

# Nebraska Power Association 2010 Research & Conservation Report



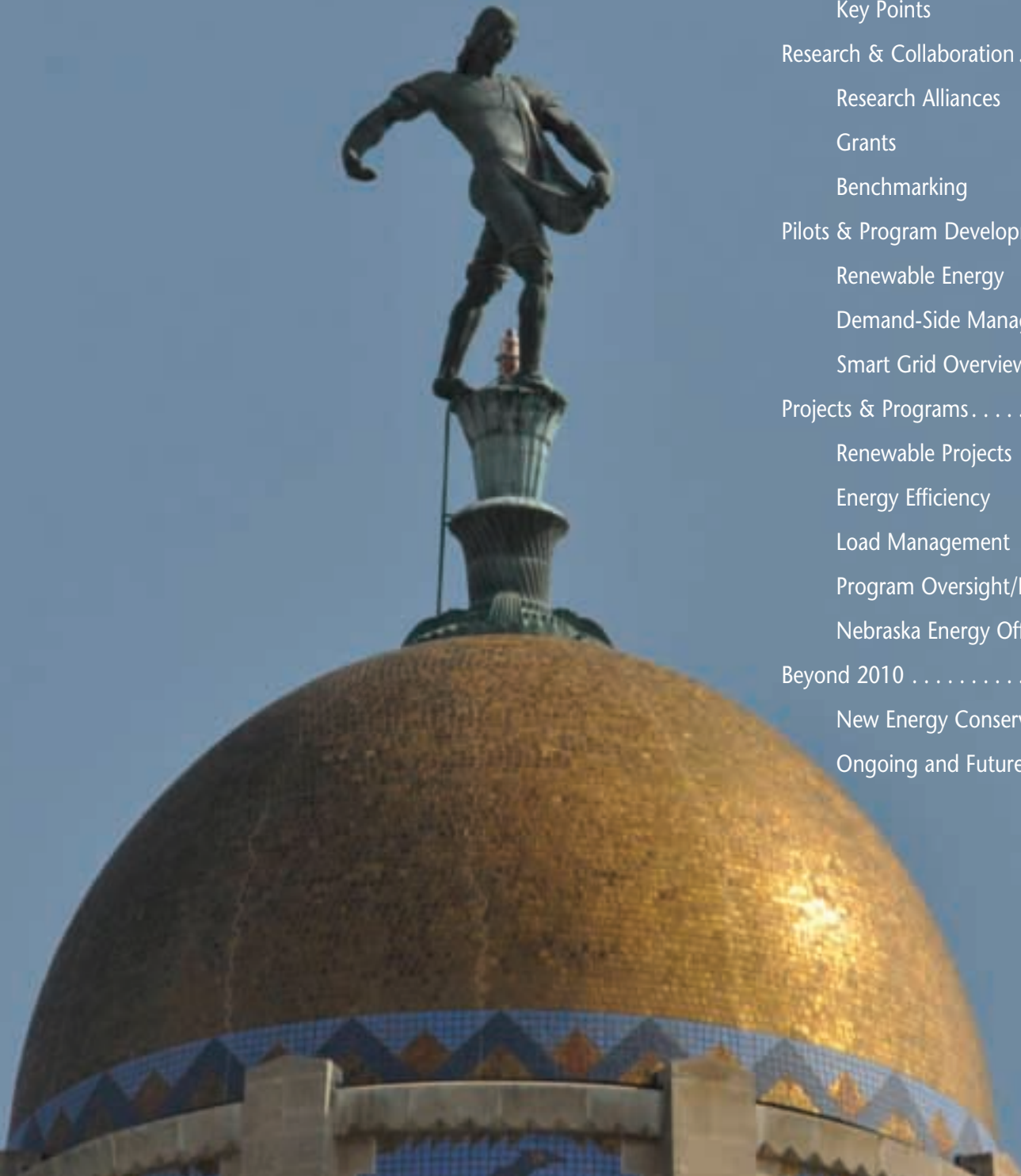


# Nebraska Power Association 2010 Research & Conservation Report (Prepared Fourth Quarter 2011)

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# Executive Summary

This report fulfills state statute 70-1026 following a request from the Nebraska Power Review Board to provide a research and conservation report on the sustainability efforts within Nebraska. This report was created with the support of many Nebraska utilities and the Nebraska Energy Office (NEO). Without their assistance, this report would not have been possible.

There are 162 utilities in Nebraska, of which 87 are participating in energy-efficiency programs. This report includes the results of many efforts in 2010, several of which are ongoing, and provides insight into future initiatives that are just on the horizon.

## Utility Sustainability Goals

### Lincoln Electric System (LES)

- Offset LES' projected five-year load growth through energy efficiency and renewable generation.

### Omaha Public Power District (OPPD)

- Reduce peak demand by 50 megawatts (MW) by the end of 2012.
- Achieve 10 percent of energy sales to retail customers from renewable resources by the end of 2020.

### Nebraska Public Power District (NPPD)

- Incorporate renewables in the total mix of NPPD-owned generation and contract purchases.
- Achieve 10 percent of the energy supply for NPPD's native load from renewable resources by 2020.
- Reduce native load energy sales by 13,700 megawatt-hours (MWh) in 2010.

## Renewable Energy

Statewide in 2010, wind generation provided over 460,000 megawatt-hours (MWh) of electricity.

## Energy Efficiency

Even greener than a kilowatt-hour (KWh) generated by a wind turbine on the Nebraska plains is a KWh that is not used.

The Nebraska Energy Office (NEO) and Nebraska utilities remain committed to providing programs and technologies designed to reduce energy consumption.

Through several energy-efficiency efforts tracked by NEO and Nebraska utilities in 2010, approximately 24 MW and 80,000 MWh were reduced. In addition, Nebraska utilities have the ability to reduce its peak demand by over nine percent through various demand-response programs.

Nebraska utilities provide opportunities for customers to save money and make their homes and businesses more comfortable, while reducing the need for more expensive power generation during peak periods, delaying the need to build additional power generation.

Nebraska's electric utilities have undertaken numerous energy-efficiency initiatives. However, national reports designed to quantify those successes may not always measure efforts that are the best fit for the state.

For example, the American Council for an Energy Efficient Economy (ACEEE) report ranks states' energy-efficiency initiatives. Points are awarded based on criteria of which Nebraska's electric utilities are directly responsible for approximately 30 percent of the total points awarded. The remaining points are made up in sectors like transportation, building codes and legislative policy.

This Research and Conservation Report reviews the sustainable efforts across the state to highlight the valuable strides Nebraska is making in energy efficiency and renewable energy.

## Key Points

Nebraska utilities are maximizing investments by working with each other and organizations to stay informed of cutting-edge technology and best practices.

The utilities are consistently adopting additional research and development projects by partnering with numerous research organizations and local universities to determine the sustainability programs that best meet the needs of Nebraskans at the most economical price.





# Research & Collaboration

Research has been done to understand the emerging trends and technology that will best meet the state's current and future sustainability needs. Nebraska utilities, NEO and others have contributed to better understand the various technologies and potential programs to identify those that best meet the needs of Nebraska consumers.

Nebraska utilities believe so strongly in providing customers with the most competitive, cost-effective service now and for years to come that they directly contributed upwards of \$5.5 million towards such research and collaboration in 2010. Perhaps even more impressive is the nearly \$129 million in total grants, matched funds, and Nebraska Energy Office loans used or earmarked for sustainable projects across the state.

## Research Alliances

Many utilities have contributed to and participated in various research efforts and organizations, including the following:

### Nebraska Clean Cities Coalition (NeC3)

Nebraska Clean Cities Coalition (NeC3) is a statewide coalition of public and private membership with a goal of improving sustainable environmental, economic and energy security. NeC3 supports partnerships, projects and programs that advance clean-burning fuels and vehicles in Nebraska and the region. NeC3 is fuel-neutral and promotes security and sustainability through fuel diversity.

Right, Municipal Energy Agency of Nebraska's (MEAN) seven-turbine wind farm near Kimball, Neb.

Below is the Chevy Volt, one of many new electric vehicles (EVs). Utilities are investigating how to best serve the growing group of customers who drive EVs.



### American Wind Energy Association (AWEA)

With more than 2,500 members and advocates, AWEA is the hub of the wind energy industry. AWEA is a national trade association representing wind power project developers, equipment suppliers, service providers, parts manufacturers, utilities, researchers and others involved in the wind industry.

### American Council on Renewable Energy (ACORE)

ACORE works to bring all forms of renewable energy into the mainstream of America's economy and lifestyle. ACORE accomplishes much of its work by convening the leaders across many sectors, publishing collaborative research and facilitating communications among members, stakeholders and the media.

### Utility Wind Integration Group (UWIG)

UWIG's mission is to accelerate the development and application of good engineering and operational practices to support the appropriate integration of wind power into the electric system.

The group pursues its mission through the coordinated efforts of its members, in collaboration with wind industry stakeholders, including federal agencies, trade associations and industry research organizations.

### Solar Electric Power Association (SEPA)

SEPA is an educational nonprofit organization dedicated to helping utilities integrate solar power into their energy portfolios. SEPA provides unbiased utility solar market intelligence, up-to-date information about technologies and business models, and peer-to-peer interaction.

### Electric Power Research Institute (EPRI)

EPRI is an independent, nonprofit company performing research, development and demonstration in the electricity sector for the benefit of the public. Projects include new technologies, electric vehicles, smart grid, energy-storage and other sustainability programs.





## Nebraska Energy Assistance Network (NEAN)

NEAN assists Nebraskans with their energy needs through education, advocacy and partnerships with fundraising and awareness campaigns about energy efficiency, weatherization and programs for low-income individuals and families.

## E Source

E Source provides independent research, advice and information services to utilities, major energy users and other key players in the retail energy marketplace. Its mission is to increase the effectiveness of programs and customer relationships, while supporting the efficient and environmentally sound use of energy.

## Omaha Community Center of Sustainability (OCCS)

The goal of the OCCS is to help the people of Omaha respond to the world's changing environment and economic conditions, and to transition to a more rational and efficient way of life.

OCCS accomplishes this by creating a living example and research center dedicated to sustainability. OCCS is a showcase of sustainable living and a center for education and research.

## Smart Grid/Electric Vehicle Studies

Utilities have been investigating the potential impact of electric vehicles (EVs) being plugged into the power grid.

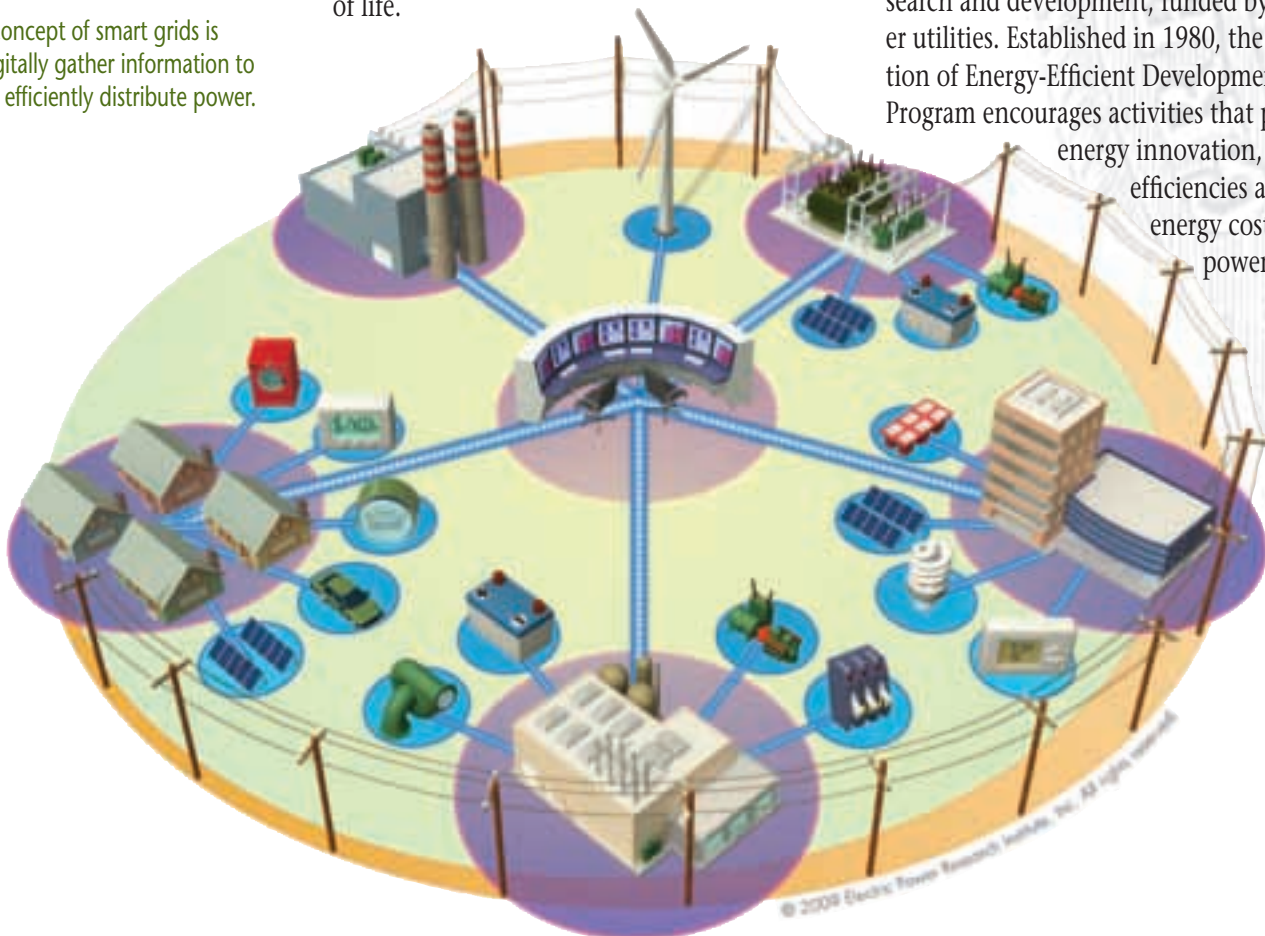
Although it may be years before such cars significantly penetrate the Nebraska market, utilities are in the process of laying the groundwork to be the "go-to" energy providers when customers have questions on electricity and EV-related technology. Some utilities have launched informative websites with toll-free help lines on the subject.

## American Public Power Association (APPA)

APPA is the service organization for the nation's more than 2,000 community-owned electric utilities. Collectively, these utilities serve more than 46 million Americans.

Within the APPA is a group focused on research and development, funded by public power utilities. Established in 1980, the Demonstration of Energy-Efficient Developments (DEED) Program encourages activities that promote energy innovation, improve efficiencies and lower energy costs for public power customers.

The concept of smart grids is to digitally gather information to more efficiently distribute power.



APPA has shared the findings of its studies with Nebraska utilities, who have integrated those results into their sustainability programs.

### **Green Omaha Coalition (GOC)**

The GOC exists to promote a healthy, sustainable community through partnerships, policy, and smart solutions using education, advocacy, and leadership. The GOC is comprised of more than 20 Omaha organizations, including OPPD, all of whose continued collaboration bolsters the efforts of the community in working towards a more sustainable Omaha.

### **Large Public Power Council (LPPC)**

Comprised of 25 of the nation's largest locally owned and controlled, not-for-profit power systems, the LPPC works to develop and advance consumer-oriented positions on national energy issues.

## **Grants**

### **DEED Grant Program: Digi Rooftop Units (RTUs)**

OPPD received a \$50,000 grant to execute an innovative pilot for digital rooftop optimizers. Digi-RTU controllers are easily mounted to existing rooftop air conditioning units that greatly improve operating efficiency.

### **ENERGY STAR and ENERGY STAR Challenge**

This is a \$15,000 grant to fully implement and document OPPD's efforts as an ENERGY STAR Partner. In addition, OPPD used the grant to develop best-practice guidelines to help other utilities start and/or maximize their participation as ENERGY STAR partners which help their customers participate in the ENERGY STAR partner challenge.

### **Measuring Airtightness in High-Rise Buildings**

Loup Power District received a DEED grant to hire a student from the University of Nebraska to investigate the airtightness of a high-rise building, using the floor-by-floor,

blower-door method. If this method works, it will be easier to pinpoint which floors in a building may need repair.

### **Demand-Side Management: Student Internship**

This grant was to hire an intern for a year, leveraging the DEED internship to help OPPD staff determine the optimal sustainability portfolio of programs, targeting various customer markets, which produced the best demand-reduction results.

### **Energy Usage: Student Internship**

This DEED grant was for an intern to identify the best solution for providing customers with usage information, comparing their usage with that of other customers who live in similar-sized homes with comparable heating and cooling systems.

### **Clean Diesel**

The Nebraska Department of Environmental Quality (NDEQ) awarded OPPD \$19,000 to reduce emissions by retrofitting ten of the utility's service vehicles. The grant was part of the Environmental Protection Agency's (EPA) \$1.73 million fund to reduce diesel emissions in Nebraska.

### **NDEQ Refrigerator and Freezer Recycling Program**

The NDEQ provided \$219,000 to help subsidize the \$578,000 costs of a program that recycled more than 3,600 refrigerators in the state. Each refrigerator or freezer recycled costs around \$165 to incentivize, pick-up, and ensure that over 95 percent of the components and materials of the discarded appliance are either recycled for beneficial uses or eliminated in an environmentally responsible way. The remaining 5 percent is used to facilitate the decomposition of biodegradable landfill material.

Old refrigerators use up to four times more electricity than new ones. The environmental benefit for each appliance recycled is equivalent to taking two cars off the road for a year. Numerous utilities contributed to this effort. (See box at right.)

### **NDEQ Refrigerator and Freezer Recycling Participants**

Auburn, Battle Creek, Brainard, Burt County Public Power District (PPD), Butler County PPD, Butler PPD, Cambridge, Cedar Knox PPD, Central City, Cornhusker PPD, Cuming County PPD, Custer PPD, David City, Dawson PPD, DeWitt, Elkhorn Rural PPD, Fairmont, Franklin, Friend, Giltner, Hebron, Hickman, Hildreth, Holbrook, Holdrege, Howard-Greeley Rural PPD, KBR Rural, Laurel, Lexington, Loup River PPD, Loup Valley Rural PPD, Madison, McCook PPD, Minden, Mullen, NPPD, Neligh, Nelson, Niobrara Valley Electric Membership, Norris PPD, North Central PPD, North Platte, Northeast Nebraska PPD, OPPD, Ord, Perennial PPD, Polk County PPD, Randolph, Schuyler, Scribner, Seward, Seward County PPD, South Central PPD, South Sioux City, Southern PPD, Southwest PPD, St. Paul, Stanton County PPD, Stromsburg, Superior, Sutton, Trenton, Twin Valleys PPD, Valentine, Wahoo, Wauneta, Wayne, Wilcox, Wymore.





A technician takes a pumping level measurement for a pump-efficiency test on an irrigation well.

### **USDA Rural Energy for America Program (REAP Grants)**

As part of a two-year program that started in 2010, the U.S. Department of Agriculture awarded a \$100,000 grant to both NPPD and OPPD for conducting energy-efficiency audits for Nebraska ag producers and rural businesses. NPPD completed 125 such audits in 2010, while OPPD completed seven. The USDA also provided a \$1.8 million grant directly to these producers and businesses to implement audit recommendations.

### **Green Jobs Training: syNErgy Partnership**

syNErgy is funded through a U.S. Department of Labor (DOL) State Energy Sector Partnership grant and coordinated through the Nebraska Department of Labor.

The goal of syNErgy is to place skilled workers in unsubsidized employment in the renewable energy and energy-efficiency fields by preserving and creating new jobs in power generation, transportation, building, agricultural and waste-management markets, while reducing the environmental footprint of these energy-intensive industries.

Nebraska received a total of \$4.8 million in syNErgy grants. The program created partnerships with multiple community colleges, private employers, Metropolitan Utilities District (MUD), LES, NPPD and OPPD.

### **U.S. Department of Energy (DOE): Creighton University Renewable Energy Studies**

This \$1.4 million project is a collaborative effort with OPPD. A total of \$1.14 million came from federal funds requested by Nebraska Rep. Lee Terry and Sen. Ben Nelson.

The DOE will administer the money as part of its mission to promote renewable energy. An additional \$1.2 million funded the development of the curriculum for a new renewable energy degree program. Creighton University also will serve as a resource for utility customers considering the use of alternative energy projects on commercial sites.

### **DOE's reEnergize Program**

The DOE's Better Buildings Program awarded \$10 million to create the reEnergize program.



reEnergize is a collaborative effort between the cities of Omaha and Lincoln to build energy-smart communities with their partners.

Over a three-year period, the plan is to work with highly qualified contractors to complete energy evaluations on a total of 263 commercial and nonprofit buildings, and make energy upgrades on 3,193 residences throughout the five-stage program.

### DOE American Recovery Reinvestment Act (ARRA) or Stimulus Grants for Renewable Energy

The goals of the Advanced Renewable Energy Project grants are to (1) increase renewable

energy generation in Nebraska, (2) demonstrate the use of renewable energy technologies, (3) deploy cutting-edge renewable technologies, (4) generate energy from renewable resources on or before March 2012, (5) avoid greenhouse gas emissions and (6) leverage funds and create jobs.

- Estimated energy savings: 400 MWh annually
- State costs (ARRA): \$3.5 million
- Non-state costs (leveraged): \$4.6 million

## Selected Advanced Renewable Energy Project Grants

Applicant	Renewable Energy Type	Project Location	Contract Amount	Match Amount	Total Project Cost	Funds Expended as of September 30, 2011*
AGP Corn Processing, Inc.	Biomass	Hastings/ Adams County	\$275,000	\$50,000	\$325,000	\$247,500
Allen Fleischman	Solar	Tekamah/ Washington County	\$106,250	\$17,000	\$123,250	\$95,625
Bluestem LLC	Wind	Springview/ Keya Paha County	\$2,300,000	\$4,338,000	\$6,638,000	\$2,300,000
David DeBoer	Solar	Ft. Calhoun/ Washington County	\$11,223	\$1,981	\$13,204	\$9,023
Design Plastics, Inc.	Wind	Omaha - Fremont/ Douglas - Dodge Counties	\$148,000	\$26,800	\$174,800	\$79,526
Ho-Chunk CDC	Solar	Winnebago/ Thurston County	\$249,780	\$40,000	\$289,780	\$202,599
Morrissey Engineering	Solar	Omaha/ Douglas County	\$72,884	\$12,862	\$85,746	\$72,883
NPPD	Solar	Norfolk/ Pierce County	\$344,958	\$70,654	\$415,612	\$344,958
<b>TOTALS</b>			<b>\$3,508,095</b>	<b>\$4,557,297</b>	<b>\$8,065,392</b>	<b>\$3,352,116</b>

\* Some of these projects are complete, but payment claims have not been submitted to the agency. Some projects are awaiting shipment of materials to begin construction. Total expenses indicated in the chart are based on a cost-reimbursement basis. For each project, five percent is withheld until all contractual obligations, including monitoring of the project by agency staff, have been completed. These figures are as reported by NEO as of October 2011.

## Community Colleges

A total of \$1.9 million of ARRA funds were committed to six Nebraska community colleges to develop renewable energy curricula to train Nebraskans in renewable energy technologies.

## State Facilities

More than \$11 million were committed to energy-efficiency upgrades for Nebraska state buildings:

- \$6 million for energy-efficiency building improvements on the University of Nebraska, state and community college campuses.
- \$4 million for energy-efficiency improvements in state government buildings under the management of the Administrative Services State Building Division.
- \$452,800 for EPA ENERGY STAR benchmarking of up to 1,000 public school buildings and investment-grade audits for a selected portion of participating schools.

## Energy Efficiency and Conservation Block Grants

The Energy Efficiency and Conservation Block Grant program provides funding to eligible entities that implement strategies to reduce fossil fuel emissions in a way that is environmentally sustainable and maximizes benefits for local and regional communities, reduces the total energy use of eligible entities, and improves energy efficiency in the building sector and other appropriate sectors.

A total of 95 projects received block grant funding in 2010, as shown in the following table. All projects involved replacing lighting or making energy-efficiency improvements.

Metropolitan Community College's LEED silver-certified connector building.





# 2010 Energy Efficiency and Conservation Block Grant Funded Projects (continued on next page)

Applicant Name	Amount Requested	Match	Total Project Cost
Adams County	\$142,918	\$35,730	\$178,648
Alma	\$41,515	\$10,379	\$51,894
Arthur County	\$40,000	\$10,000	\$50,000
Atkinson	\$3,087	\$772	\$3,859
Auburn	\$12,415	\$3,104	\$15,519
Aurora	\$96,242	\$24,063	\$120,305
Banner County	\$82,360	\$20,590	\$102,950
Bassett	\$21,064	\$5,266	\$26,330
Beatrice	\$157,170	\$60,000	\$217,170
Blair	\$248,686	\$74,286	\$322,972
Broadwater	\$60,360	\$15,090	\$75,450
Broken Bow	\$151,664	\$37,916	\$189,580
Burt County	\$150,542	\$37,636	\$188,178
Butler County	\$118,645	\$80,000	\$198,645
Callaway	\$24,329	\$6,082	\$30,411
Cambridge	\$250,000	\$151,727	\$401,727
Central City	\$179,088	\$56,748	\$235,836
Chadron	\$59,054	\$14,764	\$73,818
Clarks	\$17,894	\$4,474	\$22,368
Clay County	\$13,287	\$3,322	\$16,609
Coleridge	\$59,560	\$14,890	\$74,450
Colfax County	\$39,194	\$9,799	\$48,993
Cortland	\$6,000	\$1,500	\$7,500
Cuming County	\$250,000	\$114,378	\$364,378
Dakota City	\$13,099	\$3,275	\$16,374
Dawes County	\$180,000	\$80,000	\$260,000
Diller	\$19,556	\$4,889	\$24,445
Dodge County	\$159,234	\$39,809	\$199,043
Elwood	\$7,369	\$4,535	\$11,904
Fairfield	\$13,433	\$3,362	\$16,795

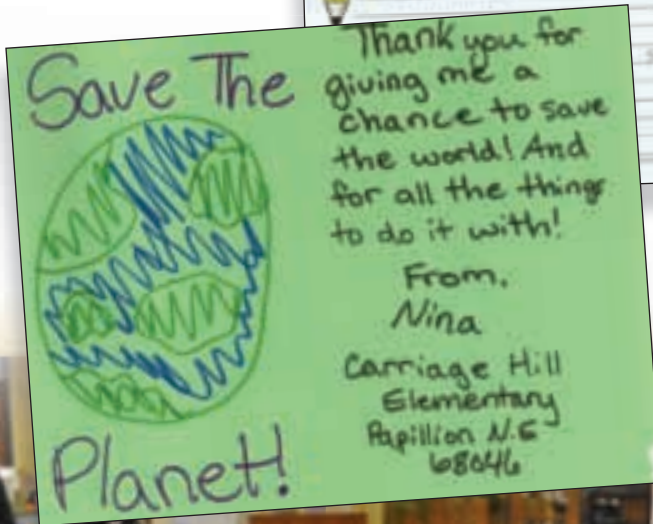
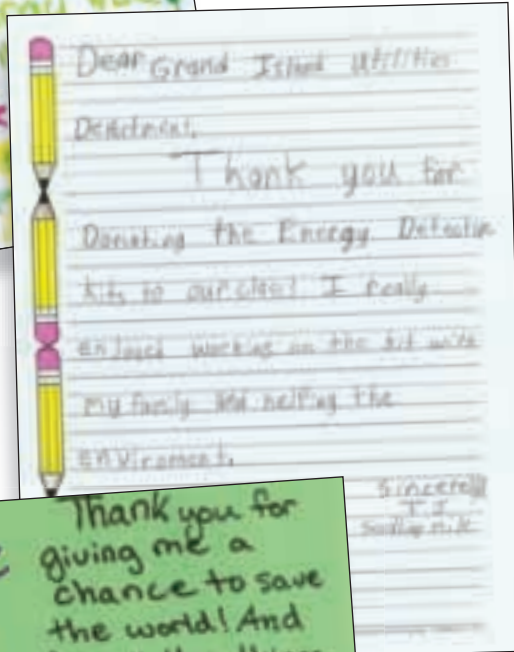
## 2010 Energy Efficiency and Conservation Block Grant Funded Projects (continued)

Applicant Name	Amount Requested	Match	Total Project Cost
Fairmont	\$41,233	\$10,308	\$51,541
Franklin	\$22,297	\$5,575	\$27,872
Frontier County	\$29,673	\$7,418	\$37,091
Garden County	\$9,774	\$2,421	\$12,194
Giltner	\$23,144	\$5,786	\$28,930
Gordon	\$93,206	\$23,301	\$116,507
Gothenburg	\$206,080	\$51,520	\$257,600
Greeley County	\$68,451	\$17,113	\$85,564
Hamilton County	\$120,029	\$30,008	\$150,037
Harlan County	\$250,000	\$89,500	\$339,500
Hartington	\$65,655	\$16,414	\$82,069
Hayes County	\$55,500	\$15,000	\$70,500
Hazard	\$13,340	\$3,335	\$16,675
Hemingford	\$221,490	\$59,999	\$281,489
Holdrege	\$250,000	\$93,029	\$343,029
Hooker County	\$47,200	\$11,800	\$59,000
Humboldt	\$78,125	\$19,531	\$97,657
Kimball	\$52,591	\$13,148	\$65,739
La Vista	\$40,154	\$10,039	\$50,193
Lexington	\$250,000	\$102,500	\$352,500
Malmo	\$1,920	\$480	\$2,400
McCook	\$84,726	\$21,181	\$105,907
McCool Junction	\$19,846	\$4,962	\$24,808
Mead	\$19,061	\$4,765	\$23,826
Mitchell	\$80,000	\$25,000	\$105,000
Mullen	\$5,960	\$1,490	\$7,449
Nebraska City	\$101,905	\$25,476	\$127,381
Nelson	\$21,847	\$5,463	\$27,310
Nemaha County	\$137,075	\$34,269	\$171,343
Ogallala	\$82,223	\$20,556	\$102,779
Orleans	\$18,920	\$4,731	\$23,651
Osceola	\$9,120	\$2,280	\$11,400
Otoe County	\$101,053	\$25,263	\$126,316



## 2010 Energy Efficiency and Conservation Block Grant Funded Projects (continued)

Applicant Name	Amount Requested	Match	Total Project Cost
Pawnee County	\$5,000	\$1,250	\$6,249
Paxton	\$14,554	\$3,639	\$18,193
Perkins County	\$230,832	\$57,708	\$288,540
Petersburg	\$21,214	\$5,303	\$26,517
Phelps County	\$53,816	\$13,454	\$67,269
Pilger	\$36,643	\$10,797	\$47,440
Polk	\$67,536	\$16,884	\$84,420
Potter	\$28,455	\$7,114	\$35,569
Prague	\$46,579	\$11,645	\$58,224
Randolph	\$8,560	\$2,140	\$10,700
Red Willow County	\$250,000	\$507,900	\$757,900
Rock County	\$145,275	\$48,425	\$193,700
Saline County	\$249,972	\$395,950	\$645,922
Scribner	\$225,189	\$56,297	\$281,486
Seward	\$239,850	\$274,170	\$514,020
Shelton	\$35,767	\$8,942	\$44,709
Sherman County	\$79,070	\$19,767	\$98,837
Silver Creek	\$52,794	\$13,198	\$65,992
South Sioux City	\$250,000	\$88,978	\$338,978
Springfield	\$24,800	\$6,200	\$31,000
Stromsburg	\$24,800	\$6,200	\$31,000
Superior	\$250,000	\$67,800	\$317,800
Tecumseh	\$224,090	\$69,331	\$293,421
Utica	\$3,200	\$800	\$4,000
Valentine	\$174,400	\$43,600	\$218,000
Verdigre	\$10,000	\$2,515	\$12,515
Wahoo	\$78,800	\$19,700	\$98,500
Wakefield	\$8,900	\$2,225	\$11,125
Walthill	\$140,508	\$35,127	\$175,635
Waverly	\$35,642	\$8,910	\$44,552
Wayne	\$250,000	\$383,596	\$633,596
Wilber	\$122,145	\$30,536	\$152,681
York County	\$168,484	\$56,159	\$224,643
<b>Grand Total</b>	<b>\$8,796,237</b>	<b>\$3,968,305</b>	<b>\$12,764,543</b>



## School-Based Education: Energy Detective Education Kits

With American Recovery and Reinvestment Act (ARRA) of 2009 funding, NEO partnered with more than 80 Nebraska utilities to share the cost of energy-efficiency lesson material and take-home efficiency kits for nearly 20,000 fifth-grade students across Nebraska.

- Targeted energy savings: 1,110 MWh annually
- State costs (ARRA): \$192,000
- Non-state costs (utilities' leveraged funds): \$192,000
- Costs are for the 2010-2011 school year; full billing will not take place until the end of the school year.





## State Energy-Efficiency Appliance Rebate Program

The DOE approved the plan for \$1.711 million and \$205,320 in state matching funds for a program that provided rebate claims after an eligible appliance had been purchased from six appliance categories: dishwashers, clothes washers, refrigerators, heat pumps, furnaces and central air conditioners. Rebates ranged from \$100 to \$250 for each appliance, with a limit of two per household.

The Nebraska Appliance Rebate program opened on July 6, 2010. By noon on July 10, all rebate funds had been obligated, pending submission of documentation by the purchasers. By Dec. 31, a total of 10,167 rebates had been approved and payment issued.

The new appliances installed by Nebraskans are expected to save 1,048 MWh annually and eliminate 27.6 million pounds of CO2 emissions over the lifetime of the appliances.

## Enhancing State Government Energy Assurance Capabilities and Planning for Smart Grid Resiliency

Under the Recovery Act, NEO received \$363,635 over three years to strengthen and expand state and local government energy assurance planning and resiliency efforts by incorporating response actions for new energy portfolios, smart grid applications, and to build in-house state and local government energy assurance expertise.

The Assurance Plan includes primary state energy use, information pertaining to vulnerability and risk, and identification of impending energy problems.

During the reporting period, activities began to create state level expertise on energy assurance planning and resiliency, focusing on smart grid applications and vulnerabilities, critical infrastructure interdependencies, cyber security, energy supply systems, energy data analysis and communications. At the end of 2010, the first draft of the Assurance Plan was submitted.

Joe Cruz from NEO provides Energy Detective Kits to fifth-grade students at Prescott Elementary school in Lincoln.

## Utility Provided Grants

In addition to supplementing other grants, utilities have funded research and collaboration directly through strategic partnerships.

### Cooperative Research Network (CRN)

A service of the National Rural Electric Cooperative Association, CRN has the mission to monitor, evaluate and apply technologies that help electric cooperative utilities control costs, increase productivity and enhance service to their consumer-members. There are 32 member utilities in Nebraska. (See list at right.)

A small sampling of the research projects include:

- A Guide to the Essentials of Energy Efficiency and Demand Response Programs.
- Engaging Commercial Property Managers
- Evaluating the Effectiveness of Third-Party Web-Based Energy Use Portals and Their Impact on Energy-Efficiency Programs
- Overview of Trends for Measuring and Verifying Energy-Efficiency Investments and Savings
- Renewable Assessment Guide
- Interconnecting Solar, Wind, and other DG Resources
- Energy Storage for Renewable Energy and Transmission and Distribution Asset Deferral

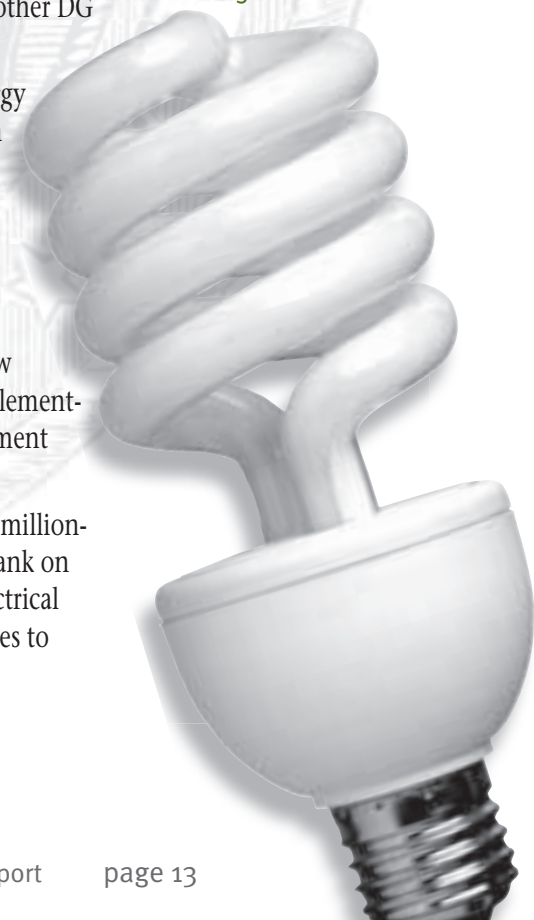
### University of Nebraska Utility Corporation (NUCorp)

LES partners with the University of Nebraska-Lincoln (UNL) to develop new projects for identifying, financing, implementing and tracking demand-side management and energy-efficiency projects at UNL.

One specific project includes a three-million-gallon, chilled-water, thermal storage tank on UNL's East Campus to control peak electrical demand and provide other opportunities to optimize chilled water production.

### Cooperative Research Network Participants

Roosevelt Public Power District (PPD), Chimney Rock PPD, Polk County Rural Public Power District (RPPD), Howard Greeley RPPD, Burt County PPD, Cumming County PPD, Cedar Knox PPD, Butler Public Power District, Seward County PPD, Stanton County PPD, Perennial Public Power District, Elkhorn RPPD, Southern Public Power District, Norris PPD, Dawson PPD, McCook PPD, Niobrara Valley EMC, Cornhusker PPD, Custer PPD, Panhandle REMA, North Central PPD, Midwest ECC, Loup River PPD, KBR Rural Public Power District, Twin Valleys PPD, Northwest RPPD, Wheat Belt PPD, Southwest PPD, Loup Valleys RPPD, South Central PPD, Northeast Nebraska PPD, City of Stromsburg.







The cup plant is a member of the sunflower family and is being researched for its biomass potential.

### District Energy Corporation (DEC)

LES has partnered with the city, county and state to develop a DEC to provide thermal energy services for government facilities. Projects include the installation of a geothermal heating and cooling system to serve the new county jail, and the development of district heating and cooling for the West Haymarket Redevelopment Zone.

### Nebraska Center for Energy Sciences Research (NCESR)

NCESR is a collaboration between UNL and

NPPD. NPPD budgets \$1 million each year for NCESR projects. NCESR was established in April 2006 to conduct research on renewable energy sources, energy efficiency and energy conservation, as well as to expand economic opportunities and improve quality of life for Nebraska and the nation.

Current NCESR research topics include:

- **Generation of Biomass-Derived Feedstocks for Biofuel and Bioenergy Production** The goal is to develop efficient, cost-effective procedures to generate biomass-derived feedstocks for biofuel and bioenergy production.
- **Self-X: An Intelligent, Large-Scale Battery System for Renewable Energy Storage** This involves developing a prototype of ambitious, paradigm-shifting, cost-effective, grid-scale, energy storage technologies that address emerging intermittency and ramping challenges for the transmission of electricity from renewable resources.
- **A Two-Phase System for Solar Domestic Water Heating** The aim is to develop a solar hot water system to maximize the efficiency and effectiveness of renewable energy usage, which can
  - (1) reduce non-renewable energy usage for hot water heating,
  - (2) perform more cost-effectively

than traditional solar water heaters in regions where freezing occurs, and (3) reduce the total cost of the equipment, its installation and maintenance.

- **Optimizing Algae and Biogas Production in Super-Loop Bio Refineries** The goals of this program are to optimize feedstocks, evaluate carbon dioxide (CO<sub>2</sub>) sources and reduce the energy requirements of algae production in Nebraska. It involves evaluating manure biogas production from different feedstocks (manure types as influ-



enced by cattle diets and housing systems) and the subsequent impact of digestate on algae growth.

- **Integrated Systems for CO<sub>2</sub> Capture, Anaerobic Digestion, and Algae Production**  
This involves developing a system to grow algae by integrating flue gas (CO<sub>2</sub>) and animal wastes (nutrients by anaerobic digestion) in the Midwest. This approach will both reduce the impact of these environmental challenges and support the production of biofuel as renewable energy and biomass for animal feed.

### Energy Savings Potential Program (ESP)

The ESP Program is a collaboration between the University of Nebraska at Omaha (UNO) and OPPD. Since 2006, OPPD has budgeted \$500,000 annually for this program.

The research focuses on customer behavior and ways to reduce energy consumption. It involves various studies related to low-income, neighborhood energy action efforts, real-time energy monitoring and commercial customer energy-efficiency program adoption.

Algae is another potential biofuel.



### Benchmarking

Nebraska's electric utilities have undertaken numerous energy-efficiency initiatives. However, national reports designed to quantify those successes may not always measure efforts that are the best fit for the state.

For example, the American Council for an Energy Efficient Economy (ACEEE) report, which ranks states' energy-efficiency initiatives awards points based on criteria of which Nebraska's electric utilities are directly responsible for approximately 30 percent. The remaining points are made up in sectors like transportation, building codes and legislative policy.

This in-home display connects wirelessly to users' electrical meters. The display indicates the amount of power in use and the cost, changing as appliances are turned on and off. Photo courtesy of Itron.





# Pilots & Program Development

## Renewable Energy

### Creighton Renewable Energy Studies

With the assistance of funding from the DOE and OPPD, Creighton University deployed a variety of solar and wind energy collection systems on the grounds of their main campus.

Altogether, the collectors are capable of generating approximately 120 kW of clean, renewable energy. The installations are being used as both research components and teaching tools for Creighton's new sustainable energy major, focused on problem-solving and cutting-edge green technology.

### OPPD's Omaha Service Center

Construction of OPPD's state-of-the-art Omaha Service Center continued in 2010, with installation of numerous "green" features, including clerestory windows to take advan-

tage of natural light, and windows that can be opened for fresh air in the spring and fall. Other green features include a 60-kW array of solar panels, a 1.2-kW vertical-axis wind turbine and LED yard lighting.

The center was designed with the goal of achieving certification through the Leadership in Energy and Environmental Design (LEED) program. LEED is a third-party certification program and nationally accepted benchmark for design, construction, and operation of high-performance green buildings.

### NPPD's Norfolk Operations Center

The Norfolk Operations Center's design and construction qualified it for LEED gold certification, the second-highest level of LEED certification available.

In addition, the center highlights renewable energy generation and serves as a green

Utilities are pursuing corn stover as a biofuel option. Stover is comprised of the stalks and other material left behind after corn is harvested.





educational exhibit. Three small wind-powered generators and a small photovoltaic array serve as onsite public demonstration displays. There also is an energy-education exhibit housed in the new facility.

### Compressed Air Energy Storage Evaluation

Phase 1 of the Compressed Air Energy Storage (CAES) Geological Development Plan involved a candidate site selection evaluation to determine if there are potential geological sites in Nebraska for a CAES plant.

CAES is a large-scale storage system that makes wind or solar energy dispatchable, meaning it can be called upon when needed. Research findings conclude that the benefits alone do not offset the cost of CAES, however,

if wind energy penetration were to increase, the benefits of CAES would increase dramatically.

### Corn Stover Biofuel Coal Additive

NPPD partnered with the Energy & Environmental Research Center (EERC) in Grand Forks, North Dakota, to pursue corn stover as a biofuel option. Stover is comprised of the stalks and other material left behind after corn is harvested. EERC maintains an extensive database on biomass materials it has tested for such purposes.

OPPD also made minor modifications at its North Omaha Power Station to test corn stover pellets as a coal additive. Unfortunately, the vendor ultimately was unable to provide enough pellets for test burns.

NPPD's Norfolk Operations Center qualified for LEED gold certification, the second-highest level of LEED certification available.



Mark Purnell of OPPD discusses a solar project with Lennis Pederson of Creighton University on its campus in Omaha.



Left to right, Steve Zach, NPPD, Rick Cheloha, Loup Power District, present an incentive check to Doctor Rick Meyer and Marsha Muhle of Eye Physicians PC for participating in their HVAC System Optimization Program.

## Demand-Side Management

Through several energy-efficiency efforts tracked by NEO and Nebraska utilities in 2010, approximately 24 MW and 80,000 MWH were reduced. Assuming fuel costs of 2¢/kWh, \$1.6 million of fuel costs were saved.

## Commercial & Industrial Customer Research

### Customer Participation and Perception Research

Many utilities have taken steps to better understand what is important to their commercial and industrial (C&I) customers regarding energy-efficiency programs. In addition, Nebraska utilities have measured C&I customer satisfaction on such programs to determine how best to engage them in energy-efficiency strategies.

Research has shown that C&I customers are most concerned with having a power company that provides reliable service – including information and time of restoration during an outage – followed by having a reasonable cost for that power. Research also has shown that despite marketing campaigns, many customers were unaware of a utility's energy-efficiency programs.

### Custom Retrofit Pilots

Due to the findings of the research, some utilities are piloting new audit and retrofit programs that provide a onetime financial incen-

tive to C&I customers to reduce their demand and energy usage through commissioning strategies, which optimize a building's installed components.

## Residential Customer Pilots

### Behavior Modification

OPPD partnered with the University of Nebraska at Omaha to study energy-monitoring devices that provided residential customers immediate feedback on their individual energy consumption. Results indicated that such monitors did not have a sustained reduction on the customer's energy consumption.

NPPD tested the effect of time-varying pricing signals and real-time energy usage information through time-of-use electrical rates and critical peak pricing. The program educated customers on the time-varying cost of electricity and provided NPPD with experience in interval metering.

### AC Load Control

OPPD test-piloted a voluntary program to reduce peak load requirements for residential customers by using a device that cycles air conditioners on and off during periods of peak energy demand. Overall, the pilot program was successful and a wide-scale program offering is planned in 2011.

### High-Efficiency AC

This program offered an incentive for the purchase of higher efficiency air conditioning



equipment and provided a marketing campaign to inform customers of other incentives.

## Smart Grid Overview

Smart grid technology has the unique potential to transform how utilities deliver energy to their customers. Many utilities across the country have begun deploying smart grid equipment in a number of different configurations, with varying levels of success.

Although Nebraska utilities have not yet deployed fully integrated smart grid technology, some have begun to study the impact a smart grid may have in their service area.

Large-scale smart grid systems require a tremendous amount of planning and a large capital investment. For these reasons, utilities have stayed cautiously optimistic about the possibilities that smart grid holds.

However, limited system upgrades and large-scale meter change-outs – which enable utilities to collect interval data on daily, hourly or even 15-minute intervals – are theoretically possible. These would require large infrastructure upgrades and hefty upgrades to data storage capacity.

With a healthy dose of Nebraska good sense, public power utilities are approaching the creation of a smarter grid conservatively. Most early smart grid efforts focused on smart meters, but more utilities are recognizing the potential for improved reliability and efficiency through information and technology enhanced grid operation.

The growing use of automated meter reading (AMR) systems could effectively serve as a first step in the adoption of smart grid technology. A total of 86 percent of rural electric systems in Nebraska have begun implementing AMR systems, some of which already have full AMR deployment.

### NPPD

NPPD is focusing on cost-effective investment in the infrastructure necessary to enable a smarter grid. NPPD is investing in real-time data capture and analysis, back-office integration and telecom networks as financial con-

straints permit. This information “blocking and tackling” will serve as the foundation for a wide range of applications associated with a smarter grid.

Strategic alignment and cooperation with other public power entities in the state are being sought through partnerships and via formation of a Smart Grid and Transmission Efficiency working group. By leveraging expertise from across the state and pursuing opportunities to share investments, NPPD is pursuing a smart approach to a smarter grid.

### Stanton County Public Power District (SCPPD)

SCPPD’s Advanced Metering Infrastructure Initiative project deploys 2,315 smart meters to cover all customers in its service territory. Paid for with a \$397,000 Smart Grid Investment Grant through ARRA funds, the project provides automatic meter reading and improved outage detection and response.

The project extends smart meter coverage from 453 to 2,768 meters and uses existing radio frequency and power-line-carrier communications networks for data collection.

### Cuming County Public Power District (CCPPD)

CCPPD received a \$1.8 million Smart Grid Investment Grant to install communications infrastructure and deploy control software.

Below, Layne Rolofson, the business manager at Capital City Christian Church, installs high-efficiency lighting.





# Projects & Programs

## Renewable Projects

### Wind Energy

Nebraska electric utilities are methodically and cost-effectively diversifying their generation mix through solar, wind and landfill gas. In 2010 alone, Nebraska deployed 293 MW of wind energy. That translates to approximately 460,000 MWh of wind energy generation.

NPPD, OPPD, LES, Municipal Energy Agency of Nebraska and Grand Island all have contracts to purchase bulk utility-grade renewable energy generated from wind farms across Nebraska. In 2010, two new wind farms began producing clean renewable energy. Laredo Ridge wind farm near Petersburg in Boone County began commercial operation in November of 2010. Laredo's 54 turbines has a maximum capacity of 1.5 MW yielding a total of 81 MW. The 40-turbine Flat Water wind farm near Humboldt in Richardson County also began commercial operation at the end of 2010. Flat Water's generating capacity is rated at 60 MW.

The Nebraska Wind Working Group sponsored the Wind Power 2010 Conference, held in Kearney Neb. This group is a state and federal

partnership – funded by the National Renewable Energy Laboratory and the U.S. Department of Energy's Wind Powering America program – to help develop the state's wind resources. Nebraska utilities also provided a third of the expert speakers at the conference.

### Wind for Schools Project

The DOE's Wind Powering America program sponsors the Wind for Schools Project to raise awareness in rural America about the benefits of wind energy, while simultaneously developing a wind energy knowledge base in the U.S. to educate future leaders of our communities about the importance of renewable energy.

Many Nebraska utilities have come together with industry and other sponsors to help 11 Nebraska schools generate and use their own wind energy. The participating schools are listed at left.

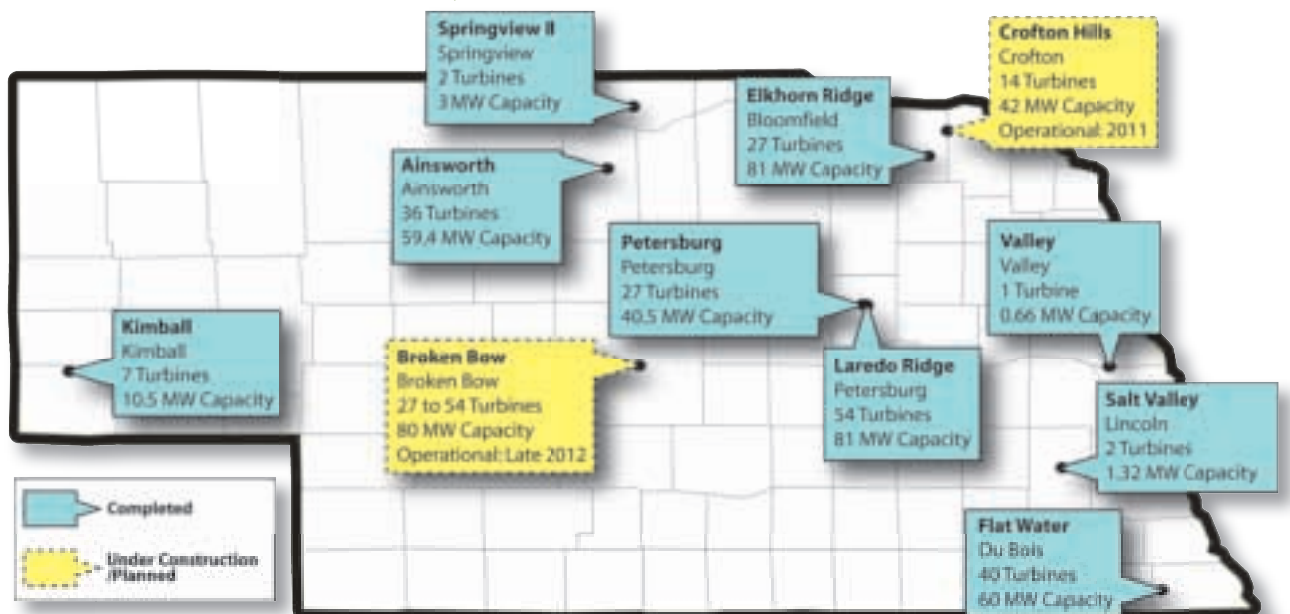
### Wind for Schools Participants

- Bancroft-Rosalie Public Schools
- Bloomfield Public Schools
- Cedar Rapids Public Schools
- Diller-Odell High School
- Elkhorn Valley District Schools
- Hayes Center Public School
- Loup City Public Schools
- Mullen Public Schools
- Norris Public Schools
- Papillion-LaVista South High School
- West Holt Public School

### Hydroelectric Power

In addition to the renewables already discussed, the state of Nebraska also generates or purchases roughly 700 MW of hydroelectric power, most of which comes from the Western Area Power Administration (WAPA).

## Wind Energy Generation Facilities in Nebraska





## Nebraska Net Metered Renewable Installations

Utility	Total Number of Installations	Total Estimated Generating Capacity of Qualified Facilities (kilowatts)	Total Estimated Energy Received From Customer Generator (kilowatt-hours)	Total Estimated Energy Produced By The Customer Generators (kilowatt-hours)
Burt County PPD	3	9	3,600	1,200
Custer PPD	1	1	0	45
Gering	1	2.4	0	1468
High West Energy, Inc.	1	2	3,568	586
K.B.R. Rural PPD	1	2.4	346	735
LES	9	60	19,614	37,438
Loup River PPD	2	36.5	0	3,679
Madison	1	10	2,080	4,120
McCook PPD	1	5	817	3,193
NPPD	10	20	0	11,000
Norris PPD	12	50.08	0	63,771
North Central PPD	1	8	4,546	18,000
Northeast NE PPD	1	2	870	3,790
Northwest Rural PPD	3	22.8	0	10,086
OPPD	16	89	667	133,394
Panhandle Rural Electric Association Membership	1	12	7,565	23,341
Roosevelt PPD	4	9.6	2,280	15,089
South Sioux City	1	2.9	0	47
Southern PPD	7	24.5	17,300	33,700
Southwest PPD	1	1.9	0	3,221
Stanton Co. PPD	1	10	1,045	6,142
Wahoo	2	10	720	9,350
Wheatbelt PPD	2	4.8	0	5,407
<b>Total</b>	<b>82</b>	<b>396</b>	<b>65,018</b>	<b>388,802</b>
<b>*Values obtained from the 2010 Nebraska Power Review Board Net Metering Report</b>				

### Cogeneration

Cogeneration is the generation of electricity through the capture and use of otherwise wasted heat energy byproducts. Cogeneration typically takes place as part of industrial or utility scale processes where a great deal of heat is generated. There are currently four cogeneration operations in the State of Nebraska totaling over 50 MW and 250,000 MWh.

### Nebraska's Consumer Generated Energy Policy

When customers choose to install their own residential renewable power generation, Nebraska requires all utilities in the state to offer net metering to customers that install solar, methane, wind, biomass, hydropower or geothermal energy systems of less than 25 kW.

The excess generation customers produce is credited on their next bill at the utility's avoided cost rate, with any revenue from excess generation at the end of an annualized period paid out to the customer. This is called net metering. In addition, Nebraska allows a 100 percent exemption from the sales and use tax imposed on the gross receipts from the sale, lease, or rental of personal property for use in community-based wind energy development projects (LB436). A table showing the number of renewable energy installations being net metered is shown above.

In addition to metered installations, Tri-state's Northwest Region also has about 75 photovoltaic (PV) installations for remote (off-grid) stock watering, as well as 24 leased PV systems. Northwest has six well service providers to install and maintain these units.

## Energy Efficiency

As public power companies, Nebraska utilities provide customers with the tools and resources they need to be successful stewards of the environment. Those resources help customers reduce their energy bills and assist utilities in managing their energy load.

Through the various energy efficiency and demand response efforts tracked by Nebraska utilities in 2010, approximately 24 MW and 79,000 MWh were reduced. The total invest-

Utilities across Nebraska are putting their experts to work to help their customers tune-up their facilities. Depending on the needs of the business, the audit could be as simple as a walk-through or as complex as a detailed investigation, followed up by on-site monitoring and commissioning.

## C&I Benchmarking

Nebraska utilities meet with C&I customers, engineers and construction managers to emphasize the sharing of best practices and



Pictured (left to right) Steve Zach, energy efficiency consultant, NPPD, Vishal Khanna, principal, Advanced Engineering Systems, Jim Goulet, vice president operations, Columbus Community Hospital, Rick Cheloha, new business supervisor, Loup Power District, Michael Hanson, president & CEO, Columbus Community Hospital, Jerrad Swanson, maintenance supervisor, operations, Columbus Community Hospital, Frederick Lerouge, vice president, Control Management Inc., Alan Busch, project manager, Control Management Inc., Jim Frauendorfer, facility director, Columbus Community Hospital.

ment in this effort is more than \$16.5 million. A brief synopsis table showing the program offerings by utility is listed below:

## Commercial & Industrial (C&I) Customers

High-efficiency equipment upgrades provide additional benefits over standard models through strict energy-efficiency guidelines set by the EPA and DOE. Typical high-efficiency equipment includes lighting, heat pumps, air conditioning, motors and drives.

### C&I Customer Audits

Nebraska utilities are working hard to improve efficiency and reduce waste.

benchmarking using the ENERGY STAR Portfolio Manager. Many utilities also offer training on this tool.

NEO is benchmarking all of the state's public school buildings. An estimated 60 buildings covering five million square feet and representing the best energy efficiency opportunities received investment-grade audits.

## Energy Efficiency Innovation Grant

LES awards grants to business customers for project design assistance, development and implanting innovative measures to improve energy-intensive processes. Awards are based on forecasted peak demand reduction, degree of project innovation, transferability to other businesses in the community and overall return on investment.

## C&I Energy Efficiency/Commissioning

This program is tailored to meet the needs of commercial and industrial businesses to help them achieve energy and peak demand



savings through one or more demand-shifting or energy efficiency measure. Components of the program include air conditioning/chiller replacement, efficient motor retrofits, variable frequency drives, compressed air systems audit and upgrades, energy management systems installation and or upgrade and systems commissioning.

## **Agricultural Energy Audits**

Nebraska utilities are committed to helping their agricultural customers save energy. The utilities provide agricultural customers with reports on how they can reduce their energy consumption through equipment conversions. The reports outline a customer's current energy use and the potential improvements with the conversion in terms of projected annual savings, payback time and estimated annual energy savings.

## **Irrigation Efficiency**

Irrigation is the lifeblood of many Nebraska farms. With irrigation, crop yields can more than double during dry years. Irrigation operating costs can be managed more effectively when growers invest in energy-efficient technologies and practices, for which participating utilities provide incentives. With the help of the USDA, Nebraska utilities provided nearly \$2 million worth of assistance through 32 audits.

## **C&I Geothermal**

Ground-source heat pumps are a cost-effective, energy-efficient, environmentally friendly way of heating and cooling a building. Geothermal heat pumps can be effectively added to new construction or retrofits of older buildings and scaled to supply nearly any building.

Along with the benefits, the rebates or incentives offered by many Nebraska utilities, more and more businesses are opting to install heat pumps as a sustainable, cost-saving way of conditioning their buildings.

USDA grants enable Nebraska utilities to conduct energy audits for customers who use irrigation, grain-drying and other ag-related equipment.







Properly installed insulation in wall cavities improves a home's energy efficiency. Above, OPPD's Renee Jacobsen and Dave Vogtman, chief sales officer at Hearthstone Homes, check insulation in an entryway of a HearthStone home being built to ENERGY STAR specifications in northwest Omaha.

LES in particular has done extensive work with the Lincoln Public School District, resulting in the District's installing geothermal heating/cooling system in all of its school buildings.

## Residential Programs

### Energy-Efficient Equipment Programs

A number of Nebraska utilities are now offering incentives for new or replacement energy efficient air conditioners and heat pumps that meet specific efficiency standards. Many

Nebraska utilities also partner with local retail stores to provide a program to reduce demand and energy consumption by incenting the replacement of incandescent light bulbs with ENERGY STAR-rated compact fluorescents.

### Cooling System Tune-Ups

NPPD offers a \$30 incentive to customers who have their cooling system inspected and tuned-up by an HVAC contractor. Qualifying systems include air conditioners, air-source and water-source heat pumps that are served by NPPD or its wholesale utility partners.

The application includes a checklist of key components contractors should inspect and items for discussion such as filter replacement schedule and proper temperature setback.

### Whole-House Sealing and Insulation Program

A house with a poor, leaky envelope will have significant heat loss through the attic and eaves. Utilities provide incentives to improve insulation levels.



### New Construction with ENERGY STAR

This part of the EPA's ENERGY STAR program helps customers and homebuilders construct homes with increased energy-efficiency. In Omaha, for example, a large residential developer has adopted the program which has resulted in a great deal of success.

LES has seen a penetration rate of 33 percent and has been operating the program for more than 10 years. OPPD's penetration rate is roughly 40 percent after working with ENERGY STAR homes for the last four years.

NEO has provided construction financing and low-interest mortgages for new homes that are rated 5-Star Plus through ENERGY STAR. These homes receive a Home Energy Rating System (HERS) score of 50 or less.





A blower door test determines natural air-infiltration rates.

## Home Air Leakage Tests and Energy Audits

This program is designed to educate customers on air leakage and energy consumption by recommending a blower door test contractor. The test can determine natural air-infiltration rates and efficiency losses from building air leakage.

## Education and Outreach

### School-Based Education: Energy Detective Education Kits

Eighty utilities partnered with NEO to use ARRA funds to provide 19,810 energy-efficiency kits to Nebraska fifth-grade students.

### Energy Efficiency Information Services

Many Nebraska utilities take part in programs that provide customers with information on a broad range of energy issues. Utilities answer questions on a wide range of topics, from home insulation and weatherization, to power quality, and lighting. These programs will even help customers determine

the best air conditioner for their home.

## Energy Efficiency Consumer Education

Many utility websites offer support and educational materials, including such items as online home energy audits, social networking applications, home energy libraries, videos on energy saving tips, kids' corners, e-newsletters and energy-use calculators for products such as TVs, lighting and irrigation.

LES coordinates large C&I customer advisory councils to provide feedback about rates, energy-efficiency, reliability and other key customer issues.

Ongoing workshops and energy forums focus on wise energy use, low-cost weatherization techniques and energy-cost budgeting. Many workshops also provide advice on how to access community resources available help people meet their energy expenses.

LES oversees the installation of a geothermal well at Clinton Elementary School.







The city of Tecumseh used an Energy Efficiency and Conservation Block Grant to upgrade its city streetlights.

In addition to the direct services provided by Nebraska's utilities, many of them are partnering with school districts and universities to provide their input in the development of energy education curriculum. These partnerships have proven to be extremely valuable to schools and universities who have begun to realize the importance of energy education within their programs. Key partnership examples are shown below:

- Helped develop Southeast Community College Operations Program and Energy Academy for ESU#4
- Investigate the creation of sustainability focused high school learning district in Plattsmouth
- University of Nebraska partnership in developing an elementary energy curriculum
- Teacher Education at seven Nebraska colleges
- With \$1.9 million in ARRA funds, NEO established renewable energy curricula at the six state community college systems
- Energy Efficiency/Renewables presentations to schools, businesses, etc.
- Energy Ideas: Weekly Television and Radio Program

The Whole-House Sealing and Insulation Program encourages owners to improve their home's efficiency. Caulking around windows and doors is a low-cost way to improve energy efficiency.

- Tours of plants and LEED accredited service centers
- Quarterly Smart Energy Forums
- Annual Energy Summit for Local Businesses and Public Sector Executives
- Large and Small C&I Advisory Councils
- "Energy Fest" Auburn and Columbus

## Load Management

### Summary of Initiatives

Many utilities in Nebraska offer load management programs. These are an important component for many utilities. It allows utilities to contract with its customers to help in reducing peak energy demand. This keeps utilities' operating costs low and prevents rate increases due to capital improvements for new generating capacity.

There are many forms of load management; one program may be structured so that the utility has the capability to curtail a customer directly, while another may be structured to allow the customer to simply implement procedures companywide to curtail the use of



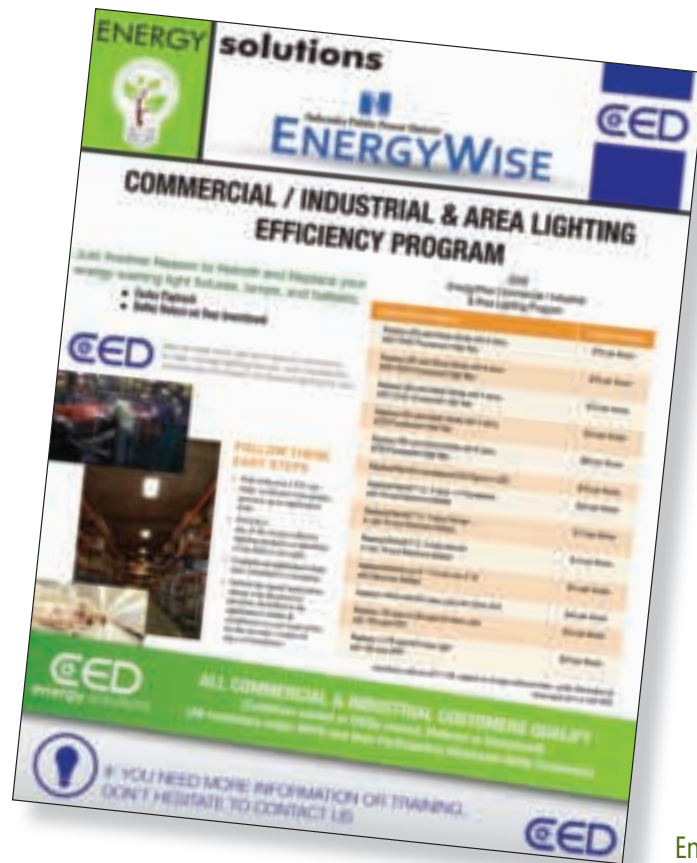


energy in their facilities at a specific time. In return for taking part in these types of programs, participants are often incentivized with a special rate, rebate, or equipment upgrade.

Nebraska utilities have approximately 1,150 MW under curtailable rates. Due to the fact that the majority of the curtailable load is irrigation, the need to protect Nebraska's crops makes it only feasible to cycle a portion of the available amount at one time, or between 600 to 700 MW on a summer peak day. This translates to about nine percent of Nebraska's 2010 total generating capacity of 7,862 MW.

According to the 2007 Census of Agriculture report, Nebraska ranks first nationally in irrigated land with 8.5 million acres. Irrigation dominates all other end-use loads as the most prevalent, accounting for over three quarters of the reported load controlled at peak in 2010. Over the last 40 years, connected irrigation horsepower has grown six fold. With irrigation having such a tremendous impact of the amount of peak energy generation Nebraska must supply in the hot summer months it is imperative Nebraska utilities have a means of controlling that load.

NPPD's and its wholesale customers invested an estimated \$2.6 million in load control equipment to aid in controlling high periods of peak energy demand on hot Nebraska days.



EnergyWise is NPPD's energy-efficiency program that offers incentives to help cover the cost of a variety of upgrades.



Refrigerator recycling programs take inefficient appliances off the grid and raise awareness of energy conservation. At right, artist Sarah Rowe created an art piece from a recycled fridge now being displayed in Omaha's Old Market area.



Caaption

# Nebraska Utility Program Offerings

Utility	Load Control	High Efficiency Equip. Rebates	Variable Freq. Drives	Grants / Custom Incentive	Irrigation Audits	HVAC Tune-up/Home Insulation	Appliance Recycling	Public Outreach
Arapahoe		x						x
Auburn		x	x			x	x	x
Battle Creek		x				x	x	x
Beatrice	x	x				x	x	x
Brainard		x					x	x
Burt Co PPD	x	x				x	x	x
Butler PPD	x	x			x	x	x	x
Cambridge							x	x
Cedar-Knox PPD	x	x	x			x	x	x
Central City		x				x	x	x
Chester		x						x
Cornhusker PPD	x	x				x	x	x
Cozad		x				x	x	x
Cuming Co PPD		x				x	x	x
Custer	x	x				x	x	x
Dawson PPD	x	x			x	x	x	x
Davenport		x						x
David City		x				x	x	x
Deshler		x						x
Dewitt		x					x	x
Dorchester		x						x
Edgar		x				x		x
Elkhorn	x	x				x	x	x
Fairmont		x					x	x
Franklin							x	
Friend		x					x	x
Giltner		x					x	x
Gothenberg		x				x		x
Hampton		x						x
Hebron		x					x	x
Hemingford								
Hickman							x	
Holbrook							x	
Holdrege	x	x				x	x	x
Howard Greeley RPPD	x	x			x	x	x	x
KBR RPPD	x	x					x	x
Laurel							x	
Leigh								
Lexington		x	x	x			x	x
LES		x	x	x		x		x
Lodgepole								x
Loup Valleys RPPD	x	x			x	x	x	x
Loup Power District	x	x	x			x	x	x



## Nebraska Utility Program Offerings (continued)

Utility	Load Control	High Efficiency Equip. Rebates	Variable Freq. Drives	Grants / Custom Incentive	Irrigation Audits	HVAC Tune-up/Home Insulation	Appliance Recycling	Public Outreach
Lyons	x	x						x
Madison		x				x	x	x
McCook PPD	x	x			x	x	x	x
Minden		x				x	x	x
Mullen							x	
NPPD	x	x	x	x	x	x	x	x
Neligh		x				x	x	x
Nelson							x	x
Niobrara Valley EMC	x	x				x	x	x
Norris PPD	x	x	x		x	x	x	x
North Central PPD	x	x				x	x	x
Northeast NE RPPD	x	x		x	x	x		x
North Platte		x				x	x	x
OPPD	x	x		x	x		x	x
Ord	x	x				x	x	x
Perennial PPD	x	x				x	x	x
Polk Co RPPD	x	x		x		x	x	x
Prague								x
Randolph		x					x	x
Schuyler							x	
Scribner							x	x
Seward	x	x				x	x	x
Seward Co PPD							x	x
Snyder		x						x
South Central PPD	x	x				x	x	x
South Sioux City		x	x				x	x
Southern PPD	x	x	x	x	x	x	x	x
Southwest PPD	x	x					x	x
Snyder		x						
Stanton Co PPD	x	x				x	x	x
St. Paul							x	
Stromsburg							x	
Superior		x				x		x
Sutton	x	x				x	x	x
Trenton							x	
Twin Valleys PPD	x	x				x	x	x
Valentine		x					x	x
Wahoo		x				x	x	x
Wakefield		x						x
Walthill								x
Wauneta							x	
Wayne		x				x	x	x
Wilcox		x					x	x
Wymore		x					x	x

## Program Oversight/Best Practices

At right, OPPD reached out through its Aim Green website to area high school students with Project GreenFlick, a video contest where students were encouraged to submit a short film on energy conservation.

Below, some ranchers in Northwest Rural Public Power District have turned to photovoltaic-powered pumping systems as a cost-effective solution for watering livestock.

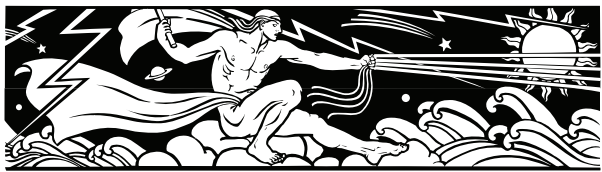
Being part of a public power state, Nebraska utilities share knowledge across service territories practices. This has enabled Nebraska utilities to develop methods that have consistently developed results to create a portfolio of best practices.

Where feasible and cost-effective, the utilities measure and verify program results using industry-accepted standards and formulas such as the International Performance Measurement and Verification Protocol.





# ENERGY OFFICE



STATE OF NEBRASKA

## Nebraska Energy Office

### Vision & Purpose

The Nebraska Energy Office's vision is for Nebraskans to have reliable and affordable sources of energy that support a cleaner environment and a more secure energy future. To promote the efficient, economic and environmentally responsible use of energy, NEO maintains a number of valuable programs, collaborating with Nebraska utilities on many of them. The assistance NEO provides Nebraska's utilities is instrumental to the success of many efficiency programs offered across the state.

### Weatherization

The Low-Income Weatherization Assistance Program, as part of the Recovery Act, received \$41.6 million over 36 months. The funding is being used to scale-up existing weatherization efforts in the state, create jobs, reduce carbon emissions and save money for low-income families by improving energy efficiencies.

Weatherization enables low-income families in Nebraska to reduce their energy bills by making their homes more energy efficient. Ten, non-profit organizations provide local weatherization services. They are responsible for establishing eligibility, performing an energy audit on the residence and scheduling the weatherization work.

Nebraska planned to weatherize 4,000 homes across the state for participants with an annual income at or below 200 percent of the federal

poverty level. As of November 1, 2011, 3,304 homes have been weatherized with Recovery Act funding. A total of 2,090 homes have been weatherized in 2010 and in 2011 to date utilizing funding from other sources such as DOE appropriations, Low-Income Home Energy Assistance Program (LIHEAP) totaling \$21.2 million. Estimated annual energy savings for this program are estimated

to be \$4.4 million annually.

### Dollar and Energy Savings Loan Program

Nebraska Dollar and Energy Savings Loans are offered statewide by NEO and the state's lending institutions. Consumers can take out the low-



interest loans (2.5 to 5 percent) for a variety of projects, from reflective window film to whole-house heating and cooling system retrofits.

NPPD retail and its wholesale customers can receive a 2.5 percent loan for a residential air-source and groundwater or ground-coupled heat pump. NPPD has made this possible through a \$1,000,000 buy-down of an applicant's interest rate, enabling the financial institution to offer the reduced interest rate.

### 2010 Results

- Estimated annual energy savings: 180,000 MWh
- American Council of Energy Efficient Economy calculated state costs: \$17 million
- Non-state costs (leveraged funds): \$6.8 million

The Nebraska Energy Office/Central Community College Mobile Weatherization trailer is used to provide training for local weatherization crew members and contractors across the state.



## Beyond 2010

Nebraska's public power utilities have made headway in sustainability research and produced some telling results. The utilities continue to share information, best practices and benchmarking data.

Utility teams continue to review future sustainability options. From these findings, many utilities are implementing new strategies, in addition to continuing with ongoing initiatives. Commissioning, air conditioning control and consumer education programs are only a few items scheduled for development.

Utilities are planning to provide more interactive dashboards on renewable energy options and highlighting examples of energy-efficiency efforts that can be utilized in classrooms. Utilities are collaborating with local colleges to offer more sustainable education opportunities.

Nebraska utilities will continue to take advantage of the opportunities created by taking part in various organizations, investigations through research and assistance grants and pilots in an effort to better understand

what technologies best fit the needs of Nebraskans. It is through these kinds of innovative involvements and activities that Nebraska utilities are able to continue to provide and improve upon the reliable, high quality energy they serve their customers with.

### New Energy Conservation Code

Utilities and NEO worked with others to gain passage of the 2009 International Energy Conservation Code (IECC) by the Nebraska Legislature in 2011.

- The estimated impact of the 2009 IECC is \$820,000 in energy savings per year.
- That's about \$164 per home for the 5,000 new homes built each year.
- The one-time incremental cost statewide to comply with the 2009 IECC is estimated at \$0 to \$476 per home, depending on location.
- NEO provided 11 training sessions on the 2009 IECC to more than 700 attendees.





At left, the 2009 International Energy Conservation Code book (IECC). The code went into effect in August 2011.

## Ongoing and Future Highlights

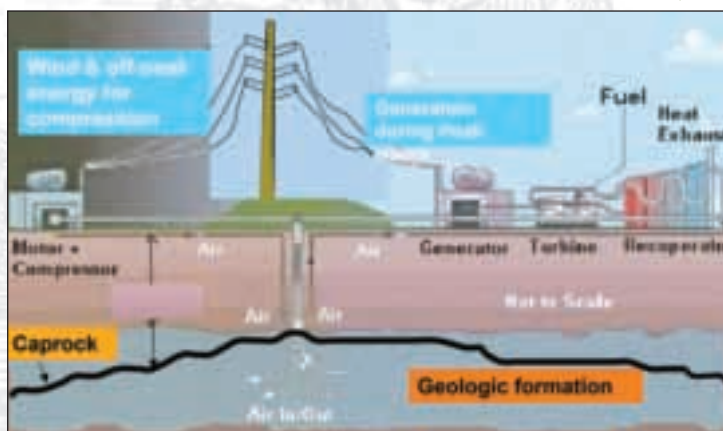
- The Large Public Power Council organized the Energy Efficiency Working Group to negotiate better economic opportunities on energy efficient equipment with the big box retail stores by capitalizing on the 9 percent of the U.S. population served by member utilities.
- Many utilities continue to study the impact of electric vehicles (EVs) and the potential fit of a smart grid.
- OPPD and NPPD are two of more than 40 utilities across the U.S. that are test-driving a Chevrolet Volt as part of a demonstration project sponsored by the Electric Power Research Institute and General Motors. This project will help utilities better serve the needs of customers who plan to drive an EV in the future.
- Additional bulk utility wind generation will continue to come on-line in the coming year. Petersburg is the next large wind installation in Nebraska, its capacity is planned at 40.5 MW and should be completed by the end of 2011. Crofton Hills and Broken Bow wind farms are also planned to be operational in 2012, these farms have a planned rating of approximately 200 MW.
- LES plans to launch a "Kilowattchrs" website to serve as a one-stop online resource for energy efficiency.

- LES is to partner with the city of Lincoln on the construction of a 3.5-MW landfill gas plant, which will generate power and reduce methane gas emission from the city's landfill.
- NPPD is negotiating rights to store compressed air in a geological formation 3,000 feet underground in Deuel County. NPPD officials say the compressed air facility will help stabilize the energy output of its wind turbines and improve the efficiency of its coal and nuclear power plants by making renewable energy dispatchable.
- NPPD is considering co-firing woody biomass with coal at its 229-MW Sheldon Station power plant near Hallam, Nebraska. This would involve burning dead or dying trees that pose forest fire risks. U.S. Forest Service Redesign Grant funds are available to cover up to half the cost of woody biomass feasibility studies for entities interested in converting to such systems.
- NEO received a DOE grant of up to \$186,000 to establish a partnership with the UNL Extension Office to accelerate the use of energy efficiency and emerging technologies for homes, businesses, farms and ranches. This is to be done through an energy- and efficiency-rating system for irrigation systems. This effort also will expand the Nebraska Agricultural Water Management Network's proven water- and energy-savings functions and extend the breadth of its technical assistance.
- NEO is developing a plan about how to address Nebraska's energy needs in times of crises.



Kilowattchrs will be Lincoln Electric Systems' one-stop online energy-efficiency resource.

NPPD is negotiating rights to store compressed air in a geological formation 3,000 feet underground in Deuel County.





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