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# Clean Energy Funds: An Overview of State Support for Renewable Energy

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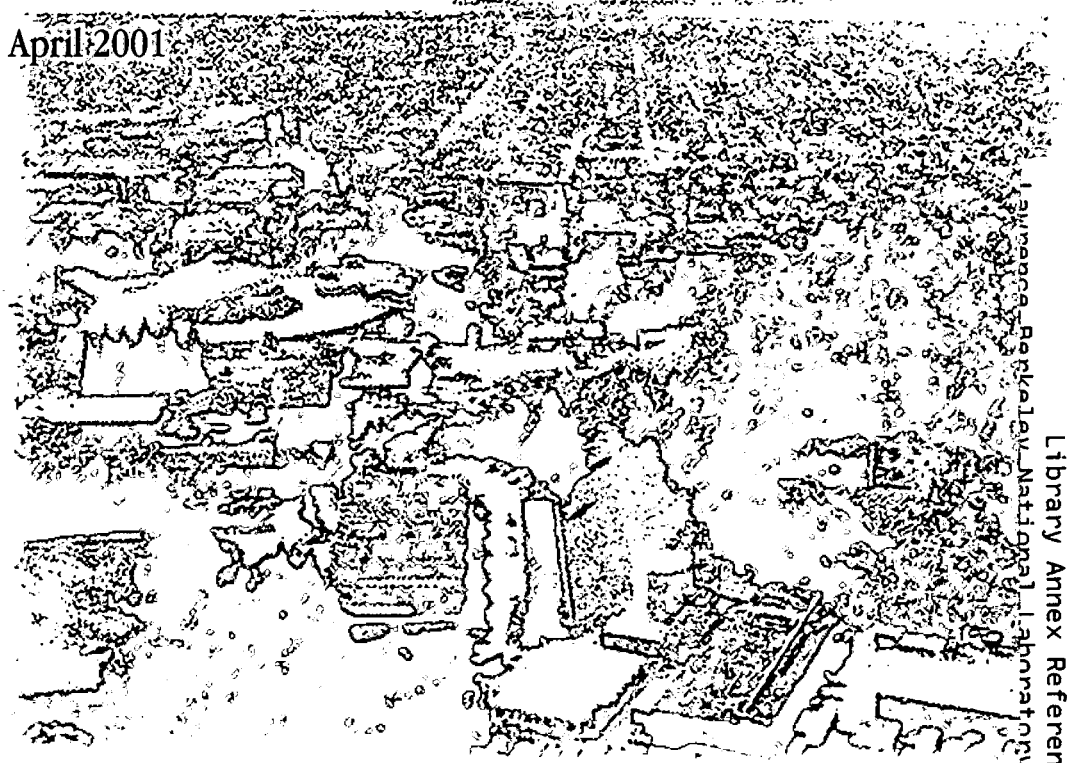
April 2001



## DISCLAIMER

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# Clean Energy Funds: An Overview of State Support for Renewable Energy

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# Table of Contents

# Acknowledgements

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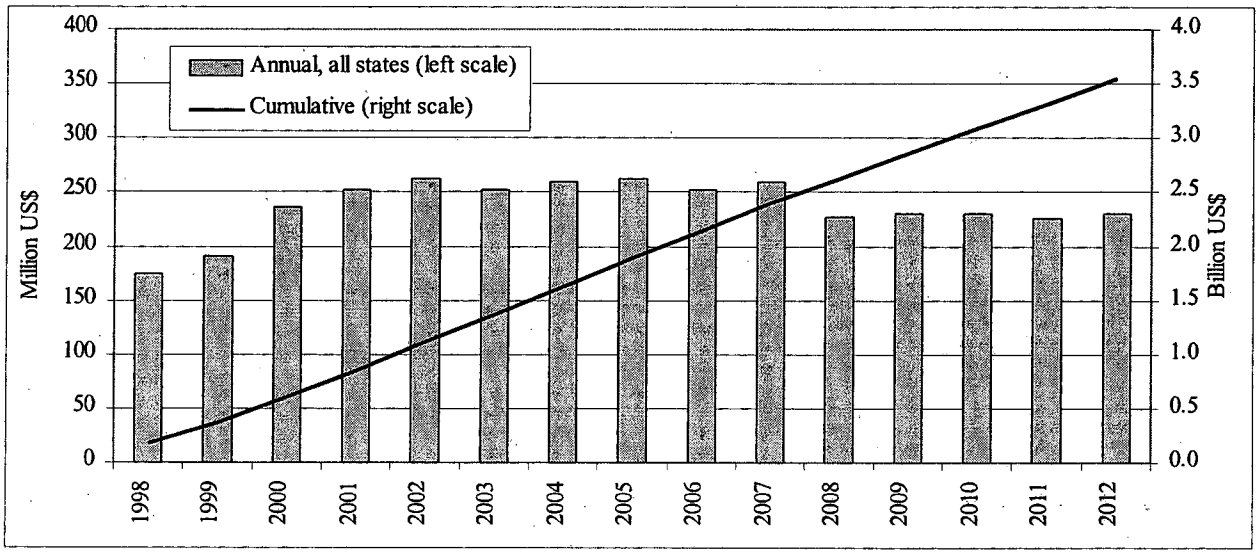
# Executive Summary

As competition in the supply and delivery of electricity has been introduced in the United States, states have sought to ensure the continuation of "public benefits" programs traditionally administered or funded by electric utilities. Many states have built into their restructuring plans methods of supporting renewable energy sources. One of the most popular policy mechanisms for ensuring such continued support has been the system-benefits charge (SBC). This paper discusses the status and performance of state renewable energy funds supported by system-benefits charges.[1]

## Overall Funding

Between 1998 and 2012, roughly $3.5 billion will be collected by the 14 states with renewable energy funds that currently exist and are covered in this paper: California, Connecticut, Delaware, Illinois, Massachusetts, Montana, New Jersey, New Mexico, New York, Ohio, Oregon, Pennsylvania, Rhode Island, and Wisconsin.

At this level of capitalization, these funds collectively have the potential to provide significant support for clean energy technologies over at least the next decade. California, whose fund will collect at least $135 million per year through 2011, accounts for more than half of all funding. Connecticut, Massachusetts, and New Jersey are the next largest funds, each collecting on average between $20 to $30 million per year. The following graph depicts combined annual and cumulative SBC funding for renewable energy over this period.




[1] Though treated less systematically, we also discuss and address some of the renewable energy funds created through utility settlements and other lump-sum transfers. We further note that our discussion excludes Arizona, which will use SBC funds to help fund their renewables portfolio standard. System-benefits charges collected by the publicly owned utilities in California are also excluded from our discussion.

**Eligibility and Administration**

Wind and photovoltaic (PV) energy are eligible for support from virtually every fund. Geothermal electricity is also eligible under many of the funds, but is frequently a strong target for support only where economic resource potential exists in the West. Landfill gas has proven to be moderately popular, especially in states that do not simultaneously have a renewable portfolio standard (RPS) to support such near-market technologies. Fuel cells (using either renewable or non-renewable fuels) have also been targeted by many funds, especially in states with limited wind and solar resources and difficult project siting constraints, such as in the Northeast. Biomass power production, with various restrictions, is eligible in most states, though only a few funds have actually supported such projects thus far; hydropower has been treated similarly. Finally, non-electrical renewable energy applications, such as geothermal heat pumps and daylighting, have been targeted by some funds.

Administrative structures and responsibilities for the 14 SBC funds studied vary considerably across states. Many of the funds are administered by state energy, commerce, or environmental agencies. Other funds are administered by quasi-public business development organizations. Still other funds are or will be managed by independent third party organizations or by the existing electric utilities. Two states allow large customers to "self-direct" their SBC funds, if desired.

**Program Status and Design**

For the most part, states are still in the very early stages of obligating program funds. Eight states – California, Connecticut, Illinois, New York, Montana, Pennsylvania, Rhode Island and Wisconsin – have already spent funds on renewable energy projects and programs. Even among these states, however, only a few years of experience is available.

States are adopting a wide array of approaches to distributing funds in support of eligible resources. These approaches can be roughly categorized into one of three models:

- **Investment Model** – Using loans, near-equity and equity investments to support renewable energy companies and projects. The Connecticut Clean Energy Fund epitomizes the investment model.
- **Project Development Model** – Using financial incentives such as production incentives and grants to directly subsidize and stimulate renewable energy project installation. California is perhaps the best example of this approach.
- **Industry and Infrastructure Development Model** – Using business development grants, marketing support programs, R&D grants, resource assessments, technical assistance, education, and demonstration projects to build renewable energy industry infrastructure. Wisconsin's program is indicative of this approach.

Restricting our attention to only those eight states that have begun to distribute funds, the following table summarizes the types of programs implemented thus far (programs that are currently under development or expected soon are not covered in this table). As shown, perhaps the most popular programmatic elements to date are financial incentives for large-scale renewable generation projects, customer-sited distributed generation programs, and support for

the renewable energy marketing (i.e., the "green" power market). Other investments undertaken include project or company financing, detailed resource assessments, business development grants, broad-based consumer education, and support for existing renewable energy projects.

| Program Type | CA | CT | IL | MT | NY | PA | RI | WI |
|---|---|---|---|---|---|---|---|---|
| Financial Incentives for Large Scale Projects[2] | ● | | ● | ● | ● | ● | ● | |
| Distributed Generation Buy-Downs | ● | | ● | | ● | | ● | |
| Distributed Generation Competitive Solicitations | | | | ● | ● | | ● | ● |
| Consumer Financing Programs | | | | | ● | ● | | ● |
| Project or Company Financing | | ● | | | | ● | | |
| Detailed Resource Assessment | | | | | ● | | ● | |
| Business Development Grants | | | | | ● | ● | | ● |
| Broad-Based Customer Education[3] | ● | | | | | | | ● |
| Support for Renewable ("green") Energy Marketing | ● | ● | | | | ● | ● | |
| Support for Existing Projects | ● | | | | | | | |

## Funding Results

***Financial Incentives for Large Scale Projects:*** SBC funds have achieved perhaps their most visible successes in funding large-scale renewable generation projects. Using a combination of production incentives and grants, six states have funded (or obligated funds to) projects larger than 1 MW, committing a combined $225 million that could ultimately result in more than 1,100 MW of new renewable capacity in the next few years, assuming that all funded projects come to fruition. Normalizing all incentives to their 5-year production incentive equivalent (using a 10% discount rate), incentive amounts have ranged from a low of 0.1 cents/kWh to a high of nearly 7 cents/kWh. Wind power has been a major beneficiary of these funds. The following table summarizes these efforts, which are described in more detail in the body of the paper.

| State | Form of Fund Distribution | Level of Funding | Results[4] | Discounted ¢/kWh Incentive over 5 Years |
|---|---|---|---|---|
| CA | 5-yr. production incentive | $162 million | 543 MW (assorted) | 1.20 |
| | | $40 million | 471 MW (assorted) | 0.59 |
| IL | grant | $0.55 million | 3 MW landfill gas | 0.57 |
| | | $1 million | 3 MW hydro | 1.86 |
| | | $0.352 million | 1.2 MW hydro | 1.63 |
| | | $0.55 million | 15 MW landfill gas | 0.11 |
| MT | 3-yr. production incentive | $1.5 million | 3 MW wind | 3.63 |
| NY | grants with performance guarantees | $9 million | 51.5 MW wind | 1.95 |
| | | $4 million | 6.6 MW wind | 6.75 |
| PA | grant/production incentive | $6 million | 67 MW wind | 1.00 |
| RI | refundable grant | $0.15 million | unclear MW wind | unclear |

[2] Wisconsin's DSARE program will fund large digester gas systems, but to date no projects have been funded.
[3] Other states have provided limited customer education (e.g., solar for schools curriculum), but only California and Wisconsin have thus far devoted a significant amount of resources to customer education activities.
[4] These results are projected and are based on announced results of solicitations. Only a fraction of the projects obligated funds are yet on line and some (perhaps many) may never come to fruition.

***Distributed Generation Policies:*** Customer-sited distributed generation programs, including buy-downs, competitive solicitations, and consumer financing programs, have been equally popular among state funds, but in some states have perhaps met with less success thus far, at least relative to initial expectations. This is perhaps due to a combination of factors including low consumer awareness, low buy-down levels in some states, and the high up-front costs of PV and other distributed technologies. These programs have thus far largely focused on PV, with lesser emphasis on small-scale wind, fuel cells, and other technologies. In aggregate, approximately 7 MW of distributed generation capacity has been developed thus far or is likely to be installed shortly under these programs. In response to the apparent under-performance of buy-down programs, several states are exploring new options for stimulating demand for distributed generation products.

***Support for Renewable Energy Marketing:*** With the introduction of customer choice in electricity markets, several SBC funds have also taken an interest in encouraging the development of the competitive market for renewable energy sales to end-use customers. States that offer direct support to this market are generally doing so with the goal of developing, over time, a sustainable market for renewable energy that is not dependent on continued subsidization. California, Pennsylvania, Connecticut, and Rhode Island have all made direct investments in this customer-driven renewable energy market.

***Other:*** Further details on the full range of programs states have established thus far may be found in the body of the paper.

**Observations and Lessons Learned**

Because many of these efforts are so new, drawing firm conclusions from this early experience would be premature. Nonetheless, we offer preliminary observations and lessons – divided into administrative, programmatic, and strategic issues – that may assist state funds as they formulate their administrative structures and program funding strategies. We summarize our findings in the briefest possible manner in the text boxes below, and refer the reader to Section V of this paper for further details and discussion.

**Administrative Issues**

- While there may be theoretical or philosophical grounds to favor one administrative approach over another, early evidence does not firmly establish any administrative structure as clearly most effective.
- Ensuring that a fund administrator has access to adequate staffing with expertise commensurate with the fund's goals appears to be as or more important than the particular administrative structure that is chosen.
- Outside input, including partnering with local non-profits, consultants, or other state funds, may be an effective way to augment staffing levels and expertise and may provide a fund with an invaluable source of information.
- Aggressive outreach and marketing to both renewable energy businesses and customers are critical to a fund's success.

## Programmatic Issues

We sub-divide these observations and lessons into the most popular programmatic activities to date: funding for large-scale renewable energy projects, renewable energy marketing, customer-sited distributed generation, and infrastructure-building activities.

Large Scale Renewable Energy Projects

- Competitive bidding, either through a formal auction or as a more open RFP, can lower project costs and thereby enhance fund leverage.
- If competitive processes are adopted, steps should be considered to minimize speculative bidding: a series of smaller auctions held at regular intervals, strict cancellation penalties, and increased administrator discretion may be used to combat undesirable bidding strategies.
- Funding should foster an incentive to perform; production incentives are one way to accomplish this, though a fund may increase its leverage by structuring a production incentive as an up-front grant, to be "earned" over time.

Renewable Energy Marketing

- Customer incentives should be carefully tailored to minimize distortions and encourage a sustainable market.
- Funds with an economic development slant may wish to provide direct support to renewable energy marketers through business development grants or direct investment, as has occurred in Pennsylvania and Connecticut.
- Non-residential renewable energy purchases can generate earned media exposure; funds may wish to specifically target such customers.
- State funds may help reduce customer acquisition costs by using their neutral status to mount education campaigns on customer choice generally and renewable power choice in particular.

Customer-Sited Distributed Generation Programs

- Buy-down levels generally need to be aggressive to encourage small PV system sales.
- Education, financing, and other market support activities may be critical to the success of these programs.
- Approaches other than buy-downs, such as targeted RFPs, innovative financing and leasing programs, and bulk purchases of distributed generation systems also merit consideration.
- Fuel cells and other distributed technologies may have different programmatic needs than PV, which has received the bulk of the attention to date.

Infrastructure-Building Activities

- Building industry and market infrastructure may be particularly important where limited renewable project experience exists.
- Many states have incorporated some form of infrastructure-building activity into their programs, including market assessments, resource studies, site prospecting, building distribution channels, early-stage investments, business development grants, and education and demonstration programs.

## Strategic Issues

- Given the limited renewable resources in some states and the regional nature of power markets and air sheds, out-of-state project funding may enhance a fund's impact and several funds are beginning to consider and fund out-of-state projects.
- State funds should consider more fully exploiting opportunities to partner with other states, given the common issues and experiences facing most funds.
- Experience in some states has shown that uncertainties and mixed signals in funding plans can cultivate a "wait and see" attitude among market participants that slows market development and, more importantly, that may result in lost funding opportunities for state funds.
- Fund managers should be conscious of other renewable energy incentives and policies, in particular federal tax credits, state RPS policies, and other market rules and regulations, and should tailor their programs accordingly to increase fund leverage.

# I. Introduction

Across the United States, as competition in the supply and delivery of electricity has been introduced, states have sought to ensure the continuation of "public benefits" programs traditionally administered or funded by electric utilities. Many states have built into their restructuring plans methods of supporting renewable energy sources.

One of the most popular policy mechanisms for ensuring such continued support has been the system-benefits charge (SBC), a non-bypassable charge to electricity customers (usually applied on a cents/kWh basis) used to collect funds for public purpose programs. Thus far, at least fourteen states have established SBC funds targeted in part towards renewable energy.

This paper discusses the status and performance of these state renewable or "clean" energy funds supported by system-benefits charges.[5] As illustrated later, existing state renewable energy funds are expected to collect roughly $3.5 billion through 2012 for renewable energy. Clearly, these funds have the potential to provide significant support for clean energy technologies over at least the next decade.

Because the level of funding for renewable energy available under these programs is unprecedented and because fund administrators are developing innovative and new programs to fund renewable projects, a certain number of program failures are unavoidable. Also evident is that states are taking very different approaches to the distribution of these funds and that many lessons are being learned as programs are designed, implemented, and evaluated. Our purpose in this paper is therefore to relay early experience with these funds and provide preliminary lessons learned from that experience. It is our hope that this analysis will facilitate learning across states and help state fund managers develop more effective and more coordinated programs.

Central to this paper are case studies that provide information on the SBC-funded renewable energy programs and experiences of 14 states. These case studies are attached as Appendix A. The body of the paper both summarizes and draws lessons from these more detailed state case studies. Section II provides a broad overview of the current status of state SBC funds, including funding level and duration, technology eligibility, and program administration. Section III offers an overview of funding activity and highlights the various renewable energy programs states have established thus far. Section IV provides a summary of results to date. Section V turns to salient observations and preliminary lessons learned from this early experience. Administrative, programmatic, and strategic observations and lessons are emphasized. The paper ends with some brief concluding remarks.

[5] Though treated less systematically, we also discuss and address some of the renewable energy funds created through utility settlements and other lump-sum transfers. The reader can find information about all of the state clean energy funds at the Clean Energy Funds Network website, www.cleanenergyfunds.org. We further note that our discussion excludes Arizona, which will use SBC funds to help fund their renewables portfolio standard. System-benefits charges collected by the publicly owned utilities in California are also excluded from our discussion.

# II. Background on Clean Energy Funds

## A. Funding Level and Duration

Table 1 illustrates the funding levels and fund duration of the 14 state SBC programs that currently exist and are covered in this paper (notes to the table are offered in Text Box 1). Figure 1, meanwhile, shows aggregate annual and cumulative fund collection over the 1998 – 2012 timeframe. While aggregate and per-capita funding levels vary considerably by state, nationwide funding for renewable energy through 2012 stands at $3.5 billion. Given current information, aggregate annual fund collection for renewable energy ranges from $175 million to over $250 million during this period. This level of funding is considerable by almost any standard.

**TABLE 1. FUNDING LEVELS AND PROGRAM DURATION**

| State | Approximate Annual Funding ($ million) | Per-Capita Annual Funding* | Per-MWh Funding* | Funding Duration |
|---|---|---|---|---|
| CA | $135 | $4.0 | $0.58 | 1998 – 2011 |
| CT | $15 → $30 | $4.4 | $0.50 | 2000 – indefinite |
| DE | $1 (maximum) | $1.3 | $0.09 | 10/1999 – indefinite |
| IL | $5 | $0.4 | $0.04 | 1998 – 2007 |
| MA | $30 → $20 | $4.7 | $0.59 | 1998 – indefinite |
| MT | $2 | $2.2 | $0.20 | 1999 – July 2003 |
| NJ | $30 | $3.6 | $0.43 | 2001 – 2008 |
| NM | $4 | $2.2 | $0.22 | 2007 – indefinite |
| NY | $6 → $14 | $0.7 | $0.11 | 7/1998 – 6/2006 |
| OH | $15 → $5 (portion of) | $1.3 | $0.09 | 2001-2010 |
| OR | $8.6 | $2.5 | $0.17 | 10/2001 – 9/2010 |
| PA | $10.8 (portion of) | $0.9 | $0.08 | 1999 – indefinite |
| RI | $2 | $1.9 | $0.28 | 1997 – 2001 |
| WI | $1 → $4.8 | $0.9 | $0.07 | 4/1999 – indefinite |

* Annual per-capita and per-MWh funding figures are based on funds expected during 2001 (with the exception of: New Mexico, which does not start until 2007; Oregon, for which we used an expected annual figure instead of just the last three months of 2001; New York, for which we used the $14 million per year figure; and Wisconsin, for which we use $4.8 million). Some states, such as Connecticut, ramp up funding levels over time, making 2001 a conservative estimate, while others, such as Ohio and Massachusetts, ramp down funding levels over time, making 2001 an aggressive choice. Note that funding scope differs by state, meaning that strict inter-state comparisons may be misleading. For example, NYSERDA's fuel cell budget is outside of the Energy $mart renewable R&D program and is not included in this table, while fuel cell funding is included in the funding levels reported for other states.

As illustrated by the table and figure:

- **Annual state funding levels for renewable energy range from $1 million to $135 million.** With $135 million per year in collections from 1998 through 2011, California's sizable fund accounts for more than half of the $3.5 billion cumulative collections of all funds. Connecticut, Massachusetts, and New Jersey have the next largest funds, each with an average of $20-$30 million per year to spend. Other than New York, the rest of the funds are likely to dedicate less than $10 million per year each towards renewable energy, with Montana, Rhode Island, and Delaware the smallest funds at $1-$2 million per year.

## TEXT BOX 1. NOTES TO TABLE 1

**California:** Annual funding levels will increase somewhat beginning in 2002 at the lessor of load growth or inflation. Annual funding figure applies to customers within California's investor-owned utility service territories. Publicly owned utilities must also collect a system-benefits charge; while some of these programs are also beginning to fund renewable energy projects, these programs are not discussed in this paper. A review of the program is slated for 2007, at which point continuation of the fund through 2011 may be altered.

**Connecticut:** Connecticut's funding will rise from approximately $15 million in 2000 and 2001 to roughly $23 million in 2002 and 2003, and then to $30 million in 2004 and thereafter.

**Delaware:** The total size of Delaware's SBC fund, which includes renewable and energy efficiency investments, is estimated to be $1.5 million per year. Senate Resolution No. 30 of Delaware's 140th General Assembly recommends that "not more than $1 million" be spent on solar energy.

**Massachusetts:** Massachusetts will collect roughly $150 million from 1998-2002 (i.e., roughly $30 million per year) for renewable energy. Starting in 2003 and continuing indefinitely (subject to a 5-year legislative review), renewables funding drops to approximately $20 million per year.

**New York:** This amount includes only NYSERDA and Niagara Mohawk SBC support for renewable energy, which amounted to about $6 million per year during the program's initial 3 years. A 5-year extension of NYSERDA's SBC funding in early 2001 allocates about $14 million per year to renewables. The Long Island Power Authority's (LIPA) clean energy fund to support energy efficiency, clean distributed energy, and renewable energy technologies – estimated to be $32 million over the five-year period from 1999 to 2003 – is not included in this figure.

**Ohio:** Ohio's revolving loan fund collection shall not exceed $15 million in any year through 2005, and $5 million in any year thereafter. Fund collection will terminate at the earlier of ten years (2010) or when the size of the fund, with interest, reaches $100 million. Only a portion of the fund, yet to be determined, will be used to support renewable energy.

**Pennsylvania:** The $10.8 million includes both renewable energy and energy efficiency funding, but does not include an $18.5 million infusion ($12 million for wind, $4 million for PV, and $2.5 million for education) into the Sustainable Development Fund as a result of the recent PECO/Unicom merger. Four separate funds to support renewable energy (and energy efficiency) development (collectively called the "sustainable energy fund") are now in existence in the service territories of PECO (a lump sum of $13.5 million through 2006), PP&L (~$3.5 million per year through 2004), MetEd and Penelec (both subsidiaries of GPU, with a combined lump sum funding of roughly $12.1 million through 2004), and West Penn/Allegheny Power (a lump sum of approximately $11.4 million through 2005). These funding amounts are guaranteed through the dates indicated; after that, funding will continue with an SBC of 0.005 - 0.01¢/kWh applied to electric rates unless changed or eliminated in a rate case. Approximately 50% of the funds are expected to be used for renewable energy. In addition, Pennsylvania has a two-year Renewable Energy Pilot Program that will spread a total of $3.9 million over five service territories to support PV, solar hot water, and in one service territory, small wind.

**Wisconsin:** Wisconsin's fund began with a $1 million pilot in 1999. Funding for the pilot was augmented with $800,000 in late 2000. Statewide implementation of the SBC begins in 2001, which includes a dedicated $2.8 million/year for renewable energy and, by 2003, is also expected to include nearly $2 million/year of other funds. Annual sunset reviews must begin in fiscal year 2004/2005.

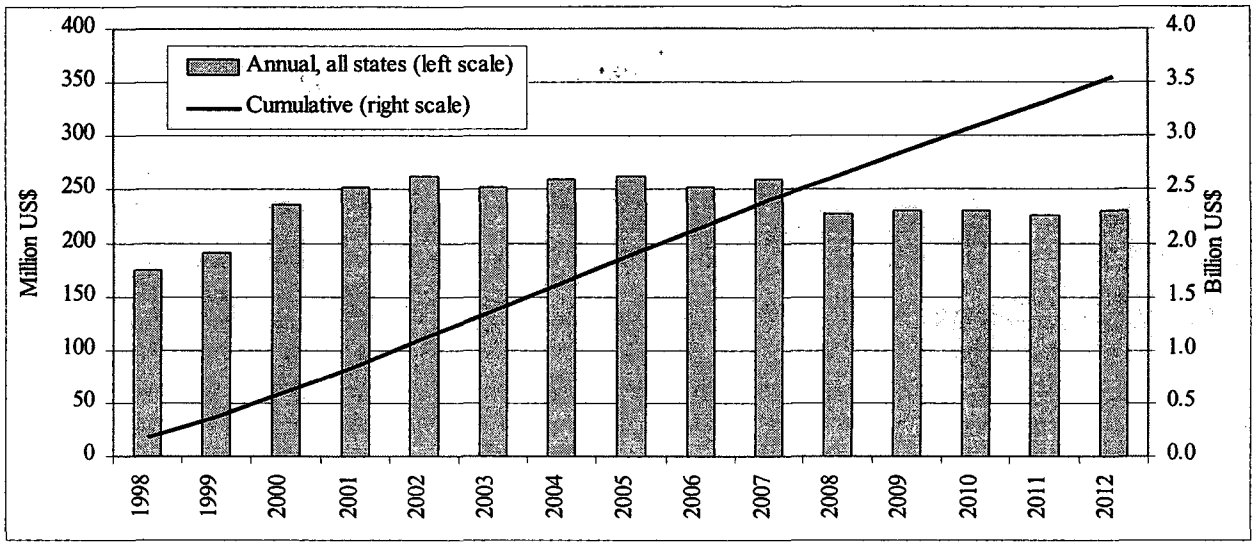



**FIGURE 1. AGGREGATE ANNUAL AND CUMULATIVE STATE FUNDING**

- **Per-capita annual funding in 2001 ranges from $0.40 to $4.70.** On an annual per-capita basis, state rankings on support for renewable energy look a bit different. Connecticut and Massachusetts provide the most funding for renewable energy, Montana, Rhode Island, and Delaware migrate to the middle of the pack, and Illinois and New York provide the lowest degree of support.

- **Per-MWh funding in 2001 ranges from $0.04 to $0.59.** This metric is similar to per-capita funding, but differs based on the electricity intensity of each state. For example, Oregon's per-capita annual funding is 3.6 times greater than New York's, but its per-MWh annual funding is only 1.5 times greater.

- **Program duration varies considerably.** Restructuring legislation in Connecticut, Delaware, Massachusetts, New Mexico, Pennsylvania, and Wisconsin authorize SBC funding to continue indefinitely (with funding levels subject to explicit review in Massachusetts and Wisconsin). Most other funds are slated to sunset, unless otherwise renewed, after program lives that range from 3 to 10 years. Two funds, however, have already been extended. California's SBC program, initially slated to end in 2002, was extended through 2011 in late 2000. Similarly, initially expected to expire in mid-2001, New York's SBC program has been extended for an additional 5 years with approximately $14 million per year dedicated towards renewable energy.

## B. Technology Eligibility and Focus

Table 2 identifies the generation sources eligible to receive funds under each of the fourteen state SBC programs (notes to the table are offered in Text Box 2).

**TABLE 2. RENEWABLE RESOURCE ELIGIBILITY**

| State | Wind | Solar | Geothermal | Biomass | MSW | Ocean-based | Hydro | Fuel Cells* |
|---|---|---|---|---|---|---|---|---|
| CA | ● | ● | ● | ● | ● | ● | ● | ● |
| CT | ● | ● | | ● | | ● | | ● |
| DE | | ● | | | | | | |
| IL | ● | ● | | ● | | | ● | |
| MA | ● | ● | | ● | ● | ● | ● | ● |
| MT | ● | ● | ● | ● | | | ● | |
| NJ | ● | ● | ● | ● | | ● | | ● |
| NM | ● | ● | ● | ● | | | ● | ● |
| NY | ● | ● | ● | ● | | | ● | ● |
| OH | ● | ● | | ● | | | ● | ● |
| OR | ● | ● | ● | ● | ● | | ● | |
| PA | ● | ● | ● | ● | ● | | ● | ● |
| RI | ● | ● | | ● | | | ● | ● |
| WI | ● | ● | ● | ● | | ● | ● | ● |

* Unless otherwise specified in Text Box 2, fuel cells are not required to use renewable fuels. States that have not specifically defined fuel cells as eligible for funds have not been marked, even though fuel cells would presumably be eligible for renewable energy status as long as they use a renewable fuel.

Based on this table and as demonstrated through program design experience, several observations can be made:

- **Wind** and **photovoltaics** are evidently the most favored technologies among the SBC programs, as distributed generation applications for PV and utility-scale wind development have been a target of virtually every state fund.

- **Geothermal** electricity is also eligible in many states, though it is likely to be a principal target for support only in the few western states where economic resource potential exists.

- **Landfill gas** has proven moderately popular, especially in states with large and concentrated populations (i.e., states with a significant number of landfills) that do not simultaneously have a renewables portfolio standard (RPS) to support such near-market technologies.

- **Fuel cells** (using either renewable or non-renewable fuels) have also become a target of many state funds, especially in those states that have relatively limited wind and solar resources and difficult siting constraints for new renewable energy projects.

## TEXT BOX 2. NOTES TO TABLE 2

**California:** Biomass includes solid-fuel biomass, landfill gas, and gas from the anaerobic digestion of biological wastes. MSW includes whole waste tire combustion, as well as waste that does not consist primarily of products originally manufactured from fossil fuels. Ocean-based power is not specifically identified in legislation. However, AB 1890 defines renewable technologies as technologies using power sources other than those defined as "conventional power sources": nuclear energy, hydropower larger than 30 MW, and the combustion of fossil fuels (with the exception of co-generation). Ocean-based power appears to fit this definition. Hydro must be no larger than 30 MW. Fuel cells must use renewable fuels during the 1998-2001 funding cycle. The CEC is exploring whether fuel cells not using renewable fuels will be eligible during the 2002-2007 time period.

**Connecticut:** Biomass includes landfill gas and low emission advanced biomass conversion.

**Delaware:** Delaware has a comprehensive green power definition including wind, solar, geothermal, the burning of agricultural waste, landfill gas, and hydro, but so far the SBC program has chosen to focus only on solar technologies (both electric and thermal).

**Illinois:** Biomass includes dedicated crops grown for energy production and organic waste biomass, but excludes waste wood and landscape waste. Hydropower must not involve new construction or significant expansion of dams.

**Massachusetts:** Biomass includes landfill gas, as well as low-emission, advanced biomass power conversion technologies, such as gasification using such biomass fuels as wood, agricultural, or food wastes, energy crops, biogas, biodiesel, or organic refuse-derived fuel. Approximately $50 million is set aside between 1998 and 2002 to fund the installation of pollution control technology at commercial waste-to-energy (MSW) facilities.

**Montana:** Additional criteria may be imposed on biomass and hydro.

**New Jersey:** Biomass includes methane gas from landfills or a biomass facility, provided that the biomass is cultivated and harvested in a sustainable manner.

**New Mexico:** Biomass is defined as combustible residues, gases, or organic material from sources such as animal manure, municipal solid waste, forest byproducts, waste water sludge, or crop residue. This includes landfill gas. Fuel cells must use renewable fuels.

**New York:** These resources are cited in NY's SBC plan; explicit eligibility requirements are not listed.

**Ohio:** These resources are defined within Ohio's restructuring legislation in reference to net metering. Whether this definition will be used to determine eligibility under the SBC is not clear.

**Oregon:** Biomass includes low-emission nontoxic biomass based on solid organic fuels from wood, forest, and field residues; dedicated energy crops available on a renewable basis; and landfill gas and digester gas. Hydro must be located outside of protected areas as defined by Federal law.

**Pennsylvania:** Biomass includes landfill gas and sustainable biomass. Only "low-head" hydro is eligible.

**Rhode Island:** Biomass must be sustainably managed. Only hydro under 100 MW that does not require construction of new dams is eligible.

**Wisconsin:** Only hydro under 60 MW is eligible. Fuel cells must use renewable fuels. The focus of the fund is on customer-sited generation.

- New York is one of the only states so far working with dedicated energy crops as a resource for biomass power production, though other states are funding traditional (e.g., California) or advanced (e.g., Connecticut) **biomass** opportunities. Uncertainty over exactly what types of biomass are eligible for funding continues in many states. In particular, many states have restricted funding eligibility to "low emission," "advanced," or "sustainable" biomass, without specifically defining what is meant by these criteria (see Text Box 2 for biomass eligibility definitions).

- **Hydropower** eligibility is often restricted to "low-head" facilities not requiring the construction of new dams or to small project sizes. Such restrictions, combined with the limited prospects for new hydropower projects and the maturity of the technology, have naturally limited SBC-funded hydropower development, though some activity has occurred in California and Illinois.

- **Non-electrical renewable energy applications** have also been targeted by some funds. Wisconsin, for example, has in the past pursued non-electrical applications such as daylighting and advanced wood stoves, though it appears as if such applications will be much less of a priority under Wisconsin's new statewide program.[6] Other states have also provided support to these "generation-offset" technologies, which also include solar hot water systems and geothermal heat pumps (e.g., Pennsylvania).

Many states require that renewable energy projects be located in state to be eligible for funds. California, Delaware, Illinois, Montana, New Jersey, New Mexico, and Ohio all fit in this category.[7] New York, Oregon, and Wisconsin have not taken a public stand on in-state/out-of-state issues, though New York and Wisconsin have thus far restricted their funding to in-state projects.[8] Connecticut, Massachusetts, and Pennsylvania, however, explicitly permit investment outside of the state or service territory, as long as the investment can be shown to benefit ratepayers within that state or service territory. Rhode Island, meanwhile, initially restricted its focus to in-state projects, but relaxed its position in late 2000 after more than two years of frustrated attempts at bringing projects to completion within its borders.

## C. Administration

Administrative structures and responsibilities for the 14 SBC funds studied vary considerably across states. As shown in Table 3, many of the funds are administered by state energy, commerce, or environmental agencies. Other funds, such as those in Massachusetts and

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[6] The March 2001 solicitation for a renewable energy administrator states that non-electrical applications will not be funded by the renewable energy program, though the renewable energy administrator is allowed to negotiate with the residential and major markets (i.e., commercial and industrial) administrators to coordinate support for such projects.

[7] The February 2001 California Energy Commission draft "investment plan" for the first 5 years of the recent 10-year extension of the fund suggests allowing new out-of-state renewable generation that is both interconnected to California's grid and isolated from local interconnection (i.e., so-called "landlocked" facilities) to be eligible for funding from the New Renewables fund.

[8] Oregon has indicated that it will use in-state vs. out-of-state as a tiebreaker in a dead-heat RFP, but otherwise will be open to projects located anywhere in the northwest region of the country.

Connecticut, are administered by quasi-public business development organizations. Still other funds, such as those in Pennsylvania, Oregon, and Wisconsin, are or will be managed by independent third party organizations.[9] Montana's SBC fund in Montana Power Company's (MPC) service territory is managed by the utility, along with some help from local independent nonprofits. (To date, only MPC's fund has been actively supporting renewable energy in Montana. Thus, any references throughout this paper to Montana funding activities apply only to MPC's fund). Rhode Island and New Jersey represent a blend of approaches. Rhode Island's fund is managed by a collaborative of utility, advocate, state, and regulatory interests, with PUC oversight. New Jersey's BPU in conjunction with the Department of Environmental Protection will administer approximately half of the renewable energy fund in that state. The remainder – focused on customer-sited generation – will be administered by the utilities for a year and by a statewide independent administrator in subsequent years. Finally, large industrial customers in both Oregon and Montana are allowed to "self-direct" their SBC obligations.

**TABLE 3. ADMINISTRATION OF STATE RENEWABLE ENERGY FUNDS**

| State | Administration |
|---|---|
| CA | California Energy Commission (CEC) |
| CT | Connecticut Innovations, Inc. |
| DE | Delaware Economic Development Office |
| IL | Illinois Department of Commerce and Community Affairs |
| MA | Massachusetts Technology Park Collaborative (MTPC) |
| MT | Utilities and large industrials, with any remaining funds administered by state |
| NJ | Combination of the BPU, Department of Environmental Protection, utilities, and an independent statewide administrator |
| NM | New Mexico Environment Department |
| NY | New York State Energy Research and Development Authority (NYSERDA) with some utility administration for a portion of the initial funds |
| OH | Ohio Department of Development |
| OR | New non-profit entity being created specifically to manage the fund |
| PA | The Reinvestment Fund (PECO), Berks County Community Foundation (GPU/MetEd), Community Foundation of the Alleghenies (GPU/Penelec), The Sustainable Energy Fund of Central Eastern Pennsylvania (PP&L), Economic Growth Connection of Westmoreland County (West Penn) |
| RI | Rhode Island Renewable Energy Collaborative (with PUC oversight) |
| WI | Department of Administration (DOA) for pilot project in 1999 and 2000; non-profit administrators yet to be named (with DOA oversight) for statewide fund beginning in 2001 (with some utility administration during a transition period) |

[9] These independent third party organizations are or will operate under the oversight of state agencies, such as the PUC (Oregon and Pennsylvania) or Department of Administration (Wisconsin).

# III. Program Status and Design

## A. Overview of Fund Status

For the most part, states are still in the very early stages of obligating program funds and the level of structure and detail in each program's implementation plan varies widely. Eight states – California, Connecticut, Illinois, Montana, New York, Pennsylvania, Rhode Island, and Wisconsin – have already spent funds on renewable energy projects and programs. Even among these states, however, only a few years of experience is available. Many other states, including Massachusetts, New Jersey, Delaware, and Ohio, expect to begin to spend funds in 2001. Fund collection has not yet begun in Oregon or New Mexico; Oregon's fund is slated to begin in October 2001, and New Mexico's has been delayed to 2007.

## B. Programmatic Focus

Given the dearth of past experience at the state level in spending public funds directly to support renewable energy, it is perhaps not surprising that states are adopting very different views about how best to target their SBC funds towards renewable energy projects and programs. While each state differs, and many states incorporate elements of each model to some degree, we observe that the fourteen system-benefits charge programs can be more or less categorized into three different models:

- **Investment Model** – Using loans, near-equity and equity investments to support renewable energy companies and projects.
- **Project Development Model** – Using financial incentives such as production incentives and grants to directly subsidize and stimulate renewable energy project installation.
- **Industry and Infrastructure Development Model** – Using business development grants, marketing support programs, R&D grants, resource assessments, technical assistance, education, and demonstration projects to build renewable energy industry infrastructure.

Which model a state uses appears to depend in part on the goals of the fund, the size of the fund, the renewable resource potential of the state, the strength of the in-state renewable energy industry, and the organization selected to administer the fund. Text Box 3 further describes these three models and our loose categorization of state funds within each model. We offer this categorization with two important caveats. First, we again note that most funds do not perfectly fit the mold of a particular model; most have remained at least somewhat flexible in their implementation, perhaps adopting elements of each of the three models. Second, the models themselves are not mutually exclusive and potentially overlap in certain areas. For example, one way to develop the renewables industry infrastructure is by investing seed capital in budding renewable energy companies.

## TEXT BOX 3. PROGRAMMATIC FOCUS OF STATE FUNDS

***Investment Model***

The SBC programs in Connecticut and Pennsylvania (and to a lesser extent Massachusetts) are largely following an investment model, in which funds will be disbursed mainly through loans, near-equity, and equity, as opposed to traditional grants, buy-downs, or other "subsidy"-based programs.[1] These funds will actively seek private sector co-investment opportunities in order to leverage their impact, and Connecticut and Pennsylvania have aspirations of achieving enough of a return on their investments to enable their funds to become self-sustaining over time. In addition to supporting the environmental benefits of renewable energy, each of these funds has a mandate to boost economic growth within their respective states or service territories. Accordingly, these funds emphasize the creation of "sustainable" renewable energy markets, and believe that the best way to accomplish this objective is to invest directly in companies or projects, providing seed capital and market support where it is believed to be most valuable and where it is least likely to create the distorted price signals and vulnerable markets that are believed to be associated with traditional subsidies.

***Project Development Model***

California, New Jersey, New York, Montana, Rhode Island, Delaware, and Illinois are following what may best be described as a project development model,[2] in which the focus is largely on installing both utility-scale and distributed generation renewable projects in as cost effective a fashion as is feasible. The funds in this category have or are likely to provide direct financial incentives to large-scale renewable energy development, as well as customer-sited distributed generation projects. For the most part, each of these SBC funds utilize production incentives, buy-downs, or other forms of grants as a means of distributing funds, rather than loans or other investment vehicles.

***Industry and Infrastructure Development Model***

Wisconsin has initially followed what may be best described as an industry and infrastructure development model, which involves the use of multiple tools, including business development grants, marketing support programs, R&D, resource assessments, technical assistance, education, and demonstration projects, to help build renewable energy industry infrastructure. In its initial pilot project in 1999 and 2000, the Wisconsin DOA felt that to overcome the barriers to developing a sustainable renewable energy marketplace it needed to target multiple facets of the market simultaneously, including marketing, education, business development and technical assistance, as well as demonstration projects. Wisconsin therefore initially employed small, competitive grants to renewable energy businesses as a primary funding mechanism. (The program was expanded in September 2000 to also include features of the project development model.) Other states have also employed certain industry and infrastructure development tools. California, for example, has funded renewable energy education efforts, while Pennsylvania offers small grants for business and technology development activities. New York has funded residential PV suppliers to build their distribution networks, and also a wind prospecting study. Massachusetts and New Jersey also appear likely to dedicate some funds to these types of activities, which may be especially helpful where an existing renewable energy market infrastructure is lacking or under-developed.

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[1] It appears as if Ohio will make use of a revolving loan fund, which would perhaps align it most closely with the investment model. It is not yet clear, however, if the goals of Ohio's fund are consistent with those of the other states within this category; on this basis, Ohio may be a better fit within the project development model.

[2] Though Oregon has not yet developed a detailed enough plan to place the state within a specific model, it appears as if the fund will largely focus on project development. Likewise, New Mexico's draft funding guidelines fit most closely within the project development model.

## C. Program Elements

Restricting our attention to only those eight states that have already begun to distribute funds, Table 4 summarizes the types of programs implemented thus far (programs that are planned but still under development are not included here).[10] As shown:

- Following the "project development" model, the most common type of program involves financial incentives for the development of new utility-scale renewable energy projects, which include various forms of production incentives and grants.
- Also popular are buy-downs and competitive solicitations for distributed generation projects (often PV), with buy-down levels ranging from $1.5/Watt to $6/Watt. To augment these programs, consumer-financing programs have been developed in three states.
- Four states have directly supported renewable energy marketing (aka "green power marketing") in a variety of ways, helping build the retail market for competitive energy service providers that sell renewable energy products.
- Project or company financing – the hallmark of the "investment" model described earlier – has been used by two states thus far, both of which will provide debt and equity financing.
- A variety of industry and infrastructure development activities, including resource assessments, consumer education, and business development grants (grants to renewables businesses used for planning, product development, and marketing), have also been used.
- California and Wisconsin have been the only two states so far to conduct broad-based educational campaigns.
- Finally, only California has provided support for existing resources, though Illinois has funded the refurbishment of existing small hydro facilities.

We describe many of these programs, and their results, in more detail in a subsequent section of this paper and in even more depth in the attached case studies.

**TABLE 4. PROGRAMMATIC ACTIVITIES OF ACTIVE FUNDS**

| Program Type | CA | CT | IL | MT | NY | PA | RI | WI |
|---|---|---|---|---|---|---|---|---|
| Financial Incentives for Large Scale Projects[11] | ● | | ● | ● | ● | ● | ● | |
| Distributed Generation Buy-Downs | ● | | ● | | ● | | ● | |
| Distributed Generation Competitive Solicitations | | | | ● | ● | | ● | ● |
| Consumer Financing Programs | | | | | ● | ● | | ● |
| Project or Company Financing | | ● | | | | ● | | |
| Detailed Resource Assessment | | | | | ● | | ● | |
| Business Development Grants | | | | | ● | ● | | ● |
| Broad-Based Customer Education[12] | ● | | | | | | | ● |
| Support for Renewable ("green") Energy Marketing | ● | ● | | | | ● | ● | |

[10] We note that this table is not intended to be entirely comprehensive. For example, many states have funded research studies that do not fall neatly into any of the categories identified in the table.

[11] Wisconsin's DSARE program will support large digester gas systems, but to date no projects have been funded.

[12] Other states have provided limited customer education (e.g., solar for schools curriculum), but only California and Wisconsin have thus far devoted a significant amount of resources to customer education activities.

Other states, not included in the table because they have not begun to obligate funds, have also developed some guidelines for the types of programs they will offer:

- **Delaware:** Delaware is developing a rebate program for PV and solar hot water and space heating that is expected to be up and running by July 2001. The program will cover 35% of installed system costs up to $1,500 for residential solar hot water, $3,500 for residential active or passive space heating (or some combination of the two), $10,500 for residential PV, and $250,000 for commercial PV.

- **Massachusetts:** During its first two years of operation, beginning in 2001, Massachusetts plans to focus on three programs: premium power applications for distributed generation (and fuel cells in particular), green buildings that utilize energy efficiency and on-site renewable energy, and wind development. Two of the three programs promote distributed generation, reflecting the emphasis placed on this sector in the summer 2000 Massachusetts Technology Park Collaborative (MTPC) strategic plan for its renewable energy programs. For each program, MTPC will provide outreach and technical services, project financing, and detailed case studies upon completion of specific projects, highlighting lessons learned. In addition to these formal programs, MTPC also plans to support the development of the renewable energy sector in Massachusetts in general by responding to unforeseen opportunities with new initiatives; for example, supporting the overseas export market for renewable energy products manufactured in Massachusetts. Furthermore, MTPC will undertake various support activities, such as participating in regulatory proceedings that affect the renewable energy market in Massachusetts. In February and March 2001, MTPC released its first five solicitations, making funds available for: a green building symposium targeted at education officials; the planning and installation of premium power systems utilizing fuel cells; predevelopment activities for renewable generation facilities greater than 1 MW; and efforts to aggregate consumers in order to purchase renewable energy.

- **New Jersey:** After considering two competing program design proposals for a year, the New Jersey BPU made a final decision in early March 2001. The final plan consists of programmatic elements that are similar to those established in California, though with broader market and infrastructure support activities, perhaps reflecting the fact that New Jersey's renewable energy market is largely undeveloped. A generous buy-down program for customer-sited renewables,[13] as well as support for grid supply projects and market development and commercialization efforts, comprise the bulk of New Jersey's proposed program.

- **New Mexico:** Prior to the recent 5-year delay of retail choice and SBC funding, New Mexico was planning to provide grants to public schools, local governments, and Native American communities to support the installation of renewable energy systems. Project selection criteria was to include the contribution of the project to the commercialization of

[13] Buy-down incentives of as much as $5/Watt for up to 60% of installed costs will be available for small (<10 kW), customer-sited renewable energy systems.

renewable energy, the educational value of the project, the amount of funding requested relative to the cost of the project, and (towards a goal of geographic diversity) the project's location. Given the lengthy delay to 2007, funding priorities are likely to change.

- **Ohio:** Though it is called the Energy Efficiency Revolving Loan Fund, Ohio's SBC fund expects to target renewables as well. The fund just began collecting money in 2001, and hopes to develop a distribution plan by the middle of the year. Legislation allows the fund to provide below-market loans, loan guarantees, and linked deposits.

- **Oregon:** In Oregon, a new nonprofit organization will administer the conservation and renewable energy portions of the SBC fund. The Oregon PUC approved an eight-member board for the fund in February 2001. The new board will take up incorporation and bylaws, and then work on a strategic plan during the first half of 2001 in preparation for the inception of funding in October 2001.

# IV. Funding Results

Here we describe in more detail the design and preliminary results of some of the programs identified in Table 4. In particular, we focus on the following:

- financial incentives for large-scale projects
- distributed generation policies, and
- support for renewable energy marketing.

These programs cover a significant fraction – but certainly not all – of overall fund activity to date.

## A. Financial Incentives for Large Scale Projects

Perhaps the most visible funding successes to date have come from the development of large-scale renewable energy projects. With the potential exception of Rhode Island, which initially tried in vain to find a suitable in-state wind site for utility-scale development, states that have targeted the bulk power market have been largely successful at obligating funds and beginning to bring new renewable energy projects on line.

Table 5 summarizes the program design used by and results from each of the six states that have supported large-scale projects to date. Based on this table (and other supporting data) we observe that:

- **Total Obligated Funds:** A total of $225 million has been obligated under these existing programs to new renewable energy projects, the majority of which comes from California.
- **Funding Types:** Programs have used a mix of financial incentive structures, from standard grants and production incentives to refundable grants. All incentives, with the exception of those in Rhode Island and Illinois, have been distributed after competitive solicitation processes.
- **Total Renewable Energy Capacity:** While many of the projects to which funds are obligated have not yet come on line, and some (perhaps many) may never be developed, a total of 1,164 MW could be installed if all projects that have been obligated funds were to come on line.
- **Renewable Resource Selection:** Wind has by far been the most-favored technology with nearly 880 MW of possible installation, followed by geothermal in California with 157 MW, and landfill gas with 101 MW. Biomass and hydropower have made lesser contributions.
- **Incentive Levels:** Because incentive structures differ by state, to allow comparison we normalized all incentives to their 5-year production incentive equivalent assuming a 10% discount rate. Equivalent 5-year production incentives range from a low of 0.11 cents/kWh to a high of 6.75 cents/kWh.

**TABLE 5. STATE SBC FUNDING OF LARGE SCALE RENEWABLE PROJECTS**

| State | Form of Fund Distribution | Level of Funding | Results[14] | Discounted ¢/kWh Incentive over 5 Years[15] |
|---|---|---|---|---|
| CA | 5-yr production incentive | $162 million | 543 MW (assorted) | 1.20 |
| | | $40 million | 471 MW (assorted) | 0.59 |
| IL[16] | grant | $0.55 million | 3 MW landfill gas | 0.57 |
| | | $1 million | 3 MW hydro | 1.86 |
| | | $0.352 million | 1.2 MW hydro | 1.63 |
| | | $0.55 million | 15 MW landfill gas | 0.11 |
| MT | 3-yr production incentive | $1.5 million | 3 MW wind | 3.63 |
| NY | grants with performance guarantees | $9 million | 51.5 MW wind | 1.95 |
| | | $4 million | 6.6 MW wind | 6.75 |
| PA | grant/production incentive | $6 million | 67 MW wind | 1.00 |
| RI | refundable grant | $0.15 million | unclear MW wind[17] | unclear |

Details of each state's activities follow:

- **California:** Using funds from its New Renewable Resources Account, California has held two auctions of 5-year production incentives. The first, held in June 1998, awarded $162 million at a weighted-average incentive of 1.2¢/kWh in support of 552 MW of new renewable generating capacity.[18] The second was held in November 2000 in response to the state's power shortage, and awarded $40 million at a weighted-average incentive of 0.59¢/kWh in support of an additional 471 MW of new renewable capacity. Wind will supply the bulk of the new generation capacity (750 MW), followed by geothermal (157 MW) and landfill gas (83 MW). As only a fraction of the capacity from the two auctions has

[14] These results are projected and are based on announced results of solicitations. Only a fraction of the projects obligated funds are yet on line. Some (perhaps many) projects may ultimately be cancelled due to unforeseen circumstances, thereby lowering the total capacity supported. Furthermore, it is difficult to know how many and what size projects would have been built in the absence of state funding, and therefore to assess the true incremental effect of state policy investments. In the interest of simplicity, we have simply assumed that none of the projects would have been undertaken in the absence of state funds.

[15] Because incentive structures differ by state, to allow comparison we normalized all incentives to their 5-year production incentive equivalent assuming a 10% discount rate. To do this, we calculated the net present value of the projected cash outlay for each state using a 10% discount rate, and then amortized that net present value over 5 years using the same 10% discount rate. For California, we used projected 5-year electricity generation output from funded projects. For other states, we assumed a 35% capacity factor for wind power in Montana, a 25% capacity factor for wind in New York and Pennsylvania, a 90% capacity factor for landfill gas in Illinois, and a 50% capacity factor for small hydro in Illinois.

[16] Two comments related to the Illinois investments bear mention. First, the two hydropower projects represent refurbishments of existing small hydro plants. Second, for both landfill gas projects, funding was used to buy-down the cost of a single 1 MW turbine as part of larger 3 MW and 15 MW projects. Here we attribute the funding to the full project sizes.

[17] Rhode Island's refundable grant to a wind project in western Massachusetts allowed the developer to begin construction of the project and thereby retain permits that were nearing expiration. While this timely grant was no doubt critical to keeping the project on track, it is unclear how to attribute wind power capacity to the grant, particularly since the grant is to be amortized and "refunded" through power discounts to marketers wheeling the power into Rhode Island. If the project comes on line and does not sell its output into Rhode Island, however, the grant is refundable to the Rhode Island Renewable Energy Collaborative.

[18] As of August 2000, 3 of the 55 original projects have been cancelled, lowering the total capacity to 543 MW.

come on line, it is still unclear how successful the auctions will be in actually bringing proposed projects to completion. The current electricity crisis in California adds additional uncertainty: with many existing renewable generators not being paid for their power, there is perhaps little incentive for proposed projects to proceed towards commissioning. However, with the 10-year extension of the SBC program, and with a proposed 45% of funds to be allocated to the New Account for biennial auctions (up from 30% in the initial 4-year program), future auctions have the potential to considerably expand renewable production in the state, assuming that stability returns to the market.

- **Illinois:** In addition to many smaller PV systems, Illinois' Renewable Energy Resources Program (RERP) has funded both a 3 MW and a 15 MW landfill gas project through the fund's standard grant/buy-down program, awarding each $550,000, the maximum grant possible within the organic waste biomass category. The RERP has also funded two hydropower refurbishments: one 3 MW plant received the maximum hydropower grant of $1 million, while a second 1.2 MW project received a grant of $352,000.

- **Montana:** Through a solicitation process in 2000, Montana Power Company committed a $1.5 million 3-year production incentive in support of 3 MW of new wind that will be part of a larger 22 MW project on Blackfeet Tribal Lands.

- **New York:** Also using a competitive solicitation, NYSERDA has awarded a total of $9 million in grants to three wind projects potentially totaling 51.5 MW (one 11.5 MW plant is already on line, another 30 MW project is in the later development phase, and a final 10 MW project is still in negotiations with NYSERDA), and Niagara Mohawk has spent $4 million of its own SBC funds on a now completed 6.6 MW wind project. Early indications on the 2001 extension of New York's fund are that wind power will receive more than half of the roughly $70 million of new funds allocated to renewables through 2005.

- **Pennsylvania:** As part of the PECO/Unicom merger settlement, the Sustainable Development Fund (SDF) received $12 million to support the development of new wind power in Pennsylvania. Eager to leverage these funds by allowing recipients sufficient time to develop their projects prior to the scheduled expiration of the federal production tax credit at the end of 2001, in late 2000 the SDF issued a competitive solicitation for new wind power, promising $6 million in the form of 5-year production incentives capped at 1.5 cents/kWh. After consulting with the winning bidders, however, the SDF determined that it could increase its leverage – and the number of MW installed – by instead effectively providing a lump sum payment (contingent on production) payable upon the commercial operation of each project (discussed in more detail in Section V). Two projects, totaling 67 MW, were announced as winners of the solicitation in early 2001.

- **Rhode Island:** After an initial lack of success in bringing in-state wind projects to completion, in 2000 Rhode Island provided a timely grant to a wind project in Massachusetts that was otherwise in danger of losing its construction permits. This $150,000 grant is refundable to the fund administrator if the project comes on line but does not sell its output into the state. Meanwhile, if electrical output is sold into the state, the grant is to be

amortized and "refunded" through power discounts to marketers selling the power into Rhode Island. Additional funding for out of state projects is expected in 2001.

In addition to these financial incentives, other state funds have used equity or debt investments to support large-scale projects (but not included in the table above), including the Connecticut Clean Energy Fund (CCEF) and two of Pennsylvania's funds. The CCEF has invested $500,000 as a convertible note in a consortium that proposes to build a 72 MW next-generation hybrid power plant combining biomass gasification and fuel cell technologies. In Pennsylvania, both the SDF and The Sustainable Energy Fund of Central and Eastern Pennsylvania (PP&L) have provided loans to the wind developer Energy Unlimited. The SDF provided $250,000 in subordinated debt financing as reimbursement for development expenses incurred during its pilot phase, while PP&L's fund recently provided a $100,000 loan to secure a land lease at a potential project site.

## B. Distributed Generation Policies

Distributed generation policies established in a number of states (including buy-down programs, competitive solicitations, and consumer financing efforts) have also begun to build markets for renewable energy, especially photovoltaics. In aggregate, approximately 7 MW of distributed generation capacity has been developed thus far or is likely to be installed shortly under these programs.

While distributed generation policies are widely popular among states, programs established to date have often experienced a more modest degree of success than those programs targeting larger-scale projects. After three years, for example, California has not been able to attract enough interest in its emerging renewables buy-down program to exhaust the funds in the first and most lucrative of five funding blocks for smaller project sizes (< 10 kW). Rhode Island, offering a less-appealing solar resource and an incentive that is half as large as California's, has also met with disappointing results, and has recently doubled its buy-down incentive to $3/watt in an effort to boost program participation. In New York, the Long Island Power Authority (LIPA) gave away 30 free PV systems to kick off its Solar Pioneer program, but in the ensuing year was only able to sell a small number of additional systems. The possible reasons for these results and plausible policy responses to improve program success are discussed in Section V. Details on each state's distributed generation programs follow:

- **California:** California's buy-down program (authorized with 1998-2001 funds) is currently divided into 5 sequential blocks of decreasing incentive levels, ranging from $3/Watt up to 50% of system costs in the first block to $1/Watt up to 20% of system costs in the fifth and final block. The first four blocks contain $10.5 million in funding, while the fifth block contains $12 million. At least 60% of the funds in each block must be awarded to systems of 10 kW or smaller, and another 15% are reserved for systems rated at 100 kW or less. Once all the funds in a block (for a particular system size) are committed, the next block offering a lower subsidy becomes available. Through August 14, 2000, 344 systems (316 PV, 26 small wind, and 2 fuel cells) totaling 1.71 MW of capacity had been installed with roughly $4.7 million in SBC support, and there were another 237 projects (212 PV and 25 small wind)

representing 1.8 MW and about $5.1 million in payments in the pipeline.[19] With a total of $9.8 million either distributed or in the pipeline, and while the energy crisis of 2000 and 2001 is stimulating increased sales, Californians have not yet depleted the first funding block for small systems (< 10 kW), even as the program nears the completion of its third year. Larger systems have proceeded more rapidly through their funding blocks. Regardless, with the SBC program extended through 2011, the CEC is expected to alter and enrich its incentives for distributed renewable generation to increase market response. For example, the CEC has proposed to eliminate the formal block structure and instead establish fixed buy-down levels.

- **Connecticut:** The Connecticut Clean Energy Fund is supporting distributed generation through early-stage investments in two companies. A $150,000 seed capital investment in Solar Dynamics, Inc., a start-up company manufacturing portable PV generators, aims to tap into the sizable export market for portable PV power. More recently, the CCEF took a $500,000 equity stake in Sure Power Corporation, a company that designs, installs, and services power systems that generate and deliver high availability electricity using fuel cells. Neither of these investments is specifically targeted at installing renewable generation in Connecticut; instead, benefits should accrue to Connecticut through job creation and increased demand for ONSI fuel cells, which are manufactured in the state.

- **Illinois:** Illinois has the most generous formal PV buy-down program of any state, offering the lesser of $6/Watt or 60% of installed costs, up to $5,000 for systems of less than 2 kW, and up to $300,000 for systems of more than 2 kW. Funding for approximately 2 MW of PV has been approved since the start of the program in late 1999. The majority of the capacity has been at public or commercial buildings, with the residential sector lagging perhaps due to the absence of statewide net metering.[20] Several solar thermal installations have also been funded, and funding for a small biogas project is pending. In addition to Illinois' state fund, the City of Chicago has its own renewable energy fund resulting from a franchise arbitration settlement with ComEd. This fund has committed to purchasing $2 million worth of PV systems from Spire Corporation's new Chicago Solar PV manufacturing facility (ComEd has also committed substantial funds to this effort). Systems will be used to power public buildings, transit facilities, and street lamps within city limits. The City of Chicago fund has been working closely with the statewide fund, in many cases funding the balance of project costs not covered by the statewide fund.

- **Montana:** Montana Power Company (MPC) does not have a structured buy-down program per se, but has nevertheless been installing PV systems at even more aggressive funding levels than those in Illinois. In particular, MPC has installed free PV systems on twelve schools, and has paid up to 75% of the cost of residential PV systems. So far, more than 50 kW have been installed on community and commercial buildings (including the schools) and 24 residences. Solar thermal and solar water-pumping systems have also been funded.

- **New York (LIPA):** The Long Island Power Authority (LIPA) kicked off its Solar Pioneer program by raffling off 30 free PV systems, but was reportedly only able to sell a small

[19] Only 175 of these 237 projects had been approved as of August 14, 2000.

[20] Illinois' rebate and/or grant programs also fund solar thermal, wind (> 10 kW), organic waste biomass, dedicated energy crops, and hydropower that does not require new dams or significant expansion of existing dams.

number of systems in 2000. This despite a well-packaged deal including a buy-down of $3/Watt for up to 30% of the installed cost of the pre-certified system, a financing option that buys down loan interest rates to 6%, net metering, and a New York state tax credit of 25% of total installed costs (up to $3,750).

- **New York (NYSERDA):** NYSERDA has taken a somewhat different and multi-faceted approach to supporting PV. On the project development side, NYSERDA has issued targeted solicitations for specific projects utilizing different PV applications, including commercial rooftop systems, building-integrated (BIPV) systems, and "high-value" off- and on-grid (wind and PV) systems. By requiring RFP respondents to have already identified sites and projects, NYSERDA has increased the likelihood that the projects it funds will actually be installed. On the industry and infrastructure development side, NYSERDA has taken a much more flexible approach by funding PV manufacturers to develop – in the manner they deem most appropriate – distribution channels that will enable them to market their products directly to consumers. By allowing these PV manufacturers the freedom to propose their own methods rather than requiring them to conform to a state-sponsored plan, NYSERDA has effectively attempted to leverage the expertise of the private sector renewable energy market. In total across all of its 1998-2000 programs, NYSERDA expects to fund over 1 MW of PV, and has budgeted nearly $5 million of its original 1998-2000 funds for this purpose. Finally, NYSERDA recently announced the formation of an innovative loan program, in which it purchases certificates of deposit from local lenders and then foregoes a portion of the interest in order to buy down the loan rate by 4.5%. This program will buy down loans as large as $500,000 for up to five years.[21]

- **Pennsylvania:** Noting that even generous buy-downs do not necessarily eliminate perhaps the largest barrier to PV dissemination – high initial costs – the Sustainable Development Fund (SDF) is considering a leasing program to distribute the $4 million in settlement funds from the PECO/Unicom merger that are specifically earmarked for PV support. In the meantime, the SDF has developed the Solar/Energy Star® Consumer Loan program, in which the SDF will fund no-hassle, unsecured consumer loans to finance the purchase and installation of PV, solar hot water, fuel cell, and geothermal heat pump systems, as well as energy efficiency upgrades. The SDF has a commercial version of this program as well, which features low-interest loans to businesses purchasing or manufacturing renewable energy technologies. Meanwhile, in PP&L's service territory the Sustainable Energy Fund of Central and Eastern Pennsylvania recently provided a $20,000 grant to the city of Allentown to purchase control systems for using microturbines to generate power from methane produced by a sewage treatment digester plant.

- **Rhode Island:** Rhode Island's PV buy-down program, offering incentives of $1.50/Watt, has met with limited success, installing fewer than 20 small residential, outdoor lighting and educational systems and two larger commercial systems since 1999. In December 2000, the Rhode Island PUC approved an increase to $3/Watt, and added a buy-down for small wind at $1.50/Watt. Rhode Island has also funded the installation of a fuel cell system.

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[21] The loan program is not limited to residential PV systems, but has been marketed in conjunction with the residential PV projects. The loan program will also support solar hot water, solar space heating, and wind, as well as efficiency improvements.

- **Wisconsin:** During the first phase of its pilot program in 1999, Wisconsin focused largely on industry and infrastructure development activities. In September 2000, however, Wisconsin expanded its Demand-Side Applications for Renewable Energy (DSARE) program to include $470,000 in project financing for distributed renewable energy installations (>50% of the energy produced must be used on site) in the form of low interest loans ($100,000), interest rate buy-downs ($135,000), production rewards ($135,000), and performance contracts ($100,000). Eligible technologies include solar energy systems (PV, passive or active thermal), wind energy, ground-source heat pumps, anaerobic digestion of waste for producing and using biogas, and advanced wood energy systems used for process and space heat. In the first three months of the expanded program, fourteen low interest loans had been made and thirty others were being finalized, four applications for production rewards had been submitted, one performance contract had been awarded, and no interest rate buy-downs had been made.

## C. Support for Renewable Energy Marketing

With the introduction of customer choice in electricity markets and the ability for consumers to direct their electricity expenditures toward power providers that sell renewable energy, several SBC funds have taken an interest in and have directly supported the development of renewable energy marketing (i.e., the "green" power market). While many forms of funding for renewable energy may indirectly support those companies selling renewable energy to end-use customers, states that have directly supported this market have generally done so with the goal of developing – over time – a sustainable market for renewable energy that is not tied exclusively to public funding. California, Connecticut, and Pennsylvania have been the three largest direct supporters of this market thus far. Rhode Island, meanwhile, is provisionally planning to help fund the development of the retail market for renewable energy in 2001, and Massachusetts has recently released two solicitations targeting the retail market.

Whether direct support for this customer-driven renewable energy market in the abstract – or the specific types of support used or planned by states – is an effective use of state funds has been the subject of considerable debate. This debate is unlikely to be clearly resolved for some time, at least until this market begins to mature. Rather than discuss the relative merits of this approach, here we simply highlight the various investments made by states:

- **California:** California's SBC program has been the most aggressive in its support of renewable energy marketing thus far. Funded with $75.6 million from 1998-2001 program funds, the CEC's customer credit subaccount currently offers a 1¢/kWh credit for any retail customer purchasing eligible renewable energy through the competitive market (capped at $1000 per year for larger customers). This credit, initially established at 1.5 cents/kWh but declining as renewable energy demand increased, is paid to competitive electricity suppliers that sell renewable power. The incentive is intended to help offset the cost of renewable energy procurement and marketing for competitive electricity suppliers and to thereby lower the cost of renewable electricity to end-use customers. Through December 2000, $50 million

of incentives had been paid to competitive electricity suppliers that were, at the peak of the market, selling renewable power to 160,000 residential and 39,000 non-residential customers.

With default service rates historically pegged to the wholesale price of power in California, the customer credit has been just about the only mechanism by which competitive electricity suppliers have been able to compete for smaller customers. While the customer credit has been criticized by some (as discussed further in Section V), as a result of the program nearly all of the residential and small commercial customers that have switched to competitive retail electricity providers in the state have been served by eligible renewable energy.

Despite some early successes in growing this customer-driven market, however, during 2000-2001 wildly increasing wholesale electricity prices largely halted retail electricity marketing in the state. Additionally, a large number of renewable energy customers reverted back to utility default service as most electricity suppliers were forced to cease service. Though significant uncertainties exist on the future of the California retail market, the CEC has proposed that the customer credit be extended for an additional 5 years with a funding level of $33.75 million per year.

- **Connecticut:** In Connecticut, the first investment of the state's SBC was a $500,000 loan (convertible to equity) to the Connecticut Energy Cooperative, Connecticut's first competitive renewable energy marketer. A similar deal involving a second marketer was in the works in early 2001.

- **Massachusetts.** In the first quarter of 2001, MTPC released its first five solicitations, two of which are aimed at supporting the retail market for renewable energy. One will provide grants of up to $150,000 to develop consumer aggregation programs for purchasing renewable electricity through the competitive retail market. Another will finance predevelopment activities for grid-connected renewable electric generating facilities of 1 MW or more located in New England. The power from such projects must be sold into the Massachusetts retail market as part of a renewable energy product.

- **Pennsylvania:** The Sustainable Development Fund (SDF) provided $250,000 in subordinated debt to help Energy Unlimited develop a small (130 kW) wind project, and a grant of $22,000 to help Community Energy develop a plan to market that wind power to commercial customers in the Philadelphia area. PP&L's Sustainable Energy Fund has also invested in both Energy Unlimited and Community Energy, providing a $100,000 loan to help Energy Unlimited secure a land lease for a potential wind project site and $150,000 in royalty financing to enable Community Energy to hire two sales representatives to solicit commercial and industrial demand for wind power.

- **Rhode Island:** Rhode Island's $150,000 refundable grant to a western Massachusetts wind project was awarded on the condition that any marketer selling renewable energy into Rhode Island would have first access to the project's output at a price discounted sufficiently to amortize and "repay" the grant over time (the grant therefore acts, in effect, as a pre-paid production incentive). More aggressively, in December 2000 the Rhode Island PUC gave

conditional approval to both retailer/customer and supply incentives.[22] Retailer/customer incentives have been proposed to be subdivided into two sub-programs. The residential and small commercial customer program would offer retailers $125/customer for the first 5,000 and $75/customer for the next 15,000 customers that sign up for an eligible renewable energy products. The large business and institutional program would bring large customers interested in purchasing renewable energy together with renewable energy marketers through an RFP process. Supply incentives, meanwhile, would be awarded as production incentives to eligible projects in New England that sell power into Rhode Island.

[22] As this report is being released, the PUC continues to withhold its final approval pending mitigation of concerns over indirect program impacts tied to unresolved last resort service issues

# V. Observations and Lessons Learned

This section offers preliminary observations and lessons learned from state experience with the management of renewable energy funds, grouped broadly into three categories: administrative, programmatic, and strategic. Of course, it is premature to draw firm conclusions from this early experience. In some cases real world experience has been brief, while other funds have not yet activated their programs. Still others have concentrated on market preparation and infrastructure-building activities in an effort to create a sustainable renewable energy market and it may take many years before these programs bear fruit. Moreover, we note that lessons learned may not be equally applicable to all states, due to differences in renewable resource potential, the state of the existing renewable energy industry, or even fund size. With these caveats, our goal here is to offer some preliminary observations and lessons that may assist state funds as they formulate their administrative structures and program funding strategies.

## A. Administrative Issues

The scope and type of funding for renewable energy available under the new SBC-funded renewable energy programs is unprecedented. Numerous administrative issues therefore arise. Who should administer the funds? How should the administrator reach out to renewable energy businesses and customers? Should outside input be obtained and, if so, how? What level of staffing and staff expertise is necessary? Here we provide some observations and preliminary lessons regarding these issues, based on early experience with state SBC programs.

### *1. No single "ideal" administrative structure appears to exist.*

As discussed earlier, states have taken multiple approaches to administering renewable energy funds. Approaches used thus far include delegating administrative responsibility to an existing state energy, commerce, or environmental agency, a quasi-public business development organization, an independent third-party organization, or the existing incumbent utilities.

While there may be theoretical or philosophical grounds to favor one administrative approach over another,[23] evidence does not yet exist to firmly evaluate the relative successes of different approaches. Meanwhile, the evidence that does exist does not clearly identify any "winners" – state funds appear to have exhibited effective administration regardless of being run by a utility, independent third party, or state agency.

Though it is difficult to identify administrative structures that should be emulated in all cases, it is perhaps easier to identify issues to consider when selecting among different

[23] For example, one might argue for independent third-party administration on the grounds that it is less susceptible to regulatory or utility "capture." Similarly, one might disapprove of utility administration due to a concern over the advantages utilities might provide to their unregulated subsidiaries. On the other hand, utilities may be uniquely positioned to implement certain programs, particularly customer-sited programs that can build upon a utility's past experience with demand-side management activities.

administrative options. Based on experience with state SBC administration, these include (but are not limited to):

- **The administrator should have renewable energy expertise.** Where renewable energy expertise does not initially exist (e.g., Connecticut Innovations and MTPC), it should be developed quickly, either internally or through other means, such as judicious hiring or working with outside consultants.
- **The administrator should be an able fund manager.** The administrator should have experience managing contracts and be willing and able to make hard calls and use discretion where needed, free of undue political influence.
- **Conflicts of interest should be minimized.** Considerable concerns have arisen in New Jersey and other states about utility administration, in part because of possible conflicts of interest related to the treatment of utility affiliates. Development of outside advisory or governing boards may help alleviate such worries.
- **Public accountability should be ensured and proper oversight provided.** The administrator should have transparent processes, thereby allowing for public oversight of and accountability for program expenditures. Providing an opportunity for input and feedback from stakeholders and market participants can also help ensure a degree of accountability.
- **The administrator's expertise should match the goals of the fund.** Where the fund objectives are economic and business development and the tools investment-based renewable energy support, business and economic organizations may be the best-suited administrators (e.g., MTPC and Connecticut Innovations in Massachusetts and Connecticut, respectively). Under the project development model, on the other hand, more traditional energy offices may be better suited for the job.
- **Geographic scope should be as wide as possible.** Concerns in New Jersey and Pennsylvania have arisen over the potentially limited geographic scope of the funds. Pennsylvania, for example, has implemented its SBC programs on a utility service territory (rather than statewide) basis.[24] Being harnessed to a limited geographic scope is quite restrictive in a large state like Pennsylvania. The potential for inefficiencies associated with duplication of efforts and general lack of coordination is also of concern. In recognition of this potential, the Pennsylvania PUC is working with the four regional funds on a business plan for a statewide "fund" that will help to identify and coordinate projects and funding opportunities.

The relative success or "fit" of a particular administrative regime may of course also be dependent on the types of institutions that already exist in a state, and their areas of expertise. For example, the New York State Energy Research and Development Authority (NYSERDA) was a pre-existing energy R&D organization well-equipped to manage New York's SBC fund, and has generally received good marks for its management of that fund. Pennsylvania, on the other hand, lacked a similarly-strong state energy R&D organization, and in PECO's territory instead found The Reinvestment Fund, an organization dedicated to

[24] Montana's programs are also administered on a utility service-territory basis, but since MPC accounts for over half of all residential electricity sales in Montana, and its service territory geographically covers perhaps three quarters of the state, the distinction between managing the fund statewide or by service territory is not as significant as in other states.

community development in the lower Delaware Valley (i.e., PECO's service territory). This organization has also received high marks for effective administration thus far. Oregon, meanwhile, has gone even farther, and will establish a new non-profit organization to administer its funds.

### *2. A full-time and appropriately trained staff is essential.*

**Staffing Levels:** Regardless of the administrative structure, virtually all of the SBC funds have found that the degree of planning, program development, deal identification, contract management, and flexibility needed to fully allocate their funds requires a full-time staff dedicated and committed to the management of the SBC program. Whether the fund's focus is on investment support or more traditional models of project-based incentives, nearly all administrators have a staff that actively manages their renewable energy funds. Only the smallest of funds, Montana and Rhode Island, each of which also has a limited initial duration, do not have such a dedicated statewide staff.

Montana Power Company has dealt with a lack of staffing by effectively outsourcing much of its administrative activity to the nonprofit National Center for Appropriate Technology and other trade allies. Montana's fund also benefits from a highly committed staffer, as well as the informed input of an advisory board that helps to prioritize projects and programs. Rhode Island, on the other hand, has thus far managed its fund entirely through a collaborative process (governed by the PUC) that includes representatives from a variety of interests. This administrative structure, while perhaps reasonable for a small fund of limited duration, restricts the amount of time and attention available to proactively manage and market the fund. In part as a result, Rhode Island has had difficulty establishing its fund's presence in the market.

**Staff Expertise:** The type of expertise needed among staff depends somewhat on which funding model is selected. Those states using the project development model have often sought staff with general utility and renewable energy market experience, for example, while the investment model requires experience in these areas as well as financial analysis and company and project investment. The industry infrastructure model may thrive under yet another set of specialized skills grounded in market transformation.

The required degree of expertise and level of staffing also appears to depend on how intensively and/or rigidly renewable energy programs are implemented. For example, by establishing clear funding guidelines and application procedures, Illinois has limited the amount of management needed for its SBC fund. Other funds, such as Pennsylvania and New York, on the other hand, have attempted to remain flexible enough in implementation to respond to market needs by supplementing certain programmatic areas, reducing others, or even completely changing course if need be. To be effective in implementing such a flexible and responsive approach will generally require a higher level of staff expertise and perhaps a larger staff size.

### *3. Outside input can provide a valuable source of information to state funds.*

Even with a capable staff, it may be valuable to establish ties to outside stakeholder groups and organizations and seek their input on program direction and design. Such input, which can come in many forms, can be even more important when in-house staffing and/or expertise is limited.

Examples of the varied nature of such input come from a number of states:

- In California, the CEC has used an extensive workshop and comment process to seek input from industry, advocacy and other stakeholder groups during program development.
- Similarly, in Pennsylvania The Reinvestment Fund relied heavily on the recommendations and analysis prepared by the American Wind Energy Association to design the fund's solicitation for new wind power plants.
- Still other states, such as Montana, have relied heavily on outside advisory committees to assist in program design and prioritization.
- Numerous funds have relied extensively on outside consultants to assist in program design, perform investment due diligence on potential fund recipients, and evaluate program results.
- Finally, for states that are using investment tools to support renewable energy businesses and companies, close interactions with private-sector investors has been found to be important.

### *4. Outreach and marketing to both renewable energy businesses and customers are critical to a fund's success.*

Experience also suggests that successful funds – especially those located in states without a robust set of renewable energy resources and where existing industry infrastructure is lacking – often must aggressively and creatively search for funding opportunities. This is perhaps most readily seen in the Northeast, where many states are faced with a modest renewable resource base, severe project siting constraints, and an underdeveloped renewable energy industry infrastructure. Given their circumstances, many states realize that in order to invest all the money they are collecting for renewable energy, they will need to aggressively pursue deals, to the point of actually creating them.

Aside from higher levels of dedicated staffing and staff expertise, fund administrators (especially those with smaller amount of funds and a more limited renewable energy industry infrastructure) have used numerous low-cost approaches to increasing their presence in a market and enhancing potential deal flow, including:

- **Marketing the fund to local renewable energy businesses.** The first step for some funds is to engage in market research and outreach to identify and target businesses in their state that could be potential fund recipients. Wisconsin and Montana, for example,

have both done well in advertising the availability of their SBC funds to local renewable energy businesses through the distribution of program information and RFPs to even the smallest of renewable energy firms. In still other cases (e.g., Massachusetts), regular newsletters on program activity have been distributed to potential funding recipients.

- **Establishing a presence through sponsorship, advertising, or presentation at local or regional renewable energy events.** The Connecticut Clean Energy Fund co-sponsored two such events in March 2000 – a green building and renewable energy conference, and a "green power" workshop that attracted more than 35 Connecticut businesses.
- **Web site advertising.** Creating a web site with program information and links to and from many other sites is a low-cost way to market the fund. The majority of state SBC funds have used this approach.
- **Partnering with another state fund or organization.** Teaming up with other like-minded organizations to get the word out can lead to economies of scale. For example, SBC funds in the Northeast could partner on a regional education campaign that would benefit all participating funds. For smaller funds with limited staffing, outsourcing marketing and other programs with high overhead to local non-profits is another idea; Montana Power Company has effectively done this with the National Center for Appropriate Technology, Sage Mountain Center, and other trade allies.

Experience further suggests that outreach and marketing should not be limited to businesses or potential RFP respondents. Electricity consumers – who are ultimately a fund's customers – must also be courted, and more often than not, educated. Only 14% of California residents and 9% of businesses, for example, were aware of the state's emerging technologies (PV) buy-down program, even after the program had been operating for two years. To overcome this consumer education barrier, some states such as California have specifically budgeted funds for customer education programs. In other cases, such as in Pennsylvania, program information has been mailed to potential renewable energy customers.

## B. Programmatic Issues

Once administrative structures and details are worked out, state funds face the equally daunting task of developing and implementing their renewable energy funding plans. In this section we identify pertinent observations and lessons from state experience thus far, split into four sub-sections:

- large-scale renewable energy project development,
- support for renewable energy marketing,
- distributed generation policies, and
- industry and infrastructure development.

### *1. A number of states have successfully supported large-scale renewable energy projects through financial incentives of various kinds.*

As discussed earlier, a number of states have successfully used program funds to support large-scale renewable energy development. Arguably, these programs have been shown to be one of the most effective uses of SBC funds. Six states have funded such projects to date,

including California, Illinois, Montana, New York, Pennsylvania, and Rhode Island. While other incentive structures have been considered, most states have thus far used various forms of production incentives and grants.

Experience is too limited to draw definitive conclusions as to the "ideal" form of support for such large-scale projects. However, several specific issues – and resultant lessons – that have arisen in multiple states deserve mention:

- **Lowering Costs Through Competition:** Most states have used competitive mechanisms – either formal auctions, solicitations or more open RFPs – to solicit project proposals. Where sizable funds are available, states have found that such competition can lower project costs and thereby enhance fund leverage.

- **Speculative Bidding Concerns Have Been Raised:** While competitive mechanisms have numerous merits, effective design of the competitive process is necessary to ensure that funds are put to good use. One concern that has arisen is speculative bidding. The one-off nature of California's initial new renewables auction, for example, along with relatively weak penalties for opting out of a successful bid, led to what many believe was a certain degree of speculative bidding, as those who had contemplated developing new facilities saw the auction as their only chance in the next four years of receiving a portion of the state subsidy. Furthermore, with the auction conducted after only a few months of experience in the new competitive market, bidders lacked important information concerning the strength of the market and the extent of the "green" premium they might expect to receive from renewable energy marketers.

  The effect of such speculative bidding is that a number of winning bidders may end up not developing their projects, either because market conditions are not as favorable as necessary to make a project economic (e.g., renewable energy revenues are lower than expected or the PTC is not extended) or because the project is unable to obtain the necessary permits. In the meantime, such projects hold up scarce funds that might have been used for other purposes in the interim. To the extent this risk is considered a serious one, at least three (non-exclusive) approaches have been used or considered by state funds to combat the incentive for such bidding strategies:

  1. *Multiple Smaller Auctions:* A series of smaller, regularly-scheduled auctions or solicitations should reduce incentives for speculative bidding, as projects are given time to arrange site selection, permitting, and perhaps even power sales agreements before bidding for funds. Pennsylvania has taken this approach to heart in splitting the $12 million PECO/Unicom wind development fund into two $6 million auctions over time, rather than auctioning the entire amount at once. Similarly, the current California Energy Commission proposal for managing the first 5 years of the recent 10-year extension of California's fund suggests holding an auction of roughly $122 million every two years.

  2. *Bid Bonds or Other Forms of Security.* Another approach to reducing speculative bidding is to penalize winning bidders that are unable to make reasonable progress

towards project completion. Both California and Pennsylvania established different forms of bid security to serve this purpose. In using this approach, funds often walk a thin line between: (1) establishing strong enough penalties to eliminate speculative bidding while (2) not making penalties so stringent as to reduce the number of possible bidders or overly penalize projects that are unable to come to completion due to circumstances outside of the control of the bidder.

3. *Administrator Discretion in Selection of Winning Bidders.* Providing fund administrators the discretion to select projects for funding that have the highest probability of completion may also reduce the risk of speculative bidding. In Pennsylvania, for example, winning projects were those that were both able to demonstrate low required incentive levels and a high probability for project completion by the end of 2001. To evaluate projects based on the latter metric, the Sustainable Development Fund asked bidders to provide information demonstrating: financial health, ability to finance a large wind energy project, technical ability to construct and manage a large wind energy project, site control, feasibility of interconnecting the proposed project with the electric grid, wind resource adequacy, and ability to secure all required permits within four months of award.[25] The more rigid project selection criteria used by the CEC, emphasizing subsidy levels, on the other hand, has not allowed for such qualitative evaluation, perhaps increasing the likelihood of speculative bidding strategies.

- **Fate of Renewable Generation Should be Considered:** Another issue faced by some states is whether fund managers should impose requirements on where winning projects are able to sell their electrical output (or renewable energy credits – RECs). Perhaps of most significance is whether projects should be able to sell into an in-state or out-of-state renewables portfolio standard (RPS). This issue is addressed in Subsection C, below. Additional issues that have arisen in some states include whether projects should be required to sell their output or RECs in-state and whether projects should be allowed to receive an additional renewable energy premium from retail or wholesale marketers. As a general rule, states have typically concluded that allowing projects to maximize their revenue increases the leverage of state funds, and that those benefits outweigh any possible benefit of power sales limitations.

- **Performance Incentives:** Most of the states supporting large-scale renewable energy development have relied on some form of performance incentive to ensure the efficient operation of funded projects. The most common form of such an incentive is simply to pay based on performance through a production incentive. California and Montana Power Company have used this approach. Other approaches, however, are possible. NYSERDA, for example, has structured its up-front grant to account for performance by holding back 25% of funding until the project has performed as expected for one year.

- **The Time Value of Money:** One important benefit of up-front incentives is that, given the time value of money, a fixed amount of money may be able to stimulate additional

[25] NYSERDA used a similar approach in its wind development solicitation, considering many factors beyond just the bid level in project selection.

renewables development if a front-loaded payment stream is used. This latter finding led the Sustainable Development Fund to develop an innovative approach to distributing its production incentive. Initially planned to be a 5-year production incentive, the Sustainable Development Fund ultimately adopted a lump sum payment to winning bidders available upon commercial operation of the project. Projects are assumed to "earn" this grant over time through a 1.5 cent/kWh incentive up to the aggregate grant level. Project performance is secured by a letter of credit. If projects do not "earn" their grant due to systematic under-performance, the Sustainable Development Fund has the ability – through the letter of credit – to take funds back from the project. If one assumes that the wind developer's cost of capital exceeds the SDF's opportunity cost of capital by 10%, it can easily be shown that this up-front lump sum approach boosts the incentive's leverage by 22% compared to a production incentive distributed over 5-years. If the cost of capital differential is 5%, an 11% leverage boost could be expected.

### 2. *Supporting the customer-driven renewable energy market may help create sustainable demand for renewable energy.*

Most traditional renewable energy policies in the U.S. and abroad have focused principally on the supply side of the renewable energy market through R&D, tax incentives, above-market power purchase contracts, and similar policies. As just discussed, many of the state renewable energy funds also appear to be successfully tackling the supply-side of the market.

With the advent of customer choice in electricity markets, however, a number of SBC funds have found it valuable to also directly target the demand side of the equation. In so doing, these states hope to improve the long-term sustainability of their programs' impacts. The competitive market for retail renewable energy sales is a convenient vehicle for implementing such an approach, and a number of state SBC funds have paid or have plans to pay particular attention to this market. While providing direct support to help build the customer-driven renewable energy market has proven controversial, such a focus is typically justified by the goal of developing – over time – a sustainable market for renewable energy that is not tied exclusively to public policy support.

Based on the experiences and plans of various states, a number of specific programs in this area might be considered:

- **Customer Incentives.** California is targeting renewable energy marketing through its customer credit program, described earlier. Though the program is recognized as having successfully helped create and build the customer-driven renewable energy market in the state, criticisms have often focused on three design features. First, because funds are provided to sales of any eligible renewable energy the program provides no incremental incentive for marketers to include "new" renewable energy in their products.[26] Second, the incentive has, at times, been large enough to make renewable energy cheaper than

[26] These critics argue that existing projects would likely have continued to run without additional incentives, and that the customer incentive program is therefore doing little to further increase the level of renewable energy in the state.

other electricity supplies, creating what some consider an unsustainable market for retail renewable energy sales. In fact, the CEC's own evaluation of the program shows that significant numbers of customers (especially non-residential customers) purchasing renewable energy and receiving the incentive are not even aware that they are purchasing renewable electricity.[27] Third, and related, the CEC's customer credit program has propped up renewable energy retailers in a market that is largely hostile to retail choice. In fact, the recent energy crisis in California has resulted in the near cessation of retail marketing in the state. The long-term effect of the program in creating sustainable demand for renewable energy is therefore uncertain.

Consequently, while the precise design of the California customer credit may be inappropriate for some states, a redesigned customer incentive program – especially if applied in a market where the long-term prospects for retail choice are bright – may be worthwhile to consider. For example, a fund might consider a customer incentive that favors new renewable generation and/or limits the size of the credit so that renewable energy remains a premium-priced product. Such modifications should reduce the amount of funds needed to support such a program, increase the supply of new generation, send proper price signals to the market (i.e., that new generation is valued over existing, and that renewable energy is a premium product), and increase the attractiveness of quality renewable energy products by reducing their premiums somewhat. In December 2000, Rhode Island's PUC took some of these issues under advisement and provisionally approved their own customer incentive program (initially proposed by the Rhode Island Renewable Energy Collaborative), pending satisfactory resolution of questions posed by the Commission. Likewise, the California Energy Commission's preliminary investment plan for 2002 through 2007 indicates that it may eventually restrict customer credit funding to new renewable resources.

- **Direct Support for Renewable Energy Marketers.** At least two other states have provided direct support to renewable energy marketers. As noted earlier, Connecticut's first major investment was a $500,000 loan, convertible to equity, to the Connecticut Energy Cooperative, Inc., an aggregator and energy service provider marketing Connecticut's first renewable energy product, EcoWatt. A second deal, similar in nature but involving a different marketer, is likely to be finalized in early 2001. Meanwhile, two of Pennsylvania's funds have supported the wind developer Energy Unlimited to install wind capacity, and its partner Community Energy to drum up demand for the output of the plant.

- **Government and Institutional Purchases of Renewable Energy.** Massachusetts' strategic plan indicates a desire to encourage local government agencies to purchase renewable energy. Rhode Island's PUC has also recently provisionally approved a program to provide incentives for larger electricity customers to purchase and promote their renewable energy purchases, pending satisfactory resolution of questions posed by the Commission. As California's market for renewable energy sales has shown, increasing renewable energy demand by large customers – especially governmental

[27] *Renewable Energy Program Preliminary Evaluation: Customer Credit Subaccount Evaluation*, prepared for the California Energy Commission by Regional Economic Research, October 30, 2000.

customers – can lead to increased coverage of the market by the press and consequently a higher degree of customer education and a stronger market for renewable energy marketing overall. Not all markets, of course, contain a robust retail electricity market, however. In markets where retail competition is limited, it may therefore be useful to consider supporting the purchase of renewable energy tags separate from retail electricity supply.[28] Such purchases are becoming more frequent in the U.S. and may ultimately serve as a key method of support for renewable energy by larger customers.

- **Customer Education.** California's SBC fund has helped offset the cost of a customer education campaign on renewable energy, and plans to play a larger role from 2002 to 2007 with the California Energy Commission currently proposing $6.75 million per year for consumer education. Rhode Island also has provisional plans to help co-fund educational efforts, and Pennsylvania is developing a plan for the $2.5 million earmarked for education resulting from the PECO/Unicom merger. Given that much of the underlying message and content will be similar across states, education may be one area where funds can benefit from partnering with one another or with non-profit organizations.

### *3. Customer-sited programs have had varying success, suggesting several design lessons.*

Many of the state SBC funds have implemented or have plans for some sort of customer-sited distributed generation program. As discussed previously, programs developed so far range from buy-downs and competitive solicitations for new distributed generation projects to education and financing efforts. Most of these efforts target customer-sited PV, with lesser emphasis on small wind, fuel cells, and other technologies.

While experience is limited, even with high incentive levels these efforts appear to have been less successful in general than initially expected. Smaller customers have been especially slow to sign-up for on-site generation, for example, and experience in California at least shows that PV performance has been lower than projections.[29] If this experience continues to hold, it appears as if program modifications will be necessary to hit initial program targets in some states. Assuming that a fund's goal is to expand the PV market, there are a number of lessons to be learned from experience to date:

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[28] Renewable energy tags represent the environmental and public benefits provided by renewable energy production, and are a separate commodity from the electricity generation itself. Other names frequently used for this type of product include renewable energy credits or certificates.

[29] Monitoring of selected PV systems installed through the program revealed that AC output was as much as one-quarter to one-third below that expected on the basis of certified module and inverter efficiencies. A combination of system considerations contributed to the under-performance, including component mismatch, wiring sizes, shading, battery storage, orientation, and inverter loading. It was also discovered that many program participants have no means of monitoring their systems' instantaneous or cumulative performance, or else do not understand what quantity of output to expect. See *Renewable Energy Program Preliminary Evaluation: Emerging Renewable Resources Account*, prepared for the California Energy Commission by Regional Economic Research, October 30, 2000.

- **Buy-downs generally need to be generous.** A number of states have used buy-down programs as the principle form of support for customer-sited generation. Even with a $3/Watt buy-down and an enviable solar resource, however, California has seen a less-than-expected response to its buy-down program, especially for smaller (under 10 kW) PV systems. Some other states have upped the ante accordingly: New Jersey's buy-down starts at $5/Watt, Illinois is offering $6/Watt, and Montana Power Company has installed free PV systems on twelve schools,[30] and requires as little as 25% co-funding for systems installed at private residences. Based on this early experience, generous buy-down incentive levels appear to be required to stimulate significant demand for grid-connected PV systems.

- **Consider declining incentives over time.** To move the PV industry in the direction of sustainability and to stimulate near-term activity, some states have enacted structured mechanisms to ensure that incentive levels decline as demand increases. California's buy-down program employs a series of five funding blocks of decreasing incentive levels. Montana Power Company's strategy, while less formal or explicit, is similar: by providing generous incentives early on, this fund's intent is to get some high-visibility projects up and running as soon as possible, raising public awareness about the SBC program and PV in general. As MPC's first residential RFP was oversubscribed, future incentive levels will most likely decline.[31] These shifting incentives are intended to ultimately lead to a sustainable market over time. They may also create a "race to the top" or a sense of urgency among PV vendors vying to capture funds from the more lucrative early blocks. Of course, the risk of these incentives is that an initially robust market for the sales of distributed generation systems might dry-up as incentive levels decline. This concern has led the CEC to propose modifications to their program that would do away with the declining block structure and set buy-down levels at a flat $3/Watt for systems under 50 kW and $2.50/Watt for systems over 50 kW.

- **Education, financing, and other market support activities may be critical to the success of customer-sited programs.** Experience also suggests that market support activities may be required to augment even a generous buy-down program. Education may be especially important. Over the past two years, the educational component of California's SBC program has focused principally on renewable energy marketing and very little on the buy-down program. Perhaps this helps explain why only 9.5% of residential and business customers were aware of the CEC's buy-down program one year after its launch, and after nearly 2 years, residential awareness rose to only 14%, while business awareness held steady at 9%.[32] Low levels of program awareness perhaps partially explain the slow response in California. Accordingly, the CEC plans to apply additional funds in the future towards education. Wisconsin has also used program funds

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[30] Schools receiving free PV systems are expected to add a solar curriculum and hold at least three open houses to demonstrate the system to the public.

[31] More than 800 people responded to ads and newspaper articles promoting the program, over 100 completed a fairly involved application process, and after some applicants were disqualified due to inadequate siting requirements, the final 24 winners were drawn out of a hat.

[32] See *Renewable Energy Program Preliminary Evaluation: Overall Program Summary Report*, prepared for the California Energy Commission by Regional Economic Research, October 30, 2000.

for broad-based customer education, and New Jersey has similarly budgeted for public awareness and outreach, target marketing, and market facilitation activities to occur in tandem with its own buy-down program.

Meanwhile, several funds (e.g., Montana Power Company) are targeting PV demonstration projects on schools and other high-visibility locations, and will (or plan to) assist with the development of a solar curriculum to leverage the demonstration value of their programs. In these cases and others involving high-visibility demonstration projects, higher incentive levels may be warranted given the supplemental educational value of the resultant projects.

Easily accessible low-cost financing – the lack of which is often noted as a barrier to PV sales – may also enhance the effectiveness of a customer-sited program. As discussed earlier, three states have or are in the process of developing such consumer financing programs: New York, Pennsylvania, and Wisconsin. While experience suggests that financing programs alone are unlikely to significantly increase PV sales, they may offer a low-cost complement to other PV incentives.

Finally, as discussed later, several states have used broader infrastructure-building activities to strengthen the supply chain for distributed generation sales. Wisconsin is a particularly good example of this approach, where business development grants and training have represented a significant part of their funding strategy thus far.

- **Consider approaches other than buy-downs.** Given the mixed success and high incentive requirement of typical buy-down programs, some state fund administrators have begun to explore whether other incentive policies may more effectively support the commercialization of PV systems. While experience with these programs is too limited to evaluate their successes relative to buy-down programs, six specific policies have been used or considered:

  1. *Project-Based Competitive Solicitations:* In lieu of setting up a typical buy-down program, NYSERDA has issued a series of RFPs for commercial PV systems, often requesting bids for specific projects (Montana Power Company has also taken this approach). This approach has the advantage of a high project completion percentage and cost minimization – receptive sites are identified up front, removing one large barrier to project completion. The RFP process also allows NYSERDA to consider factors other than cost, such as which projects provide the most visibility and demonstration value.

  2. *Building Distribution Channels:* NYSERDA has targeted the residential PV market in a more indirect way by funding three PV manufacturers to develop distribution channels that are intended to enable them to more effectively market their products to residential customers. By leaving the residential solicitation open-ended in terms of the types of responses it would consider, NYSERDA hoped to effectively tap into the expertise of the private sector, allowing respondents to propose funding approaches that would best suit their needs.

3. *Equity Investments:* The Connecticut Clean Energy Fund has provided seed capital to Solar Dynamics, Inc., a start-up spin-off whose initial product is the Solar Power Companion, a portable PV generator originally developed by ASE Americas, Inc. The goal of this investment is not necessarily to boost PV use in Connecticut, but to develop a Connecticut-based business that can tap into the interstate and international PV markets. Other state funds focusing on economic development (notably Massachusetts and Pennsylvania) may also find opportunities in such export markets, especially as the most cost effective and promising markets for PV are arguably overseas.

4. *Bulk Purchases:* Spire Corporation has secured $8 million in firm commitments ($6 million from ComEd and $2 million from the City of Chicago Department of Environment) to purchase a substantial amount of PV panels from its new Spire Chicago Solar manufacturing plant located on a redeveloped brownfield on Chicago's west side. These commitments were not only sufficient to lure Spire into Chicago, but should also result in a lower per-unit cost to the City of Chicago. As an alternative or supplement to buy-down incentives, state funds may be able to leverage their impact by aggregating or facilitating the aggregation of interested participants into a bulk purchase order. The Sacramento Municipal Utility District's PV Pioneer program has achieved considerable success in driving the price of PV systems down through bulk purchases.

5. *Project Leasing:* Pennsylvania's Sustainable Development Fund is exploring the possibility of funding a PV leasing program. Leasing programs remove perhaps the greatest barrier to PV adoption – high up front costs – and may also reduce potential anxiety a homeowner might have over system performance or maintenance, or having to move before the system pays for itself. A leasing arrangement could also reduce the costs of PV if the leasing company is be able to take advantage of bulk equipment purchases, the federal five-year accelerated depreciation tax credit, the federal 10% business energy tax credit, and long-term financing.

6. *Niche Markets:* As an alternative to supporting the broad market for PV, it may make sense in some instances to target niche applications for which the technology is particularly well-suited. As detailed in its operating plan for fiscal years 2001 and 2002, MTPC plans to undertake a green buildings program in Massachusetts to promote the use of PV and other renewable energy technologies in highly energy efficient buildings. MTPC plans to network with architects and building engineers to identify opportunities, offer technical services in facilitating deal flow and minimizing transactions costs, and provide financial incentives in the form of grants or loans. The SDF in Pennsylvania has also supported green buildings, providing a commercial loan of $250,000 and a grant of $46,759 to a developer of twelve affordable solar townhouses in West Philadelphia, which feature passive solar design and solar hot water and PV systems. Other examples of niche markets include PV-powered outdoor lighting systems funded by Rhode Island, a manufacturer of PV-

powered traffic control signs funded by the SDF in Pennsylvania, and the "high-value" PV applications funded by NYSERDA.[33]

- **Consider programs specifically designed for fuel cells and other distributed generation technologies.** Much of the discussion above emphasizes photovoltaics, but PV is by no means the only possible distributed generation technology eligible for program support. A number of states, for example, have applied their buy-down programs to small wind generators as well. Limited experience with the support for this technology in California shows that small wind is generally more cost effective than PV, but that resource and siting issues can limit customer interest.[34] Nonetheless, many of the lessons identified earlier for PV are equally applicable to small wind installations.

  Fuel cells are also often eligible for state renewable energy funds. Where fuel cell eligibility is restricted to those powered by renewable fuels, states should likely expect only limited development activity. In California, for example, where such fuel cells are eligible under the buy-down program, only two projects have come on line during the first three years (both projects, located at wastewater treatment facilities, are fueled by methane from anaerobic digestion).[35]

  Where broader eligibility of fuel cells is allowed, programs should achieve greater success. One particularly promising application of fuel cells is for "premium power," defined here as power supply that is significantly more "available" and of better quality than the regular grid and the conventional types of generation backup (e.g., diesel generators). Certain businesses experience substantial financial losses during both momentary and extended power supply disturbances. Massachusetts is therefore planning a program to target this application, the premise for which is that fuel cells' unique ability to address momentary disturbances can protect businesses against financial losses, therefore justifying the high cost of this particular technology. The program in Massachusetts will fund feasibility studies that seek to confirm the suitability of a premium power application, and will provide financial incentives to reduce the cost of fuel cell installation.

  While certain markets for fuel cells are promising, even here sizable barriers remain. Rhode Island's $2.10/Watt support of a 200 kW fuel cell installation at a hospital, when combined with a DOE incentive, covered more than half the installed cost of the system. Even so, the hospital invested nearly $400,000 in the system. For many institutions, this level of capital investment will need to be included in the annual capital budget, which could extend the sales cycle for this technology to a year or more, depending on the

[33] NYSERDA defines "high-value" as "where the intrinsic benefits of photovoltaic and/or wind power generation systems justify their installation over other energy sources," such as where grid electricity is limited or unavailable.
[34] As of August 14, 2000, 26 small (<10 kW) wind turbines had been installed through California's buy-down program, and another 21 had been approved. These figures compare with 300 installed small PV systems and an additional 143 approved. This despite the fact that small wind turbines were found to be about half the cost of small PV systems (on a $/kW basis), and up to three times more cost-effective (on a $/kWh basis). See *Renewable Energy Program Preliminary Evaluation: Emerging Renewable Resources Account*, prepared for the California Energy Commission by Regional Economic Research, October 30, 2000.
[35] The CEC may expand fuel cell eligibility to those that are natural gas fueled under 2002-2007 program funding.

capital planning cycle for the customer. Fuel cell programs should therefore support a project timeframe that is sufficient to accommodate this end-use customer reality.

The developer of the Rhode Island fuel cell also felt that it could have structured a better deal for the customer had Rhode Island's program allowed the incentive to go to the developer instead of requiring it to flow directly to the customer. If the incentive had flowed to the developer, the developer could have structured an arrangement with the customer as a lease or as a service rather than being constrained to a direct sale (with its associated large capital outlay).

Finally, experience also suggests that any distributed generation program targeting fuel cells should keep in mind that potential fuel cell customers may be very different from PV customers. PV customers are most likely motivated by environmental concerns, whereas fuel cell customers are just as likely to be motivated by power quality and reliability concerns. Fuel cells – at least for the time being – are only commercially available as 200 kW units, thereby limiting the universe of potential customers to those needing that much power (not to mention heat or steam) and commanding a significant budget. Finally, in providing power quality and reliability services, fuel cells have a number of strong competitors.

### *4. Building industry infrastructure may be especially important where limited renewable energy project experience exists.*

Though hard to evaluate analytically, a number of states have found value in augmenting renewable energy project-based incentives with various programs to increase the capacity of renewable energy firms in developing and marketing their products. Whether deployed in a supporting or central role, such capacity-building may be especially important in states where existing renewable energy markets are small, where renewable resources are limited, and where new renewable energy applications are emerging (e.g., grid-connected PV and renewable energy marketing).

Of course, the appropriate scope and type of industry and infrastructure development programs will depend on the state. Already discussed are the efforts of some states to provide loans or equity investments in renewable energy firms. This form of financing can be thought of as a specialized approach to building infrastructure through early-stage investments in promising renewable energy companies. Also previously discussed is the role of and funding for customer education programs (and high-visibility renewable energy demonstration projects) pursued by some state funds. Beyond these efforts, two additional industry and infrastructure development activities have also been pursued:

- **Market Assessments, Resource Studies, and Site Prospecting.** New York has supported its wind development RFP with projects evaluating New York's wind resource, identifying potential wind development sites, and analyzing transmission access issues. Rhode Island also conducted a general technology and resource assessment in the early days of its fund, and followed up with a more in-depth wind prospecting study.

- **Business Development Grants.** Other states have made industry infrastructure development a central pillar of their approach. The first phase of Wisconsin's Demand-Side Applications for Renewable Energy (DSARE) program, for example, was built largely around providing small grants to local businesses for business and technology development purposes.[36] Pennsylvania awards small business development grants for business planning purposes and, as discussed earlier, New York funded three PV manufacturers to develop distribution channels that will enable them to more effectively market their products.

## C. Strategic Issues

Several other strategic issues that have faced state funds are discussed here, including out-of-state project funding, the possibility of collaborative work among multiple state funds, the risk of creating a "wait and see" attitude in renewable energy markets, and the impact of renewable portfolio standards, tax credits, and various regulatory rules on state funding strategies.

### *1. Maximizing the impact of an SBC fund can involve out-of-state project funding.*

Experience shows that requiring that projects be located in-state to be eligible for funds can be constraining, especially for those states with a limited renewable resource base and/or difficult siting conditions, such as in the Northeast. Rhode Island, for example, has faced substantial challenges in finding in-state projects to fund. Adopting a broader, regional scope for eligibility may therefore make a lot of sense, particularly in well-defined regions such as New England, whose states are largely interconnected through the New England Power Pool (NEPOOL).[37] Such regional development, while perhaps not benefiting an individual state's economy as directly as would an in-state project, could potentially provide the same environmental benefits to the state as would an in-state project.[38] Furthermore, a regional approach allows states with limited renewable resource potential and acute siting restrictions to maximize the impact of their funds by supporting more economical developments in nearby states.

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[36] A recent review of Wisconsin's program questions the wisdom of its "shotgun" approach to preparing the market for transformation. Comparing responses between an October 1999 baseline survey and an August 2000 follow-up survey reveals disappointment among small business participants over many aspects of the program, and in particular over assistance with general advertising and communications materials. While the baseline survey may reflect heightened and perhaps unrealistic expectations, and the evaluation period (< 1 year) is too short to fairly judge the full effect of market transformation initiatives, perhaps a more concentrated focus on those areas where state support was perceived to be most helpful – such as project facilitation assistance – is warranted. It is particularly noteworthy in this regard that the most heavily funded and focused DSARE effort – daylighting – fared quite well in the program evaluation. See *Wisconsin Focus on Energy: Second Interim Report – Final* prepared by Hagler Bailly Services, Inc., October 2000.

[37] The mid-Atlantic states, which are connected through the PJM Interconnection, provide another example.

[38] As New England's experience with acid rain from $SO_2$ emissions and smog from $NO_x$ emissions has proven, air sheds know no political boundaries, and tend to move from west to east. In this sense, a wind farm in western Massachusetts or up-state New York could provide potentially equivalent air quality benefits to populated coastal areas as could an in-state project.

Several states have taken this view, and have expressed a willingness to fund out-of-state (or out-of-service territory) projects that can be shown to benefit in-state ratepayers. Connecticut, Massachusetts, Pennsylvania and, more recently, Rhode Island, all fall in this category. To date, the most commonly cited example of an out-of-state project that benefits in-state ratepayers has been a renewable generation facility that sells its power into the state. Pennsylvania has funded one such project in the Energy Unlimited/Community Energy wind venture, which is located outside of PECO's service territory, and Rhode Island recently funded a wind project in western Massachusetts that will – if developed – offer its output at a discount to marketers wheeling the power into Rhode Island.

### *2. Common issues, experiences, and situations may create opportunities to partner with other states.*

While state funds have not yet developed explicit partnerships or pursued many joint projects, there are certainly a number of areas where states could benefit from doing so. Though each state faces unique constraints and opportunities, all states are engaged in a similar undertaking. The key will therefore be to identify common projects that address the needs of multiple funds simultaneously. To respond to this need, the Clean Energy Funds Network (CEFN) has been created to explore, coordinate, and pursue the joint needs of the state renewable energy funds.[39] Many of the state funds identified in this report have been active in this process. Areas of possible collaboration identified by CEFN to date include:

- **Information Exchange.** Because so many different approaches to supporting renewable energy sources are being developed and used, great value may be gained by simply enhancing communication and information exchange across states about the design, results, successes, and failures of different programs.
- **Consumer Education.** Building consumer education and awareness of renewable energy is vital in every state, and in many cases the message is generic enough that a concerted multi-state effort to develop high quality educational campaigns could be effective.
- **Market Research.** Research to explore renewable energy market opportunities, resource potential, and/or appropriate program and project funding strategies is another area ripe for partnering, especially on a regional basis such as the Northeast.
- **Business Services.** Renewable energy business training and certification programs could well make sense on a regional level; a PV installer in New England will not want to restrict her business to a particular state, for example.
- **Regulatory Rules.** Certain regulatory rules are often established on a regional basis and will play a strong role in determining the attractiveness of renewable energy investments. The treatment of intermittent resources in transmission and system operations, and the treatment of renewable energy imports and exports under disclosure systems both provide

[39] The Clean Energy Funds Network (CEFN) is a foundations-funded, non-profit initiative to support the state funds. The CEFN Project is run by the Clean Energy Group (CEG), a nonprofit 501(c)(3), publicly supported charitable organization.

good examples of such rules. In such cases, states may find value in co-funding coordinated efforts to develop rules that facilitate renewable energy sales.

- **Project Funding.** Though certainly more challenging, opportunities to partner on funding specific renewable energy projects or programs may also arise. For example, a state like Rhode Island could identify a promising opportunity that is beyond the reach of its $2 million annual budget, and may therefore enter into a co-funding arrangement with Connecticut or Massachusetts. Similarly, nearby states may decide to coordinate their buy-down programs for distributed generation resources.

### *3. Uncertainty and mixed signals can cultivate a "wait and see" attitude that slows project development and may result in lost funding opportunities.*

In order to maintain a steady pace of renewable energy development, experience with some state funds suggests that it may be important for fund administrators to quickly articulate a clear funding plan and to minimize potential funding uncertainties. Failure to do so may lead to a "wait and see" attitude among market participants, thereby slowing renewable energy project development. More importantly, any resulting delays could eliminate (not just slow) certain timely funding opportunities, such as wind development prior to the possible expiration of the federal production tax credit for wind.

At least two examples show the potential effects of funding uncertainties on the market. First, the legal challenge that delayed the implementation of the Massachusetts Renewable Energy Trust Fund for over two years is claimed by some to have slowed renewable energy investment in the state, as potential developers and investors at first waited to see how the decision would play out, and then once the court ruled in favor of the Trust, began waiting for funds to become available before proceeding with their projects. Similarly, in Pennsylvania the recent PECO/Unicom merger, with its $12 million settlement fund earmarked specifically for wind development, may have caused wind developers to hold off on new projects until it was clear how the funds would be distributed. Furthermore, the remaining three utility SBC funds in Pennsylvania have been slow in naming administrators and developing funding plans, creating additional uncertainty.

### *4. Links between SBC programs and other renewables policies should be considered.*

To maximize the impacts of their efforts, state renewable energy funds are also beginning to explore the interactions between their own funds and other renewable energy programs, including in particular state RPS policies, federal tax credits, and various regulatory rules:

- **Renewable Portfolio Standards:** In states that have both an SBC and an RPS (or even where RPS policies exist in neighboring states), some fund administrators have begun to consider what types of projects will receive full support under the RPS, and then target their SBC efforts elsewhere. New Jersey has explicitly done this by excluding landfill gas – the technology that will perhaps receive the most support under the state's RPS and that perhaps does not require additional support – from receiving SBC funding.

Wisconsin, meanwhile, has limited SBC funds to supporting demand-side renewable energy activities, based in part on the assumption that the state's RPS will provide sufficient support for supply-side projects. In other cases, states have begun to consider whether to disallow funded projects from selling their output into RPS markets to ensure that "double dipping" does not take place, and that the state funds are indeed having an incremental effect on the renewable energy market beyond that which would occur under the RPS. Such "double dipping" concerns are especially prevalent for renewable energy projects that are likely to receive sufficient support from an RPS to ensure their development even absent additional SBC funds (i.e., those projects that can be used to meet the RPS requirement at lowest cost). Without getting into the complexities, suffice it to say that, by taking other forms of support into account and coordinating with these other programs, fund administrators may help maximize the impact of their SBC dollars.

- **Tax Credits:** Another important issue facing fund managers is the interaction between their SBC-funded programs and federal (and perhaps state) tax incentives. Federal tax incentives, such as the production tax credit for wind and closed-loop biomass and the investment tax credit for geothermal and solar, are reduced or offset by certain forms of state funding. If state funding simply offsets or reduces the value of existing tax credit programs, then the impact of state funds will clearly not be maximized. Given this consideration, the state of California designed its renewable energy programs to not offset the federal tax credits (discussions with and an advisory letter from the IRS were received in this regard). Because this letter applies to specifics perhaps unique to California, it would appear reasonable that other states take similar considerations in mind as they design their renewable energy programs.

  The availability of tax credits also bears consideration with respect to the timing of a fund's activities. The slated expiration of the federal production tax credit for wind after 2001, for example, has provided the stimulus for some state funds to move quickly in developing support programs for wind power. Pennsylvania promptly auctioned off $6 million from the PECO/Unicom merger in order to get projects in the ground prior to the potential expiration of the PTC and thereby maximize the leverage and impact of the fund. Similarly, Rhode Island recently provided funds to a wind project in Massachusetts that should help keep the project on track for completion prior to the expiration of the PTC. For other funds considering wind development, this experience suggests that delay could prove costly in terms of the ability to leverage state support with federal dollars.

- **Regulatory Rules:** A number of state regulations can affect the revenue sources available to renewable energy projects and the likelihood of market expansion in certain renewable energy markets. These include regulations concerning environmental disclosure, transmission and scheduling of intermittent generation, and net metering and interconnection standards. State funds can respond to such regulations in a number of ways, ranging from designing funding programs to reflect market realities (e.g., diverting support away from the customer-driven market for renewable energy sales if market rules preclude robust competition), to becoming involved in changing or shaping market rules. Some states may wish to do both. For example, Massachusetts' strategic plan indicates a desire to support retail renewable energy marketing, but in the absence of a functioning

retail market MTPC proposes to provide support through a number of alternative avenues, including remaining involved in important regulatory proceedings that could affect the future success of this market. Whether a fund manager feels that funding these types of activities is both appropriate and within its area of expertise, or whether there are other parties better suited to address these issues, it is clear that these regulatory decisions will have a substantial impact on the viability of renewable energy markets across the United States.

# VI. Conclusion

Between 1998 and 2012, roughly $3.5 billion will be collected by the 14 state SBC funds currently in existence and used to support renewable energy development. These funds, working in combination with renewable portfolio standards and voluntary renewable energy marketing programs, have the potential to begin to transform renewable energy markets from their current niche status into a more mainstream source of energy. Positive early indicators of such a change are already emerging: large-scale wind farms, for example, now exist or are planned in states where they never have before, such as Montana, Pennsylvania, Massachusetts, and New York. In still other states, such as California, funding levels are high enough to potentially stimulate the installation of thousands of megawatts of renewable capacity.

Some states, of course, have had more success than others in promoting the use and development of renewable energy sources. To some degree, variation in success can be attributed to the different approaches states are taking to the distribution of funds. As highlighted in this paper, three very different funding models are being pursued - investment, project development, and infrastructure development – and states have developed a wide range of program types.

Despite the prospects for some funding failures, however, we believe that the diversity and adaptability of approaches taken to date is encouraging and will allow states to "learn by doing." Also encouraging is that fund management has, for the most part, remained dynamic, evolving according to market needs. For example, in response to the apparent under-performance of traditional buy-down programs, some states are beginning to pursue alternative approaches, while others are taking positive steps to improve their existing programs. Other states have re-allocated funds in response to strong demand for certain resources (e.g., wind in New York) or programs (e.g., new renewable energy in California).

In this paper we have summarized early experience with these SBC programs and have offered a number of observations based on that experience, but it is clearly still too early to draw definitive conclusions. Indeed, as experimentation flourishes on the uses of these funds, absolute successes and failure may only be identified over the course of a number of years.

# Appendix A. Case Studies of Clean Energy Funds

## CALIFORNIA

### Background

California – the most populous state in the nation and ranking among the highest in terms of electricity consumption – has traditionally been a pioneer in renewable energy development. Favorable state-level incentives piggy-backing on top of aggressive PURPA implementation created a sharp rise in non-utility generation during the 1980s and early 1990s, much of it from renewable facilities. California is blessed with a relatively strong and diverse renewable resource base, including attractive geothermal sites, several good inland wind passes, abundant insolation, a significant landfill gas resource, and large biomass potential from agricultural and forestry residue. Non-hydro renewables currently make up roughly 10% of the state's electricity supply, with about 5% coming from geothermal facilities, 2% from wind, 2% from biomass and waste, and 1% from solar (PV and solar thermal electric). Hydropower makes up an additional 23% (20% large hydro and 3% small hydro of less than 30 MW).

On April 1, 1998, California became the third state to open its retail electricity market to 0competition. California's restructuring legislation (AB 1890) mandated that $540 million be collected via a non-bypassable surcharge on electricity sales between 1998 and 2002, to be used to support existing, new, and emerging in-state renewable generation. AB 1890 charged the California Energy Commission (CEC) with recommending market-based mechanisms to distribute the $540 million; most of the CEC's recommendations were approved and encoded into law in October 1997 as part of Senate Bill 90 (SB90). Funding had been slated to expire at the end of March 2002. But on September 30, 2000, the California legislature enacted the Reliable Electric Service Investments Act (RESIA), which extends SBC funding through 2011 (with a formal review after the first 5 years), starting at $135 million per year in 2002 and growing at a rate equivalent to the lesser of annual growth in electricity sales or inflation.

### Funding Approaches Under SB90

Senate Bill 90 directs the allocation of the original $540 million in the following manner:

- Existing Renewable Resources Account: $243 million (45% of total funds)
- New Renewable Resources Account: $162 million (30% of total funds)
- Emerging Renewable Resources Account: $54 million (10% of total funds)
- Customer-Side Renewable Resources Purchase Account:
    - Customer Credit Subaccount: $75.6 million (14% of total funds)
    - Consumer Education Subaccount: $5.4 million (1% of total funds)

*Existing Renewable Resources Account ("Existing Account")*

Funded with $243 million (the largest chunk of the overall $540 million), the Existing Account is intended to help renewable facilities that were operational prior to September 26, 1996 weather the transition to a competitive market. Technologies are grouped into three tiers depending on their relative need for support, with $135 million going to Tier 1 (biomass, solar/thermal, and waste tire), $70.2 million to Tier 2 (wind), and $37.8 million to Tier 3

(geothermal, digester and landfill gas, small hydro, and municipal solid waste). Funds are disbursed in the form of a production incentive, with decreasing annual allocations (for all tiers) and decreasing annual ¢/kWh incentive caps (for Tier 1 only). The size of the production incentive equals either the difference between a target price and the market clearing price, a pre-determined cap for each tier, or the funds-adjusted price[40] – whichever is least. The following table lists the target prices and caps for each tier.

| Tier | Total Funds | Price (¢/kWh) | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|
| 1 | $135 million | Target | 5.0 | 4.5 | 4.0 | 4.0 |
| | | Cap | 1.5 | 1.5 | 1.0 | 1.0 |
| 2 | $70.2 million | Target | 3.5 | 3.5 | 3.5 | 3.5 |
| | | Cap | 1.0 | 1.0 | 1.0 | 1.0 |
| 3 | $37.8 million | Target | 3.0 | 3.0 | 3.0 | 3.0 |
| | | Cap | 1.0 | 1.0 | 1.0 | 1.0 |

Senate Bill 90 defines the market clearing price to initially equal the short-run avoided cost (SRAC) specific to each of California's three distribution utilities (PG&E, SCE, and SDG&E), with the intent of switching over to the California PX day-ahead price once the CPUC determines that the PX is functioning properly for this purpose. Given the PX's demise in early 2001, however, the market clearing price (for the purposes of the existing account) remains equal to each distribution utility's SRAC.

*New Renewable Resources Account ("New Account")*

Initially funded with $162 million, the New Account is intended to kick-start development of new utility-scale renewable generation facilities (i.e., those in-state facilities coming on-line after September 26, 1996 that meet the legislative definition of "renewable"). To distribute the funds, the CEC held an auction in June of 1998, in which developers bid for a five-year fixed ¢/kWh production incentive (capped at 1.5¢/kWh). The total revenue stream for a winning bidder in the auction equals the summation of the production incentive and whatever form of power sales revenue the generator is able to negotiate in the wholesale electricity market (including any renewable energy premium available).[41] Winners are required to meet a series of six milestones within prescribed time-periods, and get back half of their bid bond after passing the first milestone, and the remainder after passing the second. The sixth and final milestone – bringing the project on-line – must be completed within 36 months of the adoption of a project award package.

As a result of California's unfolding energy crisis and the need to increase the amount of generation capacity, a second smaller auction of $40 million was held in the fall of 2000, funded by a surplus accumulating in the Existing Account as high SRACs reduced or eliminated incentive payments. To encourage the development of new capacity prior to the peak summer season, the CEC will increase the awarded production incentive by 10% for any project coming

[40] The funds-adjusted price is just the minimum of either the capped price or the difference between the target and market clearing price, factored down to account for any funding constraints.

[41] Generators may also be eligible to receive the federal production tax credit. In designing its renewable energy program, the state of California took care to ensure that state incentives would not offset the value of federal tax credits (discussions with and an advisory letter from the IRS were received in this regard).

on-line before June 2001,[42] and will reduce the awarded production incentive by 10% for any projects that are not on-line by July 2001. Another 10% will be deducted from projects that are not on-line by the end of 2001, and after that the CEC reserves the right to terminate the award altogether.

*Emerging Renewable Resources Account ("Emerging Account")*

The $54 million in the Emerging Account is used mainly to buy down the capital cost of customer-sited renewable facilities that will offset some portion of the customer's load. Qualifying "emerging" technologies include CEC-certified photovoltaic systems, solar thermal electric systems, fuel cells utilizing renewable fuels, and small (<10 kW) wind turbines. Though not limited to small generating projects, at least 60% of the funds must be awarded to systems of 10 kW or smaller, and another 15% is reserved for systems rated at 100 kW or less.

Consistent with the idea that production costs should decline as demand grows, the funds are distributed sequentially in five blocks of decreasing value. Once all the funds in a block are committed, the next block offering a lower subsidy becomes available. The following table lists the block specifications.

| **Block** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|
| **Total Funds (million)** | $10.5 | $10.5 | $10.5 | $10.5 | $12.0 |
| **Max $/Watt Rebate** | $3.0 | $2.5 | $2.0 | $1.5 | $1.0 |
| **Max Rebate as a % of Cost** | 50% | 40% | 30% | 25% | 20% |

Payments are disbursed upon proof of a certified installation accompanied by a 5-year comprehensive warranty.

*Customer Credit Subaccount*

$75.6 million is available to support the competitive retail market for renewable energy. Customers purchasing eligible renewable energy products in the competitive market are eligible for a ¢/kWh rebate, usually collected by the energy service provider and passed through to the customer via lower prices. The customer credit was originally set at its cap of 1.5¢ per kWh of eligible renewable generation (with a cap of $1,000 per year for large (>20 kW) commercial and industrial customers), but increasing retail renewable energy demand vying for a fixed amount of funds prompted the CEC to reduce the credit to 1.25¢/kWh for the period from December 1999 to June 2000, and then again to 1.00¢/kWh in July 2000, where it stands today.

*Consumer Education Subaccount*

A total of $5.4 million over four years is to be used to implement the Renewable Energy Consumer Education (RECE) Marketing Plan, which was adopted by the commission on February 17, 1999. RECE aims to raise consumer awareness of renewable energy and its benefits, focusing on both the customer-driven retail market for renewable energy and the customer-sited distributed generation market (i.e., "emerging" technologies).

[42] The total incentive, including the 10% bonus, cannot exceed 1.5 cents/kWh.

**Funding Approaches Under RESIA**

Under the RESIA, the CEC is required to produce an investment plan for the first 5 years of the SBC extension by the end of March 2001. Under the CEC's draft investment plan, circulated for comment in early 2001 and subject to change before finalization, the CEC proposes to allocate a total of $675 million[43] from 2002-2006 in the following manner:

- Existing Renewable Resources Account: $101.25 million (15% of total funds)
- New Renewable Resources Account: $303.75 million (45% of total funds)
- Emerging Renewable Resources Account: $67.5 million (10% of total funds)
- Customer Credit Account: $168.75 million (25% of total funds)
- Consumer Education Account: $33.75 million (5% of total funds)

Under this early proposal, the most dramatic shifts in funding from the original SB90 allocation take place in the Existing Account (from 45% to 15%) and the New Account (from 30% to 45%). These shifts reflect current and expected future conditions in the California electricity market, where new generation capacity is desperately needed and market prices are expected to remain high enough to fully support existing generation. Both the customer credit and consumer education accounts also show increases (from 14% to 25% and from 1% to 5%, respectively). Given the potential abolishment of customer choice under ABX1-1, however, the customer credit allocation may be revisited before the investment plan is finalized.

Proposed programs from 2002-2006 remain similar in scope to what has occurred under SB90 from 1998-2001, with a few notable exceptions, for the most part relating to the expansion of project eligibility requirements. The following is a summary of notable proposed changes from SB90 for each of the five accounts (again we note that these programs are likely to be amended before the investment plan is finalized, and for the time being should perhaps best be viewed as indications of program direction):

- **Existing Account:** Tier 3 facilities (geothermal, small hydro, waste-to-energy and landfill methane), which have not received any incentive payments since October 1999 due to high SRACs, will no longer be eligible to receive funds. Proposed target prices and caps for the other two tiers would remain constant through 2006, at a target price 5 cents/kWh for Tier 1 and 3.5 cents/kWh for Tier 2, and a cap of 1 cent/kWh for both tiers. Generation from renewable energy projects located outside of California that are both interconnected to the California grid and isolated from local interconnection in their areas ("landlocked" facilities) may be eligible for funding, and the CEC also proposes to disregard stranded asset collection considerations when determining project eligibility.

- **New Account:** Rather than conducting a single large auction, the CEC proposes to hold biennial auctions of roughly $121.5 million. In recognition of the unexpectedly high market prices in 2000 and early 2001, the CEC may attempt to tie incentive payments to market prices in order to avoid providing incentives when market prices alone may fully support new renewable energy projects. Other proposed changes involve expanding eligibility to include "landlocked" facilities, as well as projects located outside of

[43] $675 million is simply $135 million per year for five years, ignoring any adjustments due to inflation or growth in electricity sales. Assuming positive inflation and sales growth, actual funding will be higher than $675 million.

California that have guaranteed contracts to sell their power into California. In addition, on-site generation, utility-owned projects, and facilities that have sufficiently repowered so as to qualify as "new," may also be made eligible. The CEC also proposes to disregard stranded asset collection considerations when determining project eligibility.

- **Emerging Account:** Out of concern that declining incentive levels may stifle demand for distributed generation just as the market is beginning to accelerate, the CEC proposes to eliminate the declining block structure, and instead offer a level buy-down of 50% of system costs, subject to a cap of $3 per watt for small systems and $2.50 per watt for large systems. The threshold between small and large systems would be increased from 10 kW to 50 kW. The CEC further proposes to allow investor-owned utilities to own systems and receive funding. The list of eligible technologies may be expanded beyond wind, PV, solar thermal, and renewably-fueled fuel cells to include other technologies, or advanced versions of currently eligible technologies. The CEC did not identify what these technologies might be, other than to list certain criteria such as commercial viability, available five-year warranties, at least a year's worth of performance data, and that the project be designed for generating electricity on-site. Finally, the CEC is charged with determining whether fossil-fuelled fuel cells should be eligible for 2002-2007 program funds.

- **Customer Credit Account:** The credit level would be reset to 1.5¢/kWh, from its current level of 1.0¢/kWh. Eligibility may be expanded to include facilities located outside of California but connected to the Western Systems Coordinating Council. At the same time, eligibility may be restricted to energy products containing a certain level of new generation, or possibly only new generation. The CEC may also create two credit levels—one for new and one for existing renewable generation. Energy service providers receiving the credit may be required to provide renewable energy educational materials to their customers. Given the potential prohibition of retail choice contained in ABX1-1, the customer credit program may have to be re-thought.

- **Consumer Education Account:** In addition to continuing and increasing targeted grassroots and media activities throughout the state, attention will be given to decreasing or removing market barriers, such as permitting delays. A single administrator will run educational programs for both the retail renewable energy market and the emerging energy technologies market in an integrated fashion.

**Status and Results**

*Existing Renewable Resources Account ("Existing Account")*

As of June 2000, 259 projects totaling more than 4,100 MW of capacity were receiving support from the Existing Account. Due to higher-than-normal short run avoided costs of electricity purchases and the way in which the incentive payments are calculated, the payment across all tiers has been rather modest, averaging around 0.5¢/kWh, with eligible facilities (especially Tier 3 facilities) often receiving no payment at all. Indeed, Tier 3 facilities have not received any payments since October 1999. The CEC anticipates this situation will remain unchanged throughout 2001. Despite the sporadic nature of support for some technologies, an

October 2000 program evaluation reveals that nearly half of the respondents to a survey indicated that they would have reduced their output or shut down completely in the absence of the program. There is also some evidence that incentives for Tier 1 are too meager: at least one biomass facility stopped operations after the target price dropped from 5 ¢/kWh to 4 ¢/kWh.

Because of low expectations of future payments, and the fact that only about half of the $243 million allocated to this account has been disbursed to date, the CEC redirected $40 million of Existing Account funds to the New Account in order to fund a second new renewable resources auction in late 2000.

*New Renewable Resources Account ("New Account")*

Fifty-five out of a total of fifty-six bids were successful in the June 1998 new renewables auction, with the lone unsuccessful bid failing due to an inability to demonstrate adequate site control (one of the bidding requirements, along with supplying an estimate of generation over five years and a bid bond equal to 10% of expected subsidy). The required 5-year production incentive of successful bids ranged from 0.75¢/kWh to 1.49¢/kWh, with a weighted average of 1.2¢/kWh. The auction may eventually support roughly 543 MW of new capacity, with wind supplying the bulk (310 MW), followed by geothermal (157 MW) and landfill gas (70 MW). As of January 2001, three successful bidders had canceled their projects, and thirteen projects were on-line, with the remaining thirty-nine projects in various stages of development.[44]

Seventeen out of twenty-eight bids were successful in the $40 million auction held on November 15, 2000. Successful bids ranged from 0.26¢/kWh to 1.35¢/kWh, with a weighted average incentive of 0.59¢/kWh. If all successful projects are built, this auction will support over 471 MW of new capacity, with wind accounting for 439 MW, and biomass, small hydro, and landfill gas supplying the rest.

Though the new renewables auction is often cited as one of the key successes of California's renewable energy programs, only time will tell how many of the winning bidders develop their projects. Several factors, however, appear to have limited or may limit the success of the New Account. The one-off nature of the auction,[45] along with relatively weak penalties for opting out of a successful bid, led to what many believe was a certain degree of speculative bidding, as those who had contemplated developing new facilities saw the auction as their only chance in the next four years of receiving a portion of the state subsidy. Furthermore, with the first auction conducted after only a few months of experience in the new competitive market, bidders lacked important information concerning the strength of the market and the extent of the "green" premium they might expect to receive from renewable energy marketers. The effect may be that a number of winning bidders may not end up developing their projects, holding up scarce funds that might have been used for other purposes in the interim. Moreover, in retrospect, the first auction was barely competitive, as only one of the 56 bidders was denied. A series of smaller auctions spread out over time, with higher incentive caps and longer payment streams, may alleviate some of these problems and help drive down costs. The CEC's proposal to move to biennial auctions under the SBC extension is heartening in this regard.

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[44] See the CEC web site at http://www.energy.ca.gov/renewables/new_renewables_table.html for a list of all projects and their status.

[45] Instead of conducting a series of regularly-scheduled smaller auctions over time, the CEC scheduled only one large auction of production incentives for new renewables in June of 1998. The second smaller auction was initially unplanned.

*Emerging Renewable Resources Account ("Emerging Account")*

Through August 14, 2000, 344 systems (316 PV, 26 small wind, and 2 fuel cells) totaling 1.71 MW of capacity had been installed with roughly $4.7 million in support from the Emerging Account, and there were another 237 projects (212 PV and 25 small wind) representing 1.8 MW and about $5.1 million in payments in the pipeline.[46] While PV is by far the most popular technology in the buy-down program, the October 2000 program evaluation reveals that performance of installed systems has been lower than projected.[47]

With a total of at least $9.8 million either distributed or in the pipeline, Californians have not yet depleted the first funding block for small systems (< 10 kW), even as the program nears the completion of its third year.[48] Although anecdotal evidence indicates a recent surge in demand for PV and small wind systems spurred by California's energy crisis, after three years of program operation, results to date can be described as modest, and illustrate that even a generous subsidy may not attract healthy interest if potential customers are not aware of the program.[49] Although the number of requests for funds has generally increased over time, the October 2000 program evaluation reveals that even after the program had been up and running for two years, only 14% of California residents were aware of the program, and commercial awareness was even lower at 9%. This lack of awareness may be partly a function of the way in which the Consumer Education Subaccount has been managed to-date.[50]

*Customer Credit Subaccount*

With the "shopping credit" or "standard offer" pegged to the California Power Exchange (PX) market-clearing price until recently, it has been hard for energy service providers (ESPs) to offer California consumers much in the way of savings on the commodity portion of their bill. Recognizing that the value of the customer credit (originally set at 1.5¢/kWh) exceeded the wholesale premium for renewable energy by as much as 1¢/kWh, most ESPs serving small customers have supplied their customers with eligible renewable energy – whether or not their customers have requested it – in order to pick up the customer credit and lock in the margin. Some ESPs even used the savings to market retail renewable energy at a discount to PX rates. This tactic was first widely employed in early 1999, and the ensuing wave of renewable energy sales chasing a fixed amount of funds necessitated the lowering of the customer credit to 1.25¢/kWh in December of 1999, and then again to 1.00¢/kWh in July 2000, where it remains today.

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[46] Only 175 of these 237 projects had been approved as of August 14, 2000.

[47] Monitoring of selected PV systems installed through the program revealed that AC output was as much as one-quarter to one-third below that expected on the basis of certified module and inverter efficiencies. A combination of system considerations contributed to the under-performance, including component mismatch, wiring sizes, shading, battery storage, orientation, and inverter loading. It was also discovered that many program participants have no means of monitoring their systems' instantaneous or cumulative performance, or else do not understand what quantity of output to expect. See *Renewable Energy Program Preliminary Evaluation: Emerging Renewable Resources Account*, prepared for the California Energy Commission by Regional Economic Research, October 30, 2000.

[48] Larger systems have proceeded more rapidly through their funding blocks.

[49] The California Energy Commission has helped fund the development of a web-based service to help customers compare the economic value of various PV systems, given existing subsidies and net metering provisions.

[50] Stakeholder disagreements prevented the CEC from jointly implementing both the retail renewable energy and emerging technologies portions of the Consumer Education Subaccount, resulting in sequential rather than concurrent implementation, with the majority of activities thus far targeting the retail market for renewable energy (under REMB).

As of October 2000, 30 ESPs were registered as renewable energy providers, offering a total of 46 eligible renewable energy products. Most of these firms have not been active in the California market; only 2 or 3 ESPs have held the majority of retail renewable energy customers. Through December 2000, over $50 million had been distributed to ESPs via the customer credit, benefiting roughly 160,000 residential and 39,000 small commercial customers at the peak of the market in June 2000. With the recent instability in the California electricity market, however, most retail marketers of renewable energy have returned their customers to default service providers and exited the retail market.

Prior to the recent demise of the retail market, the vast majority of residential customers who switched electricity suppliers were served by an eligible renewable energy product. Thus, the customer credit was driving not only the competitive renewable energy market, but also the overall competitive retail market in California. The CEC's October 2000 program evaluation report illustrates the high degree to which this is true. In particular, in-depth interviews with ESPs offering renewable energy products reveals that the credit has strongly influenced product pricing, and that marketers have come to rely heavily upon the credit in a market that is largely hostile to retail choice. Three marketers indicated that they would most likely exit the market if the incentive were reduced, while others would raise prices and wait to see how their customers react, and still others would reduce the amount of renewable energy in their product mix.

Perhaps even more telling are the responses to a survey of customers purchasing products containing renewable energy: 40% of residential and 72% of non-residential customers that are purchasing products containing renewable energy are unaware that they are doing so. These customers were most likely attracted to the product by some other feature, such as low price, and it remains to be seen how many of these customers would continue to purchase the product if the level of the customer credit declined and prices rose accordingly. These results suggest that beneath the apparent "success" of the customer credit program lies a market that was not entirely healthy, even before the effects of the recent energy crisis are factored in. Specifically, renewable energy as the cheapest option is somewhat of a market perversion that could distort expectations and lead to a customer-driven market for renewable energy that is unlikely to continue once incentives end. Perhaps reflecting some of these concerns, the CEC's draft investment plan for 2002-2006 funds suggests some modifications to the customer incentive program.

*Consumer Education Subaccount*

Thus far, the portion of RECE devoted to supporting the retail market for renewable energy has been administered by the Renewable Energy Marketing Board (REMB), whose activities have included targeted media buys as well as partnering with Global Green USA and the Center for Energy Efficiency and Renewable Technologies (CEERT) to assist local governments and businesses in the procurement of products containing renewable energy.[51]

The "emerging" renewables portion of RECE was initially primarily limited to market research, though in the second half of 2000 the CEC published a consumer's guide to buying a photovoltaic system, distributed grants for consumer education on individual renewable energy technologies, and developed five fact sheets to raise consumer awareness about renewable energy. Further, in February 2001, the CEC issued a $620,000 solicitation for grassroots outreach efforts targeted in part at emerging renewable technologies. Finally, also in February

[51] Assistance has been mainly in the form of business and government roundtable discussions, and for the most part has been more opportunistic than coordinated.

2001, the CEC issued a $2.5 million solicitation for a public relations, advertising, or marketing firm to develop and implement a statewide renewable energy public awareness campaign. Bids for both solicitations were due in April 2001.

## CONNECTICUT

### Background

Connecticut ranks 4th among all states in terms of population density, 29th in terms of population, and 33rd in terms of residential electricity sales. Not overly blessed with a strong renewable resource base, Connecticut is highly dependent on petroleum and nuclear generation, with renewables contributing about 5% of electricity supply (with roughly 340 MW of hydro, landfill gas, waste tire, and municipal solid waste incineration).

Public Act 98-28 was enacted in 1998 to restructure Connecticut's electricity industry beginning in the year 2000. Section 44 of the act created the Renewable Energy Investment Fund, to be capitalized by a usage-based system benefits charge of 0.5 mills/kWh starting on January 1, 2000. The surcharge increases to 0.75 mills/kWh on July 1, 2002, and then again to 1 mill/kWh in July 2004. Though the fund has no sunset date, over a 5-year period roughly $120 million will be collected, with roughly $15 million available for investment in 2000, rising to $30 million in 2004.[52] The legislation placed the quasi-public Connecticut Innovations, Inc. and a 12-person advisory board in charge of administering the fund.

### Funding Approaches

Connecticut Innovations, Inc. holds the view that traditional approaches to the public support of renewable energy (e.g., providing subsidies, buy downs, and tax credits) have been targeted too close to the final consumer transaction, creating markets for technologies that are expensive and unreliable and therefore increasing the likelihood of market collapse once funding disappears. They argue that a more effective approach is to target opportunities in the earliest stages of commercialization, where an injection of seed money and proactive support is most needed and can be leveraged by attracting private funds later in the game. Such investments are overwhelmingly high-risk by nature, requiring the fund to demand equally high returns in order to remain solvent. As a result, Connecticut Innovations, Inc. has set up the Connecticut Clean Energy Fund (CCEF) along the lines of a venture capital (VC) fund.

The CCEF's over-arching fund objectives appear to be three-fold: investments should support the development of a sustainable retail renewable energy market in Connecticut, should help establish clean energy companies within the state, and should have a reasonable chance of producing an above-average return, allowing the fund to become self-sustaining over time. Investments in out-of-state projects or companies are permitted, as long as they can be shown to provide a benefit to Connecticut ratepayers. Targeted fund activities include building the retail market for renewable energy through supply-side project financing as well as demand-side VC-type investments in start-up marketers of renewable energy. In addition, the CCEF will provide VC funds to start-up firms manufacturing and marketing clean energy products. The fund will not target specific technologies, but rather plans to aggressively seek and create investment opportunities in any eligible (per section 44 of Public Act 98-28) renewable energy project that looks promising in terms of product commercialization. Proposals focused on R&D, demonstration projects, or market research will be considered only to the extent that they directly contribute to the expected commercialization of a specific product or technology, as CCEF's

[52] On a per capita basis, Connecticut's SBC fund for renewables is the largest of any state.

view appears to be that such efforts on their own will usually not result in a direct near-term contribution to Connecticut's economy.[53] Likewise, the CCEF will not emphasize the more traditional grants-based approach to supporting renewable power. The CCEF actively seeks co-financing from private investors or other state and federal funds, and will be aggressive and proactive in searching for and creating investment opportunities.

**Status and Results**

The CCEF began collecting funds in 2000 and inked its first major deal in March of that year with a $500,000 loan, convertible to equity, to the Connecticut Energy Cooperative, Inc., an aggregator and energy service provider marketing Connecticut's first retail renewable energy product, EcoWatt. The Co-op also offers solar systems (both PV and solar thermal) for the home. In August 2000, the CCEF announced its second investment, a joint venture with ASE Americas in which the CCEF provided $150,000 in seed money to fund a new spin-off. The new company, called Solar Dynamics, Inc., has taken over ASE's "Solar Power Companion" product line (portable solar generators). The goal of this second investment is not necessarily to install PV in Connecticut, but rather to tap into the sizable export market for PV and portable power.

The remainder of 2000 brought three more investments. The CCEF took a $500,000 equity stake in Sure Power Corporation, a company that designs, installs, and services highly reliable power systems that are based on fuel cell technologies (and that incorporate ONSI fuel cells, another Connecticut-based product). The CCEF also invested $500,000 as a convertible note in a consortium that proposes to build a 72 MW next-generation hybrid power plant combining biomass gasification and fuel cell technologies. If the project comes to fruition, the note, which is written against the assets of the project development company, will convert to equity at a pre-determined level. Finally, the CCEF initiated another deal (still being negotiated) with a second renewable energy marketer looking to enter the state; this deal will presumably be along the same lines as the CCEF's investment in the Connecticut Energy Cooperative.

In 2001, the CCEF is pursuing the development of an insurance product that will guarantee that new renewable generators receive a green premium, thereby enhancing such generators' ability to find reasonable financing. The fund is also exploring possibilities for wind development (both on and offshore) in New England, and is talking to a number of other project developers. Finally, the CCEF expects to make additional rounds of investment in the projects it has already funded.

Perhaps the most interesting part of Connecticut's ambitious approach is their focus on creating a self-sustaining market for renewable energy. While the method in which they attempt to accomplish this (i.e., through venture capital investing) may not be appropriate for all states, the sentiments behind the approach – that certain forms of incentives are unlikely to create a self-sustaining market – are worth bearing in mind. To the extent that state funds can identify and fund projects that are in the early stages of commercialization (and do not pose undue risk) or that build sustainable customer demand for renewable energy (rather than relying exclusively on

[53] The CCEF did co-sponsor two educational events in March 2000 (a green building and renewable energy conference, and a renewable energy marketing workshop that attracted more than 35 Connecticut businesses), and is among a number of sponsors (including the Massachusetts Renewable Energy Trust) of the Building Energy 2001 conference at Tufts University in March 2001. In addition, the CCEF commissioned a wind energy study for the Northeast.

sizable buy-downs to carry the market), their efforts may lead to greater market discipline and sustainability in the long run.

Finally, the aggressive and proactive nature by which the CCEF seeks investment opportunities (to the point of actually going out and creating them) says a lot about what it might take to get the market moving. In a state such as Connecticut, with few renewable resources or renewable energy firms, it is perhaps wishful thinking to hope that opportunities will arise on their own; more likely, they will need to be sought out or even created. Having a full-time dedicated staff and administrative structure can greatly facilitate this process.

## DELAWARE

### Background

The second smallest state, Delaware ranks 45th in terms of population size, but 7th in terms of population density. Delaware has fair solar and wind resources, and significant low-temperature geothermal resources suitable for geothermal heat pumps.

The Delaware Electric Utility Restructuring Act of 1999 (HB 10) established a phase-in of retail competition for the largest customers in Conectiv's service territory starting in October 1999, and for all customers by April 2001. HB 10 also established a system benefits charge of $.000178/kWh that will fund the environmental incentive program with $1.5 million annually. The environmental incentive program is defined to include energy efficiency and renewable energy, and is to be administered by the Delaware Economic Development Office (DEDO), in conjunction with the Division of the Public Advocate and the Delaware Energy Office.

### Funding Approaches

In August 2000, the Delaware General Assembly passed Senate Resolution No. 30, encouraging DEDO to expend up to $1 million of the environmental incentive program funds on "photovoltaic technology" in the form of "renewable energy property grants." Resolution No. 30 broadly defines photovoltaic technology to include the use of solar energy for water heating, active space heating and cooling, passive heating, daylighting, generating electricity, distillation, desalination, detoxification, and industrial or commercial process heat. The Resolution recommends that any Conectiv customer that has constructed, purchased, or leased photovoltaic technology after July 1, 2000 and placed it into service in Delaware should be eligible to apply for a renewable energy property grant equal to 35% of the system cost, subject to the following dollar caps:

- **Non-residential property**: Grants should not exceed $250,000.
- **Residential property**: Grants are limited to $1,500 per dwelling for solar hot water heating systems; $3,500 per dwelling for active space heating or combined active and passive space and domestic hot water heating; and $10,500 for any other renewable energy technology.

While Senate Resolution No. 30 is a resolution and not a law, DEDO has indicated that it will adhere quite closely to the Resolution's "suggestions" as it develops funding guidelines.

### Status and Results

A rulemaking is underway at DEDO, with draft rules scheduled to be unveiled in spring 2001 and final rules promulgated by summer 2001. DEDO is talking with schools and commercial customers about installing several PV systems in spring 2001 on a pilot basis to work out any kinks in the program and generate publicity prior to the official program launch in summer 2001. Although the SBC continues indefinitely, the rebate program is scheduled to sunset in July 2003, at which time DEDO hopes to have other programs in place.

## ILLINOIS

### Background

Illinois is the fifth most populous state, and ranks ninth in terms of residential electricity sales. Coal fuels about 54% of all electrical generation in Illinois, nuclear power supplies an additional 42%, and natural gas accounts for only 3%. With over 200 MW of installed capacity, landfill gas has dominated Illinois' development of its renewable resources, which also includes 40 MW of hydro and some PV. This pattern of development is indicative of Illinois' renewable resource base – the state has a moderate wind resource, a solar resource that is limited in terms of average insolation yet matches up well with load curves in the greater Chicago area, and the potential to at least double its landfill gas generating capacity. Illinois also has some biomass potential, but to date most of its focus on biomass has been to convert corn into ethanol.

In December 1997, Public Act 90-561 (HB 362) became law, establishing a plan for restructuring Illinois' electricity industry. In October 1999, large industrial and commercial customers were given access to retail choice. Full retail competition will be phased in for residential customers through May 1, 2002.

*Renewable Energy Resources Program (RERP)*

Article six of the Act establishes a Renewable Energy Resources Program (RERP) to be funded by the Renewable Energy Resources Trust Fund (RERTF) for the purpose of fostering investment in and the development and use of renewable energy resources within the state of Illinois. The Illinois Department of Commerce and Community Affairs is charged with administering the RERP and developing criteria to be used for distributing grants, loans, rebates, and other incentives. Eligible renewable resources include wind, solar thermal, PV, dedicated crop and organic waste biomass, and the retrofit or expansion of existing hydro facilities.[54] About $5 million per year flows into the RERTF through a monthly charge of 5¢ for residential gas and electric customers, 50¢ for medium-sized non-residential gas and electric customers, and $37.50 for large commercial and industrial gas and electric customers.[55] Fund collection began in 1998 and will continue for ten years.

*Illinois Clean Energy Community Trust (CECT)*

A May 27, 1999 settlement with Commonwealth Edison over the divestiture of its coal-fired generating plants created a second clean energy fund in Illinois, called the Illinois Clean Energy Community Trust (CECT). Out of a $3.5 billion profit from the sale of its Illinois coal generation, ComEd will fund the CECT with a one-time payment of $250 million, $25 million of which is earmarked to fund clean coal research and technology, with the potential for an additional $25 million to be used for this same purpose in the future. The Citizens' Utility Board will receive up to $1 million per year for seven years to represent ratepayer interests and provide consumer education, and the remainder of the funds (roughly $200 million) will be used to create an irrevocable environmental trust and foundation whose purpose is to fund environmental

[54] The Act also specifically prohibits the use of funds to support energy from the incineration, burning, or heating of waste wood, tires, garbage, general household, institutional and commercial waste, industrial lunchroom or office waste, landscape waste, or construction and demolition debris.

[55] The $5 million per year to the RERTF represents 50% of these charges; the other 50% goes to the Coal Technology Development Assistance Fund.

initiatives, energy efficiency and renewable energy projects, and programs to preserve Illinois' natural habitats and wildlife. It is not yet clear how much of the CECT will be paid out each year (and therefore how long the trust will remain solvent), or what portion will go to renewable energy projects. The CECT is administered by a board of six voting trustees and four non-voting trustees, all appointed by the Governor, several Illinois state agencies, and ComEd.

*City of Chicago*

As a result of a franchise arbitration settlement with ComEd, Illinois now has a third clean energy development fund, which will benefit the City of Chicago through a $100 million investment over four years. The city has pledged to spend at least $2 million of these funds on renewables (and PV in particular), with the rest going towards energy efficiency.

Separately, ComEd has agreed to spend $12 million over five years on PV installations in Chicago. The first $6 million is dedicated to buying the output of Spire's new Solar Chicago PV manufacturing facility located on a redeveloped brownfield site on the west side of the city. Spire also has first right of refusal to the second $6 million.

**Funding Approaches**

*Renewable Energy Resources Program (RERP)*

Having had poor experience with loan programs in the past, the Department of Commerce and Community Affairs has decided to distribute funds in the form of grants (for large systems) and rebates (for small systems), and has developed the following technology eligibility guidelines and funding limitations:

| Technology | Maximum Cost Share | Maximum Funding ($) | Conditions |
|---|---|---|---|
| Dedicated Energy Crops | 50% | $150,000 | 1 year of successful testing |
| Solar Thermal (grant) | 50% | $150,000 | SRCC-approved |
| Solar Thermal (rebate) | 50% | $5,000 | SRCC-approved |
| PV (grant) | 60% or $6/Watt | $300,000 | >2 kW, UL-listed |
| PV (rebate) | 60% or $6/Watt | $5,000 | 0.5-2 kW, UL-listed |
| Wind | 50% | $300,000 | >10 kW, AWEA-rated[56] |
| Organic Waste Biomass | 50% | $550,000 | 1 year of successful testing |
| Hydropower | 50% | $1,000,000 | No new construction or significant expansion of dams |

Applications for funding are accepted on an ongoing basis. Only projects built after January 1, 1998 and within Illinois' borders are eligible for funding.

*Illinois Clean Energy Community Trust (CECT)*

The CECT will provide venture capital support, grants, loans, and other financial incentives to projects that encourage the development of clean energy technologies, such as

[56] Small wind (<10 kW) is excluded due to DCCA discomfort with the technology and insufficient warranty length.

solar, wind, or biomass energy, or energy efficiency programs that reduce electricity consumption and prevent pollution. The legislation stipulates that projects and programs should benefit Illinois' environment, and the advisory board has implied that it would be willing to fund projects outside of Illinois' borders if they can be shown to benefit Illinois' environment or economy.

*City of Chicago*

This fund is working in concert with the RERP and the ComEd $12 million PV commitment to install PV systems on Chicago buildings. The three funds meet regularly to identify suitable installation sites and coordinate their funding. A high-visibility site, such as a museum, may receive the pre-determined amount of funding from the RERP (see table on previous page), with the balance funded by the City of Chicago or ComEd (or potentially both). While museums therefore often receive free PV systems, schools – another target of the program – are asked to contribute $10,000 towards each of their 10 kW PV systems.

**Status and Results**

*Renewable Energy Resources Program (RERP)*

Though SBC collection began in 1998, the RERP was not active until 1999 when, among other projects, it funded a number of PV systems, including a 5 kW rooftop system on a vocational school that trains electricians (granted $19,188), a 20 kW system on another school, and a handful of smaller systems (some grants, some rebates). In 2000, the RERP funded a number of PV systems on its own and in conjunction with the City of Chicago and/or ComEd. One of these projects received a $6/Watt grant of $175,200 to install a 29 kW rooftop/awning PV system costing a total of $441,634 (i.e., the grant covered about 40% of the total installed cost) at a ComEd customer service center. All told, the RERP is funding over 30 PV installations with a combined capacity of about 2 MW.

The RERP's apparent success in promoting PV is notable, given that Illinois has no net metering provisions in place at this time.[57] Several factors may contribute to this success. First, the RERP has focused primarily on commercial or community buildings, where the electrical output from even a large PV system will rarely exceed the building's base load, thereby limiting the need for net metering. Second, and perhaps more importantly, the RERP has been working in conjunction with the City of Chicago and ComEd to fund PV installations in Chicago. At mutually desirable sites, the RERP provides its standard $6/Watt for up to 60% of system costs, and one of the other two funds (or both) provides the balance. A free PV system no doubt overcomes any disadvantage of not being able to net meter.

The RERP has had some success with other renewable technologies as well. Three solar thermal systems, for example, received rebates totaling $6,568. A 3 MW landfill gas project received the maximum funding limit of $550,000 for that technology (representing about 11% of the $5.15 million cost of the project), and another 15 MW landfill gas project in Pontiac has also been funded at that level and will come on-line in 2001.[58] The RERP has also funded two hydro

[57] ComEd is running a "Wind/PV Generation Pricing Experiment" that provides incentives to retail customers for installing wind and/or PV systems and allows ComEd to evaluate impacts on its distribution grid. The size of each system is limited to 40 kW. This is the most comparable program to net metering in Illinois.

[58] In both cases, RERP funding was used to purchase a single 1 MW gas turbine as part of a larger landfill gas project.

projects: $352,000 for a 1.2 MW plant, and $1 million for a 3 MW project (both refurbishments). Funding for a 270 kW biogas project at a dairy facility is currently pending. Finally, the RERP is interested in supporting wind projects, but has not been able to find a viable project yet, although two small projects (10 kW) are under consideration.

*Illinois Clean Energy Community Trust*

Trustees have been appointed, and program and grant guidelines are expected by spring 2001.

*City of Chicago*

Through a combined $14 million purchase commitment ($12 million from ComEd and $2 million from the City of Chicago), the City of Chicago and ComEd have lured Spire Corporation, a Massachusetts-based manufacturer of PV equipment, to open its first PV manufacturing facility, called Spire Solar Chicago, on a redeveloped brownfield site on the west side of Chicago. This project is the first of what the U.S. Department of Energy is calling "Brightfields" – the redevelopment of brownfields for renewable energy. The facility – which also houses Greencorps Chicago, a job training and community gardening program – is a model of sustainable design, with a greenhouse, energy efficient landscaping, reuse of captured water, and rooftop PV panels. Spire will also construct a 500 kW solar electric project, the first phase of a planned 2.5 MW PV plant.

The output from Spire's manufacturing plant that is purchased by the City of Chicago and ComEd will be installed on various Chicago buildings and facilities. In the spring of 2000, for example, the Frank W. Reilly elementary school was the first school to receive a 10 kW PV system. In 2001, at least five more city schools and nine city museums will receive PV systems; in January 2001, a 30 kW PV system was installed on the roof of the Peggy Notebaert Nature Museum. Over time, as many as forty Chicago public schools could receive 10 kW PV systems.

This deal provides a potential model for attracting renewable energy manufacturing to a state: an SBC fund could engage in a PV purchase commitment and/or up-front grant, where PV panels could then be installed on community and other high-visibility buildings at low or no cost to the building owner. It is not clear, however, how many state SBC funds have enough of a budget or investment horizon to lure a large manufacturer – Spire received a $14 million commitment that will be leveraged even farther through the participation of the statewide Renewable Energy Resources Program.

## MASSACHUSETTS

### Background

Massachusetts is the thirteenth most populous state in the nation, the fourth most densely populated state, and ranks twenty-eighth in terms of residential electricity sales. Petroleum, coal, and nuclear generation are all major contributors to Massachusetts' electricity base, with gas making a lesser contribution. Between 7% and 14% of total energy purchased by end-use customers in 1997 came from renewable resources, primarily from a combination of hydro and municipal solid waste, with moderate contributions from landfill gas and biomass, and negligible contributions from a few wind and PV installations.

Massachusetts has a potentially promising renewable resource base. Cape Cod and the islands provide perhaps the best wind resources in New England (Class 5 and 6), while the Berkshire Mountains in the western portion of the state harbor Class 4 potential. Thus, within New England, Massachusetts is a prime candidate for both on- and off-shore wind development.[59] A strong agricultural base in the western half of the state promises some biomass potential, and concentrated metropolitan areas in the eastern portion provide opportunities for landfill gas generation. Massachusetts' solar resource is relatively poor.

On March 31, 1998, Massachusetts became the second state to open its retail electricity market to competition. With standard offer rates initially set below the wholesale price of power, competition has been slow to develop. Similarly, activities of The Massachusetts Renewable Energy Trust Fund ("the Trust"), which was created by the Restructuring Act to support renewable energy, have been slow to materialize, due in part to a legal challenge that tied up funds for more than two years before being resolved on April 19, 2000.[60] With the favorable ruling, roughly $100 million that has been collected through a system benefits charge since 1998 is now available for distribution.

In all, roughly $200 million will be collected over the five-year period from 1998 through 2002. Approximately $50 million is specifically earmarked to help municipalities recover the costs of installing pollution control technologies at waste-to-energy facilities (or closing them altogether), leaving $150 million to support eligible renewable technologies over this period. In 2003 and thereafter, about $20 million will be collected each year to support eligible renewable energy, which includes: solar photovoltaic and solar thermal electric energy; wind energy; ocean thermal, wave, or tidal energy; fuel cells; landfill gas; naturally flowing water and hydroelectric; low emission, advanced biomass power conversion technologies, such as gasification using such biomass fuels as wood, agricultural, or food wastes, energy crops, biogas, biodiesel, or organic refuse-derived fuel; and storage and conversion technologies connected to qualifying generation projects. The Restructuring Act charges the Massachusetts Technology Park Corporation (MTPC) with administering the Trust.

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[59] Massachusetts is also both east and south of NEPOOL transmission constraints that have vexed wind developers in New York and Maine trying to wheel power to the more populated southern coastal areas of New England, making it an attractive state for wind development.

[60] Plaintiffs had challenged the system benefits charge (SBC) that funds the Trust as an unconstitutional excise tax, since the SBC does not apply equally to customers of municipal lighting plants.

**Funding Approaches**

While the Trust was mired in legal limbo, MTPC, with the help of three consulting firms, began formulating a management plan. Arthur D. Little, Inc. focused on renewable technologies, analyzing the current state of commercialization as well as future potential. Bain & Company and Nexus Associates, Inc. focused on the Massachusetts market for renewable energy, assessing current and projected market opportunities. MTPC also engaged a number of stakeholders in the planning process. The culmination of these efforts was a draft strategic plan that was presented to MTPC's board on June 28, 2000. Even more recently, as discussed further below, the MTPC released a more detailed operating plan that identifies the specific funding targets for the fiscal years of 2001 and 2002. First, though, we summarize the broader strategic fund.

*Strategic Plan*

The strategic plan is designed to achieve the four statutory objectives laid out in the Restructuring Act: increase the demand for renewable generation, increase the supply of renewable generation, strengthen and expand the full value chain of the renewable energy sector in Massachusetts, and increase economic activity related to renewable energy. In working towards these objectives, six principles will guide the allocation of investments undertaken by the Trust: investments should build upon consumer choice and a willingness to pay for renewable energy in order to create a sustainable market; traditional subsidies should be used sparingly, and only when clearly justified and targeted towards a specific objective; Trust resources should be leveraged with co-funding from other private or public organizations to extend the impact of the Trust and demonstrate a strong and sustainable commitment to projects; investments should be systematically reviewed based on explicit criteria; specific initiatives undertaken by the Trust should result from collaboration with stakeholders; and MTPC should adopt an experimental approach, implemented through a diverse portfolio of initiatives and programs designed to test assumptions and allow the Trust to learn from experience what works and what does not.

Within these broader objectives and principles, MTPC's strategic plan indicates a desire to focus on five major initiatives.

- **Support distributed generation**: MTPC's strategic plan places significant emphasis on distributed generation, targeting four different applications – green buildings, premium power (e.g., uninterruptible or backup power), grid support, and off-grid remote power. Fuel cells and PV systems would be the primary technologies targeted, and projects would be solicited through a regularly scheduled RFP process. MTPC would provide support through project financing, technical assistance, performance monitoring, and awareness building. Project financing would target both the planning phase (conceptualization, feasibility study, and design) and system installation. Funds for the planning phase would be provided on a cost-shared basis, reimbursable to the Trust if the project goes forward.[61] Funds for system installation would be structured as loans, loan guarantees, or grants, and projects would be chosen competitively based on the following six criteria: potential public benefits, net cost per kWh, advancement of commercial potential, geographic location (with preference given not only to in-state

[61] Reimbursable grants are an interesting way to provide valuable seed capital and reduce the high level of risk facing developers in the earliest stages of a project, while ensuring some level of fund sustainability.

projects, but also to projects distributed throughout the Commonwealth), degree of leverage of Trust funds, and visibility.

- **Support the customer-driven retail market for renewable energy**: MTPC also places some emphasis on the competitive retail market for renewable energy, considering it a vehicle to create a sustainable market for utility-scale renewable energy plants. MTPC's strategic plan indicates that the fund does not feel, however, that the competitive retail market in Massachusetts has developed sufficiently to warrant specific approaches to supporting renewable energy such as a customer credit (demand-side) or an incentive auction (supply-side) at this time. As such, this initiative would focus on research and planning efforts in the near term.[62] MTPC would explore novel ways to tap into and leverage consumers' apparent willingness to pay more for renewable energy, including cooperatives that provide renewable energy at cost, social investment bonds, and charitable trusts that would structure the premium paid for renewable energy as a tax-deductible charitable contribution. Other potential activities include helping aggregators to develop retail renewable energy products appropriate for their members, encouraging local government purchases of renewable energy, conducting wind prospecting and financing studies, and promoting the establishment of legislative and regulatory policies that favor the growth of the customer-driven retail market for renewable energy. This initiative appears to be particularly focused on wind generation as the MTPC views wind as the most likely candidate for utility-scale renewable energy generation in Massachusetts.

- **Develop the renewable energy sector in Massachusetts**: MTPC would play to its strengths through this initiative, focusing on bringing different companies and organizations together to address common needs, rather than focusing on the particular concerns of individual businesses. Potential activities include helping Massachusetts companies capture a share of the growing export market for renewable energy systems, linking the entire value chain by establishing business-to-business networks, promoting cooperative R&D efforts between industry and Massachusetts universities, establishing a multiparty-financed renewable energy investment fund to provide capital to small companies in need, and establishing a fuel cell industry association modeled after an MTPC success story, MassMedic.

- **Help educational institutions develop renewable energy programs**: In addition to encouraging the use of renewable energy technologies in schools, MTPC would also work with educators to bring renewable energy lesson plans and projects into the classroom. Another idea is to develop internship positions with renewable energy companies to support university students studying renewable energy.

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[62] In general, the MTPC strategic plan emphasizes the role of distributed generation, and focuses less on utility-scale projects. This could reflect MTPC's belief that the competitive retail market for renewable energy is still too immature to support large-scale supply-side projects or it could reflect a belief that Massachusetts' RPS will provide sufficient support for such projects. This focus reinforces the need to assess the overall market environment for renewable energy in a state or region before determining funding targets.

- **Pursue special opportunities**: MTPC would seek opportunities that do not readily fall under the other four initiatives. Possibilities include large-scale demonstration projects of eligible emerging technologies, such as advanced biomass or wave and tidal systems.

*Operating Plan for Fiscal Years 2001-2002*

In February 2001, the MTPC released a detailed operating plan for FY01-02 that fleshes out much of the discussion in the MTPC's strategic plan. Going forward, a new operating division within MTPC, called the Massachusetts Renewable Energy Collaborative (MREC), will handle all initiatives of the Trust. Between now and mid 2002, the MREC plans to focus on three programs – premium power applications for distributed generation (and fuel cells in particular), green buildings that utilize energy efficiency and on-site renewable energy, and wind development. Two of the three programs promote distributed generation, reflecting the emphasis placed on this sector in the strategic plan. For each program, the MREC will provide outreach and technical services, project financing, and detailed case studies upon completion of specific projects, highlighting lessons learned. The MREC will provide financial assistance via loans, loan guarantees, equity investments or grants. At least six criteria will be used to evaluate projects: potential economic and environmental benefits, net cost per kWh, commercial potential, leverage from MREC financing, geographic location, and "contribution to the public debate." Specific details on each of the three programs follow:

- **Green Buildings Program**: The primary goal of this program is to promote the use of PV and other renewable energy technologies in highly efficient green buildings (this program will be treated as a joint energy efficiency and renewable energy effort). Power will mostly be consumed on-site, but may be sold to the grid under net metering. Grants will be based on the incremental costs associated with investments in energy efficiency equipment and renewable energy technologies, and buildings must be designed to meet or exceed a green buildings standard. The MREC hopes to initiate ten projects and complete five over the next eighteen months, and as such has budgeted $15 million, mostly for grants, in 2001 and 2002, with plans to leverage other available financial mechanisms such as DSM rebates and renewable energy or non-energy tax credits. The MREC has budgeted another $1.5 million for professional fees and technical services, which it will initially provide free of charge, with plans to gradually increase the share of such costs borne by participating projects over time (this is the case for all three programs).

- **Premium Power Program**: The primary goal of this program is to promote the installation of fuel cells in facilities owned or operated by public agencies, not-for-profit organizations, and private companies with a minimum load of 400 kW. The MREC will provide financing via loans, loan guarantees, or grants, with grants limited to 25% of the total installed system cost. Again, the MREC hopes to initiate ten projects and complete five over the next eighteen months, resulting in the installation of 8 MW of premium power capacity. As they have done for the green buildings program, the MREC is budgeting $15 million for grants, loans and/or loan guarantees, as well as another $1.5 million for professional fees and technical services for specific projects. The MREC also will spend $500,000 on related program activities, such as a study on alternative

technologies, and a separate study on ownership and financing structures for premium power installations.

- **Wind Development Program**: The primary goal of this program is to promote the development of wind as an energy source for retail renewable energy markets in Massachusetts. The MREC plans to accomplish this by first assessing whether there is a willingness among consumers, aggregators, public agencies, and municipal utilities to pay a premium for wind energy, and then by building demand among these same entities. The MREC will consider providing financing to cover any margin between consumers' willingness to pay for wind power and the cost of wind generation, but such financing, which would be provided through loans, loan guarantees, or equity investments, will be limited to the equivalent of a 1.5 cent/kWh grant over five years. Furthermore, project financing will only be provided to projects with signed long-term power purchase agreements. The MREC has not forecasted how many projects it will participate in, citing uncertainty that projects will be completed within the two-year planning horizon. The MREC plans to devote $3 million for grants, loans and/or loan guarantees for providing financial incentives for new wind projects, and is also budgeting $450,000 for technical services.

In addition to these formal programs, the MREC also plans to support the development of the renewable energy sector in Massachusetts in general by responding to unforeseen opportunities with new initiatives; for example, supporting the overseas export market for renewable energy products manufactured in Massachusetts. Furthermore, the MREC will undertake various support activities, such as participating in regulatory proceedings that affect the renewable energy market in Massachusetts, including settlement and disclosure, renewable portfolio standards, net metering and interconnection, and building codes. The MREC also plans to hold an annual conference on renewable energy in Massachusetts, conduct or support regional seminars, and produce an annual report on the fund's activities, expenditures and accomplishments.

To accomplish its goals, the MREC plans to aggressively expand its staff, from 5 full-time employees to 15 or 20 over the next two years. The MREC will also draw upon consultants and other organizations as needed, and will establish a number of review panels to support its program areas and to evaluate each individual project proposal. Final funding approval is reserved for the MTPC Board of Directors.

**Status and Results**

The Trust's funding activities have been severely limited by the two-year legal challenge, which was finally resolved in April 2000. During the period that the Trust was litigiously incapacitated, over 200 potential funding opportunities approached the MTPC. Despite this potential backlog of projects, expenditures thus far have been limited to hiring consultants to assist the MTPC in strategic planning activities, as well as working with the New England Aquarium and the Boston Convention and Exhibition Center to explore the opportunities for integrating green building and renewable energy technologies into building plans.

In February and March 2001, the MREC issued its first five solicitations:

- **Sustainable School Building Symposium.** Within the green buildings program, MREC has solicited bids from qualified consultants to plan and conduct one or more educational symposia on elements of green building design for Massachusetts school officials. The MREC envisions one-day workshops, to be held in May 2001, to help educate about 200 local officials responsible for the design and construction of new (or the rehabilitation of old) elementary and secondary schools.
- **Premium Power Planning Grants.** Up to $150,000 per grant is available to private companies, non-profit organizations, and public agencies to conduct planning or feasibility studies for fuel cell installations in Massachusetts that are part of a stationary power system used to provide high quality power to sensitive loads at specific sites. Project activities may include assessing current power quality, identifying potential losses resulting from power disruptions, defining power requirements, preparing conceptual designs, analyzing the financial feasibility of alternative systems, and developing bid documents. Private companies and non-profits must fund 10% of the total project costs, while no cost-sharing is required for public agencies. A total of $750,000 is available for this particular solicitation, but MREC expects to issue additional solicitations for premium power planning grants through June 2002, bringing total expenditures to $1.5 million.
- **Premium Power Installation Grants.** Private companies, non-profit organizations, and public agencies are eligible to receive grants covering up to 25% of the total capital costs of purchasing and installing a premium power system involving a fuel cell. There is a $2 million per project limit, and a total of $5 million is available for this particular solicitation, though MREC expects to issue additional solicitations for premium power installation grants through June 2002, bringing total expenditures to $15 million. Preference will be given to installations that take advantage of the waste heat from the system to reduce the overall emissions profile.
- **Consumer Aggregation Planning Grants.** Up to $150,000 per grant is available to governmental entities and non-profit organizations that represent consumers to develop consumer aggregation programs in Massachusetts for the purchase of green power and/or renewable energy technologies. Projects must be aimed at increasing demand for renewable electricity among a defined group of residential, commercial, and/or industrial customers who are eligible to purchase electricity from competitive suppliers. Project activities may include conducting outreach among defined groups, assessing demand for renewable energy among potential members of the aggregation, defining product or technology attributes for which potential members are willing to pay, initiating discussions with potential suppliers, and establishing marketing, purchasing, and administrative mechanisms. A total of $750,000 is available for this particular solicitation, but MREC expects to issue additional solicitations for consumer aggregation planning grants through June 2002, bringing total expenditures to $1.5 million. All applicants are expected to provide 25% cost-sharing.
- **Green Power Predevelopment Financing.** Up to $150,000 per project is available to private companies, non-profits, and public agencies interested in developing grid-connected renewable electric generating facilities of at least 1 MW in New England, with the intent to sell power into Massachusetts as part of a green power product. Funding is available only for pre-development activities, such as site prospecting, resource assessment, environmental impact studies, obtaining permits and planning approvals,

undertaking design and engineering studies, assessing technical and financial feasibility, planning electrical interconnections, securing land use agreements, and identifying and addressing community concerns. Non-profits and public agencies will receive grant funding, while for-profit companies will receive favorable loans (not exceeding 50% of total project costs) that can, among other things, be repaid in the form of discounted electricity prices to customers in Massachusetts. Preference will be given to sites that have the potential for staged development and expansion beyond 10 MW. A total of $500,000 is available for this program, and non-profits are required to fund at least 25% of project costs.

In addition to these solicitations, MREC is also looking into other measures to support renewable generation in the region (perhaps including a production incentive), and is committed to supporting the local solar industry, which has many active companies, in a manner yet to be defined.

The recent flurry of activity, including the release of the operating plan, the five RFPs, and the award of $54 million in waste-to-energy grants,[63] could begin to address broader complaints about the program. Press articles from interested groups have criticized the failure of MTPC to move more quickly to expend resources, and a recent state audit report (that focused only in part on renewable fund activities) criticized operational practices of the agency.

[63] The restructuring legislation specifically earmarked $50 million to help municipalities recover the costs of installing pollution control technologies at waste-to-energy facilities (or closing them altogether). MTPC announced the $54 million award to 138 communities on March 26, 2001.

## MONTANA

### Background

Montana is the fourth largest state (geographically) and the third least densely populated, ranking 44th in terms of population and 40th in terms of residential electricity sales. About 60% of Montana's electric generation is coal-fired, while the rest is mainly hydroelectric. Natural gas, petroleum, and non-hydro renewables (mainly biomass from timber residues) combined represent less than 1% of all generation.

In part due to its size, Montana's renewable resource base is rich, with excellent wind potential throughout much of the state. Montana's solar resource, though not outstanding, is also worth mentioning, and Montana has forestry-related biomass potential as well. Montana's hydropower resource has already been widely developed, accounting for 40% of electricity generation. Landfill gas projects and resource potential are limited, due to a small and widely dispersed population.

The Montana Utility Industry Restructuring and Consumer Choice Act (SB 390) became law in May 1997, requiring retail choice for large (i.e., average monthly loads greater than 1 MW) customers of investor-owned utilities by July 1998, and for all other IOU customers by July 1, 2002. In October 2000, the Montana PSC extended the transition period to full customer choice until July 2004, citing the lack of a workably competitive electric market, a demand-supply imbalance in the western U.S., and the lack of open and independent regional transmission systems.[64] Electric cooperatives have the choice to either opt in or out of retail competition. Montana Power Company (MPC) – by far the state's largest utility, accounting for over half of all residential sales and over 80% of all IOU residential sales – opened its electricity markets to full retail competition in April 2000, more than two years earlier than required by SB 390. Retail competition has been slow to develop – less than 0.5% of all Montana Power customers have opted for competitive retail suppliers – and there are currently no competitive retail renewable energy offerings in the state.[65]

SB 390 also established (and HB 337 later refined) a system benefits charge (SBC) for the period from January 1, 1999 through July 1, 2003, funded at an annual level equal to 2.4% of each utility's 1995 retail sales revenue.[66] Funds are to be used for low-income assistance and weatherization, energy efficiency, renewable energy, and R&D programs. Within the renewable energy category, projects involving wind, solar, and geothermal resources are given priority. All utilities and cooperatives – whether or not they opt into competition – are required to collect the charge, which for large customers amounts to the lesser of either 0.09¢/kWh or $500,000 annually. Utilities, cooperatives, and large customers can either self-direct their funds to approved internal programs, or transfer their funds to a statewide fund administered by either the Department of Health and Human Services (for funds earmarked for low-income programs) or the Department of Environmental Quality (for all other funds, including renewable energy).

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[64] Those customers that have not yet chosen a competitive electricity supplier at the end of the transition period will be assigned to one.

[65] Flathead Electric Cooperative (FEC) is offering a green pricing program, called Environmentally Friendly Power (EFP), to its customers. FEC customers may elect to pay an extra $2.00 per 100 kWh block of EFP, which consists of hydro and wind power purchased from the Bonneville Power Administration.

[66] A number of bills currently before the legislature may extend the fund through the end of 2005 and increase its size, while at the same time exempting various entities, such as educational and government facilities, from paying the SBC.

Accordingly, if spending on internal programs does not reach the annual funding requirement, the utility or cooperative is required to submit the difference to the appropriate statewide fund.

The SBC will generate approximately $14 million per year in total. At least 17% of this amount is required by law to go towards low-income programs; otherwise, the legislation provides no guidance on specific program funding levels. MPC, which will collect about $8.6 million per year in total, allocates roughly $1.1 million per year towards renewable energy programs. Montana-Dakota Utility (MDU), the only other IOU that has proposed to administer its own system benefits fund internally, plans to allocate about $64,000 per year towards research and development activities, which include renewable technologies. Including the other IOU and cooperative funds, total SBC funding for renewables could amount to almost $2 million per year.

**Funding Approaches**

So far, MPC has been the only fund active in distributing resources to renewable energy projects.[67] MPC's approach has been to issue RFPs – some open, and some directed. Open RFPs are distributed to local renewable energy dealers and environmental or renewable energy advocates, seeking a wide range of proposals without restricting project types. These RFPs are also open in the sense that MPC has been sensitive to market needs, at times issuing an RFP in response to receiving an influx of unsolicited proposals. Each proposal is brought before an MPC-created advisory committee, which helps MPC to prioritize projects and programs to be funded.

MPC has also been working with the National Center for Appropriate Technology (NCAT) based in Butte, Montana on a more-directed portfolio of six renewable energy programs. The **Sun4Schools Project** supplies local schools with 2 kW net-metered PV systems, performance-monitoring systems, and a solar energy curriculum, all at no cost to the school. The **Residential PV Group Purchase Project** supplies homeowners throughout Montana with 1 kW net-metered PV systems. The **Affordable Solar Project** targets solar space heating and hot water systems for low-income residences. The **Solar Adaptable House Design in Montana Project** seeks to develop and compile solar design guidelines to be used by members of the construction and real estate industries. The **AgSolar Project** identifies opportunities to install solar water-pumping systems and solar-powered electric fencing, and will provide information to stock-growers relating to the benefits of riparian protection and renewable power generation. Finally, the **MontanaGreenPower.com Project** provides education and outreach through a web site focusing on renewable energy resources (mostly solar and wind) and issues in Montana. Performance data from the Sun4Schools and residential PV systems may eventually be displayed on the web site.

On April 5, 2000, MPC issued its first directed wind RFP for 2-3 MW of installed wind capacity located in Montana. MPC intended neither to own the facility nor to provide a specific power purchase agreement; its role was merely to buy down the cost of the project.[68] MPC indicated it would allocate up to $1.5 million of SBC funds to the project, and allowed respondents to determine what form the funding should take (i.e., production credit, share of construction costs, or some other arrangement).

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[67] MDU is currently seeking pre-approval of its proposed SBC programs.

[68] MPC is no longer in the supply business, but will help the generator to market its power to MPC's T&D customers. The generator will need to set up a power purchase agreement with a licensed supplier, or else become a licensed supplier.

Montana Department of Revenue rules require MPC to distribute funds either in the year they were collected or the following year, which more or less restricts funding options to grants.[69] MPC favors high-visibility educational or demonstration projects, rewarding them with a higher percentage cost share than a project at a private residence would receive. Though cost-sharing levels are always negotiated, in general MPC has provided 100% of the funds for high-visibility PV systems on schools, and between 25% and 75% of the funds for commercial and residential PV systems. Projects must be installed and inspected before receiving funds.

**Status and Results**

Through its open RFP process, MPC funded 15 projects during 1999. The year 2000 has seen some of the NCAT PV programs bear fruit. A 4.5 kW PV system was installed on the roof of NCAT's Butte headquarters. Twelve schools were selected as winners of the **Sun4Schools Project**. The school PV systems, which are entirely funded by MPC's SBC fund, were installed in August 2000, with solar curriculums in place for the 2000-2001 school year.[70] The **Residential PV Group Purchase Project** received a significant response: more than 800 people responded to ads and newspaper articles promoting the program, over 100 went through a fairly involved application process to apply by the April 22 deadline, and after some applicants were disqualified due to inadequate siting requirements, the final 24 winners were drawn out of a hat. Each of the 24 residences paid $3,000 for a 1 kW PV system and monitoring equipment that normally retails for between $10,000 and $13,000. The residential systems were installed in August 2000.[71] The **Affordable Solar Project** installed six solar thermal systems. As part of the **AgSolar Project**, NCAT installed six solar-powered stock-watering wells in summer 2000 and, after the systems have operated for one full year, will produce a report detailing cost and energy savings, environmental benefits, and lessons learned. Finally, the **MontanaGreenPower.com** web page is up and running.

In 2001, MPC plans to continue to fund the **Sun4Schools** and **Residential PV Group Purchase Projects** by adding five more schools and 15 more homes. MPC will also help fund 13 more solar stock watering installations and continue funding education seminars. Two 2-kW solar electric systems will be installed on two community centers, and 21 smaller solar systems (260 watts each) on individual apartments. MPC will also pay incentives for small wind turbines, up to 40 kW in installed capacity.

Several factors have contributed to the success of MPC's PV programs to date. First, MPC teamed up with the nonprofit NCAT and other local trade allies with a credible history in sustainable energy, architecture, and agriculture, to develop and market the PV programs. Second, the PV programs have offered very attractive buy-downs: up to 100% for high-visibility demonstration projects on schools and commercial buildings, and up to 75% for residential systems (a $7-$10/Watt buy-down).[72] Third, MPC, NCAT, and their contractors have targeted

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[69] MPC applied for and received an exception to this rule for their wind RFP, allowing them to string a production incentive out over 3 years.

[70] See www.montanagreenpower.com/solar/schools/Curriculum/TOC.html

[71] As of early 2001, there were 42 net-metered PV systems in MPC's service territory (though not all were funded by the SBC fund). This number is expected to double in 2001.

[72] MPC has indicated that in future rounds of funding, these buy-down levels may decrease, probably closer to 50% or less for residential systems. NCAT's idea was to begin with very attractive buy-down levels in order to get some systems up and running and raise awareness of the program, and then reduce funding levels as necessary or

high-visibility demonstration projects as a way to raise awareness and educate the public as to the benefits and realities of PV as an electricity source. Along these lines, the **Sun4Schools Project** has implemented a solar curriculum within the twelve participating schools. By focusing on educational and demonstration projects that raise awareness and promote a sustainable market, Montana is trying to maximize the effectiveness of its generous incentives.

MPC received six proposals in response to its wind power RFP, one of which proposed to piggyback MPC's 3 MW on top of a much larger project (22 MW in total), thereby spreading the fixed development costs over a greater amount of capacity, which reduces the cost of wind energy and increases project cost effectiveness. On September 6, 2000, The Blackfeet Tribal Business Council and SeaWest WindPower, Inc. announced the signing of a development agreement for 22 MW of wind on tribal lands. MPC will fund the project with a total of $1.5 million over the three years from 2002 to 2004, with $0.5 million awarded in the form of a production credit each year. In return, MPC distribution customers will have first rights to the output of 3 MW of the project's capacity at a discounted price. The project was originally scheduled for completion in October 2001, but has been delayed until the Fall of 2002 in order to allow for a full environmental impact report and a four-season avian study.

So far, MPC has been able to spend all of its SBC funds internally, and so has not transferred any funding to the statewide program. It anticipates this to be the norm in the future, for itself and other utilities, since funds spent internally are more likely to benefit ratepayers within the service territory than are funds turned over to the statewide administrator.[73]

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appropriate in future rounds. California and New Jersey have built this concept into a structured funding mechanism by separating funds into sequential funding blocks of decreasing incentive value.

[73] The Montana Department of Environmental Quality confirmed that it has not yet received any SBC funds from utilities or cooperatives.

## NEW JERSEY

### Background

New Jersey is the ninth most populous state (and the most densely populated), but ranks only 19th in terms of residential electricity sales. The state relies heavily on nuclear generation, followed by coal and then gas, with renewables – consisting mostly of landfill gas, municipal solid waste, and hydro – contributing a small amount.

New Jersey has a relatively limited renewable energy resource base. Feasible onshore wind generation is limited mainly to a ridge with Class 3 potential running through the northwestern portion of the state, though some of the southern coastal areas may also be suitable. Biomass has promising potential in the long run, but the potential for new projects is limited by New Jersey's adoption of renewable portfolio standard (RPS) and system benefits charge (SBC) eligibility criteria requiring biomass to be cultivated and harvested in a sustainable manner.[74] Fourteen operational landfill gas facilities have a combined capacity of 135 MW, and the EPA estimates that New Jersey could tap another 22 MW of landfill gas generating capacity in the near term. New Jersey's solar resource is relatively poor in terms of insolation, but may match utility load curves quite closely (particularly in the southern half of the state), resulting in a relatively high (as much as 70%) effective load carrying capacity.

New Jersey opened its retail electricity markets to competition in November 1999, as a result of SB 7, the Electric Discount and Energy Competition Act of 1999, which was signed into law in February of that year. To support the development of a renewable energy market in New Jersey, the Act provides for both an RPS and an SBC, and requires that utilities continue to collect the SBC in an amount equal to that being collected in rates at the time of the Act (determined to be $215 million per year).[75] The Board of Public Utilities (BPU) will review SBC funding levels every four years, and the Act guarantees at least eight years of funding, starting in 2000. At least half of these funds ($107.5 million per year) will support new energy efficiency and renewable energy programs, and at least 25% of that amount ($26.875 million per year) must support Class I renewable technologies, defined by the Act as wind, solar, geothermal, landfill gas, sustainable-yield biomass, ocean-based power, and fuel cells. The other half of the fund will be used to pay off long-term contracts associated with past DSM investments.[76]

### Funding Approaches

Two competing funding proposals emerged out of early stakeholder negotiations, and both were submitted to the BPU in February 2000. One proposal was supported by the Natural Resources Defense Council (NRDC), six of New Jersey's seven investor-owned electric and gas utilities,[77] Environmental Defense, the American Wind Energy Association (AWEA), the fuel

[74] Interpreted in the narrowest sense, sustainable biomass could be limited to dedicated energy crops such as willow plantations. The BPU has yet to define sustainable biomass specifically, but may consider using the Green-e definition.

[75] Initial estimates placing this figure at $230 million were later revised to $256 million, and finally $215 million. The uncertainty surrounding this number has been a bone of contention in the rulemaking process.

[76] These costs are associated with public benefits programs for which rate recovery was approved by the board prior to April 30, 1997.

[77] Rockland Electric Company, the smallest of the four electric IOUs, did not sign either proposal.

cell and biomass industries, and BP Solarex. The other was supported by the New Jersey Division of Ratepayer Advocate, the Pace University Energy Project, the New Jersey Public Interest Research Group-Citizen Lobby, the American Littoral Society, the Mid-Atlantic Solar Energy Industries Association, the New Jersey Environmental Federation, the Sierra Club-New Jersey Chapter, and representatives of the energy service company (ESCO) industry.

The two proposals were actually quite similar to one another, containing programmatic elements modeled after those established in California, though with broader market and infrastructure support activities.[78] Both included a generous buy-down program for customer-sited renewables,[79] as well as support for grid supply projects and market development and commercialization efforts. The major differences between the two proposals came in four areas:

- **Administration of the customer-sited buy-down program.** While both proposals called for an independent statewide administrator (ISA) to run the grid supply and market development programs, the "Ratepayer" proposal wanted the ISA to administer the customer-sited buy-down program as well, whereas the "NRDC/Utility" proposal argued that the incumbent utilities, with their background in demand-side management programs, were perhaps best equipped to administer a customer-sited program and get it rolling immediately, and should be allowed to do so.
- **Funding amounts.** An upward revision to the estimate of the amount being collected in rates at the time of the Act from $230 million per year, which was the best estimate at the time the Act was drafted, to $256 million left the two parties at odds in their proposed funding plans. NRDC, which had brokered its agreement with the utilities based on the $230 million figure, decided not to challenge the BPU's position that the funding level for new programs would be based on the initial $230 million figure. The Ratepayer proposal, on the other hand, based its proposed funding allocations on the revised $256 million figure (the BPU has since determined that the correct amount is $215 million).
- **Customer credit program.** The Ratepayer proposal included a California-style customer credit program, which would provide incentives to customers purchasing renewable energy through the competitive retail market, while the NRDC/Utility proposal did not.
- **Fuel cells.** The NRDC/Utility proposal granted fuel cells powered by natural gas equal status with other Class I technologies, whereas the Ratepayer proposal significantly reduced incentives for fossil-fuel-powered fuel cells, focusing more directly on renewably-fueled projects.

After considering the merits of both proposals for a full year, the BPU announced on March 1, 2001 that it had approved a funding plan for New Jersey's SBC fund. The BPU's three-year plan, which represents a compromise between the two competing proposals, calls for $115 million in 2001, $119.326 million in 2002, and $124.126 million in 2003, with 25% of these funds used to support renewable energy. Funding for 2004 through 2008 will be

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[78] Given the lack of an existing renewable energy market in New Jersey, it seems reasonable to place some emphasis on market and infrastructure development.

[79] Buy-down incentives of as much as $5/Watt for up to 60% of installed costs were features of both proposals. These aggressive incentive levels were set in response to California's initially disappointing experience with its buy-down program of $3/Watt for up to 50% of costs, and by taking into account the difference in solar resource between California and New Jersey.

determined in August 2003, once the utilities come off of their rate cap, but an additional $15 million will be added to the 2004 funding level to compensate for the delay in implementation.

Like the two competing proposals, the BPU plan has three cornerstones: a customer-sited distributed generation program, a grid supply program, and a market development program (which is a subset of the grid supply program). The BPU, in consultation with the New Jersey Department of Environmental Protection (DEP), will oversee and monitor the implementation of all programs. In 2001, funding will be split 60%/40% between the customer-sited and grid supply programs, respectively. In 2002 and thereafter, these two programs will share the funding equally. The market development program will receive 5.5% of funds, which will come from the grid supply budget.

With the caveat that a full-scale program (i.e., not a pilot program) be implemented within 30 days of the March 1 Order, the BPU has adopted the **customer-sited buy-down program** outlined in the NRDC/Utility proposal. Buy-down funding is structured into four blocks of decreasing incentive size, distributed on a "first come – first served" basis, as shown in the following table:

| System Size | Block 1 ($/Watt) | Block 2 ($/Watt) | Block 3 ($/Watt) | Block 4 ($/Watt) |
|---|---|---|---|---|
| Small (0-10 kW) | $5.0 | $5.0 | $4.0 | $3.0 |
| Medium (10-100 kW) | $4.0 | $4.0 | $3.0 | $2.0 |
| Large (>100 kW) | $3.0 | $3.0 | $2.0 | $1.5 |
| Block Size | 2 MW | 5.5 MW | 12.5 MW | 30 MW |
| Maximum buy-down as % of installed cost | 60% | 50% | 40% | 30% |

While Class I technologies will compete against each other for funding, any single technology will be prevented from capturing more than half of the funds available under the program in any given year. In addition to the buy-down incentive, the budget will support public awareness and outreach, target marketing, market facilitation, market analysis, program development and planning, and monitoring and evaluation. All projects must be installed in New Jersey.

In order to get the customer-sited buy-down program up and running as soon as possible, the BPU named the utilities as interim administrators for the first year (subject to strict BPU oversight). During this time, the BPU will retain a consultant to identify an independent system administrator (ISA) capable of taking over program administration in the second year and thereafter. The consultant must make its recommendations to the BPU within 90 days of the completion of the first full program year, after which the BPU will have 30 days to act.

The **grid supply program** will be administered by the BPU in consultation with the DEP. The Order gives the BPU and DEP sixty days to come up with a detailed funding plan; while no details have yet been released, the Order states that this program will include a production credit awarded on a competitive basis, which is likely to resemble the competitive auction of a fixed, five-year stream of ¢/kWh premium payments outlined in the NRDC/Utility proposal. Both cost and technological diversity will be considered in awarding funding. The BPU will allow SBC funds to support grid supply projects used for RPS compliance, but will revisit this decision after one year. The customer credit program outlined in the Ratepayer proposal will not be implemented at this time, but may be considered in the future.

The BPU and DEP will also administer the **market development program**, which will command about 5.5% of the renewable energy budget each year. The BPU has adopted the proposed NRDC/Utility programs, which include resource assessment, market research, business planning/development assistance, financing assistance and facilitation, training, technology research, development and demonstration, and monitoring and evaluation. Additionally, $100,000 of market development funding will be used to develop a tracking system to support environmental disclosure and RPS compliance through the PJM Interconnection.

**Status and Results**

The customer-sited program is expected to be up and running by April 9 (further details will be available at www.njcleanenergy.com), and the BPU has until the end of April to issue specifics on the grid supply program.

## NEW MEXICO

### Background

The fifth largest state, New Mexico ranks 36th in terms of population size and 45th in terms of population density. A large supply of low-sulfur bituminous coal in the state means that most of the state's electricity – about 90% – comes from coal. Natural gas comprises most of the remainder, with very small amounts from oil and hydro. New Mexico has an excellent solar resource, a good wind resource in the eastern part of the state, and good geothermal resources suitable for both direct use and electric generation.

The New Mexico Electric Utility Industry Restructuring Act (SB 428) became law in 1999 (Laws of 1999, chapter 294). Residential, schools, and small businesses classes were scheduled to have retail access in 2001, followed by all other electricity consumers in 2002. In May 2000, citing technical and administrative difficulties, the New Mexico Public Regulation Commission (PRC) delayed retail choice for residential and small electric customers until January 1, 2002, and for large customers until July 1, 2002. Concerns over price spikes and supply problems in California have caused political leaders in New Mexico to delay retail competition even longer: on March 8, 2001, New Mexico's governor signed a law delaying retail competition and the SBC fund until 2007.

SB 428 established a system benefits charge, beginning when restructuring commences and continuing indefinitely, although SB 428 contemplates revisiting the level of support for renewable energy at some unspecified later date. Beginning in January 2002 (now 2007), the SBC charge was to be set at 0.03 cents/kWh on all retail electric sales in the state billed by public utilities, municipal utilities and distribution cooperative utilities. The charge increases to 0.06 cents/kWh in January 2007 (now 2012). Funding will amount to about $9.1 million annually, allocated as follows:

- $4 million to encourage the use of renewable energy, with funding recipients limited to public post-secondary educational institutions, school districts, and the governing bodies of cities, towns, counties, and villages.
- $4 million to develop electric service in Indian communities with limited or no current service. Eligible projects include those using renewable energy.
- $500,000 for consumer education and information.
- At least $500,000 for low-income energy assistance.
- $100,000 for fund administrative expenses.

Solar, wind, hydro, geothermal, landfill gas, biomass, and non-fossil fueled fuel cells are all eligible renewable energy technologies. Non-electrical renewable energy applications (e.g., solar hot water) are not eligible for funding, per SB 428. The New Mexico Environment Department (NMED) serves as the fund administrator.

### Funding Approaches

NMED is in the midst of a negotiated rulemaking session involving a task force of electric utilities, tribal organizations, consumer and environmental groups, and state and federal government representatives. A draft interim report on funding guidelines was released in

September 2000, providing an indication of how funds would be disbursed. Since SB 428 requires that SBC funds be returned to the state general fund if they are not spent by the end of the year, the task force has adopted the use of grants as the most expedient way to distribute funds. In addition to direct project funding, the interim report would allow reimbursement for the costs of preparing and submitting a grant application (up to 10% of total project costs). While acknowledging that such a practice is unusual, the task force is concerned that not reimbursing proposal preparation costs will decrease the number of grant applications. The September 2000 interim report also includes the following proposed ranking system for evaluating renewable energy grant applications (in the event that there are not sufficient funds available to fund all eligible projects):

- **Contribution to the knowledge and commercialization of renewable energy (45%).** Four factors make up this criterion: potential commercialization of renewable energy, technical feasibility, technical diversity, and education. The task force believes technical feasibility should rank highly, as it will have a direct impact on the success of the project. The task force mentions technical diversity to ensure that projects using different technologies will be supported. The other two factors were specifically referenced in SB 428.
- **Geographic location of the project (15%).** The task force interprets SB 428 as indicating that all areas of New Mexico should benefit equally.
- **Project cost and requested SBC contribution (40%).** The task force subdivided this criterion into project cost in relation to renewable energy production ($/kWh); financial and economic benefits; leveraging and cost share; quality of monitoring and verification plan; and environmental externalities, social benefits, and benefits to New Mexico. The task force stressed maximizing the financial leverage of the project in relation to the request for SBC funds, and the strength of project monitoring and evaluation.
- **For projects involving school districts, the number of students and their level of involvement (5%).** This category only applies to schools, and gives schools a chance of attaining a 105% rating. Priority would be given to student education and renewable energy projects, with line extension projects also being feasible.

A February 2001 update of the interim report, however, indicates that NMED has found these criteria to be too subjective (i.e., when sample projects were ranked, the projects that one would expect to rank highly did not), and as such, the criteria will most likely be revised. One idea is to internally prioritize the sub-categories; another is to focus more heavily on project economics, which should introduce more objectivity.

There are also other continuing concerns regarding the SBC fund. The first issue is the prohibition of non-electrical projects from funding eligibility. Solar hot water and space heating are viable technologies in New Mexico, and the task force would like to see such non-electrical applications included. Second, there is some uncertainty about whether Indian communities can apply for funds from the renewable energy account, or whether they are limited to the $4 million specifically earmarked for Indian communities. The current view is that Indian communities are restricted to their own $4 million allocation. Due to the delay in restructuring, these issues may be addressed during a later legislative session.

The task force has also been interested in adding provisions to ensure the success of the projects funded by the SBC. One proposal that has been considered is to hold back 10% of the

final reimbursement for a period of time to ensure that projects remains in operation. Another issue is with the limited warranty for some renewable energy equipment, and the concern that SBC applicants will have maintenance costs after their SBC funding is exhausted. One possible solution being considered is to require a 50% match of funds or a 10-year maintenance proposal, although the latter is viewed as potentially overly expensive. The task force also wants to provide education on the application process and is considering asking non-profit groups to handle this responsibility.

**Status and Results**

Even with the latest restructuring delay and the subsequent delay of SBC funding until 2007, the current rulemaking session will continue, with taskforce meetings and the formal rulemaking process. NMED hopes to have the regulations completed by late 2001.

## NEW YORK

### Background

New York is the third most populous state in the nation, and ranks eighth in terms of both population density and residential electricity sales. New York's generation base is diverse, with nuclear, hydro, coal, and gas each comprising a relatively equal portion of total generation (20-25% each) and with oil coming in slightly lower at around 12%. Non-hydro renewable generation has historically been limited: about 1 MW of PV, 39 MW of landfill gas, 167 MW of biomass, and 264 MW of municipal solid waste. The state has significant hydro potential (already being widely utilized), good wind potential (Class 4 and higher) in the Catskill and Adirondack Mountains, significant biomass and landfill gas potential, and a relatively poor solar resource.

New York is one of the few states undergoing electricity restructuring by regulatory order rather than legislation. Opinion No. 96-12 required each of the state's electric utilities to file restructuring plans with the Public Service Commission (PSC) by October 1996[80], and established a system benefits charge (SBC) to fund public benefit programs during the transition to fully competitive markets (retail access is being phased in through 2002). In July of 1998 the PSC, through Case 94-E-0952, approved the SBC in its initial form: a 3-year program administered by the New York State Energy Research and Development Authority (NYSERDA) to support energy efficiency, low-income assistance, and R&D (including renewables and environmental research). The total size of this fund is $234 million over the 3-year period from July 1, 1998 to June 30, 2001. Utilities will transfer roughly $177 million to NYSERDA over this period for statewide programs, and will retain the remaining $58 million to fund their own programs. Only $12.7 million of NYSERDA's $177 million will go to support renewables. In addition, Niagara Mohawk, the only New York investor-owned utility with a significant renewable energy program, will provide about $4 million to fund renewables, bringing total renewables support to about $17 million over three years.[81]

The only New York utility not covered by the restructuring settlement agreements – the Long Island Lighting Company – was partially acquired by the Long Island Power Authority (LIPA), which in May 1999 established its own clean energy fund to support energy efficiency, clean distributed energy, and renewable energy technologies. The size of the fund is estimated to be $32 million over the five-year period from 1999 through 2003.

In January of 2001, citing the slow development of workably competitive electric markets, the remaining barriers to the market provision of public benefit programs, and the need for electric load reduction programs, the PSC extended the SBC for five years, running through June 2006. The PSC also significantly increased SBC funding to $150 million annually. NYSERDA must conduct detailed program evaluations in December 2002 and December 2004, the last of which will help decide whether the SBC should be extended again.

The PSC extension order increased annual funding for renewables to $14 million, with a substantial portion of funding dedicated to large-scale wind development. The order further indicated that spending on smaller distributed wind projects receive a "significant increase in

[80] The PSC approved settlement agreements between the utilities and interested parties for six of the state's seven investor-owned utilities (IOUs) in late 1997 and early 1998, the exception being the Long Island Lighting Company (LILCO).

[81] NYSERDA and Niagara Mohawk reached an agreement in April 1998 to coordinate their renewables programs.

spending". The PSC also expects NYSERDA to encourage "the development and stimulation of green energy markets."

**Funding Approaches**

*NYSERDA*

NYSERDA manages the SBC funds under the New York Energy $mart program, which supports PV, wind, and biomass. Using targeted solicitations, NYSERDA distributes funds mainly as competitive grants with performance incentives.[82] All projects require a minimum of 50% co-funding. The original goal for the program was to develop (in combination with Niagara Mohawk's programs) 10 MW of wind and 1.6 MW of PV statewide.

*LIPA*

LIPA is running the Solar Pioneer Program, a PV buy-down of $3/Watt for up to 30% of the installed cost of a pre-certified system, combined with a financing option that buys down loan interest rates to 6%. Systems are sized between 250 W and 10 kW, and are installed with net metering capability. Marketed as a complete package, the Solar Pioneer Program also calls attention to a New York state tax credit of 25% of total installed costs (up to $3,750).

**Status and Results**

Now almost three years into the program, NYSERDA has distributed the bulk of its initial funds and initiated some interesting projects.

*Wind*

The New York Energy $mart program has far exceeded its goal of 10 MW of wind development. One of NYSERDA's first solicitations was for partial funding (up to $6 million) of at least 4 MW of utility-scale wind power in New York. NYSERDA recently approved an additional $3 million for the support of wind development under this program. With this recent addition, NYSERDA funding in the amount of $9 million, combined with private sector co-funding, will be supporting the development of three wind farms with an expected combined capacity of 51.5 MW. [83] In addition, Niagara Mohawk has funded the construction of a 6.6 MW wind farm using $4 million of its own SBC funds. A $1.3 million solicitation for "high-value" wind and PV projects[84] was issued in the spring of 2000, and $600,000 has been approved to fund six wind prospecting contracts to determine suitable wind sites in the state. Two R&D projects in support of wind – one studying transmission access issues and the other creating a wind map for New York – have also been funded.[85]

NYSERDA has remained flexible in its funding approach, allowing it to respond to evolving market needs. For example, upon realizing that there was a greater interest in

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[82] NYSERDA has also recently announced a loan program to assist renewable energy financing (see PV section of "Status and Results").

[83] The 11.5 MW Madison wind farm became operational in October 2000. With increased NYSERDA and private sector funding, the Fenner wind farm is now expected to increase in size from 12 MW to 30 MW, and to be on-line by the end of 2001. Another 10 MW wind project is in the negotiation stage.

[84] NYSERDA defines "high-value" as "where the intrinsic benefits of photovoltaic and/or wind power generation systems justify their installation over other energy sources," such as where grid electricity is limited or unavailable.

[85] The wind map is complete. See http://www.truewind.com/Pages/page5nywindmap.html.

developing New York's wind resource than it had originally anticipated, NYSERDA adapted its original funding plan to include the wind prospecting study, wind resource map, and transmission access study. These three projects will help to mitigate some of the early development risk facing wind developers in the state.

*PV*

To date, NYSERDA has funded more than 1 MW of PV in total, targeting several different applications through separate solicitations for residential, commercial rooftop, building-integrated PV (BIPV), and "high-value" systems. In 1999, NYSERDA funded 3 PV suppliers with a total of $1.25 million to develop distribution channels allowing them to market residential grid-tied PV systems directly to consumers.[86] With contractor co-funding and additional DOE funds, a total of about $5 million will go into this project, with a goal of installing 300 residential PV systems throughout the state. To reduce the cost of financing these systems, NYSERDA has also recently announced the formation of an innovative loan program, in which it purchases certificates of deposit from local lenders and then foregoes a portion of the interest in order to buy down the loan rate by 4.5%. NYSERDA has $8.8 million to spend on this program, and will buy down loans as large as $500,000 for up to five years.[87]

Another $2.1 million solicitation targeted PV systems of 40 kW or more on commercial buildings; five companies have been selected to install over 600 kW of PV on 11 buildings throughout the state. By requiring solicitation respondents to have already identified sites, NYSERDA has greatly increased the likelihood that these projects will actually be built. NYSERDA also contributed $250,000 towards the installation of a BIPV system at a new building for the New York Department of Environmental Conservation, and has provided $600,000 to New York City for two BIPV projects, including one currently under negotiation at the White Hall Ferry Terminal. All told, about 781 kW of building-integrated PV capacity should result from these projects, more than five times the original goal.

Finally, the $1.3 million "high-value" solicitation described above for wind supports PV as well, and will most likely support off-grid and dedicated load on-grid PV applications. As of February 2001, four projects had been selected, some of which include PV applications.

In addition, LIPA has installed free PV systems, won through a lottery, on 30 homes on Long Island. The purpose of the lottery was to spread the word about and create interest in the Solar Pioneer Program. In the year since the lottery, the program has reportedly seen only a few additional installations.

*Biomass*

With the advent of restructuring, Niagara Mohawk has withdrawn some of its financial support of the short rotation willow cropping project undertaken by the Salix Consortium. SBC funds of $878,000 have been used to fill this gap. A goal of NYSERDA and the Salix Consortium is to bring 800 acres of willow into production for eventual co-firing with coal. As

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[86] NYSERDA left its requirements for this program somewhat open-ended in order to encourage creativity on the part of respondents. For example, Astropower, one of the three contractors selected, is using a good portion of its funds to support a public education initiative, which will benefit the entire market. NYSERDA's approach is to help companies and markets succeed; one way to do this is to tap into the expertise of RFP respondents by allowing them to identify and propose what they see as the best use of funds to create a sustainable market.

[87] The loan program is not limited to residential PV systems, but has been marketed in conjunction with the residential PV projects. The loan program will also support solar hot water, solar space heating, and wind, as well as efficiency improvements.

of the end of 2000, 14 landowners were participating with 500 acres planted; another 200 acres at six additional sites were added during 2000. Currently, about 600 acres are in production; some acreage was lost during the 1999 drought. The project has been delayed somewhat by Niagara Mohawk's sale of the targeted coal plant, and having to renegotiate a new agreement with NRG Energy, the new plant owner.

*Renewable Energy Marketing*

The competitive retail market for renewable energy has been notably absent from NYSERDA's programmatic repertoire, in part because retail access is not yet widespread in New York, and in part because NYSERDA made a conscious decision to initially focus on the supply side of the market, leaving the demand side for future funding rounds (assuming that the SBC would be extended). NYSERDA's goals for the initial round were to develop the PV dealer/installer infrastructure and to build several wind farms in New York; they have been successful in these endeavors. With SBC funding extended through 2006, the retail market for renewable energy may be more heavily targeted in the next round of programmatic activity.

# OHIO

## Background

Ohio is the seventh most populous state and the fourth largest state in terms of electricity sales. The state is heavily industrialized, with 46% of all retail electric sales in Ohio going to the industrial sector. Coal accounts for 90% of the state's utility generation, followed by nuclear at 9% and much smaller amounts of hydro, gas and oil. Ohio's renewable resource base is fairly limited, with biomass (both energy crops and landfill gas) being perhaps the most viable option.

Ohio opened its electric market to retail competition in January 2001, the result of Senate Bill 3 that passed in July 1999. SB3 established the Energy Efficiency Revolving Loan Fund (EERLF), financed through a temporary rider on retail electric distribution service rates that will be collected for 10 years or until the fund reaches $100 million (including interest), whichever comes first. Annual collections shall not exceed $15 million through 2005, and $5 million after 2005. The Ohio Department of Development (ODOD) will manage the EERLF.

## Funding Approaches

Despite the fund's name, ODOD believes that SB3 allows the fund to support renewable energy as well as energy efficiency. The EERLF may provide low-interest loans, loan guarantees, and deposits linked to loans. SB3 dictates that funding assistance should be spread among the service territories of distribution utilities, participating electric cooperatives, and participating municipal electric utilities in amounts proportional to the funding contributions of each utility and cooperative. SB 3 also specifies that projects must meet the following criteria in order to receive financial assistance:

- The project must be an investment in products, technologies, or services, including energy efficiency for low-income housing, for customers of distribution utilities or participating rural electric cooperatives in Ohio.
- The project must improve energy efficiency in a cost-efficient manner both by adhering to national, federal, or other product standards and by using best practices for technology, products, or services in the context of the total facility or building.
- The project must provide economic and environmental benefits to Ohio citizens.
- The project's receipt of financial assistance should be a major determining factor in the decision to proceed with the project.

## Status and Results

ODOD staff are designing application procedures for financial assistance and the terms and conditions of loans, loan guarantees, and linked deposits. They are also developing criteria pertaining to the eligibility of participating lending institutions and other implementation issues. Spring 2001 will be used to develop the rules and program materials, and the staff hopes to begin funding renewable energy projects in the middle of 2001.

## OREGON

### Background

Though it is the tenth largest state in the U.S., Oregon ranks closer to the middle of the pack in terms of population (28th) and residential electricity sales (25th). Approximately 85% of Oregon's electricity generation comes from hydropower, with about another 7.5% each from coal and gas.[88] Oregon's wind resource is strong, as is its biomass potential. Oregon's landfill gas development and potential are limited, but have not been fully exploited, and its solar resource is relatively poor.

Senate Bill 1149 became law in July 1999, paving the way for the restructuring of Oregon's electricity industry by October 2001, when large commercial and industrial customers of Portland General Electric (PGE) and PacifiCorp, the state's two largest investor-owned utilities, will be granted direct access.[89] Small commercial and residential customers will remain within a regulated structure and not gain direct access, but instead will be offered a portfolio of different rate plans, including at least a standard cost-of-service rate, a market-based rate, and an environmental rate plan that includes some portion of renewable energy. By January 2003 the PUC must report to the legislature about whether residential customers would benefit from direct access.

SB 1149 also requires utilities offering customer choice to collect a system benefits charge (SBC) equal to 3% of their total revenue from electricity sales for a period of 10 years.[90] The total fund size (assuming only PGE and PacifiCorp allow direct access) is estimated to be about $50 million per year. The first 10% of collected funds are to be allocated directly to education service districts to help schools conduct energy audits, implement weatherization and energy efficiency projects, administer energy conservation education programs, and invest in renewable energy resources. The remaining 90% of SBC funds (~$45 million) are to be allocated as follows: 63% for new cost-effective conservation and market transformation, 19% for the above-market costs of new renewable energy, 13% for new low-income weatherization, and 5% to the Housing and Community Services Department Revolving Account. Thus, roughly $8.6 million per year will be available for 10 years to fund the above-market costs of new renewable energy. Of this $8.6 million, about $1.5 million can be self-directed by large industrial customers that have direct access to the market.[91] The PUC is charged with administering the central fund for all other customers, but as will be discussed below the PUC plans to outsource most administrative functions to a new, non-profit organization.

Eligible renewable resources are defined by SB 1149 to include wind, waste, solar, geothermal, dedicated energy crops, landfill and digester gas, hydro facilities located outside of

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[88] Given that the seasonal nature of Oregon's hydropower production does not match up well with its load, historically a significant amount of Oregon's hydropower has been sold into California during the summer, and then Oregon has imported fossil fuel fired generation in the winter, when its load is heaviest. As a result, Oregon's historic annual electricity consumption is much different than its generation profile: only about 50% of demand is met by hydropower, and as much as 40% comes from coal and oil.

[89] Publicly owned utilities and electric cooperatives have the choice of whether to allow direct access for their large C&I customers.

[90] Oregon's large aluminum smelters are required to pay only a 1% SBC (instead of the normal 3%).

[91] The legislation permits commercial or industrial customers with an electrical load of more than 1 average MW to self-direct their SBC spending; in this case, no more than 68% of the annual SBC may be self-directed towards conservation, and no more than 19% may fund the above-market costs of new renewables.

federally protected areas, and low-emission nontoxic biomass based on solid organic fuels from wood, forest and field residues. To qualify as a "new" renewable energy resource, facilities must not have been operational prior to the effective date of SB 1149 (July 23, 1999).

**Funding Approaches**

In February 2000, the PUC concluded that a nonprofit organization would be best suited to administer the conservation and renewable energy portions of the SBC fund, and initiated the process of establishing a new organization to fulfill these duties. After a lengthy public process involving multiple stakeholders, PUC staff released a draft white paper in July 2000 proposing the purpose and structure of the new organization, broad guidelines for how it would operate, and bylaws to govern it. Comments on the draft white paper were solicited at a July 20 public workshop (see below), and the PUC expected to approve the non-profit concept and have a board of directors in place by early 2001.

The white paper was not prescriptive in how the nonprofit should administer the fund, leaving such decisions up to the nonprofit's board of directors. The white paper does require the formation of two advisory committees – one for conservation and one for renewable resources – to advise the board of directors in the development of a strategic plan and to advise the staff of the nonprofit in the implementation of the plan. It also states that public purpose funding will be competitively bid except when there are circumstances warranting an alternative approach.[92]

**Status and Results**

Comments on the draft white paper were due by July 31, 2000. Based on comments received, most stakeholders were generally in favor of the white paper's proposals, though several were concerned with the degree of latitude granted to the nonprofit administrator's board of directors, as well as its relationship with, and potential lack of accountability to, the PUC. Others were concerned that the white paper did not go far enough towards stressing the goal of achieving a competitive, sustainable renewable energy market at the end of the ten-year funding period. Still others were uncomfortable with the nonprofit administrator's ability to seek funds from sources other than the SBC, and to use those funds for activities that fall outside the provisions of SB 1149.

Nevertheless, the Oregon PUC approved the establishment of a quasi-independent nonprofit administrator in October 2000, and in February 2001 approved an eight-member board. The new board will take up incorporation and bylaws, and then work on a strategic plan during the first half of 2001 in preparation for the inception of funding in October 2001. Preliminary programmatic ideas being discussed include offering a customer credit-type incentive to those customers signing up for the environmental offerings that will be among the mandated portfolio of residential rate plans starting in October 2001. With wholesale market prices more volatile than expected, there is also some discussion of whether to allow non-residential customers that do not choose competitive suppliers, but want to buy renewable

[92] At least one of the stakeholders working with the PUC (the Renewable Northwest Project - RNP) would like to see the nonprofit organization take on a market transformation role, with the goal of creating a sustainable renewable energy market by the end of the fund's legislated ten-year period. To accomplish this, RNP believes that the organization would need to be achievement-oriented, focusing more heavily on results than on spending, and it would require a strong board of directors and an expert staff free from the micro-management of the PUC.

energy, access to the environmental portfolio options and the proposed customer credit. Finally, with substantial amounts of wind energy planned for the Northwest even in the absence of state SBC support,[93] Oregon's SBC fund may well focus more on customer-sited programs than on large wind projects.

[93] The first two months of 2001 saw the announcement of a 300 MW stateline (Oregon/Washington) wind project and the BPA's solicitation for up to 1000 MW of new wind capacity.

## PENNSYLVANIA

### Background

Pennsylvania is the sixth most populous state in the nation, and ranks seventh in terms of residential electricity sales. Traditionally considered to be coal country – 58% of electricity generation is from coal-fired power plants (with another 36% from nuclear) – Pennsylvania also has a promising renewable resource base. Many ridges along the Appalachian and Allegheny mountains harbor Class 4 wind sites, widespread agricultural lands could be utilized for biomass production, the Pennsylvania Department of Environmental Protection has identified sixteen untapped landfills suitable for electricity generation from landfill gas, and a large number of existing dams on small streams could potentially be retrofitted for small hydro generation. Pennsylvania does not have a strong solar resource in terms of average insolation, though PV generation may match load curves quite closely (particularly in the more-populated eastern portion of the state), resulting in a relatively high effective load carrying capacity (ELCC). Despite its resource potential, Pennsylvania currently receives only a minute fraction of its electricity from renewables: hydro contributes about 1% of generation, and "other" (which includes municipal solid waste incineration) accounts for another 1%.

Pennsylvania was the fourth state to open its retail electricity markets to competition, with retail access phased in starting January 1999 and completed January 2000. With default service rates well above wholesale power costs as the market opened, customers and energy service providers took advantage of significant opportunities for savings, quickly making Pennsylvania the most vigorous competitive market to date, with about 10% of residential customers switching suppliers.

The state's restructuring legislation – H.B. 1509 – offers limited guidance on system benefits charges to fund public purpose programs such as renewable energy, stating only that those programs that are in existence at the time of the legislation shall, at a minimum, continue to be funded at existing levels. Details concerning the administration of such programs were left to be determined in each utility's restructuring settlement with the PUC. As a result, four separate funds[94] to support renewable energy development (collectively called the "sustainable energy fund") are now in existence in the service territories of PECO (a lump sum of $13.5 million through 2006)[95], PP&L (~$3.5 million per year through 2004), MetEd and Penelec (both subsidiaries of GPU, with a combined lump sum funding of roughly $12.1 million through 2004, with the MetEd portion representing $5.7 million and Penelec totaling $6.4 million), and West Penn/Allegheny Power (a lump sum of approximately $11.4 million through 2005).[96] These

[94] In July 1999 the PUC issued an order calling for a nine-member statewide oversight board (comprised of a representative from the PUC, the Pennsylvania Department of Environmental Protection, the Pennsylvania Department of Community and Economic Development, the Pennsylvania Office of Consumer Advocate, the Pennsylvania Environmental Council, and each of the four regional sustainable energy funds) to explore the possibility of setting up a coordinated statewide Sustainable Energy Fund, perhaps funded by the four regional funds. The advisory board is currently developing a business plan for the proposed statewide fund.

[95] Another $1.6 million per year – the other half of the 0.01¢/kWh charge assessed to customers in PECO's service territory – goes to the Delaware Valley Regional Economic Development Fund (DVREDF) to support economic development projects that have an employment impact. In addition, the PECO fund has received an infusion of $18.5 million over five years resulting from the PECO/Unicom merger settlement.

[96] The restructuring settlements also place a renewable energy requirement on the competitive default service provider (i.e., the entity serving as provider of last resort) in these four service territories.

funding amounts are guaranteed through the dates indicated; after that funding will continue with an SBC of 0.01¢/kWh (0.005 cents/kWh for PECO) applied to electric rates unless changed or eliminated in a rate case. In addition, another $18.5 million ($12 million for wind development, $4 million for PV development, and $2.5 million for consumer education) is to be added to PECO's fund over the next five years as a result of concessions gained through negotiations surrounding the PECO/Unicom merger.

In addition to these four sustainable energy funds, the final restructuring orders also included a separate renewable energy pilot program in each of the above service territories plus that of the Duquesne Light Company. Established as part of each utility's universal service and low-income assistance programs, the pilot program is funded at a combined $3.9 million over two years (originally scheduled for 1999-2000), and will support the installation of PV and solar hot water systems for low-income customers. The programs are now scheduled to be in operation in 2001 and 2002.

**Funding Approaches**

Only PECO's final restructuring order specifically designated a program administrator for its portion of the sustainable energy fund; the other three settlements left it up to the required board of directors to pick a fund manager. While the PUC approved the boards of all funds in the summer of 1999, it wasn't until the spring of 2000 that they approved the by-laws of the three non-PECO funds. Since approved bylaws are required before a fund manager can be selected and funds can be released, most of the non-PECO funds are just now getting underway, and PECO's fund has been the most active so far.

*The Sustainable Development Fund (SDF)*

PECO's restructuring settlement with the PUC designated the Delaware Valley Community Reinvestment Fund, more recently re-named The Reinvestment Fund (TRF), as manager of PECO's portion of the sustainable energy fund. TRF began managing what it calls the Sustainable Development Fund (SDF) in 1999. The SDF's mission is to promote the use of renewable energy, advanced clean energy technologies (e.g., fuel cells, flywheels, microturbines), energy conservation, and energy efficiency among residential, commercial, institutional and industrial customers in PECO's service territory, and to promote the start-up, attraction, expansion and retention of sustainable energy businesses within PECO's service territory (PECO's service territory is the southeastern corner of the state, including Philadelphia).[97]

The size of the fund, financed via a 0.005¢/kWh charge on customers within PECO's service territory, will be roughly $1.6 million per year.[98] The SDF intends to raise additional private capital sufficient to allow the fund to have a significant and sustained impact throughout the region. And, as mentioned above, the SDF received an additional injection of over $18.5 million from the PECO/Unicom merger settlement: $12 million for new wind development, $4

[97] See www.trfund.com/sdf

[98] With the merger of PECO and Unicom, the fund was paid a lump sum of $13.5 million (not including $18.5 million specifically earmarked for wind, PV, and consumer education) that equates to collecting the 0.005¢/kWh charge through 2006.

million for PV installations, and $2.5 for educating the public about the benefits of renewable energy.[99]

The SDF's funding approach will be business-like, yet flexible and entrepreneurial enough to meet customers' needs. Most projects will be financed in one the following three ways: commercial loans, near equity (including subordinated debt and royalty financing), and equity. The SDF also offers a limited number of small grants for sustainable energy business start-up and planning and green building design, though such grants are not a major focus of the program, which hopes to earn at least a modest return from its financial products and to become self-sustaining over time. In addition, the SDF offers technical assistance through a referral network.

In the early years of the fund, roughly twice as much is budgeted for energy efficiency as is for renewable energy, reflecting a reality facing the fund – investment opportunities in efficiency are simply easier to find in the near term. While the SDF may be front-loading efficiency, over the long term it plans to allocate most of the fund towards renewable energy, as more deals enter the pipeline.

*GPU Sustainable Energy Fund*

The purpose of the GPU Energy Sustainable Energy Fund is to promote the development and use of renewable energy and clean energy technologies, energy conservation and efficiency, sustainable energy businesses, and projects such as restoring watersheds and abandoned mine sites that improve the environment in GPU's service territories. The Community Foundation for the Alleghenies is the fund administrator for the Penelec service territory; the Berks County Community Foundation administers the fund for the MetEd service territory. Both administrators are operating under the same funding approach and guidelines.

The majority of funding (about $4 million in each fund) will be invested in the form of loans or equity in businesses that are pursuing one or more of the fund's goals. Up to $500,000 may be invested per project, although the fund reserves the right to depart from that guideline. Eligible renewable energy technologies include wind, solar, biomass, methane, and hydro; both small-scale (for on-site consumption) and large grid-connected projects will be considered. The fund will also consider investing in the development of sustainable energy technologies (such as solar panel manufacturing), businesses that use renewable energy (such as wind power to drive equipment), and businesses that improve energy efficiency and conservation (such as recycling).

About $2 million in grants will also be available for educating electric consumers about renewable energy and energy conservation, improving the environment related to the company's transmission and distribution facilities, and conducting resource and feasibility studies of established and developing technologies (e.g., wind resource studies). Grants for feasibility studies are limited to $25,000 per applicant.

*PP&L Sustainable Energy Fund of Central Eastern Pennsylvania*

The Sustainable Energy Fund of Central Eastern Pennsylvania's objectives are to promote the development and use of renewable energy and advanced clean energy technologies, energy conservation and efficiency, and sustainable energy businesses. The fund is financed by a 0.01¢/kWh assessment in PP&L T&D rates, guaranteed through 2004 and until T&D rates are changed thereafter. The estimated receipts were $3.3 million in 1999, growing with increased

[99] In addition, the PECO/Unicom settlement provides a grant of $3.5 million directly to Community Energy, a company marketing blocks of wind power to commercial customers in Philadelphia.

sales to an estimated $20.5 million accumulation over six years. The fund will finance investments and projects with a mix of commercial loans, subordinated debt, royalty financing, equity investments, and grants.

*West Penn/Allegheny Power Sustainable Energy Fund*

The West Penn Power Sustainable Energy Fund has commissioned Penn State University to help it develop a funding plan. No details are available at this time.

*Renewable Energy Pilot Programs*

This combined fund of $3.9 million over two years (spread over five different service territories) will go entirely to helping low income customers install solar hot water and PV systems. The one exception comes from West Penn's service territory, where small wind is seen as a viable option and is therefore also included as an eligible technology.

**Status and Results**

*The Sustainable Development Fund (SDF)*

The SDF has invested almost $2.1 million through November 2000, with $1.87 million in loans and near equity deals, and $215,000 in ten grants. Its first two investments, made in December 1999 shortly after the PUC approved its bylaws, were to a developer of twelve affordable solar townhouses in West Philadelphia. A commercial loan of $250,000 and a grant of $46,759 support the townhouses, which feature passive solar design and solar hot water and PV systems.

In 2000, the SDF invested in the Community Energy/Energy Unlimited venture, in which Community Energy markets wind power from an Energy Unlimited wind farm in the Pocono Mountains (i.e., outside of PECO service territory) to commercial customers in the Philadelphia area. Energy Unlimited received $250,000 in subordinated debt financing as reimbursement for development expenses incurred during its pilot phase (Phase I), while Community Energy received a grant of $22,650 to help them develop a business plan.[100] This joint venture is a good example of a program focused on both the supply and demand sides of the retail market for renewable energy. Programs such as these that simultaneously link the supply and demand sides of the market may be particularly valuable in creating a sustainable market.

The Community Energy/Energy Unlimited partnership also demonstrates how restricting a fund's scope to within a specific geographical region can limit funding opportunities. PECO's service territory, for example, has a relatively poor wind resource (Class 2) and a relatively high population density, severely limiting investment opportunities in wind development. Like the CCEF in Connecticut, however, the SDF is allowed to invest outside of PECO's service territory as long as it can demonstrate that its investments benefit PECO ratepayers. Without this degree of flexibility, the SDF would have been unable to invest in this promising wind partnership (and most likely in wind development in general).

Other investments in 2000 include a $70,000 secured term loan to finance the installation of a geothermal heating and cooling system at a manufacturing facility, a $50,000 secured term loan to a manufacturer of PV-powered traffic control signs, a $250,000 subordinated convertible note to a company providing internet-based energy efficiency services to commercial real estate

[100] Energy Unlimited and the SDF have had preliminary discussions concerning investment in a Phase II expansion of 15-20 MW.

owners, and a $250,000 secured term loan to help a manufacturer of point-of-purchase signs to upgrade the efficiency of its production equipment. A handful of small grants – most focused on energy efficiency and green buildings – round out the SDF's investment activities.

Other activities have included setting up strategic alliances and establishing loan programs. For example, in response to seeing a significant number of financing requests coming from start-up, early stage, and "virtual" companies during its first six months of operations, the SDF has taken steps to better address the needs of such businesses, who would otherwise find it difficult to secure funding. Specifically, the SDF has been working with Ben Franklin Technology Partners (BFTP) to develop the Energy Technology Innovation Fund (ETIF), which, upon a successful due diligence review drawing upon BFTP's expertise in that area, will provide royalty financing, subordinated debt, or equity financing to the applicant.

The SDF has also partnered with the Philadelphia Industrial Development Corporation (PIDC) to send out letters marketing SDF's flexible energy loan product to 130 pre-screened PIDC portfolio companies. The initial response was strong, resulting in many leads and one loan commitment (to the point-of-purchase sign printer mentioned above) after just one month.

Through the Solar/Energy Star® Consumer Loan program, the SDF will fund no-hassle, unsecured consumer loans to finance the purchase and installation of PV, solar hot water, fuel cell, and geothermal systems, as well as energy efficiency upgrades. This program addresses a commonly-cited barrier to customer-sited renewable energy development – a dearth of financing options. The SDF has teamed up with another financial institution that will originate and administer the consumer loans on behalf of the SDF. The SDF has a commercial version of this program as well, which features low-interest loans to businesses purchasing or manufacturing renewable energy technologies.

The SDF has also recently announced plans to distribute the first $6 million of the $12 million in dedicated wind funds resulting from the PECO/Unicom merger (i.e., Phase I of the Pennsylvania Wind Development Program). In late 2000 the SDF issued a competitive solicitation for new wind power, promising $6 million in the form of 5-year production incentives capped at 1.5 cents/kWh.[101] After consulting with the winning bidders, however, the SDF determined that it could increase its leverage – and the number of MW installed – by instead effectively providing a lump sum payment (contingent on production) payable upon the commercial operation of each project. Projects are assumed to "earn" this grant over time through a 1.5 cent/kWh incentive up to the aggregate grant level. Project performance is secured by a letter of credit. If projects do not "earn" their grant due to systematic under-performance, the Sustainable Development Fund has the ability – through the letter of credit – to take funds back from the project. If one assumes that the wind developer's cost of capital exceeds the SDF's opportunity cost of capital by 10%, it can be shown that this up-front lump sum approach boosts the incentive's leverage by 22% compared to a production incentive distributed over 5-years. If the cost of capital differential is 5%, an 11% leverage boost could be expected. Two projects, totaling 67 MW, were announced as winners of the solicitation in early 2001.

Finally, the SDF is considering a leasing program to distribute the $4 million in settlement funds from the PECO/Unicom merger that are specifically earmarked for PV support. Leasing programs remove perhaps the greatest barrier to PV adoption – high up front costs – and may also reduce any potential anxiety a homeowner might have over system performance or

[101] A production incentive is generally inconsistent with the SDF's community-based investment approach, but was adopted in this case due to the specific nature of the funds (resulting from the PECO/Unicom merger settlement) and the sense of urgency created by the slated expiration of the federal production tax credit at the end of 2001.

maintenance, or having to move before the system pays for itself. A leasing arrangement could also reduce the costs of PV if the leasing company is be able to take advantage of bulk equipment purchases, federal five-year accelerated depreciation, the federal 10% business energy tax credit, and long-term financing.

*GPU Sustainable Energy Fund*

The Penelec portion of the fund recently invested $200,000 in the Goodwill Industries of Comenaugh Valley recycling project in Johnstown, and as of early 2001 is considering other possible investments, including geothermal heat pumps and a letter of credit to a proposed wind project that would later be converted into a low-interest loan. The MetEd portion of the fund will announce its first investments in spring 2001.

*PP&L Sustainable Energy Fund of Central Eastern Pennsylvania*

At a meeting in November 2000, the board of directors approved the following investments:

- A $20,000 grant to the city of Allentown to buy control systems for using microturbines to generate power from methane at a sewage treatment digester plant.
- A $100,000 loan to Energy Unlimited to secure a land lease at a potential wind project site.
- $150,000 royalty financing for Community Energy to hire two sales representatives in order to build commercial and industrial demand for retail renewable energy products.
- A $500,000 equity investment in Powerweb Technologies, a company focusing on internet-delivered load management applications. This is a joint investment with the SDF.

*Renewable Energy Pilot Programs*

Originally scheduled for implementation in 1999 and 2000, the Renewable Energy Pilot Programs still have not quite gotten off the ground. PECO originally embarked upon a proposal involving PV-powered security lighting, which renewable energy advocates rejected as not being in the spirit of compliance, and which the PUC had not approved. In response, the PUC drafted and approved generic program guidelines in April 2000. Utility proposals must abide by the new guidelines, and programs will only be implemented after receiving public comments and obtaining PUC approval. Programs are now slated to be up and running in 2001 and 2002. Preliminary budgeting indicates that all programs will fund PV and solar hot water roughly at parity during the first year of the program (with PV having a slight edge in four of the five service territories); in the second year of the program, solar hot water funding will not change, while PV funding will more than double.

## RHODE ISLAND

### Background

Rhode Island is the smallest state in the nation (geographically), and the second most densely populated. Rhode Island ranks 43rd in terms of the size of its population, and 47th in terms of residential electricity sales. Rhode Island's electricity generation, consisting primarily of natural gas-fired facilities, is relatively clean by northeastern standards. Rhode Island's renewable resource base, however, is relatively limited. Renewable resources account for about 22 MW of electrical generation in Rhode Island, with the majority of this (about 15 MW) coming from landfill gas, and most of the rest from hydro.

The Rhode Island Utility Restructuring Act of 1996 requires Rhode Island electric utilities to collect, starting on January 1, 1997 and lasting for five years, a system benefits charge of 2.3 mills per kWh to fund demand-side management (DSM) and renewable energy projects. The Act gives the Rhode Island Public Utilities Commission (RIPUC) responsibility for approving the allocation of the approximately $17 million per year in funds generated by this charge between DSM and renewable energy projects. The RIPUC subsequently decided to convene a multi-stakeholder group that would identify, develop, and implement programs for the renewable energy portion of the SBC funds (subject to RIPUC approval), and created the Rhode Island Renewable Energy Collaborative (RIREC) to fill this role. RIREC is composed of representatives of Narragansett Electric, Pascoag Fire District (the state's only municipal utility), the Division of Public Utilities and Carriers, the Conservation Law Foundation, the Rhode Island State Energy Office, and The Energy Council of Rhode Island. Spending on renewables has typically amounted to about $2 million per year. Rhode Island's SBC funding is slated to expire at the end of 2001, though a bill currently before the legislature would extend the fund for another five years.

The Act defines renewable energy resources to mean "power generation technologies that produce electricity from wind energy, small scale (less than 100 megawatts) hydropower plants that do not require the construction of new dams, solar energy, and sustainably managed biomass. Fuel cells may be considered an energy efficiency technology to be included in demand-side management programs." In practice, RIREC has addressed fuel cell funding alongside renewables programs, as fuel cells have more in common conceptually and programmatically with renewable generation than with DSM.

### Funding Approaches

To date, through a series of competitive RFPs, RIREC has dedicated funds or effort towards program development studies, photovoltaic installations (residential, commercial, and outdoor lighting), wind power site prospecting and project funding, fuel cell installations, landfill gas development, and a green campus study. Details on each of the programs follow.

- **Program development studies:** In its first year (1997), RIREC funded a comprehensive technology assessment to help identify the renewable technologies with promise for Rhode Island as well as the barriers that inhibit their commercial development. In addition, RIREC commissioned an in-depth study of market development in the

photovoltaic industry to help the Collaborative identify promising PV projects for funding in 1998.

- **Residential PV projects:** First approved in 1998, this project allotted $250,000 towards the installation of small PV systems within Rhode Island, targeting primarily residential, educational, and non-profit customers. One goal of this project was to collect metering data on the installations in conjunction with Rhode Island's newly implemented net metering policy (see RIPUC Docket No. 2710). As a result of this program, roughly ten PV systems were installed at residences, a high school, a college, and an environmental education center. The contract amount was subsequently reduced to $50,000.
- **Commercial PV projects:** This project aimed to install up to 300 kW of PV at commercial, industrial, and institutional sites. Two installers were funded on a performance basis to the tune of $450,000. In 1999, Sun Power Electric installed a 43 kW PV system on the roof of BJ's wholesale club in Middletown, RI. When contracts expired at the end of 1999, one of the two contractors was given a 10-month extension, with a reduced goal of 100 kW. In the fall of 2000, Powerlight installed a 25 kW system on a commercial building in Portsmouth.
- **PV vendor program:** The original residential and commercial PV programs were consolidated in 2000 through the PV vendor program, which began by offering buy-downs of $1.50/Watt to any Narragansett or Pascoag Fire District customer. RIREC has budgeted $250,000 and selected five PV vendors to implement the program. In 2001, RIREC has increased the buy-down level to $3/Watt, and also made small wind systems eligible.
- **PV outdoor lighting:** $50,000 funded the installation and performance monitoring of four PV-powered outdoor lighting systems intended to serve as demonstration projects. Pending successful results, another $20,000 was set aside to conduct a PV-powered outdoor lighting workshop.
- **Landfill gas project:** This project set aside $300,000 to replace the existing 480 kW landfill gas generating unit at the Cranston landfill with a more efficient 800 kW unit. An unrelated Superfund action by the state environmental agency stymied this project, however, and the repowering has still not been completed. Another larger opportunity exists at the Johnston Landfill, which is currently funding a study to assess its options, including on-site generation or supplying methane to a new gas-fired power plant located nearby. Active retail or carbon emission offset markets might create a stronger value proposition for this potential project.
- **Green campus project:** A total of $50,000 (split between the renewables and DSM budgets) funded a campus-wide study of the energy conservation and renewable energy opportunities at the University of Rhode Island.
- **Wind prospecting project:** This contract was organized in phases with Phase 1 being a review of existing wind speed data and initial site identification and Phase 2 being direct measurement of the wind resource at one or more promising sites and final site selection. Phase 3 would have been the construction and commissioning of up to three commercial scale (> 600 kW) wind turbines of up to 2.1 MW combined capacity. RIREC support for this project was structured to provide the contractor with a total of $500,000 in funding, with between $70,000 and $100,000 available to support the Phase 1 and Phase 2 efforts. In completing Phases 1 and 2, however, the contractor was unable to identify a site that combined strong winds and appropriate land use while at the same time offering the

landowner a value proposition attractive enough to overcome a host of concerns. These concerns included those common to most wind installations (i.e. noise levels, visibility, safety), as well as the perception that the value offered by the project was insufficient to offset the potential impact of a wind installation on the value of the real estate. As a result of these difficulties, Phase 3 was suspended.

- **Fuel cell projects:** In 1999, RIREC allocated $325,000 each to the University of Rhode Island (URI) and the South County Hospital to install 200 kW ONSI PC25 fuel cells. The URI project included an additional $30,000 to promote the educational value of the installation. Developers worked to combine the RIREC funding with an incentive offered by the U.S. DOE to create a desirable value proposition for these promising fuel cell hosts. Together, these two sources of funding could have constituted more than half of the total installed cost of each of these fuel cell units. While the South County Hospital fuel cell was installed and became operational in 1999, the URI installation was cancelled due to an inability to secure the DOE incentive. In 2000, RIREC expanded its fuel cell project, making $840,000 available for two large-scale ONSI (200+ kW) fuel cells and $60,000 available for smaller residential-scale Avista fuel cells of less than 10 kW. So far there have been no installations, perhaps because ONSI has raised the price of its PC 25 by $300,000, and because the Avista fuel cell is awaiting the development of a natural gas reformer.
- **Open solicitation:** In 2000, RIREC sent out an open request for proposals (RFP) for renewable electric generation projects not covered by other targeted RFPs. RIREC has made available $425,000 in funding, but no projects have been funded as of early 2001.
- **Future project development:** Having been challenged over the years to find funding opportunities that subsequently develop into tangible projects, RIREC issued a solicitation for consulting services in April 2000 for support in developing the market for renewable electric resources in Rhode Island. $50,000 is specifically earmarked for this project.
- **Wind development grant:** In the fall of 2000, RIREC initiated its first out-of-state project by funding a wind developer with a $150,000 grant that enabled it to begin construction on a western-Massachusetts wind project and thereby retain its site permits, which were in danger of expiring. This $150,000 grant is refundable to the fund administrator if the project comes on line but does not sell its output into the state. Meanwhile, if electrical output is sold into the state, the grant is to be amortized and "refunded" through power discounts to marketers selling the power into Rhode Island.
- **Renewable energy retailer/customer and supply incentive programs:** In December 2000, the Rhode Island PUC gave conditional approval to supporting the retail market for renewable energy through both retailer/customer and supply incentives.[102] It is proposed that retailer/customer incentives be split into two programs: (1) a residential and small commercial program offering retailers $125/customer for the first 5,000 and $75/customer for the next 15,000 residential and small commercial customers that sign up for an eligible retail renewable energy product, and (2) a large business and institutional program that will bring large customers interested in purchasing renewable

[102] As this report is being released, the RIPUC continues to withhold its final approval pending mitigation of concerns over indirect program impacts tied to unresolved last resort service issues.

energy together with renewable energy marketers through an RFP process.[103] Supply incentives would be awarded as production incentives to eligible projects in New England that sell power into Rhode Island.

**Status and Results**

Despite implementing a wide array of potentially promising programs, RIREC has had only limited success to date in funding projects that actually come to fruition. The wind prospecting study, for example, was unable to find a suitable wind site in Rhode Island. The photovoltaic programs – though resulting in a few notable installations – have generally not met their development expectations. Landfill gas development has yet to materialize, and one of two fuel cell installations was abandoned.

One lesson to be learned from RIREC's experience is that state funds need to be aggressive in seeking out funding opportunities, potentially to the point of going out and creating them. This is particularly true in a state like Rhode Island, with limited renewable resource potential and severe siting constraints. Programs must also be supported by education and outreach, in addition to an attractive economic incentive. For example, one barrier to the success of RIREC's PV programs has undoubtedly been the small size of the buy-down, which until being raised to $3/Watt in 2001 had ranged between $1.00 and $1.50/Watt. This level of incentive has proven to be insufficient in reducing the higher up-front cost of PV to a level that homeowners find economically attractive. Going beyond simply providing a stronger economic incentive, however, RIREC could also potentially boost interest in its PV programs by more aggressively promoting them. Rhode Island has one of the best net metering policies in the nation, along with perhaps the simplest interconnection standards (for systems < 25 kW) and attractive state tax incentives. While a buy-down of $1.50/Watt (or even $3/Watt) may not by itself be sufficiently attractive to generate interest in PV, when marketed in conjunction with these additional benefits, the complete package of incentives may be enough to stimulate demand.

Until recently, RIREC has also limited its opportunities – particularly with respect to wind energy – by only funding projects located within Rhode Island's borders. In terms of renewable resource potential, Rhode Island is perhaps the most limited of the six New England states, and its small geographic size and dense population base exacerbate the problem by severely restricting siting possibilities. In this light, RIREC's recent demonstrated willingness to begin funding out-of-state projects is a positive development.

[103] The Collaborative is currently considering increasing the proposed incentive for small commercial customers beyond that mentioned here. The residential incentive would not change.

## WISCONSIN

### Background

Wisconsin ranks eighteenth among all states in terms of population, and twenty-fourth in terms of residential electricity sales. Roughly 75% of in-state electricity is generated by coal-fired power plants, with another 18% coming from nuclear. Hydro contributes an additional 3%, while non-hydro renewables (mostly wood-fired steam plants) make up less than 1%. Nevertheless, thanks to recent legislation, new renewable generation has been making inroads in the state. In response to 1997 Wisconsin Act 204 (see below), a consortium of utilities erected two 660 kW wind turbines in 1998, and by July 1999 an additional 33 turbines were on line.

Wisconsin is in the unique position of being the only state to implement both a system benefits charge (called the "Public Benefits Fund") and a renewable portfolio standard without opening its retail electricity markets to competition, choosing instead to take a gradual and measured approach to restructuring. Two recent legislative acts demonstrate this philosophy. 1997 Wisconsin Act 204 loosened restrictions on new generation, ordered utilities in the eastern portion of the state to install 50 MW of new renewable energy capacity, and required utilities to join an independent system operator by June 2000, all in an effort to shore up the grid in preparation for eventual competition. A year and a half later, 1999 Wisconsin Act 9 – better known as the "Reliability 2000" legislation – continued in this vein by creating the nation's first independent transmission company, formed by consolidating the ownership, operation, and maintenance of four transmission systems in eastern Wisconsin.[104] Reliability 2000 also established a renewable portfolio standard and an independent Public Benefits Fund, to be administered by multiple non-profit administrators and overseen by the Department of Administration (DOA) through its Energy Division.

The DOA and its Energy Division are not new to this role. In January 1998, Wisconsin Public Service Corporation (WPSC) asked the DOA to administer the energy efficiency portion (which included some renewable energy funds) of its demand side management program as a two-year pilot initiative. The resulting partnership between the public and private sector, called Wisconsin Focus on Energy, began operating in the fall of 1998, with activities scheduled to conclude on June 30, 2000. In July 2000, however, the Focus program was extended through 2002. This case study reports on both the Wisconsin Focus on Energy effort as well as developments surrounding the new Public Benefits Fund.

### Funding Approaches

*Demand-Side Applications of Renewable Energy (DSARE)*

The original phase of the Wisconsin Focus on Energy program (Focus 1) was funded by the ratepayers of WPSC to the tune of $16.75 million over two years, which represents 80% of WPSC's energy efficiency funds for 1998 and 1999. The DOA viewed their administrative role as an opportunity to prepare the market for a future when energy efficiency services and renewable energy development would no longer be mandated by state government. As such, they worked closely with the private sector, developing programs for private contractors

[104] Because the previous transmission owners will retain partial ownership of the new company and will be represented on its board of directors, the new "transco" will be required to join the Midwest Independent System Operator (MISO) in order to satisfy FERC's requirement of complete independence.

(selected through an RFP process) to implement. With complete market transformation not a realistic goal over such a short period, the DOA focused primarily on market preparation and infrastructure building activities, with a peripheral goal of demonstrating that the public sector could play an effective and sustainable role in promoting energy efficiency and renewable energy.

While most of the $16.75 million was earmarked for energy efficiency, $1 million was reserved to support renewable energy, focusing only on demand-side applications (the pilot program was born out of WPSC's DSM program). The Demand-Side Application of Renewable Energy (DSARE) program was set up as an initiative within Wisconsin Focus on Energy to manage this $1 million.[105] DSARE's first action was to identify eighteen demand-side applications worth targeting[106]:

- Solar: daylighting, off-grid PV, hot water, passive and active space heating
- Off-grid wind: residential, rural, commercial, industrial
- Biomass: clean wood stoves, waste wood burning, paper pellets as fuel, and biogas from waste
- Ground-source heat pumps: residential and commercial
- Small-scale hydro: off-grid, commercial, and industrial, all at existing dams

After compiling a list of market barriers to attack, DSARE 1 identified eighteen specific avenues for funding the above demand-side applications:

- General marketing: marketing
- Education: residential training, commercial daylighting training, print information, public TV/video, educational institutions, research
- Business development: marketing grants, project facilitation, financing, business recruitment, daylighting "copy" rooms[107]
- Technical assistance: audits, feasibility assistance, daylighting review services
- Demonstration: technology and daylighting demonstrations
- Evaluation: program evaluation

Using a "shotgun" approach that funded multiple technologies through these different funding avenues, DSARE targeted many different facets of the market with small competitive grants (averaging $15,000) . This approach was a direct result of the DOA's long-running experience with the renewable energy industry in Wisconsin. Perceiving the industry as being made up of primarily small firms in a highly fragmented market, the DOA felt that the simultaneous support of a wide variety of activities was the most effective way to overcome

[105] Though DSARE's budget was set at $1 million, additional funds amounting to roughly $0.25 million that were budgeted to other programs (such as marketing and R&D) supported renewables from outside of the DSARE program. Thus, the total amount of funds spent in support of renewables during the first phase of the pilot program was roughly $1.25 million.

[106] In defining what constitutes an eligible demand-side application, the Public Service Commission of Wisconsin drew the line at the power plant boundary, thereby prohibiting net metering. This rule has since been relaxed to allow net metering as long as at least 50% of the electricity produced is consumed on site.

[107] Daylighting "copy" rooms are demonstration projects highlighting standardized designs that can be copied to a wide variety of different building situations, thereby enhancing technology transfer.

barriers and create new synergies that would lead to a sustainable network of renewable energy firms. Many of the activities funded under the shotgun approach were expected to be effective at targeting the demand-side even where the underlying renewables industry is not significantly developed. Education, training, research, and publicity are all activities that can be undertaken in the absence of a strong market.

It is interesting to note that DSARE did not limit its program to renewable *electricity* applications, but instead targeted those broader renewable energy applications it felt to be most cost-effective. In fact, as is somewhat evident from the list of funding avenues, daylighting received special emphasis, capturing one quarter of the entire budget. Daylighting was seen as the most cost-effective application identified, with perhaps the greatest potential to succeed. The DOA also wished to leverage DSARE's funds by building upon a pre-existing Energy Center of Wisconsin/utility "Daylighting Collaborative" program. Other non-electrical applications include solar hot water, solar space heating, and clean wood stoves – applications that are perhaps more often targeted through energy efficiency programs (where they may be among the *least* cost-effective applications) rather than renewable energy programs (where they can be among the *most* cost-effective applications).

While the original DSARE program (DSARE 1) wound down at the end of 2000, a second phase (DSARE 2) has recently begun. Since most of WPSC's DSM program was already being managed by the DOA's Focus on Energy, the utility responded to the new Public Benefits legislation (see next section below) by turning over all of their funds to the DOA, rather than waiting for the transition period. To manage the new funds, the DOA opted in July 2000 to extend the Focus on Energy program until it has time to develop new program guidelines and select non-profit administrators for the statewide fund. Under the extension, $800,000 will go towards renewables, with DSARE 2 largely building upon DSARE 1's efforts, with a few notable enhancements:

- Most importantly, DSARE 2 has added a resource acquisition component (i.e., project financing) that makes up about half of the budget. This component was added to "kick start" the market and show immediate project results, and is also consistent with recommendations from an interim evaluation of DSARE 1 (see *Status and Results* section for DSARE 1). Project financing comes in one of four forms: (1) low-interest (4%) loans of up to $20,000 for three, five, or seven year terms; (2) a 4% interest rate buy-down on loans between $20,000 and $500,000; (3) production awards of $20,000 to $50,000 based on projected kWh output, the cost of energy displaced, and technology adjustment factors; and (4) energy savings performance contracts.[108]
- DSARE 2 expands the definition of "demand-side applications" to include those applications where at least 50% of energy production is consumed on site. Allowing up to half of a project's generation to be fed into the grid opens up new project possibilities.

*Reliability 2000 Public Benefits Fund*

The Reliability 2000 legislation included in 1999 Wisconsin Act 9 provides for two distinct pubic benefit programs, the Low-Income Assistance Program and the Energy Program. The Energy Program is further subdivided into residential, major markets (i.e., commercial and industrial), renewable resources, and environmental research programs. Like its predecessor

[108] See *Enhancement of a Renewable Energy Public Benefits Program in Wisconsin*, by Don Wichert for the 2001 ASES conference.

DSARE, the renewable resources program is limited to focusing only on demand-side customer-sited applications of renewable energy, with the presumption being that the renewables portfolio standard also contained in Act 9 will promote supply-side applications.[109] The renewable resources program commands 4.5% of the total funds allocated to the Energy Program, and the DOA will also require the residential and major markets programs to allocate 4% of their annual budgets towards renewable energy programs.[110]

The Energy Program has two sources of funding. Utilities are required to continue to collect funds from their customers on a per kWh basis, in amounts equal to total collections in 1998 (determined to be $46 million). In addition, utilities are directed to impose new flat fees, capped at the lesser of 3% of a customer's electricity bill or $750 per month, with 70% of all funds raised via this method coming from the residential sector. These new flat fees are expected to raise an additional $17 million per year, placing the overall size of the fund at approximately $63 million per year. The 4.5% share allotted to the renewable resources program will amount to roughly $2.8 million per year, with an additional $980,000 from both the residential and major markets programs, bringing total support for renewable energy to roughly $4.8 million per year.

The new statewide programs are to be phased in over a three-year transition period from 2001 to 2003. During this period, utilities have the option to either continue administering their existing public benefits programs, or to slowly phase them out by transferring an increasing portion of their funds to the DOA. By 2003, all utilities, with the possible exception of municipal utilities and cooperatives,[111] must contribute the entirety of their funds to the DOA.

As primary overseer of the fund, the DOA is required to carry out its duties in consultation with the newly created 11-member Council on Public Benefits. In addition, the DOA must contract with one or more non-profit organizations to administer the Energy Program. Non-profit administrators will have the responsibilities of soliciting, awarding, and administering grants according to criteria established by the DOA. Contracts are to be awarded only on a competitive basis. The DOA has decided to contract with multiple non-profit administrators to manage different aspects of the program (e.g., residential, commercial and industrial, renewable energy, etc.), and a solicitation for the renewable energy administrator was issued in early 2001, with responses due by late March. The fund is authorized indefinitely, though beginning in fiscal year 2004-2005, the DOA must annually assess the need to reduce or discontinue the energy programs.

**Status and Results**

*Demand Side Applications of Renewable Energy Program (DSARE)*
*DSARE 1*

The timetable for completing the Wisconsin Focus on Energy and DSARE 1 programs was pushed back a few months. All programs were initially scheduled to be fully obligated by February 2000 and fully implemented by June 30, 2000, but in reality programs were fully

[109] The renewable portfolio standard requires utilities to supply customers with at least 0.5% renewable energy by the end of 2001, increasing in 0.35% increments up to 2.2% by the end of 2011.
[110] The residential and major markets administrators will retain control over the funds they are devoting to renewable energy, and it is the responsibility of the renewable energy administrator to coordinate the expenditure of these funds with its own activities, based on a memorandum of understanding between the three administrators.
[111] In what is known as the "commitment to community programs," municipal utilities and cooperatives are permitted to retain their funds and administer their own programs if they so desire.

obligated by June 30, 2000, with contracts extended through the end of 2000. In the two years of the program more than one million dollars have supported 41 renewable energy projects in the 23-county area of northeast Wisconsin (with a population of roughly one million) that is WPSC's service territory. Cost sharing was a feature of all but a few grants, thereby leveraging the impact of DSARE 1 funds. DOA administrators estimate that they achieved a two-to-one ratio of private-to-public funds, implying that over $3 million was invested in the market as a result of the pilot program.

Of the 47 funded projects listed on Wisconsin Focus on Energy's web site (representing projects funded under both DSARE 1 and 2), 18 are categorized as business and marketing assistance, 16 as technical assistance, and 13 as financing and demonstration. Business and market assistance projects are intended to assist renewable energy companies in establishing and expanding a client base and information channels. Technical assistance projects consist of engineering assessments for renewable energy technologies and projects, as well as efforts to ensure that renewable energy options are included in existing energy auditing services. Financing and demonstration projects are to be used both as marketing props and as training sites. The 47 projects total about $613,000, averaging $13,000 per grant.[112] A majority of the remaining funds were devoted to daylighting activities.

One of the more intriguing aspects of DSARE 1 is that an independent evaluation firm was hired to assess whether or not the program was effective at preparing or transforming the market. As part of the evaluation process, baseline surveys of 86 renewable energy businesses and 66 daylighting businesses were conducted in the fall of 1999, prior to the first wave of program funding. A second round of surveys upon program completion will measure progress against the baseline to determine the degree to which DSARE (and the entire Wisconsin Focus on Energy program) has achieved its goals. The final evaluation report is expected sometime in 2001.

In the meantime, an interim evaluation report questions the wisdom of DSARE 1's "shotgun" approach to preparing the market for transformation. Comparing responses between the October 1999 baseline survey and an August 2000 follow-up survey reveals disappointment among small business participants over many aspects of the program, and in particular over assistance with general advertising and communications materials. While the baseline survey may reflect heightened and perhaps unrealistic expectations, and the evaluation period (< 1 year) is too short to fairly judge the full effect of market transformation initiatives, perhaps a more concentrated focus on those areas where state support was perceived to be most helpful – such as project facilitation assistance – is warranted. It is particularly noteworthy in this regard that the most heavily funded and focused DSARE 1 effort – daylighting – fared quite well in the program evaluation.[113]

*DSARE 2*

Implementation of DSARE 2 began in September 2000. As of early 2001, 23 new market preparation (i.e., DSARE 1-type) projects were under contract, in the areas of training and education, daylighting, and market development. Some of the project financing options are also bearing early fruit. Fourteen low-interest loans (11 advanced wood heating systems, 2 geothermal heat pumps, and 1 solar water heater) have been made and thirty others are being

[112] For a brief description of each of these projects, see http://www.wifocusonenergy.com/renewable/index.html.
[113] See *Wisconsin Focus on Energy: Second Interim Report – Final* prepared by Hagler Bailly Services, Inc., October 2000.

finalized. Four applications for production rewards have been submitted for wind, PV, solar thermal, and geothermal, and one energy savings performance contract has been implemented (no interest rate buy-downs have occurred).

*Public Benefits Program*

Many details concerning the new Public Benefits program are still being worked out. In particular, fund administrators have not yet been named. The DOA has recently issued an RFP to determine the renewable energy administrator, and responses are due in late March 2001. The administrator's contract will run only through 2003, though the DOA may award up to three annual contract renewals beyond 2003. The renewable energy administrator must be a non-profit entity, but can identify subcontractors to deliver programs (subcontractors need not be non-profit). Due to the 3-year transition to full statewide management, the DOA expects the following amounts to be available to the renewable energy administrator over the transition period: $1,522,800 in 2001, $1,976,500 in 2002, and the full $2,801,400 in 2003. In addition, both the residential and major market administrators are each expected to allocate $372,000 in 2001, $588,000 in 2002, and $980,000 in 2003 to support renewables. Thus, total statewide support for renewables should be roughly $2.3 million in 2001, $3.2 million in 2002, and $4.8 million in 2003 and thereafter. It appears likely that municipal utilities and cooperatives will opt out of participation in the statewide DOA program, and will instead continue to administer their own programs.

In an abrupt about-face for Wisconsin, the RFP for the renewable energy administrator indicates that non-electrical applications of renewable energy will not fall under the purview of the renewable energy administrator. It appears, however, that non-electrical projects may be funded by the residential and major markets administrators, and the renewable energy administrator is free to negotiate support for such projects while coordinating with those two funds.

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