

**PROCESS EVALUATION
of the
RENEWABLE ENERGY PROGRAMS
ADMINISTERED AND MANAGED
by the
NEW JERSEY BOARD OF PUBLIC UTILITIES
OFFICE OF CLEAN ENERGY**

EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

The Center for Energy, Economic and Environmental Policy (CEEPP) at the Bloustein School of Public Policy and Planning, Rutgers University, has been engaged by the New Jersey Board of Public Utilities to manage the New Jersey Clean Energy Program's evaluation activities and associated research. On May 27, 2004, Aspen was notified that it had been selected to perform a Process Evaluation of the portfolio of renewable-energy programs that are being managed and administered by the Board's Office of Clean Energy (BPU/OCE).

EVALUATION OBJECTIVES

The main objectives of the Process Evaluation are:

1. Assess the systems, processes and procedures for program management, financial management and quality control, and provide recommendations for improvements
2. Assess the systems for tracking information utilized for regulatory reporting, financial reporting and program evaluation, and provide recommendations for improvements
3. Review existing overall and program-specific goals, and assess whether programs are meeting them
4. Review existing metrics and recommend changes to metrics to measure success (such as performance indicators and goals)
5. Assess standards for reviewing applications and awarding incentives
6. Assess program impacts and update protocols for measuring energy savings (as needed)

PROGRAMS EVALUATED

Four renewable-energy programs are currently being administered and managed by the BPU/OCE:

The **Customer On-site Renewable Energy (CORE) Program** offers financial incentives to customers of the state's investor-owned utilities that install qualified renewable-energy generation systems on the customer's side of the electric meter. Incentives are structured in terms of four tiers determined by the type and rated capacity of the system. Four types of systems are eligible: Photovoltaic, small wind, sustainable biomass, and biogas- powered fuel cells. This program began in April 2001, and was managed jointly by the state's seven investor-owned electric and gas utilities until April 2003, when the BPU/OCE assumed management responsibilities. It is the largest of the four programs.

The **Renewable Energy Advanced Power (REAP) Program** supports the installation of large renewable-energy systems that supply electricity to the PJM Power Pool. Financial incentives are a combination of a "down payment" incentive of up to 20% and secured tax-exempt or taxable bonds for the balance of the construction costs. The program is delivered in partnership with the New Jersey Economic Development Authority (EDA).

The **Renewable Energy Economic Development (REED) Program** provides funding for renewable-energy businesses in New Jersey. The BPU is working with the EDA to provide

venture capital to businesses: the BPU/OCE will pre-qualify applicants in terms of their renewable energy involvement, and the EDA will assess the quality of the business plan. Funding will be made available to qualified applicants as recoverable grants of up to \$500,000 per business. (The companies will be required to pay back the money as their business venture begins to generate revenues.)

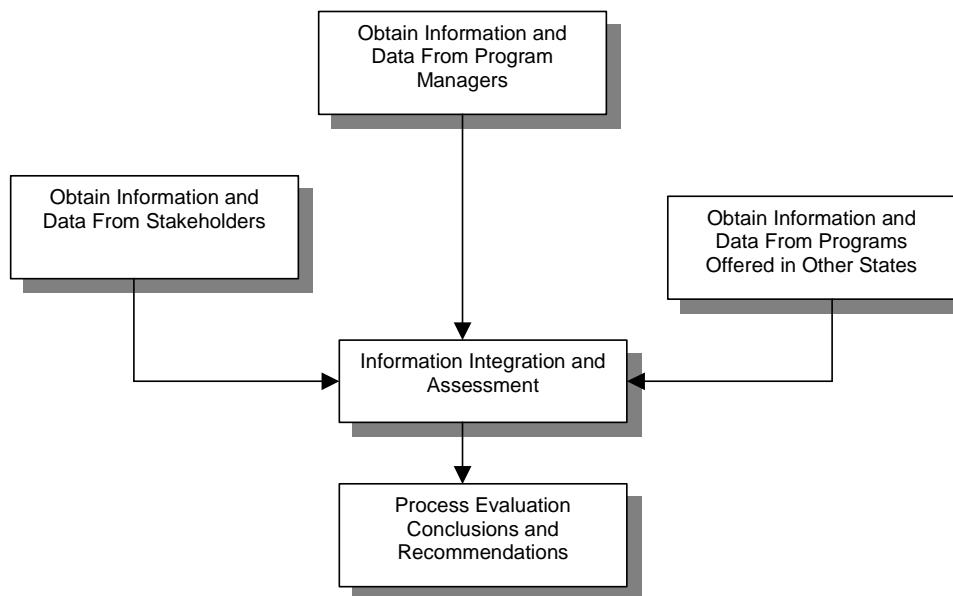
The **Reduced Energy Demand Options (REDO) Program** offers financial incentives and low-interest financing to governments and schools. This program allows local governments and schools to develop comprehensive energy-efficiency and renewable-energy projects, and to save money each month through the low-interest financing program. The BPU is working with the EDA to offer local governments low-interest, long-term financing that will cover the entire incremental cost of the projects.

RESEARCH CONDUCTED

The Process Evaluation covered the time period from April 2003 to the present, which began when the BPU/OCE assumed responsibility for both managing and administering the CORE Program. The project's approach is summarized in Exhibit ES-1. Data-collection efforts involved the collection, analysis, and interpretation of three types of data and information:

1. That obtained by interviewing BPU/OCE staff members, CEC members, and program-support contractors; and by examining and analyzing program records and documents.
2. That obtained via survey interviews with actual program participants, potential program participants, and trade allies. (The latter group includes installers and dealers, manufacturers, builders and developers, and architects and engineers.)
3. That obtained by reviewing Websites, reports and papers pertaining to similar programs offered in other states and countries, and by interviewing the persons who administer these programs.

Exhibit ES-1: Aspen's Process Evaluation Methodology



In addition to the six Evaluation Objectives listed above, Aspen also researched four additional Objectives:

7. Assess the process followed to develop and implement new programs
8. Assess the manner and extent of coordination among the various programs
9. Assess program marketing and outreach activities
10. Assess motivations for and barriers to program participation

The data-collection effort involved more than 350 interviews. After the data-tabulation and analysis was completed, the leaders of Aspen's evaluation project team compiled Findings from all sources that pertained to each of the ten Objectives. These Findings were then reviewed to identify Conclusions, and from these the Recommendations were developed. The Recommendations were based on: 1) Aspen's experience in designing and operating successful energy-efficiency programs, and 2) the practices followed in renewable-energy programs offered in other states. The Findings are summarized in Chapter 4 of the main report. The Conclusions and Recommendations applicable to each Objective are summarized below.

Several of the conclusions and recommendations apply to more than one objective. This crossover is identified in the respective sections.

CONCLUSIONS AND RECOMMENDATIONS

OBJECTIVE 1: Assess the Systems, Processes and Procedures for Program Management, Financial Management and Quality Control, and Provide Recommendations for Improvements

Systems, Processes and Procedures for Program Management

Conclusions

The systems, processes and procedures used by the BPU/OCE to manage the renewable-energy programs are efficient and effective in concept, but execution has been much less than ideal because the volume of work to be done exceeds that which the existing staff complement can handle accurately on a timely and consistently error-free basis. The present BPU/OCE staffing level is inadequate to sustain efficient and timely management of the renewable-energy programs. Reporting and record keeping have suffered, as have the ability to carefully plan future activities and programs, to document procedures, and to resolve outstanding issues concerning CORE Program rule refinements. In addition, some important quality checking steps are not being performed. (Further information concerning these matters is presented under many of the other Objectives.)

Plans are underway for the BPU/OCE to hire an experienced program-implementation organization to manage the CORE Program. This action would eliminate the problems caused by the current staffing shortage, but the process of soliciting and evaluating proposals, selecting the contractor, and negotiating a contract will take several months, and therefore, interim solutions such as temporary staffing are important.

Some installers have noted that they feel they are "out of the loop" because they are not informed about proposed program rule changes and upcoming meetings of the Clean Energy Council's

Renewable Energy Committee. Therefore, improved communications with stakeholders are warranted.

As is discussed below under Objective 8, the BPU/OCE has not as yet formulated and documented the details of how it will work with EDA to review applications submitted for the REAP, REED and REDO Programs.

Recommendations

1. In recognition of the time delays associated with hiring a third-party organization to manage the CORE Program on its behalf, the BPU/OCE should proceed quickly to:
 - A. Train more staff (either new hires, temporaries, or transfers from another state agency) and assign them to work on the routine aspects of the CORE Program. Senior BPU/OCE staff would then have time to pursue the following tasks:
 1. Add additional fields to the CORE Program Database and correct errors (see detailed list provided under Objective 2)
 2. Publish a Guidebook for each program that contains all program rules, and make these documents available for downloading from the NJCEP Website
 3. Write out rules for processing applications and managing program financial obligations, including financial tracking and management procedures for the recommendations described under “Systems, Processes and Procedures” below
 4. Have queries prepared that enable important data summaries to be easily and routinely extracted from the CORE Program Database, and issue program status reports on a timely basis
 5. Develop and implement solutions to the other issues identified in this evaluation.
 - B. Organize its relationship with EDA for the joint activities needed to make the REAP, REED, and REDO Programs successful.
2. Issue the RFP and proceed to contract with a third party to manage the CORE Program. Because the level of activity on the other programs is quite low, we recommend that the BPU/OCE continue to manage them, at least until the level of activity increases to the point where they require much more staff effort than is currently the case.
3. Develop an “Interested Parties” list for each program and use this list to disseminate draft rule or procedure changes and notices announcing forthcoming meetings convened by the Clean Energy Council’s Renewable Energy Committee.

Systems, Processes and Procedures for Financial Management

Conclusions

A commercial bank is used as “fiscal agent,” to hold the SBC funds¹ collected by the utilities, and to disperse funds (e.g., to pay contractors and issue rebate payments) when authorized to do

¹ “SBC funds” means the funds obtained via a “System Benefit Charge” assessed on the electric and natural gas bills of customers of the state’s regulated electric and gas utilities. This charge provides funding for all the NJCEP energy-efficiency and renewable-energy programs.

so. The procedure for issuing these authorizations (three signatures required) appears to be sound.

A routine financial audit of revenues and expenses (i.e., fund collections and distributions) is currently being performed by the New Jersey Department of the Treasury.

The procedures presently being followed to verify that rebate amounts are being correctly calculated are not as rigorous as they should be. As is described under Objective 2, the basis for these calculations is not being properly recorded in the CORE Program Database.

Monthly and quarterly status reports are not being prepared in a timely manner, at least in part because considerable effort is currently required to extract data summaries, such as "Amount of current rebate commitment" (further details are provided under Objective 2). As a result, expenses and budgets are not being routinely tracked or forecast, which impedes the BPU/OCE's ability to properly manage the budget for the programs. This creates the potential risk that funding may be over-committed before staff becomes aware of the issue. (There are indications that the CORE Program budget may already be over-committed, or is very close to that status.)

The New Jersey School Construction Corporation (SCC) provides grants to public school districts to support school construction and renovation projects. Some school districts systems perceived that the combination of the CORE Program rebate and a SCC grant would pay all of the cost of installing a solar PV system. The BPU/OCE's initial acceptance of this assumption has set a precedent that the BPU/OCE thinks now may be incorrect because the program rules explicitly require that the maximum percent of installation cost that may be rebated is the cost net of any other grants or funding. A large number of CORE Program applications have been submitted by school districts. If approved, these applications would further aggravate the budget over-commitment problem, and would eliminate the opportunity for others to participate unless the budget were increased. The BPU/OCE has not acted on the applications, to either accept or to reject them, because the legal and policy situations are unclear.

Recommendations

1. The BPU/OCE should proceed quickly to:
 - A. Establish timely financial-management procedures. These should include:
 1. Data entry of application-specific financial transactions and decisions, with dates, within 24 hours of the transaction or decision.
 2. Establishing a rebate-commitment level (e.g., 90% of budget) at which management action must be taken on whether to approve pending applications or to establish a waiting list. (Factors that would affect this decision are: 1) proximity to the end of the fiscal year,² 2) expected or authorized budget for the coming year, and 3) the percentage of applications expected to lapse or be cancelled.)
 3. Establishing automated queries for preparing financial reports, including a daily report showing current rebate-commitment level.
 4. Establish clear responsibility for advising the Clean Energy Council when the rebate-

² Projects that are not expected to be completed until the next fiscal year would be paid from that budget and not the current year's budget. The waiting list approach should be used once it is clear that approved rebates will reach any year's annual budget ceiling.

commitment level reaches the pre-determined limit.

- B. Resolve the issue of computing the rebate amount when the applicant has access to other funding.

Systems, Processes and Procedures for Quality Control

Conclusions

Two types of quality control are relevant:

1. Program quality consisting of: Actions taken by the BPU/OCE to assure that its internal processes operate smoothly and efficiently, that program rules are publicized and adhered to, that complaints are responded to promptly, that applications are processed expeditiously, and that rebate amounts are calculated correctly.
2. Product quality consisting of: Steps the BPU/OCE takes to help ensure that program participants will be satisfied with the performance of the systems that are promoted and installed by the program.

The first type of quality control has been discussed above, and is also discussed under Objective 2. The second type is primarily a concern only in the case of the CORE Program. Product quality is encouraged by:

- ◆ Requiring that equipment manufacturers provide a warranty (5-year minimum)
- ◆ In the case of solar installations, requiring that sun access is available in all seasons (with minimal shading by trees or other structures). In the case of wind-powered generators, requiring that the turbine be mounted well-above surrounding trees or buildings.
- ◆ Requiring compliance with the National electrical Code (as evidenced by passing an inspection conducted by a Code Official)
- ◆ Requiring approval of the installed system by the Program's QC Inspector

Several installers who were interviewed noted that the local Code official was unfamiliar with the technologies, and this required the installer to spend a considerable amount of time "educating" the inspector.

Virtually all the installers who were interviewed were highly complimentary of the Program's QC Inspector. Our interview with the Inspector confirmed this opinion. We learned, however, that the Inspector does not use an Inspection Form to record findings, and does not have an Inspection Procedures Guide. Prudent quality-assurance practices suggest that an Inspection Form should be used to ensure that nothing is missed. This will help to ensure that high-quality inspections will continue should the current inspector become incapacitated or be unwilling to perform the work for any reason in the future.

The Evaluation scope included performing on-site re-inspections of a sample of 25 systems that have been in operation for a year or more. The objective was to learn whether any changes to the final inspection protocol are needed to improve quality. The results from this series of re-inspections showed that all systems, except one, were performing very well, and the owners were highly satisfied with both the systems and the program. Some installations showed the beginning signs of rust and corrosion of mounting hardware. (The single system that was not performing well had design flaws. The manufacturer discontinued the model and changed the design. The system owner is negotiating with the manufacturer to obtain corrective action.)

Recommendations

1. Reinstate the series of training seminars that were previously offered to local Code Officials and continue to offer them periodically.
2. Have the QC Inspector prepare and use an Inspection Form and Inspection Procedures Guide. Add a line item to the form to cover inspection of materials used for mounting frames, electrical cables and connectors, and fasteners to verify that they are not subject to rusting and corrosion.
3. Include as an explicit requirement in the Program rules that materials used for mounting frames, electrical cables and connectors, and fasteners are not subject to rusting and corrosion.

OBJECTIVE 2: Assess the Systems for Tracking Information Utilized for Regulatory Reporting, Financial Reporting and Program Evaluation, and Provide Recommendations for Improvements

Conclusions

The Core Program Database is comprehensive, but it has some significant errors and omissions that urgently need to be corrected. Queries need to be written to extract data summaries needed for monthly and quarterly reports. Because these queries have not been written, a considerable amount of effort is needed to extract the data summaries needed for monthly and quarterly reports. Because of the pressure on staff to process applications and tend to other pressing duties, the data has not been extracted and reports have not been prepared in a timely manner. (We understand that the report for the 2nd Quarter of 2004 was issued in early November, as this report was being finalized.)

The problems with the CORE Database include the following:

- ◆ There are no entries in several important date fields.
- ◆ Some date entries are not accurate; they appear to be a record of the date when the entry was made, and not the date when the event defined in the column heading occurred.
- ◆ Numerous rebate amounts appear to be incorrectly calculated (see below).
- ◆ The “Total System Rated Capacity” field has a large number of errors. Entries in this field are supposed to be expressed as conventional alternating-current (AC) kilowatts (kW), obtained by multiplying “System Size” capacity in DC (direct current) units by Inverter Efficiency. The numerical values shown for some records reflect this multiplication, but many do not. Many Inverter Efficiency entries are missing. The field heading should include the units (“AC kW”), to help to avoid confusion between DC and AC values.
- ◆ The “Status” field does not have a “Reservation Cancelled” category. The database does not have a field to indicate the reason for the cancellation, and another field to record the date when the status change from “Approved” to “Reservation Cancelled” was made.

- ◆ There are no fields where the following can be recorded:
 - 1) The date when evidence was submitted that an applicant has executed a contract for system installation
 - 2) The date when a letter notifying the applicant that their Rebate Reservation has been cancelled (in the event that such a letter needs to be sent)
 - 3) The total rated capacity (DC Watts), and the actual total cost, of the system actually installed (as recorded on the Final Application)
 - 4) The total rated capacity (DC Watts) of the system actually installed, and the outcome of each QC Inspection (as recorded on the QC Inspector's report)
 - 5) The date of each QC Inspection³
 - 6) The two provisional rebate amounts (one based on \$/Watt and the other based on the percentage cap)

The following paragraphs discuss the various Database "issues" listed above.

Apparent Rebate Amount Errors. Aspen reviewed the numerical values that appear in the "Rebate Amount" field of a copy of the CORE Program Database provided by BPU/OCE for PV systems 10-kW and smaller. The rebate amount is supposed to be the lesser of the values calculated from applying: (1) the \$/Watt algorithm to the "System Size (DC Watts)" value, and (2) the maximum percentage of the project cost that can be rebated to the "Installation Cost" value. We performed these calculations and found apparently incorrect Rebate Amount entries for at least 56 applications (12% of all PV applications for systems 10 kW or smaller).

When we discussed the apparent errors with program staff, we were told that the numerical values recorded for System Size and Installation Cost were initially obtained from the Pre-Installation Application. These values are supposed to be updated (changed) when the values shown on the Final Application are different. Evidently, this updating step had not been done. We were told that the Rebate Amount values are correct, and were based on the System Size and Installation Cost values shown on the Final Application. We also noted several instances in the case of solar PV systems rated 10 kW or smaller where "60%" or "40%" (instead of "70%") is incorrectly shown for the percentage rebate cap. We were told that the correct value was used in the calculation. (If a percentage that is too low is used, the rebate paid will be smaller than it should be. It is very likely that the system owner and installer expect the rebate will be a certain amount, and if it is a smaller amount they will quickly ask the BPU/OCE for an explanation.)

The scope of this project did not include performing an audit to verify that the Rebate Amounts shown in the Database are correct. Rather, it was to identify areas where program process improvements were needed. The addition of fields where the DC Watts and Total Installed Cost values that appear on the Final Application form can be recorded, and fields where the calculation of the two provisional rebate amounts is captured (as well as the final amount of Rebate Amount paid), would serve to:

1. Minimize the likelihood that an error is made in determining the rebate amount,
2. Help to ensure that all important data appears accurately in the Database, and
3. Facilitate a QC verification that the rebate amount is correct.

³ Only the date of the last inspection performed is currently being recorded.

“Commitment Cancelled” Status Category. The addition of the “Commitment Cancelled” status category would mean that the “Approved” status would apply only for systems that: (1) comply with all program rules, and (2) have not been withdrawn. It then would be an easy matter to generate a report showing accurate data for systems “in the pipeline” (i.e., those for which a Rebate Reservation exists), including aggregate capacity and aggregate future rebate obligation. Without this designation, a great deal of effort is required to develop aggregate data summaries for reports.

“Total System Rated Capacity” Errors. The problem involving the “Total System Rated Capacity” field originates on the Technical Worksheet, where Item 8 is incorrectly labeled “DC Watts” (which is the same as Item 3). It is at this location on this form where the applicant is supposed to multiply Total Array Output (expressed as DC Watts) [Item 3] by Inverter Efficiency [Item 7] to obtain AC Watts.⁴

QC Inspection Results. The DC Watts metric, Inverter manufacturer and model designation information, and Inverter Efficiency are obtained from the Technical Worksheet. The actual installation is verified by the Program QC inspection to confirm that the proposed capacity and inverter shown on the Technical Worksheet were, in fact, installed. However, the results from the inspections are not recorded in the Database. At the present time, the only entry is “Date Inspection Completed.” It would be useful to be able to query the Database to obtain information such as how many repeat inspections are required for each installer, and the reasons for failed inspections. This information would help to identify potential areas for program improvement.

“Process-Performance” Metrics. The CORE Program Database does not have fields showing elapsed time between key events (e.g., days between receipt of an application and disposition of the application). By recording and tracking these “process-performance” metrics, the BPU/OCE would have a way to gauge its performance and refute spurious charges that it takes too long to approve applications and issue rebate checks.

Tracking All Program Expenditures. The CORE Program Database is not used to record and track expenditures other than rebates. The addition of fields in which to record other expenditures would enable the BPU/OCE to better track expenditures vs. budget, and to more quickly compile data for monthly and quarterly status reports.

REED Program Database. The REED Program database is adequate for tracking progress at the current level of program participation and activity.

Recommendations

1. The following fields should be included in the CORE Program Database:
 - ◆ Last Date When Evidence of System Installation Contract Can be Submitted (90-days after Approval Letter Date)
 - ◆ Date When Evidence of System Installation Contract is Received
 - ◆ Date Applicant Notified that Rebate Reservation has been Cancelled
 - ◆ Date of the last “Status” Change
 - ◆ Days Elapsed from Application Received Until Disposition Action
 - ◆ Days Elapsed from Final Application Until Disposition

⁴ The purpose of the inverter is to transform DC power produced in the solar array to conventional AC power.

- ◆ Total Rated Capacity (DC Watts) of the system actually installed (as recorded on the Final Rebate Application)
 - ◆ Actual Installation Cost (as recorded on the Final Rebate Application)
 - ◆ Total Rated Capacity (DC Watts) of the system actually installed (as recorded on the QC Inspector's report)
 - ◆ Outcome of Each QC Inspection
 - ◆ Date of Each QC Inspection
 - ◆ Provisional Rebate Amount based on \$/Watt Algorithm
 - ◆ Provisional Rebate Amount based on the Percentage Cap
 - ◆ Expenditures by Category (e.g., Staff, Supplies, Contractors, Travel)
2. Date entries to the CORE Program Database should be accurate (e.g., the actual date an item of paperwork was received or inspection performed). The errors in Total System Rated Capacity should be corrected. There should be no missing entries ("N/A" should appear wherever an entry is not applicable).
 3. The Status field should have "Reservation Cancelled" as an optional entry.
 4. The BPU/OCE should immediately initiate a careful review of all of the rebate calculations in the CORE Database. (The BPU/OCE should consider using CEEEP or an independent party to conduct this review.)
 5. The BPU/OCE should immediately initiate a procedure requiring a sign-off by both the individual who made the original calculation of rebate amount and a QC reviewer.
 6. The programs should move quickly to hire or contract with a qualified Database-management professional to implement the recommendations listed in this section. Up to a week's time should be anticipated for this effort for the CORE Program and lesser amounts for the other programs. If an individual is hired, the person could become a part-time Database manager for all programs. The initial task for this individual or firm should be to:
 - A. Add the fields listed in Recommendation 1 above
 - B. Develop standardized queries to extract data summaries from the CORE Database. This will help to free-up staff time and enable the data summaries to be available in a timely manner for monthly and quarterly reports, and daily when there may be a concern that the rebate commitment is nearing the budgeted amount.
 7. Each member of the BPU/OCE staff who is responsible for a program should use the queries developed by the Database management professional to prepare Monthly Status Reports that provide an overview of status in terms of the numbers of applicants or participants, system kW planned or operating, and rebate amount committed or paid, for each Status category. The report should also show funds committed and funds remaining, issues in the resolution process, etc. In the case of Programs such as CORE that involve a complex, multi-step process, the report should document metrics that track "process performance."
 8. Add expense records (other than rebate amounts) to the Databases.

OBJECTIVE 3: Review Existing Overall and Program-Specific Goals, and Assess Whether Programs are Meeting Them

Conclusions

The overall quantitative goals of the NJCEP renewable-energy programs are:⁵

- A. 300 MW of Class I renewable-energy generating capacity installed by 2008
- B. 90 MW of solar PV generating capacity installed by 2008 (30 percent of the 300 MW).

However, no plan appears to exist that projects the annual contribution of the NJCEP's individual programs to these overall goals. Thus, from a management perspective, monitoring progress toward the overall goals must be subjectively based on the annual achievements of the individual programs. Interviews with BPU/OCE staff and other individuals associated with the programs indicate that there is strong focus on the *general* goals of increasing renewable-energy generation and establishing a renewable-energy infrastructure in New Jersey rather than managing progress toward the specific overall quantitative and qualitative goals.

At present, an annual budget is established for each renewable-energy program, and each program attempts to achieve as much progress as possible, given its mission. No evidence was found of an expected relationship between annual budget and quantitative annual goals.

Success in meeting the Board's 2008 renewable-energy generating capacity goals may be impeded by a factor that is external to the state's scope of control. There are some indications that solar PV panels may be in short supply during 2005 and perhaps beyond. Solar programs in other states and other countries have produced a demand for PV modules that exceeds aggregate production capability. Although production capabilities are expanding, demand continues to grow. Hence, shortages may develop that slow the rate at which installations are completed.

Review of the CORE Program Database indicates that installed capacity, annual generation, savings, and emissions-reductions are not being correctly calculated in all cases. The other parameters are derived from installed capacity, and as was noted under Objective 2, the latter quantity is sometimes wrong because of confusion between AC and DC values.

An Impact Evaluation to measure the *actual* kW and kWh (AC and DC) output of a sample of installed systems would add confidence to the nominal energy metrics that are currently recorded. These results could be used to develop a set of "realization rate" values.⁶

The CORE Program's rebate structure is also relevant to achieving the goals. The existing rebate structure has a sharp decline at 10.0 kW, dropping from \$5.50/Watt to \$4.00/Watt at this point. Our analysis of the CORE Program Database disclosed that 34 percent of the applications are in the 0-kW to 5.0-kW range, 45 percent are in the 5.01-kW to 10.0-kW range, but only 5 percent are in the 10.01-kW to 30-kW range. This analysis supports the suspicion that the drop in rebate rate at 10.0 may be too great because the cost of an installation does not decrease as rapidly.

⁵ NJBPU Order, Agenda Date: 4/28/04, In the Matter of Appropriate Utility Funding Allocation for the 2004 Clean Energy Program, and In the Matter of Comprehensive Energy Efficiency and Renewable Energy Resource Analysis, Docket Nos. EX03110946 and EX04040276.

⁶ The realization rates would be a pair of coefficients defined as the ratio of actual metered output power to nominal output, and actual annual electricity generation (MWh) to nominal generation.

Aspen's analysis of the CORE Program Database also indicates that the installer often quotes a total cost such that the percentage cap times this price is approximately the same as the rebate amount calculated on the basis of the \$/Watt algorithm. This finding suggests that, in situations where the installer is not competing for the sale, the percentage caps on rebate amounts may be helping to keep system prices high. We note that the BPU/OCE is attempting to encourage purchasers to seek multiple price quotes. This activity is very worthwhile and should be strengthened.

A financial incentive in the form of a series of periodic "performance payments" instead of an initial rebate have been successful in Germany and plans are being made to test them in California. An alternative is to offer both forms of incentive. The advantage of performance payments is that all parties are incentivized to be sure that installed systems actually produce as much electricity as possible, year after year.

California has a policy of reducing the rebates by a small amount (\$0.20/Watt) every six months. The objective is to have a slow but steady withdrawal of financial incentives. The creation of RECs with economic value to system owners may mean that New Jersey can adopt a similar policy.

Recommendations

The recommendations for Objective 3 are divided into recommendations concerning *program impact goals* and recommendations concerning *program operational, or process, goals*.

The following recommendations have the objective of creating individual program *impact goals*. Such goals will allow program management to monitor aggregate progress toward the State's overall impact goals and make timely adjustments to either the programs' procedures or its goals to keep the goals and performance consistent with the market realities.

1. Annual capacity goals (MW) should be set for each of the programs that are contributing to the 2008 Class I renewable-energy installed generating capacity goals, i.e., the CORE, REAP, and REDO programs. These goals—and program accomplishments toward them—should be expressed in annual peak MW and MWh units (based on the common 60-Hz AC power standard).
2. Once annual capacity goals are established for the CORE, REAP, and REDO Programs, the overall quantitative goals set for all renewable-energy programs and all solar PV programs should be re-evaluated annually in the context of the individual programs' aggregate performance.
3. The REED Program, which does not directly result in the installation of renewable-energy generating capacity, should also have a set of quantified annual goals extending over the period of the project or activity and from one to four years into the future. These might include:
 - A. The number of new businesses established in New Jersey annually as a result of program loans
 - B. The number of existing businesses expanded annually as a result of program loans
 - C. Specific increases in units of renewable-energy equipment manufactured in New Jersey over the four years

- D. The number of new jobs added in New Jersey annually
 - E. The annual amount of new tax revenues
4. The types of non-generating-capacity goals listed above for the REED Program can also apply to the REAP Program.
 5. For the REDO Program, the number of schools and municipalities participating, and resulting quantifiable demand, energy, and emissions impacts, should be goals.
 6. For all programs, quantitative goals should be established to monitor progress toward the following overall *qualitative* goals:
 - A. *Making energy service more affordable for low-income customers*: The projected reduction in electricity price (\$/kWh) that can be attributed to the growth of self-generation from renewable resources. The estimated savings from this projection will be for all New Jersey ratepayers, including low-income customers.
 - B. *Eliminate funding for programs that can be delivered into the market without SBC funding*: The annual change in the renewable-energy generation capacity installed in New Jersey as rebate levels are gradually decreased. This is also a market transformation goal.
 7. Each funded project should have a formal “Mission Statement” Qualitative goals should be established for programs for which quantitative goals are not appropriate.
 8. The CORE Program’s rebate structure should be carefully reviewed to identify beneficial and cost-effective changes. Consideration should be given to changing to a “production payment” type of incentive (or to a combination of small rebate and production payment), especially for larger systems (e.g., 50 kW and larger) where it is likely that “revenue-grade” metering is already installed and record-keeping is probably already being done.
 9. Increase efforts to encourage potential CORE and REDO Program participants to solicit competitive bids from installers.

The following recommendations have the objective of creating program *process* goals. Such goals will give program management a benchmark for assessing whether adjustments to individual program processes might improve operational efficiency. Process-related goals should be limited to the processes that are critical to evaluating program performance and accountability. They should be address processes that program staff can control and not involve processes that can be significantly affected by external events.

10. For all programs:

- A. Average time between customer-initiated and program-initiated activities. Using the CORE program as an example, these would include average time between:
 - ◆ Initial application and program decision
 - ◆ Final application and program QC inspection
 - ◆ Final application and mailing rebate check
 - ◆ Request for utility meter and actual installation
- B. Compliance with budgetary limits while maintaining continuous program operations
- C. High levels of participant satisfaction.

OBJECTIVE 4: Review Existing Metrics and Recommend Changes to Metrics to Measure Success (such as performance indicators and goals)

Conclusions

Several of the appropriate impact metrics for the CORE and REAP Programs are being calculated at this time (e.g., MW installed and operating, annual MWh generated); however, they are not being calculated properly (as noted previously under Objective 2).

A number of metrics on the performance of the programs' *processes* that could be used to monitor operational efficiency are not being calculated and tracked. Examples of these metrics include: the time (days) between receipt of an acceptable Final Application and (a) the date of the Program QC Inspection, and (b) mailing of the rebate check.⁷ Other process metrics could be the time it takes for the utilities to approve the Interconnection Agreement, and to install a suitable meter, if needed (both by utility), and the number of installations that fail the first program inspection, by installer.

There are no clearly established metrics of any kind for the REED and REDO Programs.

We understand that a formal plan for periodically evaluating the programs is currently being developed by CEEEP and the BPU/OCE.

Recommendations

1. Establish a formal plan for periodically conducting independent impact and process evaluations using indicators such as those listed in these recommendations. This plan should take into consideration the goals discussed and recommended under Objective 3 plus other metrics that can be used to identify need for improvement in specific activities. The schedule for these independent evaluations should specify that they be conducted every two to three years.
2. As noted previously under Objective 2, the procedures for calculating MW, annualized MWh, and emissions reductions should be corrected.
3. In addition to the *impact* metrics required to track progress toward the goals (Objective 3) the following impact metrics should be defined and measured:

⁷ This was also listed under Objective 3.

A. For the CORE and REDO Programs:

1. Estimated annual electricity cost savings for participants
2. Annual number and value of solar renewable energy certificates sold
3. Persistence of systems' operations as determined by a periodic, e.g., every two years, sample on-site meter survey. This survey should record reasons for any deterioration of system output and system failures.
4. The amount of annual state funding provided for installations compared to the aggregate annual value of installations installed. This indicator evaluates both program leverage and progress toward market transformation by comparing the annual private investment in outcomes desired by the programs to the funding invested in them by New Jersey.

B. For the REED Program:

1. The number of new renewable-energy businesses established in New Jersey annually that do *not* use program loans. This is also a market transformation metric.
 2. The amount of new annual tax revenues from renewable-energy businesses established or improved *without* program loans. This is a market transformation metric.
4. In addition to the *process* metrics required to track the operational efficiency of the program (Objective 3), the following process metrics should be defined and monitored.

A. For the CORE and REDO Programs:

1. A projection of rebate funding requirements based on the rate of program operations and other factors
2. The monthly, annual, and cumulative numbers of Pre-Installation and Final Applications that are (a) received for processing, (b) approved, and (c) rejected or returned because of missing information
3. The monthly, annual, and cumulative numbers of Pre-Installation Applications that lapse because either: (a) evidence of an installation contract was not received within 90 days, (b) the installation was not completed within the prescribed time, (c) application withdrawn, and (d) the QC inspection cannot be passed because one or more requirements are not satisfied.
4. The monthly, annual, and cumulative numbers of Pre-Installation Applications for which a time extension has been: (a) requested, (b) granted, and (c) refused.
5. The monthly, annual, and cumulative percentages of installations that fail the first QC inspection
6. The monthly, annual, and cumulative numbers of installer and Code Official training sessions held, and numbers of individuals trained

B. For the REED and REAP Programs

1. The monthly, annual, and cumulative numbers of applications that are (a) received for processing, (b) approved, and (c) rejected or returned because of missing information
2. The monthly, annual, and cumulative numbers and dollar values of contracts:

- (a) underwritten, (b) completed, (c) behind schedule, (d) cancelled, (e) repaid, and (f) determined to be in default status.

OBJECTIVE 5: Assess Standards for Reviewing Applications and Awarding Incentives

Conclusions

The BPU/OCE's procedures for reviewing applications are appropriate. However, these procedures have not as yet been documented. A written description of the CORE Program would benefit from having "Program Guidelines" that would contain (1) all program rules and requirements, and (2) a detailed description of the program process.

The surveys of CORE and REED Program participants show that these participants are well satisfied with the programs, and are mostly satisfied with programs' processes. However, CORE Program participants (especially residential participants) generally have only an indirect involvement in the process, since they typically allow the installer to be their agent in dealings with the BPU/OCE.

Installers expressed some dissatisfaction concerning delays at BPU/OCE (especially delays in issuing rebate checks), but the general consensus is that things are much better in 2004 than they were in 2003. The only complaint voiced by REED Program participants concerned the length of the contract negotiation process.

The problems associated with the delayed and extended review of REED Program applications and selection of awardees in 2003 were mostly the result of the "first-time ever" nature of the exercise, combined with the lack of experience in contracting, lack of staff resources, and the need to concurrently focus efforts on handling the growing number of CORE Program applications. However, as is also noted under Objectives 1 and 8, procedures for working with EDA to review applications submitted for the REAP, REED and REDO Programs have not been fully formulated and documented.

The BPU/OCE has recently begun taking steps to enforce the requirement to cancel CORE Program rebate reservation if evidence of a contract for system installation is not submitted within 90 days of issuance of the commitment letter.

Recommendations

1. Consideration should be given to changing the REAP and REED Programs such that there are two or three proposal submittal dates each year, with firm dates for awardee selection, rather than, "submit anytime, but we don't know when we will be able to look at them and make a decision." By having firm dates, proper plans can be made for the procedures to be followed, and staff resources at both BPU/OCE and EDA can be scheduled in advance.
2. The BPU/OCE should prepare a "Program Guidelines" document for each program, and make it available for downloading from the Website. This document would contain (1) all program rules and requirements, and (2) a detailed description of the program process. The program process description should provide the expected or "target" timelines for each step in the process.

OBJECTIVE 6: Assess Program Impacts and Update Protocols for Measuring Energy Savings (as needed)

Conclusions

The measurement of energy and demand impacts for customer-cited generation systems is based on algorithms that estimate each system's annual generation and coincident peak capacity. Input data are based on fixed assumptions, engineering estimates, and data obtained from the program's technical worksheets.

An industry-standard calculation tool (PVWATTS) from the National Renewable Energy Laboratory is used to estimate PV System annual generation. For wind-turbine installation, estimated annual generated is calculated using industry data table and inputs such as average wind speed at hub height, rotor diameter, and typical wind efficiencies for wind-speed/rotor-diameter combinations. These protocols appear to be appropriate.

All of the protocols used for customer-sited demand and energy outcomes for the CORE and REDO programs (assuming the latter will be the same as those for the CORE Program) appear to be consistent with the protocols used in the industry, and therefore, appropriate.

A key input to the protocols used to calculate program benefits and impacts (kW[AC]) is not being consistently calculated and reported accurately, and therefore the reported items that depend on this parameter (electricity generation, savings, and emissions reductions) are not as accurate as they could be.

Recommendations

1. Correct the CORE Database: add "kW[AC]" to the "Total System Rated Output" field heading, ensure that Inverter Efficiency is always entered and used to calculate values in the "Total System Rated Output" field. Correct Item 8 on the Technical Worksheet so it shows "AC Watts" for the quantity recorded. Instruct the applicant to calculate the entry by multiplying Item 3 by Item 7.

OBJECTIVE 7: Assess the Process Followed to Develop and Implement New Programs

Conclusions

The BPU/OCE's intended process for developing new programs is appropriate, but the intended process has not been followed. The basic problem is that the task is not pursued in a timely manner because assigned staff have other, more urgent responsibilities on existing programs. As a result, new programs have been launched before the preparatory work (which is needed to assure that the programs will be successful) has been done.

Recommendations

1. To avoid operational issues and the potential for participant misunderstandings, new programs should be fully designed before they are launched for participation. Full design should include:
 - ◆ Identifying quantitative annual goals and objectives
 - ◆ Identifying other State agencies whose missions might be affected by the program. Ensuring that these agencies fully understand how they may affect the program's success, and are prepared to cooperate and able to cooperate (e.g., staff and budgets in place). Perform training if such is needed.
 - ◆ Developing procedures for coordinating activities and outputs with other program managers, state agencies, and electric and gas utilities (as needed)
 - ◆ Determining whether sufficient numbers of trained trade allies are available. If not, recruit and train more.
 - ◆ Developing a Program Theory document and a Program Logic Diagram
 - ◆ Developing and documenting program rules for participants and trade allies
 - ◆ Obtaining comments from the Clean Energy Council
 - ◆ Preparing application forms
 - ◆ Developing a "Program Procedures" manual that documents the program's process for logging, reviewing, and acting-on applications, for authorizing expenditures, and for assuring high-quality performance by staff and trade allies
 - ◆ Developing and documenting an information-dissemination marketing and outreach plan (including a Website)
 - ◆ Developing electronic tracking systems for applications and for expenditures
 - ◆ Developing a plan for the periodic evaluation of the program's performance and accomplishments
2. If for any reason, a new program must be announced before the above program activities and inputs are in place, it's announced launch date should be far enough in the future to allow for all these activities to be completed before the launch date.

OBJECTIVE 8: Assess the Manner and Extent of Coordination Among the Various Programs

Conclusions

A guiding vision of New Jersey's Clean Energy Program is the creation of an optimal mix of renewable and energy-efficiency installations and businesses in New Jersey. The current portfolio of programs has a unified *brand image*, which is important to avoid confusion among consumers.

There should be close coordination between the CORE and REDO Programs, but at the present time the REDO Program is in limbo because its rules and procedures have not been fully formulated (e.g., procedures related to EDA's involvement have not been documented, nor have criteria governing acceptance of applications been formulated.). The REDO Program also requires coordination with one of the C&I energy-efficiency programs (*New Jersey SmartStart Buildings®*).

The REAP, REED and REDO Programs all require participation in application decisions by EDA. Although the programs are different, the procedures governing EDA's involvement should be similar. However, these procedures have not as yet been formulated and agreed to by all concerned.

There does not need to be close coordination among the CORE, REAP and REED Programs because these three programs have different objectives and seek participation from widely different groups.

Recommendations

1. Where interactions among programs or among agencies are identified, a detailed plan and timetable for cooperation should be established before the cooperative effort is initiated.
2. Procedures governing EDA's involvement in the REAP, REED, and REDO Programs need to be developed and documented before these programs are marketed. Whenever one or more other agencies are involved with the BPU/OCE in a program (e.g., when the BPU/OCE provides a rebate and EDA provides a loan), the agencies should meet and answer the following questions before the program begins. The goal should be to make things as simple as possible for applicants.
 - ◆ Can the program have a single, unique name? (Program literature should describe the involvement of each agencies, and might mention related programs offered by each agency.)
 - ◆ Which agency takes the marketing lead?
 - ◆ Does the applicant directly interact with both agencies or just with one?
 - ◆ Can there be a single application form?
 - ◆ Which agency will have ultimate accountability for the program?
 - ◆ How will credit for program achievements be allocated to avoid double counting?
 - ◆ Which agency measures and reports which performance metrics?

OBJECTIVE 9: Assess Program Marketing and Outreach Activities

Conclusions

The BPU/OCE recently issued contracts to four firms to conduct marketing and outreach directed toward specific targeted groups. In addition, plans are currently being formulated for BPU/OCE to undertake an expanded “awareness-building” marketing and outreach program that is primarily intended to increase awareness of the advantages of energy-efficiency and renewable-energy systems, and the NJCEP, among New Jersey’s citizens. These activities are likely to result in additional CORE Program participants.

The CORE Program is currently receiving 40-50 applications per month, based solely on marketing by installers and dealers/distributors. This level of activity is taxing the ability of the BPU/OCE to properly administer the program, and may also soon lead to the depletion of the Program’s rebate budget. For the time being, therefore, additional CORE Program marketing by the BPU/OCE that is targeted at increasing participation in this program should be given low priority.

Recommendations

1. The current BPU/OCE marketing plans appear to be adequate. However, attention should be given to aligning marketing efforts with program participation goals.

OBJECTIVE 10: Assess Motivations for and Barriers to Program Participation

Conclusions

Environmental concerns and saving money offer the strongest motivations for both residential and nonresidential customers to participate in the CORE Program.

The most significant barriers to greater participation in the CORE Program, for both the residential and non-residential sectors, are: 1) lack of awareness of the program, and 2) lack of familiarity with the technologies the program promotes.

The greatest barriers to CORE Program participation among those who are aware of the program are:

- ◆ The high cost of installations
- ◆ The appearance of installations
- ◆ Concern that the technology(ies) is(are) unreliable
- ◆ Site compatibility (e.g., shading in the case of solar projects and zoning restrictions in the case of wind projects)
- ◆ A general lack of familiarity with the technologies

Recommendations

1. When and if marketing of the CORE Program by the BPU/OCE is undertaken, the content should take into account the factors that tend to motivate participation, and should address the specific barriers to participation identified above.
2. Marketing messages should include “case studies” citing actual savings achieved, with pictures of successful installations and endorsements from satisfied participants.

**PROCESS EVALUATIONS
of the
RENEWABLE ENERGY PROGRAMS
ADMINISTERED AND MANAGED
by the
NEW JERSEY BOARD OF PUBLIC UTILITIES
OFFICE OF CLEAN ENERGY**

November 2004

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Appendix E: Renewable Energy Programs in Other States and Countries

1 INTRODUCTION

By Order dated March 9, 2001, Docket Nos. EX99050347 et al., the New Jersey Board of Public Utilities (the Board or BPU) issued its first decision under the *Comprehensive Research Analysis* (CRA) proceeding.¹ The CRA Proceeding required the state's investor-owned electric and gas utilities to undertake a comprehensive analysis to identify cost-effective energy-efficiency and Class-1 renewable-energy programs, and to recommend the allocation of funding for these programs. The Board's decision established program administration, program funding levels and programs to be funded for the first four years. The Order determined that the energy-efficiency programs and the Customer-Sited Renewable-Energy Program were to be initially administered by the State's seven natural gas and electric utilities, and that the Grid-Connected Renewable-Energy Program was to be administered by the BPU.²

By Order dated January 22, 2003, Docket No. EX99050347 et al., the Board established the New Jersey Clean Energy Council (CEC) to advise the Board on matters related to New Jersey's Clean Energy Program (NJCEP). Over the course of 2003, the CEC considered various issues and recommended changes to the administrative structure of the renewable-energy programs component of the NJCEP.

In April of 2003, the administration and management of the *Customer On-site Renewable Energy (CORE) Program* was transferred from the utilities to the Board's Office of Clean Energy (BPU/OCE), thus bringing both renewable-energy programs under the direct administration and management of the Board. Since that time, the Board has also initiated additional renewable energy programs. Chapter 2 contains descriptions of all of the current and contemplated NJCEP renewable energy programs.

The Center for Energy, Economic and Environmental Policy (CEEPP) at the Bloustein School of Public Policy and Planning, Rutgers University, has been engaged by the Board to manage the New Jersey Clean Energy Program's evaluation activities and associated research. On April 23, 2004, CEEPP solicited proposals for a Process Evaluation from firms with experience in evaluating energy programs.³ On May 27, 2004, Aspen was notified that it had been selected to perform the evaluation. The evaluation began on June 10, 2004, when a project initiation meeting was convened at the BPU's offices in Trenton. Representatives from Aspen, the BPU/OCE, and CEEPP attended this meeting.

¹ This proceeding was required by the Electric Discount and Energy Competition Act, N.J.S.A. 48: 3-49 et seq. (EDECA). The Act established requirements to advance energy efficiency and renewable energy in New Jersey through the societal benefits charge (SBC), N.J.S.A. 48:3-60a(3). EDECA required that within four months of its effective date, and every four years thereafter, the BPU shall initiate a proceeding and cause to be undertaken a comprehensive resource analysis (CRA) of energy programs and determine the appropriate level of funding for energy efficiency and Class 1 renewable energy and the programs to be funded.

² As is explained in Chapter 2, these two programs were subsequently renamed the CORE Program and the REAP Program, respectively.

³ Request for Proposal issued by Rutgers University (RFP No.199, "Renewable Energy Program Evaluation Services for Programs Administered and Managed by the New Jersey Board of Public Utilities' Office of Clean Energy Under the New Jersey Clean Energy Program").

1.1 EVALUATION OBJECTIVES

Six main objectives of the process evaluation were identified in the RFP:

1. *Assess the systems, processes and procedures for program management, financial management and quality control, and provide recommendations for improvements.*
2. *Assess the systems for tracking information utilized for regulatory reporting, financial reporting and program evaluation, and provide recommendations for improvements.*
3. *Review existing overall and program-specific goals, and assess whether programs are meeting goals.*
4. *Review existing metrics and recommend changes to metrics to measure success, such as performance indicators, goals, and minimum requirements for program administration.*
5. *Assess standards for reviewing applications and awarding incentives.*
6. *Assess program impacts and update protocols for measuring energy savings (as needed).*

Aspen also researched four additional Objectives:

7. *Assess the process followed to develop and implement new programs*
8. *Assess the manner and extent of coordination among the various programs*
9. *Assess program marketing and outreach activities*
10. *Assess motivations for and barriers to program participation*

This Process Evaluation covers the time period from April 2003 to the present, the period subsequent to when the BPU/OCE assumed responsibility for the CORE Program.

1.2 RESEARCH QUESTIONS

The RFP for this study identified a number of specific “Research Questions” to be addressed. To these, Aspen added research questions concerning participation motivation and barriers, and marketing activities, that are often included in a Process Evaluation. Exhibit 1-1 contains a list of all the research questions, with those that pertain to a common Evaluation Objective grouped together. This exhibit also shows the three sources of information and data that constituted input for addressing each question:

- ◆ Stakeholders (current and potential program participants, and trade allies)
- ◆ NJCEP program records; staff, contractors, and other parties associated with the programs being evaluated
- ◆ Similar renewable-energy programs in other states.

Further information about these sources of information and Aspen’s methodology for this evaluation are provided in the next section.

Exhibit 1-1: Evaluation Objectives and Research Questions

Topics and Associated Research Questions	Source of Information and Data		
	Various Stakeholders	Program Records and Staff	Programs Offered Elsewhere
1. Assess the Systems, Processes and Procedures for Program Management, Financial Management and Quality Control, and Provide Recommendations for Improvements <ul style="list-style-type: none"> ◆ Is the organization both efficient and effective? ◆ Is the use of contractors optimum? ◆ What collaboration process exists with trade allies? Is it effective? ◆ Are applications processed in a timely manner? What are the sources of delays, if any, in processing applications? Are staff resources adequate? ◆ Are existing systems and procedures adequate to assure that: programs remain within budgets, available funding is closely tracked, payments to participants and contractors are properly authorized and closely tracked, and that financial aspects are properly audited? ◆ When other state or local agencies are involved, is their involvement smoothly integrated? ◆ How well are the renewable energy systems installed under the CORE Program and in service for 12 months or longer operating? ◆ Are inspection procedures adequate to reasonably ensure that systems are of high quality and are properly installed, such that reliable operation occurs over the life of the system? 			
		X	
		X	
	X	X	X
	X	X	X
	X	X	X
	X		
		X	X
2. Assess the Systems for Tracking Information Utilized for Regulatory Reporting, Financial Reporting and Program Evaluation, and Provide Recommendations for Improvements <ul style="list-style-type: none"> ◆ Are tracking systems complete and accurate? Are they able to ensure that all contract requirements are being met? ◆ Are appropriate systems and procedures in place to properly ensure that contract milestones and other requirements are met? 			
		X	
		X	X
3. Review Existing Overall and Program-Specific Goals, and Assess Whether Programs are Meeting Them <ul style="list-style-type: none"> ◆ Are program goals clearly defined? ◆ Are the goals consistent with program budgets? 			
		X	X
		X	X
4. Review Existing Metrics and Recommend Changes to Metrics to Measure Success (such as performance indicators and goals) <ul style="list-style-type: none"> ◆ Are the metrics clearly defined and accurately measured? 			
		X	
5. Assess Standards for Reviewing Applications and Awarding Incentives <ul style="list-style-type: none"> ◆ Are appropriate procedures in place to ensure applications are properly reviewed and approved? Are the actual review and approval processes consistent with these procedures? ◆ Are customers satisfied with the programs' process? 			
		X	X
	X	X	
6. Assess Program Impacts and Update Protocols for Measuring Energy Savings (as needed) <ul style="list-style-type: none"> ◆ Are the protocols used to calculate program benefits and impacts commensurate with those used by other utilities/states? 			
		X	X

Exhibit 1-1: Evaluation Objectives and Research Questions (Concluded)

<p>7. Assess the Process Followed to Develop and Implement New Programs</p> <p>◆ What is the process for designing new programs? Are alternative processes available that are more effective?</p>		X	X
<p>8. Assess the Manner and Extent of Coordination Among the Various Programs</p> <p>◆ Can efficiency be improved by coordinating activities among programs?</p>		X	
<p>9. Assess Program Marketing and Outreach Activities</p> <p>◆ Are the program marketing and outreach efforts successful in conveying the benefits of participation, and in attempting to overcome the barriers to participation?</p>	X	X	
<p>10. Assess Motivations for and Barriers to Program Participation</p> <p>◆ What factors have a strong influence on program participation, either for or against?</p>	X	X	X

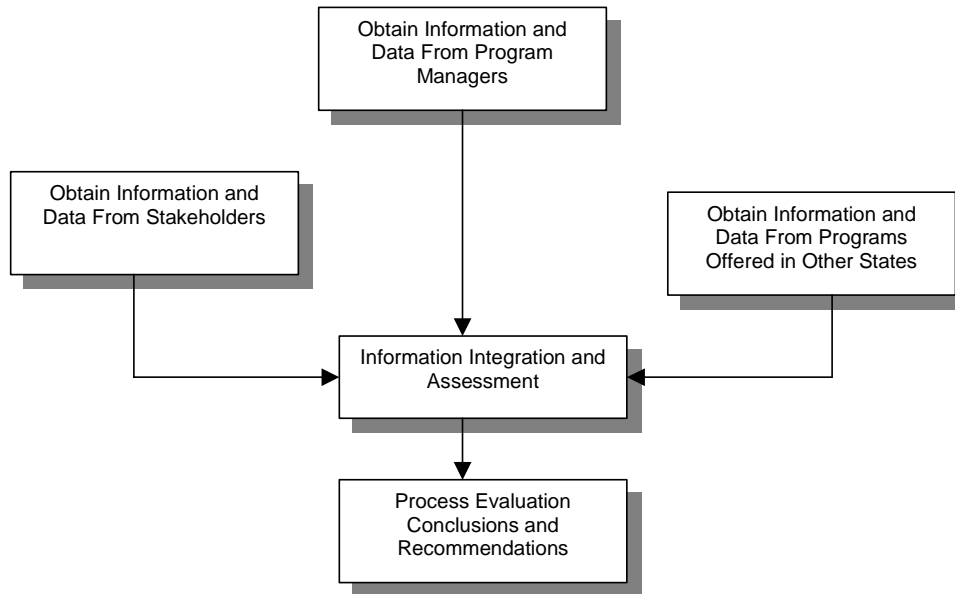
1.3 EVALUATION METHODOLOGY

The methodology used for this Process Evaluation involved the analysis and interpretation of information obtained from three categories of sources:

1. The programs themselves, through interviews with BPU/OCE staff members, CEC members, and program-support contractors; and by examining and analyzing program-related records and documents.
2. Other program stakeholders, through interviews with actual program participants, potential program participants, and trade allies. (The latter group includes installers & dealers, manufacturers, builders & developers, and architects & engineers.)
3. Similar programs offered in other states, obtained by reviewing program-related reports that describe similar programs, and by interviews with the persons who administer these programs.

As is depicted in Exhibit 1-2, the Process Evaluation of the NJCEP renewable energy programs consisted of these three data-collection tasks plus an “Integration and Assessment” task where the Findings from the three data-collection tasks were analyzed and synthesized into Conclusions and Recommendations. Included in this “Integration and Assessment” task was the development of Program Logic Diagrams for three programs. These “PLMs” were a significant help in developing a clear understanding of each program’s process. They also help to identify questions to be asked during the survey interviews—questions that seek to validate assumptions concerning the strengths of various cause⇒effect relationships. (Copies of the PLMs are presented together with the program descriptions in the next chapter.)

Exhibit 1-2: Aspen's Process Evaluation Methodology



As part of the data-collection activities, Aspen:

- ◆ Interviewed 10 BPU/OCE staff and contractors, and associated personnel
- ◆ Conducted 295 survey interviews with stakeholders (see Exhibit 1-3)
- ◆ Inspected 25 solar PV systems installed under the CORE Program and in operation for at least 12 months
- ◆ Interviewed 21 individuals who administer or manage renewable-energy programs in other states.

Exhibit 1-3: Sample Sizes for Stakeholder Survey Interviews

Participant Survey Interviews	
Program / Segment	Completes
CORE / Residential	25
CORE / Nonresidential	15
REED	6
Total:	46

Nonparticipant Survey Interviews	
Program / Segment	Completes
CORE / Residential	120
CORE / NonResidential	30
REDO / Schools	15
REDO Municipalities	15
REED REAP	6
Total:	186

Trade Allies Survey Interviews	
Program / Segment	Completes
Installers / Distributors	21
Builders	15
Manufacturers	12
Architects & Engineers	15
Total:	63

1.4 STRUCTURE OF THE PROCESS EVALUATION REPORT

This initial chapter provides descriptions of the Evaluation Objectives and Methodology. The next chapter contains descriptions of the Programs being evaluated, and a summary of their histories and current status. The third chapter contains a summary or relevant information gleaned from our examination of similar renewable-energy programs offered in other states.

The fourth and final chapter contains: 1) a summary of Aspen's **Findings** developed from the results of the primary and secondary research conducted by the study team, 2) the **Conclusions** our team has drawn from these Findings, and 3) **Recommendations** for improvements to the programs and their administration.

The appendices to the report contain the detailed results from the research activities. These results provide the bases for the Findings.

- ◆ Appendix A contains the results of: (1) our interviews with members of the program staff, consultants and subcontractors to the program, members of the Clean Energy Council, and staff of the Economic Development Authority; and (2) our detailed examination of program records and documents.
- ◆ Results of the surveys of other stakeholders are summarized in Appendices B (Actual Program Participants), C (Potential Program Participants), and D (Trade Allies).
- ◆ Appendix E contains detailed information concerning the renewable-energy programs and activities taking place in 13 other states and 10 foreign countries. It also contains a summary of programs offered by the federal government to support and encourage the installation of renewable energy systems.

1.5 CONTRIBUTORS TO THE EVALUATION STUDY

This process evaluation of the New Jersey's renewable-energy programs was funded by the New Jersey Board of Public Utilities and administered by the Center for Energy, Economic & Environmental Policy (CEEPP) of Rutgers University. Aspen would like to thank Scott Weiner, Director of CEEPP, and Mike Ambrosio, consultant to CEEPP, for their insights during the project and comments on drafts of the project report.

Within Aspen, Daniel Waitroob, Director of the Energy Services Group in Aspen's Energy and Environmental Services Business Unit, oversaw the project. The Co-Principal Investigators were William Steigelmann, PE, and Harley Barnes, Ph.D.

Mr. Steigelmann served as project manager. In addition to the three aforementioned leaders of the study, other members of the project team were:

Rosa Cassidy	Tom Henkel
Jill Cliburn	Jeanne Liu
Eric Coffman	Carol Kharbanda
Jim Diefenderfer	Tom Ryan
Trent Eades	Sara Shaffer
Joe Gillette	Ed Skeeahan

2 NEW JERSEY'S RENEWABLE ENERGY PROGRAMS

The first section in this chapter provides an overview of the four programs that are currently being administered and managed by the BPU/OCE. The second section contains brief descriptions of additional programs that are currently being developed. The third section presents summaries of the histories of the four active programs, plus summaries of their current status. These summaries provide the context for this report and are based on information we obtained from interviews with BPU/OCE staff and other parties involved in the programs, plus data obtained by analyzing the CORE Database. Finally, in the fourth subsection, we present the Logic Models that we developed for the CORE, REED, and REAP programs.

2.1 DESCRIPTIONS OF PROGRAMS BEING EVALUATED

The following paragraphs provide brief summaries of the four renewable-energy programs being offered by the NJCEP. Additional information is available at:

http://njcleanenergy.com/html/3renewable/1_home.html

1. CORE (Customer On-site Renewable Energy) Program

The CORE Program offers financial incentives to customers of the state's investor-owned utilities that install qualified renewable-energy generation systems and thereby reduce the amount of electricity that needs to be delivered by the utility. Incentives vary with technology and are structured in terms of four tiers determined by rated capacity, and range between \$5.50/Watt for PV systems in the first tier to \$0.15/Watt for wind and sustainable biomass systems in the fourth tier (capacity ratings extending up to 1.0 MW are eligible for the incentive). The total incentive is capped at a percentage of total installed cost that varies with system capacity and technology. Qualified system technologies are: solar photovoltaic, wind-powered generators, generating systems that use sustainable biomass as fuel, and fuel cells powered by biogas.

To receive the financial incentive, program participants must first submit a Pre-Installation Application and, after being notified that this application is accepted, submit evidence that they have contracted for installation of the proposed system. Installation must be completed within six months in the case of residential systems, and within 12 months in the case of larger systems that may be installed by businesses, governmental agencies, schools, religious organizations, etc. After the installation is completed, participants must file a Final Application and pass an Electrical Code Inspection (performed by their local code-enforcement official) and a final quality-control inspection performed by a BPU/OCE contractor. In addition, the participant must execute an Interconnection Agreement with the local electric utility. Before signing the agreement, the utility requires that the applicant submit for its review information and data describing the system and its proposed interconnection.

2. Renewable Energy Advanced Power (REAP) Program

The current version of the REAP program was initiated in 2003. Projects are expected to supply electricity to the PJM Power Pool, or for large power users, to incorporate a minimum of 1.0-MW power generation at their facility, or aggregate a minimum of 1.0 MW of renewable electricity generating systems into one proposal. Financial incentives now provided under the REAP program are a combination of a “down payment” incentive of up to 20% and secured tax-exempt or taxable bonds for the balance of the construction costs. The program is expected to fund 10-15 MW of new renewable generation. The BPU has made \$20 million available for this solicitation. The program is delivered in partnership with the NJ Economic Development Authority (EDA), which is expected to provide \$30 million for debt financing.

The program is offered through an open-ended solicitation that remains open until funding is exhausted. It is designed to provide seed grants and access to capital in order to make renewably powered electricity cost-competitive with conventional power plants. This program is designed to ensure that a diverse portfolio of renewable-energy technologies are used to provide power and environmental benefits to the ratepayers in New Jersey; to accelerate the rate of deployment for large-scale renewable power plants, and to encourage the development of a thriving renewable-energy market in New Jersey.

3. Renewable Energy Economic Development (REED) Program

The REED Program provides funding for renewable-energy businesses in New Jersey. The BPU/OCE is working with the EDA to provide venture capital to businesses. The current version of the REED program is offered through an open-ended solicitation (remains open until funding is exhausted). The BPU/OCE will pre-qualify applicants in terms of their renewable energy involvement and the EDA will assess the quality of the business plan. Funding will be made available to qualified applicants as recoverable grants of up to \$500,000 per business. The companies will be required to pay back the money as their business venture begins to generate revenues. The concept is to provide seed capital for new businesses or business ventures, and then to transition the business into traditional capital markets.

To be eligible to participate in the REED Program, participants must meet the following requirements: 1) be a renewable energy company; 2) be a New Jersey company; 3) be committed to growing the business in New Jersey; and 4) have an economically sound business plan.

4. Reduced Energy Demand Options Program (REDO)

The REDO Program offers financial incentives and low-interest financing to local governments and schools, to support their development of comprehensive energy-efficiency and renewable-energy projects. The BPU/OCE is working jointly with the EDA, who will provide low-interest, long-term financing that will cover the entire incremental cost of the projects.

2.2 NEW PROGRAMS IN THE PROCESS OF BEING DEVELOPED

Financing for Renewable Energy and Energy Efficiency (FReEE)

The New Jersey Clean Energy Program will offer low-interest loans for businesses that wish to finance energy-efficiency upgrades and renewable-energy installations at their facilities. This program will allow businesses to save money by financing their energy improvements.

The Program will be administered jointly by the BPU/OCE and the EDA. The program encourages New Jersey based businesses to develop energy improvement plans that use energy efficiency strategies and incorporate on-site renewable energy systems at their facilities. The program will provide incentives and grants to cover some of the costs of the improvement, and will work with traditional banks and the EDA to finance the incremental amount of the total project.

Demonstration Program

This program will provide funding for demonstration of renewable energy projects.

Manufacturing Incentive Program

This program will provide an incentive payment to manufacturers that produce solar panels in New Jersey. The payment will be structured on a \$/Watt of generating capacity manufactured.

2.3 HISTORY AND CURRENT STATUS OF ACTIVE PROGRAMS

1. CORE (Customer On-site Renewable Energy) Program

The CORE Program was named the Customer-Sited Clean Energy Program when it began in 2001, and was managed by the state's seven investor-owned electric and gas utilities. In mid-2002, the BPU amended the program's rules that: 1) increased incentives for solar energy projects, and 2) made fuel cells powered by natural gas ineligible for rebates, limiting approved fuel to "biogas" produced from the decomposition of waste products. Subsequently, the Board ordered that the rebate schedule again be modified to increase the incentives provided for solar energy projects, effective December 31, 2002.

A third upward adjustment in the incentive structure for solar energy projects was ordered on March 3, 2003. This last order contained three other highly significant provisions:

- Rebates would be paid for only the first 1.0 MW (1,000 kW) of capacity.
- All projects will have 90 days after issuance of the commitment letter to provide a signed contract to the program administrator; otherwise the reservation for funding will revert back to uncommitted funds.
- Administration and implementation of the Program "will be transferred from the utilities to the Board staff and contractors, as needed."

The BPU/OCE began to transition Program activities immediately, and in April assumed responsibility for Program operations. The BPU/OCE executed a contract with the same Program QC Inspector who had performed this task for the utilities. The BPU/OCE also

arranged with the utilities to issue rebate checks during a transition period, until arrangements could be made with a commercial bank to perform this task and act as a repository for the SBC funds collected by the utilities.

Exhibit 2-1 shows the number of Approval Letters issued during each calendar quarter, since April 2003. (The data appearing in this exhibit were developed by Aspen during our review of a copy of a portion of the Program tracking system. The portion of the tracking system made available to us did not contain a record of all applications received; only applications for which an Approval Letter was issued.)

Exhibit 2-1: Number of Approval Letters Issued by the BPU/OCE during each Calendar Quarter

Calendar Quarter	Number of Approval Letters
2 nd – 2003	67
3 rd – 2003	61
4 th – 2003	93
1 st – 2004	59
2 nd – 2004	195
3 rd – 2004*	122

* July and August only

Exhibit 2-2 shows: 1) the distribution of systems by type for the systems represented by these Approval Letters, and the associated generating capacity and rebate amounts, and 2) corresponding data for the subset of these systems that have been installed.

Exhibit 2-2: Overview of CORE Program Projects

System Type	Number of Approval Letters	Rated Capacity (kW)	Rebate Amount (Million \$)
Solar PV	589	23,211	\$95.00
Wind	5	276	\$0.26
Biomass	2	1,385	\$0.86
Fuel Cell	1	250	\$0.86
Totals:	597	25,122	\$96.98

System Type	Number of Systems Installed	Rated Capacity (kW)	Rebate Amount (Million \$)
Solar PV	208	1,487	\$7.56
Wind	1	10	\$0.04
Biomass	0	0	--
Fuel Cell	1	250	\$0.86
Totals:	210	1,747	\$8.46

This exhibit shows that the solar PV systems are the predominant renewable-energy technology in the Program, which is fully consistent with resource availability.

Accurate data concerning systems “in the pipeline” (i.e., those with valid rebate commitments) evidently does not exist. The BPU/OCE has not been enforcing the requirement that rebate commitments be cancelled if evidence of a valid contract for system installation is not provided within 90 days of issuance of the Approval Letter.⁴ The version of the CORE Database made available to us does not contain a field showing “Date Evidence of Contract Submitted.” The “Status” field does not show any entries corresponding to “Cancelled Commitment.” This status applies for those applications that have not met either of the Program’s two time requirements [1) evidence of an installation contract, or 2) completion of installation and filing of a Final Application], or have been withdrawn by the customer. We believe the addition of this “Status” category and the reclassification of applications to it from “Approved” status when either of the two time-related requirements are not satisfied, or when an application is withdrawn, are vital for successfully management of the Program.

We have analyzed the entries in the database and eliminated those for which a Final Application has not been submitted within the specified 6- or 12-month period. The result shows that 310 systems are “in the pipeline.” The rated capacity of these systems is 20 MW, and the theoretical rebate commitment is \$78 million. Without the Database being modified such that “Approved” status provides an accurate indication that a proposed system is in compliance with Program rules, the BPU/OCE and the BPU Commissioners have no way of knowing how much progress is being made toward the Board’s renewable-energy goals, and how much of a financial commitment has been made to systems that are “in the pipeline.”

2. Renewable Energy Advanced Power (REAP) Program

The REAP Program was originally named the Grid-Supply Renewable Energy Program. The Board approved its first solicitation for project proposals on December 19, 2001. The stated objective was to fund projects that would provide the maximum installed renewable-energy capacity and energy per dollar of funding provided. Other criteria included promoting a diversity of technologies and maximizing environmental benefits.

The funds awarded to successful proposals included production credits for completed projects for a maximum period of five years. Limited grants for start-up costs (up to 10% of the total amount sought) were also considered to facilitate construction of winning projects. On July 15, 2002, the Board approved funding for four projects and for a wind power feasibility study. No applications have been received since that time.

3. Renewable Energy Economic Development (REED) Program

In January of 2003 the BPU announced a competitive solicitation to provide funding for the development of renewable energy businesses, technologies and market infrastructure in New Jersey. The goal of the program was to leverage public and private funding for the purpose of advancing the technologies and services necessary to support a thriving renewable-energy industry in the state.

⁴ At the time when final revisions were being made to this report, we were informed that the BPU/OCE has begun to enforce this rule.

The solicitation was open to proposals seeking funding for research, business development, and commercialization and technology demonstrations of innovative products or services that advance the delivery of renewable energy systems to the marketplace. The BPU sought proposals that 1) demonstrated a clear path to advancing the cost-effective implementation of renewable-energy technologies and services, and 2) established a dynamic business infrastructure within New Jersey's renewable-energy industry. Innovations in the renewable-energy industry in terms of technology, services, system integration, financing, and supporting systems and fuels were sought.

The BPU awarded \$2.7 million to 10 entities that met the solicitation goals. Work began in late 2003 or early 2004, and generally is proceeding as planned.

4. Reduced Energy Demand Options Program (REDO)

The BPU/OCE has received some inquiries, but no applications. One problem is that the procedures for the BPU/OCE to work with the EDA to review applications have not as yet been established. Another problem is that schools believe they can get systems at no cost by combining CORE Program rebates with grants from another state agency. This issue is unresolved.

2.4 PROGRAM LOGIC MODELS

A "PLM" is instrumental for evaluating programs offered by utilities or governmental agencies. It is implicit (but not always explicit) in designing a marketing program for any product or service. A logic model diagrams the sequence of causes (resources, activities, and outputs) that produce the effects (outcomes) sought by the program. It is common practice in program evaluations to prepare a logic model of the program before moving too far into the evaluation process. Exhibit 2-3 shows a simplified illustration of a logic model.

Exhibit 2-3: Simplified Program Logic Model for a Deployment Program



A program's design reflects an underlying *program theory* about how and why the program's activities and outputs will achieve the intended program outcomes. A logic model describes how the program theory is embodied in the program's activities and outputs to achieve its outcomes.⁵

A well-designed logic model requires the manager and evaluator to think about what it is the program is trying to accomplish, and how its activities produce outputs that are, in turn, supposed to cause the outcomes the program is trying to achieve. It focuses thinking on the links between resources and achievements, and thus on the links between resources and performance.

Program managers use "inputs" to design program "activities" which, in turn, produce the program "outputs" that managers hope will achieve the "outcomes" that the program's goals require. It is important not to become too entangled in the definitions of "activities," "outputs," and "outcomes." Program parts are not easily classified into tidy cause-effect categories. For example, a curriculum-development "activity" is used to develop a training class as an "output" of the program. However, the training class then becomes an "activity" that produces qualified solar-PV system installers as an "output." In the case of the REED Program, "activities" involve soliciting and evaluating grant applications, negotiating contracts, and making awards (The last is an "output.") The ultimate "outcomes" (e.g., increased employment, lower-cost renewable-energy systems) may not occur until some years in the future.

Thus, programs can (and typically do) have multiple "outputs" that occur at different points in the program life cycle. Likewise "outcomes" are typically multiple and sequential (sometimes called the program's outcome structure). There are "short-term outcomes" representing changes or benefits directly associated with, or "caused," by the program's outputs. There are "intermediate outcomes" that are changes resulting from the short-term outcomes, and "ultimate" outcomes that occur in the more distant future. In some discussions of logic models, intermediate outcomes are referred to as "mid-term" outcomes, and ultimate outcomes are called "long-term outcomes."

Exhibits 2.4, 2-5 and 2-6 contain Logic Models that Aspen developed for the CORE, REED, and REAP Programs, respectively, for this evaluation. These models reflect the results of Aspen's review of the program literature and discussions with the program staff. They represent the program's inputs, activities, outputs, and desired outcomes at a relatively high level and provided the team a useful schematic overview of the programs.

⁵ A useful discussion of logic models, including a brief description of the history of logic models applied to program evaluation and a stage-by-stage process for constructing them, can be found in, McLaughlin, J. A., and G. B. Jordan, "Logic Models: A Tool for Telling Your Program's Performance Story," Evaluation and Program Planning, Vol. 22, No. 1, February 1999. The University of Wisconsin-Extension Website also has useful resources on the development of logic models. www.uwex.edu/ces/pdande/evaluation/evalllogicmodel.html.

Exhibit 2-4: Logic Model for the CORE Program

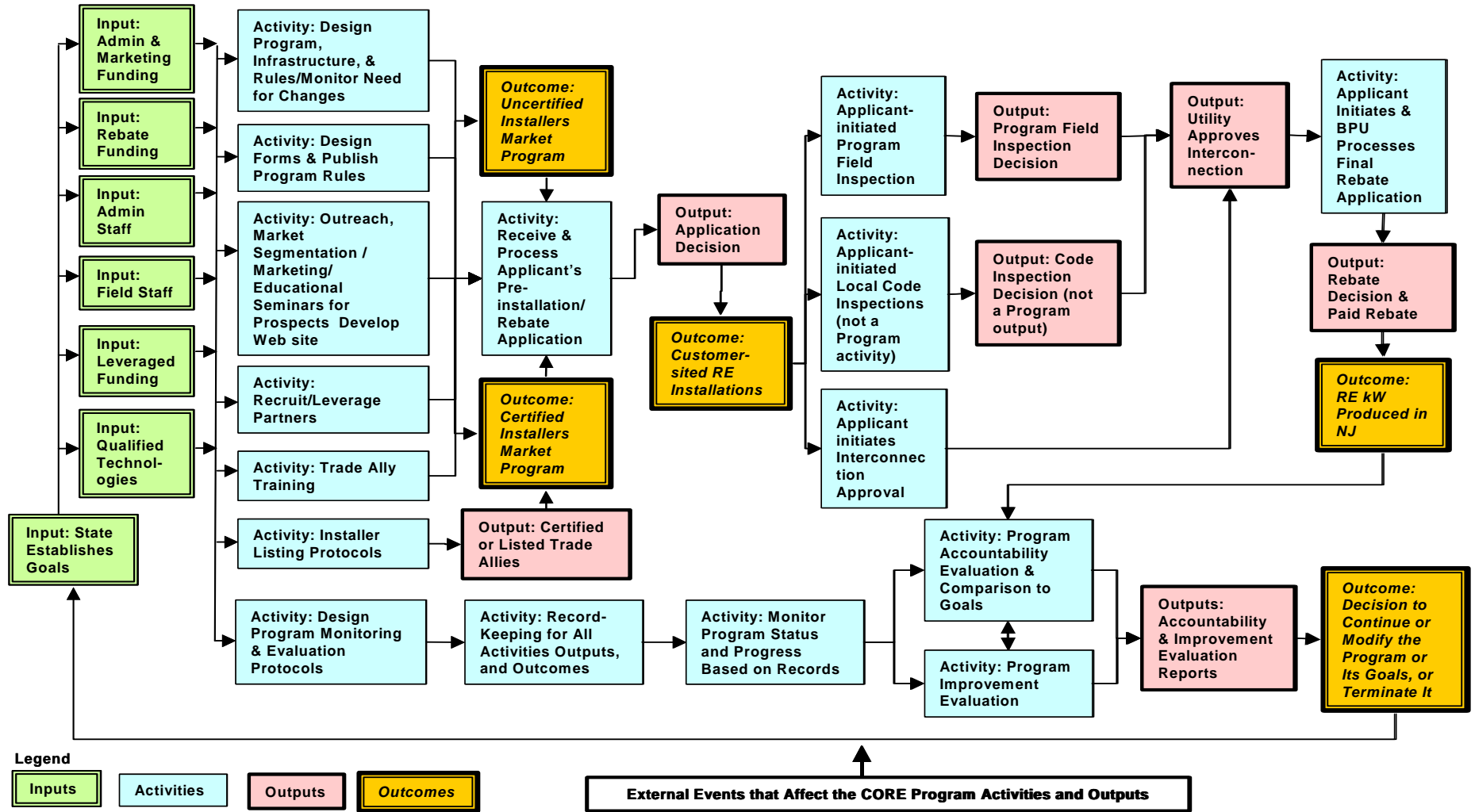


Exhibit 2-5: Logic Model for the REED Program

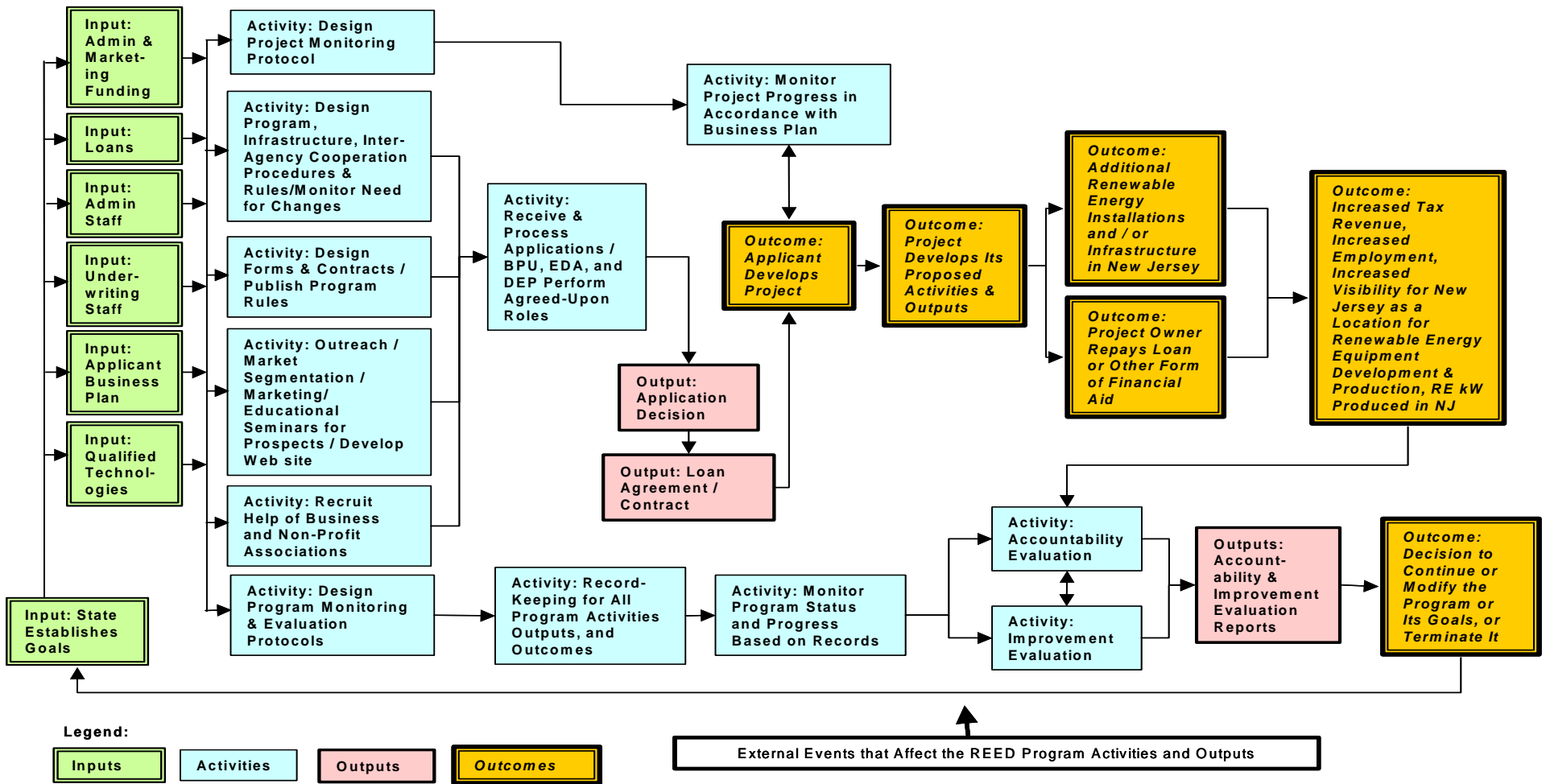
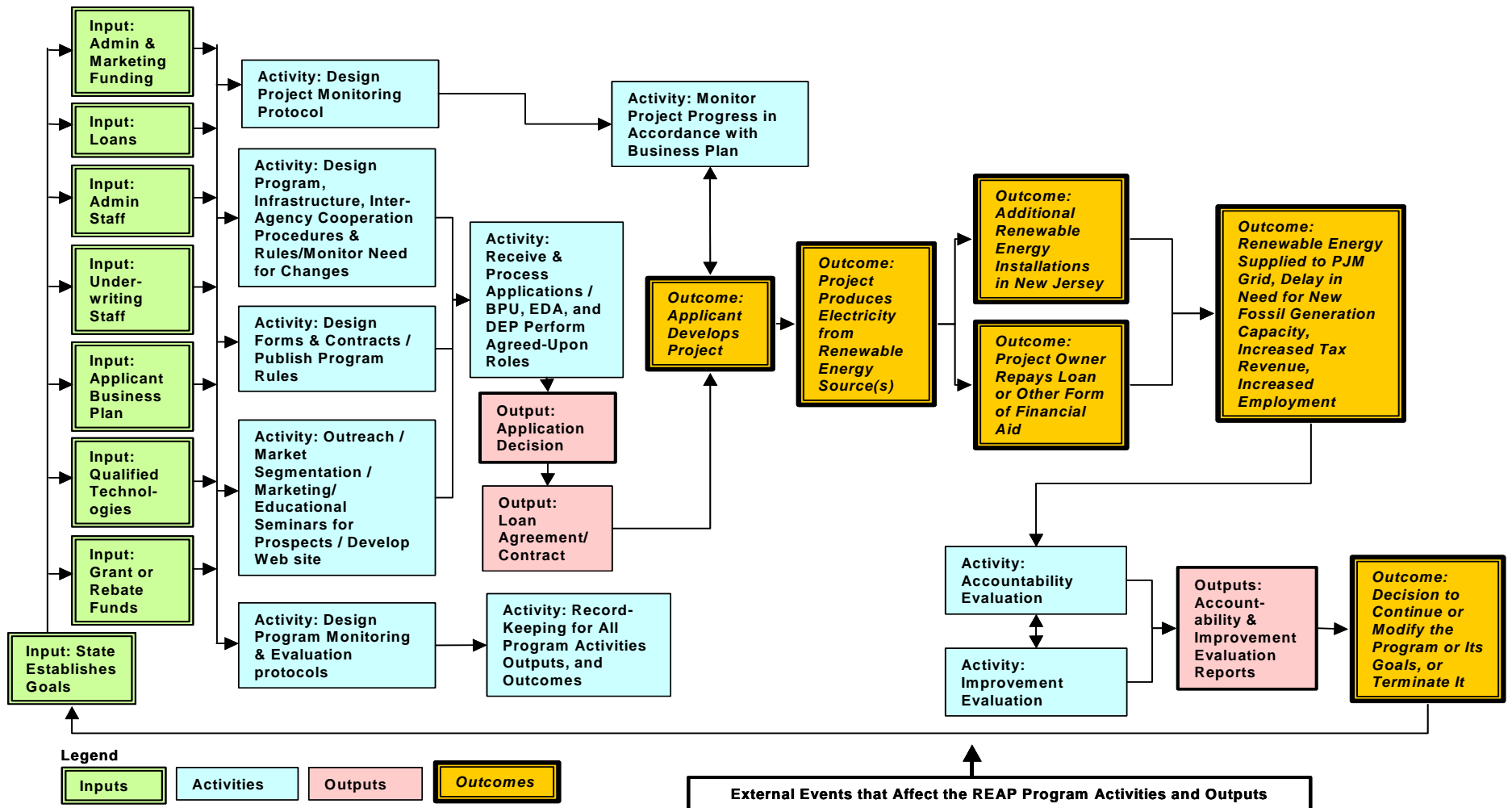


Exhibit 2-6: Logic Model for the REAP Program



3 RENEWABLE ENERGY PROGRAMS OFFERED IN OTHER STATES

This chapter has two parts:

- ◆ A summary of the key features of a sample of the U.S. programs that provide incentives for the installation of renewable-energy systems. Information concerning related supporting activities is also summarized.
- ◆ Some of the “best practices” design features incorporated into these programs.

The material in this chapter has been extracted from Appendix E, which provides more detailed descriptions of these programs and activities, plus information concerning similar programs offered in other nations. We obtained data and information concerning these programs and activities by means of a combination of secondary research (i.e., literature reviews, Web searches, conference attendance) and primary research (i.e., telephone interviews with program staff and state officials).

3.1 Key Features of Renewable Energy Programs in Other States

Aspen researched renewable-energy programs in California, New York, Massachusetts, Texas, New Mexico, Oregon, Wisconsin, Illinois, Pennsylvania, Connecticut, Delaware, Vermont and Washington. This research included an assessment of available renewable-energy resources, detailed information about a sample of programs, and documenting supporting activities (i.e., regulations pertaining net metering, standardized interconnection requirements, standby rates, and renewable-energy portfolio standards).

A key component to any effort to evaluate programs is to ensure program design and operational characteristics are consistent with program goals, are designed to succeed in the regulatory and economic environment in which they operate, and take into account factors such as:

- ◆ Program Administration and Funding
- ◆ Incentives
- ◆ Staffing
- ◆ Timeliness of Processing
- ◆ Marketing and Program Promotion
- ◆ Supporting Activities

Each of these factors is discussed in the remainder of this section.

3.1.1 Program Administration and Funding

Programs that encourage the installation of renewable-energy systems are a logical outgrowth of earlier programs that encourage the installation of energy-efficiency measures (EEMs) by utility customers. This activity began about 25 years ago, prompted by: 1) the national interest in reducing energy use, as a response to the “Energy Crisis” of the mid 1970s; and 2) the soaring cost of new power plants and concerns about the environmental consequences of rapidly increasing energy use. The underlying principle being that it is often more cost-effective and always better for the environment to reduce energy consumption (especially by eliminating

energy waste) than to increase energy supply.

Originally, EEM programs were administered and managed by electric and gas utilities. In the case of investor-owned utilities (IOUs), this was done in those states where the agency that regulated utilities authorized the program expenditures. It was logical for regulators to have the utilities administer the programs because utilities had customer contact information, utility staff were already engaged in dealing with customers, and utilities were generally regarded by customers as the “energy experts” whose advice and recommendations could be trusted. Some publicly owned utilities, which are not subject to state regulation, agreed that these programs offered advantages to their operations and to their customers, and decided to offer them.

Although program operation by the utilities offered definite advantages, there was also a potential downside. IOUs that are vertically integrated (i.e., those that generate the electricity they sell to customers) may be reluctant to undertake activities that reduce energy sales—such as promote the use of EEMs and renewable-energy systems. These utilities will undertake these activities when directed to do so by their regulator, but there is always the underlying concern by some advocates of greater EEM and renewable-energy usage that the utilities are not supporting the programs as strongly as they would if the program were one that increased sales. Whether or not these concerns are valid in the case of any given utility, the concerns arise whenever a potential conflict-of-interest exists.

Some state regulatory agencies have implemented policies intended to disconnect utility profits from electricity sales and/or to provide an economic incentive to utilities to promote EEM programs, but these efforts have had only mixed success. The most recent initiative, which has been undertaken in some states with the broader goal of encouraging competition in the wholesale and retail electricity markets, was to require IOUs to divest the generation function (either completely or partially), and in some cases to be only deliverers of electricity generated by other parties (and not resellers of the electricity). In any event, over the years there has been a trend to shift the administration and management of EEM and renewable-energy programs from IOUs to state agencies or third-parties who specialize in this type of work. New Jersey's policy in this regard is in full accord with this trend. Exhibit 3-1 shows how a sample of the renewable-energy programs in other states are being administered or managed,⁶ and their current funding level.

Funding is one of the most critical factors in program design; in fact, few program managers will ever say that they have sufficient funding. Unfortunately, funding is rarely responsive to the market and is the product of state government appropriations, settlements with utilities and other energy-industry entities, or system benefit charges (SBC). Funding is essentially finite and may be constricted further by state government policy decisions and fixed percentages that can be used for marketing, program administration, and rebates.

⁶ The terms “administration” and “management” of programs is not used in a consistent way in different states.

Exhibit 3-1: Sample of U.S. Renewable Energy Programs

State	Program	Program Administrator	2004 Funding (millions)
California	Emerging Renewables ⁷	State Agency (CEC ⁸)	\$240
	Self Generation Incentive	State Agency (CPUC) and Utilities	\$125
	Los Angeles Department of Power and Water	Municipal Utility	\$7.0 (incl. 2005)
	Sacramento Municipal Utility District	Municipal Utility	\$2.5
Massachusetts	Green Buildings and Infrastructure	3 rd Party (Massachusetts Technology Collaborative)	\$4.0
New York	New York Energy Smart PV	State Agency (NYSERDA)	\$7.0
Oregon	Solar Electric and Water Heating	3 rd Party (Energy Trust of Oregon)	\$1.2
Texas	Austin Energy Solar Rebate Program	Municipal Utility	\$0.9
Wisconsin	Focus on Energy (Renewables portion)	State Agency (Dept. of Administration) & 3 rd Party	\$3.5
Vermont	Solar & Wind Incentive	3 rd Party (Vermont Energy Investment Corporation)	\$0.9

3.1.2 Incentives

A large incentive will likely draw a large number of program participants but will quickly deplete program funds, result perhaps in fewer installations at a higher overall cost to the program, and leave many potential participants not served. Also, large amounts of quickly depleted incentives may have a negative affect on renewable-energy dealer and installer networks by attracting “fly by night” or “new and inexperienced” companies or individuals who do not have properly trained technicians. When the funds for incentives are depleted, the market collapses and the dealers and installers who want to establish a long-term business suffer. On the other hand, a program with low incentives may not attract enough participants to meet program goals. An under-funded program may never fully attain momentum to entice enough participants.

Program-specific incentives can take one of three forms:

- ◆ Grants, which may be predetermined by a formula or negotiated within a specified range.
- ◆ Rebates paid on the basis of generating capacity installed. This is the most common form of incentive, and is intended to help to overcome the high first-cost barrier by reducing the amount of investment required of a system owner. (Although the purchaser may have

⁷ This is the largest of six CEC programs that promote renewable-energy systems. The others are the Existing Renewable Facility Program, the Ag-Bio Program, the New Renewable Facilities Program, and the Consumer Education Program

⁸ California Energy Commission.

to pay full cost and then receive the rebate, generally the installer will wait to receive payment of a large portion of the total installation cost until after the rebate is received. The CORE Program has formalized this arrangement by giving the participant the option of having the rebate paid directly to the installer or another third-party.)

- ◆ Production payments to the system owner on the basis of the amount of electricity generated (or heat produced). Payments are made monthly, quarterly, annually, etc., based on metered output (or an imputed system output if the cost of metering would be onerous.) One advantage of this type of incentive is that it literally provides an additional incentive to the owner to make sure the system is well maintained and produces maximum output. Germany's very successful program uses this type of incentive instead of rebates, a small program in Pennsylvania uses it, and California's large Emerging Renewables Program is giving serious consideration to changing to this type of incentive, or to a hybrid system that provides both a rebate and a production payment.

Experienced program administrators constantly review incentives levels against program activities and budgets, conduct Benefit/Cost analyses to gauge performance, evaluate performance against goals, and adjust incentives up or down as needed to satisfy the goals.

Exhibit 3-2 shows the current incentives in a sample of programs being offered in other states.

Exhibit 3-2: Rebates Offered in a Sample of Renewable Energy Programs

State	Program	Program Administrator	Solar PV (\$/Watt)
California	Emerging Renewables	State Agency (CEC)	\$0.90 - \$3.40
	Self Generation Incentive	State Agency (CPUC) and Utilities	\$2.50 - \$4.50
	Los Angeles Department of Power and Water	Municipal Utility	\$3.50 - \$5.00
	Sacramento Municipal Utility District	Municipal Utility	\$2.50 - \$8.75
Massachusetts	Green Buildings and Infrastructure	3 rd Party (Massachusetts Technology Collaborative)	(Grants, not rebates)
New York	New York Energy Smart PV	State Agency (NYSERDA)	\$4.00 - \$4.50
Oregon	Solar Electric and Water Heating	3 rd Party (Energy Trust of Oregon)	\$3.50 (Res.) \$2.50 (NonRes.)
Texas	Austin Energy Solar Rebate	Municipal Utility	\$5.00 (\$6.25 if Texas manufacturer)
Wisconsin	Focus on Energy (Renewables portion)	State Agency (Dept. of Administration) & 3 rd Party	(Grants, not rebates)
Vermont	Solar & Wind Incentive	3 rd Party (Vermont Energy Investment Corporation)	\$1.50 - \$2.50

3.1.3 Staffing

Staffing is a product of program funding and program activity. During program peaks, temporary staff may be hired or transferred from other programs to ensure that the level of customer service provided is adequate. Also, some programs may make greater use of contractors than others, and some may, or may not, perform 100% QC inspections. These are some of the reasons it is difficult to make meaningful comparisons among programs. Another reason is differences in the lengths of time that various programs have existed. Relatively new programs require a larger staff because of the need to develop procedures, a tracking system, and application forms. In addition, some programs accept and process applications at any time, while others handle them only at one two specific dates. In the latter case, there may be very little program activity for 90 percent of the year. Exhibit 3-3 shows staffing levels for a sample of programs, but the caveats noted above should be recognized.

Exhibit 3-3: Staffing Levels in a Sample of Renewable Energy Programs

State	Program	Program Administrator	Number of Staff
California	Emerging Renewables	State Agency (CEC)	~23 plus QC Contr.
	Los Angeles Department of Power and Water	Municipal Utility	2 FT plus several PT
	Sacramento Municipal Utility District	Municipal Utility	3 FTE
Massachusetts	Green Buildings and Infrastructure	3 rd Party (Massachusetts Technology Collaborative)	20 FTE (incl. other programs)
New York	New York Energy Smart PV	State Agency (NYSERDA)	3 FTE
Oregon	Solar Electric and Water Heating	3 rd Party (Energy Trust of Oregon)	~4 FTE
Texas	Austin Energy Solar Rebate	Municipal Utility	2 FT plus some PT
Vermont	Solar & Wind Incentive	3 rd Party (Vermont Energy Investment Corporation)	5 PT

3.1.4 Timeliness of Processing

The timeliness of incentive payments is critical to keeping customers and dealers interested in the program, as well as to develop a stable installer and dealer network. Payments that are late or delayed can cost system owners or installers finance charges that cut into profits, thereby reducing the effectiveness of the incentive. Inquiries and complaints from unhappy program applicants, participants, or installers can further clog administrative pathways, and also creates negative publicity that can discourage others from participating.

3.1.5 Marketing and Program Promotion

Marketing and program promotion are critical to program success. The larger the program and the lower the incentive, the more promotion and marketing activities are needed to attract applicants. For example, a rebate program in the state of Delaware was originally funded with no provision for marketing (or administration). Low response from the community and little interest from installers convinced the Delaware legislature to provide a small marketing budget.

Most of the programs we investigated use trade-ally networks to promote the program. This is an innovative and efficient way of increasing marketing activities in programs with limited budgets.

3.1.6 Supporting Activities

The success or failure of renewable-energy initiatives can also be significantly affected by other factors, which may be either a direct part of the program or external to it. These factors include:

- ◆ Standardized grid interconnection requirements
- ◆ Net metering
- ◆ “Green Power” market-stimulation efforts

Standardized Grid Interconnection Requirements

Utility distribution systems are designed on the basis of electricity flowing in only one direction, from a connection to the transmission system to customers. When there is a problem and a switch or relay in the distribution system is opened, no voltage exists on the part of the network that is connected to customers. When a generator is installed on this side of the network, and if this generator can operate independent of the utility grid, the generator must have special protective devices to prevent its inadvertent connection to the distribution system. If the customer-sited generator does not have the protective devices, or if they are not designed to act quickly and reliably, there could be damage to the generator or to a nearby customer's equipment, or a utility employee or nearby customer may be hurt. The utility therefore has the right and obligation to determine whether the special protective devices installed with customer-sited generators are adequate.

The Board has taken the initiative of getting the state's electric utilities to adapt a common application form and standardized requirements for systems with generating capacity of 100 kW or smaller, and to give these applications expedited review. However, there should be no need for this review to be repeated over and over when standardized equipment is used, especially in the case of small generators (e.g., less than ~10 kW in a residence). California and New York have adopted the practice of pre-approved equipment. One review establishes that a given inverter will satisfy the common requirements. If an application cites pre-approved equipment, then approval is automatic. (Further comment is provided in Section 3.2, and Aspen's recommendation is presented in Section 4.1.)

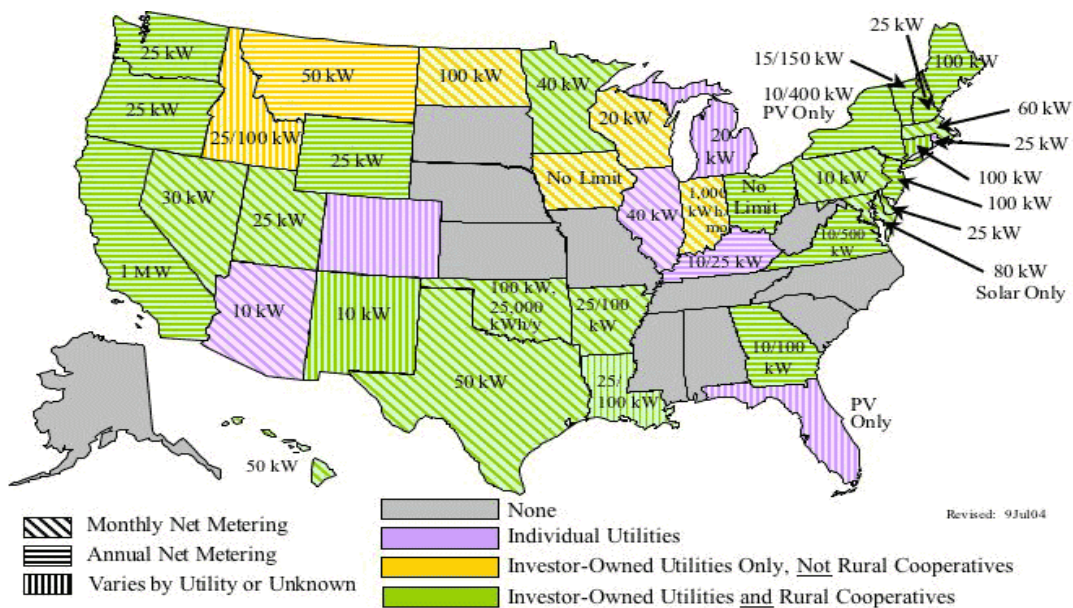
Net Metering

The term “Net Metering” simply means that electricity is permitted to flow bilaterally between the utility and the customer, and the customer's bill reflects the net difference between these flows. In effect, the customer sells excess electricity to the utility under the same tariff as he or she buys electricity. If the net difference is negative (i.e., sales to the utility exceed customer usage), the customer gets a credit against the fixed monthly customer charge. For some customers, the existing electric meter is designed such that it runs backward when electricity

flows from the customer to the utility. If the meter is not of this type, or if the utility chooses to more closely monitor flows to and from the utility, two separate meters are installed.

Most states restrict net metering to only certain situations, and typically limit in some way the aggregate amount of annual net sales to the utility, although sales greater than this amount may be permitted but the price the utility must pay for this excess is reduced to the equivalent real-time wholesale price. Typically, a state will restrict eligibility for net metering to sites with generating systems that 1) rely upon renewable-energy (solar or small wind systems only, and 2) have a capacity rating that is less than a certain value. To date over 39 states have implemented a net metering regulation. Some include only investor owned utilities (IOU), but have exempted cooperatives, while in others states net metering is applicable to both. (Municipal utilities are not under the purview of a state regulatory agency, and decide individually the conditions, if any, under which they will permit net metering.) Exhibit 3-4 provides an overview of net metering regulations throughout the United States. (New Jersey's recent action to increase the capacity limit from 100 kW to 2 MW is not reflected in this figure, and most of the restrictions on eligible systems are not indicated.)

Exhibit 3-4:



Source: U.S. Department of Energy Efficiency and Renewable Energy Green Power Network

Renewable Energy Market-Stimulation Efforts

In a market-based economy, where every product needs a consumer, a viable and growing market for “Green Power” (i.e., electricity generated from a renewable source) is one of the critical factors for the success of renewable-energy programs. There are three primary ways by which the market for Green Power can be stimulated:

- ◆ Appeals for voluntary purchase of Green Power
- ◆ Renewable Portfolio Standards

◆ Renewable Energy Certificates.

As environmental awareness grows among the public and the price of fuel oil, gasoline, natural gas, and propane increases, interest in and the demand for Green Power has increased, especially in states where electricity has been deregulated at the retail level, and electric utilities are the deliverers of electricity generated by other entities.⁹ The basic idea is that the seller of electricity (electric utility or other entity) markets electricity generated (at least partially) from renewable sources. The sales message is that this electricity costs more, but by buying it you are helping to decrease the amount of electricity generated from sources that are harmful to the environment. Many individuals and businesses have been willing to pay a premium price for this “Green Power.” Though somewhat successful, these appeals for voluntary action are not likely to increase the amount of Green Power generated in the U.S. by more than a few percentage points.

A major impetus beyond purely voluntary action is the promulgation of a Renewable Portfolio Standard (RPS) by a state regulatory agency or an individual utility. An RPS is simply a requirement that all electricity providers (be they utilities or other entities who sell electricity in a deregulated market) include in their supply portfolio a specified percentage of electricity generated from eligible renewable sources, by a specified date. Sixteen states have established a statewide RPS and some others have initiated efforts to develop one. Some individual municipal utilities have also taken this action. Many states have different definitions as to what sources are eligible to be considered a renewable. Though most agree that the definition includes solar and wind power, there is wide disagreement with regard to power generated from large-scale hydro-electric plants and power plants that burn municipal solid waste.

An RPS is one of the most effective ways of encouraging a Green Power market that leads to the installation of renewable energy technologies. Several large states, including California, New York, and New Jersey have taken this step, as well as most of the New England states. Illinois and a few other states have a “renewable energy goal” instead of a standard. Texas and some other states require that electricity providers disclose the content of their supply portfolio (i.e., the percentage generated from coal, natural gas, renewables, etc.).

Renewable Energy Certificates (“RECs” or sometimes called “Green tags”) have been developed to support RPS and Green Power sales. These certificates represent a quantity of electricity (e.g., 1.0 MWh) that has been generated from a renewable-energy source. The buyers are utilities and non-utility electricity providers who are required to show compliance with a RPS criterion, or who wish to claim a specific “renewables content” in the electricity they sell. The expectation is that the RPS requirements will stimulate the market for RECs, and the price will be set based on supply and demand at any given time. New Jersey is in the forefront of states that are attempting to see that a market for RECs is quickly established, recognizing that this action will provide an additional source of revenue to participants in the CORE and REAP Programs.

⁹ In many deregulated states, an “other entity” can be a utility affiliate.

3.2 “Best Practices” Design Features of Renewable Energy Programs

Aspen's research into the features of renewable-energy programs offered in New Jersey and other states has served to enable us to identify a few “Best Practices” design features that provide both a high participation level and satisfied participants and trade allies. In many cases Aspen has incorporated these features into our recommendations, which are presented in the next chapter.

3.2.1 Noteworthy Features of the CORE Program

The CORE Program's design has at least five features that we judge to be superior to similar aspects of other programs, and a sixth feature that is at least as noteworthy as the equivalent provided by other programs.

- ◆ First, the way the rebates are structured to approximate the way costs decline as system size increases, rather than paying a fixed \$/Watt rebate irrespective of system capacity, or having two rates, one for residential systems and one for nonresidential systems. (Note, however, that we are recommending that the rebate structure be refined and “fine-tuned” to better track the installation cost vs. size relationship.)
- ◆ Second, the BPU/OCE established a relationship with a commercial bank to handle the collection and dispersing of funds.
- ◆ Third, the BPU/OCE has been proactive in seeking outside advertising and marketing experts to help publicize the NJCEP's energy-efficiency and renewable-energy programs, and the advantages (including environmental benefits) of energy-efficiency equipment and renewable-energy systems in general.
- ◆ Fourth, the Board established the requirement that applicants must show evidence of having a signed contract for system installation within 90 days of issuance of the Approval Letter. Program rules also establish allowable periods (as a function of system capacity) for applicants to complete system installations. These requirements are intended to help insure that rebate funds are not obligated to applicants (and installers) who are not serious about expeditiously proceeding with an installation.
- ◆ Fifth, the Program's rules facilitate participants being able to assign the rebate to installers or another third party. This ability is a definite help to participants and installers, and costs virtually nothing to implement.
- ◆ Sixth, application forms and lists of installers and other trade allies are available on the Program's Website.

The early initiatives taken by the Board to: 1) establish strong net metering regulations; and 2) requiring the state's electric utilities to establish a common set of simplified interconnection requirements for systems having a generating capacity of 100 kW or smaller, provided a significant economic incentive and facilitated the a high level of participation in the CORE Program. The more recent initiatives taken by the Board and the BPU/OCE to issue RECs for participants and establish an RPS requirement that makes a market for the RECs should help significantly to attract households and businesses in the more risk-averse segments of the market. These actions help to establish New Jersey's position as a national leader in renewable-energy utilization.

3.2.2 Noteworthy Features of Other Programs

Program Information Dissemination

The Emerging Renewables Program (ERP) in California has prepared a Program Manual (“Guidebook”) containing all rules and an easy-to-understand a description of the Program’s application process. Also, the ERP has a “list server” that provides press releases, notices of hearings and other meetings, and notices of changes to rules and procedures, to all interested parties who have registered for the service.

Ceasing to Accept Applications When the Budget Ceiling is Reached

Although the ERP did allow a certain amount of over-subscription in its early years, when it became apparent that the multi-year budget ceiling would be exceeded, program staff announced that applications would not be accepted until some “pipeline” applicants dropped out or were declared ineligible, or until the budget was increased. Applications that were received during the suspension period were placed in a queue, and then subsequently accepted in sequence as slots opened up.

Declining Rebates with Time

The ERP currently has a rule requiring the rebate amount to decrease by \$0.20 every six months. Some programs that promote EEMs (e.g., some of the programs administered by NYSERDA in New York) have a similar rule.

Production Payment Form of Incentive

The ERP is planning to experiment with a production payment form of incentive through which periodic payments would be made to participants that will be based on actual (metered) generation. At the time of this writing, details—such as whether this incentive would completely replace the initial rebate, and the system size range it would apply to—were still being developed.

Pre-Approved Equipment

The California Energy Commission and NYSERDA have established lists of pre-approved equipment (solar PV modules, inverters, microturbines, and fuel-cell systems) and has this posted at their Websites. The idea is that the electrical interconnection requirements are presumed to be satisfied if this equipment is used. This approach significantly simplifies the review effort needed of the electric utilities. In principle, it would also facilitate a rule that the Interconnection Agreement is automatically approved unless the utility files an objection.

Involvement of Venture Capital Firm in Renewable-Energy Business Development

One of the “initiatives” of the *Industry Support Program* of the Massachusetts Technology Collaborative involves a working arrangement with a venture capital firm to back promising new businesses that are beyond the initial-financing stage.

Zero Energy Home Initiative in California

This new initiative is seeking to incentivize home builders to offer homebuyers the option of a home that has a very annual energy-usage requirement (i.e., has more insulation and higher-efficiency equipment and appliances than required by California's Energy Code) and also has a solar PV system to supply this lower-than-average-new-home load. This approach is a highly cost-effective way to combine energy-efficiency measures with customer-sited renewable-energy systems.

4 FINDINGS, CONCLUSIONS, AND RECOMMENATIONS

This chapter contains Aspen's Findings, Conclusions and Recommendations. As was noted in Section 1.5, the Findings are based the results from the primary and secondary research reported in the Appendices. The Conclusions and Recommendations are based on a combination of: 1) the specific Findings, and 2) the experience of the Project Executive (Daniel Waitroob) and the Co-Principal Investigators (William Steigelmann and Harley Barnes).

4.1 OBJECTIVE 1: Assess the Systems, Processes and Procedures for Program Management, Financial Management and Quality Control, and Provide Recommendations for Improvements

Research Questions:

- Is the organization both efficient and effective?
- Is the use of contractors optimum?
- What collaboration process exists with trade allies? Is it effective?
- Are applications processed in a timely manner? What are the sources of delays, if any, in processing applications? Are staff resources adequate?
- Are existing systems and procedures adequate to assure that: programs remain within budgets, available funding is closely tracked, payments to participants and contractors are properly authorized and closely tracked, and that financial aspects are properly audited?
- When other state or local agencies are involved, is their involvement smoothly integrated?
- How well are the renewable energy systems installed under the CORE Program and in service for 12 months or longer operating?
- Are inspection procedures adequate to reasonably ensure that systems are of high quality and are properly installed, such that reliable operation occurs over the life of the system?

4.1.1 Findings

Systems, Processes and Procedures for Program Management

Organization and Staffing Adequacy

- Each program is headed by a Program Administrator who reports to the BPU/OCE Director. For some small or inactive programs, the same individual serves as Program Administrator.
- The effectiveness of program management is seriously affected by the fact that the CORE Program is understaffed. The staff is working diligently, and has managed to reduce the program-process delays that were a large problem in 2003 and early 2004, but there have been negative consequences: Proper procedures and program rules are not being followed, accurate records are not being kept, reports are not being prepared, and decisions to resolve issues are continually being deferred. Also, the work needed to

develop well-defined and smooth working relationship with EDA, concerning programs where both agencies play a role, have been repeatedly deferred.

Use of Subcontractors

- The CORE Program QC Inspector and some staff members are contract employees.
- The BPU/OCE plans to competitively select and contract with a third-party organization to manage operation of the CORE Program (and perhaps other renewable-energy programs as well). Implementation of this plan has been repeatedly delayed. After the selection process begins, a period of two to four months will be required before the new organization can be in full operation.
- Programs similar to the CORE Program offered in other states are not managed by the state's regulatory agency, but are either managed by a different state agency or are "contracted out" to a third party.
- Trade allies can participate in meetings convened by the Clean Energy Council's Renewable Energy Committee. However, the dates when these meetings are to be held are not well publicized.
- A couple of installers voiced suspicions that the BPU/OCE gives preferential treatment to some of their competitors, and also complained that rule clarifications are not issued in a timely manner. Other installers complained about the rules being changed too frequently. One installer noted that he had recently found multiple instances where a participating customers' local electric utility was issuing incorrect bills, and not correcting the problem immediately when it was called to the utility's attention. In other instances, the utility's internal communications were inadequate: meter readers didn't know that a customer has a system and was permitted to send power into the utility's lines, and threatened to disconnect the customer's utility service. The installer expressed frustration at there not being a way to ensure that the BPU/OCE would investigate and work to make sure the utilities address the matters expeditiously.

Timeliness of Application Processing

- The BPU/OCE and CEC Interviews clearly showed that the BPU/OCE is aware that it is understaffed, considering 1) the volume of work that must be done to keep the CORE Program process "on-track," 2) the lack of time to prepare monthly status reports, and 3) the number of things that need to be done to get the other programs organized and promoted (e.g., work out both pending policy issues with EDA as well as the practical aspects of "exactly who does what and when"; plan the re-launch of the REAP, REED and REDO Programs, and the launch of the FReEE Program; participate in planning the new marketing and outreach effort).
- CORE Program Participants had only a few negative comments about application-processing delays, but this may be because in general they tend to rely on the installers to handle all the paperwork. (Typically, the customers have no cash-flow issues with regard to the project until after it is completed and the installer bills them.)
- CORE Program Installers and Dealers did have some negative comments about the timeliness of BPU/OCE application-review activities, and other process operations:
 - With regard to the timeliness of Pre-Installation Application review, 25 percent gave a rating of "5" or less (on a "0-to10" timeliness scale)

- With regard to the timeliness of the Final Application review, 49 percent gave a rating of “5” or less. (However, one installer noted that things have gotten much better during the past three months.)
- All REED Program Participants expressed very favorable comments on the way the program has proceeded since contracts were signed. However, several participants commented negatively about the awardee-selection and contract-negotiation process. They indicated that it was obvious that the BPU/OCE had no experience with these activities. Both activities took entirely too long (eight months), there was little feedback or discussion about scope and budget changes made by the BPU, and the BPU couldn't make up its mind whether to try to have a single, common contract template, or “customized” contracts.
- The survey of renewable-energy program activities in other states tends to confirm that the BPU/OCE is trying to a lot of things with too few people. This survey also indicates that in virtually all cases where the proposals and applications submitted are “few-and-far-between,” these documents are not reviewed “when submitted,” but instead the programs specify two or more specific “cut-off dates” each year when all proposals/applications submitted since the last cut-off date are reviewed.

Involvement with Other State Agencies

- The BPU/OCE plans to have a major involvement with the New Jersey Economic Development Authority (EDA) with regard to the redesigned REED, REAP, REDO and FReEE programs. A memorandum of understanding has been signed, but the details of who does what and when are yet to be settled.
- The BPU/OCE often interacts with the DEP when wind and biomass projects are being considered. The owner of the proposed project has the major involvement with DEP, but the BPU/OCE must sometimes provide information.
- The BPU/OCE has an indirect relationship with the Department of Community Affairs (DCA). This results from the fact that local code-enforcement officials are under the cognizance of DCA, although they are employees of a township, city, or county, and they must approve every system installed under the CORE and REAP Programs.
- During the survey of installers, several complaints were heard about some local code-enforcement officials. Installers claimed that they often encountered inspectors who were totally unfamiliar with the technologies they were being asked to approve, and this sometimes resulted in delays. Several installers recommended that the BPU/OCE reinstate the series of training seminars that were previously offered to local code officials.

Systems, Processes and Procedures for Financial Management

- The Staff Interviews and our review of the CORE Program Database indicate that payments to participants and contractors are properly authorized and closely tracked. The fact that an outside agent (Wachovia Bank) handles all funds, and issues checks only upon receipt of a Payment Authorization Form, provides a high level of confidence.
- A financial audit by the New Jersey Treasury Department is currently being performed.

Systems, Processes and Procedures for Quality Control

System Performance

- The On-site Inspection survey showed that 24 of 25 systems installed under the CORE Program and operating for a year or more appeared to be in good condition and operating properly. In most cases, Aspen verified system performance by examining a recent electric bill or another record of metered data. All system owners except one expressed satisfaction with the performance of their system. The sole exception is a large corporation that has several PV systems operating in various parts of the U.S. The problem at this site is poor design of the panels and their electrical connectors, which has resulted in short circuits and broken connections. The firm is in the process of negotiating a resolution of the problem with the manufacturer of the solar panels. One of the firm's representatives reported that these panels were no longer being manufactured, and also expressed the opinion that these defects could not have been detected during inspections prior to startup. The firm's own inspection did not uncover them. Both representatives who were interviewed expressed high praise for the BPU and its programs.

Inspection Procedures

- The Staff Interviews disclosed that a formal Inspection Form is not used by the Program's QC Inspector. Instead, the inspector uses a copy of the Technical Worksheet as a guide, and "checks off" each item as he confirms compliance.

4.1.2 Conclusions

Systems, Processes and Procedures for Program Management

The systems, processes and procedures used by the BPU/OCE to manage the renewable-energy programs are efficient and effective in concept, but execution has been much less than ideal because the volume of work to be done exceeds that which the existing staff complement can handle accurately on a timely and consistently error-free basis. The present BPU/OCE staffing level is inadequate to sustain efficient and timely management of the renewable-energy programs. Reporting and record keeping have suffered, as have the ability to carefully plan future activities and programs, to document procedures, and to resolve outstanding issues concerning CORE Program rule refinements. In addition, some important quality checking steps are not being performed. (Further information concerning these matters is presented under many of the other Objectives.)

Plans are underway for the BPU/OCE to hire an experienced program-implementation organization to manage the CORE Program. This action would eliminate the problems caused by the current staffing shortage, but the process of soliciting and evaluating proposals, selecting the contractor, and negotiating a contract will take several months, and therefore, interim solutions such as temporary staffing are important.

Some installers have noted that they feel they are "out of the loop" because they are not informed about proposed program rule changes and upcoming meetings of the Clean Energy Council's Renewable Energy Committee. Therefore, improved communications with stakeholders are warranted.

As is discussed below under Objective 8, the BPU/OCE has not as yet formulated and documented the details of how it will work with EDA to review applications submitted for the REAP, REED and REDO Programs.

Systems, Processes and Procedures for Financial Management

A commercial bank is used as “fiscal agent,” to hold the SBC funds¹⁰ collected by the utilities, and to disperse funds (e.g., to pay contractors and issue rebate payments) when authorized to do so. The procedure for issuing these authorizations (three signatures required) appears to be sound.

A routine financial audit of revenues and expenses (i.e., fund collections and distributions) is currently being performed by the New Jersey Department of the Treasury.

The procedures presently being followed to verify that rebate amounts are being correctly calculated are not as rigorous as they should be. As is described under Objective 2, the basis for these calculations is not being properly recorded in the CORE Program Database.

Monthly and quarterly status reports are not being prepared in a timely manner, at least in part because considerable effort is currently required to extract data summaries, such as “Amount of current rebate commitment” (further details are provided under Objective 2). As a result, expenses and budgets are not being routinely tracked or forecast, which impedes the BPU/OCE’s ability to properly manage the budget for the programs. This creates the potential risk that funding may be over-committed before staff becomes aware of the issue. (There are indications that the CORE Program budget may already be over-committed, or is very close to that status.)

The New Jersey School Construction Corporation (SCC) provides grants to public school districts to support school construction and renovation projects. Some school districts systems perceived that the combination of the CORE Program rebate and a SCC grant would pay all of the cost of installing a solar PV system. The BPU/OCE’s initial acceptance of this assumption has set a precedent that the BPU/OCE thinks now may be incorrect because the program rules explicitly require that the maximum percent of installation cost that may be rebated is the cost net of any other grants or funding. A large number of CORE Program applications have been submitted by school districts. If approved, these applications would further aggravate the budget over-commitment problem, and would eliminate the opportunity for others to participate unless the budget were increased. The BPU/OCE has not acted on the applications, to either accept or to reject them, because the legal and policy situations are unclear.

Systems, Processes and Procedures for Quality Control

Two types of quality control are relevant:

- ◆ Program quality consisting of: Actions taken by the BPU/OCE to assure that its internal processes operate smoothly and efficiently, that program rules are publicized and adhered to, that complaints are responded to promptly, that applications are processed expeditiously, and that rebate amounts are calculated correctly.
- ◆ Product quality consisting of: Steps the BPU/OCE takes to help ensure that program

¹⁰ “SBC funds” means the funds obtained via a “System Benefit Charge” assessed on the electric and natural gas bills of customers of the state’s regulated electric and gas utilities. This charge provides funding for all the NJCEP energy-efficiency and renewable-energy programs.

participants will be satisfied with the performance of the systems that are promoted and installed by the program.

The first type of quality control has been discussed above, and is also discussed under Objective 2. The second type is primarily a concern only in the case of the CORE Program. Product quality is encouraged by:

- ◆ Requiring that equipment manufacturers provide a warranty (5-year minimum)
- ◆ In the case of solar installations, requiring that sun access is available in all seasons (with minimal shading by trees or other structures). In the case of wind-powered generators, requiring that the turbine be mounted well-above surrounding trees or buildings.
- ◆ Requiring compliance with the National electrical Code (as evidenced by passing an inspection conducted by a Code Official)
- ◆ Requiring approval of the installed system by the Program's QC Inspector

Several installers who were interviewed noted that the local Code official was unfamiliar with the technologies, and this required the installer to spend a considerable amount of time "educating" the inspector.

Virtually all the installers who were interviewed were highly complimentary of the Program's QC Inspector. Our interview with the Inspector confirmed this opinion. We learned, however, that the Inspector does not use an Inspection Form to record findings, and does not have an Inspection Procedures Guide. Prudent quality-assurance practices suggest that an Inspection Form should be used to ensure that nothing is missed. This will help to ensure that high-quality inspections will continue should the current inspector become incapacitated or be unwilling to perform the work for any reason in the future.

The Evaluation scope included performing on-site re-inspections of a sample of 25 systems that have been in operation for a year or more. The objective was to learn whether any changes to the final inspection protocol are needed to improve quality. The results from this series of re-inspections showed that all systems, except one, were performing very well, and the owners were highly satisfied with both the systems and the program. Some installations showed the beginning signs of rust and corrosion of mounting hardware. (The single system that was not performing well had design flaws. The manufacturer discontinued the model and changed the design. The system owner is negotiating with the manufacturer to obtain corrective action.)

4.1.3 Recommendations

Systems, Processes and Procedures for Program Management

1. In recognition of the time delays associated with hiring a third-party organization to manage the CORE Program on its behalf, the BPU/OCE should proceed quickly to:
 - A. Train more staff (either new hires, temporaries, or transfers from another state agency) and assign them to work on the routine aspects of the CORE Program. Senior BPU/OCE staff would then have time to pursue the following tasks:
 4. Add additional fields to the CORE Program Database and correct errors (see detailed list provided under Objective 2)
 5. Publish a Guidebook for each program that contains all program rules, and

- make these documents available for downloading from the NJCEP Website
6. Write out rules for processing applications and managing program financial obligations, including financial tracking and management procedures for the recommendations described under “Systems, Processes and Procedures” below
 7. Have queries prepared that enable important data summaries to be easily and routinely extracted from the CORE Program Database, and issue program status reports on a timely basis
 8. Develop and implement solutions to the other issues identified in this evaluation.
- B. Organize its relationship with EDA for the joint activities needed to make the REAP, REED, and REDO Programs successful.
2. Issue the RFP and proceed to contract with a third party to manage the CORE Program. Because the level of activity on the other programs is quite low, we recommend that the BPU/OCE continue to manage them, at least until the level of activity increases to the point where they require much more staff effort than is currently the case.
 3. Develop an “Interested Parties” list for each program and use this list to disseminate draft rule or procedure changes and notices announcing forthcoming meetings convened by the Clean Energy Council’s Renewable Energy Committee.

Systems, Processes and Procedures for Financial Management

1. The BPU/OCE should proceed quickly to:
 - A. Establish timely financial-management procedures. These should include:
 9. Data entry of application-specific financial transactions and decisions, with dates, within 24 hours of the transaction or decision.
 10. Establishing a rebate-commitment level (e.g., 90% of budget) at which management action must be taken on whether to approve pending applications or to establish a waiting list. (Factors that would affect this decision are: 1) proximity to the end of the fiscal year,¹¹ 2) expected or authorized budget for the coming year, and 3) the percentage of applications expected to lapse or be cancelled.)
 11. Establishing automated queries for preparing financial reports, including a daily report showing current rebate-commitment level.
 12. Establish clear responsibility for advising the Clean Energy Council when the rebate-commitment level reaches the pre-determined limit.
 - B. Resolve the issue of computing the rebate amount when the applicant has access to other funding.

¹¹ Projects that are not expected to be completed until the next fiscal year would be paid from that budget and not the current year’s budget. The waiting list approach should be used once it is clear that approved rebates will reach any year’s annual budget ceiling.

Systems, Processes and Procedures for Quality Control

1. Reinstate the series of training seminars that were previously offered to local Code Officials and continue to offer them periodically.
2. Have the QC Inspector prepare and use an Inspection Form and Inspection Procedures Guide. Add a line item to the form to cover inspection of materials used for mounting frames, electrical cables and connectors, and fasteners to verify that they are not subject to rusting and corrosion.
3. Include as an explicit requirement in the Program rules that materials used for mounting frames, electrical cables and connectors, and fasteners are not subject to rusting and corrosion.

4.2 OBJECTIVE 2: Assess the Systems for Tracking Information Utilized for Regulatory Reporting, Financial Reporting and Program Evaluation, and Provide Recommendations for Improvements

Research Questions:

- Are tracking systems complete and accurate? Are they able to insure that all contract requirements are being met?
- Are appropriate systems and procedures in place to properly ensure that contract milestones and other requirements are met?

4.2.1 Findings:

- The BPU/OCE Staff Interviews disclosed that a comprehensive tracking system is maintained for only the CORE Program. The REED and REAP programs are tracked informally. In the case of the REED Program, for example, receipt of monthly Progress Reports and quarterly Financial Status Reports is tracked by the Program Administrator using a simple spreadsheet. If a participant does not submit a report on time, the Program Administrator sends a “reminder” via a telephone call. (The reminder-call part of the process was confirmed during the telephone interviews with REED Program Participants.)
- Aspen’s detailed examination of the CORE Program Database disclosed that:
 - The database is comprehensive but not complete. It is not used to record and track expenditures other than rebates, nor to calculate any “process-performance” metrics (e.g., days between receipt of an application and disposition of the application). Its software is an MS Access application.
 - There are no entries in several important date fields.
 - Some date entries are not accurate: it appears that they may be a record of the date when the entry was made, and not the date when the event defined in the column heading occurred. (For example, there are 104 occurrences where the Date of the QC Inspection is before the Date when the Final Application was received.)

- Several rebate amounts appear to be incorrectly calculated.
- The “Total System Rated Capacity” field has a large number of errors. Entries in this field are supposed to be expressed as conventional alternating-current (AC) kilowatts (kW), obtained by multiplying “System Size” capacity in DC (direct current) units by Inverter Efficiency. The numerical values shown for some records reflect this multiplication, but many do not. Many Inverter Efficiency entries are missing. The field heading should include the units (“AC kW”), to help to avoid confusion between DC and AC values.
- The “Status” field does not have a “Reservation Cancelled” category. There should also be a field to indicate the reason for the cancellation and another field to record the date when the status change from “Approved” to “Reservation Cancelled” was made. The three alternative reasons for canceling a Rebate Reservation are:
 - Evidence of an installation contract was not provided within 90 days
 - Installation was not completed within the specified 6- or 12-month period
 - Customer withdrew application.
- There are no fields where the following can be recorded:
 - 1) The date when evidence was submitted that an applicant has executed a contract for system installation
 - 2) The date when a letter notifying the applicant that their Approval and Rebate Reservation have been cancelled (in the event that such a letter needs to be sent).
- The addition of the “Commitment Cancelled” status category would mean that the “Approved” status would apply only for systems that have not been withdrawn and comply with program rules. It then would be an easy matter to generate a report showing accurate data for systems “in the pipeline” (i.e., those for which a Rebate Reservation exists), including aggregate capacity and aggregate future rebate obligation.
- The problem involving the “Total System Rated Capacity” field originates on the Technical Worksheet, where Item 8 is incorrectly labeled “DC Watts” (which is the same as Item 3). It is at this location on this form where the applicant is supposed to multiply Total Array Output (expressed as DC Watts, Item 3) by Inverter Efficiency (Item 7) to obtain AC Watts. (The purpose of the Inverter is to transform DC power produced in the solar array to conventional AC power.)
- The DC Watts metric, Inverter manufacturer and model designation information, and Inverter Efficiency are obtained from the Technical Worksheet. The actual installation is verified by the Program QC inspection to confirm that the proposed capacity and inverter shown on the Technical Worksheet were, in fact, installed.
- Some CORE Program participants and system installers monitor generation (kWh or MWh) using high-quality metering equipment. This metering is quite common for large systems of all types, but rare in the case of systems with ratings of 10-kW and smaller. Currently, the only systems that must file metered data with the BPU/OCE are solar PV systems larger than 10-kW that wish to receive solar RECs (renewable energy certificates). We understand the rules concerning what data are to be filed and how often have not as yet been issued.

- Because of staffing resource shortages, monthly and quarterly status reports are not being prepared in a timely fashion. Two of the reasons for this are that: 1) costs are tracked manually on a spreadsheet, and not recorded as part of the CORE Database, and 2) the simple queries to extract data summaries from the database have not been written. As a consequence, a significant amount of staff time is needed to “pull the numbers” for these reports.
- The review of state and other utility programs revealed that MS Access is the most popular database software for renewable-energy program tracking systems. MC Excel was also frequently encountered. All of the states and utilities using these software programs created custom databases for their programs. No commercially available software designed specifically as a tracking system was identified.

4.2.2 Conclusion

The Core Program Database is comprehensive, but it has some significant errors and omissions that urgently need to be corrected. Queries need to be written to extract data summaries needed for monthly and quarterly reports. Because these queries have not been written, a considerable amount of effort is needed to extract the data summaries needed for monthly and quarterly reports. Because of the pressure on staff to process applications and tend to other pressing duties, the data has not been extracted and reports have not been prepared in a timely manner. (We understand that the report for the 2nd Quarter of 2004 was issued in early November, as this report was being finalized.)

The problems with the CORE Database include the following:

- ◆ There are no entries in several important date fields.
- ◆ Some date entries are not accurate; they appear to be a record of the date when the entry was made, and not the date when the event defined in the column heading occurred.
- ◆ Numerous rebate amounts appear to be incorrectly calculated (see below).
- ◆ The “Total System Rated Capacity” field has a large number of errors. Entries in this field are supposed to be expressed as conventional alternating-current (AC) kilowatts (kW), obtained by multiplying “System Size” capacity in DC (direct current) units by Inverter Efficiency. The numerical values shown for some records reflect this multiplication, but many do not. Many Inverter Efficiency entries are missing. The field heading should include the units (“AC kW”), to help to avoid confusion between DC and AC values.
- ◆ The “Status” field does not have a “Reservation Cancelled” category. The database does not have a field to indicate the reason for the cancellation, and another field to record the date when the status change from “Approved” to “Reservation Cancelled” was made.
- ◆ There are no fields where the following can be recorded:
 - 1) The date when evidence was submitted that an applicant has executed a contract for system installation
 - 2) The date when a letter notifying the applicant that their Rebate Reservation has been cancelled (in the event that such a letter needs to be sent)
 - 3) The total rated capacity (DC Watts), and the actual total cost, of the system actually installed (as recorded on the Final Application)

- 4) The total rated capacity (DC Watts) of the system actually installed, and the outcome of each QC Inspection (as recorded on the QC Inspector's report)
- 5) The date of each QC Inspection¹²
- 6) The two provisional rebate amounts (one based on \$/Watt and the other based on the percentage cap)

The following paragraphs discuss the various Database "issues" listed above.

Apparent Rebate Amount Errors. Aspen reviewed the numerical values that appear in the "Rebate Amount" field of a copy of the CORE Program Database provided by BPU/OCE for PV systems 10-kW and smaller. The rebate amount is supposed to be the lesser of the values calculated from applying: (1) the \$/Watt algorithm to the "System Size (DC Watts)" value, and (2) the maximum percentage of the project cost that can be rebated to the "Installation Cost" value. We performed these calculations and found apparently incorrect Rebate Amount entries for at least 56 applications (12% of all PV applications for systems 10 kW or smaller).

When we discussed the apparent errors with program staff, we were told that the numerical values recorded for System Size and Installation Cost were initially obtained from the Pre-Installation Application. These values are supposed to be updated (changed) when the values shown on the Final Application are different. Evidently, this updating step had not been done. We were told that the Rebate Amount values are correct, and were based on the System Size and Installation Cost values shown on the Final Application. We also noted several instances in the case of solar PV systems rated 10 kW or smaller where "60%" or "40%" (instead of "70%") is incorrectly shown for the percentage rebate cap. We were told that the correct value was used in the calculation. (If a percentage that is too low is used, the rebate paid will be smaller than it should be. It is very likely that the system owner and installer expect the rebate will be a certain amount, and if it is a smaller amount they will quickly ask the BPU/OCE for an explanation.)

The scope of this project did not include performing an audit to verify that the Rebate Amounts shown in the Database are correct. Rather, it was to identify areas where program process improvements were needed. The addition of fields where the DC Watts and Total Installed Cost values that appear on the Final Application form can be recorded, and fields where the calculation of the two provisional rebate amounts is captured (as well as the final amount of Rebate Amount paid), would serve to:

1. Minimize the likelihood that an error is made in determining the rebate amount,
2. Help to ensure that all important data appears accurately in the Database, and
3. Facilitate a QC verification that the rebate amount is correct.

"Commitment Cancelled" Status Category. The addition of the "Commitment Cancelled" status category would mean that the "Approved" status would apply only for systems that: (1) comply with all program rules, and (2) have not been withdrawn. It then would be an easy matter to generate a report showing accurate data for systems "in the pipeline" (i.e., those for which a Rebate Reservation exists), including aggregate capacity and aggregate future rebate obligation. Without this designation, a great deal of effort is required to develop aggregate data summaries for reports.

¹² Only the date of the last inspection performed is currently being recorded.

“Total System Rated Capacity” Errors. The problem involving the “Total System Rated Capacity” field originates on the Technical Worksheet, where Item 8 is incorrectly labeled “DC Watts” (which is the same as Item 3). It is at this location on this form where the applicant is supposed to multiply Total Array Output (expressed as DC Watts) [Item 3] by Inverter Efficiency [Item 7] to obtain AC Watts.¹³

QC Inspection Results. The DC Watts metric, Inverter manufacturer and model designation information, and Inverter Efficiency are obtained from the Technical Worksheet. The actual installation is verified by the Program QC inspection to confirm that the proposed capacity and inverter shown on the Technical Worksheet were, in fact, installed. However, the results from the inspections are not recorded in the Database. At the present time, the only entry is “Date Inspection Completed.” It would be useful to be able to query the Database to obtain information such as how many repeat inspections are required for each installer, and the reasons for failed inspections. This information would help to identify potential areas for program improvement.

“Process-Performance” Metrics. The CORE Program Database does not have fields showing elapsed time between key events (e.g., days between receipt of an application and disposition of the application). By recording and tracking these “process-performance” metrics, the BPU/OCE would have a way to gauge its performance and refute spurious charges that it takes too long to approve applications and issue rebate checks.

Tracking All Program Expenditures. The CORE Program Database is not used to record and track expenditures other than rebates. The addition of fields in which to record other expenditures would enable the BPU/OCE to better track expenditures vs. budget, and to more quickly compile data for monthly and quarterly status reports.

REED Program Database. The REED Program database is adequate for tracking progress at the current level of program participation and activity.

4.2.3 Recommendations:

1. The following fields should be included in the CORE Program Database:
 - ◆ Last Date When Evidence of System Installation Contract Can be Submitted (90-days after Approval Letter Date)
 - ◆ Date When Evidence of System Installation Contract is Received
 - ◆ Date Applicant Notified that Rebate Reservation has been Cancelled
 - ◆ Date of the last “Status” Change
 - ◆ Days Elapsed from Application Received Until Disposition Action
 - ◆ Days Elapsed from Final Application Until Disposition
 - ◆ Total Rated Capacity (DC Watts) of the system actually installed (as recorded on the Final Rebate Application)
 - ◆ Actual Installation Cost (as recorded on the Final Rebate Application)
 - ◆ Total Rated Capacity (DC Watts) of the system actually installed (as recorded on the QC Inspector’s report)

¹³ The purpose of the inverter is to transform DC power produced in the solar array to conventional AC power.

- ◆ Outcome of Each QC Inspection
 - ◆ Date of Each QC Inspection
 - ◆ Provisional Rebate Amount based on \$/Watt Algorithm
 - ◆ Provisional Rebate Amount based on the Percentage Cap
 - ◆ Expenditures by Category (e.g., Staff, Supplies, Contractors, Travel)
2. Date entries to the CORE Program Database should be accurate (e.g., the actual date an item of paperwork was received or inspection performed). The errors in Total System Rated Capacity should be corrected. There should be no missing entries (“N/A” should appear wherever an entry is not applicable).
 3. The Status field should have “Reservation Cancelled” as an optional entry.
 4. The BPU/OCE should immediately initiate a careful review of all of the rebate calculations in the CORE Database. (The BPU/OCE should consider using CEEEP or an independent party to conduct this review.)
 5. The BPU/OCE should immediately initiate a procedure requiring a sign-off by both the individual who made the original calculation of rebate amount and a QC reviewer.
 6. The programs should move quickly to hire or contract with a qualified Database-management professional to implement the recommendations listed in this section. Up to a week’s time should be anticipated for this effort for the CORE Program and lesser amounts for the other programs. If an individual is hired, the person could become a part-time Database manager for all programs. The initial task for this individual or firm should be to:
 - A. Add the fields listed in Recommendation 1 above
 - B. Develop standardized queries to extract data summaries from the CORE Database. This will help to free-up staff time and enable the data summaries to be available in a timely manner for monthly and quarterly reports, and daily when there may be a concern that the rebate commitment is nearing the budgeted amount.
 7. Each member of the BPU/OCE staff who is responsible for a program should use the queries developed by the Database management professional to prepare Monthly Status Reports that provide an overview of status in terms of the numbers of applicants or participants, system kW planned or operating, and rebate amount committed or paid, for each Status category. The report should also show funds committed and funds remaining, issues in the resolution process, etc. In the case of Programs such as CORE that involve a complex, multi-step process, the report should document metrics that track “process performance.”
 8. Add expense records (other than rebate amounts) to the Databases.

4.3 OBJECTIVE 3: Review Existing Overall and Program-Specific Goals, and Assess Whether Programs are Meeting Them

Research Questions:

- Are program goals clearly defined?
- Are the goals consistent with program budgets?

4.3.1 Findings:

- The State has set quantitative targets for 2008 for Class I renewable-energy capacity (300 MW = 300,000 kW) and also for solar PV capacity (90 MW = 90,000 kW),¹⁴ and created programs to achieve the targets. However, no plan appears to exist that projects the annual contribution of the NJCEP's individual programs to these overall goals. The individual programs do not have annual or long-term quantitative goals. Thus, from a management perspective, monitoring progress toward the overall goals must be subjectively based on the annual achievements of the individual programs. The BPU/OCE Staff Interviews indicate that there is strong focus on the general goal of increasing the generation of renewable energy and establishing a renewable-energy infrastructure in New Jersey.
- The overall, qualitative goals of the NJCEP are to establish energy-efficiency and renewable-energy programs that "have environmental benefits over and above those of existing standard-offer programs, make energy service more affordable for low-income customers, and eliminate funding for programs that can be delivered into the market without SBC funding."¹⁵
- At present, an annual budget is established for each renewable-energy program, and each program attempts to achieve as much progress as possible, given its mission. No evidence was found of an expected relationship between annual budget and quantitative annual goals.
- The CORE Program is currently the only one contributing toward the quantitative goals.
- Program staff have noted that the prices for solar PV systems have not been dropping even though participation in the CORE Program is very high. One possible explanation is that the numerous programs promoting customer-sited and grid-supply renewable energy systems offered in other states, and the growing international market for PV systems, is increasing demand for these systems faster than the existing production capacity can supply them. Manufacturers of solar PV panels are "maxed out," selling everything they have production capacity to produce. There is a growing waiting list for panels, and manufacturers are scrambling to increase manufacturing capabilities, which calls for heavy new investments. This is not a situation that produces declining prices. It also may portend a problem for meeting New Jersey's quantitative goals at current funding levels.

¹⁴ Navigant, "New Jersey Renewable Energy Market Assessment," Final Report prepared for the Rutgers University Center for Energy, Economic, and Environmental Policy, p. 5, August 2, 2004. The draft BPU "Strategic Plan: 2005-2008 and Beyond" (dated 9/2/04) clarifies that the 300-MW of Class I capacity will be "fostered."

¹⁵ Quoted from the 2002 Annual Report of the NJCEP.

- Aspen's analysis of the CORE Program Database shows that Solar PV is the predominant technology being deployed under the program, accounting for 99 percent of the installed systems and 94 percent of the installed capacity.
- The *Emerging Renewables Program* in California reduces rebate amounts by \$0.20 every six months, as a means for: 1) spreading a given budget over a larger number of modules, and 2) gradually reducing the incentive over time.
- Other states are beginning to give serious consideration to changing their incentive from rebates (to reduce installed cost) to production payments that "pay for performance" over time. The latter type of incentive has been very successful in Germany—so successful that manufacturers are shipping a large portion of solar-panel production to Germany instead of making the panels available for sale in the U.S. California is planning to test the acceptance of this approach by potential participants.

4.3.2 Conclusions

The overall quantitative goals of the NJCEP renewable-energy programs are:¹⁶

- A. 300 MW of Class I renewable-energy generating capacity installed by 2008
- B. 90 MW of solar PV generating capacity installed by 2008 (30 percent of the 300 MW).

However, no plan appears to exist that projects the annual contribution of the NJCEP's individual programs to these overall goals. Thus, from a management perspective, monitoring progress toward the overall goals must be subjectively based on the annual achievements of the individual programs. Interviews with BPU/OCE staff and other individuals associated with the programs indicate that there is strong focus on the *general* goals of increasing renewable-energy generation and establishing a renewable-energy infrastructure in New Jersey rather than managing progress toward the specific overall quantitative and qualitative goals.

At present, an annual budget is established for each renewable-energy program, and each program attempts to achieve as much progress as possible, given its mission. No evidence was found of an expected relationship between annual budget and quantitative annual goals.

Success in meeting the Board's 2008 renewable-energy generating capacity goals may be impeded by a factor that is external to the state's scope of control. There are some indications that solar PV panels may be in short supply during 2005 and perhaps beyond. Solar programs in other states and other countries have produced a demand for PV modules that exceeds aggregate production capability. Although production capabilities are expanding, demand continues to grow. Hence, shortages may develop that slow the rate at which installations are completed.

Review of the CORE Program Database indicates that installed capacity, annual generation, savings, and emissions-reductions are not being correctly calculated in all cases. The other parameters are derived from installed capacity, and as was noted under Objective 2, the latter quantity is sometimes wrong because of confusion between AC and DC values.

¹⁶ NJBPU Order, Agenda Date: 4/28/04, In the Matter of Appropriate Utility Funding Allocation for the 2004 Clean Energy Program, and In the Matter of Comprehensive Energy Efficiency and Renewable Energy Resource Analysis, Docket Nos. EX03110946 and EX04040276.

An Impact Evaluation to measure the *actual* kW and kWh (AC and DC) output of a sample of installed systems would add confidence to the nominal energy metrics that are currently recorded. These results could be used to develop a set of “realization rate” values.¹⁷

The CORE Program’s rebate structure is also relevant to achieving the goals. The existing rebate structure has a sharp decline at 10.0 kW, dropping from \$5.50/Watt to \$4.00/Watt at this point. Our analysis of the CORE Program Database disclosed that 34 percent of the applications are in the 0-kW to 5.0-kW range, 45 percent are in the 5.01-kW to 10.0-kW range, but only 5 percent are in the 10.01-kW to 30-kW range. This analysis supports the suspicion that the drop in rebate rate at 10.0 may be too great because the cost of an installation does not decrease as rapidly.

Aspen’s analysis of the CORE Program Database also indicates that the installer often quotes a total cost such that the percentage cap times this price is approximately the same as the rebate amount calculated on the basis of the \$/Watt algorithm. This finding suggests that, in situations where the installer is not competing for the sale, the percentage caps on rebate amounts may be helping to keep system prices high. We note that the BPU/OCE is attempting to encourage purchasers to seek multiple price quotes. This activity is very worthwhile and should be strengthened.

A financial incentive in the form of a series of periodic “performance payments” instead of an initial rebate have been successful in Germany and plans are being made to test them in California. An alternative is to offer both forms of incentive. The advantage of performance payments is that all parties are incentivized to be sure that installed systems actually produce as much electricity as possible, year after year.

California has a policy of reducing the rebates by a small amount (\$0.20/Watt) every six months. The objective is to have a slow but steady withdrawal of financial incentives. The creation of RECs with economic value to system owners may mean that New Jersey can adopt a similar policy.

4.3.3 Recommendations

The recommendations for Objective 3 are divided into recommendations concerning *program impact goals* and recommendations concerning *program operational, or process, goals*.

The following recommendations have the objective of creating individual program *impact goals*. Such goals will allow program management to monitor aggregate progress toward the State’s overall impact goals and make timely adjustments to either the programs’ procedures or its goals to keep the goals and performance consistent with the market realities.

1. Annual capacity goals (MW) should be set for each of the programs that are contributing to the 2008 Class I renewable-energy installed generating capacity goals, i.e., the CORE, REAP, and REDO programs. These goals—and program accomplishments toward them—should be expressed in annual peak MW and MWh units (based on the common 60-Hz AC power standard).

¹⁷ The realization rates would be a pair of coefficients defined as the ratio of actual metered output power to nominal output, and actual annual electricity generation (MWh) to nominal generation.

2. Once annual capacity goals are established for the CORE, REAP, and REDO Programs, the overall quantitative goals set for all renewable-energy programs and all solar PV programs should be re-evaluated annually in the context of the individual programs' aggregate performance.
3. The REED Program, which does not directly result in the installation of renewable-energy generating capacity, should also have a set of quantified annual goals extending over the period of the project or activity and from one to four years into the future. These might include:
 - A. The number of new businesses established in New Jersey annually as a result of program loans
 - B. The number of existing businesses expanded annually as a result of program loans
 - C. Specific increases in units of renewable-energy equipment manufactured in New Jersey over the four years
 - D. The number of new jobs added in New Jersey annually
 - E. The annual amount of new tax revenues
4. The types of non-generating-capacity goals listed above for the REED Program can also apply to the REAP Program.
5. For the REDO Program, the number of schools and municipalities participating, and resulting quantifiable demand, energy, and emissions impacts, should be goals.
6. For all programs, quantitative goals should be established to monitor progress toward the following overall *qualitative* goals:
 - A. *Making energy service more affordable for low-income customers:* The projected reduction in electricity price (\$/kWh) that can be attributed to the growth of self-generation from renewable resources. The estimated savings from this projection will be for all New Jersey ratepayers, including low-income customers.
 - B. *Eliminate funding for programs that can be delivered into the market without SBC funding:* The annual change in the renewable-energy generation capacity installed in New Jersey as rebate levels are gradually decreased. This is also a market transformation goal.
7. Each funded project should have a formal "Mission Statement" Qualitative goals should be established for programs for which quantitative goals are not appropriate.
8. The CORE Program's rebate structure should be carefully reviewed to identify beneficial and cost-effective changes. Consideration should be given to changing to a "production payment" type of incentive (or to a combination of small rebate and production payment), especially for larger systems (e.g., 50 kW and larger) where it is likely that "revenue-grade" metering is already installed and record-keeping is probably already being done.
9. Increase efforts to encourage potential CORE and REDO Program participants to solicit competitive bids from installers.

The following recommendations have the objective of creating program *process goals*. Such goals will give program management a benchmark for assessing whether adjustments to individual program processes might improve operational efficiency. Process-related goals should be limited to the processes that are critical to evaluating program performance and accountability. They should address processes that program staff can control and not involve processes that can be significantly affected by external events.

10. For all programs:

- A. Average time between customer-initiated and program-initiated activities. Using the CORE program as an example, these would include average time between:
 - ◆ Initial application and program decision
 - ◆ Final application and program QC inspection
 - ◆ Final application and mailing rebate check
 - ◆ Request for utility meter and actual installation
- B. Compliance with budgetary limits while maintaining continuous program operations
- C. High levels of participant satisfaction.

4.4 OBJECTIVE 4: Review Existing Metrics and Recommend Changes to Metrics to Measure Success (such as performance indicators and goals)

Research Questions:

- Are the metrics clearly defined and accurately measured?

4.4.1 Findings

- Aspen's analysis of the CORE Program Database shows that:
 - The Database records include the project's status, the rated output in DC (direct current) kilowatts (kW), and the rebate amount (which is based on DC Watts). The Database also has a field labeled "Total System Rated Output." We understand that the entries in this field are intended to be expressed as conventional alternating current (AC) kilowatts (kW), because these are the measurement units used for reporting accomplishments in the official NJCEP Quarterly Reports, which contain similar data for all programs, energy efficiency as well as renewable energy. Unfortunately, this field contains several errors—many of the entries are merely a repeat of the DC kW values found in another field, other entries seem to bear no relationship to either AC kW or DC kW. Although the numerical totals by calendar quarter are less than 10 percent incorrect, a conceptual error such as this should be eliminated. (Further information is provided in the next section, where the Database is discussed in greater detail.)
 - Annual electricity savings reported in the NJCEP Quarterly Reports are based on the inconsistent kW values and an assumed value of annual kWh per kW. Actual metered data results have been incorporated into the protocols. These "issues" mean that the kWh and dollar savings and the emissions-reduction

values, which are derived from the kW capacity and generation values are not accurate.

- The Database has the capability to report “process metrics,” such as the time to process applications and perform inspections, but these process metrics are not currently being either calculated or reported.
- Relative few CORE Program installations are being made in the 10-kW to 50-kW range. This suggests that the sharp drops at 10 kW of both the rebate amount (\$5.50/Watt to \$4.00/Watt) and the percentage cap (from 70 percent to 60 percent) may not track the drop in installer costs at this point.
- In several instances the total cost of the installation appears to be determined as
R times C divided by P

where: R = applicable per-unit rebate (\$/Watt)

C = system capacity (expressed as Watts)

P = percentage “cap” on the total rebate amount.

This suggests that the percentage caps are acting as a deterrent to price reductions when the installer does not face competition. (The installer can tell the buyer, “If I reduce my price you will pay about the same amount because the rebate will be smaller. So, why not let me show a higher price on my invoice and collect the higher rebate?”)

4.4.2 Conclusions

Several of the appropriate impact metrics for the CORE and REAP Programs are being calculated at this time (e.g., MW installed and operating, annual MWh generated); however, they are not being calculated properly (as was noted previously under Objective 2).

A number of metrics on the performance of the programs' *processes* that could be used to monitor operational efficiency are not being calculated and tracked. Examples of these metrics include: the time (days) between receipt of an acceptable Final Application and (a) the date of the Program QC Inspection, and (b) mailing of the rebate check.¹⁸ Other process metrics could be the time it takes for the utilities to approve the Interconnection Agreement, and to install a suitable meter, if needed (both by utility), and the number of installations that fail the first program inspection, by installer.

There are no clearly established metrics of any kind for the REED and REDO Programs.

We understand that a formal plan for periodically evaluating the programs is currently being developed by CEEEP and the BPU/OCE.

4.4.3 Recommendations:

1. Establish a formal plan for periodically conducting independent impact and process evaluations using indicators such as those listed in these recommendations. This plan should take into consideration the goals discussed and recommended under Objective 3 plus other metrics that can be used to identify need for improvement in specific

¹⁸ This was also listed under Objective 3.

activities. The schedule for these independent evaluations should specify that they be conducted every two to three years.

2. As noted previously under Objective 2, the procedures for calculating MW, annualized MWh, and emissions reductions should be corrected.
3. In addition to the *impact* metrics required to track progress toward the goals (Objective 3) the following impact metrics should be defined and measured:
 - A. For the CORE and REDO Programs:
 1. Estimated annual electricity cost savings for participants
 2. Annual number and value of solar renewable energy certificates sold
 3. Persistence of systems' operations as determined by a periodic, e.g., every two years, sample on-site meter survey. This survey should record reasons for any deterioration of system output and system failures.
 4. The amount of annual state funding provided for installations compared to the aggregate annual value of installations installed. This indicator evaluates both program leverage and progress toward market transformation by comparing the annual private investment in outcomes desired by the programs to the funding invested in them by New Jersey.
 - B. For the REED Program:
 1. The number of new renewable-energy businesses established in New Jersey annually that do *not* use program loans. This is also a market transformation metric.
 2. The amount of new annual tax revenues from renewable-energy businesses established or improved *without* program loans. This is a market transformation metric.
4. In addition to the *process* metrics required to track the operational efficiency of the program (Objective 3), the following process metrics should be defined and monitored.
 - A. For the CORE and REDO Programs:
 1. A projection of rebate funding requirements based on the rate of program operations and other factors
 2. The monthly, annual, and cumulative numbers of Pre-Installation and Final Applications that are (a) received for processing, (b) approved, and (c) rejected or returned because of missing information
 3. The monthly, annual, and cumulative numbers of Pre-Installation Applications that lapse because either: (a) evidence of an installation contract was not received within 90 days, (b) the installation was not completed within the prescribed time, (c) application withdrawn, and (d) the QC inspection cannot be passed because one or more requirements are not satisfied.
 4. The monthly, annual, and cumulative numbers of Pre-Installation Applications for which a time extension has been: (a) requested, (b) granted, and (c) refused.
 5. The monthly, annual, and cumulative percentages of installations that fail the first QC inspection
 6. The monthly, annual, and cumulative numbers of installer and Code Official training

sessions held, and numbers of individuals trained

B. For the REED and REAP Programs

1. The monthly, annual, and cumulative numbers of applications that are (a) received for processing, (b) approved, and (c) rejected or returned because of missing information
2. The monthly, annual, and cumulative numbers and dollar values of contracts:
 - (a) underwritten, (b) completed, (c) behind schedule, (d) cancelled, (e) repaid, and (f) determined to be in default status.

4.5 OBJECTIVE 5: Assess Standards for Reviewing Applications and Awarding Incentives

Research Questions:

- Are appropriate procedures in place to ensure applications are properly reviewed and approved? Are the actual review and approval processes consistent with these procedures?
- Are customers satisfied with the programs' process?

4.5.1 Findings

Application-Review Procedures

- The Staff Interviews disclosed that the BPU/OCE does have appropriate procedures in place to ensure that applications are properly reviewed and approved. It appears that these procedures are mostly being followed in practice. The BPU/OCE acknowledges that it has not had time to put these procedures in written form.
- The Staff Interviews and the Installer survey interviews have disclosed some instances where the BPU/OCE has not been following its own program rules. An example is not notifying customers who submitted a Pre-Installation Application but who failed to submit evidence of a contract for system installation within 90 days of issuance of the commitment letter, that the commitment and their rebate reservation have been cancelled.¹⁹
- Programs operated in other states do not generally have a "Program Guidelines," document, but one of the largest programs—the *Emerging Renewables Program* in California—does have such a document.
- Both the Staff Interviews and the Installer survey interviews disclosed that the CORE Program would benefit from having "Program Guidelines" that would contain (1) all program rules and requirements, and (2) a detailed description of the program process.

Customer Satisfaction

- A large majority (83%) of the Residential Participants in the CORE Program reported high satisfaction with the program as a whole. Forty percent of those in the remaining 17% mentioned the need for greater cooperation from the utilities as their major

¹⁹ At the time in mid-October when final revisions to this report were being made, Aspen learned that the BPU/OCE had recently sent letters to applicants that had not complied with this requirement, requesting that evidence of a contract be submitted.

complaint. Almost all of the Residential Participants (97%) were completely satisfied with their installer. Most of the installation processes went smoothly. Two-thirds (67%) of the participants experienced no delays during the installation process. Twenty-one percent reported that delays were caused by: overloaded contractor, inspection process, or zoning approval process.

- In response to a request for specific recommendations for improving the CORE Program, Residential Participants gave varying responses. The most frequently mentioned recommendations (10% each) were, “Get better cooperation among the installer, BPU, and the utilities,” and “Do more advertising.”
- The Residential Participants rely heavily on the installer to prepare the pre-installation paperwork. Slightly more than three-quarters (77%) of the participants relied on the installer to submit both the pre-installation application and the technical worksheet. Only 13% submitted both themselves.
- Of the small number of Residential Participants who submitted either or both of the pre-installation application and the technical worksheet (n=7), 86% found the process easy. The remaining 14% felt the terminology used on the forms was too technical.
- A large majority (83%) of the CORE Program Nonresidential Participants reported high satisfaction with the program as a whole. The remaining 17% constitute one nonresidential participant who was so unhappy with the results of a combined energy-efficiency and renewable-energy installation that the individual intended to involve attorneys.
- Installers expressed some dissatisfaction concerning delays at BPU/OCE (especially delays in issuing rebate checks), but the general consensus is that things are much better in 2004 than they were in 2003.
- All of the REED Program Participants were enthusiastic about the program and expressed satisfaction with it. They uniformly reported that BPU/OCE staff is providing diligent oversight without imposing onerous requirements.

4.5.2 Conclusions

The BPU/OCE's procedures for reviewing applications are appropriate. However, these procedures have not as yet been documented. A written description of the CORE Program would benefit from having “Program Guidelines” that would contain (1) all program rules and requirements, and (2) a detailed description of the program process.

The surveys of CORE and REED Program participants show that these participants are well satisfied with the programs, and are mostly satisfied with programs' processes. However, CORE Program participants (especially residential participants) generally have only an indirect involvement in the process, since they typically allow the installer to be their agent in dealings with the BPU/OCE.

Installers expressed some dissatisfaction concerning delays at BPU/OCE (especially delays in issuing rebate checks), but the general consensus is that things are much better in 2004 than they were in 2003. The only complaint voiced by REED Program participants concerned the length of the contract negotiation process.

The problems associated with the delayed and extended review of REED Program applications and selection of awardees in 2003 were mostly the result of the “first-time ever” nature of the exercise, combined with the lack of experience in contracting, lack of staff resources, and the need to concurrently focus efforts on handling the growing number of CORE Program applications. However, as is also noted under Objectives 1 and 8, procedures for working with EDA to review applications submitted for the REAP, REED and REDO Programs have not been fully formulated and documented.

The BPU/OCE has recently begun taking steps to enforce the requirement to cancel CORE Program rebate reservation if evidence of a contract for system installation is not submitted within 90 days of issuance of the commitment letter.

4.5.3 Recommendations

1. Consideration should be given to changing the REAP and REED Programs such that there are two or three proposal submittal dates each year, with firm dates for awardee selection, rather than, “submit anytime, but we don’t know when we will be able to look at them and make a decision.” By having firm dates, proper plans can be made for the procedures to be followed, and staff resources at both BPU/OCE and EDA can be scheduled in advance.
2. The BPU/OCE should prepare a “Program Guidelines” document for each program, and make it available for downloading from the Website. This document would contain (1) all program rules and requirements, and (2) a detailed description of the program process. The program process description should provide the expected or “target” timelines for each step in the process.

4.6 OBJECTIVE 6: Assess Program Impacts and Update Protocols for Measuring Energy Savings (as needed)

Research Questions:

- Are the protocols used to calculate program benefits and impacts commensurate with those used by other utilities/states?

4.6.1 Findings

- The CORE Program provides potential participants with a link to standard software (PVWATTS) for calculating expected cost savings. The software is based on work performed at the National Renewable Energy Laboratory (NREL). The underlying protocols are widely used. This software requires AC (alternating current) Watts as input. Unfortunately, Item 8 of the Technical Worksheet is mislabeled as “DC Watts.” It is intended to be “AC Watts,” calculated as the product of Item 3 (“DC Watts”) and Item 7 (“Inverter’s Peak Efficiency”).
- As was noted above in Section 4.2, the CORE Program Database records PV system rated capacity as DC (direct current) Watts. This is reasonable for purposes of calculating the rebate amount. However, the AC (alternating current) Watts and kilowatts (kW) figures should also be calculated, tabulated, and used for calculating energy and cost

savings, and emissions reductions. This is not now correctly being done; for many systems the kW[DC] value is tabulated in the Database.

- Electricity generation, savings, and emissions reductions are based on an assumed kWh/kW coefficient, not on the result of metering performed as part of an Impact Evaluation.

4.6.2 Conclusions

The measurement of energy and demand impacts for customer-cited generation systems is based on algorithms that estimate each system's annual generation and coincident peak capacity. Input data are based on fixed assumptions, engineering estimates, and data obtained from the program's technical worksheets.

An industry-standard calculation tool (PVWATTS) from the National Renewable Energy Laboratory is used to estimate PV System annual generation. For wind-turbine installation, estimated annual generated is calculated using industry data table and inputs such as average wind speed at hub height, rotor diameter, and typical wind efficiencies for wind-speed/rotor-diameter combinations. These protocols appear to be appropriate.

All of the protocols used for customer-sited demand and energy outcomes for the CORE and REDO programs (assuming the latter will be the same as those for the CORE Program) appear to be consistent with the protocols used in the industry, and therefore, appropriate.

A key input to the protocols used to calculate program benefits and impacts (kW[AC]) is not being consistently calculated and reported accurately, and therefore the reported items that depend on this parameter (electricity generation, savings, and emissions reductions) are not as accurate as they could be.

4.6.3 Recommendations

1. Correct the CORE Database: add "kW[AC]" to the "Total System Rated Output" field heading, ensure that Inverter Efficiency is always entered and used to calculate values in the "Total System Rated Output" field. Correct Item 8 on the Technical Worksheet so it shows "AC Watts" for the quantity recorded. Instruct the applicant to calculate the entry by multiplying Item 3 by Item 7.

4.7 OBJECTIVE 7: Assess the Process Followed to Develop and Implement New Programs

Research Questions:

- What is the process for designing new programs? Are alternative processes available that are more effective?

4.7.1 Findings

- The BPU has introduced two new programs since April 2003: the REED and REDO Programs. It has also revised the REAP Program and announced the intention to offer the FReEE Program. The Staff Interviews disclose that the process followed by the BPU/OCE to develop new programs is to form an ad hoc program-design team that includes representatives of other State agencies if it is believed they can contribute to the success of the program. In the case of these programs, EDA will participate in the programs' design and administration, and will also contribute funding.
- Because of the press of other duties, the ad hoc design teams have not met, and may not have been officially formed, before the programs were announced. This has led to the BPU/OCE having to perform application-evaluation functions during 2003 that might have been performed more efficiently with EDA participation.
- It is also not clear that the design process includes provisions for periodic evaluations of the programs to determine if they are performing as designed and achieving their objectives.

4.7.2 Conclusions

The BPU/OCE's intended process for developing new programs is appropriate, but the intended process has not been followed. The basic problem is that the task is not pursued in a timely manner because assigned staff have other, more urgent responsibilities on existing programs. As a result, new programs have been launched before the preparatory work (which is needed to assure that the programs will be successful) has been done.

4.7.3 Recommendations

1. To avoid operational issues and the potential for participant misunderstandings, new programs should be fully designed before they are launched for participation. Full design should include:
 - ◆ Identifying quantitative annual goals and objectives
 - ◆ Identifying other State agencies whose missions might be affected by the program. Ensuring that these agencies fully understand how they may affect the program's success, and are prepared to cooperate and able to cooperate (e.g., staff and budgets in place). Perform training if such is needed.
 - ◆ Developing procedures for coordinating activities and outputs with other program managers, state agencies, and electric and gas utilities (as needed)

- ◆ Determining whether sufficient numbers of trained trade allies are available. If not, recruit and train more.
 - ◆ Developing a Program Theory document and a Program Logic Diagram
 - ◆ Developing and documenting program rules for participants and trade allies
 - ◆ Obtaining comments from the Clean Energy Council
 - ◆ Preparing application forms
 - ◆ Developing a “Program Procedures” manual that documents the program’s process for logging, reviewing, and acting-on applications, for authorizing expenditures, and for assuring high-quality performance by staff and trade allies
 - ◆ Developing and documenting an information-dissemination marketing and outreach plan (including a Website)
 - ◆ Developing electronic tracking systems for applications and for expenditures
 - ◆ Developing a plan for the periodic evaluation of the program’s performance and accomplishments
2. If for any reason, a new program must be announced before the above program activities and inputs are in place, it’s announced launch date should be far enough in the future to allow for all these activities to be completed before the launch date.

4.8 OBJECTIVE 8: Assess the Manner and Extent of Coordination Among the Various Programs

Research Questions:

- Can efficiency be improved by coordinating activities among programs?

4.8.1 Findings

- The Staff Interviews disclosed that, at present, there is little coordination because the CORE, REED and REAP Programs are by their nature quite different, have different objectives, and address different purposes. However, it is anticipated that the REDO and FReEE Programs will be closely connected to the CORE Program.
- The Staff Interviews also disclosed that the REDO Program is in limbo because its rules and procedures have not been fully formulated (e.g., procedures related to EDA’s involvement have not been documented, nor have criteria governing acceptance of applications been formulated.). The REDO Program also requires coordination with one of the C&I energy-efficiency programs (*New Jersey SmartStart Buildings®*).
- The REAP, REED and REDO Programs all require participation in application decisions by EDA. Although the programs are different, the procedures governing EDA’s involvement should be similar. However, these procedures have not as yet been formulated and agreed to by all concerned.

4.8.2 Conclusions

A guiding vision of New Jersey’s Clean Energy Program is the creation of an optimal mix of renewable and energy-efficiency installations and businesses in New Jersey. The current

portfolio of programs has a unified *brand image*, which is important to avoid confusion among consumers.

There should be close coordination between the CORE and REDO Programs, but at the present time the REDO Program is in limbo because its rules and procedures have not been fully formulated (e.g., procedures related to EDA's involvement have not been documented, nor have criteria governing acceptance of applications been formulated.). The REDO Program also requires coordination with one of the C&I energy-efficiency programs.

The REAP, REED and REDO Programs all require participation in application decisions by EDA. Although the programs are different, the procedures governing EDA's involvement should be similar. However, these procedures have not as yet been formulated and agreed to by all concerned.

There does not need to be close coordination among the CORE, REAP and REED Programs because these three programs have different objectives and seek participation from widely different groups.

4.8.3 Recommendations

1. Where interactions among programs are identified, a detailed plan and timetable for cooperation should be established before the cooperative effort is initiated.
2. Procedures governing EDA's involvement in the REAP, REED, and REDO Programs need to be developed and documented before these programs are marketed. Whenever one or more other agencies are involved with the BPU/OCE in a program (e.g., when the BPU/OCE provides a rebate and EDA provides a loan), the agencies should meet and answer the following questions before the program begins. The goal should be to make things as simple as possible for applicants.
 - ◆ Can the program have a single, unique name? (Program literature should describe the involvement of each agencies, and might mention related programs offered by each agency.)
 - ◆ Which agency takes the marketing lead?
 - ◆ Does the applicant directly interact with both agencies or just with one?
 - ◆ Can there be a single application form?
 - ◆ Which agency will have ultimate accountability for the program?
 - ◆ How will credit for program achievements be allocated to avoid double counting?
 - ◆ Which agency measures and reports which performance metrics?

4.9 OBJECTIVE 9: Assess Program Marketing and Outreach Activities

Research Questions:

- Are the program marketing and outreach efforts successful in conveying the benefits of participation, and in attempting to overcome the barriers to participation?

4.9.1 Findings

- Both Residential and Nonresidential Potential Participants had relatively low awareness of the BPU's renewable-energy programs.
- The BPU/OCE has done no marketing or outreach for any renewable-energy program since assuming administration responsibility for the programs. Marketing of the CORE Program has consisted of the installation contractors' efforts to recruit prospects. Occasional articles about local installations in local newspapers have aided the installers' efforts. The large number of applications shows that these marketing efforts are successful.
- The BPU/OCE plans to re-launch the REED Program. The BPU/OCE and EDA will hold public relations meetings with the business associations whose members are likely potential participants. EDA will conduct direct mailings to businesses with which it has a relationship.
- The BPU/OCE has established a marketing director and initiated contracts with advertising and public relations firms to market awareness of all of the Clean Energy Programs, including the efficiency programs. This marketing campaign will be limited to creating awareness and educating households and businesses about the benefits of energy efficiency and customer-sited renewable energy.
- Grants from a \$300,000 program opportunity notice have recently been awarded to four organizations for marketing and awareness-building to specific audiences (e.g., religious institutions and schools).
- The CORE Program Participant surveys found a high level of awareness of New Jersey's Solar Renewable Energy Certificates (SRECs) among participants whose installations were completed since April 2003. BPU/OCE is undertaking an effort to notify earlier participants with older installations may not be aware of the SRECs. They have begun an effort to identify and these older participants.
- The CORE Program Residential Participant survey showed that a strong plurality of systems are installed by households with two to five occupants, having 2,000 to 4,000 square-feet of floorspace in an owned home and a household income in excess of \$100,000, with a young-to-middle-age (35 to 54) head of household with some college education. More than half had incomes in excess of \$75,000. This characterization of participants is consistent with innovation-of-diffusion theory descriptions of "innovators" and "early adopters."²⁰
- The marketing efforts by other states and utilities for their renewable-energy programs mostly follow traditional methods. These include bill inserts, working through trade

²⁰ E. Rogers, *Innovation of Diffusion*, 4th ed. (New York: The Free Press, 1995), Chapter 7.

allies, periodic newspaper advertisements, Web sites, and news articles about successful installations.

4.9.2 Conclusions

The BPU/OCE recently issued contracts to four firms to conduct marketing and outreach directed toward specific targeted groups. In addition, plans are currently being formulated for BPU/OCE to undertake an expanded “awareness-building” marketing and outreach program that is primarily intended to increase awareness of the advantages of energy-efficiency and renewable-energy systems, and the NJCEP, among New Jersey’s citizens. These activities are likely to result in additional CORE Program participants.

The CORE Program is currently receiving 40-50 applications per month, based solely on marketing by installers and dealers/distributors. This level of activity is taxing the ability of the BPU/OCE to properly administer the program, and may also soon lead to the depletion of the Program’s rebate budget. For the time being, therefore, additional CORE Program marketing by the BPU/OCE that is targeted at increasing participation in this program should be given low priority.

4.9.3 Recommendations

1. The current BPU/OCE marketing plans appear to be adequate. However, attention should be given to aligning marketing efforts with program participation goals.

4.10 OBJECTIVE 10: Assess Motivations for and Barriers to Program Participation

Research Questions:

- What factors have a strong influence on program participation?

4.10.1 Findings

Participation Motivators

- “Environmental concerns,” “Save money, and “Show a ‘Green’ image” offer the strongest motivations to CORE Program Participants. Sixty percent of the residential participants claimed that “helping the environment” was the most important reason why they installed their renewable energy system (60%). Another quarter (23%) were most strongly motivated by saving money.
- Installers believe that a good residential prospect has the following characteristics:
 - High income.
 - Suitable location and physically compatible building.
 - Higher than average education.
 - Willingness to be innovative and take risks.
 - Values the environment.
 - Expects to be in home longer than the payback period.
- Installers believe that a good non-residential prospect has the following characteristics:

- Ability to evaluate a system as a medium- to long-term investment opportunity.
- Suitable location and physically compatible building.
- Knowledgeable about the systems.
- Perceives electricity rates to be high.
- Values the environment.
- Support from the top level of management.

Participation Barriers

- The Potential Participant surveys disclosed that the principal barriers to participation in the CORE Program are:
 - Awareness of the program and the systems promoted by it. Ninety-one percent of the residential customers interviewed and 81 percent of the non-residential customers had not heard of the CORE Program prior to the interview. Seventy-five percent of the residential customers and 67 percent of the non-residential customers had not heard of PV systems before the interview. This lack of awareness was not evident for wind systems, however. Seventy-one percent of the residential customers and 95 percent of the non-residential customers had heard of wind-powered systems prior to the interview.
 - PV (non-residential): Unsightly. A small plurality of non-residential customers (18%) cited this barrier. This was not a concern in the residential sector.
 - Wind (residential and non-residential): Unsightly. A moderate plurality (29%) of the residential customers and a large plurality of non-residential customers (42%) cited this barrier.
- Over three-quarters (76%) of the residential and over half (52%) of the non-residential potential participants were opposed to having a wind system on their property after having it described to them. In contrast, 56 percent of the residential potential participants and 71 percent of the non-residential potential participants had no immediate objections to installing PV systems after having them described.
- When asked what it would take to persuade their neighbors and friends to install renewable energy systems, these participants offered a wide variety of reasons. The most frequently mentioned focused on cost and confidence. Twenty-seven percent said, “less up front money or lower price,” and one quarter said, “education on reliability and performance to instill confidence.”
- When asked what it would take to get other businesses or organizations to install a system like theirs, half of the responses related to reducing the cost.

4.10.2 Conclusions

Environmental concerns and saving money offer the strongest motivations for both residential and nonresidential customers to participate in the CORE Program.

The most significant barriers to greater participation in the CORE Program, for both the residential and non-residential sectors, are: 1) lack of awareness of the program, and 2) lack of familiarity with the technologies the program promotes.

The greatest barriers to CORE Program participation among those who are aware of the program are:

- ◆ The high cost of installations
- ◆ The appearance of installations
- ◆ Concern that the technology(ies) is(are) unreliable
- ◆ Site compatibility (e.g., shading in the case of solar projects and zoning restrictions in the case of wind projects)
- ◆ A general lack of familiarity with the technologies

4.10.3 Recommendations

1. When and if marketing of the CORE Program by the BPU/OCE is undertaken, the content should take into account the factors that tend to motivate participation, and should address the specific barriers to participation identified above.
2. Marketing messages should include “case studies” citing actual savings achieved, with pictures of successful installations and endorsements from satisfied participants.