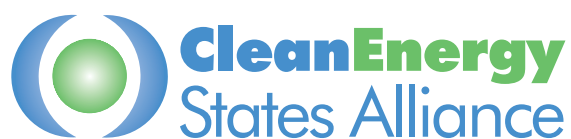




State Leadership in **Clean Energy** A W A R D S

Advancing Clean Energy Progress:
Past, Present, and Future

JUNE 2018





Contents

- 1 Introduction**
- 2 The 2018 Award Judges**
- 3 Connecticut Green Bank and PosiGen**
“Solar for All” Partnership
- 7 Massachusetts Clean Energy Center/
Massachusetts Dept. of Energy Resources**
Advancing Commonwealth Energy
Storage (ACES) Program
- 11 NYSERDA**
Clean Energy Communities Program
- 15 Oregon Department of Energy**
Renewable Energy Development
Grant Program
- 19 Rhode Island Office of Energy Resources**
Block Island Offshore Wind Farm
- 23 Xcel Energy Renewable Development
Fund (Minnesota)**
Minneapolis Park and Recreation Board
(MPRB) Solar Demonstration Project
- 27 CESA Members**

Cover Images

Front Cover:

(top) Block Island Offshore Wind Farm – Source: Deepwater Wind

(bottom left) Lake Nokomis Beach Solar Canopy – Source: Minneapolis Park and Recreation Board

(bottom middle) Electric Vehicle Charger in Ulster Country, NY – Source: Ulster County

(bottom right) Solar Homes in Connecticut – Source: PosiGen

Inside Front Cover: East Phillips Park in Minneapolis (Wall Mounted PV panels) – Source: Ray Colby/Sundial Solar

Inside Back Cover: PV System at Octagon Apartments, New York City – Source: NYSERDA

Introduction

This past year, the Clean Energy States Alliance (CESA) celebrated its 15th Anniversary as a national, nonprofit consortium of states with robust, renewable energy programs. It is wonderful to see the impressive progress that CESA-member organizations have made to advance clean energy over that time. The collective impact of the states' leadership and programs has been tremendous. In most parts of the country, and especially in states participating in CESA, the number of renewable energy installations has ramped up dramatically and clean energy deployment continues to grow. Both rooftop solar and utility-scale solar arrays are common sights; tens of thousands of wind turbines are churning out emission-free electricity; battery storage is in a period of rapid expansion; and various other clean energy technologies, including air-source heat pumps, wood pellet boilers, and biogas digesters, are gaining markets.

CESA's *State Leadership in Clean Energy Awards*, established in 2008 and held biennially, highlight the continuing progress and achievements by state clean energy programs across the U.S. Past award winners have included state programs that supported the first Solarize program in the country and created thermal renewable energy certificates (RECs), as well as solar lease programs, commercial PACE, solar RECs, and business incubator programs, to name a few.

The 2018 award winners continue a tradition of innovation and practical solutions. The six winning programs have shown vision, perseverance, and creativity. They have helped establish new markets for offshore wind, energy storage, and solar financing. They also have stimulated community-level clean energy actions and made solar PV more accessible. The awardees illustrate the wide range of clean energy activities that states are pursuing as they continue to transform clean energy markets.

The programs detailed in this summary report are excellent examples of effective state action. An independent panel of judges selected these six winners from among many other noteworthy efforts that were nominated. In conjunction with the release of this report, CESA is hosting a webinar series featuring each of the winning programs to provide additional information and lessons learned. We invite you to learn about the *State Leadership in Clean Energy Award* winners, past and present, at www.cesa.org/projects/state-leadership-in-clean-energy, where case study reports and webinar recordings can be accessed.

It is likely that the next 15 years will be as transformational as the last, with emerging technologies such as electric vehicles, energy storage, and offshore wind becoming more prevalent; and with established renewables such as solar PV and land-based wind becoming much more economical than fossil-fueled electricity. This future will be realized because of the leadership, actions, and decisions that states and their populations make to embrace clean energy technologies.

We look forward with great enthusiasm to a future with more state program innovations and clean energy progress in the years to come.

Maria Blais Costello

Manager of Program Administration, CESA

The 2018 Award Judges

The *State Leadership in Clean Energy Awards* are made possible by the generous donation of time and expertise by our panel of judges. These individuals have an impressive wealth of knowledge and experience related to clean energy. We would like to express our sincere appreciation for their enthusiasm and participation in this process.



Elizabeth Doris
Principal Laboratory
Program Manager,
National Renewable
Energy Laboratory

Elizabeth Doris is the Principal Laboratory Program Manager for State Local, and Tribal Audiences at the National Renewable Energy Laboratory. She manages a \$10M annual portfolio

and is responsible for developing and directing all aspects of NREL's relationship with these audiences and coordinating these activities across the laboratory. Liz has 18 years of program development and management experience in energy efficiency and renewable energy policy research and content expertise in energy policy, including over 50 publications on effective policies for clean energy development. Her current projects include NREL's Advanced Energy Systems Design Initiative, which uses high performance computing, NREL's world class energy decision-making tools, and high-end visualization to increase accessibility of technical information to stakeholders making today's complex energy decisions.



John Geesman
Former Commissioner
and Executive Director,
California Energy
Commission

John Geesman has been a soldier in California's energy revolution since the 1970s and has served in leadership positions at the California Energy Commission, the California

Power Exchange, and The Utility Reform Network. An attorney, he spent two decades in the bond markets as an investment banker and is winding up six years of regulatory litigation over the shutdowns of the San Onofre Nuclear Generating Station and the Diablo Canyon Nuclear Power Plant. From 2006 to 2011, John served as Co-Chair of the American Council on Renewable Energy and was a frequent speaker at national and international policy conferences. He is the author of two energy-related e-books and former executive producer of the blip-tv animated series, *Scurvy News Network*.



Sara Fisher-Goad
Senior Program Manager,
The Denali Commission

Sara Fisher-Goad was the Executive Director for the Alaska Energy Authority from February 2011 through July 2016. Sara was responsible for leading Alaska's energy office, including the development of energy policy, renewable energy projects, diesel powerhouse systems, bulk fuel tank farms, and energy efficiency projects. Sara lives in Washington DC and

works as a senior program manager for the Denali Commission, an independent federal agency designed to provide critical utilities, infrastructure, training and support for rural Alaska.



Rebecca O'Neil
Program Manager, Renewable
Energy Programs, Pacific Northwest
National Laboratory

Rebecca O'Neil oversees the laboratory's support of the EERE renewable power offices within the U.S. Department of Energy. Her personal research interests lie in energy storage regulatory development, electricity market design, hydropower valuation, and marine energy development. She is presently

serving a rotation into the U.S. Department of Energy's Water Power Technologies Office. Prior to her work at the federal level, Rebecca led several renewable energy and energy efficiency programs for the state of Oregon's Department of Energy, including the Renewable Portfolio Standard. She has also administered a utility energy efficiency incentive program and coordinated a coalition of river conservation and recreation organizations to participate in federal hydropower dam licensing.



Devashree Saha
Director of Energy & Environmental
Policy, The Council of State
Governments

Dr. Devashree Saha is the Director of Energy and Environmental Policy at the Council of State Governments where she works with state legislative, executive and judicial branch officials on a wide range of energy and environmental topics. Prior to joining CSG, Devashree was an associate fellow at

the Brookings Institution Metropolitan Policy Program where her research focused on the intersection of clean energy and economic development policy. She has published several highly impactful publications, including papers on clean energy financing, that have informed state and metropolitan policy making in the United States. Prior to joining Brookings, she worked at the National Governors Association on transportation and land use planning issues.

Program Highlights

- ▶ The *Solar for All* partnership has supported over 1,540 solar PV systems totaling over 9 MW in Connecticut, with 970 (63 percent) of these installations verified as low-to-moderate income homeowners.*
- ▶ These systems are estimated to produce over 280,000 MWh of electricity, and PosiGen's presence in Connecticut has generated over 45 direct jobs.
- ▶ Participating homeowners will save 20–30% on utility costs over the lifetime of their contracts.
- ▶ The *Solar for All* program has leveraged nearly \$40 million in private capital.
- ▶ Since the partnership was launched, solar penetration in Connecticut's low-income communities has increased 188 percent.

* RSIP-approved PosiGen projects through 5/31/18. In Connecticut, households earning less than 100% of the area median income are considered LMI.

Connecticut Green Bank and PosiGen “SOLAR FOR ALL” PARTNERSHIP

The Connecticut *Solar for All* program is a ground-breaking public-private partnership between the Connecticut Green Bank and PosiGen. The program offers a low-to-moderate income (LMI) targeted solar lease paired with energy efficiency measures for homeowners, regardless of income or credit. Since the partnership launched, solar penetration in Connecticut's low-income communities has increased 188 percent and 970 low-income verified households have signed up to go solar with PosiGen. *Solar for All* is an exemplary model of how to bring LMI energy solutions to scale and achieve inclusive prosperity in the clean energy economy.

Bringing the Benefits of Clean Energy to LMI Communities

Achieving participation by low- to moderate-income constituents in the clean energy economy is a key challenge throughout the United States. There are many barriers to going solar for low-income communities, including state program structures, access to financing, perceived and real credit-quality issues, inability to fully realize public incentives, education gaps, and contractors' customer acquisition strategies. All of these challenges can prevent solar from reaching LMI customers. By integrating the Green Bank's LMI solar financing resources with PosiGen's solar and energy efficiency product offerings, Connecticut has demonstrated a model for addressing several of these barriers.

With the *Solar for All* program, the Green Bank provides two types of financial support to advance low-income solar access in Connecticut. Through the Green Bank's Residential Solar Investment Program (RSIP), which provides incentives to residential solar PV installations across the state, the Green Bank offers an elevated performance-based incentive (PBI) for qualifying LMI solar projects. The LMI PBI enables contractors to offer more affordable pricing to LMI customers. In addition, the Green Bank has partnered with and provided financing to PosiGen Solar Solutions to help the company rapidly scale up an LMI-focused solar lease and energy efficiency savings agreement (ESA) product in Connecticut. The Green Bank's financial support includes direct credit enhancement of PosiGen's Connecticut lease fund in the form of \$5 million of subordinated debt and \$3.5 million in working capital.



A happy solar customer in New Haven, CT.
Source: PosiGen.

Connecticut Green Bank and PosiGen: “Solar for All” Partnership

Background on Connecticut’s Efforts

The Connecticut Green Bank was established through legislation in 2011 and is the country’s first full-scale Green Bank. The Green Bank supports clean energy deployment across several sectors, including single-family residential homes, multifamily properties, and commercial and institutional buildings. It is a state-supported institution that works with private-sector investors to create low-cost, long-term sustainable financing to maximize the use of public funds.

In 2012, the Green Bank launched the RSIP to provide up-front rebates and performance-based incentives to solar PV installations on owner-occupied residential properties through a declining block model. Within two years of launching the RSIP, Connecticut experienced tremendous growth in its residential solar market, expanding from 16 MW approved in 2012–2013, to 33 MW in 2014 alone.

Despite this success, only 11 percent of projects approved in 2014 were located in census tracts with a median income less than 80 percent of the area median income. While the RSIP was successful from the start in stimulating residential solar investment and development, it served few low-income customers.

To rectify this disparity, in 2015 the Green Bank established a unique low-to-moderate income performance-based incentive within the RSIP that is approximately three times higher than the market rate PBI. Because LMI homeowners frequently do not have a large enough tax burden to take advantage of the federal solar tax credit for owned systems, this incentive is available to third-party-owned solar PV installations that serve LMI customers. To qualify for the program, contractors must respond to an open RFQ with their proposed product pricing, marketing strategy, and general qualifications. The additional program requirements ensure that Green Bank-supported LMI solar projects will have a positive economic benefit for customers, are able to leverage all available revenue streams, and provide strong consumer protection.

The Green Bank provided a direct credit enhancement in the form of \$5,000,000 of subordinated debt to PosiGen’s Connecticut lease fund, as well as \$3.5 million in working capital loans to facilitate timing gaps associated with third-party tax equity financing.



Matilda and Hubert Young are excited about the new solar installation on their home in Bridgeport, CT. Source: Susan Young.

Recognizing that contractors interested in serving LMI solar markets may face unique challenges, and to spur early market development, in 2015 the Green Bank also issued a solar financing RFP to identify solar PV system providers for underserved markets. The purpose of this financing opportunity was to help the selected provider(s) establish solar businesses in Connecticut that are focused on LMI customers and to further ensure that contractors utilizing the LMI PBI would be successful in reaching underserved markets.

PosiGen responded to both opportunities and was approved by the Green Bank to participate in the LMI RSIP and the solar financing opportunity. PosiGen offers both a solar lease and an optional energy savings agreement that allows customers to install additional energy efficiency upgrades and pay for them over time. PosiGen’s product is available to customers regardless of income or traditional measures of creditworthiness. PosiGen’s model includes an alternative underwriting approach to qualify customers, and a community-based marketing model that targets LMI communities—two key ingredients to reaching this market segment.

Program Components

As mentioned above, the Green Bank approved PosiGen as a qualified solar contractor to access the RSIP LMI PBI and also selected the company to receive Green Bank investment under its solar financing RFP. The Green Bank provided a direct credit enhancement in the form of \$5,000,000 of subordinated debt to PosiGen's Connecticut lease fund, as well as \$3.5 million in working capital loans to facilitate timing gaps associated with third-party tax equity financing. In 2017, the RSIP program budget was \$13.6 million, \$1.5 million of which was appropriated to LMI solar projects.

The subordinated debt and working capital loans Green Bank provided to PosiGen have supported the company in attracting over seven times more private investment than the Green Bank's term financing contribution. These investments have supported a fund of \$37 million for PosiGen's Connecticut solar installations. The Green Bank support through the RSIP program's LMI PBI provides an additional stream of high-quality cash flows that further attracts third-party capital into PosiGen's Connecticut fund. In addition, by driving down the cost of capital through its participation in the financing structure, the Green Bank allows PosiGen to offer a more competitive solar lease product and achieve deeper savings for customers.

To further bolster chances of success within Connecticut's LMI market, the Green Bank provided strategic support to PosiGen on community partnerships, outreach, and general market research. The Green Bank helped to identify four communities in which to launch focused campaigns (Bridgeport, Hartford, New Haven, and New London) and facilitated introductions to non-profit and community-based organizations for potential partnering opportunities.

In 2017, Green Bank worked with PosiGen and C+C Consulting to complete an updated Connecticut LMI solar customer segmentation analysis which provided key insights into potential market segments, size, geographies, and messaging. The Green Bank also worked with Yale University and Experian to purchase and analyze a large dataset of Connecticut residents' credit and financial health. Both of these market analyses have supported the Green Bank and PosiGen in quantifying market potential, honing outreach strategies, targeting efforts, and measuring success.

Program Results

The *Solar for All* partnership demonstrates innovation in the way it tackles multiple barriers to LMI solar access while delivering a product that has real impact on household-level energy burdens. The combination of low-cost Green Bank

capital with the low-to-moderate income performance-based incentive provides security to PosiGen investors and enables PosiGen to offer an attractive lease product to customers. PosiGen's alternative underwriting approach circumvents many of the real and perceived credit-quality issues LMI homeowners face, and a lease offering for LMI homeowners allows customers to receive the full value of the federal investment tax credit in the price they pay for solar.

By partnering with the Green Bank, PosiGen has been regarded in the market as both a quality contractor and a trusted community partner. Consumer protections the Green Bank built into the program provide greater oversight to LMI contractors in the state and assurance that LMI solar adopters receive quality installations. By working with municipalities, community groups, and faith organizations to implement Solarize-style community campaigns and deliver their message, PosiGen has been able to enter new markets through trusted partners that can help educate homeowners on the benefits of solar and PosiGen's product offering.

In addition to solar access, customers are offered the opportunity to go deeper with energy efficiency improvements through an added \$10-a-month, 20-year energy savings agreement to further reduce energy burdens and make the most of the PV system. Nearly 100 percent of PosiGen customers receive basic energy efficiency services through the state's utility-run Home Energy Solutions program, and 70 percent of customers have opted to go deeper on efficiency with PosiGen's energy savings agreement. Participating homeowners will save 20–30 percent



Governor Dan Malloy joins staff from CT Green Bank, CT DEEP, PosiGen, and the town of Hamden, CT for a *Solar for All* kickoff event. From Left: Jody Goeler, Superintendent of Schools; Kathleen Schomaker, Town of Hamden; Bryan Garcia, CT Green Bank; Mary Sotos, CT DEEP; Tom Neyhart, PosiGen; and Connecticut Governor Dan Malloy. Source: Rudy Sturk, CT Green Bank.

Customers who go solar with PosiGen pay \$60-\$110 a month for a 4.5-8 kW system and receive an average net savings of \$450 each year. This equates to over \$690,000 in solar savings annually across PosiGen’s 1,540 solar homes.

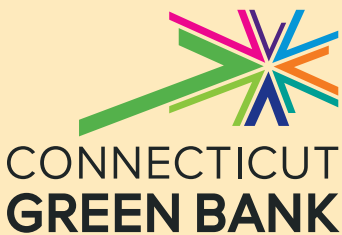
on utility costs over the lifetime of their contracts (based on Green Bank’s energy burden model which accounts for state electricity prices, estimated annual production, and cost of the solar lease over 20 years).

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Through the *Solar for All* program offerings and partnership, the Green Bank and PosiGen have demonstrated leadership in tackling difficult LMI energy issues and providing real solutions for moving the needle on inclusive prosperity. By taking a multi-pronged, strategic approach to addressing many of the barriers and needs of the state’s LMI communities, the Green Bank and PosiGen have been able create a model that works for Connecticut homeowners and that could be replicated by other states that want to provide solar benefits to LMI customers and meaningful reductions to LMI energy burdens.

Judges’ Comment

“Bringing the benefits of solar power to low-income communities is challenging and has numerous obstacles. The Connecticut Green Bank’s Solar for All partnership is a smart and well-designed program that is having tangible impacts by lowering the utility bills for over 800 low-income homeowners who have been able to go solar so far. The public-private partnership structure has allowed the Connecticut Green Bank to use limited public dollars to attract sevenfold private investment, maximizing the program’s impact.”



About the Connecticut Green Bank

The Connecticut Green Bank was established by the Connecticut General Assembly on July 1, 2011 as a part of Public Act 11-80. As the nation’s first full-scale green bank, it is leading the clean energy finance movement by leveraging public and private funds to scale-up renewable energy deployment and energy efficiency projects across Connecticut. The Green Bank’s success in accelerating private investment in clean energy is helping Connecticut create jobs, increase economic prosperity, promote energy security and address climate change. In 2017, the Connecticut Green Bank received the Innovations in American Government Award from the Harvard Kennedy School Ash Center for Democratic Governance and innovation for their “Sparking the Green Bank Movement” entry. For more information about the Connecticut Green Bank, please visit www.ctgreenbank.com.

For more information:

www.ctgreenbank.com
www.posigen.com

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Program Highlights

- ▶ ACES supports 26 demonstration projects, showcasing both monetizable and non-monetizable benefits, that will dramatically increase the state's storage capacity.
- ▶ The Commonwealth's \$20 million in grant funds is bolstered by a minimum 50 percent cost-share match, leveraging another \$31 million in cost-share.
- ▶ ACES-supported projects will demonstrate how currently non-monetizable benefits from energy storage projects can be assessed and defined for value, and the projects' results will inform policy recommendations for industry and the state.
- ▶ ACES projects will demonstrate replicable business models in diverse applications including residential, hospital, transportation, agriculture, and many others.

Massachusetts Clean Energy Center/ Massachusetts Dept. of Energy Resources

ADVANCING COMMONWEALTH ENERGY STORAGE (ACES) PROGRAM

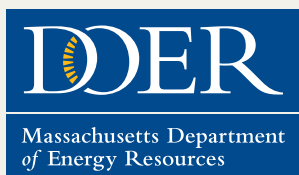
The Advancing Commonwealth Energy Storage (ACES) grant program, part of the Baker-Polito Administration's Energy Storage Initiative (ESI), was created to jump-start the energy storage industry by piloting innovative, broadly-replicable energy storage demonstration projects with multiple value streams, thereby priming Massachusetts for increased commercialization and deployment. ACES grants totaling \$20 million will support 26 demonstration projects, spanning nine use cases and 14 business models, which will collectively add 83 MWh to the grid where only 7 MWh currently exists. This is expected to accelerate the adoption of storage technologies, provide benefits to customers and utilities, highlight market and regulatory barriers, and help Massachusetts reach its immediate goal of 200 MWh of energy storage installed by January 1, 2020.

A Strategic Statewide Commitment to Advancing Energy Storage

Energy storage is a clean energy enabling technology with many potential benefits to the electric grid and all segments of the energy market. In the first phase of the Massachusetts Energy Storage Initiative (ESI), the Massachusetts Department of Energy Resources (DOER) and the Massachusetts Clean Energy Center (MassCEC) produced an energy storage study, *State of Charge*, which presented a broad view of energy storage technologies in order to inform future policy and programs. The study provided insights into the Massachusetts-specific context and regional context to advance energy storage interests in the Commonwealth based on analysis of grid conditions in Massachusetts and lessons from other states.



Interior of battery storage system container in Sterling, MA. Source: CESA.





Massachusetts Governor Charlie Baker (back row, center) joins MassCEC CEO Stephen Pike, Massachusetts Department of Energy Resources Commissioner Judith Judson, and MassCEC's 2017 ACES award recipients at UMass Memorial Marlborough Hospital in December 2017. Source: Massachusetts Clean Energy Center.

The *ACES Program* is part of ESI's second phase. It was designed to catalyze the energy storage market in Massachusetts and to demonstrate how storage systems can achieve benefits that are currently non-monetizable, a significant barrier to the development of the storage market that was identified by the *State of Charge* report.

These benefits include cost reductions in the wholesale market; provision of ancillary services; lowered energy prices; services to the transmission and distribution grids; increased renewables integration; reduced peak demand; resiliency benefits; and greenhouse gas emissions reductions. *ACES*-funded projects aim to educate customers, utilities, consumers, policy makers and a variety of industry stakeholders on the benefits of energy storage; encourage appropriate regulatory and market reform to broaden the monetizable use cases available to energy storage; and help de-risk future investments in energy storage projects.

A Wide Array of Projects Demonstrate the Range of Benefits from Energy Storage

MassCEC and DOER worked in partnership to create the *ACES Program*. They received support from the U.S. Department of Energy's Office of Electricity, the Clean Energy States Alliance, and Sandia National Laboratories.

In December 2017, \$20 million dollars of funding was awarded to 26 projects under the *ACES Program*. These projects demonstrate nine diverse energy storage use cases and a variety of monetizable benefits and system-owner savings. The program's focus on replicable business models (14 distinct models were awarded) is expected to accelerate storage commercialization by showcasing adoptable and achievable examples of projects that provide multiple customer benefits, system benefits, and

positive economic returns. Most projects provide system benefits and some address specific local energy challenges. *ACES* grantees provide a foundation for the industry to demonstrate storage services and benefits for which no markets currently exist or where there are no existing methods for storage providers to be proportionally compensated for the services their systems provide.

Projects span a variety of use cases including transit, behind-the-meter commercial and industrial solar plus storage, municipal light plant assets, medical facility applications, and a merchant co-located with traditional generation plant, among others. Examples of replicable business models include owner owned and operated energy storage systems, storage-as-a-service, developer or third-party financed systems, and energy storage system leases, among others.

The 26 projects also represent a diverse set of energy storage technologies, including lithium-ion, zinc-iron flow, vanadium-redox flow, ice thermal technologies, and flywheels. While there is significant representation of lithium-ion battery technology among the awarded projects, the range of technologies among the *ACES* projects is more diverse than in

In December 2017, \$20 million dollars of funding was awarded to 26 projects under the *ACES Program*. These projects demonstrate nine diverse energy storage use cases and a variety of monetizable benefits and system-owner savings.

the current U.S. energy storage market, representing a unique opportunity for increased commercialization and deployment of emerging technologies in Massachusetts. Most of the projects involve integration with other clean energy technologies, such as solar photovoltaics, promoting innovative opportunities to increase deployment of renewable energy.

The *ACES Program* leveraged significant private investment. Awarded projects are required to provide at least a 50 percent cost-share match to their ACES grant amount, enabling the program to extend the impact of its grant funds even further. For the 26 projects under ACES, this amounts to approximately \$20 million in DOER grant funds and \$31 million in leveraged cost-share.

Jump-Starting an Industry

The *ACES Program* is the state's first substantial investment in energy storage projects and is designed to significantly catalyze the market. While technology demonstration programs are common, this program is unique in its business model demonstration objectives.

Broad replicability was a critical primary selection criterion of selected projects in order to prime Massachusetts for

The *ACES Program* leveraged significant private investment. Awarded projects are required to provide at least a 50 percent cost-share match to their ACES grant amount, enabling the program to extend the impact of its grant funds even further.

increased commercialization and deployment of storage technologies. To further promote the replicability and analysis of storage technologies, MassCEC intends to publicly share anonymized and aggregated lessons learned from the projects at periodic intervals, so that *ACES* awardees, as well as future projects, may consider these results in new project design and implementation. The lessons are expected to span the market, regulatory, and policy landscapes and will be of benefit to industry, policy makers, and customers. MassCEC also plans to hold periodic stakeholder meetings to share these lessons and foster discussions in an interactive setting.

The data collection, project reports, and insights from *ACES* projects will provide Massachusetts the opportunity

Advancing Commonwealth Energy Storage (ACES)



Host Site Types



Utility

8 sites



Commercial

9 sites



Education

3 sites



Hospital

2 sites



Residential

2 sites



Manufacturing

1 site



Agriculture

1 site



Transit

1 site



Hotel

1 site



DOD

1 site



Biotech

1 site

"Utility" icon created by Georgiana Velez from the Noun Project, "Commercial" icon created by Mikhail Nizhny from the Noun Project, "Education" icon created by Noddy from the Noun Project, "Hospital" icon created by Romagosa from the Noun Project, "Residential" icon created by Marisa Luvion from the Noun Project, "Manufacturing" icon created by Evard from the Noun Project, "Agriculture" icon created by Andrew Adams from the Noun Project, "Transit" icon created by John Spring from the Noun Project, "Hotel" icon created by Aaron Cooper from the Noun Project, "DOD" icon created by Chris Couder from the Noun Project, "Biotech" icon created by ADF Arnold from the Noun Project

The *ACES Program* is expected to have long-lasting impacts on the energy storage industry. Its successful demonstration of monetizable and non-monetizable benefits will help support new energy storage applications and markets in the Commonwealth and beyond.

to implement policy and market mechanisms to address barriers to large scale energy storage deployment

The *ACES Program* is expected to demonstrate that storage is ready to enter new markets at a time when efforts are underway to incorporate storage into existing programs such as the Alternative Portfolio Standards, energy efficiency plans, and

the Solar Massachusetts Renewable Target incentive program. Additionally, Order No. 841, issued by the Federal Energy Regulatory Commission, now requires Independent System Operators and Regional Transmission Organizations to revise market rules to allow energy storage to participate and to take the operational attributes of storage into account.

The *ACES Program* is expected to have long-lasting impacts on the energy storage industry. Its successful demonstration of monetizable and non-monetizable benefits will help support new energy storage applications and markets in the Commonwealth and beyond.

Judges Comments

"Storage is the holy grail in terms of integrating large volumes of renewables into the grid, but it is still in the early stages of market development. By demonstrating effective energy storage use cases and business models, the ACES program will have impacts far beyond Massachusetts."



Massachusetts Clean Energy Center (MassCEC)

MassCEC is a state economic development agency dedicated to accelerating the growth of the clean energy sector across the Commonwealth to spur job creation, deliver statewide environmental benefits, and secure long-term economic growth for the people of Massachusetts. MassCEC works to increase the adoption of clean energy while driving down costs and delivering financial, environmental, and economic development benefits to energy users and utility customers across the state. MassCEC manages the Renewable Energy Trust fund for the state. www.masscec.com



Massachusetts Department of Energy Resources (DOER)

DOER develops and implements policies and programs aimed at ensuring the adequacy, security, diversity, and cost-effectiveness of the Commonwealth's energy supply to create a clean, affordable and resilient energy future. As part of DOER, the Emerging Technology Division works with other DOER Divisions and related state and federal agencies to develop programs and initiatives which promote energy resilience, energy storage and electric vehicle technologies. www.mass.gov/doer

For more information:

<http://www.masscec.com/advancing-commonwealth-energy-storage-aces>

Read summaries of all 26 projects at:

<http://files.masscec.com/Simplified%20Projects%20Summary.pdf>

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Program Highlights

- ▶ The *Clean Energy Communities Program* encourages and financially supports clean energy solutions that incorporate tools and services from New York State Agencies and Authorities, while supporting trusted community champions to help implement local plans to deploy clean energy technologies.
- ▶ The *Clean Energy Communities Program* presents a clear roadmap for communities to engage in clean energy in a way that saves money while driving economic development.
- ▶ More than 400 local governments have completed more than 1,155 high impact actions. These governments represent over 16 million New Yorkers, which is more than 84 percent of the state's population.*

* As of 6/25/18

NYSERDA

CLEAN ENERGY COMMUNITIES PROGRAM

NYSERDA's *Clean Energy Communities* program helps local governments earn recognition and grant funding by demonstrating their clean energy leadership. NYSERDA has identified 10 high-impact actions that local governments can take to reduce energy costs, create jobs, and protect the environment. By completing four of the ten actions, the applying jurisdiction earns the *Clean Energy Community* designation. Additionally, the jurisdiction can apply for a grant, with no cost share, between \$50,000 and \$250,000 to support additional clean energy projects in the jurisdiction. Since the program was launched in August 2016 by Governor Andrew M. Cuomo, 413 communities from across the state have completed more than 1,155 high-impact actions. These communities represent more than 16 million New Yorkers, over 84 percent of the state's population. As of late June 2018, 195 communities have earned the Clean Energy Community designation.

Supporting Local Governments to Implement Clean Energy

Local governments play a critical role in affecting energy choices in their communities, but many local governments in New York State were not aware of available clean energy initiatives and funding opportunities. Those that were aware of the opportunities often struggled with how to prioritize, and eventually implement, those actions that would have the greatest impact in terms of meeting local needs, cost savings, and environmental benefits. The *Clean Energy Communities Program* provides local governments with a simple, but robust and flexible, framework to guide them through implementation of the most impactful clean energy actions. It includes:



Bradford Tito, NYSERDA's program manager for Communities and Local Government, joined local officials from the Town of Hempsted, NY, America's largest township, to celebrate their Clean Energy Communities designation. Source: NYSERDA

NYSERDA: Clean Energy Communities Program

A Clear Roadmap: *Clean Energy Communities* is designed to help save energy and money, in both the municipalities' budgets, and within homes, businesses, and community institutions. It guides communities looking to save money, foster a vibrant economy, and improve the environment.

Help for Resource-Constrained Local Governments:

Dedicated and knowledgeable Clean Energy Coordinators from regional planning organizations are available to provide free on-demand technical assistance, step-by-step guidance, case studies, model ordinances, and project development support.

Funding to Support Local Priorities: The program is designed to provide grants to a total of 163 communities. Grant funding with no local cost share is available to support clean energy projects—up to \$250,000 for large communities (+40,000 population) and up to \$100,000 for small/medium communities (0–39,999 population). Grants are awarded to the first 18 communities in each of the state's ten Regional Economic Development Council regions, except for the New York City region where only New York City is eligible for a grant. Within each region, funding is set aside for large and small/medium-sized communities so communities in each region are only competing against those of similar size in their region. This *Clean Energy Communities* designation competition drives deep penetration of the program in every part of the state. Once all the grants are claimed in a size category or region, communities may still earn the *Clean Energy Community* designation but are not eligible for grant funding.

Clean Energy Communities resonates with a large cross-section of the state's communities and presents opportunities for even the smallest towns to benefit. The program has made major inroads in urban, rural, and suburban communities across the state from Western New York to Long Island.

Clean Energy Community Impact Areas

As part of the *Clean Energy Communities Program*, NYSERDA identified 10 high-impact clean energy actions that local governments can take to reduce energy costs, stimulate the economy, and protect the environment. By completing four of the 10 high-impact actions, municipalities earn the *Clean Energy Community* designation. At least two actions must be completed after August 1, 2016, when the program was launched. The high impact actions are:

1. **Benchmarking:** Adopt a policy to report the energy use of municipal buildings



Members of the Town of Chatham's Climate Smart Committee with the electric vehicle charging station they had installed as part of the Clean Energy Communities program. Source: Town of Chatham, NY.

2. **Clean Energy Upgrades:** Achieve 10 percent reduction in greenhouse gas emissions from municipal buildings
3. **LED Street Lights:** Convert at least half of the jurisdiction's street lights to energy efficient LED technology
4. **Clean Fleets:** Install electric vehicle charging stations or deploy alternative fuel vehicles in the municipal fleet
5. **Solarize:** Undertake a local solarize campaign to increase the number of solar installations
6. **Unified Solar Permit:** Streamline the approvals process for local solar projects
7. **Energy Code Enforcement Training:** Train compliance officers in energy code best practices
8. **Climate Smart Communities Certification:** Get certified by the New York State Department of Environmental Conservation
9. **Community Choice Aggregation:** Put energy supply choices in the community's hands
10. **Energize New York Finance:** Establish a Property Assessed Clean Energy (PACE) financing program for businesses and non-profits

Providing Technical Assistance to Ensure Success

To help local governments prioritize and implement the high-impact actions and navigate the program, expert guidance is provided by *Clean Energy Communities* Coordinators, at no cost to the local government. The Coordinators are funded by NYSERDA and based at regional planning organizations that have long-standing relationships with local governments in their regions. Their services include meeting with municipal staff, answering questions, preparing LED street light cost-

benefit reports, providing assistance with software for tracking municipal energy use, and identifying grant opportunities for electric vehicles and charging infrastructure.

Coordinator and community discussions are documented in customer relationship management (CRM) software. This allows program staff to track engagement with communities. *Clean Energy Community* Coordinators are currently in active discussions with nearly 600 communities state-wide. While 1,155 actions have been completed, communities are either considering or executing nearly 2,000 additional actions. Having this level of granular information collected with the CRM software allows for robust analysis to better understand the pipeline of high-impact actions and anticipate needs. NYSERDA has employed a wide range of data analytics and visualization to help target program resources. For example, this information allows the Coordinators to apply different strategies and tactics for moving a community from being “inactive” to “engaged” and from “engaged” to “participating” and from “participating” to “designated.” Applying a sales approach to high-impact action engagement has helped maximize the impact of the program.

Clean Energy Communities resonates with a large cross-section of the state’s communities and presents opportunities for even the smallest towns to benefit. The program has made major inroads in urban, rural, and suburban communities across the state from Western New York to Long Island.

Clean Energy Communities also offers online toolkits for each high-impact action with resources including step-by-step guides, calculators, case studies, and model language that communities can incorporate into legislation. These toolkits ensure the program will continue after funding is expended.

Once a community earns the *Clean Energy Community* designation, it has three months to submit a proposal for use of the grant. NYSERDA evaluates proposals to ensure they present a sound approach; reduce energy use and greenhouse gas emissions; transfer knowledge to the broader region and state; are innovative and replicable; and leverage public and private dollars and/or generate economic development benefits. A total of 111 grants have been awarded for projects that include converting street lights to LED, installing solar on

municipal buildings, purchasing electric vehicles, and making energy upgrades to wastewater treatment facilities.

Cost Effectiveness

Clean Energy Communities is a three-year initiative to award \$16 million in grants to local communities. The program is supported by an additional five-year, \$9 million contract for the network of *Clean Energy Community* Coordinators who will meet with municipal staff, to provide technical assistance, answer questions, prepare reports, and identify additional grant opportunities.

Program Results and Replicability

Clean-energy actions completed so far through the program include:

- 243,978 street lights converted to LED
- 612 electric vehicles deployed
- 670 electric vehicle charging points installed
- 357 municipal officials trained in Energy Code enforcement
- 192 laws passed to track and report the energy use in municipal buildings
- 215 communities have streamlined the permitting process for local solar projects

NYSERDA estimates clean energy high-impact actions taken to date have reduced greenhouse gas emissions by 126,000 tons annually—equivalent to taking 27,000 cars off the road.



The first *Clean Energy Community* designated in New York was Ulster County. Amanda LaValle and Mike Hein stand next to the EV charging station the County installed as part of the *Clean Energy Communities* Program. Source: County of Ulster.

While the *Clean Energy Communities* program is based around high impact actions that address the needs of New York jurisdictions, the program design could easily be adapted to include additional high-impact actions applicable to other locations.

NYSERDA has promoted the program through email blasts, newsletters, press releases, and press events. Most communities engage with the program as a direct result of local elected officials and staff having face-to-face meetings with NYSERDA staff and *Clean Energy Community* Coordinators. NYSERDA staff and *Clean Energy Community* Coordinators have presented at dozens of events and conferences across the state. Many webinars have educated municipal officials and community stakeholders on a range of topics.

The *Clean Energy Communities* program is replicable in other states, nationally and globally. Communities can take many practical steps to address their energy challenges. While the *Clean Energy Communities* program is based around high impact actions that address the needs of New York jurisdictions, the program design could easily be adapted to include additional high-impact actions applicable to other locations.

Other programs require communities to complete a certain number of pre-defined actions to earn designation or certification, but those programs often include more than 100 actions, as opposed to *Clean Energy Communities* which provides a short list of 10 high-impact actions.

Judges' Comments

"This is a high-impact program, demonstrating results in a short period of time, and pushing new solutions as well as existing ones. NYSERDA's Clean Energy Communities Program has effectively incentivized communities to participate, and it seems likely that momentum will continue after the program ends."



About NYSERDA

The New York State Energy Research and Development Authority, known as NYSERDA, promotes investment and innovation in clean energy and energy efficiency in ways that improve New York's economy and environment. Collectively, NYSERDA's efforts aim to reduce greenhouse gas emissions, accelerate economic growth, and reduce customer energy bills. NYSERDA works with stakeholders throughout New York including residents, business owners, developers, community leaders, local government officials, university researchers, utility representatives, investors, and entrepreneurs. NYSERDA partners with them to develop, invest, and foster the conditions that:

- Attract the private-sector capital investment needed to expand New York's clean energy economy
- Overcome barriers to using clean energy at a large scale in New York
- Enable New York's communities and residents to benefit from energy efficiency and renewable energy.

Governed by a 13-member Board, NYSERDA has provided objective information and analysis, technical expertise, and support in New York State since 1975.

For more information:

<https://www.nyserda.ny.gov/All-Programs/Programs/Clean-Energy-Communities>

Contact

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Program Highlights

- ▶ As the first tax credit auction in the country, the *RED Grant Program* is an innovative means to provide funds to award grants for renewable energy production systems.
- ▶ Approximately \$5 million has been awarded through the *RED Grant Program*. An additional \$2 million will be allocated in spring 2018.
- ▶ Once all 55 awarded projects are built, they will generate approximately 103 million renewable kilowatt hours each year in total, which could prevent the release of more than 156 million pounds of CO₂ annually.

Oregon Department of Energy RENEWABLE ENERGY DEVELOPMENT GRANT PROGRAM

The Oregon Department of Energy's *Renewable Energy Development (RED) Grant Program* promotes investment in, and development of, renewable energy projects by providing competitive grants up to \$250,000 for businesses, public bodies, schools, nonprofits, and tribes that install and operate a renewable energy system that produces electricity. Since 2012, ODOE has awarded nearly \$5 million for 55 renewable projects statewide, including solar, hydropower, biogas, biomass, and geothermal installations. The program taps into an innovative funding source—an independently administered auction of tax credits—to help the agency serve Oregonians without using scarce general fund dollars.

An Innovative Finance Mechanism Leverages Limited Public Dollars and Encourages Private Investment

Oregon's *Renewable Energy Development (RED) Grant Program*, which started in 2011, was funded by the state's first-ever state tax credit auction. This innovative financing mechanism combines the benefits of a direct grant program, where everyone can participate, with the benefits of the auction format, which encourages private investment in renewable energy. Most of the Oregon Department of Energy's (ODOE) incentive programs have historically been in the form of tax credits. However, it's challenging for organizations that don't have tax liability, including nonprofits, government agencies, and schools, to participate. The auction allows bidders with tax credit appetites to support renewable grants to entities without tax liabilities.



This solar array at Bend Area Habitat for Humanity ReStore received awarded \$36,120 in *RED Grant Program* funds by the Oregon Department of Energy. Source: Jennifer Kalez, Oregon Department of Energy.

Oregon Department of Energy: Renewable Energy Development Grant Program



This solar array at Coyote Trails School of Nature in Medford, OR was awarded \$11,356 in *RED Grant Program* funds by the Oregon Department of Energy. Source: Jennifer Kalez, Oregon Department of Energy.

During each round of the auctions that fund the *RED Grant Program*, Oregonians bid on tax credit certificates in increments of \$500; the minimum bid is \$475, and the average bid from the most recent auction was \$551.70 with the highest bids winning. Buyers use the tax credits to reduce the amount they owe in state taxes. Additionally, buyers may be able to consider the tax credit purchase a charitable donation which they can deduct from their federal taxes, leading to bids in excess of the face value of the credit. Besides the financial incentive to participate in the auction, many bidders are motivated by the opportunity to support renewable energy development in Oregon.

All revenue from the tax credit auctions goes towards the *RED* grants. Most of the cost of administering the *RED Grant Program* is covered by a \$500 application fee and a 1.25 percent fee for projects selected for technical review. Since

the program's creation in 2011, the Oregon Department of Revenue has held nine auctions providing over \$8.5 million for *RED* grants. Oregon statute sets the maximum amount of tax credits that can be auctioned each biennium at \$3 million. Other benefits of the tax credit auction are that it allows more revenue to be generated than the actual value of the tax credits, and that proceeds from the tax credit auction can earn interest once deposited in the *RED* grant subaccount.

RED Grant Program funds often leverage funding from other sources, such as federal grant programs, Energy Trust of Oregon support, and programs by Oregon utilities. Leveraged amounts vary by project and organization, but many awardees earn a variety of funds thanks to the strength of their projects. For example, in the case of the Bend Area Habitat for Humanity's ReStore, the nonprofit installed a 56-kilowatt solar photovoltaic system with \$0 out of pocket after ODOE's *RED* grant and grants from Energy Trust of Oregon and Pacific Power's Blue Sky Renewable Energy program. The electricity cost savings from the solar array on the organization's ReStore support homeownership programs.

Program Guidelines Support Diverse and High-Quality Projects

The *RED Grant Program* supports renewable energy installations across the state—many of which would not be completed without the *RED* grant funding. The program also reaches diverse communities, as well as large and small organizations.

Since the program's creation in 2011, the Oregon Department of Revenue has held nine auctions providing over \$8.5 million for *RED* grants. Oregon statute sets the maximum amount of tax credits that can be auctioned each biennium at \$3 million.

To apply for a grant, project owners submit an application in response to an open opportunity announcement. ODOE has developed a two-tier system for the competitive grants, so similarly sized projects compete together. For a \$2 million grant round, the agency allocates about \$500,000 in *RED* grant funds to projects sized up to 300 kW, and \$1.5 million to projects greater than 300 kW. The competitive process includes a careful review of projects and may adjust award amounts to help spread funding to more applicants.

Projects are scored using several criteria, including amount of energy generated, resource diversity to support a variety of renewable types, and community benefits. Projects are awarded additional points for factors that achieve special public benefits, including: installations in rural communities and those with high unemployment rates; community-owned systems that benefit the larger community rather than just the building's owner; and the number of jobs created and sustained by the project. For the 2018 *RED* grant round, points will also be awarded for projects that are designed with resiliency in mind. Renewable systems that are capable of supplying electricity when the larger grid is unavailable—due to extreme weather or other emergencies—will earn more points.

In addition to providing funding, ODOE offers technical assistance and resources to entities exploring how to integrate renewable energy generation into their processes and/or footprint. These same resources are available to entities not seeking *RED* funding.

Top-ranked applications go through a technical review process: ODOE reviews the information provided in the application against industry standards to determine whether the project is technically feasible and should operate in accordance with the representations made by the applicant. If the project passes technical review, the renewable energy projects are awarded a performance agreement.

Projects must start construction within 12 months of the execution of the performance agreement. During construction, the applicant makes periodic progress reports to ODOE. Each project's performance agreement provides the timeframe to complete the project, usually two to three years.

Once projects are constructed and operating, project owners submit a final report documenting that the performance agreement has been satisfied. ODOE reviews the submitted material and conducts a site visit before dispersing grant funds. All projects issued a grant must remain in operation for at least five years to ensure that scarce funds are spent on long-sustaining projects. ODOE may inspect a project throughout the required five-year period of operation.

Since the *RED Grant Program* began, 35 projects—all solar installations—have been completed, totaling \$2.2 million in grants. Twenty more projects totaling \$2.8 million have been awarded tentative grants but have not yet been completed. Most of these projects are also for solar, but biogas, hydro-electric, and geothermal projects are also in process. The \$5 million in grant funding for the 55 projects is supporting nearly \$75 million in total costs for the projects.

In many cases, *RED Grant Program*-funded projects have helped awardees reduce electricity bills to zero and have influenced additional sustainability projects. For one project, at Coyote Trails School of Nature in Medford, the installed solar array has become part of the school's teaching curriculum. ODOE has highlighted several *RED* projects and their benefits on ODOE's blog and podcast: energyinfo.oregon.gov.

In addition to providing funding, ODOE offers technical assistance and resources to entities exploring how to integrate renewable energy generation into their processes and/or footprint. These same resources are available to entities not seeking *RED* funding.

Program Success

The average award amount has increased over the years, as more Oregonians participate in the *RED Grant Program* auction to support clean energy:

Year RED of Application	Average Amount Awarded/ Offered/In Process
2012	\$36,365
2013	\$86,346
2014	\$26,216
2015*	\$91,420
2017	\$140,175

* Two Opportunity Announcements offered in 2015, none in 2016.
Data as of 1/24/18

Renewable energy projects supported by the grant program offset carbon emissions and reduce pollution caused by fossil fuel-generated energy. In total, the 55 awarded projects—both small-scale and very large-scale—are expected to generate approximately 103 million renewable kilowatt hours (kWh) each year, reducing carbon dioxide emissions by an estimated 156 million pounds annually.

A Model for Other States

The program is replicable by other states or jurisdictions. For states or jurisdictions that want to start slowly, the *RED Grant Program's* tier for smaller renewable energy generating projects could offer a modest way to begin supporting renewable energy generation and worthwhile community projects without committing large amounts of funding. With the continual drop in many renewable energy-related costs, even a small grants program can have a big impact.

The *RED Grant Program's* innovative funding method could be replicated by other states or jurisdictions that allow the sale of tax credits. The Oregon Legislature's House Bill 3672 (2011) established the parameters of the tax credit sales for renewable energy development contributions, and Administrative Rule 330-200-0000 implemented the program at ODOE.

For states or jurisdictions that want to start slowly, the *RED Grant Program's* tier for smaller renewable energy generating projects could offer a modest way to begin supporting renewable energy generation and worthwhile community projects without committing large amounts of funding.

Judges' Comments

"The Oregon Department of Energy's Renewable Energy Development Grant Program has an innovative funding structure that makes efficient and productive use of tax dollars. It is a creative way to use a tax credit program to support entities that may not be able to take advantage of tax credits: public agencies, schools, and nonprofits."



About the Oregon Department of Energy

The Oregon Department of Energy (ODOE) implements the state's energy goals and policies. ODOE programs help the state maximize energy efficiency and conservation, expand home-grown energy resources, and support innovations in demand response, energy storage, and resiliency. ODOE reports to the governor's office and to the state's legislative and judicial branches. ODOE also staffs the Energy Facility Siting Council, which is responsible for siting Oregon's large energy facilities.

For more information:

<http://www.oregon.gov/energy/At-Work/Pages/Renewable-Energy-Grants.aspx>

Contact

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Program Highlights

- ▶ The *Block Island Offshore Wind Farm* was the first offshore wind project successfully built in the U.S. and has helped create considerable momentum behind further offshore wind development along the Atlantic Coast.
- ▶ Strong support and considerable work by Rhode Island State Government over nearly a decade made the five-turbine project possible.
- ▶ The *Block Island Offshore Wind Farm* is capable of powering about 17,000 homes; and the town of New Shoreham uses only 1/6th of the power generated by the wind farm, with the rest of the power transmitted back to the mainland.
- ▶ Block Island residents previously had some of the highest power rates in the country due to local generation by small diesel-powered generators. Now, energy officials estimate that the average household will save \$30 per month.



Rhode Island Office of Energy Resources

BLOCK ISLAND OFFSHORE WIND FARM

In December 2016, Rhode Island became home to North America's first offshore wind farm with the successful installation and operation of the 30 MW Block Island Offshore Wind Farm. This five-turbine project was developed by Deepwater Wind, headquartered in Providence, Rhode Island. It was advanced and developed with the support and active participation of the administrations of three Governors starting in 2007. The wind farm has helped launch a new clean energy industry and is leading to additional, larger offshore wind farms along the Atlantic Coast. The project is also notable for helping to connect Block Island (an island off the state's southern coast) to the mainland electrical grid for the first time.

Becoming the First: From Concept to Reality

Rhode Island first began exploring the concept of offshore wind development in 2007. In subsequent years, a wide range of parties were involved with the process, including the Rhode Island Office of Energy Resources (OER) and other state energy and environmental regulatory agencies, federal governmental agencies, fisheries trades and businesses, and the University of Rhode Island (URI).

The Rhode Island General Assembly passed legislation in 2009 and 2010 that enabled the *Block Island Offshore Wind Farm* to be built through a long-term, power purchase agreement (PPA) with the Narragansett Electric Company/National Grid, the state's investor-owned utility. The PPA guaranteed a buyer for the power to be produced by the wind farm and helped to secure the needed financing



The fifth of five wind turbines being installed off Block Island, RI. Source: Deepwater Wind



Block Island Offshore Wind Farm as seen from Block Island in January 2018. Source: Shauna Beland/RI OER.

for the project. Prior to the adoption of this state law, it was impossible for a PPA to be issued or awarded for offshore wind. Because of the law, Deepwater Wind, the developer of the *Block Island Offshore Wind Farm*, was able to enter into a long-term PPA with National Grid.

The Rhode Island Coastal Resource Management Council (CRMC) and URI developed an Ocean Special Area Management Plan (Ocean SAMP) that was adopted in 2010. The Ocean SAMP and associated research and stakeholder meetings occurred with state agencies (Coastal Resource Management Council, Department of Environmental Management), URI, environmental

The U.S. Department of Interior's Bureau of Ocean Energy Management has recognized Rhode Island's Ocean SAMP as a model that other states could utilize in evaluating offshore wind opportunities in coordination with other state and federal water uses.

nonprofits, and fisheries trade organizations between 2009 and 2011, and looked at the differing uses of the state waters. This provided a context for evaluating potential offshore wind projects. The Ocean SAMP resulted in the selection of the Block Island wind farm location. It also identified suitable locations for future offshore wind projects in federal waters adjacent to Rhode Island and Massachusetts state waters. The U.S. Department of Interior's Bureau of Ocean Energy Management has recognized Rhode Island's Ocean SAMP as a model that other states could utilize in evaluating offshore wind opportunities in coordination with other state and federal water uses.

The *Block Island Offshore Wind Project* began construction in the summer of 2015 with the installation of the jacket system foundations. The wind turbines (blades, nacelles, towers) were installed in the summer of 2016. The project became commercially operational with National Grid in December 2016. The town of New Shoreham on Block Island officially turned off its diesel generators in May 2017, becoming the first and only town in North America to be 100 percent powered by offshore wind.

Rhode Island Governor Gina Raimondo remarked that: “Rhode Island is proud to be home to the nation’s first offshore wind farm—and I’m proud to be the only governor in America who can say we have steel in the water and blades spinning over the ocean.”

The Role of the Rhode Island Office of Energy Resources

The Office of Energy Resources played a variety of important roles in advancing the *Block Island Offshore Wind Farm* project between 2007 and 2016. OER worked with the CRMC and URI in securing funds that enabled the Ocean SAMP research to be conducted between 2008 and 2012 to examine offshore wind opportunities in state and federal waters. OER also worked in coordination with the state’s Department of Transportation and Department of Environmental Management as well as National Grid to determine the location for the submerged transmission cable coming to the mainland from the Block Island Wind Farm. Additional coordination with the Public Utility Commission was also necessary. The cable was installed at Narragansett State Beach.

The considerable attention the *Block Island Offshore Wind Farm* has received since it went online, its popularity with a wide range of Rhode Island stakeholders, and the opportunity it has given many people to visit an operating offshore wind project have all helped to create momentum behind further offshore wind development.

A Small Project with Large Benefits

Although the *Block Island Offshore Wind Farm* is small compared to future offshore wind projects that will be installed over the coming decade off the coasts of Northeast and Mid-Atlantic states, it has made large impacts. It is capable of powering about 17,000 homes, or about 1 percent of the state’s electricity. Moreover, through the transmission interconnection between Block Island and the Rhode Island mainland, the project has allowed the town of New Shoreham to shut down the diesel-fired power plant that had previously provided electrical power, saving nearly one million gallons of fuel per year and eliminating the need to ship diesel fuel to Block Island. The switch from diesel to wind-powered electricity generation and the transmission connection to the mainland grid have increased reliability and will reduce island electric

rates for the town’s ratepayers by an estimated 40 percent. The project is also helping the state meet its Renewable Energy Standard goal of 38.5 percent renewables by 2035, and it is contributing to Governor Raimondo’s goal of 1,000 MW of clean energy by 2020.

From an economic development perspective, according to Deepwater Wind, more than 300 local workers were involved with building the *Block Island Offshore Wind Farm*. Moreover, Deepwater Wind used four Rhode Island ports—at Block Island, Galilee, Quonset Point and ProvPort—to complete construction and staging.

By launching the offshore wind industry in the U.S., the Block Island project has helped stimulate new workforce development opportunities. The Rhode Island Department of Labor and Training’s Real Jobs RI program recently awarded an implementation grant to a partnership, “Implementing Rhode Island Wind Energy Technology Career Pathway System.” The North Kingstown Chamber of Commerce is leading this grant effort along with the New England Institute of Technology, URI, Community College of Rhode Island, North Kingstown Schools, and Exeter Job Corps. The partnership will focus on developing a career pathways training program that can supply skilled workers to satisfy future demand. They will be working with multiple education entities across the state to utilize and augment existing training programs to fit the needs of the budding offshore wind industry.

Leading the Way for More Offshore Wind Projects

The *Block Island Offshore Wind Farm* showed that it is possible to build an offshore wind project in the United States. The considerable attention it has received since it went online, its popularity with a wide range of Rhode Island stakeholders, and the opportunity it has given many people to visit an operating offshore wind project have all helped to create momentum behind further offshore wind development.

Other states are now following Rhode Island’s lead. Recent offshore wind solicitations by New York, Connecticut, and Massachusetts demonstrate the offshore wind industry’s potential for becoming a major energy provider and economic catalyst for the Northeast and Mid-Atlantic. To help those states, OER has shared information about its experiences with the Block Island project and has passed along lessons learned.

The success of the Block Island project helped create an appetite in Rhode Island for a larger project. In May 2018, Rhode Island announced that it will procure 400 MW of offshore wind energy from Deepwater Wind’s Revolution Wind project. The

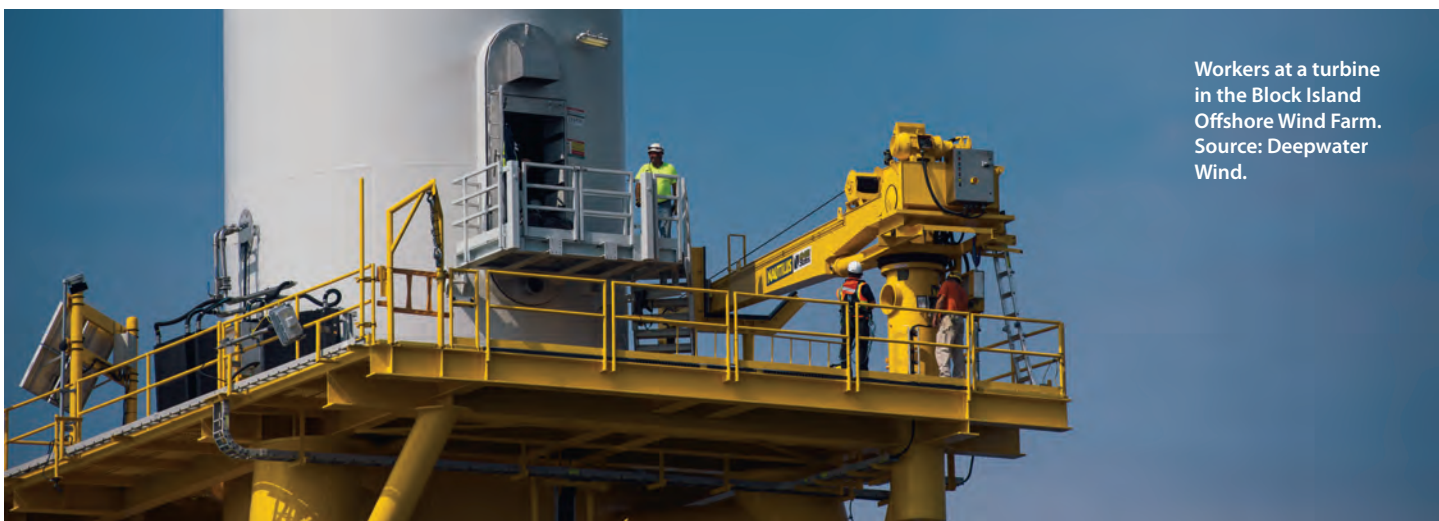
Rhode Island Office of Energy Resources: Block Island Offshore Wind Farm

state selected that project by participating in a clean energy procurement process conducted by the Commonwealth of Massachusetts. Rhode Island state agencies, including OER and the Division of Public Utilities and Carriers, independently evaluated the proposals that were made in response to the procurement. Deepwater Wind and Rhode Island Governor Raimondo reported that the 400 MW Revolution Wind project will create over 800 jobs in the state, 50 of them permanent.

Judges' Comments

"The Block Island Offshore Wind Farm is a monumental achievement and a milestone for renewable energy in the United States, and it would not have happened without the advocacy and support of the Rhode Island Office of Energy Resources."

Other states are now following Rhode Island's lead. Recent offshore wind solicitations by New York, Connecticut, and Massachusetts demonstrate the offshore wind industry's potential for becoming a major energy provider and economic catalyst for the Northeast and Mid-Atlantic.



Workers at a turbine in the Block Island Offshore Wind Farm. Source: Deepwater Wind.



About the Rhode Island Office of Energy Resources

The Office of Energy Resources (OER) is Rhode Island's lead state agency on energy policy and programs. Its mission is to lead Rhode Island to a secure, cost-effective, and sustainable energy future. OER works closely with private and public stakeholders to increase the reliability and security of the state's energy supply, reduce energy costs and mitigate price volatility, and improve environmental quality. By developing and implementing smart energy policies—such as those that promote energy efficiency and renewable energy—OER reduces Rhode Island's dependence on out-of-state fossil fuels and helps make the state a national leader in the new clean energy economy.

For more information:

<http://www.energy.ri.gov/renewable-energy/wind>

Contact

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Program Highlights

- ▶ The five solar arrays installed throughout the city have displaced 288 MW of conventional electricity and avoided 214 metric tons of CO₂ in emissions.
- ▶ To support the local solar industry, all of the solar panels were manufactured in Minnesota, and the project employed local solar installers and consultants.
- ▶ The projects are featured throughout the Minneapolis park system, demonstrating solar energy to 23 million visitors each year and helping to educate them about the importance of solar energy.
- ▶ Community engagement and public input on the siting of solar projects was used for public buy-in for the project.



Xcel Energy Renewable Development Fund (Minnesota)

MPRB SOLAR DEMONSTRATION PROJECT

With a grant to the Minneapolis Park and Recreation Board (MPRB), the Xcel Energy Renewable Development Fund supported the installation of 200 kW of solar PV in the Minneapolis parks system to model the seamless incorporation of renewable energy into public amenities. The PV installations demonstrate a wide variety of solar designs and are featured in high-traffic public areas, with the potential to reach the parks' 23 million visitors per year. The project includes specific education and interpretive program components, while demonstrating an environmentally friendly and sustainable solution for public works or park projects to mitigate energy costs, reduce carbon emissions, and promote local solar businesses.

Engaging Diverse Communities in Solar Education

Since its inception, the Xcel Energy Renewable Development Fund (RDF) has provided funding of more than \$317 million for renewable energy initiatives, including support for projects that identify and develop new or emerging renewable energy sources. RDF grants have been awarded to research universities, nonprofit organizations, commercial businesses, and government agencies. In early 2014, the fourth cycle of the RDF program recommended awards for 26 projects and three higher education research programs totaling nearly \$43 million. In March 2014, the Minnesota Public Utilities Commission approved the funding recommendations, and the *MPRB Solar Demonstration Project* was one of the grant recipients.



A 153-kW roof-mounted ballasted solar helps power the largest indoor ice arena in Minneapolis.
Source: Minneapolis Park and Recreation Board.

Xcel Energy Renewable Development Fund (Minnesota): MPRB Solar Demonstration Project

The MPRB applied for funding with four specific goals: first, to install 200 kW of photovoltaic capacity throughout the Minneapolis park system; second, to utilize Minnesota-made solar panels to support the local solar industry; third, to demonstrate the value of alternative solar designs such as canopies where roof mounted solar facilities are not feasible due to structural, historical, or other barriers to traditional solar installations; and fourth, to promote the use of solar through education and interpretive programs that increase the awareness of and demand for solar throughout the state of Minnesota.

Minneapolis is an economically and ethnically diverse city. One of the planning objectives for this project was to spread the solar installations amongst all six park districts in the city. Siting these projects in parks would reach people who may not readily have access to solar in their neighborhood while promoting solar via educational information demonstrating creative urban solar installations. Spreading out the installations has reached neighborhoods with unique and varied characteristics. Three of the five *MPRB Solar Demonstration Project* sites are in areas where residents' annual income is below the poverty threshold and where 50 percent or more of residents are people of color. The other two sites draw from a regionally diverse pool of visitors.

The project leverages the potential audience at some of the most popular, heavily used, public facilities in the Minneapolis to show the park system's 23 million annual visitors examples of solar energy installations. Each site contains interpretive signage to help educate park users. Those signs paired with

a multi-pronged digital campaign that included a social media video, rooftop news conference, and periodically updated online project page, amplify the reach of the solar demonstrations.

A public input process was used to consider public priorities, visibility, and accessibility to the neighborhoods that the MPRB serves. The project went through a community engagement process to receive community feedback and support for the proposed locations. More than 50 sites were considered after extensive public outreach and an open house event. All sites that were suggested from the public outreach process were vetted through a detailed matrix to determine technological and demographic suitability. The MPRB partnered with an expert sustainability consulting firm, Sustology, to identify the best opportunities for solar power in the park system. Potential project sites were evaluated for the best potential for visibility, safety and security, environmental impact, structural challenge, and budgetary limitations.

Ultimately, five sites were selected.

Parade Ice Garden Arena: The arena has the greatest electrical usage of any of the MPRB facilities. A 153-kW roof-mounted ballasted array is expected to produce about 184,000 kWh per year, roughly 15 percent of the building's annual power consumption. The arena's electricity demand reaches its highest point on hot summer days in July and August when solar output is also at its highest, thereby reducing energy demand at a crucial time. The solar array, along with several recently completed energy efficiency upgrades at the arena, saves taxpayers hundreds of thousands of dollars each year while cutting greenhouse gas emissions.

Webber Park Natural Swimming Pool: This pool became the first public natural swimming pool in North America when it opened on July 24, 2015. The pool is unique in that uses filters and plants, not chemicals, to cleanse its water. The unique characteristics of the pool draw visitors from across the community. A 4.6-kW roof-mounted solar array was installed and is expected to produce about 6,433 kWh per year, roughly 15 percent of the facility's total electricity usage. The solar array is located on the pump house that powers the natural filtration system.

Rev. Dr. Martin Luther King Jr. Recreation Center: This 18.5-acre park serves the King Field neighborhood in the southwest part of the city. This park provides recreational opportunities to many communities of color and offers important services to low-income residents, such as free meals for youth during the



A 6.5-kW wall-mounted array at the East Phillips Park Community and Cultural Center in Minneapolis. Source: Ray Colby/Sundial Solar.



Solar installers working on the 6.4-kWh roof-mounted PV array that will power the pumps that clean the water at the Webber Natural Swimming Pool.
Source: Ray Colby/Sundial Solar.

summer. The 6.2-kW roof-mounted solar array is expected to produce about 8,670 kWh per year, which is roughly 10 percent of the facility's total electricity usage.

East Phillips Park Cultural and Community Center:

A 6.5-kW wall-mounted solar array is expected to produce about 9,089 kWh per year, roughly 10 percent of the center's total electricity use. This site demonstrated the use of solar in a challenging location: because the gymnasium roof did not have the structural integrity to support solar panels, a wall-mounted array was used. The site was selected because the facility is used year-round, with a variety and levels of program activities ranging from community recreation to cultural events that support the great ethnic diversity of the neighborhood. The solar installation is partially visible from Minnesota State Highway 55.

Lake Nokomis Main Beach: A 7.4-kW solar canopy array was installed at the beach to provide much-needed shade for beachgoers. The solar array is expected to produce about 10,348 kWh per year, which is roughly 15 percent of the beach's total electricity use during the summer. In the winter, the solar array should deliver almost all power generated to the grid. As a regional resource, the beach draws visitors from all over the city and metropolitan area, including visitors from around Minnesota.

Public Education and Program Results

The *MPRB Solar Demonstration Project* highlights several varieties of solar installation (roof-mounted, wall-mounted, canopy) across a variety of unique, diverse urban environments. The project was innovative from a technological perspective by demonstrating how design can overcome challenging

installation limitations. Each installation had a unique design feature. For example, helical pier foundations were used for the canopy at Lake Nokomis to accommodate the unstable, sandy soil conditions. Since the community goals for the Nokomis beach area indicated the need for more shade, the solar installation was designed to provide that function. Special mounting brackets were used at the Martin Luther King recreation center to secure the system to the roof. Custom racking was designed for the East Phillips array to allow a wall mounting due to an unsuitable roof. Ballasted racking was used at the Parade Ice Arena to prevent damage to a newly installed roof. Special roof mounting brackets were used at Webber Park due to the steep roof pitch.

To date, the solar arrays installed via the *MPRB Solar Demonstration Project* have displaced 288 MW of traditional electrical power and provided 130 registered renewable energy certificates (RECs). The environmental benefits from the generation of this renewable energy include a reduction in air emissions of 214 metric tons equivalent of CO₂. The project has provided an interpretive program and educational opportunities that highlight the installed arrays' energy output, carbon offsets, and other educational features as a way to increase solar demand in Minnesota.

The project has also supported the local clean energy economy: two Minnesota-based solar installation firms were hired to install the five arrays, and all the solar panels were manufactured in Minnesota. Additionally, 27 percent of the total project expenditures were allocated to City of Minneapolis Target Market Program businesses and Minnesota Unified Certification Program Disadvantaged Minority Owned Business Enterprises.

Xcel Energy Renewable Development Fund (Minnesota): MPRB Solar Demonstration Project

The Role of the RDF

The RDF supports renewable energy projects across Minnesota with funds that come from Xcel Energy electric customers in Minnesota. It especially looks for projects that promote the startup, expansion, and attraction of renewable energy projects and companies. The fund also stimulates research and development into renewable energy technologies. Both efforts are designed to increase innovation, introduction, and promotion of renewable energy resources at reasonable costs. RDF grant awards are recommended by a seven-member advisory group comprising two representatives of environmental organizations, a Prairie Island Indian Community representative, an industrial/commercial ratepayer representative, a residential ratepayer representative, and two Xcel Energy representatives. The Minnesota Public Utilities Commission approves Renewable Energy Fund grant awards.

The RDF grant of \$969,741 awarded to the Minneapolis Park and Recreation Board contributed significantly to the \$1,119,741 program budget for demonstration projects to utilize Minnesota-made solar panels and demonstrate the effectiveness of alternative solar designs. The program has educated millions of visitors to Minneapolis parks about the viability of solar technologies, reduced carbon emissions, and supported local economic development, which are excellent results for Minneapolis and for Minnesota that can be replicated in other locations.

Judges' Comments

"This is a unique project that has resulted in the deployment of public-facing solar installations that reach not only a large number of people, but also very diverse populations. This means that people who may not otherwise be exposed to solar have the opportunity to experience it up-close. It also furthers the expansion of solar into non-traditional spaces and fosters new advocates for solar energy."



About the Xcel Energy Renewable Development Fund

The Xcel Energy Renewable Development Fund (RDF), which is financed by Xcel Energy Minnesota electric ratepayers, promotes the start-up, expansion and attraction of renewable electric energy projects and companies in the Xcel Energy service area. The overall purpose of the RDF is to: stimulate research and development of renewable electric energy technologies; encourage grid modernization, including, but not limited to, projects that implement electricity storage, load control, and smart meter technology; and stimulate other innovative energy projects that reduce demand and increase system efficiency and flexibility. Expenditures from the fund must benefit Xcel Energy Minnesota ratepayers or the Prairie Island Indian community.



About the Minneapolis Park and Recreation Board

The Minneapolis Park and Recreation Board is an independent, semi-autonomous body responsible for the Minneapolis park system. With 179 park properties totaling 6,804 acres of land and water, the Park Board provides places and recreation opportunities for all people to gather and engage in activities that promote health, well-being, community and the environment. Its Grand Rounds Scenic Byway, neighborhood parks, recreation centers and diversified programming have made the park system an important component of what makes Minneapolis a great place to live, play and work. More than 23 million annual visits are made to the nationally acclaimed park system, which was named the number one park system in the nation in each of the last six years by The Trust for Public Land's ParkScore® Index.

For more information:

<https://www.minneapolisparks.org/solar>

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The Clean Energy States Alliance (CESA) is a national, non-profit coalition of public agencies and organizations working together to advance clean energy. CESA members—mostly state agencies—include many of the most innovative, successful, and influential public funders of clean energy initiatives in the country.

CESA works with state leaders, federal agencies, industry representatives, and other stakeholders to develop and promote clean energy technologies and markets. It supports effective state and local policies, programs, and innovation in the clean energy sector, with an emphasis on renewable energy, power generation, financing strategies, and economic development. CESA facilitates information sharing, provides technical assistance, coordinates multi-state collaborative projects, and communicates the views and achievements of its members.

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