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CASE STUDIES OF STATE SUPPORT FOR RENEWABLE ENERGY

Green Buildings: The Expanding Role of State Clean Energy Funds

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CASE SUMMARY

Case Description

“Green” buildings are typically designed to minimize environmental impacts in multiple areas (e.g., energy, water, materials), and to maximize the health and quality of life of building occupants.

Green buildings can provide a niche market for renewable energy technologies for several reasons. First, designers of green buildings often wish to include renewable energy systems due to their associated environmental benefits and visibility. Green buildings also tend to be new buildings, where renewable energy technologies are often most cost-effective to install. Due to their energy efficiency and other features, green buildings may also provide opportunities to leverage additional funds – e.g., utility or state energy efficiency funds. Last, green buildings tend to receive a relatively high degree of public attention, increasing the exposure of any renewable energy systems they incorporate.

This case study examines the efforts of several state renewable energy funds to promote renewable energy

use in green buildings. These efforts fall into two categories: targeted funding for renewable energy systems used specifically on green (or at least energy-efficient) buildings, and general green building promotion. The states that are covered include Massachusetts, New York, Pennsylvania, Connecticut, New Jersey, Wisconsin, Oregon, Illinois, and Ohio.

Innovative Features

State clean energy funds have explored a variety of methods to promote the use of renewable energy technologies on green buildings, including:

- Design and planning incentives;
- Construction incentives;
- Public education;
- Training;
- Organizational support;
- Schools support; and,
- Research.

Results

- *Design and Planning Incentives:* Eight state funds offer grants that support the incremental costs of adding

green considerations (including renewable energy) into the design process of new buildings, including the Massachusetts Technology Collaborative (MTC), Wisconsin Focus on Energy (WFE), the Sustainable Energy Fund of Central Eastern Pennsylvania, the Sustainable Development Fund of Pennsylvania, the Metropolitan Edison Sustainable Energy Fund (MESEF) of Pennsylvania, the New York State Energy Research and Development Authority (NYSERDA), the Energy Trust of Oregon, and the Illinois Clean Energy Community Foundation (ICECF). These planning and design grants range in maximum value from \$10,000 to \$130,000.

- **Construction Incentives:** Two funds, MTC and NYSERDA, provide grant incentives of up to \$500,000 per project to cover a significant fraction of the incremental construction costs of adding renewable energy technologies to green buildings. NYSERDA's Energy Smart Loan Fund also offers an additional loan of up to \$500,000 for green building features incorporated into buildings that utilize energy efficiency and renewable energy. In addition, NYSERDA offers differentially higher incentives to PV systems that are installed on homes that have earned the ENERGY STAR label (\$4.50 vs. \$4 per watt for standard homes), and has differentially supported the use of PV in new subdivisions of ENERGY STAR labeled homes. The New Jersey Clean Energy Program (NJCEP) is funding the installation of PV on four schools that each must achieve a LEED Silver rating. Finally, a few funds also provide support for the commissioning of

new buildings to better ensure their effective operation.

- **Public Education, Training, and Organizational Support:** Six state funds are promoting green buildings on a more general level. NYSERDA, WFE, ICECF, and the Connecticut Clean Energy Fund (CCEF) have each sponsored at least one LEED training workshop for local building professionals. CCEF and MESEF have each provided grants directly to local green building associations for general purposes. NYSERDA is supporting the formation of a U.S. Green Building Council chapter, and has held green building salons in two cities. MTC has allocated \$600,000 for grants related to increasing public education and awareness about green buildings.
- **Schools Support:** Two state funds, MTC and NJCEP, are implementing programs that focus specifically on incorporating renewable energy technologies into green schools. MTC offers planning, design and construction grants, while NJCEP funds PV installations and provides grants to cover the costs of LEED certification. In addition, NYSERDA is creating a web-based training curriculum for architects and engineers on the design and construction of green high-performance schools.
- **Research:** MTC has allocated an additional \$8 million over three years for research into the complex issues of how renewable energy technologies and green buildings can be integrated, and additional funds for the creation of a detailed database of knowledge on the subject to inform future program decisions.

CASE STUDY DETAILS

Background

“Green” buildings are typically designed to minimize environmental impacts in multiple areas and to maximize the health and quality of life of building occupants. Green buildings tend to use energy efficiently through proper

envelope construction and equipment installation, conserve or even re-use water, minimize waste in their construction and operation, be comprised of non-toxic, recycled, and recyclable materials, make use of natural lighting and ventilation, and

minimize the alteration of existing habitat. Though not a universal requirement, renewable energy technologies and design strategies (e.g., passive solar design, daylighting) are often incorporated into green buildings.

Green buildings offer a niche market for renewable energy technologies for several reasons. First, green building designers are often looking for opportunities to minimize the environmental impacts of their buildings, as well as to incorporate green elements with a high degree of visibility. Renewable energy systems can help them meet these goals.

Green buildings also tend to be new buildings, and renewable energy systems are often most cost-effective when incorporated into the design of a new building rather than when retrofitted onto an existing building.

Due to their energy efficiency and other features, green buildings may also occasionally provide opportunities to leverage additional outside financial or other assistance – e.g., green buildings designers may have access to utility or state energy efficiency funds.

In addition, green buildings can serve as an excellent showcase venue for renewable energy technologies because these buildings frequently receive increased public attention. The multiple innovative features of a green building are apt to attract a variety of visitors, who are then exposed to the renewable energy systems of the building.

Several state renewable energy funds have chosen to explore the promotion of renewable energy technologies and green buildings through an integrated approach. Some of these activities are aimed specifically at increasing the use of renewables on planned or existing green (or otherwise energy-efficient) buildings, while others promote green buildings in a more general sense.

This case study summarizes the efforts of nine states: Massachusetts, New York,

Pennsylvania, Connecticut, New Jersey, Wisconsin, Oregon, Illinois, and Ohio. It does not include programs that promote the use of renewable energy technologies and/or energy efficiency measures separate from each other, but instead focuses on efforts to specifically encourage renewable energy use in green, or energy-efficient, buildings.

Massachusetts¹

The Massachusetts Technology Collaborative (MTC), administrator for the Massachusetts Renewable Energy Trust, has undertaken the largest and most aggressive effort among state clean energy funds at promoting the use of renewable energy in green buildings. MTC is implementing a statewide Green Buildings Program budgeted at about \$36 million from 2002 through 2005. The program supports feasibility studies and provides design and construction grants for the incorporation of renewable energy technologies into green schools and other green buildings. Through these efforts, MTC hopes to not only support the construction of green buildings in Massachusetts, but also to increase knowledge of green building practices among building professionals and the public. The four elements of MTC's Green Buildings Program are described below.

Green Schools Initiative

One element of the Green Buildings Program, the Green Schools Initiative provides funding for feasibility studies, design, and construction of green public schools that incorporate renewable energy technologies, energy efficiency measures and other high-performance design features. About \$13.5 million was allocated for this Initiative. Participating projects must be built in accordance with the Massachusetts version of the best practices advocated by the Collaborative for High Performance Schools, or MASS-CHPS.² Other requirements for

¹ For further information, see Porter, K., M. Bolinger, and R. Wiser. "Massachusetts' Green Buildings Program." Berkeley Lab and the Clean Energy Group. September 2002.

http://eetd.lbl.gov/ea/EMS/cases/MA_Green_Buildings.pdf

² The Collaborative for High Performance Schools originated in California to promote the development of schools that are

participation include applying for any available incentives offered through utility energy efficiency programs, beating the state energy code by at least 20%, and commissioning – a critical but often overlooked method of improving a building's energy performance.³

Through August 2003, MTC has announced 39 feasibility study grants of up to \$20,000 each and has selected 17 pilot projects for design and construction assistance. The design and construction pilot projects were selected using a competitive review process, while the feasibility study grants were awarded on a first-come, first-served basis. The 39 feasibility study grants were awarded to help schools consider the use of green building options (including renewable energy) and to conduct feasibility assessments. The 17 design and construction projects will each receive up to \$130,000 for the incremental planning and design costs of incorporating renewable energy, energy efficiency, and other high-performance design features. Each of the 17 design projects is also eligible for up to \$500,000 more in incremental construction and installation costs associated chiefly with renewable energy technologies. Some of the construction funding may be used for energy efficiency measures as well (up to 30% of the total construction grant).

Some of the 17 projects that have been selected for design and construction assistance are also eligible for additional funding from the Massachusetts Department of Education's School Building Assistance (SBA) Program. The SBA Program covers anywhere between 50% and 90% of public school construction costs in Massachusetts. Through its partnership with MTC for the Green Schools Initiative, the SBA Program will increase its total construction grant by 2% for school

districts with eligible Green Schools Initiative pilot projects that are certified by MTC and the Department of Education as Massachusetts Green Schools. The Department of Education has also indicated that it is willing to consider requests from the pilot projects to waive certain funding caps.

Green Buildings Initiative

Through the Green Buildings Initiative, funding is available pursuant to three separate grant opportunities: feasibility studies, design and construction assistance, and public education and awareness. For all three categories, a project must qualify as a green building. The preferred benchmark is the U.S. Green Building Council's (USGBC's) Leadership in Energy and Environmental Design (LEED) rating system, although applicants can suggest a comparable alternative. Applicants are required to apply for any available incentives offered through utility energy efficiency programs as well.

MTC has budgeted \$840,000 for feasibility study grants through 2003, with successful applicants receiving up to \$20,000 each for considering renewable energy technologies as part of a green building project. The grants are awarded competitively and MTC has a goal of funding a wide range of green building types (excluding only owner-occupied single-family homes). A 100% match is required of all private/taxable organizations and construction must begin within two years of the award date.

MTC has also allocated \$13.5 million for green building design and construction grants, awarded competitively through 2004 at up to \$500,000 per project. These grants may support up to 75% of the incremental costs of incorporating renewable energy technologies into green buildings. Incremental costs are defined as the first costs in excess of the costs that would have been incurred absent the renewable attribute or other feature being installed. At least 70% of the grant must be used for the purchase, installation, and commissioning of a renewable energy system that generates electricity. The other 30% can

healthy, comfortable, safe, secure, adaptable, easy to operate and maintain, and resource-efficient.

³ Commissioning is the process of ensuring that a building's complex array of heating, cooling, ventilation, lighting, and other systems is designed, installed, and tested to perform according to design intent and the building owner's operational needs.

be used for other renewable energy and energy efficiency features.

In addition, MTC has allocated \$600,000 through 2006 for grants related to increasing public education and awareness about green buildings that incorporate renewable energy technologies. Applicants may receive up to \$30,000 per project, and potential activities are left to applicants to define.

Special Opportunities Partnership Initiative

In addition to the Green Schools and Green Buildings Initiatives, discussed above, MTC also administers the Special Opportunities Partnership Initiative (SOPI). SOPI is a three-year, \$8 million effort to partner with public or private organizations for the purpose of exploring issues related to green buildings and renewable energy technologies. Financial details of each partnership established through SOPI are determined on a case-by-case basis, and this solicitation is open-ended in an effort to seek creative project and funding opportunities.

Case Study Database and Documentation

One of MTC's primary goals in administering the Green Buildings Program has been to develop knowledge about green buildings and renewable energy technologies that can be used in educating building professionals and the public. MTC is now in the process of gathering data from a variety of projects funded through the initiatives described above, and developing a general green buildings database to better document their awardees' efforts, successes, and failures. The planned database will be able to quickly produce data tailored to specific audiences, geographic areas, or technologies.

Finally, MTC is planning to provide opportunities related to promoting green building practices in affordable housing in the near future.

New York

NYSERDA, administrator of the New York Energy Smart program, has also undertaken several initiatives to promote renewable

energy technologies and green buildings in an integrated fashion.

Through its commercial New Construction Program, NYSERDA issued a revised Program Opportunity Notice (PON) 593-01 in July of 2002, allocating \$6 million for building-integrated PV and advanced solar (e.g., water heating collectors) and daylighting projects. To be eligible, these applications must be integrated into new construction or major renovation projects that are already planned to be energy-efficient (though not necessarily featuring other green attributes). Of the total, \$3 million was allocated to building-integrated PV projects, with a cap of \$500,000 per project. An additional \$3 million was allocated toward incentives for advanced solar and daylighting projects, with a per-project cap of \$100,000. In both cases, incentives may fund up to 70% of the incremental cost of the design and installation of eligible measures (or the lesser of this and \$5 per watt for building-integrated PV). These incentives are consistent on a per-project basis with those available from NYSERDA for replicable PV demonstration projects through a separate solicitation (PON 691-02).

Another incentive in the revised PON 593-01 provides up to \$400,000 per-project for energy efficiency and certain renewable energy technologies, and offers LEED-certified projects a 10% larger award. This incentive may cover a maximum of 80% of the incremental equipment and installation costs beyond standard design practice. Eligible renewable energy technologies include photovoltaic systems that serve a dual purpose (e.g., power generation and window shading, power generation and building-integrated envelope material), as well as passive solar thermal storage and air pre-heating systems.

NYSERDA also provides grants for green building technical assistance on an equal cost-sharing basis of up to \$50,000 per project. To date, NYSERDA has provided technical assistance to several green building efforts in New York, including new green buildings for the New York State Department of

Conservation and the Four Times Square skyscraper in New York City – both of which also received financial assistance from NYSERDA for the installation of PV panels.

Through PON 716-02, NYSERDA is offering incentives aimed at facilitating the installation of photovoltaic systems on energy-efficient homes. This PON provides incentives for small-scale PV installations in New York through the end of 2005 (or until funds run out) installed on both standard and energy-efficient homes, but NYSERDA offers a differentially higher incentive to any grid-connected PV system installed on a home that has earned the ENERGY STAR label (\$4.50 vs. \$4 per watt for standard homes). Seven of the 29 systems funded since this PON was released in the fall of 2002 have been installed on ENERGY STAR labeled homes.

In January 2002 (RFP 655-01), NYSERDA accepted proposals for an additional incentive aimed at seeding the construction of ENERGY STAR labeled homes and the incorporation of PV systems onto at least some of those homes. Up to \$650,000 was allocated for this initiative, with the goals of facilitating the construction of one subdivision consisting entirely of ENERGY STAR labeled homes in each of the six participating utility service territories in the state, and the installation of grid-connected PV on a total of at least twelve homes within those subdivisions. Through this effort, NYSERDA has offered to pay 100% of the installed costs of a PV system for the first home in each subdivision, 75% of the second installation, and 60% of the third. The initiative also provides technical training and marketing assistance to building industry professionals.

In an effort to increase knowledge of green building practices in the state, NYSERDA is supporting the formation of a USGBC chapter in upstate New York. NYSERDA has also co-sponsored LEED training courses and Green Building Salons in both NYC and Albany. The salons are monthly 2-hour sessions featuring an expert presenter, with additional time for networking.

In addition, NYSERDA has provided assistance for the creation of high-performance building guidelines for NYC and for the development of a Green Building Tax Credit for the state of New York. The tax credit, signed into law in 2000, offers \$25 million of tax benefit for green features on large building projects planned through 2004. \$18.9 million of this amount has already been committed to the first five projects.

NYSERDA's Energy Smart Loan Fund also offers special benefits for green building projects. The Loan Fund reduces interest rates by up to 400 basis points (4.0%) and offers a per-project maximum of \$1 million in loans for energy efficiency and renewable energy technologies. The special benefit for green buildings is that other eligible green building features (e.g., green carpets, low volatile organic compound finishes, etc.) can be eligible for an additional loan amount of up to \$500,000. To be eligible for this loan, borrowers must provide evidence that they have registered the building for LEED certification.

Finally, in conjunction with its Energy Smart Schools Program, NYSERDA is nearing completion of a web-based training curriculum for architects and engineers on the design and construction of resource-efficient high-performance schools. The curriculum will include 25 modules, many of which will promote green practices such as the use of efficient and renewable energy systems, water conservation, recycling, green building products, site design, and daylighting.

Pennsylvania

All five clean energy funds operating in Pennsylvania are promoting the use of renewable energy through green buildings. Unlike some funds in other states tasked solely with promoting renewable energy, each fund in Pennsylvania has also been charged with advancing energy efficiency. Thus some green building projects supported in PA may not necessarily require the incorporation of renewable energy technologies.

The Sustainable Energy Fund of Central Eastern Pennsylvania (SEFCEP) lists green building technologies among projects eligible for financial assistance. In addition to the installation of renewable energy systems, the SEFCEP is also interested in funding passive solar design, systems integration, and other architectural design services. The SEFCEP has provided a number of loans and grants to green building projects to date, including a \$500,000 loan for a new LEED Silver school building and grants for the incorporation of green design considerations into several additional buildings.

In addition to providing loans, subordinated debt, and royalty and equity financing to renewable energy projects or companies, the Sustainable Development Fund (PECO service territory) provides Green Building Design Grants averaging \$25,000 each. These grants, several of which have been awarded to-date, are available to architectural and engineering firms, building developers and building owners for the purpose of funding building energy simulation modeling in a green design context.

The Metropolitan Edison Sustainable Energy Fund (MESEF) has also promoted the construction of green buildings through support for green building design, energy simulation modeling, and construction. MESEF also provided a grant to the Green Building Association of Central Pennsylvania for the promotion of environmentally responsible building design, planning, construction, and operation.

Investment in green building projects is also a goal of both the West Penn Power Sustainable Energy Fund and the Pennsylvania Electric Company Sustainable Energy Fund (PECSEF). These funds typically support projects through grants, loans, and equity financing. For example, PECSEF has approved a grant/financing package for a new building complex projected to house the nation's first green Goodwill building.

Connecticut

The Connecticut Clean Energy Fund (CCEF) has not offered financial incentives targeted specifically at green building projects, but has taken other steps to seed the green building industry in the state. Through financial and staff support, CCEF helped to launch the Connecticut Green Building Council in the fall of 2001, and has since remained active in its activities to educate building professionals and the public about green buildings. CCEF also sponsored a large LEED training workshop in the spring of 2002, as well as a high-performance green schools workshop in June of 2003.

New Jersey

The New Jersey Clean Energy Program (NJCEP) has recently implemented two pilot projects related to green schools. NJCEP has accepted proposals and will fund the installation of photovoltaic systems (roughly 30-40kW each) on four schools at \$260,000 each (i.e., \$8.6-\$6.5/W). To be eligible for the funds, each school must achieve a LEED Silver green building certification rating. Through its energy efficiency initiatives, NJCEP has also begun offering grants of \$2500 to schools to cover the costs of official LEED certification.

Wisconsin

In its original pilot program covering the northeastern portion of the state, Demand Side Applications for Renewable Energy, Wisconsin Focus on Energy (WFE) spent a significant portion of its \$800,000 annual renewable energy budget promoting the use of daylighting in buildings. These efforts focused on training for architects and other building professionals and were implemented by the Energy Center of Wisconsin.

Under subsequent statewide efforts, Focus on Energy administered separate programs promoting renewable energy technologies and high-performance green buildings. The High Performance Buildings Program offered information resources, technical (e.g., LEED) training, and financial incentives. Technical and design assistance grants (up to \$10,000)

were available to help offset the cost of incorporating energy efficiency, renewable energy, or other green considerations into building projects. Implementation assistance grants, determined on a case-by-case basis, were also available for small businesses and buildings with integrated designs that incorporated energy-efficient or renewable energy technologies in a minimum of two systems (e.g., PV for electricity generation and energy efficient lighting).

As a stand-alone program, Wisconsin's High Performance Buildings Program ended in the summer of 2003, the result of program restructuring and budget reductions. However, WFE plans to soon hire a coordinator to integrate aspects of the former High Performance Buildings Program into its four new areas of non-residential concentration: commercial, schools and government, agricultural, and industry. Extra incentives for renewable energy technologies used on green buildings are not planned for these new initiatives.

Oregon

The Energy Trust of Oregon (ETO) released an RFP in the spring of 2003 for a program management contractor for a commercial and industrial new construction program that will offer incentives for both energy and non-energy related strategies and features of high-performance green buildings. This program will provide design assistance, building simulation, and commissioning services to green building developers who commit to meet energy standards equivalent to two or more points on the LEED rating system. The emphasis of this program is to provide design and commissioning support rather than incentives for equipment installations.

ETO has also recently funded a portion of the above-market costs of installing PV on the newly renovated Brewery Blocks Building #4, a green building in Portland.

Illinois

The Illinois Clean Energy Community Foundation (ICECF) highlights green

buildings as an important avenue for the use of renewable energy technologies through green design training and financial assistance. ICECF's Green Building Design Program provides up to \$75,000 in design assistance and \$25,000 for building commissioning. To date, it has awarded over \$1.8 million in grants to 27 projects throughout Illinois. Tax-exempt not-for-profit or local or state government entities are eligible to receive the funding for incremental design and commissioning work, which is intended to support enhancement and integration of efficiency and renewable energy measures into new or major rehabilitated buildings. The goal of the program is to meet or exceed the requirements of the USGBC Silver LEED Rating or the 2000 International Energy Conservation Code. ICECF has also sponsored a LEED training workshop in support of a community's efforts to require LEED certification for new buildings. Finally, green building owners can also take advantage of other renewable energy incentives available for small-scale photovoltaic and wind energy systems. These incentives are not limited to green design grantees, however; any eligible applicant interested in these technologies can request funding.

Ohio

While not administering programs directly promoting green buildings or the inclusion of renewable energy technologies therein, the Ohio Energy Loan Fund has recently helped to finance both energy efficiency measures and the installation of PV panels on the newly renovated Cleveland Environmental Center through a linked deposit transaction, effectively lowering the loan interest rate.

Lessons Learned

Though support for green buildings among state renewable energy funds is still a relatively new endeavor, early experience suggests a few preliminary lessons learned:

- Because the concept of green building design is still relatively new to many in the building industry, educational outreach to architects, builders and others is often a critical first step in

- developing a base of interested applicants for subsequent project-related incentives.
- Many green features cannot be simply checked off a list, but rather must be carefully integrated into the design of each new building. Thus, programs to promote green buildings as a niche market for renewable energy may be well served to include incentives at the planning and design stage, in order to facilitate effective capital investments later.
 - Because knowledge of how to design, construct, and commission buildings to be green is somewhat scarce, it can be valuable to develop case studies of funded projects to reduce the learning curves and associated expenses of future projects.

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ABOUT THIS CASE STUDY SERIES

A number of U.S. states have recently established clean energy funds to support renewable and clean forms of electricity production. This represents a new trend towards aggressive state support for clean energy, but few efforts have been made to report and share the early experiences of these funds.

This paper is part of a series of clean energy fund case studies prepared by Lawrence Berkeley National Laboratory and the Clean Energy Group, under the auspices of the Clean Energy States Alliance. The primary purpose of this case study series is to report on the innovative programs and administrative practices of state (and some international) clean energy funds, to highlight additional sources of information, and to identify contacts. Our hope is that these brief case studies will be useful for clean energy funds and other stakeholders that are interested in learning about the pioneering renewable energy efforts of newly established clean energy funds.

Twenty-two total case studies have now been completed. Additional case studies will be distributed in the future. For copies of all of the case studies, see:

<http://eetd.lbl.gov/ea/ems/cases/> or <http://www.cleanenergystates.org/>

ABOUT THE CLEAN ENERGY STATES ALLIANCE

The Clean Energy States Alliance (CESA) is a non-profit initiative funded by members and foundations to support the state clean energy funds. CESA collects and disseminates information and analysis, conducts original research, and helps to coordinate activities of the state funds. The main purpose of CESA is to help states increase the quality and quantity of clean energy investments and to expand the clean energy market. The Clean Energy Group manages CESA, while Berkeley Lab provides CESA with analytic support.

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