$

$$\text{Demand Savings (kW)} = 0.129 * \text{HP}$$

$$\text{Coincident Peak Demand Savings (kW)} = 0.106 * \text{HP}$$

### Definitions of Variables

HP = nameplate motor horsepower

#### Air Compressors with VFDs

Component	Type	Value	Source
<i>Motor HP</i>	Variable	Nameplate	Application
<i>kWh/motor HP</i>	Fixed	774	Aspen Systems Study <sup>24</sup>
<i>kW/motor HP</i>	Fixed	0.129	Aspen Systems Study
<i>Coincident Peak kW/motor HP</i>	Fixed	0.106	Aspen Systems Study
Time Period Allocation Factors	Fixed	Summer/On-Peak 28% Summer/Off-Peak 39% Winter/On-Peak 14% Winter/Off-Peak 19%	

<sup>24</sup> Aspen Systems Corporation, Prescriptive Variable Speed Drive Incentive Development Support for Industrial Air Compressors, Executive Summary, June 20, 2005

## C&I Construction Gas Protocols

### **Gas Chillers**

The measurement of energy savings for C&I gas fired chillers and chiller heaters is based on algorithms with key variables (i.e., Equivalent Full Load Hours, Vacuum Boiler Efficiency, Input Rating, Coincidence Factor) provided by manufacturer data or measured through existing end-use metering of a sample of facilities.

### **Algorithms**

Winter Gas Savings =  $(VBE_q - BE_b)/VBE_q \times IR \times EFLH$

Electric Demand Savings = Tons X  $(kW/Ton_b - kW/Ton_{gc}) \times CF$

Electric Energy Savings = Tons X  $(kW/Ton_b - kW/Ton_{gc}) \times EFLH$

Summer Gas Usage (MMBtu) = MMBtu Output Capacity / COP X EFLH

Net Energy Savings = Electric Energy Savings + Winter Gas Savings – Summer Gas Usage

### **Definition of Terms**

$VBE_q$  = Vacuum Boiler Efficiency

$BE_b$  = Efficiency of the baseline gas boiler

IR = Input Rating = Therms/hour

Tons = The capacity of the chiller (in tons) at site design conditions accepted by the program.

$kW/Ton_b$  = The baseline efficiency for electric chillers, as shown in the Gas Chiller Verification Summary table below.

$kW/Ton_{gc}$  = Parasitic electrical requirement for gas chiller.

COP = Efficiency of the gas chiller

MMBtu Output Capacity = Cooling Capacity of gas chiller in MMBtu.

CF = Coincidence Factor. This value represents the percentage of the total load that is on during electric system peak.

EFLH = Equivalent Full Load Hours. This represents a measure of chiller use by season.

### Gas Chillers

Component	Type	Value	Source
VBE <sub>q</sub>	Variable		Rebate Application or Manufacturer Data
BE <sub>b</sub>	Fixed	75%	ASHRAE 90.1
IR	Variable		Rebate Application or Manufacturer Data
Tons	Variable		Rebate Application
MMBtu	Variable		Rebate Application
kW/Ton <sub>b</sub>	Fixed	<b>&lt;100 tons</b> 0.79kW/Ton  <b>100 to 150 tons</b> 0.79 kW/ton  <b>150 to &lt;300 tons:</b> 0.718 kW/Ton  <b>300 tons or more:</b> 0.639 kW/ton	Collaborative agreement and C/I baseline study.  Assumes new electric chiller baseline using air cooled unit for chillers less than 100 tons; water cooled for chillers greater than 100 tons
kW/Ton <sub>gc</sub>	Variable		Manufacturer Data
COP	Variable		Manufacturer Data
CF	Fixed	67%	Engineering estimate
EFLH	Fixed	1,360	JCP&L Measured data <sup>25</sup>
Electric Time Period Allocation Factors	Fixed	Summer/On-Peak 45% Summer/Off-Peak 39% Winter/On-Peak 7% Winter/Off-Peak 9%	

Variable data will be captured on the application form or from manufacturer's data sheets and collaborative/utility studies.

<sup>25</sup> Results reflect metered use from 1995 – 1999.

For certain fixed components, studies and surveys developed by the utilities in the State or based on a review of manufacturer's data, other utilities, regulatory commissions or consultants' reports will be used to update the values for future filings.

### **Gas Fired Desiccants**

Protocols to be developed.

### **Gas Booster Water Heaters**

C&I gas booster water heaters are substitutes for electric water heaters. The measurement of energy savings is based on engineering algorithms with key variables (i.e., Input Rating Coincidence Factor, Equivalent Full Load Hours) provided by manufacturer data or measured through existing end-use metering of a sample of facilities.

#### **Algorithms**

Demand Savings (kW) = IR X EFF/3412 X CF

Energy Savings (kWh) = IR X EFF/3412 X EFLH

Gas Usage Increase = IR X EFLH

Net Energy Savings = Electric Energy Savings – Gas Usage Increase  
(Calculated in MMBtu)

#### **Definition of Variables**

IR = Input Rating in Btuh

EFF = Efficiency

CF = Coincidence Factor

EFLH = Equivalent Full Load Hours

The 3412 used in the denominator is used to convert Btus to kWh.

### **Gas Booster Water Heaters**

Component	Type	Value	Source
IR	Variable		Application Form or Manufacturer Data
CF	Fixed	27-32%	Summit Blue

Component	Type	Value	Source
EFLH	Fixed	1,000	PSE&G
EF	Variable		Application Form or Manufacturer Data
Electric Time Period Allocation Factors	Fixed	<i>Requires additional research</i>	

## Water Heaters

This prescriptive measure targets solely the use of smaller-scale domestic water heaters (50 gallons or less per unit) in all commercial facilities. Larger gas water heaters are treated under the custom measure path. The measurement of energy savings for C&I gas water heaters is based on algorithms with key variables (i.e., energy factor) provided by manufacturer data.

## Algorithms

$$\text{Gas Savings} = ((\text{EF}_q - \text{EF}_b)/\text{EF}_q) \times \text{Baseline Usage}$$

### Definition of Variables

$\text{EF}_q$  = Energy factor of the qualifying energy efficient water heater.

$\text{EF}_b$  = Energy factor of the baseline water heater. Calculated as  $0.67 - 0.0019 * \text{gallons of capacity}$ . Based on a 40 gallon water heater.

Baseline Usage = Annual usage of the baseline water heater, in therms.

## Water Heaters

Component	Type	Value	Source
$\text{EF}_q$	Variable		Application Form or Manufacturer Data
$\text{EF}_b$	Fixed	0.544	Federal EPACT Standard
Baseline Usage	Fixed	254	DOE/FEMP website <a href="http://www.eren.doe.gov/femp/pro">http://www.eren.doe.gov/femp/pro</a>
Time Period Allocation Factors	Fixed	Summer 50% Winter 50%	1

1. Prorated based on 6 months in the summer period and 6 months in the winter period.

## Furnaces and Boilers

This prescriptive measure targets the use of smaller-scale boilers (less than or equal to 1500 MBH) and furnaces (no size limitation) in all commercial facilities. Larger sized boilers are treated under the custom measure path. The measurement of energy savings for C&I gas fired furnaces and boilers is based on algorithms with key variables (i.e. Annual Fuel Utilization Efficiency, capacity of the furnace, EFLH) provided by manufacturer data or utility data.

## Algorithms

$$\text{Gas Savings} = ((\text{AFUE}_q - \text{AFUE}_b)/\text{AFUE}_q) \times \text{CAPY} \times \text{EFLH}$$

## Definition of Variables

$\text{AFUE}_q$  = Annual Fuel Utilization Efficiency of the qualifying energy efficient furnace or boiler

$\text{AFUE}_b$  = Annual Fuel Utilization Efficiency of the baseline furnace or boiler

CAPY = Capacity of the furnace or boiler in therms/hour

EFLH = Equivalent full load heating hours

### Furnaces and Boilers

Component	Type	Value	Source
$\text{AFUE}_q$	Variable		Application Form or Manufacturer Data
$\text{AFUE}_b$	Fixed	Furnaces: 78% Boilers: 80%	EPACT Standard for furnaces and boilers
CAPY	Variable		Application Form or Manufacturer Data
EFLH	Fixed	900	PSE&G
Time Period Allocation Factors	Fixed	Summer 12% Winter 88%	1

Prorated based on 12% of the annual degree days falling in the summer period and 88% of the annual degree days falling in the winter period.

## *Building Operation & Maintenance*

### **Protocols**

The measurement of energy and demand savings for the building O&M program is based on saving a fixed percent of a building electric and gas load through the performance of various O&M improvement activities. It will be necessary to collect a facilities prior year electric and gas usage for input to the equations.

The following is an explanation of the algorithms used and the nature and source of all required input data.

### Algorithms

#### **Electric Savings**

Energy Impact (kWh) = PYEL X ESF

Peak Demand Impact (kW) = (Energy Impact / EFLH) X CF

#### **Gas Savings**

Energy Savings (Therms) = PYGL X GSF

### Definition of Variables

PYEL = Participants previous years electric energy use.

PYGL = Participants previous years gas energy use.

EFLH = The equivalent full load hours of operation for the average commercial or industrial establishment in New Jersey.

CF = The coincidence factor for the average commercial or industrial establishment in New Jersey.

ESF = Electric savings factor as a % of facility load prior to program participation.

GSF = Gas savings factor as a % of facility load prior to program participation.

A summary of the data sources and fixed values follows:

**C&I Building O&M**

<b>Component</b>	<b>Type</b>	<b>Value</b>	<b>Sources</b>
PYEL	Variable		Customer Application
PYGL	Variable		Customer Application
EFLH	Fixed	3900	1
CF	Fixed	0.875	2
ESF	Fixed	10%	3
GSF	Fixed	7%	4

## Source Notes:

1. EFLH: Equivalent Full Load Hours of 3900 is based on a typical NJ load profile from the NJ 2000 Forecast.
2. CF: Coincidence Factor of 0.875 is based on the average of 85% for commercial customers and 90% for industrial customers.
3. ESF: Electric Savings Factor of 10% of pre-participation facility load is based on a review of multiple O&M improvement programs.
4. GSF: Gas Savings Factor of 7% of pre-participation facility load is based on a review of multiple O&M improvement programs.

*Compressed Air System Optimization*

## **Protocols**

### **Compressed Air Systems**

The energy and peak demand savings due to Compressed Air Optimization measures will be based on an a site-specific engineering analysis completed for each participating site. The engineering analysis will determine what increase in efficiency will be realized through program participation. This will be compared to the current baseline condition to estimate savings.

# Combined Heat and Power (CHP) Program

## ***Protocols***

The measurement of energy and demand savings for Combined Heat and Power (CHP) systems is based primarily on the characteristics of the individual CHP systems subject to the general principles set out below. The majority of the inputs used to estimate energy and demand impacts of CHP systems will be drawn from individual project applications.

CHP systems typically use fossil fuels to generate electricity that displaces electric generation from other sources. Therefore, the electricity generated from a CHP system should not be reported as either electric energy savings or renewable energy generation. Alternatively, electric generation and capacity from CHP systems should be reported as Distributed Generation (DG) separate from energy savings and renewable energy generation. However, any waste heat recaptured and utilized should be reported as energy savings as, discussed below.

## **Distributed Generation**

**Electric Generation (MWh)** = Estimated annual and lifetime electric generation in MWh provided on the project application, as adjusted during the project review and approval process.

**Electric Demand (kW)** = Electric capacity of the CHP system in kW provided on the project application, as adjusted during the project review and approval process.

## **Energy Savings**

**Gas Energy Savings:** Gas savings should be reported on a consistent basis by all applicants as the reduction in fuel related to the recapture of thermal energy (e.g., reduction in boiler gas associated with the recapture of waste heat from the CHP engine or turbine)

**Electric Energy Savings:** Electric energy savings should be reported only in cases where the recapture of thermal energy from the CHP system is used to drive an absorption chiller that would displace electricity previously consumed for cooling.

## **Emission Reductions**

For many CHP applications there can be substantial emission benefits due to the superior emission rates of many new CHP engines and turbines as compared to the average emission rate of electric generation units on the margin of the grid. However, CHP

engines and turbines produce emissions, which should be offset against the displaced emissions from the electricity that would have been generated by the grid.<sup>26</sup>

The New Jersey Department of Environmental Protection (DEP) has provided the BPU with emission factors that are used to calculate the emission savings from energy efficiency and renewable energy projects. These factors should be used to calculate the base emission factors which the CHP system emission factors would be compared to. The emissions from the CHP system would be subtracted from the base emissions to determine the net emission changes as follows:

### ***Base Emission Factors***

***DEP Emissions Reduction Factors*** for electric programs are as follows:

- CO2 (Carbon Dioxide) emissions are reduced by 1,520 lbs. per MWh saved
- NOx (Nitric Oxide) emission reductions are 2.8 lbs. per MWh saved
- SO2 (Sulfur Dioxide) emission reductions are 6.5 lbs. per MWh saved
- Hg (Mercury) emission reductions are 0.0000356 lbs. per MWh saved

### ***CHP Emission Reduction Algorithms***

$$\text{CO2 ER (lbs)} = (1,520 * \text{MWh}) - (\text{CHP CO2EF} * \text{MWh})$$

$$\text{NOx ER (lbs)} = (2.8 * \text{MWh}) - (\text{CHP NOxEF} * \text{MWh})$$

$$\text{SO2 ER (lbs)} = (6.5 * \text{MWh}) - (\text{CHP SO2EF} * \text{MWh})$$

$$\text{HG ER (lbs)} = (0.0000356 * \text{MWh}) - (\text{CHP HGEF} * \text{MWh})$$

### **Definitions**

ER = Emission reductions in pounds

CHP EF = the emission factors of the CHP system in pounds per MWh for each type of emission

MWh = the estimated annual and lifetime generation from the CHP system

Emission reductions from any CHP system energy savings, as discussed above, would be treated the same as any other energy savings reported.

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<sup>26</sup> Summit Blue, Draft Energy Efficiency Market Assessment of New Jersey Clean Energy Program, Book III, Page 196, May 26, 2006

## Cool Cities Program

### ***Protocol***

CITYgreen's energy conservation study utilizes methods developed by Jill Mahon of AMERICAN FORESTS, interpolated from research by Dr. Greg McPherson of the USDA Forest Service. The program estimates the energy conservation benefits of trees resulting from direct shading of residential buildings.

Trees are most effective when located to shade air conditioners, windows, or walls and when located on the side of the home receiving the most solar exposure in addition to other criteria. In many parts of the country the west side is most valuable, followed by the east and the south, although this ranking can change based on geographical considerations.

CITYgreen assigns each tree an energy rating, 1 through 5, based on location characteristics listed above and information about tree size and shape. For example, in many parts of the country, a large tree located near the west side of a building and shading an air conditioner or window would be assigned a maximum energy rating.

Each tree then is assumed to reduce a home's annual energy bill by a percentage associated with energy rank, which varies based on the climate being studied. The percentage savings produced by each tree around a home are multiplied by a home's average annual cooling cost (\$600.00 for New Jersey). CITYgreen adds the results together to produce the savings per home, which are in turn summed to estimate savings per site.

### **Methodology**

The measurement plan for tree plantings for reducing energy use by shading communities is based on a randomly selected sample study area in each of the selected neighborhoods where trees were planted. A sample study area in the planted neighborhood is used due to the large volume of field data needed to calculate energy savings over time for the tree plantings. In the sample study area, averages are created to extrapolate savings over the planted areas within a municipality.

The sample study area is a single location randomly selected, which includes over 10% of the initial planting area within each municipality. The data within that sample study area are collected to run a growth model and then a tree energy savings model year by year after the initial year's calculations. Currently the best

fitting model for modeling the tree planting energy savings over the Cool Cities Initiative planting areas is CITYgreen 5.4.

The program assigns an energy rating (0= No Savings, 5= Maximum Savings) to each tree that has been field verified and inventoried based on the following criteria:

- Distance from residential building structure
- Orientation to the building
- Ability to shade a window and/or an air conditioner

CITYgreen incorporates research from eleven cities distributed across the United States. Users are asked to identify their region of the United States; the program uses data from the nearest of those eleven cities. If data is available from more than one city within the region, the user is asked to identify which is closest to the project location.

The user is prompted to enter the annual cooling cost (\$600 for NJ). Multipliers associated with each energy rating (representing percent energy use-reduction) are assigned to each tree. Each home's annual energy use is multiplied by each associated tree's multiplier to produce an estimate of dollar and kilowatt savings per household, not including inflation.

Multipliers used in CITYgreen were interpolated from "Modeling Benefits and Costs of Community Tree Planting in 12 U.S. Cities" and "Chicago's Urban Forest Ecosystem: Results of the Chicago Urban Forest Climate Project."

Dr. McPherson's research found that a second tree located in an optimal location provides about 2/3 as much savings as the first. Therefore, when more than one tree is assigned a rating of 5 for a given home, only one tree is assumed to provide the full benefits: the rest are assumed to provide 2/3 of the equivalent of a number 5 energy rating.

CITYgreen's tree growth model was developed by AMERICAN FORESTS. The program "grows" the tree trunk diameter at breast-height (DBH), the tree height, and the tree canopy according to species and year of growth selected. CITYgreen also considers the area of the country your projection is in, since trees grow at different rates in different parts of the country. Currently modeling has been with Northeast setting. The program uses the following method, derived from Nowak, Susinni, Stevens, and Luley, to estimate growth:

<b>Tree Growth Rate</b>	<b>Trunk DBH (Inches/Year)</b>	<b>Height (Inches/Year)</b>
Slow-Growing Trees	0.1	1.0
Medium-Growing Trees	0.25	1.5
Fast-Growing Trees	0.5	3.0

The height change is determined by multiplying the number of growth years by the height growth rate assigned to the species. The tree trunk diameter (DBH) changes are projected by adding the existing DBH (inches) to the number of growth years multiplied by the DBH growth rate assigned to the species.

A growth factor was derived for individual tree species based on the DBH and canopy area trends taken from AMERICAN FORESTS' composite tree species database of more than 13,000 trees. This growth factor is multiplied by the calculated tree trunk DBH growth for each species to estimate projected canopy radius and canopy area in square feet. By looking at the largest inventoried specimen from each species, a maximum potential growth has been determined for nearly all tree species in the CITYgreen species database. The canopy growth factor is based on a linear regression of canopy radius divided by tree trunk DBH.

To accumulate the energy savings, the energy savings model runs for one year. Then the growth model runs for one year and then the energy savings model runs for one year on the new growth projection, repeating this process for 30 years of growth. The process gives 31 year of savings, because the first year was before one year's growth.

The 31 years of energy savings are summed for the study area. To determine the energy savings over all the planting areas within a municipality, a ratio relationship is used between area and total savings.

### **Calculation for total energy savings**

$$\text{TES/SAMES} = \text{TPA/SA}$$

$$(\text{SAMES}) \text{ TES/SAMES} = (\text{SAMES}) \text{ TPA/SA}$$

$$\text{TES} = (\text{SAMES}) \text{ TPA/SA}$$

TES – Total Energy Savings

SAMES – Sample Area Modeled Energy Savings

SA – Sample Area

TPA – Total Planting Area

### **Definition of Terms**

Air conditioning unit – Any air conditioner unit below three stories

Average annual cooling cost – The average amount of energy used in one year to cool a home. Currently the Cool Cities Initiative is using \$600 per annual cooling cost.

Diameter at breast-height (DBH) – A standard measurement of the diameter of a tree trunk at 4.5 feet above the ground.

- Initial planting area – The area that was first planted in a municipality.
- Municipality – The controlling governing body of a selected area. This would be a city, town, township, borough, or village.
- Window – A three-foot by four-foot window under three stories. If a window is much larger than this it is counted as two, for example a four-foot by six-foot window counts as two windows.
- Year of growth – The projected growth in one year's time.

## References

1. AMERICAN FORESTS 2002. CITYgreen calculating the value of nature Version 5.0. Washington, DC: AMERICAN FORESTS. Much of the information is directly from this source.
2. Energy Information Administration. "Method for Calculating Carbon Sequestration by Trees in Urban and Suburban Settings," Voluntary Reporting of Greenhouse Gases, September 1996. Washington, DC: U.S. Department of Energy.
3. McPherson, E. Gregory, Nowak, David J. and Rowan A. Rountree, eds. 1994. "Chicago's Urban Forest ecosystem: Results of the Chicago Urban Forest Climate Project." Gen. Tech. Rep. NE-186 Radnor, PA: USDA Forest Service, Northeastern Forest Experiment Station.
4. McPherson, Greg, Sacamano, Paul and Steve Wensman, 1993. "Modelling Benefits and Costs of Community Tree-Planting in 12 U.S. Cities." USDA Forest Service.
5. Nowak, David J., Stevens, Jack C., Luley, Christopher J. and Susan M. Susinni. 1996. "Effects of Urban Tree Management on Atmospheric Carbon Dioxide," Syracuse, NY: Unpublished manuscript, (To be submitted to the Journal of Arboriculture)
6. Wenger, Karl F., ed. 1984. Forestry Handbook. New York: John Wiley & Sons.

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## **Customer On-Site Renewable Energy Program (CORE)**

### ***Protocols***

The energy and demand impacts for customer sited generation systems participating in the CORE program are based on algorithms that estimate each system's annual energy production and coincident peak capacity production. Input data are based on fixed assumptions, engineering estimates and data supplied from the program's technical worksheets and inspection forms. The reported generation will be based on as installed conditions, as verified by site inspection documentation.

For solar electric generation, an industry standard calculation tool (PVWATTS from the National Renewable Energy Laboratory) is used for estimating PV system annual outputs.

For wind installations estimated annual energy output is calculated using approved wind resource data maps, wind-speed at proposed hub height, and approved annual estimated output power curves for each turbine.

For sustainable biomass projects the protocols include recommended formats but the energy and peak capacity for each project will be estimated on a case by case basis. This level of flexibility allows for the use of more detailed case specific engineering data in the protocol reporting.

For all technologies, the customer sited generation protocols report the gross electrical generation from the system. Therefore, for example, the estimates for production from sustainable biomass projects do not account for estimated consumption of the applicable biomass fuel.

The following is an explanation of the algorithms used and the nature and source of all required input data.

### **Renewable Generation Algorithms**

#### **Photovoltaic Systems**

PVWATTS (Version 1) is used to estimate the energy generated by photovoltaic systems. PVWATTS was developed and is available through the Renewable Resource Data Center (RReDC). The RReDC is supported by the National Center for Photovoltaics (NCPV) and managed by the Department of Energy's Office of Energy Efficiency and Renewable Energy. The RReDC is maintained by the Distributed Energy Resources Center of the National Renewable Energy Laboratory. The subroutines used to calculate the energy generation are based on information developed by Sandia National Laboratories.

PVWATTS is available through the RReDC website,

[http://rredc.nrel.gov/solar/codes\\_algs/PVWATTS/](http://rredc.nrel.gov/solar/codes_algs/PVWATTS/). Note that program generation algorithms have used Version 1 of PVWATTS.

The following input values are used by PVWATTS to estimate average annual energy production. These are collected and/or are available for each PV project on the PV technical worksheet and inspection documentation.

- System Rated Output (AC output based on DC Output at Standard Rating Conditions and default DC/AC ratings.)
- Fixed, Single or Double Axis Tracking
- Array Tilt angle (for fixed axis only)
- Array Azimuth (for fixed axis only)
- Weather data (based on closest weather station data for Version 1)

The Peak demand impact for photovoltaic systems is estimated separately from the annual energy output. Summer and winter peak impacts are based on research conducted by Richard Perez, of SUNY Albany, ([http://www.nrel.gov/ncpv/documents/pv\\_util.html](http://www.nrel.gov/ncpv/documents/pv_util.html)). The estimated summer effective load carrying capacity (ELCC) for New Jersey is 60% to 70%. A value of 65% is adopted for these protocols.

Summer Peak Impact (kW) = System Rated Output \* Summer Effective Load Carrying Capacity (ELCC).

Winter Peak Impact (kW) = System Rated Output \* Winter Effective Load Carrying Capacity (WELCC).

A summary of the input values and their data sources follows:

## Photovoltaic Systems

Component	Type	Value	Sources
System Rated Output (SRO)	Variable		Application Technical Worksheet, and inspection documentation
Fixed, Single, Double Axis tracking	Variable		Application Technical Worksheet, and inspection documentation
Array Tilt	Variable		Application Technical Worksheet, and inspection documentation
Azimuth Angle	Variable		Application Technical Worksheet, and inspection documentation
Weather Data	Variable	City, State – four sites will be used (Wilkes Barre PA, Newark NJ, Philadelphia PA, and Atlantic City, NJ)	Application Technical Worksheet – Version 2 if adopted provides average resource data based on 40km square grid.
ELCC	Fixed	65%	( <a href="http://www.nrel.gov/ncpv/documents/pv_util.html">http://www.nrel.gov/ncpv/documents/pv_util.html</a> )
WELCC	Fixed	8%	Monitored system data from White Plains NY

## Wind Systems

Estimated annual energy output for wind systems will be based the program's method for calculating the Expected Performance Based Buy-down for system rebates. These calculations are derived from industry data resources and calculation methods.

Currently there is a lack of data on the peak impact of small wind systems in New Jersey and an estimate of 0% will be used. This value will be updated if supporting data are identified.

Annual Energy Output (kWh) is a function of:

- Average annual wind speed (using one of three approved wind resource maps) at 50 meters for the proposed site
- The proposed hub height for the turbine
- An approved annual energy output curve for each turbine

Data summary of the input values and their data sources follows:

## Wind Systems

Component	Type	Value	Sources
Average annual wind speed at 50 meters (m/s) or (mph)	Variable		Application Technical Worksheet, verified by checking against approved wind resource maps
Turbine hub height as installed	Variable		Application Technical Worksheet, verified by inspection documentation
Annual energy output power curve for proposed turbine	Variable look up based on wind speed and hub height at each location		Annual energy output power curves based on manufacturer's published data. Values checked against industry experience and acceptance for use in other jurisdictions.
Summer Peak Impact	Fixed	0%	Data on peak impact not available at this time
Winter Peak Impact	Fixed	0%	Data on peak impact not available at this time

## Sustainable Biomass

Estimated annual energy output and peak impacts for sustainable biomass systems will be based on case specific engineering estimates and manufacturer data.

## SREC-Only Pilot

The measurement of energy and demand impacts for photovoltaic systems participating in the SREC-Only pilot will be based on the rules and protocols for metering, reporting and verification that are expected to be developed in 2008. Prior to formal adoption of these rules and protocols, methods similar to those identified above will be used to estimate each systems annual energy production and coincident peak capacity production. Reported generation will be based on as installed conditions, as verified by site inspection documentation.

## Renewable Energy Development Initiative

Energy savings/generation for projects installed pursuant to the Renewable Energy Development Initiative will be determined on a case-by-case basis based on the information provided by project applicants, and inspection data for verification of as-installed conditions. The reported savings for each project participant in the REDI will be calculated and presented for review by the Office of Clean Energy.

Appendix A  
Measure Lives

**NEW JERSEY STATEWIDE ENERGY-EFFICIENCY PROGRAMS**  
**Measure Lives Used in Cost-Effectiveness Screening**  
**July 2001**

PROGRAM/Measure	Measure Life
<b><i>Residential Programs</i></b>	
Energy Star Appliances	
ES Refrigerator post 2001	17
ES Refrigerator 2001	17
ES Dishwasher	13
ES Clotheswasher	20
ES Dehumidifier	11
ES RAC	10
Energy Star Lighting	
CFL	6.4
Recessed Can Fluorescent Fixture	20
torchiere residential	10
Fixtures Other	20
Energy Star Windows	
WIN-heat pump	20
WIN-gas heat/CAC	20
WIN-gas No CAC	20
Win-elec No AC	20
Win-elec AC	20
Refrigerator/Freezer Retirement	
Refrigerator/Freezer retirement	8
Residential New Construction	
SF gas w/CAC	20
SF gas w/o CAC	20
SF oil w/CAC	20
SF all electric	20
TH gas w/CAC	20
TH gas w/o CAC	20
TH oil w/CAC	20
TH all electric	20
MF gas w/AC	20
MF gas w/o AC	20
MF oil w/CAC	20
MF all electric	20
ES Clotheswasher	20
Recessed Can Fluor Fixture	20
Fixtures Other	20
Efficient Ventilation Fans w/Timer	10

PROGRAM/Measure	Measure Life
Residential Electric HVAC	
CAC 13	15
CAC 14	15
ASHP 13	15
ASHP 14	15
CAC proper sizing	15
CAC QIV	15
CAC Maintenance	7
CAC duct sealing	15
ASHP proper sizing/install	15
E-Star T-stat (CAC)	15
E-star T-stat (HP)	15
GSHP	30
CAC 15	15
ASHP 15	15
Residential Gas HVAC	
High Efficiency Furnace	20
High Efficiency Boiler	20
High Efficiency Gas DHW	10
E-Star T-stat	15
Low-Income Program	
Air sealing electric heat	17
Duct Leak Fossil Heat & CAC	15
typical fossil fuel heat	17
typical electric DHW pkg	10
typical fossil fuel DHW pkg	10
screw-in CFLs	6.4
high-performance fixtures	20
fluorescent torchieres	10
TF 14	20
TF 16	20
TF 18	20
SS 20	20
TF 21	20
SS 22	20
TF 25	20
audit fees	20
Attic Insulation- ESH	17
Duct Leak - ESH	15
T-Stat- ESH	5
HP charge air flow	8
electric arrears reduction	1
gas arrears reduction	1
<b>Home Performance with ENERGY STAR</b>	
Blue Line Innovations – PowerCost Monitor™	5

**Non-Residential Programs**

C&amp;I Construction

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PROGRAM/Measure	Measure Life
Air Compressors with VFDs	15
Commercial Lighting — Remodel/Replacement	15
Commercial Custom — New	18
Commercial Chiller Optimization	18
Commercial Unitary HVAC — New - Tier 1	15
Commercial Unitary HVAC — Replacement - Tier 1	15
Commercial Unitary HVAC — New - Tier 2	15
Commercial Unitary HVAC — Replacement Tier 2	15
Commercial Chillers — New	25
Commercial Chillers — Replacement	25
Commercial Small Motors (1-10 HP) — New or Replacement	20
Commercial Medium Motors (11-75 HP) — New or Replacement	20
Commercial Large Motors (76-200 HP) — New or Replacement	20
Commercial VSDs — New	15
Commercial VSDs — Retrofit	15
Commercial Comprehensive New Construction Design	18
Commercial Custom — Replacement	18
Industrial Lighting — New	15
Industrial Lighting — Remodel/Replacement	15
Industrial Unitary HVAC — New - Tier 1	15
Industrial Unitary HVAC — Replacement - Tier 1	15
Industrial Unitary HVAC — New - Tier 2	15
Industrial Unitary HVAC — Replacement Tier 2	15
Industrial Chillers — New	25
Industrial Chillers — Replacement	25
Industrial Small Motors (1-10 HP) — New or Replacement	20
Industrial Medium Motors (11-75 HP) — New or Replacement	20
Industrial Large Motors (76-200 HP) — New or Replacement	20
Industrial VSDs — New	15
Industrial VSDs — Retrofit	15
Industrial Custom — Non-Process	18
Industrial Custom — Process	10
Small Commercial Gas Furnace — New or Replacement	20
Small Commercial Gas Boiler — New or Replacement	20
Small Commercial Gas DHW — New or Replacement	10
C&I Gas Absorption Chiller — New or Replacement	25
C&I Gas Custom — New or Replacement (Engine Driven Chiller)	25
C&I Gas Custom — New or Replacement (Gas Efficiency Measures)	18
Building O&M	
O&M savings	3
CHP	15
Compressed Air	
Compressed Air (GWh participant)	8