

DEED Digest

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DEED PROJECT SPOTLIGHT



Frozen! Ice Storage Shifts A/C Load to Off-peak Hours

Azusa Light & Water's residential thermal energy storage systems (DEED project G-330)

Azusa Light & Water in California has a peak demand of approximately 78 MW, with annual energy requirements of approximately 260 GWH. Residential customers make up 89 percent of the customer base and hot summer days in the Los Angeles basin cause significant peak demand to meet these customers' air conditioning needs.

In an effort to reduce peak demand, improve the utility's load factor, and optimize operational efficiencies, Azusa has developed a residential thermal energy storage solution to shift peak demand from A/C load to off-peak periods.

Under a research and demonstration project, partially funded through the American Public Power Association's Demonstration of Energy & Efficiency Developments (DEED) program, Azusa installed and evaluated

two prototype residential TES systems, labeled Ice Cub and developed with their partner, Ice Energy.

Azusa Light & Water General Manager George Morrow said, "We are excited to explore the tremendous potential of residential thermal energy storage cooling applications on behalf of our citizens and the more than 2,000 members of the APPA who helped fund this technology research project. The future savings for individual residential customers could be significant and even more importantly, when deployed at scale, residential thermal energy storage systems in cooling applications could cut untold millions from the peak power expenses of municipalities across the country."

The initial Ice Cub TES unit was similar to a standard residential air conditioning unit, box-like in configuration

Continued on page 3

Fun inDEED! A Birthday Bash, Steroids, and More

2015 is turning out to be another great year for DEED, as we celebrate our 35th birthday. Our spring 2015 funding cycle awarded 6 grants and 16 scholarships, worth a total of \$383,716. All the projects are under way and we look forward to sharing the ideas and lessons they yield with all of you. We're pleased to spotlight some of our recently completed projects in this issue of the *DEED Digest*, and you can find nearly 500 project reports on the DEED Project Database.

You, too can apply for a grant to fund an innovative project idea. Fall cycle grant applications are due Aug. 15. If you're not ready for this round, start planning now for the next funding cycle — applications will be accepted Dec. 1, 2015 through Feb. 15, 2016.

Continued on page 4

TABLE OF CONTENTS

Fun inDEED! A Birthday Bash, Steroids, and More	1
Frozen! Ice Storage Shifts A/C Load to Off-peak Hours	1
A Steady Wind — Using Compressed Air Energy Storage for More Wind Power	2
On Board	3
Apply for DEED Fall Grants by Aug. 15	3
Compare and Save: Energy Efficiency Benchmarking Tools	4
DEED at the 2015 National Conference	5
New Books & Resources	6
DEED Scholarship Projects	7
New Grants & Scholarships	9
What We Learned About Public Power	12

DEED PROJECT SPOTLIGHT

A Steady Wind — Using Compressed Air Energy Storage for More Wind Power

**Lincoln Electric System's
Compressed Air Storage System
to Supplement Wind Generation
(DEED project G-334)**

Lincoln Electric System in Nebraska used an American Public Power Association Demonstration of Energy & Efficiency Developments grant to build a compressed air storage system to address the intermittent nature of wind energy. The system stores surplus wind in the form of compressed air and then releases it to generate power when wind is deficit.

In wind turbines, there usually is considerable mechanical spillage. Mechanical spillage is defined as the difference between potential power that blades can extract from the wind and the rated power of the generator. This DEED project built a rotary vane machine to divert the mechanical spillage into compressed air storage and to regenerate electricity from the storage system, thereby increasing overall wind power generation and efficiency.

Compressed air can help apply extra bi-directional torque on the generator shaft via an air motor. This provides desired generation and regulation on the grid, like power balance, frequency regulation, and power reserve.



The technology of compressed air energy storage has been developed for large scale applications. However, small-scale compressed energy storage is either subject to geographical constraints or low efficiency. To overcome those issues, this DEED project introduced a rotary vane machine to couple with a conventional wind turbine through a planetary gear system and work as a compressor or expander, as required. The new configuration helps to get rid of geographic constraints by using small aboveground or underground air tanks.

Lincoln Electric's system integrates a compact compressed air

system into a conventional wind energy conversion system. It has the potential to increase overall power generation as well as reinforce the self-sufficiency of electric power for a community. It also could enable transmission lines in rural areas to downsize or maintain the same size when power demand in the community increases.

This technology is applicable to other rural areas under the same conditions as the Great Plains in Nebraska, where abundant wind energy resources exist and small communities are located far from the generation center.

2

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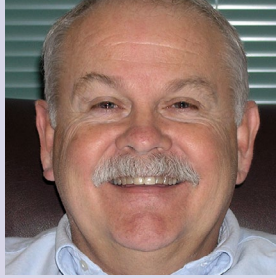
On Board

DEED welcomes our newest board member, Allen Johnson, representing Region 1 (Colorado, New Mexico, Utah, and Wyoming). Johnson brings experience in many areas of public power and expertise in power generation.

Thank you to Mike Sims, former Electric Utility Director of Farmington (New Mexico) Electric Utility System. Sims retired after serving a three-year term on the DEED board. He participated in the DEED board's strategic planning process in 2012 and was a key driver for development of DEED educational scholarships, which launched in fall 2013.



Allen Johnson



Mike Sims

Apply for DEED Fall Grants by Aug. 15

DEED is accepting fall grant applications from members through August 15, 2015. Apply for up to \$125,000 in funding for your innovative project ideas. Selected grantees will be notified at the end of September. DEED grants encourage energy innovation and support the development and demonstration of innovative technologies, tools, and services to help public power utilities. DEED members can apply for grants for projects to increase energy efficiency programs, reduce costs, investigate new technologies, offer new services, and improve processes and practices to better serve customers. Grants can support pilot projects, new technology demonstrations, early commercialization projects, and development of best practices. For access to the online application, email your request for login credentials to DEED@PublicPower.org.

Frozen! Ice Storage Shifts A/C Load to Off-peak Hours

Continued from page 1

but slightly larger — approximately 4'x6'x4'. A second "Tall and Skinny" unit was built with a smaller footprint to fit into tighter properties (e.g. zero-lot lines and condominiums) — approximately 2'x 8'x6'.

Water is frozen into ice to replace the cooling power of air conditioning units during peak times—with 100 percent efficiency. The ice freezes at night during off-peak times. During peak demand hours, the units use the ice, rather than the air conditioning unit's compressor, to cool the hot refrigerant, cutting cooling costs substantially and saving carbon dioxide emissions.

Azusa already uses TES units at major city facilities, including the public library, event center and gymnasium, police station headquarters, critical data centers, Azusa Light and Water main offices, and Azusa Pacific University — the utility's largest customer.

In September 2014, Azusa completed deployment of two smaller design variants of the commercial thermal energy storage system at two Azusa homes. The alpha versions of the Ice Cub proved that Ice

The Ice Cub can also be used as a whole house AC unit to cool a home while making ice and then used as a storage device by taking its compressor offline for 3–4 hours during peak periods.

Energy's successful commercial ice storage technology can be extended to the residential market.

The Ice Cub can be a storage-only system, providing up to 12-14 ton hours of cooling a day. It can be used by utilities as a peak-shifting device for demand reduction with the ability to curtail the operation of a 3-ton AC compressor unit for four hours or to shift the operation of a 4-ton AC system for three hours a day. This shift in compressor operation from on peak to off peak will reduce AC system demand by approximately 95 percent.

The Ice Cub can also be used as a whole house AC unit to cool a home while making ice and then used as a storage device by taking its compressor offline for 3–4 hours during peak periods. With the simple addition of a furnace unit, the Ice Cub could be a complete replacement for traditional AC units.

The prototypes developed under the project require some design and engineering improvements such as new materials for tank insulation, improved heat exchanger, and continued work developing guidelines for evaporator selection.

This research and demonstration project has inspired Ice Energy to immediately move forward with the development of a residential solution.

The Ice Cub can be used in all climate zones, nationwide, wherever refrigerant-based air conditioners are used to improve the comfort of residents.

Since the project's conclusion, Ice Energy has created five Ice Cub prototypes, each incorporating different improvements and changes from the lessons learned during this DEED project. Ice Energy expects an Ice Cub unit to be commercially available in the first quarter of 2016.


DEED PROJECT SPOTLIGHT

Compare and Save: Energy Efficiency Benchmarking Tools

Santee Cooper's interactive tools and training to benchmark energy efficiency performance
(DEED project G-329)



Public power utilities are committed to energy efficiency and offer a variety of programs and services to help customers reduce energy use and save on their bills. However, utilities lack adequate tools to measure the effectiveness of energy efficiency programs and to compare spending and savings with other utilities.

The best source of national energy efficiency data, the U.S. Depart-

ment of Energy's Energy Information Administration-861 survey, can be confusing and is therefore filled out inconsistently by different utilities. Resource-constrained utilities find it difficult to access reliable data, make apples-to-apples comparisons, confidently rank their performance, and decide how to allocate resources to future energy efficiency programs.

An American Public Power Association Demonstration of Energy

& Efficiency Developments research grant funded a project to help public power utilities produce quality energy efficiency program data and better access and use EIA-861 data. With enhanced data, utilities can make informed decisions and better allocate resources to energy efficiency programs.

This DEED project produced an interactive online benchmarking tool, the DSM Benchmarker (available on the APPA website at <http://dsmbenchmarker.publicpower.org/>), to help public power utilities compare energy efficiency spending and savings with peers. The tool generates customizable peer comparison charts by geography, ownership type, size, year-over-year, and other options. The charts address a range of energy efficiency indicators such as energy savings, potential demand reduction, and spending.

Led by Santee Cooper in South Carolina, the utilities contributing to this project were Austin Energy, Nebraska Public Power District, Or-

Continued on page 11

4

Fun inDEED! A Birthday Bash, Steroids, and More

Continued from page 1

And if you're looking for potential project partners, you can crowd source your ideas on the DEED Idea Exchange to gauge interest from APPA corporate members.

We've been celebrating DEED's 35th birthday this year with a traveling poster show of some outstanding DEED projects over the years. We're taking the show to many APPA conferences and education events this year. You can see the virtual poster show on our website.

As a special 35th birthday gift from DEED, we've made the DSM Benchmarker — a web-based tool to allow utilities to compare energy efficiency benchmarks with peers — available free to all APPA members.

You can read more about this cool new tool in *Public Power Daily*. The DEED project that generated this tool is described on this page of the *DEED Digest*.

The importance of research and development continues to grow as the electricity industry evolves in the face of changing technologies, regulation, and customer preferences. We feel fortunate to have DEED, which makes the benefits of R&D accessible and affordable for all public power utilities. APPA recently released its strategic plan for 2016 – 2018 and we're pleased that R&D is one of the six strategic initiatives identified in the plan — APPA has committed to continue to use our DEED program to help public power stay at the forefront of electricity

innovation. As APPA President and CEO Sue Kelly said, "We're putting DEED on steroids!"

Remember, DEED is a great funding source for your innovative projects, a tool to attract and retain a strong workforce, a knowledge resource for all utility departments, and an avenue for recognition. Not yet a DEED member? Join today.

Send us your thoughts on how we can grow the DEED program to better meet your needs — email us at DEED@PublicPower.org.

Mike Hyland, Senior Vice President, Engineering Services

Michele Suddleson, DEED Program Director, American Public Power Association

DEED at the 2015 National Conference



The DEED Booth was a meeting spot for all things R&D.



Captain Public Power visited DEED Program Director Michele Suddelson at the Public Power Expo.



DEED's celebratory 35th Anniversary traveling poster show was on display.

5



Scholarship recipient Bismark Singh with Micheal J. Hyland.



Michele Suddelson with DEED research grant recipient Margaret Cook. Her project is described on page 9, Austin Energy Studies Impact of Cooling with Discharge.


NEW BOOKS & RESOURCES

All resources can be ordered through the online APPA Product Store at www.PublicPower.org/Store

Smart Grid Customer Engagement Essentials

From health to privacy, electricity customers have many concerns and unfounded suspicions about smart meters. As small and medium sized utilities transition to advanced grid technologies, it is critical to communicate properly with customers. This DEED-funded guidebook helps utility staff, mayors, and city council members provide accurate information about smart meters and other technologies to dispel myths and fears and engage customers. It includes 139 survey responses from public power utilities on issues in smart grid deployment and customer engagement strategies. It lists the benefits of smart meters and spells out common customer concerns. The book guides policies, plans, and procedures and the development of community partnerships. Case studies describe how public power utilities use social media and other technologies for engagement. The guidebook provides engagement plan checklists, communication templates, and metrics.

DEED Members: \$20; APPA Members: \$50; Nonmembers: \$75

Solar Engagement Options for Public Power

Customers want solar — and no matter how they access it, they will turn to their utility for help. The technology may not be for everyone, but utilities that are prepared can better respond if customer interest does arise. Public power utilities are already employing a variety of business models to facilitate solar build-out. This DEED-funded publication prepared by the Solar Electric Power Association describes the four ways that public power utilities can offer solar to customers — purchased power, ownership, customer engagement, and community solar — and discusses the benefits and challenges of each. The book includes charts and public power case studies to illustrate and differentiate the options. It deals with costs and



financing, utility planning, solar forecasting, smart inverters, and energy storage.

DEED Members: \$25; APPA Members: \$65; Nonmembers: \$130

DEED members can get a FREE electronic copy.

Smart Grid Investment
Grant Projects:
Public Power Case Studies

The U.S. Department of Energy Smart Grid Investment Grant program, funded by the American Reinvestment and Recovery Act, is designed to accelerate the modernization of electric transmission and distribution systems and promote investments in smart grid technolo-

gies, tools, and techniques. Of the 99 SGIG grants awarded to more than 225 electric utilities and other partnering organizations, 32 were led by public power utilities.

SGIG projects were funded in five categories — advanced metering infrastructure, customer systems, electric distribution systems, electric transmission systems, and equipment manufacturing. This DEED-funded publication, prepared by the Sacramento Municipal Utility District and Energetics Incorporated, profiles the 32 public power SGIG projects, reviews specific smart grid technologies, and discusses how public power utilities can benefit

Continued on page 7

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DEED SCHOLARSHIP PROJECTS

Rancho Cucamonga Synthesizes Material for Energy Storage S-183

LiFePO₄ is a cost-effective and environmentally friendly material for use in batteries. Darren Kwee, a student at Riverside City College, teamed up with Rancho Cucamonga Municipal Utilities to synthesize LiFePO₄ particles with emphasis on environmental and scale considerations. Multiple working batteries were created during this demonstration and the team continues to work toward optimizing the performance of LiFePO₄ particles by controlling particle size, particle crystallinity, and conductive layer coating.

Tulahoma Organizes Record Drawings S-184

Tulahoma Utilities Board engineers were having a difficult time keeping track of record drawings and identifying the most current versions. A DEED-funded intern, Andrew Gray, helped to design and implement a data management system for the electric department record drawings by using NextGen Document Management system software. Gray scanned all record drawings and organized them by substation and drawing type. He also renamed all the drawings according to a scheme



created by the department manager. The engineers in the electric department are now able to access drawings more easily.

ElectriCities Designs Reconfigurable Solar Converters for PV Plants S-185

Iman Mazhari, a DEED-funded intern at the ElectriCities of North Carolina, designed a single-stage Reconfigurable Solar Converter to integrate solar photovoltaic systems with battery energy storage. The RSC uses a single power conversion system for different operation modes such as PV to grid, PV to battery, battery to grid, and battery/PV to grid. The converter requires minimal complexity and modifications

to PV-battery systems and helps in firming capacity of PV power plants. The energy storage systems smooth the output and control the ramp rate (MW/min) to eliminate rapid voltage and power swings on the electrical grid. The battery adds or subtracts power to the PV output to smooth out the power variations during transient cloud shadows on the PV array. The RSC offers potential for flexible, retrofit, and expandable platforms for PV power plants.

Riverside Improves Solar Cell Performance S-186

Dye Sensitized Solar Cells are next-generation solar cells, with wide applications, including building integrated photovoltaic technology and flexible solar cells. Taehoon Lim, a DEED-funded intern at Riverside Public Utilities, worked to improve the photovoltaic characteristics of DSSCs by addressing two of their main drawbacks —inefficient electron transfer and long-term instability. He fabricated DSSCs with an advanced and novel hybrid nanostructured photoelectrode material and modified device architecture to improve photovoltaic characteristics and overall

Continued on page 8

7

NEW BOOKS & RESOURCES

Continued from page 6

from smart grid deployments and address unique challenges. The publication includes a summary of all SGIG-funded public power utility projects; a review of key findings across multiple funding recipients; and an in-depth analysis of four public power SGIG projects — led by the Sacramento Municipal Utility District, the Central Lincoln People's Utility District, EPB of Chattanooga, Tennessee, and the Cuming County Public Power District.

DEED Members: \$25; APPA Members: \$65; Nonmembers: \$130

DEED members can get a FREE electronic copy.



eReliability Tracker

APPA's eReliability Tracker, created under a DEED grant, is an easy-to-use, web-based and mobile-friendly service that allows public power utilities to collect, categorize, and summarize outage information. Data for multiple outages can be recorded. A second DEED grant helped to fund several enhancements requested by system users. The enhanced

eReliability Tracker allows reporting of partial restorations or multi-layered outage events, multiple versus single cause events, number of customers per circuit to auto-calculate the number of customers interrupted, and custom variables and equipment details on each outage. With this service, utilities can run reports to identify the top worst performing circuits, rank the most common causes of outages based on count and duration, and calculate IEEE 1366 reliability indices. Subscribers to eReliability Tracker receive an annual national reliability report and earn points toward a Reliable Public Power Provider (RP₃) designation.

DEED Members: \$99; APPA Members: \$149; Nonmembers: \$299

DEED SCHOLARSHIP PROJECTS



8

Continued from page 7

performance. More efficient and long-term stable DSSCs are needed to fully commercialize building integrated PV products — they can help to locally generate a portion of the energy required by buildings and to lower energy loads by acting as an effective thermal mass.

Lansing Installs Activated Carbon Injection System S-188

Andrew Smith, a DEED-funded intern at the Lansing Board of Water & Light, worked on a capital project for activated carbon injection (ACI) systems. ACI is used to reduce mercury emitted from power plants in their flue gas. Smith helped the utility get ready to install a new ACI system at its Eckert Station, which previously did not have one. He also helped to recommission an old ACI system installed at Erickson Station in 2007. Smith coordinated with the Eckert plant engineer to determine the best location for an ACI module and used AutoCAD to draft a scale floor plan of four proposed positions.

Plant maintenance supervisors approved the plan and an ACI module will be installed in 2015. Smith also oversaw an inspection of Erickson's system by original equipment manufacturer Cabot Norit. Afterward, he spoke with the plant maintenance and operations supervisors about effecting the repairs and upgrades recommended by Cabot Norit in their report.

Holland Engages the Community on Energy Efficiency S-189

The Holland Board of Public Works' Community Energy Plan was a semifinalist in the Georgetown University Energy Prize 2-year competition and used the services of a DEED-funded intern, Katelyn Tooley, to develop a communication strategy and materials to boost community knowledge and participation in conservation and energy efficiency efforts. The City of Holland's goal in the Georgetown University Energy Prize competition was an 8 percent reduction in energy use over two years. Tooley created "SUPER" tips — the top five energy efficiency tips for homes — that were highlighted on the utility's website and used as the basis for a series of video and radio public service

announcements. Tooley consistently updated the website and submitted monthly content to the City of Holland's e-newsletter. She also created a script for door-to-door marketing efforts, planned how to promote energy literacy and participation among school students, and participated in various community events to spread energy conservation messages. The internship resulted in a multidimensional communications strategy and a body of unified messaging materials.

Colton Encourages Tree Planting for Energy Savings S-190

Andrew Flores, a DEED-funded intern, helped Colton Electric Utility develop a tree planting rebate program that can potentially cut residential cooling costs by 20 percent and reduce greenhouse gas emissions. Trees in residential yards that shade the windows, roof, and walls of a home can significantly reduce energy needed for cooling. Flores helped to determine what trees provide the most abundant shade with roots that are not destructive to underground piping and utility lines. He conducted a literature review and collected and analyzed data. Using an Urban Forest Management Plan toolkit, the framework and guidelines for tree planting and maintenance were constructed. To track the energy and environmental benefits of planting a shade tree, Colton used the DEED-funded online Tree Benefits Estimator® provided by Sacramento Municipal Utility District. This software helps to estimate the amount of energy saved and carbon-dioxide reduced as a result of trees planted.

Austin Energy Studies Impact of Cooling Water Discharge S-191

During a drought or heat wave, some power plants discharging cooling water to lakes or rivers have met or exceeded the Environmental Protection Agency's cooling water effluent temperature constraints. In 2012, the Texas Commission on Environmental Quality proposed amendments to the Texas Surface Water Quality Standards to encourage more power plants to assess cooling water thermal impacts. Margaret Cook, a DEED-funded intern, helped to create a model to estimate lake conditions and the effects of heated

Continued on page 9

NEW DEED PROJECTS

Grants & Scholarships

Understanding Hydro Power CS-2008

The Colorado River Commission of Nevada is offering an internship to help a student learn the role of a mechanical engineer in the generation and distribution of hydro power, understand the mechanics of hydro power, and learn day to day skills needed to work at a utility.

Integrating Variable Solar Power into the Grid CS-2009

Fallon Municipal Electric System is working with an intern, Yacouba Moumouni, to explore how the electric grid can accept a large-scale integration of solar photovoltaic power without power quality and reliability problems, given that PV installations can change output between 10 to 100 percent in a few seconds, many times a day.

Evaluating Energy Efficiency Programs CS-2010

The Iowa Association of Municipal Utilities is responsible for filing the results of energy efficiency programs for the 136 municipal electric utilities across the state of Iowa and setting future energy efficiency goals and



spending for these utilities. IAMU will use an intern to collect and analyze the results of individual utility energy efficiency programs for 2013 and 2014.

Installing Advanced Metering Infrastructure CS-2011

The Town of Benson is implementing an Advanced Metering Infrastructure in spring and summer 2015 for electric and water systems. As staff does the AMI installation, an intern will work with the AMI vendor to learn all system capabilities, map the system, capture existing and new meter

data, monitor the system for signal strength, support IT improvements, and help roll out the AMI system to the public.

Developing a Web-based Lighting Calculator CS-2012

The Northern California Power Agency is offering an intern the opportunity to develop a web-based lighting calculator that captures all the technical rigor of a current Excel-based calculator, but is formatted for easier use by utility staff and contractors at project sites via laptops and tablets.

Continued on page 10

9

DEED SCHOLARSHIP PROJECTS

Continued from page 8

effluent from a cooling reservoir used by an Austin Energy power plant. She modeled the cooling discharge as it leaves the plant — including the impacts of power generation and climate conditions around the reservoir like air temperature, wind speed, evaporation, dew point, and soil moisture. This model helped to determine how much generation a power plant might have to curtail to meet temperature limits under extreme climate conditions. This project could mitigate the effects of drought and heat wave at power plants and offer a tool to help plants operate at

an optimal level even during times of water and temperature stress. The model also helps to determine what changes a plant could make to lessen the impact its heated effluent might have on the environment.

Lincoln Electric Designs Compressed Air Storage for Wind Energy S-195

Jie Cheng, a DEED-funded intern, helped Lincoln Electric System design a novel wind energy conversion system with storage for spillage recovery. He integrated compressed air energy storage with a conventional wind turbine. The system recycles the mechanical spillage from the turbine blades and stores it for later

electricity generation with the help of a rotary vane machine. Most wind turbine designs rely on the traditional wind power profile, mapping various wind speeds to output power. At certain speeds a great amount of wind energy is trimmed away, because of the power limitation of the turbine generator, causing mechanical spillage. Lincoln's system helps to recycle the spillage and store it to increase future wind power generation. This system is applicable to small to medium sized wind turbine generator systems. It helps rural farms cope with dynamic load, and it also helps to reduce fluctuation of grid power flow as well as system regulation.


NEW DEED PROJECTS

Grants & Scholarships

Continued from page 9

The calculator will summarize energy and cost data to support program management, rebate processing, and regulatory reporting requirements.

Centralizing Management of Smart Meter Data CS-2013

The Northern California Power Agency is using a student intern, Mohammed Jagun, to help develop an aggregated Meter Data Management System warehouse system for utility water and electric distribution systems. A centralized MDMS will help to obtain economies of scale in the storage and use of meter data from interval smart meters at residential customer sites.

Demand Side Management for Special Populations CS-2014

The Omaha Public Power District will provide an intern the opportunity to develop a new demand side management program for special groups of OPPD customers. The program will educate income-qualified residents, veterans, seniors, and persons with disabilities on managing and budgeting energy use. The intern will help OPPD track participants and support program marketing and evaluation.

Increasing Solar Cell Efficiency CS-2015

The Town of Front Royal is working with a student at the University of Virginia, Andre Slonopas, to increase the efficiency of solar cells and decrease solar electric rates. The intern is exploring the effectiveness of adding a chalcogenide junction to increase the efficiency of a solar cell up to 3 percent, while providing a cost effective method of manufacturing.

Increasing Efficiency of Solar Energy CS-2016

The Research Department of the University of North Carolina, Charlotte is working with a student, Soheil Razmyar, to build one-dimensional nano-cable heterostructures. The heterostructures will help to achieve multiple functions including strong

light absorption, efficient photocarrier conversion and separation, and rapid carrier transport for higher efficiency in solar energy usage via photocatalysis.

Assessing Payback from Net Zero Homes CS-2017

Natalie Johnson, a student at the University of Wisconsin-River Falls, will work with River Falls Municipal Utility to compare the payback of energy efficiency and renewable energy use in different types of housing — high efficiency net zero homes for low-income citizens vs. conventional homes and campus buildings. The study will demonstrate whether net zero and LEED campus buildings provide a viable sustainable option economically, socially, and environmentally.

Updating Energy Services Program Guidebook CG-1081

Lansing Board of Water and Light will review and update the 2009 APPA guidebook, Evaluating Your Utility's Energy Services Program on energy efficiency and demand side management programs. Lansing will survey DEED members and guidebook users and provide case studies and examples from small and medium sized utilities.

Pathways to a Technical Future CG-1082

Nebraska Public Power District will evolve Pathways to a Technical Future — a package of educational experiences tied to academic requirements and public power practices — to help school students become energy literate and develop the knowledge, practical skills, and expertise to be successful in the STEM workforce. Pathways will develop a robust educational website and other community education resources.

Testing a New CO₂ Combined Water and Space Heater CG-1083

Silicon Valley Power will conduct a controlled field evaluation of a new-to-the-market combination split system water heater/space heater using carbon dioxide as a refrigerant.

An unbiased evaluation of the energy efficiency and demand response performance of this combination unit compared to other electric space heating/water heating appliances is necessary to understand the unit's value proposition to the customer and utility.

Hosting DEED-sponsored Web Applications CG-1084

The American Public Power Association will host and maintain a range of select web applications developed through DEED projects. Maintenance includes regular code development/debugging and web services such as certificates, IP addresses, and subdomain names. This project will ensure that DEED members have access to quality web tools developed by colleagues. Any new features and upgrades to applications will require separate funding.

Enhancing eReliability Tracker for Outage Analysis CG-1085

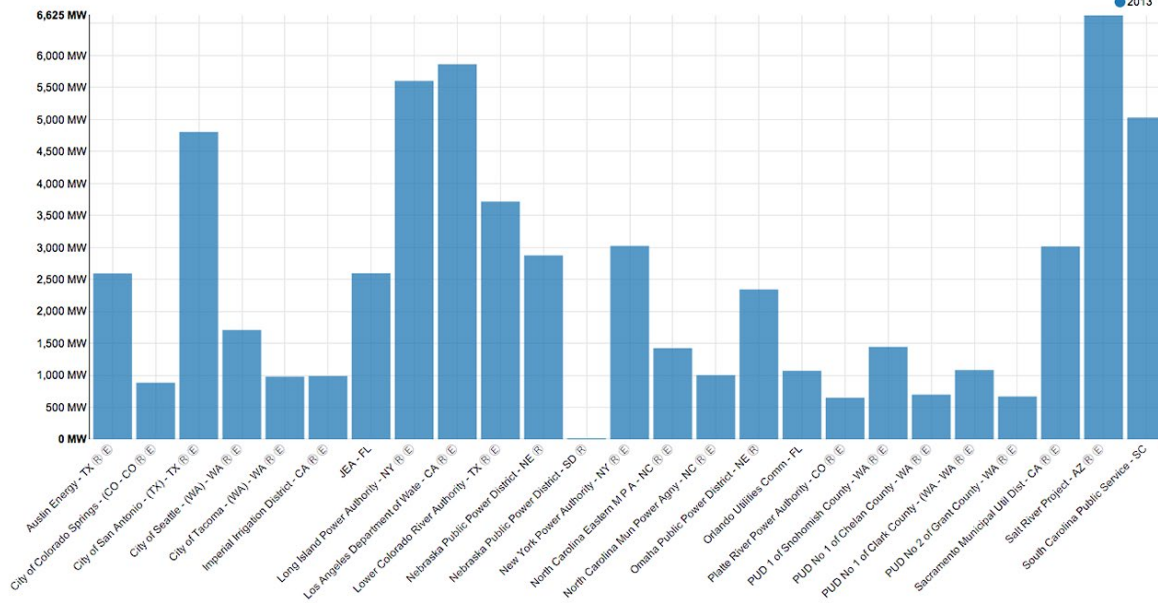
eReliability Tracker software from the American Public Power Association is a DEED-funded, national web-based application to help public power utilities catalog and analyze outage data. With a new DEED grant, APPA will enhance the features of eReliability Tracker to allow utilities to do more advanced data recording and analysis. Proposed enhancements will allow outage management systems to connect to the tracker, build smart meter analysis capabilities, support mobile phone use, and incorporate safety tracking and job-site briefing features.

Physical Security Essentials — A Public Power Primer CG-1086

The American Public Power Association will develop a guidebook to help public power systems shore up physical security of critical substations, large power transformers, and other utility assets and infrastructure, and provide for security of employees. The guidebook will support identification of risks and vulnerabilities, development of strong intrusion response plans, and coordinating with government and other players, if there is an incident.

Compare and Save: Energy Efficiency Benchmarking Tools

Annual Peak Demand



The DSM Benchmarker allows utilities to filter EIA data to enable peer-to-peer comparisons of energy efficiency and demand response programs.

Continued from page 4

lando Utilities Commission, Omaha Public Power District, and Tacoma Public Utilities. A contractor, Alliance to Save Energy, facilitated, and managed the project.

The DSM Benchmarker includes data from 750+ utilities that submit EIA-861, schedule 6 data — including more than 300 public power utilities.

Even small utilities that are not required to report data to EIA can manually enter their energy efficiency data in DSM Benchmarker or use filters to see results for other small utilities. Future year uploads will require marginal effort, and the tool will collect data for multiple years.

The DSM Benchmarker can significantly reduce the time and effort public power utilities invest in reporting EIA-861, Schedule 6 data and generate benchmark comparisons for management decision making and to share with external stakeholders.

This sample chart generated by the DSM Benchmarker displays Annual Peak Demand (in MW) for members of the Large Public Power Council (LPPC).

To improve national data quality, this DEED project also provided technical assistance, created training materials, and trained utilities in completing the most current version of EIA-861, Schedule 6.

The project team produced a supplemental guide on how to generate reliable, comparable data, working directly with EIA to clarify desired reporting practices and get sign-off on examples and consensus reporting practices. The supplemental guide to *Form EIA-861 Instructions and Respondent Handbook focuses on reporting for Schedule 6: Demand-Side Management and Smart Grid Information*. The guide provides helpful tips, examples, and recommendations based on input and feedback from utility peers.

The DEED project also analyzed 2010 and 2011 EIA-861 data to

The DSM Benchmarker can significantly reduce the time and effort public power utilities invest in reporting EIA-861...

identify reporting inconsistencies and conducted outreach to provide technical assistance to utilities with likely errors. The project identified five types of errors: miscategorization of data due to confusion about reporting instructions; failure to provide data that is not regularly tracked by the utility; incorrect reporting due to misunderstanding of definitions; human errors; and errors overlooked as reporting was assigned to non-data specialists and/or assigned to different staff members year to year.

What We Learned About Public Power

DEED Scholarship Recipients Share



“I learned a great deal about public power... Coming in having no previous knowledge of public power, I left understanding what jobs and opportunities are available within a utility. I am now much more comfortable with the idea of working at a public power utility...I'd like to thank DEED and APPA once again for this amazing opportunity.”

Jasmin Alsaied, scholarship recipient,
Fayetteville Public Works Commission

“I learned an immense amount about the logistics of the electrical industry and the future of the energy industry and how energy is an integral and necessary part of our life. So much change is on the horizon, and it's phenomenal that a degree in engineering will help me assist in making these changes. I am so grateful for the opportunity to learn from professionals and experience firsthand the work and time put into the flip of our switch we so take for granted. This experience has truly shaped the kinds of career paths I consider.”

Olivia Foster, scholarship recipient, St. Charles Township



“I am planning on graduating with a degree in electrical engineering with an emphasis on power systems in May 2015. I am very excited about choosing a career in the power field. I took an internship during the summer at a coal fired power plant. The DEED scholarship pushed me to take more power emphasis classes to further strengthen my background in the power industry. “

Lucas Schaaf, scholarship recipient, Valley City Public Works

“I spent a summer as an engineering intern with Independence Power and Light (IPL) and while I was there I gained valuable knowledge and insight into the public power industry. ... I am optimistic about where it is headed and what my role might be in reshaping the utility of the future. I was able to gain valuable insight into the production and delivery of affordable power. I witnessed firsthand that many things are changing now and IPL is making great strides to meet the increasing regulations and efficiency goals. The mentorship experience was great and helped me understand things about an industry I did not previously know much about.”

Eric Rothmeier, scholarship recipient, Independence Power and Light

