Solidifying the Foundation of Savings: A Review of NYSERDA's Methodology for Estimating Energy Benefits, One Kilowatthour at a Time

Scott Albert, GDS Associates, Inc.
Tom Rooney, GDS Associates, Inc.
Lawrence J. Pakenas, New York State Energy Research and Development Authority
Jennifer Ellefsen, New York State Energy Research and Development Authority
Helen Kim, New York State Energy Research and Development Authority

ABSTRACT

This paper summarizes the review of ten of the largest New York State Energy Research and Development Authority (NYSERDA) System Benefits Charge (SBC)-funded programs to assess the reasonableness of methodologies used to estimate program-level electricity (kWh) savings and peak demand (kW) reductions. Two of these program assessments are considered in detail.

Assessment of the ten programs has yielded defensible and informative results at significantly lower costs when compared to more traditional program impact evaluations. Each program's review includes the following:

1. NYSERDA Program Overview
2. Review of Savings Methodology in terms of:
   a. kWh Savings
   b. Measure Life
   c. Demand Reduction (kW)
3. Summary of Findings and Recommendations

A key element of the review is identification and assessment of studies conducted by other organizations on similar programs in order to verify algorithm and assumption reasonableness. By comparing NYSERDA's methods for estimating savings from specific measures and programs to the methods employed by other groups, the review establishes if NYSERDA's estimating conventions are considered reasonable. Reasonable in this context is defined as being in-line with common industry practices and procedures. This review also includes interviewing NYSERDA staff and contractors from the identified programs, where appropriate, to clarify their estimating methods and to better understand underlying assumptions.

Finally, this paper identifies critical items for future data collection that will improve the accuracy of key savings estimates.

The New York Experience

New York's public benefits program was established by order of the New York State Public Service Commission (PSC) in January 1998 (NY PSC 1998). The program began July 1, 1998, with funds collected by the electric utilities through a non-bypassable system benefits charge (SBC). The PSC designated NYSERDA as the Statewide administrator of most of the program funds. The remaining funds were administered by utilities to complete

or continue some of their existing energy efficiency and low-income programs. During the initial three years, a variety of programs and services were offered to improve the State's energy efficiency, reduce the energy burden of low-income users, and support research and development in energy efficiency, renewable energy technologies, and environmental monitoring and protection. NYSERDA's public benefits programs are offered under the service mark name of **New York Energy $mart**℠ (NYSERDA 2002).

The initial funding period for the **New York Energy $mart**℠ Program covered the period between July 1, 1998 and June 30, 2001. Of the $243.3 million collected for public benefit programs during this three-year period, approximately $172 million was administered by NYSERDA. In January 2001, the PSC issued an order extending the SBC for another five years and increasing the total funding to $750 million or $150 million annually through June 30, 2006 (NY PSC 2001). Of this amount, NYSERDA is administering approximately $139 million annually and the New York electric utilities administer $11 million annually for low-income assistance programs.

The PSC also increased evaluation funding for the **New York Energy $mart**℠ Program from $650,000 for the initial three-year program, to approximately $15 million for the five-year extended program. As a percentage of total program funds, evaluation funding represented 0.38% for the initial three-year period and is now 2% for the subsequent five-year period. (Note: The methodology presented in this paper was developed under the initial evaluation funding level of $650,000 – thus NYSERDA was tasked to provide substantiation of its savings estimate values with very little funding.)

NYSERDA's evaluation efforts for the initial three-year period were ultimately governed by the PSC's policy goals for the public benefits program. These goals were: 1) to promote competitive markets for energy efficiency services; 2) to provide direct benefits to electricity ratepayers, or to be of clear economic or environmental benefit to the people of New York; and 3) to improve system-wide reliability and peak reduction through end-user efficiency actions.[1]

Therefore, the savings methodology assessments focus on peak reduction (kW savings) as well as energy savings (kWh savings). Moreover, the assessments include the extent to which traditional energy production techniques, primarily fossil-fuel based, are offset by renewable, non-polluting energy sources through **New York Energy $mart**℠ Program delivery.

Savings Review Methodology

This paper presents a summary of GDS Associates' review of NYSERDA's methodologies for estimating electric energy and peak demand savings for specific **New York Energy $mart**℠ Program interventions. The purpose of these reviews was to assess the reported program-level kW and kWh savings for reasonableness. The reviews, performed in lieu of more costly and detailed impact analyses, evaluated the reasonableness of savings estimates used in each program, and, when appropriate, offered revisions to the methodology used to derive the estimates. The reviews also helped identify, for future data collection, critical items that could improve the accuracy and appropriateness of key estimates. The reviews used several methods and sources to verify the savings claimed by

[1] Initially there were two goals defined by the PSC, the third goal was added later in the process.

the programs and compared these savings estimates to similar programs in other parts of the country. A listing of the related studies and similar programs is included in the Appendix.

The first step of each program review was to fully understand the program and how current estimates were derived. GDS reviewed available program data from quarterly NYSERDA evaluation tracking reports, marketing materials, and program materials (e.g., incentive forms, lists of qualifying measures). In addition, GDS conducted informal interviews with appropriate NYSERDA evaluation staff and program managers, as well as contractors, to obtain program savings estimates, including the engineering algorithms and default input assumptions used to calculate the estimates.

The second step was to identify and review savings verification studies and/or evaluations that were conducted elsewhere in the country. This step also included conducting informal interviews with program staff and contractors that were involved in the design, implementation, and/or evaluation of these related programs.

NYSERDA's methodologies were then compared with those used by related programs. All recommendations and suggestions made by GDS were supported with examples and data included within the written reviews. In cases where NYSERDA had not yet developed an estimating methodology, GDS suggested an appropriate method. Each review included the following:

1. NYSERDA Program Overview
2. Review of Savings Methodology (NYSERDA's approach and comparison to approaches and results from similar programs around the country)
    a. Energy Savings (kWh)
    b. Demand Reduction (kW)
    c. Measure Life
3. Summary of Findings/Recommendations

The Savings Review Approach—What It Is (and What It Is Not)

The savings methodology reviews were not intended to encompass all of the aspects of traditional impact evaluations, but rather they resemble the components typically found in the "engineering review" section of such studies. For example, there was no on-site component to this approach and only a limited review of actual program participant data was undertaken. Moreover, because these reviews used the data compiled in more extensive evaluations and studies associated with similar programs as the basis for determining "reasonableness," this paper does not suggest that the approach described herein is a replacement for an impact evaluation. However, this approach has served two critical needs for NYSERDA, which are:

- Offering a substantiation of program savings from the most basic elements, including measure-specific engineering algorithms and associated operating assumptions; and,
- Serving as a screening mechanism, which allows NYSERDA to more appropriately channel future evaluation funding where additional data on key programs would help refine savings estimates.

By focusing on the components of each program that make up the basis for the reported level of kW and kWh savings, this approach solidifies the foundation of program

savings. Each assumption and algorithm is assessed and compared with those used in similar programs to establish whether NYSERDA's approach is reasonable. This review of algorithms that are used to estimate the savings, rather than only the resultant savings values, minimizes regional differences. To the extent possible, reasonableness conclusions are directly tied to relevant secondary research findings so that readers can consider the source(s) and review the primary study if desired.

Although this approach is limited by the existing research available, there is a diverse range of secondary sources available in the extensive evaluations conducted for utility programs in Massachusetts, California, Wisconsin, Texas, and other states. In cases where there was an issue or assumption that was not addressed in published evaluations or reports, industry experts were contacted for their insights. For example, the assessment of the impact of NYSERDA's ENERGY STAR® marketing campaign included both conversations with industry experts and interim findings from recent studies of similar efforts that raised questions for further evaluation.

Free-ridership, spillover, and market effects were not directly addressed in the savings methodology reviews. NYSERDA could not address these factors within the scope of the limited initial three-year program evaluation budget.

Examples of Savings Review Summaries

This section includes two examples in summary format. The examples are condensed versions of the reviews conducted for the Premium Efficiency Motors Program and the Wind Power and Development Programs. These reviews illustrate the issues and key findings from an energy efficiency program and a renewable energy program, respectively.

Premium Efficiency Motors Program

Overview

The Premium Efficiency Motors Program was designed to induce lasting structural change in the motor market resulting in increased use of National Electrical Manufacturers Association (NEMA)-premium motors in all commercial applications. By offering vendors monetary incentives and providing marketing materials NYSERDA aims to achieve the program goal of increasing the market share of NEMA-premium motors in New York.

In reviewing NYSERDA's savings estimating methodology, best practices of the following organizations were considered:

1. Northeast Energy Efficiency Partnerships, Inc. (NEEP);
2. Northwest Energy Efficiency Alliance (NEEA);
3. Southern California Edison (SCE);
4. Pacific Gas & Electric (PG&E);
5. San Diego Gas & Electric (SDG&E), and;
6. National Grid.

Note: The corresponding numbers are used to reference the various sources within this summary.

Savings Estimates

The following table highlights the findings from the review of savings for the Premium Efficiency Motors Program.

Program Component	NYSERDA's Method	Comments
kWh Savings	75% Load and DOE Hours	Consistent with all others
kW Savings	75% Load	Consistent with all others
Measure Life	15 years	Consistent with Sources 1 and 6

A. Energy Savings (kWh)

The basic engineering algorithm for determining savings associated with the installation of premium efficiency motors is universal for all programs reviewed in this report. The two inputs that vary according to the specific program assumptions are: (1) annual operating hours and (2) motor loading factor. Given the current program design, which targets upstream market actors (motor vendors), determining application-specific information for each motor sold is counter to the program's goals of maximizing motor sales. In lieu of such data, the assumptions that NYSERDA is using for annual operating hours and motor loading are reasonable and are derived from well-documented sources, primarily the 1998 DOE report, "United States Industrial Motor Systems Market Opportunities Assessment"(DOE 1998). In the absence of an in-depth metering study of motors installed and operating in New York, the assumptions used by NYSERDA to estimate the electricity consumption of baseline and premium efficiency motors are the best available.

Further study would be useful to assess the validity of assuming "average" annual operating hours for motors based on horsepower ratings. In addition, further research is warranted for determining actual motor loadings based on horsepower rating as well as on end-use application. To this end, several studies were noted to be underway, including: 1) Research from NEEA on the over-sizing of motors; 2) Research updating DOE's inventory data from the 1998 Report; 3) Research from PG&E focusing on operating characteristics of motors in the field; and 4) NEEP's database of motors program information.

Anecdotal information from the motor experts contacted for this savings methodology review indicated that the average annual operating hours as published in the DOE Report, and used in the NYSERDA savings estimates, are conservative and likely to be higher in the field. Conversely, the available anecdotal information, from the same sources, on motor loading indicates that 75% is optimistic and that actual loading in the field is probably lower.

B. Demand Savings (kW)

As discussed in the kWh Savings section above, the engineering algorithm used to determine demand reduction is universal. The 75% loading factor estimate appears to be commonly accepted as a default value when actual loading information is not available. As stated previously, based on anecdotal information, this value is considered to be optimistic and as such, the demand savings estimates shown in this report may be slightly overstated when viewed before consideration of market effects. It is important to restate that it is difficult to estimate an "average" loading factor due the wide variety of possible motor applications. This is exemplified by the range of loading factor assumptions used in motors programs, from 62% in the National Grid program to 100% in the SCE program.

In upstream motor programs, where the marketing and incentives are focused on the vendors and distributors of the motors, it is very difficult to accurately estimate peak demand reduction that is coincident with the utility grid system peak.

Based on the modest coincident peak reduction estimates and a determination noted by Southern California Edison that motor upgrades did not offer significant peak reduction, it appears that motors will be low on the list of programs contributing to reductions in peak demand. It is also noted that although the demand savings estimates are reasonable for quantifying the benefits of the motor program, they should not be used to provide a basis for load planning decisions due to the variability in actual motor loading and operating hours.

C. Measure Life

For determining lifetime kWh savings, NYSERDA assumes a measure life of 15 years. Other programs assume measure lives ranging from 10 to 20 years.

Findings / Recommendations

Based on the research conducted for the Premium Efficiency Motors Program Savings Review, this NYSERDA program appears to estimate the energy savings associated with the installation of energy-efficient motors in a manner that is consistent with the body of knowledge available in this area. Moreover, using the same set of assumptions and engineering calculations, reasonable estimates can be made concerning the corresponding kW demand savings.

While this report has attempted to illustrate the potential kW peak demand reduction resulting from installation of premium efficiency motors, it is concluded that these estimates contain too many critical assumptions to provide a basis for load planning decisions. Furthermore, it is concluded that the limited level of potential kW peak load reduction does not warrant the research necessary to refine these critical assumptions.

Wind Power and Development Programs

Overview

The goal of the Wind Power and Development programs is to foster the establishment and growth of companies focused on the development of clean and sustainable wind power generation. This includes companies involved in all stages of green power development such as installation, maintenance, engineering, and planning. Two major wind-related research and development (R&D) efforts are being implemented by NYSERDA: the Wind Prospecting Program and the Wind Power Plant Demonstration Program.

The Wind Prospecting Program is intended to increase the market for wind power generation by assisting developers with site location and financially mitigating some of the risks associated with development and operation of wind power plants. NYSERDA cost-shares site identification and characterization activities.

The Wind Power Plant Demonstration Program was designed to assist with the development of specific pilot wind power projects. Exceeding the program goal of 4 MW, the initial competitive solicitation for partners resulted in the construction of the 11.5 MW Madison Windpower project, which began operation on October 12, 2000. In addition, a 30 MW plant in Fenner, NY became operational on November 1, 2001. Program-wide the wind projects total a capacity of 41.5 MW.

In addition to reviewing NYSERDA's method of estimating savings, the best practices of the following wind projects and equipment manufacturers were considered:

1. Moorhead Public Service (Moorhead, MN; Minnesota Capture the Wind);
2. Madison Gas & Electric (Kewaunee County, Wisconsin);
3. Wisconsin Public Service (Kewaunee County, Wisconsin);
4. Platte River Power Authority (Wyoming); and
5. Vestas Wind Systems of Denmark.

Savings Estimates

The following table shows the assumptions and values used by NYSERDA when estimating savings from the program:

Critical Assumption	NYSERDA Value	Comments / Recommendations
Availability Factor	95%	Revised value based on Sources 2 & 4.
Capacity Factor	30%	Consistent with Sources 1-3.
Turbine Lifetime	20 Years	Consistent with Source 5.
Power Output	Specified power rating	Consistent with Sources 1-4.

A. Energy Generation (kWh)

Wind programs, being energy generation initiatives, while not reducing power consumption or demand, will offer a renewable, non-polluting, generation alternative to the fossil-fueled power generation facilities.

Estimated energy produced is based upon the rated generating capacity of the installed turbines and the estimated capacity factor of the wind-powered generator. NYSERDA assumes the capacity factor to be 30%. GDS recommends that NYSERDA modify its annual energy calculation formula to include a conservative 95% availability factor to consider maintenance and outage down-time or use a combined availability and capacity factor of 28.5% (95% estimated availability x 30% current capacity factor).

As part of its Wind Prospecting program, and hourly monitoring of its Wind Power Plant Demonstration projects, NYSERDA should continue its attempts to get the best historical wind information it can for use in calculating annual energy generation. Given the constant seasonal and annual fluctuations in (and site-specific nature of) wind speeds and frequencies, the longer the period of historical data, the more realistic an annual energy estimate can be derived. For these same reasons, NYSERDA should be careful not to rely on any one particular year's worth of wind data and/or operating history when calculating combined availability and capacity factors and ultimately determining kWh output.

B. Demand Savings (kW)

Based on installed capacity, NYSERDA's current estimate of renewable generation (nominal demand reduction) of 41.5 MW is appropriate. However, it is

important to note that on average over the year, the fossil-fueled capacity offset (actual demand reduced) would likely be less. This is due to one or more of the units not running at full output or at the same time at any particular moment during the year.

NYSERDA has not attempted to estimate the coincident peak demand contribution of the wind plants. GDS proposes an approximate value based on the monthly kWh generation values calculated by AWS Scientific, Inc. for Madison Windpower. From the monthly generation values, a dependable capacity factor can be assigned on a monthly basis. The Madison Windpower data indicate a capacity factor of 12% for the month of August, which is a typical peak summer month. Applying this value to the total 41.5 MW of wind generation developed through NYSERDA's Wind Power Demonstration R&D Project yields a coincident peak reduction value of approximately 5 MW. GDS believes that this represents a conservative value of dependable capacity for planning purposes, but suggests that actual wind conditions and plant performance continue to be monitored so that the combined availability and capacity factor can be updated based on a longer period of historical record.

C. Measure Life

As a conservative estimate, GDS recommends that NYSERDA continue to use the manufacturer's rated life of twenty years for the purposes of lifetime energy savings estimates.

Findings/Recommendations

Based on the projects reviewed and the performance of the Madison Windpower plant to date, it appears that NYSERDA's **New York Energy $mart℠** Wind Power Research and Development Programs are projecting accurate electricity generation values for their potential wind projects. To improve the accuracy of energy production estimates, GDS recommends that NYSERDA modify its annual energy calculation formula by replacing the current estimated 30% capacity factor with a combined availability and capacity factor (*i.e.,* 95% x 30% = 28.5% estimated annual plant factor) to account for documented history of turbine down time.

Appropriateness of Data Collection

Because the data collected and tracked within each program is critical for calculating savings, the savings methodology reviews also attempted to address the level of data collection for each program and offered recommendations as necessary. A common issue that arose when requesting specific queries or reports from program databases was that such information was not readily accessible. Although in most cases it was clear from the program incentive forms that the critical data were being collected, GDS was generally limited to the overall program totals (e.g., kWh, participants, dollars spent) as included in NYSERDA's quarterly evaluation tracking reports.

NYSERDA has acknowledged that the development of a comprehensive data tracking system is an important component of tracking savings estimates as well as refining future program offerings and is in the process of updating to a central database that will include all program information. A fully accessible data tracking system would allow an evaluator to poll specific information by a number of variables, including: energy end-use, efficiency

measure, customer size or region. This type of categorized information could be used to refine savings estimates, focus program efforts to underserved areas, and help to better inform NYSERDA on overall program effectiveness.

In some cases, the savings reviews have brought the need for such information to light and have helped to identify areas where such information is most useful. In the case of the commercial and industrial technical assistance programs, the review demonstrated that identifying the frequency of specific recommended measures would not only assist in estimating savings potential but also help in directing the focus of future programs. In addition, the tracking of custom measures through the New Construction and Commercial and Industrial Performance Program will form a basis for "average" savings values that are specific to NYSERDA projects.

Involvement of Program Implementation Staff

A unique aspect of GDS' reviews is the involvement of the NYSERDA program implementation staff throughout the process. This permitted more accurate and timely findings and provided an immediate feedback loop into the program. Findings from several of the completed reviews have led to real-time refinements in the methodologies used for estimating program savings. For example, the review completed for the Premium Efficiency Motors program indicated that the program implementation contractor could provide kW savings in quarterly program tracking reports.

As of this writing, the methodologies for estimating kW and kWh savings have been reviewed for ten NYSERDA programs. The following table presents a listing and brief summary of the methodologies currently in use by NYSERDA for estimating savings (or renewable energy generation) from each of the ten programs examined to date. A listing of the related studies and programs used in conducting the reviews is included in the Appendix.

Savings Methodologies for Ten NYSERDA SBC Programs

Program Name	Methodology Used	Recommendations
Premium-Efficiency Motors Program	Engineering estimates based on typical operating conditions, including a 75% loading factor and operating hours based on the 1998 DOE report.	Estimates are based on accepted engineering practices. Recommend that NYSERDA monitor ongoing research regarding "average" values for hours of use and loading factors.
Residential Appliances and Lighting Program and Energy Star® Awareness Program	Engineering estimates of savings from specific lighting applications and appliances based on typical installations. Plus estimates of market effects from Energy Star® campaigns.	Estimates are conservative. Major challenge to distinguish NYSERDA impacts vs. impacts from national campaign. Ongoing surveys should help to refine estimates. For lighting, surveys are being used to develop estimates of in-service rates, spillover and free ridership.
C/I New Construction Program	Engineering estimates, including building simulations, based on site-specific data. Prescriptive estimates for motors, lighting, unitary HVAC, and transformers. For whole building and custom measures, NYSERDA issued a list of current standard practices to ensure a consistent baseline.	Estimates are reasonable and both the prescriptive and custom measure estimating methods are consistent with other programs. NYSERDA's program is unique in its use of a current standard practice baseline that is 5% above New York State building code, yielding slightly lower savings.

Program Name	Methodology Used	Recommendations
Wind Power Research and Development Programs	Engineering estimates, including a 30% capacity factor, applied to historical wind data for a specific location.	Estimates are accurate but GDS recommends that a 95% availability factor be applied. Plant contribution at peak will require further monitoring.
C/I Technical Assistance Program and Institutional Performance Contracting Assistance Program	Estimates are based on evaluation findings from a large sample of NYSERDA projects that indicated 25 kWh in electric savings for every $1.00 of NYSERDA funding.	Estimates are consistent with other programs. GDS recommends that NYSERDA continue with its data collection of implementation rates and energy savings by specific measures.
Peak Load Reduction Program - Permanent Demand Reduction Efforts	Demand reduction estimates based on customer-reported implementation plans. Implementation plan is reviewed by 3rd party engineering firm for reasonableness of measure cost and savings. 3rd party engineer verifies installation and provides final approval of estimated demand reduction.	Estimates are consistent with similar programs. GDS recommends that coincidence factors be established to refine estimates of peak contribution.
Low Income Direct Installation Program	Lighting savings based on engineering estimates using reported wattage and DOE RECS room-by-room operating hours. Refrigerator savings is based on DOE ratings of pre- and post models.	Estimates are based on accepted industry practices and are consistent with other low-income programs reviewed.
Photovoltaic (PV) Power Programs	Engineering estimates, including a 16% capacity factor, based on historical Statewide insolation values.	Estimates are consistent with similar efforts nationwide. GDS recommends that capacity factor be reduced to 14% to account for converter efficiency and maintenance downtime. Estimates will be refined through monitoring of installed systems.
C/I Performance Program (formerly Standard Performance Contracting)	Engineering estimates are validated by energy savings measurement and verification (M&V) activities conducted in accordance with the International Measurement and Verification Protocol. Energy and demand savings estimates are refined at each stage of a project from application, to the detailed energy analysis (DEA), through M&V. On-site inspections are made prior to installation to verify baseline conditions and following installation to verify that the installed project is as approved in the DEA.	NYSERDA requires M&V as part of the CIP program. Performance-based incentive payments for energy savings are calculated based on the measured energy use over the performance period compared to the baseline energy use as defined in the M&V plan for each project. Energy savings estimates appear to be more reliable than for other programs due to the requirement for M&V.
Loan Fund	Per-unit values for pre-qualified equipment based on engineering estimates assuming baseline of standard efficiency and typical operating conditions (i.e., hours of use, average statewide climate). Custom measures estimated using accepted engineering practices. Increases in production efficiency are estimated based on the difference in kWh per unit produced.	GDS recommendations for pre-qualified savings estimates are currently under NYSERDA review. For production efficiency savings, no comparative method was found, however, the method of estimating savings based on the difference in kWh per unit produced appears sensible.

Conclusions

Given the breadth of NYSERDA's programs and the limited evaluation budget for the initial 3-year period, the approach to verifying the reasonableness of methodologies used to estimate energy savings associated with ten of NYSERDA's **New York Energy $mart**SM Programs was successful. As appropriate, kW and kWh savings estimates were refined based on the findings from each of the program reviews. Other savings methodology reviews are currently underway for ten additional **New York Energy $mart**SM Programs. These reviews will now include two new sections, one that specifically addresses data collection and reporting needs, and another that addresses non-electric savings estimates (e.g., fossil fuels and water).

References

New York State Public Service Commission. 1998. In the Matter of Competitive Opportunities Regarding Electric Service., Opinion No. 98-3. *Opinion and Order Concerning System Benefits Charge Issues*. Cases 94-E-092 et al.

New York State Research and Development Authority (NYSERDA). 2002. ***New York Energy $mart**SM* Program Final Report on the Initial Three-Year SBC Program and Interim Evaluation and Status Report.* Albany, NY.

New York State Public Service Commission. 2001. *Order Continuing and Expanding the System Benefits Charge for Public Benefits Programs.*

Department of Energy (DOE). 1998. *Motor Challenge: United States Industrial Motor Systems Market Opportunities Assessment.* Washington, D.C.: U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Office of Industrial Technologies.

Appendix

The following table includes a listing of related studies and organizations whose programs were assessed as part of the review process described in this paper.

NYSERDA Program Name	Organizations, Studies and Programs Reviewed
Premium Efficiency Motors Program	Northeast Premium Efficiency Motor Initiative Market Baseline and Transformation Assessment, Easton Consultants, 1999; Northwest Energy Efficiency Alliance (NEEA); Southern California Edison (SCE), Pacific Gas and Electric Company (PG&E), San Diego Gas and Electric Company (SDG&E), Northeast Utilities (NU), and National Grid.
Residential Appliances and Lighting Program and Energy Star® Public Awareness Program	Wisconsin Energy Conservation Corporation (WECC); NEEA; Regional Consortium of Massachusetts Investor-Owned Electric Utilities; National Grid Company (MA); Oregon Office of Energy; Commonwealth Edison (IL); and ACEEE Report: Selecting Targets for Market Transformation Programs: A National Analysis, 1998.
C/I New Construction Program	State of California's Savings By Design Program; NU's Energy Conscious Construction Program; National Grid's Design 2000 Program; Portland General Electric's Earth Smart Program; and Northern States Power's Energy Assets Program.
Wind Power Research and Development Programs	Moorhead Public Service's Capture the Wind™ project; Madison Gas and Electric (MG&E); Wisconsin Public Service Corporation (WPS); Platte River Power Authority; and Vestas Wind Systems.
C/I Technical Assistance Program and Institutional Performance Contracting Assistance Program	U.S. Department of Energy's Industrial Assessment Center (IAC) Program; Brazos Valley Energy Conservation Coalition (BVECC); Seattle City Light's Lighting Retrofit Program; and U.S. Department of Energy's Federal Energy Management Program (FEMP)
Peak Load Reduction Program - Permanent Demand Reduction Efforts	ACEEE Report: Using Targeted Energy Efficiency Programs to Reduce Peak Electrical Demand and Address Electric System Reliability Programs, 2000; Anaheim Public Utilities' Commercial / Industrial Energy Efficiency Programs; Sacramento Utility District's (SMUD) Retrocommissioning Program; MA Division of Energy Resources: 1999 Energy Efficiency Activities.
Low Income Direct Installation Program	NSTAR Low-Income Single Family Program; National Grid Appliance Management Program; Consolidated Utilities Co. (ConEdison); and New York State Electric and Gas Corporation (NYSEG).
Photovoltaic (PV) Power Programs	Massachusetts Electric Company; Western Massachusetts Electric Company; Solar Electric Power Association, and GDS Associates, Inc.
C/I Performance Program (formerly Standard Performance Contracting)	SDG&E; PG&E; SCE; and TXU Electric C & I Standard Offer Program (SOP).
Loan Fund	Nebraska Energy Office, Dollar and Energy Savings Loan Program; Texas LoanSTAR; Tennessee Small Business Energy Loan Program; National Grid, 2000 DSM Performance Measurement Report, 2001; ACEEE Report: Selecting Targets for Market Transformation Programs: A National Analysis, 1998; GasNetworks Regional Energy Efficiency Programs (Massachusetts); NSTAR's Residential High Use Program; and Electric Power Research Institute (EPRI) Engineering Methods for Estimating Impacts of Demand Side Management Programs, 1993.