

Current Funding Cycle

This funding cycle included 29 projects

Energy Production Projects: Twenty awards totaling \$26.6 million were approved for energy production projects. These projects include the installation of 13.1 MW's of new renewable energy generation capacity.

- **Anoka Ramsey Community College**, Coon Rapids (\$828,900) : A ground-mount photovoltaic array and a roof-mounted photovoltaic array that totals 458 kilowatts of solar capacity will be installed at the College Training Center. In addition, a solar electric vehicle charging station will be integrated with a carport outside the main administrative building. The solar arrays and the EV charging station will be monitored for performance data and will also be hands-on laboratories integrated with solar energy related coursework and energy research activities at the College. Electricity generated will be consumed on site
- **Aurora St. Anthony Limited LLC**, St. Paul (\$398,000): A roof-mounted 252 kilowatt photovoltaic facility will be installed at the former Old Home Milk Dairy facility on the Central Corridor LRT line at Western Avenue. Aurora is renovating the facility to create 57 units of rental housing, commercial space, and parking. The project will specifically demonstrate designs and ownership structure for solar energy that can be integrated with affordable housing projects and urban redevelopment projects generally. Electricity generated will be consumed on site
- **Bergey Windpower Co.**, central Minnesota (\$1,106,600): Fifty 10 kW wind turbines will be constructed in Stearns, Benton and Meeker Counties to install 500 kilowatts of wind capacity and increase the market penetration of small wind turbines within Minnesota. The project will use Excel 10 wind turbines which have a 23-ft blade diameter that is set at a 120-ft hub height. Power generation begins at 5 mph and reaches 10 kW at 26 mph. Electricity generated will be consumed on site.
- **Best Power, Int'l LLC**, Mankato (\$900,000): A 907 kilowatt ground-mounted photovoltaic facility will be constructed on the School Sisters of Notre Dame (SSND) campus in Mankato. SSND has a "Green Habit Campaign" to recognize and promote sustainable living practices. The facility will provide a process for local electrical inspectors to understand the new technology of a 1,000 Vdc (Volts direct current) system,. Best Power own, operate, and maintain the system over a 20-year agreement. Electricity generated will be sold to Xcel Energy.
- **Best Power, Int'l LLC**, Colleagueville (\$172,213). The project will be an expansion of the St. John's Solar Farm that was funded from the 3rd RDF cycle and completed in 2009.: A static, ground-mounted 198 kilowatt photovoltaic array will be constructed adjacent to the existing 400 kilowatt array to provide an on-site, side-by-side comparison of competing solar technologies, linear axis tracker technology currently in place and fixed tilt technology of the new array. The St. John's Solar Park will continue to be owned, operated and maintained by Best Power Int'l, LLC. Electricity generated will be sold to Xcel Energy.
- **City of Hutchinson** (\$958,369): A ground-mounted 402 kilowatt photovoltaic (PV) facility that uses tenKsolar RAIS Wave equipment and panels will be constructed on a capped municipal landfill site adjacent to the City's Wastewater Treatment Plant. System design will allow the facility to be built without any penetrations into the surface of the landfill, which will be a model for other landfill sites in the state that may wish to develop a similar solar energy installation. This can serve as a model in Minnesota for how to cost effectively develop a renewable energy resource on a landfill that would otherwise have little or no economic value. Electricity generated will be consumed on site
- **City of St. Paul** (\$555,750): Two photovoltaic arrays totaling 105 kilowatts of solar capacity will be installed at the new Saints Stadium. One array will be a shade pavilion over a group spectator terrace which can be seen by visitors throughout the Ballpark and the second will be an array on a car canopy over a parking lot adjacent to the Ballpark. The project will promote the benefits of solar through direct engagement with Ballpark spectators and reduce the park's greenhouse gas and pollution footprint. Electricity generated will be consumed on site
- **Cornerstone Group**, Richfield (\$310,310): A 152 kilowatt roof-mounted photovoltaic facility will be installed at the former Lyndale Garden Center. This facility will be a component of a redevelopment project to create a Town Center by combining retail, mixed income housing, and an expansive public place connected to Richfield Lake Park. Included will be a solar carport to demonstrate energy storage and an electric vehicle charging station. The array will utilize Titan solar modules from tenKsolar. Electricity generated will be consumed on site
- **Dragonfly Solar LLC**, Dodge Center (\$1,650,000): A ground-mounted 998 kilowatt photovoltaic facility will be constructed near the northern edge of the existing GM Solar wind farm near Dodge

Center, MN. The installation at a wind farm will take advantage of existing interconnection and construction costs. Dragonfly Solar assumes project design and implementation control whereby GM Solar would retain ownership of the facility. Electricity generated will be sold to Xcel Energy.

- **Farmamerica**, Waseca (\$600,000). This project is to install 120 kilowatts of solar and wind to achieve a net zero, non-combustion based energy production system at the Farmamerica Interpretive Center. A fixed photovoltaic array, a tracker photovoltaic array, and a small wind turbine will be constructed. Access electricity will be stored in the 20 kilowatt to 30 kilowatt battery bank of an electric vehicle charging station. Electricity generated will be consumed on site
- **Goodwill Solar LLC**, St. Paul (\$1,075,250): A 700 kilowatt roof-mounted photovoltaic facility will be installed at the Goodwill Easter Seals corporate headquarters in Saint Paul, Minnesota. Goodwill Solar, LLC, is a special purpose entity that will own and operate the solar facility and will be the grant recipient. Geronimo Energy will be an owner and the managing member of Goodwill Solar, LLC. Data from the project will aid in the research and development of accurate energy and capacity pricing for solar technologies,. The project site has multiple options for interconnection due to its proximity to Xcel Energy's Prior Substation. The project will either connect directly to the substation or the feeder line located just south of the project site. Final determination of the point of interconnection will be made during final engineering. Electricity generated will be sold to Xcel Energy.
- **Innovative Power Systems Inc.**, St. Paul (\$1,850,000): Five roof-mounted photovoltaic facilities that total 967 kilowatts solar capacity will be installed on commercial buildings within the Energy Innovation Corridor. Power produced by each facility will be fed into the host building's electrical service with surplus generation supplied to the grid. The project will use the latest generation of RAISwave™ panels manufactured by tenKsolar. This project will demonstrate a development process for solar energy through a public-private tax equity investment structure, performance monitoring to build a baseline for solar project financing, and demonstrate that these benefits can be achieved using locally-manufactured products. Electricity generated will be sold to Xcel Energy.
- **Metropolitan Airports Commission**, Bloomington (\$2,022,507): A 1,180 kilowatt roof-mounted photovoltaic array will be installed on the upper deck of the Gold Parking Garage at Terminal One of the Minneapolis-St. Paul International Airport. The solar equipment will be installed on structural support so as to maintain current parking spaces on the upper deck. It will be configured for future integration with energy storage, EV charging and other demand management technologies. Solar PV on the Gold Ramp will be designed to target production to reduce peak loads between 9 a.m. to 9 p.m. on non-holiday weekdays. The facility will serve as a prototype for future solar projects at the airport which showcase energy innovations and focus public awareness, Electricity generated will be consumed on site.
- **Minneapolis Park and Recreation Board**, Minneapolis (\$969,741): 200 kilowatts of roof mounted solar capacity will be installed on rooftops and sun shade canopies at municipal parks owned by the Minneapolis Park and Recreational Board. The technology used will be a Minnesota Made panel from either tenKsolar or Silicon Energy, depending on the location and type of application. These facilities will demonstrate the effectiveness of alternative solar designs such as carpools and outdoor restaurant seating canopies when roof mounted solar systems are not feasible due to structural, historical, or other barriers to traditional solar installations. Electricity generated will be consumed on site.
- **Minneapolis Public Schools**, Minneapolis (\$917,250): Thomas Edison High School in Northeast Minneapolis will install and operate 485 kilowatts of solar capacity as part of a "green campus" initiative that also includes demonstrations of other sustainability measures, such as urban storm water management. The solar array will serve as a hands-on "classroom" that will be integrated with the school's science, math and technology curricula. Over the life of the project, in addition to educating students and the public about solar energy, these solar energy installations will save operating costs for school facilities and contribute net revenues to the school budget. Electricity generated will be consumed on site.
- **Minnesota Renewable Energy Society**, statewide (\$2,661,320): A 1,000 kilowatt solar community garden will be installed to allow people who would like to participate in renewable electric energy generation but are unable to install a photovoltaic array on their residence or business. In addition, best practices for community solar in Minnesota will be developed. Electricity generated will be sold to Xcel Energy.
- **Mondovi Energy Systems**, Mondovi, Wis (\$2 million): A 2,000 kilowatt community-based anaerobic digester and co-fermentation biogas plant will be installed to utilize various community organic wastes to generate electricity and heat. This includes a wastewater treatment plant, manure from several large dairy farms, a pet food palatability company, several meat processing plant, a dairy processing plant, bakeries, restaurants, grocery stores, a hospital, nursing home, cheese processing plant, meat processing plant, food processing plant, milk packaging plant, several schools, and several other businesses that produce food waste. A garbage collection service will

collect the food waste and other input substrates from businesses each day for delivery to the Biogas Plant. Electricity generated will be sold to Xcel Energy.

- **Oak Leaf Energy Partners Ohio LLC**, Shakopee (\$2 million): A 1,000 kilowatt photovoltaic facility will be installed at the Metropolitan Council's Blue Lake Wastewater Treatment Plant. The facility will have remote data acquisition and monitoring solution to analyze and display historical and live solar electricity generation data. For public outreach and education purposes, system performance data will be accessible through the internet. Oak Leaf will operate and maintain the monitoring system. Electricity generated will be consumed on site.
- **SGE Partners LLC**, South St. Paul (\$583,513): Sanimax Industries Inc and Green Energy Partners Inc. have partnered to form SGE Partners LLC for the construction and operation of a 1,100 kilowatt anaerobic digester, adjacent to the existing Sanimax rendering facility. The anaerobic digester will be designed to process approximately 150,000 tons per year of non-agricultural source separated organic materials from the rendering process as well as organic waste from restaurants and food processors within the metropolitan area. The facility will demonstrate the viability of an urban biodigester utilizing nonagricultural residue. Electricity generated will be sold to Xcel Energy.
- **Target Corp.**, St. Paul (\$583,513): A 350 kilowatt roof-mounted photovoltaic facility will be installed at the Super Target Midway store on University Avenue in St. Paul. Target will own and operate the system that will be used to educate the community on the benefits of commercial-scale solar and to reduce Target Midway's greenhouse gas footprint. Electricity generated will consumed on site.

Research and development projects Six awards totaling \$5.4 million were approved for research and development projects.

- **Barr Engineering**, Minneapolis (\$161,081): Research is to reduce the cost of wind energy by giving wind farm owners and operators a cost-effective means of assessing the health and life expectancy of towers and foundations. A portable sensor system will be developed to be deployable on wind-turbine towers and foundations to measure strain and tilt which are used to assess the turbine health and life expectancy. Strain measurements enable researchers to characterize the behavior of the turbine tower and the loads it exerts on the foundation under a variety of conditions. The sensor system and estimation methods would first be tested on the University of Minnesota's Eolos Research Wind Turbine and then tested on wind turbines in Xcel Energy's Grand Meadow and Nobles wind farms.
- **University of Minnesota**, Minneapolis (\$1,899,499): Research is to develop a solid biofuel that has potential for direct, stand-in use at power generation facilities and develop distributed generation in rural environments using rural biomass as fuel. A high-efficiency steam-electric boiler generator system will be constructed to utilize densified biomass fuel. The prototype will be able a biomass conversion reactor and a 100 kW steam-electric generator. A demonstration-scale system will be designed and constructed at the University campus and then tested at the Natural Resources Research Institute's Coleraine research facility.
- **University of Minnesota**, Morris (\$982,408): Research will be conducted at the dairy operation at the West Central Research and Outreach Center in Morris, Minnesota. Research will focus on effective methods to integrate and control on-site small wind and solar photovoltaic (PV) generation, conduct economic feasibility and life cycle analysis, and then disseminate the results through the web, regional meetings, and a hands-on statewide workshop and tour. To conduct performance testing two generation facilities will be designed and installed, a 20 kilowatt small wind turbine and a 54 kilowatt photovoltaic array. To allow for time shifting of the wind and solar generation, these systems will be integrated with a thermal storage tank combined with a heat pump.
- **University of Minnesota**, Minneapolis (\$625,102): Research will quantify infrasound annoyance to better understand noise emissions from wind turbines and provide a basis for regulatory and permitting requirements. The research will first analyze and characterize low-frequency sound and infrasound from data gathered at the University of Minnesota's research wind turbine site at UMore Park and at selected Minnesota winds turbine farms. This data will be used to recreate the audible sound and infrasound in the laboratory and measure the physical, emotional and psychological responses of human subjects. The study will expose participants to simulated turbine audible sound and infrasound and measure physical and emotional responses..
- **University of Minnesota**, Minneapolis (\$1,391,684): This project will leverage and build upon research findings from the recently completed Cycle 3 RDF project RD3-42. Research will extend the capabilities of this first generation modeling tool to include the ability to simulate aeroelastic loading of the blades and incorporate current industry standards and advanced turbine control methods and technologies. These capabilities will be demonstrated via comparisons with data from utility-scale wind turbines and farms. The resulting virtual wind modeling tool will thus be able to be used in practice to improve wind farm performance and reduce operational

costs. Support documentation on the modeling tool will be developed and will be transferred to public/private industry partners through a series of training workshops.

- **Xcel Energy**, Minneapolis (\$390,000): An information technology (IT) system will be developed and tested that will logically link community solar garden production and the associated economic benefits for subscribers back to the subscriber's energy use and billing statement. The system will resolve issues associated with non-automated verification of subscriber eligibility and will enable potential customer participation in several community solar gardens while ensuring that any and all subscriber and solar garden requirements and regulations are met. The system will be tested and verified across all the metering, tariff, and customer service variables to enable an accurate system interaction for solar garden operators and subscribers across a variety of customer classes. Building and testing an IT system with early pilot community gardens will lay the necessary foundation for Xcel Energy to support a solar garden model of energy generation on a larger scale.

Institutes of higher education Three Minnesota institutions of higher education received block grant awards totaling \$10 million to be used for renewable electric energy research initiatives.

- **Minnesota State Colleges and Universities** (\$5.5 million): MnSCU's Minnesota Energy Center (MnEC), established in the fall of 2012, will select, oversee, and implement the block grant program within the MnSCU system. Research proposals will be solicited from MnSCU's 31 institutions which include 24 two-year colleges and seven state universities. Based on the research interests of the colleges and universities, MnSCU has the potential to focus on a wide variety of renewable electrical energy technologies such as wind, solar, biomass and range from feasibility initiatives to generating algorithmic tools for diagnostics and prognostics of energy generation facilities. Proposals will be distributed through two funding cycles over three years with the intent of funding up to a maximum of 14 research projects.
- **University of Minnesota** (\$3 million): The University of Minnesota's block grant program will support a three-year research initiative. The program will be managed by the Institute on Environment (IonE). IonE will solicit detailed proposals from University of Minnesota faculty. Proposals will be evaluated by peer researchers outside the University of Minnesota and funds will be awarded on the basis of their recommendations.
- **University of St. Thomas** (\$1.5 million): The University of St. Thomas will install a sustainable 0.25 MW peak, multi-purpose micro grid at the WineHaven Visitors Center near Chisago City, Minnesota. The primary objective of the facility will be to promote the collaboration between private industry and the academic community in the design-build, testing and validation of near commercial concepts in the field of electricity generation and micro grid control. In the second and third year of the program, an RFP will be issued for industrial and academic collaborations using an Engineering Senior Design Clinic model. The Clinic has a record of success in the design-build and testing of major equipment for industry in the region, as well as assisting with several new business starts. An ancillary benefit of the program is that it will provide a platform for power systems engineering education for undergraduate and graduate students in the School of Engineering.