



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

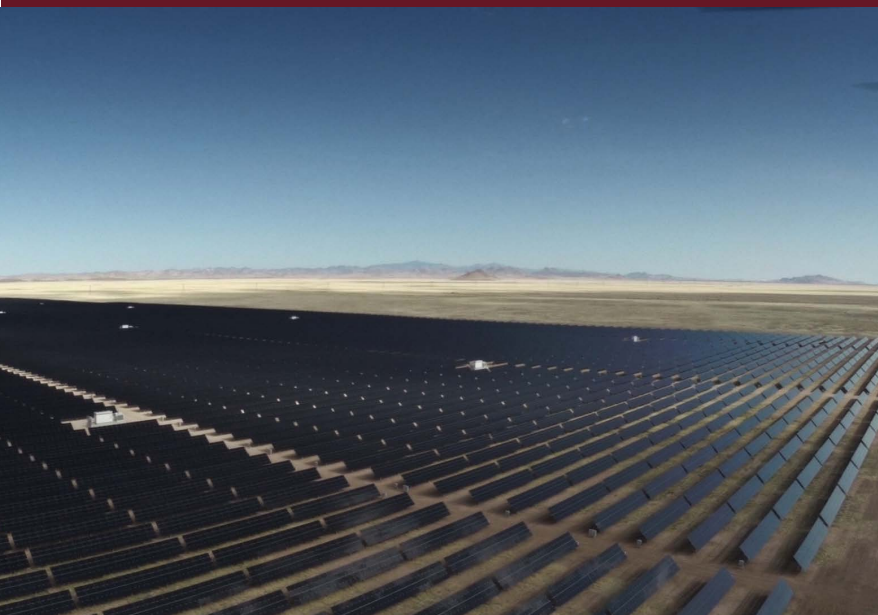
Outstanding Programs
Found Here

N O V E M B E R 2 0 1 4





Above: City of Gresham, Wastewater Services Division staff champions, Jeff Maag, engineer (L) and Alan Johnston, senior engineer (R), at the FOG receiving and processing station. By collecting and diverting fats, oils, and grease (FOG) out of the wastewater collection stream and using anaerobic digesters to create biogas from the waste, this system enables the wastewater treatment facility to reach its net-zero energy use goals.



Above: The Macho Springs Solar facility, located in Luna County, New Mexico, is a 50 MW AC ground mounted single-axis tracking PV system. It is located on almost 600 acres of land, or about the size of 300 football fields, and generates enough clean energy to power more than 19,000 average homes.

Photos on the cover

Top photo: Solar PV roof at Crest Mechanical, a Green Bank C-PACE project. Bottom photos, L-R: NM REPTC wind installation on land leased from the State of New Mexico; Terror Lake Hydroelectric turbine installation in Alaska; Co-digestion project at Sacramento Regional County Sanitation District's waste water treatment facility, supported by SMUD.

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Introduction

The *State Leadership in Clean Energy Awards* recognize outstanding state and municipal programs that have accelerated the adoption of clean energy technologies and strengthened clean energy markets. This report is a collection of case studies of the eight recipients of the 2014 awards. It also serves as an introduction to the innovative projects and initiatives implemented by members of the Clean Energy States Alliance (CESA).

The programs nominated for these awards were submitted by state and municipal clean energy agencies from across the country. The entries were reviewed by a team of distinguished, independent judges (whose bios are on the next page), and were scored based on public benefits and results, cost effectiveness, leadership and innovation, and replicability. The winning programs exemplify the ground-breaking work being done by states and municipalities in the arena of clean energy development and deployment.

The energy landscape is changing across America, revealing a new reality that is cleaner, more secure, and more sustainable. Solar panels and wind turbines are now common sights in all regions of the country, and state policies and programs have been primary drivers to get those projects deployed. State and municipal clean energy agencies are developing effective strategies to advance emerging clean energy technologies and new finance tools. Among other things, they are supporting innovative projects to get power from food waste; they are looking to distributed energy solutions like combined heat and power (CHP) systems, microgrids, and energy storage to add resiliency and security to the electric power system; they are creating financial products so that clean energy loans can be bundled into financial offerings attractive to investors; they are helping isolated communities power themselves almost exclusively by renewable energy sources; and they are developing the workforce needed by the growing clean energy industry.

Over the past dozen years, CESA has worked with many state and municipal clean energy organizations, and we are constantly impressed by the incredible progress they are achieving. Leadership from these agencies and the work of their staffs have been admirable as they diligently chart a course to strengthen our energy system. Despite many financial, political, and technological challenges, these civil servants and public administrators are finding solutions to make clean energy an appealing option for communities, homes, businesses, public infrastructure, and financial markets.

The *State Leadership in Clean Energy Awards*, a biennial event, is an opportunity to take notice of these exemplary programs and results. The 2014 recipients are diverse geographically, technologically, and in the size of their programs. But the two things they all have in common are their commitment to clean energy and their ability to get things done.

We at CESA applaud the efforts of the 2014 *State Leadership in Clean Energy* award recipients, as well as those of the other CESA-members agencies that are not highlighted in this year's publication. The case studies found in the following pages are excellent examples of what's working today as well as outstanding models for future success in clean energy deployment. We could not be more pleased to promote this important, transformational work.

The 2014 Award Judges

State Leadership
in Clean Energy

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, which they applied to this task. We would like to express our sincere appreciation for their enthusiasm and participation in this process.



Steve Lindenberg
Senior Advisor, Renewable Power,
United States Department
of Energy

Steve Lindenberg has directed environmental compliance and business line research and development in the electric utility industry for more than 30 years. Mr. Lindenberg's past employment with the National Rural Electric Cooperative Association, the Electric

Power Research Institute, and Cooperative Power Association prepared him for his responsibilities at the U.S. Department of Energy. He currently works as a Senior Advisor for the Deputy Assistant Secretary of Renewable Power. In that position he has responsibility for coordinating efforts to expand deployment of wind, solar, water, geothermal and biomass energy resources across the nation.



Andrea Luecke
President and Executive Director,
The Solar Foundation

Andrea Luecke leads the Solar Foundation's development and implementation of high-level research and educational initiatives that promote solar market transformation. She oversees several U.S. Department of Energy contracts, is lead author and spokesperson for the highly acclaimed

National Solar Jobs Census series, Vice-Chair of the IREC Clean Energy Training Program Accreditation Committee, and Chair of the National Solar Schools Consortium. Ms. Luecke frequently presents on "best practice" approaches and has provided consultation to numerous organizations including the National Academy of Sciences and the Inter-American Development Bank. Previously, she ran Milwaukee's multimillion dollar Solar America Cities program.



Bill Ritter, Jr.
Founder and Director,
Center for the New Energy
Economy

Bill Ritter, Jr. is the founder and director of the Center for the New Energy Economy (CNEE) at Colorado State University. The Center works directly with governors, legislators, and regulators to create policies that will

facilitate America's transition to a clean-energy economy. Mr. Ritter was elected as Colorado's 41st governor in 2006. During his four-year term, he signed 57 new energy bills into law, including a 30% Renewable Portfolio Standard and a Clean Air Clean Jobs Act that replaced nearly a gigawatt of coal-fired generation with natural gas. Mr. Ritter is a member of board of the directors of the Energy Foundation and the Advanced Energy Economy Institute. He served as Denver's district attorney from 1993 to January 2005.



Larry Sherwood
Vice President and COO,
Interstate Renewable
Energy Council

Larry Sherwood is Vice President and COO of the Interstate Renewable Energy Council and President of Sherwood Associates, a renewable energy consulting firm. Mr. Sherwood has over 35 years of experience in the renewable energy field. He is

the author of IREC's annual report on U.S. Solar Market Trends. He also is the Project Administrator for the Solar America Board for Codes and Standards and Executive Director of the Small Wind Certification Council. Mr. Sherwood lives in a PV-powered house in Boulder, Colorado.



Robert W. Thresher
NREL Research Fellow,
National Wind Technology
Center, National Renewable
Energy Laboratory

Robert Thresher has more than 40 years of research, development, engineering, and management experience in wind technology, plant engineering, and aerospace systems. As a professor

at Oregon State University, he worked with the U.S. Department of Energy to develop early wind technologies. At NREL he has been a principal researcher developing early wind technology and an architect of NREL's wind program and of the National Wind Technology Center. Since Dr. Thresher was appointed NREL Research Fellow in 2008, he has been a strategist and spokesperson for the initiation of a national research program to develop offshore renewable technologies. He currently serves as NREL's Program Manager for wave, tidal, river and tidal current technology research.

Program Highlights

- ▶ This project proves the effectiveness of the Renewable Energy Fund as a tool to help achieve the state's 50 percent renewable energy goal by 2025. For the first nine months of 2014, Kodiak Electric Association has generated 99.7 percent of its power from renewable energy, reducing its diesel fuel purchases to nearly zero and resulting in significantly lower energy costs for the community.
- ▶ Kodiak Electric Association has saved its small community (pop. 6,300) about \$13 million in reduced fuel costs through the end of 2013. Over \$4 million per year is now saved by the Kodiak community.
- ▶ By restricting diesel use to a few hours per year, the project has resulted in cleaner local air and dramatically reduced greenhouse gas emissions.



Alaska Energy Authority/ Kodiak Electric Association

KODIAK, ALASKA: A 99% RENEWABLE ENERGY COMMUNITY

Alaska's Renewable Energy Fund, managed by the Alaska Energy Authority, has catalyzed a movement towards renewable energy across Alaska by funding 277 renewable energy grants totaling \$250 million over the past seven years. With support from the Fund, strong local leadership, and hard work, the Kodiak Electric Association (KEA) has achieved over 99 percent renewable energy electric generation. KEA has developed a renewable energy grid that includes hydro power, wind, and battery storage technologies.

A Commitment to Renewable Energy

Alaska's Renewable Energy Fund has made it possible for communities and villages across the state to study their renewable energy resources, conduct proper engineering designs for those projects that are economically and technically feasible, and construct their projects for the greatest public benefit possible. In the case of Kodiak Electric, which serves about 6,300 people on Kodiak Island, prior to the Renewable Energy Fund's start in 2008, KEA generated approximately 60 percent of its electricity from hydro power and 40 percent from diesel. Through multiple successful applications to the Renewable Energy Fund, KEA was able to conduct feasibility studies, design, permit, and construct two phases of wind development, adding six 1.5MW turbines on Pillar Mountain, just above the City of Kodiak. During phase two of the project, KEA added two 1.5MW (1MWhr) battery storage systems that provide 30 to 90 seconds of bridging power to allow ramping up of output of a nearby hydroelectric system at times when the wind output decreases rapidly.

The addition of the battery systems has allowed the wind to be used without curtailment, and it allows more water to be stored at the hydro facility during times when the wind blows. Additionally, and with the financial support of the Renewable Energy Fund, a third hydroelectric turbine was added to the existing Terror Lake powerhouse to increase output by an additional 13.8 MW. Since

Three GE 1.5 megawatt (MW) turbines were installed in 2009 on Pillar Mountain just above the city of Kodiak. In 2012, the utility expanded the wind farm, adding three more GE 1.5 MW turbines. Combined with upgrades to their hydropower system, the switch to wind power has saved the utility an estimated \$22 million in avoided diesel fuel costs since the first turbines were installed in 2009.





Alaska Energy Authority

The Alaska Energy Authority is a public corporation of the State of Alaska with the mission “to reduce the cost of energy in Alaska.” To meet this mission the Authority operates a diverse portfolio of programs and projects that benefit communities throughout the state, including energy efficiency, energy planning, renewable and traditional fossil fuel resource energy projects, and research on emerging energy technologies.

For more information

www.AkEnergyAuthority.org

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During phase two of the project, KEA added two 1.5MW (1MWhr) battery storage systems that allow 30–90 seconds of bridging power to allow ramping up of output from the Terror Lake hydroelectric system at times when the wind output decreases rapidly. The addition of the battery has allowed the wind to be used without curtailment.

the end of 2013, KEA has been able to shut off the diesel generators and allow the battery/hydro mix to fulfill their spinning reserve requirement. They also have enough hydro redundancy to allow for maintenance of hydro turbines without burning diesel fuel to generate power. For the first nine months of 2014, KEA generated 99.7 percent of its power from renewable energy, resulting in significantly lower energy costs for the community by reducing its diesel fuel purchases to nearly zero.

Impressive Return on Investment

KEA estimates that it saved its small community about \$13 million in reduced fuel costs through the end of 2013. Over \$4 million per year is now saved by the community, to the benefit of residents, seafood processors, the Coast Guard Base, and all other electrical customers. It has also cut diesel emissions to zero except for a few hours per year, resulting in cleaner local air and dramatically reduced greenhouse gas emissions.

The Renewable Energy Fund provided a total of \$16 million of grant funding to launch Kodiak’s renewable energy projects. The Alaska Legislature provided an additional \$7.7 million for the hydro construction phase, and the utility covered the remaining \$12 million of the roughly \$37 million project through loans and Clean Renewable Energy Bonds. Without the Renewable Energy Fund and the state’s earlier funding of the Terror Lake hydroelectric project, these projects would have been delayed or reduced in scope, or may not ever have come to fruition.

An Example for Others to Consider

For the hundreds of other non-connected electric utilities in Alaska, this set of KEA projects demonstrates that the right renewable resources and good utility management can result in a clean energy portfolio with reduced or predictable energy costs. The replicability of Kodiak’s renewable energy projects would depend upon available local, renewable energy resources as well as outstanding utility commitment. This approach, though typically on a smaller level, is being replicated in many other small remote communities in Alaska; typically, wind-diesel systems or hydro-diesel systems are being installed. Both the funding mechanisms and the evaluation process used by these projects could be replicated by any state, local government or even a utility, to competitively find and fund the most cost-effective renewable energy projects.

Judges’ Comments

This project shows vision and leadership to achieve a remarkable level of renewable energy penetration. It is a shining example of long-term planning and effective implementation. Even though the project has unique features, it serves as a model for other communities in Alaska in terms of clean energy generation, and can also serve nationally as a model for state, utility, and community-level partnership and accomplishment.

Program Highlights

- ▶ The Connecticut Microgrid Program is the first program of its kind in the country and has already deployed its first completed microgrid project.
- ▶ The CTDEEP program funds design, engineering, wiring and interconnection costs for technically feasible microgrids that best address Connecticut's energy security, reliability and clean energy goals.
- ▶ It requires pairing renewable generation with energy storage when calculating microgrid generation capacity.
- ▶ The program employs a unique public-private partnership and its innovative design leverages limited public funds with private funding sources to maximize environmental and social benefits with the least cost to taxpayers.

Connecticut Department of Energy and Environmental Protection (CTDEEP)

CONNECTICUT MICROGRID PROGRAM

In 2011 and 2012, Connecticut experienced severe weather events that knocked out electric service to over 2,000,000 residents. CTDEEP developed its microgrid program in the wake of those storms to provide reliable electrical service to critical facilities during times of grid outages and to increase the safety and quality of life of its residents. It funds the design, engineering, wiring, and interconnection costs for technically feasible microgrids that will best address Connecticut's energy security, reliability and clean energy goals. CTDEEP encourages renewable generation in microgrids and encourages renewables to be paired with energy storage.

Supporting Local Distributed Generation for Critical Facilities

The Connecticut Microgrid Program is the first program of its kind in the country, offering \$45 million in funding over multiple rounds to support the development of municipal-led microgrid projects to support critical infrastructure with resilient power. With "islanding" technology that allows energy systems to disconnect from the main grid during a power outage, microgrids can keep the power on at critical facilities when the rest of the grid shuts down. The CTDEEP program integrates several important energy policy goals, including the promotion of renewable generation and public-private investment to improve energy security, reliability, and resiliency for Connecticut citizens and businesses. The program's innovative design leverages limited public funds with private funding sources to maximize the environmental and social benefits with the least cost to taxpayers. The program has also increased awareness and improved organization and communication around local resiliency efforts.

In Round 2, the Connecticut Microgrid Program is helping to advance Connecticut's clean energy goals by limiting the amount of diesel generation in each microgrid to 25 percent of the total generation capacity, and by allotting 10 percent of the total project evaluation score for the use of renewable generation resources. In addition, the program requires the pairing of PV and wind resources with energy storage if those renewables are to be counted toward total microgrid



Governor Dannel P. Malloy, joined by CTDEEP Commissioner Rob Klee at the Wesleyan University Microgrid ribbon cutting (2014)



CTDEEP

CTDEEP is dedicated to conserving, improving and protecting Connecticut's environment and natural resources - and increasing the availability of cheaper, cleaner, and more reliable energy. CTDEEP was created by 2011 legislation to bring a unity to the energy policy functions that were scattered across state agencies and boards. CTDEEP merged environmental protection functions with energy regulatory policy. Within CTDEEP the Bureau of Energy and Technology Policy (BETP) is responsible for formulating and implementing the state's energy policies. BETP is organized into three "offices." The microgrid program is in the Office of Energy Supply.

For more information

[www.dpuc.state.ct.us/DEEPEnergy.nsf/\\$EnergyView?OpenForm&Start=1&Count=30&Expand=7&Seq=2](http://www.dpuc.state.ct.us/DEEPEnergy.nsf/$EnergyView?OpenForm&Start=1&Count=30&Expand=7&Seq=2)

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Governor Dannel P. Malloy, joined by former CTDEEP Commissioner Daniel C. Esty at the City of Bridgeport announcing the Microgrid grant recipients (2013)

generation capacity. In Round 2, every proposed project includes clean generation and three proposed projects include PV paired with energy storage.

The program has funded 11 microgrids in its first two rounds of funding, with one project already commissioned.

Creative Partnerships

CTDEEP has collaborated with the electric distribution companies and the Connecticut Green Bank to develop the parameters for the Connecticut Microgrid Program. The program emphasizes the development of public-private partnerships including municipalities and private sector players to connect microgrids to critical infrastructure facilities. Because the program does not pay for generation or energy storage, applicants have sought private investment in the form of direct ownership of the generation assets or a purchase power agreement.

In Round 2 of the program, CTDEEP encouraged applicants to seek assistance from the Connecticut Green Bank to locate capital partners for the financing of clean energy generation assets. CTDEEP considers the cost of the grant on a \$/kW basis to ensure that state dollars are spent in the most cost-effective manner possible. Not only has the Connecticut Green Bank increased awareness in the finance community about the nature and financial viability of microgrids, which include clean and renewable generation, it has also qualified potential capital partners who are interested in financing the microgrid generation.

Tools for Replicating the Program

CTDEEP has taken several steps to encourage the transferability of its microgrid program. Staff has met with and provided technical assistance to other states and local entities seeking to develop a similar effort. In addition, all of the information and tools developed as part of the program are accessible on CTDEEP's microgrid website at [http://www.dpuc.state.ct.us/DEEPEnergy.nsf/\\$EnergyView?OpenForm&Start=1&Count=30&Expand=8&Seq=1](http://www.dpuc.state.ct.us/DEEPEnergy.nsf/$EnergyView?OpenForm&Start=1&Count=30&Expand=8&Seq=1). This website includes links to FAQs and informative webinars on specific issues such as energy storage and combined heat and power. These materials can assist project developers and other interested stakeholders in developing effective microgrid projects and programs.

Judges' Comments

Connecticut's microgrid program is addressing an important issue: enhanced resiliency for communities during power outages. It could be readily replicated by other states that seek the multiple benefits of energy efficiency, resiliency, and deployment of renewable energy. CTDEEP has worked to improve the initiative through each subsequent round and shares its lessons learned with others interested in developing microgrid programs.

Program Highlights

- ▶ With C-PACE, building owners are able to secure 100% upfront financing for clean energy upgrades to their businesses and buildings.
- ▶ Within a year of its launch, Connecticut's C-PACE program was the largest in the country. The Connecticut Green Bank has approved over 60 projects totaling nearly \$50 million.
- ▶ One hundred Connecticut municipalities accounting for over 83 percent of the state's commercial and industrial building stock are participating in the program.
- ▶ The C-PACE program had the first securitization of its commercial energy-efficiency loans in May 2014, the first known transaction of this kind. This helped prove that energy efficiency is able to attract private capital.



Connecticut Green Bank

COMMERCIAL PROPERTY ASSESSED CLEAN ENERGY (C-PACE)

The Connecticut Commercial Property Assessed Clean Energy (C-PACE) program enables commercial, industrial, and multi-family building owners to access affordable, long-term financing for smart energy upgrades to their buildings. These upgrades save property owners money and increase property values. The Connecticut Green Bank launched Connecticut's C-PACE program in January 2013 and it quickly became the largest commercial PACE program in the US—surpassing programs that had been around for years. In its first 22 months, C-PACE approved nearly \$50 million for more than 60 clean energy projects, which will result in the deployment of over 8 megawatts of solar energy and myriad energy efficiency improvements across over 4 million square feet of buildings.

Financing Clean Energy and Saving Money

With C-PACE, building owners are able to secure 100 percent upfront financing for clean energy upgrades to their businesses and buildings. Property owners place a voluntary assessment on their property tax bill, and then pay for clean energy improvements over time through this additional charge. Capital provided under the C-PACE program is secured by a lien on the property, so low-interest capital can be raised from the private sector, with no government financing required. Building owners can be cash-flow positive from day one, because of the long term of C-PACE financing. This allows them to do deeper energy upgrades than they otherwise would have done. The repayment obligation transfers to the next owner if the property is sold.

The Connecticut Green Bank developed and manages Connecticut C-PACE. Although PACE financing has been in practice for years, Connecticut's C-PACE program has achieved notable success with its many innovations. Within a year of its launch, it was the largest in the country and brought



C-PACE helped the Bushnell Center save \$48,961 in energy costs last year with energy upgrades including a new hot water heater, three high efficiency boilers, and replacement of a single, inefficient steam boiler. Projected Savings: \$1.2M over the life of the upgrade.



"The C-PACE program allowed me to access low-cost and long-term financing to further support our desire to deploy solar energy and stabilize our energy costs over the long-term. The C-PACE program will allow me to re-evaluate all my energy systems in all of my Connecticut properties."
— Paul Breglio, President, Crest Mechanical



CT Green Bank – C-PACE

The Connecticut Green Bank was established by Connecticut's General Assembly on July 1, 2011 as a part of Public Act 11-80 to lead the green bank movement by accelerating private investment in clean energy deployment for Connecticut to achieve economic prosperity, create jobs, promote energy security and address climate change. As the nation's first state Green Bank, it leverages public and private funds to drive investment and scale-up clean energy deployment in Connecticut.

For more information
www.c-pace.com

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\$20 million in financing to clean energy projects in Connecticut. In May 2014, it reached a landmark in its short history with the first-ever securitization of its commercial energy-efficiency loans. Achieving this “holy grail of energy efficiency finance,” the deal helped prove that energy efficiency is able to attract private capital, catalyzing the PACE market and energy efficiency financing across the country. The Connecticut Green Bank also played a significant role in demonstrating proof of the warehouse model (whereby a portfolio of transactions—a “warehouse” of financed projects—which share a similar structure and underwriting standard could be bundled for sale in the financial markets) for commercial PACE loans that were used to fund energy efficiency in Connecticut commercial buildings.



C-PACE helped Forstone Capital save \$240,000 in energy costs last year with financing to install VFDs on pumps and chillers, fan powered VAV boxes, new cooling towers, data center retrofit, new direct, digital control for HVAC, new chillers, PROJECTED SAVINGS: \$6.05M over the life of the upgrades.

served. The security of the tax lien provides confidence to the private market that the financing will be repaid and therefore private capital can flow to qualified buildings.

Since launching C-PACE, the Green Bank has approved over 60 projects totaling nearly \$50 million. The Green Bank has used its balance sheet to finance these transactions and then sold the transactions in bundles of roughly \$10 million to a private capital provider. Closed and approved projects will result in a total savings in avoided electric and fuel costs that will exceed \$97M in aggregate for the property owners. Projects closed and approved in the first 18 months of the C-PACE program alone will lead to an estimated 160 million kWh in electric savings and over 320 million MMBTU in fuel savings over the lifetime of the projects.

Transferring Success to Other States and Cities

Connecticut Green Bank is already sharing its work and resources with other agencies and organizations that have an interest in replicating its C-PACE model. It readily shares the documents underpinning the Commercial PACE program, as well as marketing materials aimed at ramping up demand and lessons learned.

Judges' Comments

The C-PACE program helps meet the challenge of financing clean energy projects and upgrades. This new financing mechanism seems like an incredibly good approach to servicing energy loans. It could have a huge multiplier effect and attract significant private capital to leverage public investment dollars. The low-risks of this program to the building owner and the lender makes this an effective finance tool. Connecticut's success can serve as an inspiration to other states.

Deploying Projects and Growing Investments

C-PACE has energized the state's clean energy economy by attracting private investment and deploying more clean energy to achieve greater public benefit. It works through a strong partnership among the state, local governments, and the private sector. One hundred Connecticut municipalities accounting for more than 83 percent of the state's commercial and industrial building stock have signed onto the program, allowing for a tax lien to be placed on the property and the assessment to be

Program Highlights

- By early 2015, the City of Gresham Wastewater Treatment Plant will produce all its electricity from onsite renewable power from two co-generation engines fueled by biogas, enhanced production of biogas from the co-digestion of fats, oils and grease, and solar electricity.
- Gresham's renewable energy projects, made possible with sustained support from Energy Trust, are helping keep ratepayer costs low, advancing the plant's environmental sustainability, and hedging against future retail power price increases.
- The comprehensive renewable energy production and energy efficiency approach being implemented in Gresham is a model for other wastewater treatment facilities across the nation.



Energy Trust of Oregon CITY OF GRESHAM WASTEWATER TREATMENT PLANT

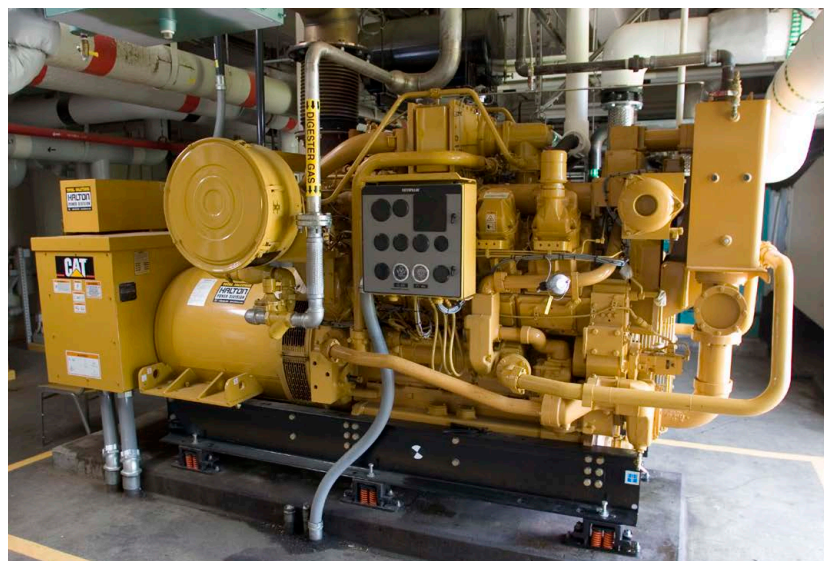
Technical and financial assistance from Energy Trust of Oregon and the Oregon Department of Energy, combined with the determined efforts of the City of Gresham Wastewater Treatment Plant's energy management team, is making this water resource recovery facility the first in the Pacific Northwest to achieve net-zero energy consumption from a combination of renewable energy production and energy-efficiency investments. By early 2015, the facility will produce all its electricity from onsite renewable power using two co-generation engines fueled by biogas; increased production of biogas from the co-digestion of fats, oils and grease; and a 420-kilowatt solar electric system.

Waste Not, Want Not

Through the visionary and sustained efforts of its energy management team and technical and financial assistance from Energy Trust and the Oregon Department of Energy, the City of Gresham Wastewater Treatment Plant implemented a highly successful program to achieve its aggressive goals to reduce its need for electricity from the electricity grid. By early 2015, the facility will generate from renewable sources as much electricity as it needs to operate the plant. It is using two, 395-kilowatt co-generation engines fueled by biogas, increased production of biogas from the co-digestion of fats, oils and grease (FOG), and a 420-kilowatt ground mount solar electric system. As the soon-to-be first net-zero energy treatment plant in the Pacific Northwest, Gresham is setting a high standard for environmental sustainability.

Over a 10-year period, Energy Trust has supported the City of Gresham with technical assistance, project development support, and cash incentives that lowered energy-efficiency project costs and the above-market costs of the two co-generation systems and the solar electric system at the wastewater treatment plant. Through these projects, Energy Trust is helping to keep energy costs low and adding clean power to the generation mix for the benefit of all utility customers. Importantly, by gathering lessons learned and accomplishments from Gresham's experience, Energy Trust is able to provide improved support to help other municipalities, and project developers are able to craft feasible and financially sound renewable energy projects.

The City of Gresham started implementing renewable energy for heat and electricity in 1990 through the combustion of biogas produced from the anaerobic digestion of wastewater sludge. As the volume of wastewater treated at the plant increased, biogas production increased as well.



The first of two 395-kW co-generation engines (where the electricity is generated); a second engine will be installed late 2014 for a total of 790 kW installed capacity.

CITY OF GRESHAM



Energy Trust

Energy Trust of Oregon is an independent nonprofit organization serving 1.5 million customers of four investor-owned utilities. Energy Trust invests in cost-effective energy efficiency, helps pay the above-market costs of renewable energy resources and transforms markets to higher efficiency products and services. Since 2002, Energy Trust has provided cash incentives, services and information to help households, commercial businesses, industries and public buildings save energy and generate renewable power at more than half a million locations.

For more information

<http://energytrust.org>

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This presented Gresham with the opportunity to expand its 250-kilowatt co-generation system. In 2005, with financial support from Energy Trust, the facility replaced the aged co-generation set and expanded generation nameplate capacity to 395 kilowatts. The expansion of the co-generation engine helped build the energy management team's confidence and created momentum to explore new renewable generation and efficiency opportunities. Further steps to achieve net-zero energy demand were the installation of a solar electric system, the addition of a FOG receiving and processing facility, and a 2014 decision to double co-generation capacity. Additional critical steps included implementing, in 2010, an energy management team that met monthly, integration of a chapter on Energy Independence Projects in the plant's 2011 Master Plan, and an Energy Efficiency Study that led to the 2012 installation of highly efficient aeration basin turbo blowers and new digester linear motion mixers.

Increasing Clean Energy and Reducing Costs

Wastewater treatment facilities are very energy intensive. In the case of Gresham, the facility requires approximately 5,550 megawatt hours (MWh) of electricity per year. Through a net metering and interconnection agreement with Portland General Electric (PGE), the solar and biogas fueled systems will be managed to achieve net-zero energy demand. Co-generation from biogas will produce about 5,100 MWh per year while the solar array, which became operational in 2010, will generate another 450 MWh of renewable electricity. From the generation of renewable electricity from biogas alone, about 72,000 Renewable Energy Certificates will be created from 2005 through 2028 and retired for the benefit of PGE customers. Overall, the renewable energy and energy efficiency projects installed at the plant since 2005 cost \$8.39 million, including \$890,000 for the FOG Phase 1 receiving station installed in 2012; and \$3.2 million for the 395-kW co-generation engine expansion and FOG receiving station expansion in 2014. Energy Trust and the Oregon Department of Energy funded 38% of the total project costs.

The FOG station also has profound operation and maintenance benefits for the City. Diverting fats, oils, and grease at their source (e.g., restaurant, food processor) before they get flushed into the wastewater collection system avoids significant collection system cleanout costs. Further, waste hauling companies are currently delivering about 8,000 gallons of FOG to the facility each day with plans to receive 15,000 gallons per day with the expanded facility, saving money through shorter hauling distances for disposal. The tipping fees the haulers pay provide the City of Gresham with a significant annual revenue stream of about \$250,000. The production of electricity from Gresham's renewable energy projects is helping keep ratepayer costs low, advancing the plant's environmental sustainability, and making the facility immune from possible future retail power price increases. Gresham has demonstrated that water resource recovery facilities may have significant potential to adopt technological innovations to reduce or eliminate net energy use and, for some facilities, become net exporters of renewable energy.

Lessons Learned

The City of Gresham's renewable energy success is providing valuable lessons, which can be shared with other water resource recovery facilities throughout Oregon and across the nation to show that they, too, may have the capacity to generate renewable energy while providing significant benefits to the environment and their ratepayers. Generation of renewable energy at wastewater treatment plants is nothing new. However, only a few facilities in the country have been successful in reaching net-zero energy generation. The opportunity for increased co-digestion and co-generation at water resource recovery facilities in Oregon is significant. For that reason, Energy Trust and the Oregon Department of Energy are highlighting the Gresham plant project in an anaerobic digestion case study and are encouraging other municipalities in Oregon and industry leaders to use it as a model.

Judges' Comments

The City of Gresham Wastewater Treatment Plant project demonstrates leadership, long-term commitment, and clean energy innovation. The combination of using biogas from the wastewater treatment process, additional biogas from fats, oils and grease, and solar electricity to achieve net-zero energy demand is novel and impressive. It is a model that should be considered for replication in other municipalities.

Program Highlights

- ▶ The Massachusetts Clean Energy Internship Program provides college students with valuable hands-on training at a clean energy company, better preparing them to enter the Massachusetts workforce after graduation.
- ▶ Since its creation in 2011, the Internship Program has placed 952 interns at 228 companies. For many students, these internships have led to full or part-time positions.
- ▶ The program links one of Massachusetts' largest and strongest populations, the higher education sector, with one of its fastest growing industries, the clean energy sector.
- ▶ Small, startup companies with limited financial resources receive valuable labor assistance they need in order to prosper.



Massachusetts Clean Energy Center MASSACHUSETTS CLEAN ENERGY INTERNSHIP PROGRAM

The Massachusetts Clean Energy Internship Program, created and managed by the Massachusetts Clean Energy Center (MassCEC), provides valuable support to Massachusetts' growing clean energy economy. By connecting Massachusetts students and recent graduates with paid internships at clean energy companies across the state, MassCEC is helping to ensure that there is a steady stream of prepared, talented, and experienced workers ready to meet the growing market demand.



Governor Deval Patrick celebrated the success of the Massachusetts Clean Energy Internship Program at MassCEC's office with students who interned at clean energy employer FloDesign Sonics, Inc.

Training the Clean Energy Economy Leaders of Tomorrow

The clean energy industry in Massachusetts is experiencing significant growth. MassCEC's 2014 Clean Energy Industry Report notes that MA clean energy jobs grew by 10.5 percent from 2013. Massachusetts has over 88,000 clean energy workers and nearly 6,000 clean energy firms. This growing market sector presents both an opportunity and a challenge. In order for industry growth to continue, businesses need to be able to hire new workers, which requires both the capital to afford those workers, and a skilled labor pool to draw from.

The Massachusetts Clean Energy Center saw the need to connect prospective employers and new clean energy start-ups with skilled entrants into the workforce. The Massachusetts Clean Energy Internship Program has matched two key resources: a growing population of environmentally conscious college students and a growing clean energy sector in search of skilled workers.

Through the Massachusetts Clean Energy Internship Program, MassCEC provides paid internships that students can apply for. To be eligible, participating students must either be enrolled at a higher education institution in Massachusetts, a permanent Massachusetts resident attending an out of state institution, or recently graduated within the previous year. Students and recent graduates gain valuable workforce experience through their internships and build connections in the Massachusetts clean energy industry.

Businesses that participate in the internship program are reimbursed up to \$12 an hour for the intern's labor. This is a significant benefit for companies, especially for startups that would not otherwise be able to afford new interns or employees.



MassCEC

MassCEC is dedicated to accelerating the success of clean energy technologies, companies, and projects in the Commonwealth—while creating high-quality jobs and long-term economic growth for the people of Massachusetts. Since it began operating in 2009, MassCEC has helped clean energy companies grow, supported municipal clean energy projects and invested in residential and commercial renewable energy installations, creating a robust marketplace for innovative clean technology companies and service providers.

For more information
www.masscec.com/intern

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The impacts of the Massachusetts Clean Energy Internship Program are long-term. By helping clean energy companies grow and by training workers entering the field, MassCEC is helping to prepare the next generation of clean energy leaders and ensuring future market growth.

Leveraging Available Resources for Maximum Impact

The success of the program is due to a smart and simple concept: linking one of Massachusetts' largest and strongest populations, the higher education sector, with one of its fastest growing industries, the clean energy sector. After MassCEC's initial work to launch the initiative, the program has developed considerable momentum, because people in the two sectors have a strong interest in promoting it widely. MassCEC now only has to put continued funding and provide modest administrative work to keep the program going strong.

Additional benefits of the Internship Program have included increased exposure for Massachusetts-based clean energy companies as well as alleviating stubbornly high unemployment among college students, especially during the summer months. Due to heavy interest from both applicants and employers, the program has expanded from a summer-only internship, to a year-round program, offering part-time positions in the fall and spring, and full-time positions in the summer.

To participate in the program, students—both undergraduates and graduate students—submit a resume, official or unofficial transcript, and proof of residency (if applicable) into an online database. This information is viewed by participating employers, who select the individuals most likely to meet their workforce needs. Since its creation, the program has placed 952 interns at 228 companies. More than 50 interns have gained permanent positions at their host companies, while many others have found positions elsewhere in the state clean energy industry.



Massachusetts Clean Energy Center CEO Alicia Barton speaks with two 2013 Summer Internship Program participants. Held at Roxbury Community College, the 2013 Employer Appreciation Event helped to bring together students and employers to network with one another.

A Model for Other States

The Massachusetts Clean Energy Internship Program could be replicated in other states at any scale: state-wide or regional, technology-specific or all-inclusive. Primary components needed for replication are funding for reimbursements, a population of interested college students, and interested clean energy companies. Since an agency or organization hosting the program is simply serving to facilitate the selection process, very little logistical work is required to administer

a similar program once sufficient protocols have been established. As the application process continues to evolve and take on a more digital component, it will also require far less administration on the part of the host entity in the future.

Judges' Comments

Massachusetts' commitment to growing its clean energy sector is exemplified in this internship program. Developing a skilled workforce for the future is an important issue to address. Both the clean energy industry and the student interns are well-served by this program. Other states could adopt similar programs to develop their clean energy workforce.

Program Highlights

- ▶ The Renewable Energy Production Tax Credit Program has brought wind and solar developers to invest in New Mexico. Interest has grown to the point that the state now has a project waiting list and industry is advocating for an increasing in the cap on the annual energy production available for this credit.
- ▶ As a result of the program, 794 MW of wind capacity and 232 MW of solar capacity have been installed, representing just the beginning of clean energy development in New Mexico.
- ▶ The long-term benefits of the incentive program far outweigh the costs of the ten-year incentive program, resulting in continued economic benefits from and investments in renewable energy in the state.

State of New Mexico, Energy Conservation and Management Division (ECMD), Energy, Minerals and Natural Resources Department

RENEWABLE ENERGY PRODUCTION TAX CREDIT PROGRAM

New Mexico's total renewable generation capacity is now over 1 million kilowatts. This huge milestone for renewable energy in New Mexico would have not been realized so soon without the Renewable Energy Production Tax Credit (REPTC). The program supports utility-scale wind, biomass, and solar projects by providing a refundable 10-year tax credit against the corporate income tax of 1 cent per kilowatt-hour (kWh) for wind or biomass, and between 1.5–4 cents per kWh for solar. This innovative program involved collaboration between utilities, industry, and state government. It has resulted in long-term economic and societal benefits, leveraged private investment, and increased renewable energy deployment.

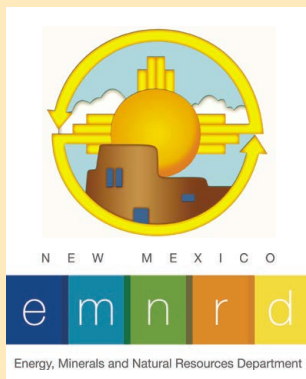
Making a Change to Renewables Easier

ECMD develops and implements effective clean energy programs—renewable energy, energy efficiency, alternative fuels, and safe transportation of radioactive waste—to promote environmental and economic sustainability and to protect public health and safety for New Mexico's citizens. In 2003, ECMD began implementing the REPTC.



Macho Springs Solar is the largest solar project in the New Mexico REPTC program, with a generating capacity of 48.5 megawatts.





New Mexico

Energy Conservation and Management Division at NM EMNRD develops and implements effective clean energy programs—renewable energy, energy efficiency and conservation, alternative fuels, and safe transportation of radioactive waste—to promote and administer policies for environmental and economic sustainability and to protect public health and safety for New Mexico and its citizens. Reduced energy consumption and expenditures and effective administration of federally funded programs lead to generation of new jobs and revenues, environmental protection and improvement, enhancement of public health, decreased consumptive water use for power generation, lessened dependence on foreign oil, and greater energy security.

For more information

<http://www.emnrd.state.nm.us/ECMD/CleanEnergyTaxIncentives/ProdTaxCredit.html>

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How the REPTC works: For wind and biomass, the credit is \$0.01 per kilowatt hour (kWh) and applies to up to 400,000,000 kWh for each certified generator in each of ten consecutive tax years. The statewide cap of the credit for wind and biomass is 2,000,000,000 kWh of production per year. For solar, the credit ranges between \$0.015 and \$0.04 per kWh (an average of \$0.027/kWh) and applies to the first 200,000,000 kWh for each certified generator in ten consecutive tax years. The statewide cap of the credit for solar is 500,000,000 kWh. Since October 2007, the REPTC has been a refundable tax credit and can be allocated at any time to a new owner of the renewable energy generation project. To qualify, the energy generator must have a capacity of at least 1 megawatt (MW) that is installed before January 2018.

Thorough Planning Yields Long-Term Benefits

Quantifying the potential for renewable energy: The ECMD began this effort by developing “investment grade” wind maps for the state using an international firm whose reputation was acceptable to investment bankers. With this data, wind developers and investors became more comfortable in developing projects. Projects were advanced by at least three years because developers had reliable data at an early stage with which to base decisions.

The additional New Mexico 10-year production tax credit made wind and solar attractive investments. Since the inception of REPTC, 10 wind and 21 solar projects have been completed, leading to 2,246,000,000 kWh in annual energy production. There are now 794 MW of wind and 232 MW of solar operating in New Mexico. These projects created approximately \$2 billion in construction activity over the past ten years. A waiting list for the tax credit includes another 677 MW of wind and 65.5 MW of solar. The existence of REPTC has also made it easier for electric utilities in the state to cost-effectively meet the targets in the state’s Renewable Portfolio Standard (RPS).

Revenue generated by land leases: The New Mexico State Land Trust receives direct revenue from leasing public lands to wind, solar, and geothermal power plants. The projects qualify for the tax credit for ten years, but continue to produce renewable energy far beyond the 10-year incentive, as state land leases are commonly up to 30 years in length. Lease revenue for the next 38 years from renewable energy and transmission projects is projected to be \$574 million.

Renewable energy projects are also leasing private land. This has become an important supplemental income source for a number of ranchers. Land leases, construction jobs, and permanent maintenance positions are additional ways that renewable energy farms are supporting rural communities. A wind turbine typically generates about \$20,000 in annual income to farmers and ranchers. PV systems also generate income to the land owners.

A Net Economic Benefit

Maximum tax liability for the state each year for the wind/biomass and solar tax credits combined is \$33,500,000. In contrast, as noted above, the revenue for the next 38 years from renewable energy and transmission projects for state-owned land leases is projected to be \$574 million, which spread relatively equally over that time frame will be \$15 million per year, and will continue for an estimated 28 years beyond the 10-year tax incentive.

Without this tax incentive New Mexico would possibly have a small amount of wind energy, but it would in no way been able to create the substantial land lease revenue it has now with many, large-scale wind farms throughout the state. Creating the REPTC was New Mexico’s planned approach to make the state RPS acceptable to all stakeholders. In turn, this tax incentive leveraged private investment to benefit New Mexico. Since the REPTC was instated in 2003, several other states have examined the NM REPTC as a model for creating their own programs. This program could be modified to fit the needs and limits of other states.

Judges’ Comments

The State of New Mexico’s program identified its renewable energy resources and potential sources of revenue to create an incentive program that has long-term benefits. By providing developers with reliable, investment-grade data in state wind maps, and with its collaboration with state lawmakers, the ECMD program has enabled rapid development of renewable energy projects by utilities and private investors.

Program Highlights

- ▶ Through the CHP Acceleration Program, New York is not only meeting its resilient power and clean energy goals, but is driving real transformation in the CHP market.
- ▶ The program was launched in 2012 with a list of pre-approved modules consisting of 36 systems offered by eight vendors, and has recently been expanded to 141 systems offered by 13 vendors.
- ▶ NYSEDA is in discussions with several other states about the possibility of turning its catalog of pre-approved CHP modules into a national list.

New York State Energy Research and Development Authority (NYSEDA)

CHP ACCELERATION PROGRAM

The NYSEDA CHP Acceleration Program is structured to drive market transformation by endorsing commercially-available pre-engineered/pre-packaged modular combined-heat-and-power (CHP) products as plug-and-play appliances and provide all of the ease and assurances that conveys. The program explores whether a standard-offer, prescriptive program can effectively accelerate the adoption of the complex and expensive measure of clean and efficient CHP. NYSEDA aims for this program to be a model for multi-state standardization, which could be a real game-changer for the CHP marketplace.

Promoting a Plug-and-Play CHP Solution

Since 1975, NYSEDA has worked to advance innovative energy solutions in ways that improve New York's economy and environment. In 2012, drawing from years of experience with CHP programs, NYSEDA launched the CHP Acceleration Program, which focuses on modular CHP from 50 kW to 1.3 MW (NYSEDA also has a companion program for CHP systems larger than 1.3 MW).

CHP systems are able to capture waste heat from commercial and industrial-scale electrical or mechanical power generation and use it to provide heat and power for multi-family, commercial, institutional, and industrial sites or local communities. The CHP marketplace in New York has traditionally been very fragmented and compartmentalized. To address this issue, NYSEDA has coordinated with utilities to vet and approve commercially available pre-engineered and pre-packaged CHP units and to identify approved vendors for the modules.

The program was launched in 2012 with a list of pre-approved modules consisting of 36 systems offered by eight vendors, and has recently been expanded to 141 systems offered by 13 vendors. NYSEDA vets the quality, reliability, durability, and integrated consistency/harmony of the specific CHP modules, which builds customer confidence, increases standardization, minimizes custom engineering, lowers acquisition costs, and leads to quicker decision-making. A project developer or design team can then select from a menu an appropriate module package that matches a potential installation site.

The program's strategy of identifying and selecting equipment vendors of the modules also provides multiple benefits. The system vendor is responsible for resolution of all issues pertaining



Potential CHP customers mingle with NYSEDA's pre-approved CHP vendors at the fourth CHP Expo in Albany, N.Y.

NYSERDA

The New York State Energy Research and Development Authority (NYSERDA), a public benefit corporation, offers objective information and analysis, innovative programs, technical expertise, and funding to help New Yorkers increase energy efficiency, save money, use renewable energy, and reduce reliance on fossil fuels. NYSERDA professionals work to protect the environment and create clean energy jobs. NYSERDA has been developing partnerships to advance innovative energy solutions in New York State since 1975.

For more information

<http://www.nyserda.ny.gov/chp-acceleration>

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A 75 kW modular CHP system from Aegis Energy Services installed in 2014 at the Toledo Building (a multifamily residence) in Queens, NY.

to the purchase, installation, maintenance and performance of each system. They become an integral part of the design team early in the design process, thereby reducing the likelihood of incompatible or sub-optimal designs and allowing the vendors to be the repository for lessons learned regarding their equipment. The program provides transparency that allows customers to compare prices from different vendors and also enables vendors to offer firm pricing that takes into account financial support offered by NYSERDA.

Addressing Market Barriers to CHP Deployment

NYSERDA's CHP Acceleration Program is addressing the system of CHP purchasing in New York, making it more streamlined, cost-efficient, and effective, while providing benefits to both customers and vendors. The \$60 million program budget is expected to leverage \$90 million in private capital and reduce peak electric load by 37.5 MW. The program offers support for installation of approved modules, support services, technical assistance, system performance data collection, and other activities.

The CHP Acceleration Program will further the public policy goals of increased grid reliability and resiliency. All projects must have the ability to run in parallel with the utility grid to save energy and reduce energy costs on an everyday basis, and must also have the ability to run independently during a grid outage to provide power to priority loads at the site. Additional financial support is offered for CHP systems installed to support critical infrastructure, such as facilities of refuge.

Although only halfway through the program, results are already very positive. There is much greater participation in this CHP Acceleration Program than in NYSERDA's previous CHP programs, and CHP systems are being deployed much faster. In the first 18 months of the program, 29 project applications were received. Twelve of those projects already have equipment on-site. One project was temporarily paused by a proposer, but has since restarted. The program has experienced zero attrition.

A Model for Other States

NYSERDA would like to see its approach become a model that other states will emulate. The agency hopes that its catalog of pre-approved modules will be adopted by other states and become a national list of approved CHP equipment. Other states are already beginning to look at NYSERDA's CHP Acceleration Program to see how they can build on it.

Judges' Comments

This program is an excellent way to encourage more CHP projects. By creating standards for modules and tracking system performance, NYSERDA will give potential customers confidence. By promoting CHP as a plug-and-play technology and as a resilient power solution, the program has developed a model that deserves recognition and emulation.

Program Highlights

- ▶ A community solar project and three anaerobic digester projects are generating renewable electricity locally, displacing the use of fossil fuels, and capturing and destroying methane.
- ▶ The CRED program brings local economic benefits via job creation and increased tax revenue for the community.
- ▶ The two farm projects create a steady revenue stream for the dairy farmers through lease agreements with the project developer, and provide them with facilities and equipment that improve dairy operations.
- ▶ The four projects exemplify the types of multi-value, community-scale, renewable energy projects that can be replicated nationwide.

Sacramento Municipal Utility District (SMUD)

SMUD'S COMMUNITY RENEWABLE ENERGY DEPLOYMENT (CRED)

SMUD's Community Renewable Energy Deployment (CRED) program developed four innovative local renewable energy projects, providing up to 5.6 MW of additional clean energy generation to SMUD's customers. The projects bring local economic and environmental benefits through the creation of jobs, increased tax revenue for the community, supplemental revenue for dairy farmers, turning wasteland into solar power plants and transforming existing infrastructure and problem wastes into sustainable energy resources. In addition to displacing fossil fuels and reducing greenhouse gas emissions, the projects demonstrated that community solar projects and anaerobic digesters can be readily implemented through collaborative partnerships.

InCREDible Results for Clean Energy Goals

SMUD has a renewable energy goal of 37% of retail sales by 2020, which consists of 33% RPS plus 4% from a voluntary green pricing program. In addition, a Sustainable Power Supply objective will require greenhouse gas (GHG) reduction to 10% of 1990 levels by 2050. SMUD taps into local renewable resources to help meet its aggressive renewables and GHG goals, mitigate transmission constraints, and bring economic and environmental benefits to the community. SMUD staff developed a collection of projects deploying renewable energy technologies within SMUD service territory. In 2009, SMUD applied and received grants from the US Department of Energy (DOE) and the California Energy Commission (CEC) to implement four projects, which were comprised of a community solar project and three anaerobic digesters.

Simply Solar: SMUD teamed up with The City of Sacramento and solar company Conergy to develop this 1.5 MW community-scale solar project. Conergy designed, constructed, and financed this photovoltaic system in Sacramento's Sutter Landing Regional Park, which was built on a closed landfill. The project, which included carport and dog park shade structures in addition to a large



SMUD helped develop this 1.5 MW community-scale solar project at a closed, former landfill site.



Dairy digester at New Hope dairy farm, one of two anaerobic digesters supported by the CRED project.





Sacramento Municipal Utility District (SMUD)

SMUD is the nation's sixth-largest community-owned electric service provider, providing low-cost, reliable electricity for more than 65 years to Sacramento County (and a small adjoining portion of Placer County). SMUD is a recognized industry leader and award winner for its innovative energy efficiency programs, renewable power technologies, and for its commitment to a healthier environment. SMUD was the first large California utility to have more than 20 percent of its energy coming from renewable resources.

For more information
<https://smud.org>

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ground-mounted system, was designed to address land settling issues. This project met SMUD's objective of installing community-scale solar generation on disturbed, marginal, publicly-owned land near the region's load center. It also resulted in excellent public visibility, educational impact, public amenities and aesthetic value. SMUD collaborated extensively with the City, Conergy and DOE to resolve permitting and environmental impact issues so that the project could be constructed. This project became operational in September 2014.

Regional County Sanitation District Wastewater Treatment Facility: This CRED project created a co-digestion facility to receive fats, oils, and grease (FOG) and food processing waste (FPW) in order to increase biogas production. The Sacramento Regional County Sanitation District wastewater treatment facility has a new feedstock receiving station and blends local FOG and FPW (such as off-specification soda pop) with sewage to increase biogas generation. This biogas is being used at SMUD's Cosumnes Power Plant to generate clean energy. The project provides an innovative, local solution to problem wastes that can clog pipes and pumps and previously required trucking to distant locations. It is expected to provide up to 3 MW of additional renewable electricity, generating power for up to 3,000 homes, reducing greenhouse gas emissions and helping local businesses save money.

Dairy Anaerobic Digestion Systems: The remaining two CRED projects are dairy manure anaerobic digestion systems (a 600kW covered lagoon and a 450kW above-ground complete stirred tank) for combined heat and power (CHP) applications, which deliver electricity to SMUD's grid. These anaerobic digesters were installed at the New Hope and Van Warmerdam dairies. Through a power purchase agreement with SMUD, the projects generate enough electricity to power roughly 500 homes in Sacramento. Waste heat from the engine-gensets is used to heat the digesters. In addition, both projects improve farm operations by providing a better system to handle the manure, which stabilizes the waste and reduces odors and flies. The projects began commercial operations in mid-2013. SMUD matched the project developers with the dairymen, provided the DOE and CEC funds, provided expertise with permitting and grid interconnection, provided long-term power purchase and greenhouse gas offset contracts.

Working Partnerships for a Shared Vision

In addition to reducing greenhouse gas emissions, the CRED projects demonstrate that solar projects and anaerobic digesters that directly benefit the community can be readily implemented through collaboration between developers and local business owners, and supported through a combination of state and federal programs. SMUD fostered the partnerships needed for each project and secured grant funding from DOE and the CEC to lower capital costs.

Other communities could replicate these projects and learn from SMUD's experience with the CRED program to assess, overcome barriers, utilize and benefit from renewable energy generation in their region. The Simply Solar project is a good example of installing community-scale solar on disturbed, marginal, publicly owned land. FOG and FPW are abundant in most metropolitan areas, and the U.S. has approximately 21,000 publicly owned wastewater treatment facilities. In addition, there are over 1,400 registered dairies in California but only 16 have digesters. SMUD is already developing another dairy digester and has additional local projects in the pipeline, which could benefit from California's Cap & Trade and SMUD's Climate Change programs.

SMUD's CRED program succeeded despite facing challenging technical, environmental, economic, regulatory, political, and institutional barriers. They demonstrated that, given the appropriate support and favorable conditions, similar projects can be widely implemented throughout the United States.

Judges' Comments

This was a challenging program to accomplish, given the range of disparate technologies involved, and it would not have gone forward without persistent leadership from SMUD. The commitment shown by the utility offers valuable insights into how to overcome challenges and work with others to achieve clean energy goals. The CRED program shows that community-based deployment of small, innovative renewable energy projects are replicable with proper local, state, federal and other stakeholders' support.

CESA MEMBERS

CESA Core Members

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District Department of the Environment, Energy Administration — D.C. (DDOE)
Energy Trust of Oregon
Maryland Energy Administration (MEA)
Massachusetts Clean Energy Center (MassCEC)
New Hampshire Public Utilities Commission — Sustainable Energy Division
New Jersey Clean Energy Program (NJCEP)
New York State Energy Research & Development Authority (NYSERDA)
Ohio Development Services Agency — Office of Energy
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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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