State Energy Program

American Recovery and Reinvestment Act of 2009
Final Report, January 2013

Nebraska Energy Office
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Project Overview

At the conclusion of the State Energy Program (SEP) American Recovery and Reinvestment Act of 2009 (ARRA) funding cycle, the Nebraska Energy Office (NEO) had successfully carried out many programs that transformed the market leaving broad and lasting impacts in the reduction of energy used in Nebraska. The NEO worked closely with the Governor's office to develop a strategic plan to invest the $30,910,000 in SEP ARRA funds received from DOE. The plan addressed primary barriers to broad scale deployment of energy efficiency and renewable energy, access to financing and information. The State's plan prioritized funding to expand the existing energy efficiency revolving Dollar and Energy Saving Loan Program, renewable energy projects, building code adoption and enforcement, education and public awareness activities. The plan also included projects that would transform energy markets to accelerate near-term deployment of energy efficiency and renewable technologies, consumer information, state building retrofits.

The plan was presented to stakeholders across the state through a series of public meetings before it was submitted to DOE in May 2009. DOE approved the plan in June 2009 and the first solicitation for Advanced Renewable Energy Projects was released in July 2009. NEO staff worked diligently to identify leveraged partnerships with Nebraska-based lending institutions and utilities for energy efficiency and renewable energy projects that would benefit residential and commercial energy users in Nebraska. The projects that NEO was able to undertake with SEP ARRA funds provided energy efficient investments in more than 68 state, university, and community college buildings; furthered the development of renewable energy curriculum in wind, solar, biomass, and hydro-power at the state's six community colleges; provided a science-based curriculum and put energy savings tools in the hands of 39,157 fifth-grade students in public, private, and home schools; financed nearly 800 energy efficiency improvements through loans; installed seven small-scale wind turbines installed at K-12 public schools; the adoption of the 2009 International Energy Efficiency Code and 19 trainings under that code; spurred the implementation of innovative renewable energy technologies in a variety of forms throughout the state including two direct drive wind turbines with a total generating capacity of 3 megawatts in rural Springview, Nebraska; a free-standing tracking solar system at the Nebraska Public Power District (NPPD) Norfolk Operations Center; and a radiant in-slab solar heating project installed by a local resident in Ft. Calhoun, Nebraska that used 90 evacuated tubes for hot water generation to distribute heat through an in-floor system and incorporated thermal storage to recover heat on cloudy days. The NEO not only achieved but exceeded its stated goals for each market title. Projects developed and implemented under the NEO's SEP ARRA program have benefitted public entities, private companies, non-profit organizations, and private citizens across the state and has furthered the NEO's mission to promote the efficient, economic and environmentally responsible use of energy. The following narrative describes the highlights of the NEO's SEP ARRA program.

SEP ARRA Goals Expected and Achieved

The NEO's SEP ARRA plan outlined the goals below, which were exceeded.

GOAL: Leverage $5,000,000.00 through the investment of the $30,910,000.00.

ACTUAL: Leveraged $21,695,663.36 through cost shares ($.70 invested for each $1 in grant funding).

GOAL: Create or retain 366 Full Time Equivalent jobs.

ACTUAL: Created or retained 382 Full Time Equivalent jobs.

GOAL: Generate or save 473,598.64 Mmbtu's of energy.

ACTUAL: Generated or saved 502,554.91 Mmbtu's, without estimates generated from the adoption of the 2009 IECC building code.

Project Implementation and Accomplishments

Project Summary

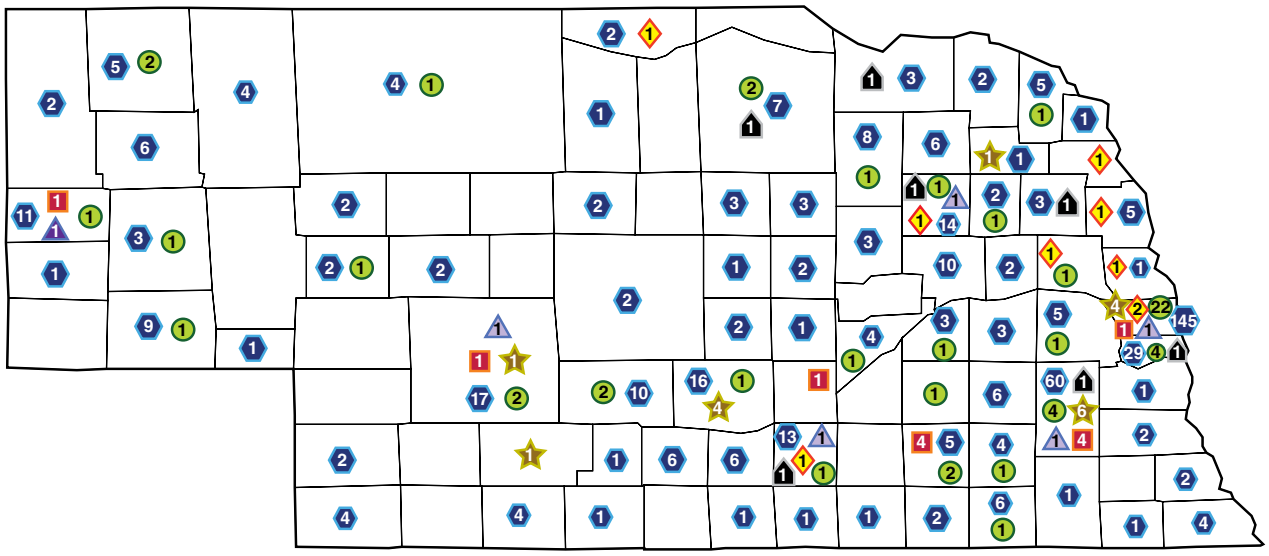
The NEO welcomed the opportunity to invest SEP ARRA funds and worked with partners and stakeholders to maximize the impact of the investment of SEP funds into projects that would benefit our state long after the dollars were expended. The purpose of NEO's SEP ARRA program was to create and retain jobs, bolster the efficient use of energy in all sectors, and increase energy generation from renewable energy sources. NEO's approach to accomplishing these goals was to invest in a variety of project types that would yield both short- and long-term energy savings. Retrofits in state-owned buildings and renewable energy projects produced more immediate energy savings once completed while projects under the renewable curriculum and building codes market titles ensure ongoing improvement in the efficient use of energy throughout the state.

Grant Activities

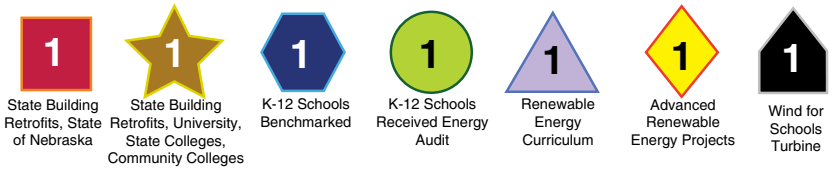
The Nebraska Energy Office (NEO) developed its SEP ARRA funding plan based on the goals listed below and considered DOE's goals when developing the market titles to administer the program.

- Increase the energy efficiency of the U.S. economy.
- Reduce energy costs.
- Improve the reliability of electricity, fuel, and energy services delivery.

State Energy Program ARRA Project Locations



Each symbol represents a type of ARRA project. The number in the symbol shows the number of projects completed. The location of the symbol on the map shows the project location.



• Develop alternative and renewable energy resources.
• Promote economic growth with improved environmental quality.
• Reduce our reliance on imported oil.

Grant activities are summarized in this document.

The Nebraska Energy Office (NEO) developed its SEP ARRA funding plan based on the goals listed above and considered the recommended project types in developing the market titles summarized in this section.

Advanced Renewable Energy Projects (AREP)

The Advanced Renewable Energy Project market title challenged applicants to propose projects that demonstrated the use of renewable energy technologies in new ways across the renewable energy spectrum. Specific objectives of the Advanced Renewable Energy projects were to:

• Increase renewable energy generation in Nebraska.
• Demonstrate the use of renewable energy technology in new ways.
• Deploy cutting edge renewable technologies.
• Generate energy from renewable resources on or before March 2012.
• Avoid greenhouse gas emissions.
• Leverage funds and create jobs.

A solicitation for proposals was issued on July 24, 2009, and Letters of Intent were due on September 3, 2009. By the deadline, 112 applicants submitted Letters of Intent for an array of projects totaling more than $135 million. On November 3, 2009, formal project applications were due. NEO received 49 completed proposals from the original 112 detailing projects totaling more than $41.06 million. Under the solicitation's guidelines, all proposed projects were reviewed for State Energy Program compliance and suitability under the National Environmental Policy Act by the U.S. Department of Energy.

In total, seven projects were awarded $3,508,095.13 in SEP ARRA funds. The projects leveraged a total of $4,560,697.07.A complete list of Advanced Renewable Energy Projects can be found in Attachment 1 and the news release on project solicitation can be found at: http://neo.ne.gov/ARRA/documents/PR_NEO_SEP_ADVRENEW_Jul_24_2009[1].pdf.

Originally, funds were awarded to a sustainable public transit facility with energy storage and transfer technologies project, a methane generation project, and biomass gasification technology project. Changes in the project scopes and difficulty leveraging funds to implement the projects resulted in the de-obligation of SEP ARRA awards for these three projects. Still, the ultimate AREP award recipient projects represent a range of renewable energy project types that were successfully implemented.

Each of the AREP projects received onsite technical reviews by the NEO Energy Technical Advisor at project commencement and completion. In addition, three projects: the Bluestem LLC, Ho-Chunk CDC, and Nebraska Public Power District (NPPD) projects received on-site programmatic monitoring in accordance with the NEO SEP ARRA Operations and Monitoring Manual. Ho-Chunk CDC and NPPD were monitored in May 2011 and Bluestem's project received a site visit in September 2011. Commendations for project completion, file organization, appropriate costing of funds, meeting ARRA requirements and good relationships with sub-grantees were issued to the NEO. No findings were issued for the NEO by its DOE Project Officer and NEO did not issue any findings for any of its sub-grantees.

Solar Sustainability Project at DeBoer's Farm

Post-ARRA projects supporting renewable energy technologies will be reviewed as appropriate funding becomes available. Renewable energy projects are eligible for low-interest loans under NEO's Dollar and Energy Saving Loan Program to sustain future advanced renewable projects beyond ARRA funding.

Significant Results

A solar tracking 45.57 kilowatt photovoltaic array was installed the Nebraska Public Power District Norfolk Operations Center and become operational in August 2010. The system operated continuously throughout the grant reporting period and is expected to continue operating for the foreseeable future. By April 30, 2012, the solar array had generated 123.171 MWh of electricity and reduced 78.71 tonnes of green house gases. See the link listed in Attachment 2 for a time lapsed video of the installation of the solar array.

The Radiant In-Slab Solar Sustainability Project developed and installed by David DeBoer in Ft. Calhoun was completed and generating heat for Mr. DeBoer's workshop since October 2011. The project installation and heat generation exceeded expectations as the entire shop was heated without using outside fuel sources. The project consisted of a solar thermal heating system that uses 90 evacuated tubes for hot water generation and an in-floor system to distribute heat. The design included thermal storage used to recover heat during cloudy days. All components were procured locally except the evacuated tubes but finding viable solar vendors was a difficult task. The project displaced over four tons of green house gases and transferred over 5 MWh during the 2011-2012 winter season. Local energy savings of $446 make it difficult to pay back the initial investment over standard life cycles but the system requires minimal maintenance and was very easy to manage. Mr. DeBoer also provided design tours to local officials as well as several students from Creighton University and Metro Community College.

Bluestem LLC received $2.3 million to procure and install a three MW capacity wind turbine to be part of the Springview II Wind Farm near Springview, NE. The turbine was successfully installed and began generating power in early 2011. From installation through April 30, 2012 17,466.74 Mwh or 595,420.09 MMBtu's were generated by the turbine. See Attachment 2 for links to newspaper articles and websites publicizing the Springview II Wind Farm.

Allen and Becky Fleischman of Tekamah, NE used SEP ARRA AREP funds to install an active solar tracking system featuring a dual axis that orients the panels to the sun from sunrise to sunset as well as adjusting the seasonal tilt to optimize collection over the course of the year. Each pole-mounted system utilizes 40-175 Watt American made solar panels. The system is sized to replace the electricity loads at the Fleishman farm, completely offsetting their consumption, making it the first 100 percent solar electric farm in the state. The expected lifespan of the system is 20 years and the estimated production power is 34.4 MW annually. The panels were installed and operational in the first quarter of 2012.

Previously, the AGP facility in Hastings, NE used natural gas to burn off volatile organic compounds (VOCs) that are a byproduct of ethanol production. An existing covered lagoon collects waste during the ethanol manufacturing process and is "flared off" as it accumulated. With SEP ARRA AREP funds, AGP converted this process to use the methane from the lagoon to burn the VOC's instead of using natural gas. This successful project expected to replace 45,360 MmBtu's of natural gas with biogas and eliminate the need for the flare which would eliminate 228 MmBtu of propane. Based on evaluation of the data obtained from July 2011 through March 2012, AGP concluded that the biogas replaced 63,000 MmBtu of natural gas on a projected annual basis which exceeded expectations. Through the programming process AGP discovered that the flare could not be totally eliminated because of safety considerations involving the operation of the regenerative thermal oxidizer (RTO). Therefore, when the RTO has any type of alarm condition, the biogas is switched to the flare. It was concluded that an annual usage decrease of 205 MmBtu is more accurate. These results calculate as annual savings of 3,680 Tons/Year (CO2 Equivalent) green house gas emissions, which is 39 percent more savings than was predicted.

Solar Sustainability Project at Fleischman's Farm

State Building Retrofits

The goal of this market title was to upgrade the energy efficiency of state buildings, University of Nebraska campuses, State Colleges and Community Colleges. A program was added to benchmark public schools and provide investment-grade audits for a select portion of participating schools, using deobligated funds from the Advanced Renewable market title. A complete list of State Building Retrofit projects can be found in Attachment 1.

Altogether, $9,732,163 was granted and $518,646 was contracted and $7,254,435.43 was leveraged under this market title. Approximately $6 million was allocated to the University of Nebraska campuses, State Colleges and Community Colleges and approximately $4 million to the State Building Division.

The NEO monitored State Building Retrofit projects in accordance with the SEP ARRA Operations and Monitoring Manual and as directed by the U.S. DOE Project Officer. Three separate monitoring occasions included visits to State Building Retrofit projects. The first occurred in May 2011 and included the four State of Nebraska Geneva Youth Rehabilitation and Treatment Center projects and the University of Nebraska Medical Center Chilled Water and HVAC Systems project in Omaha. Commendations for project completion, file organization, appropriate costing of funds, meeting ARRA requirements and good relationships with sub-grantees were issued to the NEO by its DOE Project Officer. No findings were issued for the NEO by DOE or by NEO to its sub-grantees.

The second monitoring occurred in September 2011 and included the projects at Mid-Plains Community College, the State of Nebraska Troop D building, Nebraska College of Technical Agriculture, and the University of Nebraska at Kearney. Commendations for file organization, appropriate costing of funds, meeting ARRA requirements, and striving to develop positive relationship with sub-grantees were issued. No findings were issued for the NEO by DOE or by NEO to its sub-grantees.

The third monitoring occurred in August 2012. The Metropolitan Community College and State of Nebraska Executive Building HVAC projects were included in this visit. Commendations for project completion, file organization, appropriate costing of funds, meeting ARRA requirements and good relationships with sub-grantees were issued to the NEO. No findings were issued for the NEO by DOE or by NEO to its sub-grantees.

Significant Results

The State Building Retrofit market title had the most sub-grantees and had a positive effect on buildings throughout the state from Scottsbluff on the western edge to Omaha on the eastern border. Several of the retrofit projects were required to incorporate a new continuous commissioning technology into their retrofit projects known as ECO 24/7. In total, four community colleges, one state college, and three State of Nebraska projects included this commissioning piece.

Reports from the company that implements the ECO 24/7 process show improved system reliability and energy efficiency in the buildings that were optimized. In addition, comfort complaints were reduced and electricity and gas consumption were noticeably reduced based on early data

available demonstrating significant energy savings (projects were completed near the end of the period of performance so annual comparison data is not yet available). Some examples include: the three buildings at the Youth Rehabilitation and Treatment Center campus experienced a 15.5 percent reduction in electricity consumption and 13 percent reduced gas consumption over a seven month period; Building 10 on the Metropolitan Community College campus experienced 18.7 percent reduction in electricity and 26.7 percent in gas consumption; and the Energy Square Building at Southeast Community College reduced its electricity usage by 38.3 percent in seven months.

The public schools benchmarking project was successful and laid the groundwork for many schools to move forward post ARRA. Out of 254 school districts in Nebraska, 152 (59.8 percent) participated in the program. Those districts were home to 606 buildings that were entered into Energy Star's Portfolio Manager to benchmark energy use. Using the Energy Star scores from Portfolio Manager, the NEO selected 57 school buildings representing 5,875,284 square feet to receive investment-grade energy audits. The result was a report outlining existing conditions, utility use, and a menu of Energy Efficiency Measures (EEMs). The Waldinger Corporation and Schemmer Associates, as contracted through a competitive RFP process, continued to enter utility data information for participating schools through the end of the contract period, which coincided with the original period of performance (April 30, 2012). Subsequently, the NEO offered its Dollar and Energy Saving loan program at a special low interest rate of 1 percent for schools that participated in the program and that continued to benchmark their buildings in Portfolio Manager. The special interest rate is also available to schools that previously opted out of the program but start benchmarking their buildings prior to applying for a loan through the NEO program. By December 2012, multiple schools had inquired about using the loan program for improvements but no loans have been funded thus far. The NEO continues to work with schools to provide them with information and access to capital for energy efficiency improvements.

Energy Efficient Boilers at Mid-Plains Community College

Renewable Energy Curriculum

The $1,910,000.00 allocated to this market title financed curriculum development for energy efficiency and renewable energy vocational training programs at the state's community colleges. The objectives were to 1) develop renewable energy curricula for use at Nebraska technical community colleges; 2) create new jobs and increase productivity to spur economic growth and community development by providing training and instruction in renewable energy methods and technologies; 3) implement renewable energy curricula that will result in increased energy generation from renewable technologies in Nebraska; and 4) evaluate and assess the outcomes and impact of the renewable energy climate.

The original solicitation in January 2010 called for the six community colleges to develop renewable energy curricula to train Nebraskans in renewable energy technologies under one grant as a consortium (The Nebraska Consortium for Renewable Energy Studies or NCRES). However, Metropolitan Community College (MCC) was unable to join the consortium with the other five colleges. Nonetheless, they were determined to pursue a comprehensive approach to the development of renewable energy curricula in the state so MCC received funds to focus on solar technology curriculum. The consortium focused on joint development of renewable energy curricula that will meet both current and emerging workforce needs. Consortium college members include Central, Mid-Plains, Northeast, Western Nebraska, and Southeast Community Colleges, whose service areas encompass all but four Nebraska counties. Although they were not a part of the consortium, Metropolitan Community College collaborated closely with the other five colleges in curriculum development, making this project a true state-wide initiative.

MCC had already begun a phased renewable energy curriculum prior to applying for the SEP ARRA grant. The SEP ARRA grant enabled them to proceed with Phase II, which expanded existing offerings and the focus on solar technologies.

Participants in the NCRES grant focused on the other types of renewable energy technologies. The focus of each community college's curriculum is described below.

Southeast Community College assumed the role of lead applicant and fiscal agent. Each consortium college took a

leadership or supporting role in developing specific renewable energy curriculum that is relevant to job opportunities and economic development in its region of the state, statewide, or nationally. Through this collaboration, curriculum was developed for wind, solar, hydro, and geothermal energy sources. Teams of instructors from across the state developed courses in wind, solar, hydropower and geothermal technologies using national competency standards and continue to expand the course offerings. Instructors received training from organizations such as the American Wind Energy Association, National Hydropower Association, Geothermal Energy Association, Solar Energy Institute, and others who offer the most advanced thinking in renewable energy.

Solar Class at Metropolitan Community College

Significant Results

Metropolitan Community College (MCC) – The solar project was a success in the development of a comprehensive solar program at MCC where none existed before. The solar energy program is part of the Sustainability Initiative, which includes weatherization, green living, urban farming and related courses. There are three types of active solar: electric, air, and water. A training facility was built for use in solar air, solar water and solar electric installation projects. Students have the opportunity to use best practices on the latest equipment and applications. A state-wide "train-the-trainer" was also developed. Six Specialist Diplomas were developed that are tied to major trade programs (HVAC, plumbing, and electrical) and contributed to the development of a ready-made workforce that can work in the traditional trades and also be prepared for renewable energy jobs when the industry develops more consistently in the Midwest. Additional classes include general renewables (wind, hydro, solar, etc.), passive solar and solar site selection. The grant also facilitated an articulation agreement with Creighton University to share resources. Additionally, new economic development opportunities were identified with solar technology, specifically the greenhouse coupled with solar hot water technology. Some training statistics that resulted from the SEP ARRA funding are as follows: 1) 9 Community College faculty trained; 2) 21 classes offered resulted in 46 students (unduplicated) completing 440 credit hours within 5 quarters; 3) 22 of the 46 students could achieve one or more of the six solar specialist diplomas (SSD).

Central Community College, Hastings Campus (CCC) – CCC was able to make significant progress in developing an Alternative Energy program, a goal that was started in 2009 with the introduction of wind energy to the campus. Participation in NCRES launched a comprehensive specialization to include other technologies such as solar and utility grade wind technician training. This consortium supported CCC's long-term goals and it now has the pieces in place to meet the future needs of students and the communities it serves. Many of the courses developed have been incorporated in to existing programs and created a new program available in the Fall 2012 semester. CCC also was successful with delivering workshops related to alternative energy.

This project prompted the college to make an additional investment with a dedicated facility and expanded solar project. This would not be possible without the development of curriculum to support these new competencies, which CCC now possesses. Further, the college noted a greater awareness of alternative energy throughout the state bolstering its ability to recruit students.

Mid-Plains Community College (MPCC) – Theory & application courses were developed and integrated into other related programs. Faculty created a Hydro Electrical Mechanical Technology program by combining the new courses with a mixture of electrical, welding and general education courses that created a 68-credit program. TIG and MIG welders and heavy equipment simulators were also added. Instructors were able to purchase additional equipment, which allowed the existing courses to be improved.

Northeast Community College (NECC) – NECC focused on developing a Wind Energy Program. A Wind Energy Coordinator was hired and worked with Western Nebraska Community College to develop the curriculum for the two-year associate degree in Wind Energy Technology and a Wind Turbine Service Technician certificate. A near-by 4-year college, Wayne State College, will accept up to 60 credit hours from NECC toward a Bachelor of Science degree in Technology. A Micon 108 wind turbine was purchased, installed, and commissioned in February 2012. This turbine is being used by students for training and hands-on experience. Students are able to develop

the necessary skills for their future workplaces, including start up and shut down of turbine systems and the monitoring of wind speed and direction. Along with the training and testing equipment, the Micon 108 wind turbine gives students significant experience practicing their climbing, safety rescue, preventative maintenance, and repair skills. NECC also was able to purchase a portable wind turbine for off-site training and demonstration at local industry locations and area high schools. NECC has decided to include a permanent full-time position into its general budget to ensure the continuing success and on-going course offerings of this program.

Southeast Community College (SCC) – The grant funding helped launch the new energy education program at a time when energy business workers are, and will continue to be, in high demand. The funding helped SCC develop its Associates of Applied Science in Energy Generation Operations, a comprehensive program of study that provides training in multiple energy systems that include: renewable wind and biofuels specializations and traditional fossil fuel and nuclear programs. Students learn skills for power plant operators, ethanol production operators, wind farm technicians and operators, as well as operators of other types of energy production facilities. Programs are certified by the Wind Energy Association and the Nuclear Energy Institute. After evaluating the geothermal resources in Nebraska for training needs, it became apparent that the best application of the geothermal resource is from the standpoint of heat pumps, thereby more efficient use of the natural geothermal conditions in heating and cooling systems. As a result of this finding, SCC faculty decided that one course for the geothermal focus is adequate and probably fits within any college's HVAC program better than energy generation. Significant curriculum was developed and major lab equipment was purchased including a wind turbine, climbing tower, and lab equipment used daily in the Energy Generation Operations program for a variety of courses. Those physical resources will continue to serve the student population for many years.

Wind Turbine Class at Southeast Community College

Western Nebraska Community College (WNCC) –WNCC was successful in developing additional curriculum that will allow for transferrable coursework to NECC. Overall, the project was a success in that seven students (just short of the 10 expected) will complete the one-semester professional skill award and transfer to another program or seek entry-level employment in the wind energy field. A solid base of knowledge is available to our students and demand for classes in the next few semesters is growing.

Dollar and Energy Savings Loan Program (DESLP)

Administered by the NEO, the Dollar and Energy Saving Loan Program is a revolving fund that reduces the interest rate for energy-related projects meeting minimum efficiency standards. Active since 1990, it is one of the longest standing and highest volume energy efficiency loan programs in the country. It was created with $10 million in petroleum violation escrow (PVE) funds with an additional $15 million in PVE, state, trust, and State Energy Program competitive grant funds added over time. NEO placed $12.4 million in ARRA funds into the loan pool, bringing the total loan pool today to approximately $38 million.

More than 265 Nebraska lenders, operating at over 900 locations across the State issue loans for energy efficiency to borrowers. NEO then purchases 50, 65 or 75 percent of each loan at 0 percent interest to deliver an interest rate of 5 percent, 3.5 percent or 2.5 percent, respectively, to the borrower. This allows the bank to retain a 10 percent return on its share of the loan. The portion of the loan purchased by NEO is decided by the rate offered to the borrower by the lender.

The program lends to all sectors, including the residential, commercial and industrial, and public sectors. However, the large majority of the projects it finances are in the residential sector. The maximum state contribution to residential loans is $100,000 for single family and $250,000 for multifamily.

Significant Results

Initially in 2010, $11 million of the SEP ARRA funds were allocated to the loan program. By February 2012 all $11 million had been committed and expended on 742 projects in the following sectors: Business/Agriculture: $120,125.37, Energy Efficient Financing: $2,316,930.00, Government: $4,311,577.17, Residential: $4,168,750.60, and Wind: $82,616.89. Later, deobligated and contingency funds from other market titles were transferred into the loan program resulting in a new loan program total of $12,311,138.88, which leveraged $8,822,494.66 in other investments. In addition, $174,417.40 in program income was added for a grand total of $12,485,556.38. These dollars expended equaled a total of 799 loans made using SEP ARRA funds. By December 2012, a total of $1,431,238.16 in SEP ARRA funds had been repaid and re-loaned out for eligible projects. Statewide demand for this loan program continues to grow.

Energy Detective Visits 5th Grade Class

Consumer Information on Energy Efficiency and Renewable Energy

Consumer information market title goals focused on providing Nebraskans with energy efficiency and renewable energy information so energy-wise choices and decisions are made resulting in reductions of state-wide energy usage. Funds were used to purchase consumer "Energy Saver" information booklets, print promotion materials on the NEO Dollar and Energy Saving Loan program, support the agency website for consumer awareness, attendance at a state-wide Wind Conference, wind-for-schools project and energy detective kits.

Significant Results

The energy detective kit program was administered for two school years and disseminated 39,157 detective kits to fifth grade class rooms in public, private and home schools statewide. The participation rate was 90 percent among state-wide fifth-graders with projected 10 year savings/home (based on lifetime of kit items) are: 14,887 gallons of water; 56 therms of natural gas and 1,292 kWh of electricity. The 50/50 cost share was leverage from the grant and 80 utilities. A competitive RFP solicitation led to a contract to implement a multi-resource efficiency education program designed around Nebraska's Energy Detective campaign to facilitate installation of efficiency measures in homes and build knowledge about water and energy. The design yielded a variety of simple measurable energy and water savings results using the best messengers – students. A proven blend of teacher-designed classroom activities with hands-on home projects to install high-efficiency devices introduces resource-conscious behavior to students and their families.

The annual reports for each school year published by the energy detective program administrator illustrates the popularity and success of the program can be found at the links listed below:

www.neo.ne.gov/energydetectkit/energydetective2010-11.pdf

www.neo.ne.gov/energydetectkit/energydetective2011-12.pdf

The Wind for Schools program was launched in Nebraska in 2007 by the National Renewable Energy Laboratory (NREL). The program objectives are to engage schools in the concept that wind offers an alternative energy and economic future, engage school teachers and students in energy educations, specifically wind, and equip college juniors and seniors in wind energy applications and education to provide the growing wind industry with interested and equipped engineers. To meet these goals, small wind turbines (2.3 KWH capacity) were to be installed at K-12 schools in Nebraska communities with the help of the Wind Applications Center at the University of Nebraska – Lincoln. The University facilitator worked closely with NEO throughout the period of performance to formulate agreements using a total of $35,000 available for 7 K-12 schools. All participating schools continue to track their energy data on a real time basis.

Building Codes

The Building Codes market title goal focused on providing information, training and technical assistance on residential and commercial building energy codes to city and county code officials and members of the construction industry. The NEO staff worked to update the state's building energy code from the 2003 International Energy Conservation Code (IECC) to the 2009 IECC through state legislation. The NEO offered trainings and technical assistance to ensure energy code compliance, enforcement and inspections. Originally $315,000 was allocated to this mar-

ket title. As the end period of performance drew near, some of the funds originally obligated in this market title were transferred to the consumer information market title to fund the second year of energy detective kit program.

Significant Results

The NEO formed a Building Codes Advisory Council consisting of commercial builders, home builders, code inspectors, engineers, architects, utilities, and HVAC technicians. The Committee met regularly to discuss code adoptions, enforcement, trainings, and compliance. The NEO also worked closely with the Nebraska Legislature to draft and support the successful passage of, LB 329 "Update to the International Energy Conservation Code and change Nebraska Energy Code provisions". The bill, which updated the Nebraska Energy Code from the 2003 IECC to the 2009 IECC, was approved and signed into law on April 14, 2011 and took effect on August 27, 2011. The NEO drafted and promulgated rules and regulations for the 2009 IECC. Training and technical assistance was provided to local code jurisdictions on the code adoption. Trainings were also held for the construction industry. The NEO continues to work with local code jurisdictions to assist them in assessing code compliance and enforcement and provides technical assistance and training regarding specific code issues beyond the funding this grant provided.

Building Energy Codes Training Session

Funding received under the SEP ARRA award was used for a hands-on RESCheck training for the IECC as part of the 2012 Great Plains Energy Codes Conference. NEO organized and hosted the event held in Omaha, NE in October 2012. SEP ARRA funds leveraged funding from another building codes grant and matching funds from Omaha Public Power District (OPPD). The conference focused on the 2009 International Energy Conservation Code (IECC), 2012 IECC beyond code programs, and innovative ideas for code compliance. Nearly 175 builders, code officials, architects, engineers, HVAC installer/distributors, government officials, product suppliers, and Home Energy Raters from 21 states, the District of Columbia, Canada and Guam attended. Some highlights of the conference include:

- Keynote addresses from prominent code experts.
- Tours of energy efficient buildings.
- A hands-on RESCheck training for the IECC to code officials, builders, engineers and other industry professionals.
- Presentations from Trane, National Fenestration Rating Council, Lutron and the Weidt Group on products and projects for energy efficiency and code compliance.
- 28 educational sessions in four tracks with 38 speaks who are experts in their field.
- An interactive case study session in which participants heard the details of a non-compliant building in Nebraska and discussed ideas for compliance.

Pictures from the conference on the NEO's Facebook page: http://www.facebook.com/NebrEnergyOffice?ref=hl

SEP ARRA funds were also used to provide and analysis of 2012 IECC titled, "Energy Impact Study of the 2009 IECC and 2012 IECC Energy Codes for Nebraska". The study found the 2012 IECC performs best with average savings in whole-house energy costs at 11% with savings ranging from $171 to $553 per year, depending on house size and locations. A copy of the study can be found at: http://www.neo.ne.gov/home_const/iecc/documents/NEcodesreport3-14-12.pdf

The Building Codes market title also provided funding for nine IECC compliance trainings at locations throughout the state In addition, three RESCheck and three COMCheck trainings were held in 2012 with a total of 76 attendees, four American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) trainings were held with a total of 125 attendees, and three building science trainings were held with 69 participants using SEP ARRA funds under this market title. Approximately 200 quick reference codes official guidebooks were also produced with SEP ARRA funds and disseminated to code officials throughout the state.

Program Support, Administration, Evaluation, Management and Reporting

The Program Support market title included funds that paid for salaries, postage, printing, office supplies, and other administrative supplies needed to administer the NEO's SEP ARRA grant. This also included gathering data and compiling quarterly reports, DOE compliance and monitoring activities of each sub-grantee to ensure compliance with ARRA conditions such as Buy American, Davis-Bacon, and Historic Preservation. In addition, funds to evaluate the NEO Dollar and Energy Saving Loan Program were set aside under this market title.

Significant Results

NEO contracted with the University of Nebraska-Lincoln who brought together a team of economists and researchers to create a tool to assess the economic and environmental impact of the NEO Dollar and Energy Saving Loan Program. The NEO loan program is a revolving fund that reduces the interest rate for energy-related projects meeting minimum efficiency standards set by the NEO. The evaluation developed a methodology to quantify the energy, economic and environmental impacts that resulted from loan program investments made in 2009 and early 2010. This was done through examination of energy usage prior to the investments as compared to energy usage after the investments. The evaluation identified the economic impact of the loan program on output, value added, labor income and jobs added. It also examined the environmental impacts of the programs in term of reductions in a variety of emissions and the economic saving that the emission reductions produce.

Energy Office Director, Ginger Willson addresses teachers and students at the launch of the Energy Detective Program in November 2010.

The economic impact of program investments is estimated based on both the direct spending in Nebraska due to these investments and the "multiplier impact" that occurs as initial spending circulates further in the state economy. Program investments are also expected to generate economic impacts in future years as these investments allow households to divert income from energy consumption to spending on other goods and services. The aggregate economic impact is measured in terms of output, value added, employment and job-years created.

The analysis also estimates the environmental impacts of the NEO's investments in the energy loan. Estimates are made of reductions in emission of greenhouse and other pollutant gases as a result of the investments. These estimates are converted into economic benefits based on both the long-term potential costs of these emissions and the more immediate costs from pollution including health impacts, water pollution and reduced farmland productivity.

Over the 2009-2010 period examined, the NEO invested just over $4 million in loans for energy related projects. That investment generated an equal amount of private investment from the Nebraska banks that underwrite the loans resulting in $2.1 million in future expected energy savings. It also generated about $8.1 million in output, $4.7 million in value added, $3.5 million in labor income and created 92.52 job-years of employment (i.e. one job for 52 weeks or 92.52 jobs for one week). Finally, the investment generated about $2.1 million in environmental, comfort, health and safety impacts. The collective results were combined into an Excel-based reporting tool that will be used to provide ongoing impact data for the program with funds that continue to revolve and invested in energy improvements.

Best Practices and Lessons Learned

Through the implementation of the various project and programs administered with SEP ARRA funds, the NEO has identified the following as best practices and could either be replicated or continued in the future.

- Development of a specific evaluation tool to measure the economic and environmental impacts of implemented energy efficiency measures.
- Deployment of Energy Detective kits to fifth-grade students to facilitate installation of energy efficiency measure in homes and build knowledge about water and energy usage.
- Participation with state-wide utilities in project development, deployment and implementation Partnerships with state-wide educational institutions.
- Grant funding allowed the NEO to address market sector barriers, such as access to financing capital, especially in the education, state-owned buildings and residential sectors.
- Grant funding allowed great access to publish energy efficiency information to the general public.
- The transparency of grant funding was positively received and appreciated by the public.

During the administration of the SEP ARRA grant, if given the chance to go back to the beginning of the grant period these would likely be addressed sooner or in a different manner if possible.

- Rush to award projects:
  - o The rush to obligate and spend SEP ARRA funds created some compliance problems because many of the ARRA requirements were new to SEP programs and U.S. DOE was not able to provide definitive guidance from the onset of the program.
  - o In hindsight, NEO would have preferred to wait for guidance to award many of its projects so that it could have provided more guidance to its

sub-grantees to ensure compliance for all ARRA requirements.

- Davis-Bacon Act Compliance: a number of issues presented hurdles for NEO staff to ensure compliance with the Davis-Bacon Act.
  - Lack of timely guidance made it difficult to convey clear directions to sub-grantees despite experience with Davis-Bacon Act payroll review. The confusion related to which wage determinations to use for SEP projects created frustrations for sub-grantees and their contractors and sub-contractors since many had been contracted with and work had already begun by the time the guidance was clarified.
  - To help ensure compliance, NEO staff contracted with a company to administer an online Davis-Bacon review system that all sub-grantees would use. The system was not as user-friendly as NEO staff first believed and despite many efforts to train all sub-grantees, many refused to use the online system opting to submit hard copy payroll reports instead. The inability of the company hired to get all sub-grantees trained in a prompt and user-friendly manner led NEO staff to agree to this arrangement. As a result, most sub-grantees submitted hard copy reports, creating a backlog of review work for NEO staff.
  - Because of the push to write aid agreements quickly and get funds out, so many projects were started by the time these Davis Bacon issues were apparent. As a result, many revisions were required on payroll reports, which created even more backlog for NEO staff. Revisions were made and all sub-grantees were found to be in compliance.
  - Trainings: It became known that many contractors employed operated under standard project management standards and either lacked understanding of federal requirements entirely or, in cases where ARRA regulations were more specific or the U.S. DOE General Counsel had provided more specific guidance, were unaware of the clarification and in some cases were initially unwilling to change their way of doing business. Ascertaining the proper documentation also created additional workload for NEO staff. In the future, NEO staff will coordinate "trainings" or "kick-off" meetings with sub-grantees. A representative of NEO and/or its sub-grantee will also need to be present at all pre-bid meetings with contractors.

Key Outcomes/Other Achievements

The NEO has identified additional areas where State Energy Office administration or grants are needed. The flexibility of these grants funds allowed the state to create jobs, and deploy energy technologies and reduce energy usage in greater volume than ever before. The areas of transparency, civil engagement and efficiency will have lasting effects.

ARRA was a unique opportunity that allowed the State to develop programs that could not have been implemented without the significant support in funding. The reality is that programs have been created that States fiscally do not have the funding to maintain. The DOE should realize that the SEP formula program is successful and should be obligating more funding to the State formulas to sustain the success of ARRA and sustain the programs created over a long period of time.

States should continue to have full discretion to direct funds in areas that are priorities determined by each State. Expending funds with a narrow federal focus does not lead to overall success. Placing States' needs first leads to individual state success and overall national success.

Cost Status

The table below illustrates the successful expenditure of NEO's SEP ARRA funds. NEO's close out period end date is January 31, 2013. The small balances in program support and building codes will be spent on administrative work in January 2013. The final payment that equals the balance in State Building Retrofits was received and processed in early January 2013.

Approved Budget	Approved Budget	Cumulative Expenditures as of 12/31/12	Award Balance as of 12/31/12	Percent of Award Expended
Program Support (Personnel & Operating Expense & Administration, Evaluation, Management & Reporting)	$2,100,000.00	$1,924,335.55	$30,000.00	93.8
Loan Program (DAESLP)	$12,485,556.38	$12,485,556.38	0.00	100.0
Advanced Renewable Energy	$3,476,231.56	$3,476,231.56	0.00	100.0
Building Codes	$199,838.20	$172,063.63	$27,774.57	86.1
Consumer Information	$661,984.05	$661,984.05	0.00	100.0
Renewable curriculum	$1,909,998.00	$190,9998.00	0.00	100.0
State Building Retrofit	$10,250,809.31	$9,969,633.87	$281,175.44	97.1
Totals	$30,910,000.00	$30,596,909.53	$313,090.47	98.9

Attachment 1: SEP ARRA Subgrantees by Market Title

AREP Subgrantees

Subgrantee	Renewable Energy Type	Project Location	Aid Amount	Match/ Leverage	Total Cost	Expended
AGP Corn Processing Inc	Biomass	Adams County	$275,000.00	$50,000.00	$325,000.00	$262,691.37
Allen Fleischman	Solar	Burt County	$106,250.00	$17,000.00	$123,250.00	$106,250.00
Bluestem LLC	Wind	Keya Paha county	$2,300,000.00	$4,338,000.00	$6,638,000.00	$2,300,000.00
David DeBoer	Solar	Washington County	$11,223.00	$1,981.00	$13,204.00	$10,878.39.00
Design Plastics, Inc.	Wind	Douglas & Dodge counties	$148,000.00	$26,800.00	$174,800.00	$146,753.25
Ho-Chunk CDC	Solar	Thurston County	$249,780.00	$43,400.00	$293,180.00	$231,816.82
Morrissey Engineering	Solar	Douglas County	$72,884.00	$12,862.00	$85,746.00	$72,883.60
Nebraska Public Power District	Solar	Madison County	$344,958.13	$70,654.07	$415,612.20	$344,958.13
Totals			$3,508,095.13*	$4,560,697.07	$8,068,792.20	$3,476,231.56
*Total granted in aid agreements; actual ending project totals may be lower due to actual prices of materials and labor.						

State Building Retrofit Subgrantees – University of Nebraska

Subgrantee	Project Location	Aid Amount	Match/Leverage	Total Cost	Expended
University of NE Med Center (UNMC)	University Towers 1-4; Durham Outpatient Center	$860,000	$3,890,000	$4,750,000	$859,999.90

University of NE -Lincoln	12 Buildings	$188,500.00	$124,788.00	$313,288.00	$188,500.00
	Hamilton Hall Energy Efficient Retrofits	$92,240	$34,377	$126,617	$92,240
	Scott Engineering Center	$470,468	$159,362.00	$629,830	$470,468
	Othmer Hall	$145,990	$27,710	$173,700	$145,990
	Beadle Center, Bessey Hall and Home Economics Buildings	$81,261.00	$83,368.00	$164,629	$80,260.80
Nebraska College of Technical Agriculture	Biomass Boiler	$400,000	$1,130,700	$1,530,700	$400,000
University of NE-Omaha	Allwine Hall	$308,300	$132,000	$440,300	$288,350.79
	Eppley Administration Bldg	$334,000	$120,000	$454,000	$248,223.59
University of NE – Kearney	Mantor Hall	$216,000	$270,200	$486,200	$216,000
	Randall Hall	$120,001	$136,191.00	$256,192	$110,059.11
	Cushing/Ryan Library	$75,040	$20,000.00	$95,040	$64,824.00
	Chilled Water Controls	$282,000	$397,200.00	$679,200	$276,900.00
Totals		$3,572,800.00	$6,526,896	$10,099,696.00	$3,441,816.19

State Building Retrofit Subgrantees – State Colleges

Subgrantee	Project Location	Aid Amount	Match/Leverage	Total Cost	Expended
Wayne State College	Bowen Hall	$300,000.00	$0	$300,000.00	$300,000.00
Totals		$300,000.00	$0	$300,000.00	$300,000.00

State Building Retrofit Subgrantees – Community Colleges

Subgrantee	Project Location	Aid Amount	Match/Leverage	Total Cost	Expended
Mid-Plains Community College	McDonald Belton Building	$450,000	$21,071.00	$471,071	$450,000
Metropolitan Community College Omaha	South Campus — Mahoney Building Ft. Omaha Campus — Building 10	$449,922.79	$0.00	$449,922.79	$449,922.79
Southeast Community College	Energy Square Building	$450,000	$391,097.00	$841,097	$450,000.00
Western Nebraska Community College	Main Bldg & Pioneer Hall	$606,521	$33,501.00	$640,022	$606,521.00
Totals		$1,956,443.79	$445,669.00	$2,402,112.79	$1,956,443.79

State Building Retrofit Subgrantees – State of Nebraska – Building Division

Subgrantee	Project Location	Aid Amount	Match/Leverage	Total Cost	Expended
Nebraska State Patrol Norfolk	Troop B Building	$383,710.37	$44,930.00	$428,640.37	$379,426.97
Nebraska State Patrol Grand Island	Troop C Building	$373,735.00	$41,118.05	$414,853.05	$369,167.58
Nebraska State Patrol North Platte	Troop D Building	$482,543.50	$40,442.38	$522,985.88	$472,376.87
Youth Rehabilitation and Treatment Center Geneva	Burroughs Cottage	$275,932.85	$30,380.00	$306,312.85	$275,932.85
Youth Rehabilitation and Treatment Center Geneva	Sandoz Cottage	$272,091.85	$30,380.00	$302,471.85	$267,091.85
Youth Rehabilitation and Treatment Center Geneva	Sacajawea Cottage	$320,467.71	$0.00	$320,467.71	$320,463.62
Youth Rehabilitation and Treatment Center Geneva	Central Plant	$1,359,908.00	$70,0000.00	$1,429,908.00	$1,354,953.50
Administrative Services, Building Division	Executive Building – Lincoln (lighting)	$71,960.75	$0.00	$71,960.75	$71,960.05
Administrative Services, Building Division	Executive Building – Lincoln (HVAC)	$95,731.80	$24,620.00	$120,351.80	$95,731.80

Administrative Services, Building Division	State Office Building - Omaha	$27,200.00	$0.00	$27,200.00	$27,200.00
Administrative Services, Building Division	State Office Building - Lincoln	$94,700.00	$0.00	$94,700.00	$94,520.15
Administrative Service, Building Division	1526 K St Building - Lincoln	$305,070.00	$0.00	$305,070.00	$23,902.65
Totals		$4,063,051.83	$281,870.43	$4,344,922.26	$3,752,727.89

State Building Retrofit Subgrantees – Public School Audits

Subgrantee	Project Location	Aid Amount	Match/Leverage	Total Cost	Expended
Waldinger Corporation & Schemmer Associates	statewide	$518,646.00	$0.00	$518,646.00	$518,646.00
Totals		$518,646.00	$0.00	$518,646.00	$518,646.00

Renewable Curriculum

Subgrantee	Project Location	Aid Amount	Match/Leverage	Total Cost	Expended
Metropolitan Community College	Omaha	$318,333.00	$0.00	$318,333.00	$318,333.00
Southeast Community College Statewide		$1,591,665.00	$253,245.00	$1,844,910.00	$1,591,665.00
Totals		$1,909,998.00	$253,245.00	$2,239,243.00	$1,909,998.00

Wind For Schools (part of the Consumer Information market title)

Subgrantee	Project Location	Aid Amount	Match/Leverage	Total Cost	Expended
Bancroft-Rosalie School District	Firth	$5,000.00	$16,140.35	$21,140.35	$5,000.00
Norris School District	Bancroft	$5,000.00	$14,211.00	$19,211.00	$5,000.00
Papillion/La Vista South School District Papillion		$5,000.00	$15,000.00	$20,000.00	$5,000.00
West Holt Public School	Atkinson	$5,000.00	$18,634.00	$23,634.00	$5,000.00
Creighton Community Schools	Creighton	$5,000.00	$16,252.00	$21,252.00	$4,897.00
Norfolk High School	Norfolk	$5,000.00	$9,019.00	$14,019.00	$5,000.00
Hastings Public School	Hastings	$5,000.00	$17,000.00	$22,000.00	$5,000.00
Totals		$35,000.00	$106,256.35	$141,256.35	$34,897.00

Attachment 2: Products Produced or Technology Transfer Activities (Media and Outreach)

Renewable Energy Curriculum

Renewable Energy Career Opportunities in Nebraska
http://www.neo.ne.gov/careers/energycareers.htm

Advanced Renewable Energy Projects
NPPD Tracing Solar Energy Project
http://neo.ne.gov/ARRA/sep/nppd.htm

Time lapsed YouTube video of installation of solar array at the Norfolk Operations Center.
http://www.youtube.com/watch?v=pRe9lZyxhAg

David DeBoer Radiant In-Slab Sustainability Project

Bluestem LLC Springview Wind Turbine

http://neo.ne.gov/ARRA/sep/bluestem.htm

http://journalstar.com/news/local/wind-turbines-coming-back-to-springview/article_bde5c0ec-520f-5f21-9630-acc60b73449e.html

http://journalstar.com/news/state-and-regional/nebraska/nppd-will-dedicate-new-springview-wind-turbines-on-friday/article_1704f50e-9ce7-55d4-a77f-4ee587ca827a.html

http://www.springview-ne.com/attractions.asp

Allen Fleischman

http://neo.ne.gov/ARRA/sep/Allenfleischman.htm