



MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

American Recovery & Reinvestment Act

State Energy Program

Final Report

DOE Award Number: DE-EE-0000131
Principal Investigator: Llona C. Weiss
Reporting Period: April 1, 2009 – December 31, 2012

MARCH 2013

Table of Contents

Executive Summary	i
Program Development and Management	1
Program Development.....	1
Program Management.....	2
Buildings	5
Energize Missouri Homes.....	5
Homeowner Upgrades and Geothermal.....	5
Neighborhood Challenge.....	6
Marketing and Outreach Tour.....	6
Building Standards Workshops.....	8
Schools and Local Governments.....	13
Schools Pilot (Independence School District).....	15
State Buildings.....	17
State Parks Facilities.....	19
Electric Power and Renewable Energy	21
Anaerobic Digestion and Landfill Methane.....	21
Renewable Energy Feasibility Studies.....	24
Algae Energy Roadmap.....	27
Geothermal Resource Assessment.....	28
Industry	30
Energize Missouri Industries.....	30
Industrial Energy Efficiency.....	30
Best-Price Energy Efficiency.....	30
Industry Pilot (Noranda & 3M).....	31
Water & Wastewater.....	38
Energize Missouri Agriculture.....	40
Small Cost-Share Grants.....	40
Field Day: Energy Training.....	42
Farm Energy Management.....	44
Policy, Planning and Energy Security	46
Stakeholder Process.....	46
Energy Efficiency Opportunities Analysis.....	48
Public Service Commission Energy Study Component.....	50
Utility Regulatory Consultants.....	52
Utility Regulatory (Division of Energy Staff).....	54
Appendix A. Lists of Subgrantees	A-1
Appendix B. Program Metrics	B-1

Executive Summary

In June 2009, the U.S. Department of Energy (DOE) awarded the Missouri Department of Natural Resources (department) \$57,393,000 in American Reinvestment & Recovery Act (ARRA) funding through the State Energy Program (SEP). The Recovery Act's goal was to stimulate the economy and to create and retain jobs. The department issued a competitive request for proposals (RFP) for the development of multiple initiatives targeting the agricultural, residential, and industrial sectors and completed multiple programs in-house. The department made this funding available through various grants, loans and rebates and projects were grouped into five market titles. The department initiated a request for proposals and contracted with Shaw Environmental & Infrastructure, Inc., (Shaw) to assist in program design and implementation of agricultural, residential, and industrial programs.

Buildings

Homeowner Upgrades and Geothermal Program (HUG)

The department provided rebates to owner-occupants of single-family homes to receive energy audits, implement whole-house energy saving measures identified in the audits and install geothermal systems. The department selected six organizations, called program aggregators, to serve as a local point of contact for homeowners in different regions of the state.

Neighborhood Challenge Program

The department selected two projects to receive Neighborhood Challenge grant awards: Home Energy Reports and In-home Energy Monitoring Devices. The first offering, Home Energy Reports, provided a test group of homeowners with a report regarding the energy usage of their home for a period of 12 consecutive months. The Home Energy Reports platform was to brew a competitive atmosphere among the various participants by comparing each participant's energy usage against that of their neighbors.

The second offering, an In-Home Energy Monitoring Device, was a program in which a test group of homeowners received devices that display home energy usage data in real time. The purpose of the program was to see if homeowners being aware of their household energy usage and the associated cost prompted changes in behavior that resulted in reduced energy usage.

Marketing and Outreach Tour

A special purpose bus with built-in energy efficiency displays assisted with marketing of the HUG program's rebate offering to enroll eligible participants. As the rebate program quickly demonstrated promise, the tour branched out from the HUG program and became a separate initiative.

Approximately 26 community events were visited throughout the state in the six week time period, which meant approximately two (2) to three (3) cities were visited per week. Tour stops were selected in both suburban and rural areas in order to ensure statewide coverage. Event sites included local farmers markets, festivals, fairs, national home improvement retailers (e.g., Home Depot and Lowe's), and home and garden shows. Event times and dates were selected to include weekday and weekends and daytime and evening time slots, to reach a larger audience. A total of 2,570 consumers interacted with the education and outreach efforts. As the tour progressed, the team consulted with representatives from each venue to ensure that the display was located in the highest traffic areas available at each event.

Building Standards Workshops

Shaw, working with the department, developed and offered a series of building energy standards workshops throughout Missouri. The target audience included local government officials, builders, architects, and other interested parties. The goal of the workshops was to provide participants with information and tools to make informed decisions about energy efficient building construction and code adoption.

A total of 15 workshops were offered in geographically-representative areas throughout the state. There were a total of seven (7) in-person workshops offered in four cities with the highest population in the state, and generated an attendance of 95 participants.

Revolving Loans - Schools and Local Government

The department provided more than \$14.5 million in low interest loans with a 2 percent interest rate for energy efficiency projects through the Schools and Local Governments program. Loan recipients benefited from increased occupant comfort in their buildings and reduced energy costs. The financing also freed up tax dollars that school districts, higher education facilities and local governments could use for essential services or other capital improvements.

Schools Pilot

This project allowed for the replacement of heating and cooling equipment in four facilities of the Independence School District with new, high efficient equipment which resulted in lower energy costs. As a result of school district realignment and consolidation, the Independence School District in the Kansas City area came into custody of some old facilities with very outdated heating systems. Following a technical review of the equipment by school officials and local contractors, it was determined that replacement of the equipment was more financially feasible than repair of the equipment. Using funds provided through this grant, the district installed new, high efficient equipment with expected energy savings of more than 25 percent.

State Buildings

Funds were provided to the Office of Administration – Facilities Management, Design & Construction (OA-FMDC) to implement energy efficiency projects at state buildings including correctional centers, a rehabilitation center and a state lab. Energy conservation measures included HVAC upgrades, boiler tie upgrades, pump replacements, building automation controls, valve upgrades, boiler replacements, occupancy sensors, temperature controls, exhaust fan controls, heat trace on hot water pipes, and piping insulation.

State Parks Facilities

The department provided funds to the Office of Administration (OA) to implement energy efficiency projects and educational exhibits about energy efficiency at Bennett Spring, Roaring River and Meramec State Parks. Energy efficiency measures at the three parks include solar heating water at shower houses, hybrid hot water tank upgrades, building insulation, LED lighting upgrades, T8 lighting upgrades, occupancy sensors, HVAC upgrades, temperature control improvements, window tinting, and efficient fireplace stove replacement. An energy audit was conducted at Babler State Park.

Electric Power and Renewable Energy

Anaerobic Digestion and Landfill Methane

The department offered grants for anaerobic digester or landfill gas-to-energy projects. These grant funds supported an agricultural anaerobic digestion-to-energy system and a landfill biogas-to-energy project.

Renewable Energy Feasibility Study

The department offered grants for renewable energy resource assessments and project feasibility studies by Missouri residents, businesses, corporations, not-for-profit organizations, universities and research institutions, and county or city governments.

Algae Energy Roadmap

The department contracted with Missouri Technology Corporation to conduct a study that developed a roadmap for algae research, development, demonstration and commercialization in Missouri. This study also assessed the potential benefits to the state economy of developing a healthy and robust algae industry and made a number of recommendations to maintain and strengthen Missouri's leadership in the algae biofuels area.

Geothermal Resource Assessment

Department of Natural Resources Division of Geology and Land Survey conducted a study that developed the Missouri ground water temperatures for six physiographic regions of Missouri. The maps and accompanying report show and enhance the understanding of ground source heat pump (GSHP) potential in the state.

Energy Education

Energy Education activities were completed as part of the Buildings and Industry market titles, and were reported under those titles. Under the Buildings market title, the Marketing and Outreach Tour and the Building Energy Standards Workshops were both highly successful education endeavors, reaching more than 2,500 individuals. Under the Industry market title, the Agricultural Field Day Energy Training Program delivered energy education and information to over 2,800 rural residents.

Industry

Industrial Energy Efficiency Program (IEEP)

This program provided industrial companies with grants to conduct energy audits and to implement energy efficiency projects. While incentives were given on a kWh saved per year basis, projects resulting in natural gas savings were also eligible to receive funding. To insure a broad based distribution of grants, small and large industries competed for separate funds, and had different limitations. In general, energy audits and lighting upgrades were the most popular type of projects receiving grant funding, but projects also included a number of other measures such as boiler and chiller retrofits.

Best Price Efficiency Program

The department provided grants to energy efficiency companies that competitively bid for energy efficiency incentives through a "reverse auction." The program was designed to reach industrial and commercial entities through a rapid deployment program at a market driven lowest cost for

energy efficiency savings. Pre-qualified providers bid on the available grant amounts by specifying the minimum amount of money that they would be willing to accept in order to provide energy efficiency services on a \$/kWh saved basis.

The providers that won the reverse auction had approximately two (2) years to identify industrial and commercial customers to implement energy efficiency projects to expend their allotment of incentive funds and fulfill their energy savings obligation to the department. This innovative program allowed the free market to drive the best price for energy efficiency incentives instead of the guess work typically involved with traditional energy efficiency program designs. Missouri viewed this as a new and exciting way to ensure our energy efficiency dollars were spent as cost-effectively as possible.

Industry Pilot Program

The Pilot Program provided funding for unique and innovative projects. While IEEP and Best Price programs replaced existing equipment with energy efficient equipment or funded audits to find energy savings opportunities, the Pilot Program funded manufacturing systems or processes. Two projects were funded under the Pilot Program. One of the projects funded a new feed system for an existing process which resulted in energy savings and production increases. The feed system was part of a Six Sigma effort by the subgrantee. The other project funded was the development of a new production line to produce a thin polymeric film for use in the production of photo voltaic solar collectors.

Revolving Loans – Water and Wastewater

This program provided low-interest loans for Missouri drinking water and wastewater facilities for energy efficiency projects. The department awarded financing with a 2.5 percent interest rate for eligible projects. The loan program provided funding for projects to update and improve facilities with new equipment that resulted in reduced energy costs.

Small Cost-Share Grants (Agriculture)

The department offered cost-share grants to agricultural operations for energy efficiency improvements and renewable energy equipment. Missouri farmers were awarded cost-share grants to purchase equipment such as solar powered livestock watering systems, solar powered fences, GPS and auto-steer systems for tractors and applicators, or irrigation system upgrades and improvements.

Field Day: Energy Training Program

The department funded an Energy Training program for organizations to provide energy-efficiency education and workshops to Missouri farmers. Over 50 sessions were held across the state with a total of more than 2,800 people attending. At each Field Day, farmers were provided information on how to identify opportunities for increasing energy efficiency, how to conduct an energy assessment, and how to calculate energy savings and simple payback.

Farm Energy Management

The department funded case studies to determine potential energy savings on individual farms, groups of farm types, and overall potential energy savings within the agricultural community. These case studies additionally supported contractual requirements to evaluate, measure, and verify the approaches and processes for the agriculture program.

Policy, Planning and Energy Security

Stakeholder Process

The department conducted an Energy Stakeholder Process to elicit discussion on complex energy issues, trends, opportunities and challenges for the State of Missouri. The purpose of the Energy Stakeholder Process was to build long-term strategy and capacity for the Division of Energy and to identify future energy needs of Missouri by identifying key implementable energy recommendations through a stakeholder process.

Participants in the Energy Stakeholder Process worked together with the department's project facilitator, The Cadmus Group, to identify and prioritize recommendations for where the Division of Energy should focus its efforts and expend its resources, post ARRA. The results of the stakeholder process will inform the division in strategic planning, budget planning and resource allocation decisions.

Energy Efficiency Opportunities Analysis

The department contracted with the American Council for an Energy Efficient Economy (ACEEE) to complete a Missouri study titled "Missouri's Energy Efficiency Potential: Opportunities for Economic Growth and Energy Sustainability." The report focused on the potential for energy efficiency in Missouri and ACEEE conducted analysis and recommended policy opportunities that would benefit Missouri for the period 2010 through 2020. The goal of the project was to identify energy policy recommendations that would be tailored to Missouri and quantify the benefits of those policies. The recommendations in the report will be used to inform future energy policy discussions as well as guide future focus areas for the department.

Public Service Commission Energy Study Component

The Missouri Department of Economic Development's Public Service Commission (PSC) sought the department as a partner in undertaking a Missouri Statewide Demand-Side Management Market Potential Study in 2010 to assess the types of demand side management (DSM) potential (technical, economic, achievable and naturally occurring potential) for Missouri. The department recognized the benefits of this study in supporting an analysis of policy opportunities for Missouri, as well as to inform the department's positions in regulatory cases before the PSC in support of utility investments in energy efficiency. The department and the PSC signed a Memorandum of Understanding (MOU) on June 14, 2010, to co-fund the study at approximately \$100,000 from each agency. The budget included \$100,000 in ARRA SEP funds from the department and \$98,530 from the PSC from other funding sources.

A final report was delivered to the PSC and the department on March 4, 2011, and subsequently revised on April 14, 2011. The study was used by ACEEE as one of its sources in completing the Missouri Energy Efficiency Policy Opportunities report, which the department also funded under ARRA SEP.

Utility Regulatory Consultants

The department contracted with GDS Associates (GDS) to provide consulting services in support of the department's participation in Integrated Resource Plan (IRP) cases and Missouri Energy Efficiency Investment Act (MEEIA) cases before the Missouri Public Service Commission (PSC). Additionally, GDS provided expert review of utility reports and planning documents.

Utility Regulatory (Division of Energy Staff)

Department staff worked extensively with the Missouri Public Service Commission and utilities,

intervening in regulatory cases to encourage public policy and utility investments in energy efficiency and renewable energy. These included numerous rate cases, rulemaking dockets and workshops, integrated resource planning cases and utility energy efficiency advisory groups. Staff participated in meetings, filed written comments and testimony, served as witnesses in evidentiary hearings, and worked collaboratively with parties to advance public policy goals. The department hired additional temporary staff to ramp up our capacity and involvement in regulatory proceedings, with special emphasis on the Missouri Energy Efficiency Investment Act (MEEIA) that was enacted in 2009, with an effective date of August 28, 2009.

Applicants for all programs were encouraged to leverage other funding sources to the greatest extent possible. Leveraged funds are those funds made available to the project from sources other than the grant or loan. Examples of leveraged funds successfully employed include applicant contributions, utility rebates or incentives, bonds, state funds, and other federal funds as applicable to the project.

Program Development and Management

Program Development

Development of the Missouri State Energy Program (SEP) to implement the American Reinvestment & Recovery Act (ARRA) grant to the department was a detailed and thorough process. Input and recommendations were solicited from a wide variety of sources including department staff, Governor’s Office, General Assembly, trade associations, other state government departments and agencies, senior management and individuals through the state Transform Missouri website.

A core group of senior department staff was then detailed to evaluate the recommendations and assemble them into a program framework. The criteria for evaluation included estimates of energy savings, jobs retained and created, scope, cost, location (the department wanted statewide distribution), and target population. The department also wanted to use off-the-shelf technology and implement the program in a short time.

The department also considered how the program would be implemented and managed. Could it be accomplished in-house? Would it require additional staff? Would it require contracting out part or the entire program?

Using all of these inputs, the core group then organized the proposals into the traditional SEP Market Titles and wrote briefing papers for senior management to outline possible programs. There were many iterations of program design before a final plan was approved. Even after program approval, based on changing conditions and feedback, programs were modified to best meet the needs of Missouri citizens. The following table lists the major program milestones.

Date	Milestones and Significant Events
2009 – Feb	ARRA legislation enacted
2009 – Mar	SEP-ARRA funding opportunity released
2009 – Mar	Missouri Department of Natural Resources Core Group created
2009 – Apr	Missouri awarded ARRA funding
2009 – Dec	<i>Shaw Environmental & Infrastructure awarded contract for Energize Missouri Homes, Energize Missouri Industries and Energize Missouri Agriculture</i>
2009 – Dec	Agriculture Cost–share program released
2010 – May	Energize Missouri Industries program released
2010 – Jun	Energize Missouri Homes program released
2010 – Sep	All SEP grant funds obligated
2011 – Mar	Water and Wastewater loan program released
2011 – Apr	Schools and Government loan program released
2012 – Dec	All Missouri ARRA SEP programs complete and payments made to sub recipients

Table 1- Program Milestones

Program Management

Most of the facets of program management were common across all the projects. These facets included: marketing and outreach; solicitation of funding recipients; review and selection of applications for funding based on a priority system; programmatic and financial management; data tracking and reporting; fiscal procedural and quality control monitoring; and delivery of workshops.

Marketing and Outreach

Marketing and outreach efforts used a multi-media approach, including printed material, radio, newspapers, magazine articles, and television interviews. An Energize Missouri page was set up on the department website to provide information regarding programs under the ARRA SEP grant. The department also used trade associations, schools and colleges, and other county, state and federal government agencies. Messages were targeted at specific sectors for each program. This targeted approach ensured participation of targeted subgrantees in numbers sufficient to obligate funds by specific deadlines.

For contractor managed programs, the department coordinated with the contractor on marketing and outreach efforts, outlining the strategies, milestones and timelines needed to engage the public and new contractors in the initiatives; developed brand standards and marketing guidelines; reviewed marketing materials for consistency; and coordinated around the state for participation in the energy programs and workshops.

Application and Selection

Implementation tasks included ensuring that grant funds were awarded to eligible entities via a competitive application process. The department used staff knowledge and expertise and consulted with contractor and industry experts to prepare program guidelines, program manuals, and subgrantee application forms to be sent to prospective applicants. Specific applications documents were prepared for each of the larger programs. The guidelines provided technical assistance to potential applicants on how the programs were to be implemented, as well as details on all aspects of the application, implementation and reporting process.

The department evaluated every timely submitted application via a multi-party review, which was based on both qualitative and quantitative criteria. Applications were evaluated (1) to determine whether the application submitted was completed in accordance with program guidelines, (2) to determine whether the proposed project met the project eligibility criteria specified in these program guidelines and (3) to determine whether, based on the information supplied by the applicant, the application demonstrated sufficient likelihood of actual project development and achievement of benefits. After the initial screening, applications were rated to determine which eligible projects best met evaluation criteria.

Monitoring

Monitoring projects was a key part of the overall program. Subgrantees were monitored to ensure compliance with all ARRA requirements. The monitoring procedures developed and used in Missouri were noted as a national ARRA Best Practice by DOE, and the Performance Monitoring Plan and Monitoring Checklist have been used as templates for programs in other states. The Performance Monitoring Plan was distributed nationally to all subgrantees as an example of an ideal monitoring system by DOE.

Specific statutory compliance requirements which were monitored included the following areas:

- **Davis-Bacon and related Acts (DBA):** The DBA requires weekly payment of locally prevailing wages (including fringe benefits) to laborers and mechanics on federal government contracts in excess of \$2,000 who are employed directly on the site of the work.
- **National Environmental Policy Act:** Missouri projects were required to consider the potential environmental impacts of proposed actions and comply with NEPA provisions.
- **Waste Management Plan:** Prior to the expenditure of federal funds to dispose of sanitary or hazardous waste, subgrantees were required to provide documentation to the department demonstrating that an adequate disposal plan had been prepared for sanitary or hazardous waste generated by the proposed activities
- **National Historic Preservation Act:** All Energize Missouri funding recipients were required to meet Federal Cultural Resource Review requirements under the National Historic Preservation Act (NHPA).
- **Reporting Requirements:** Subgrantees were required to submit monthly progress reports for the duration of their subgrant agreement.
- **Procurement Standards:** Subgrantees were permitted to use their own procurement procedures provided that procurement conformed to standards set forth in the “Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments.” (OMB circular A-122 and A-87)

In order to determine the frequency of monitoring for each subgrantee, ensure consistency, and outline compliance requirements for each subgrantee, a Performance Monitoring Plan was developed for specific programs. The Performance Monitoring Plan identified potential risks involved with undertaking each project, and highlighted project-specific monitoring requirements and risk determinations. For each subgrantee, a risk analysis matrix was developed to determine the likelihood that subgrantees would have compliance issues during the life of the grant.

Specific risk factors were identified for each project. These risk factors were then applied to the risk assessment matrix to assign a risk rating to subgrantees. The risk rating was then used to determine the frequency of monitoring on-site visits and desk reviews.

Monitors conducted on-site visits and desk reviews for subgrantees. Compliance issues were documented, and subgrantees were required to address issues and correct deficiencies. A desk review was a remote monitoring review of evidentiary documents including receipts, invoices, time sheets, photographs, monthly reports, and other relevant materials. Desk reviews were completed by a monitor who often incorporated a conference call with the project contact to answer questions and provide additional information. On-site visits were used to document that the intended scope of work was being carried out, and that all compliance requirements were being met.

The department was also subject to continuous monitoring. DOE, the Office of Inspector General (OIG), and Office of the State Auditor all conducted their own monitoring of the specific SEP Programs.

Monitoring Challenges and Successes

The broad scope of the monitoring requirements necessitated the hiring of several staff members dedicated to monitoring duties. As these were not permanent positions, turnover of personnel was high and continuous training was required.

The creation of the Performance Monitoring Plan with a Risk Assessment Matrix allowed for consistent and thorough monitoring. As subgrantees were monitored, outstanding issues were noted and resolved throughout the grant period.

Reporting Challenges and Successes

Due to the exacting and comprehensive nature of federal quarterly reporting, many subgrantees indicated that they felt overwhelmed when compiling their monthly reports. The many requirements of ARRA grants required that significant time and effort be dedicated to reporting at all levels, including subgrantees and their vendors. In order to streamline the process and create a standardized method for providing metrics, the primary contractor, Shaw, developed an electronic Subgrantee Reporting Tool (SRT), and required subgrantees to use the SRT.

This approach was successful in gathering the necessary metrics from the majority of subgrantees; however, some subgrantees initially had difficulties using the tool. There was also an initial reporting period during which the SRT was not yet finalized; during this time, subgrantees submitted an Intermittent Reporting form with the required metrics filled in. Once subgrantees learned how to enter metrics into the SRT, the reporting process became significantly more streamlined with metrics gathered by running reports tailored to supply the necessary information for each program.

Frequent changes in official guidance for reporting details also resulted in many extra hours of staff time to meet stringent reporting deadlines. Just as the State of Missouri and other recipients adjusted to the stringent requirements for reporting, DOE was making adjustments to its processes as well. The many requirements of the ARRA go beyond what many other federal grants have required in terms of accountability and transparency. The lessons learned by Missouri and other ARRA funding recipients may be instrumental in helping to streamline processes and requirements for future programs.

BUILDINGS

Energize Missouri Homes

1. Project Activities

The Energize Missouri Homes Program provided Missouri homeowners with the opportunity to reduce home energy use, which resulted in lower energy bills and improved awareness of their energy usage. The program included two areas: Homeowner Upgrades and Geothermal (HUG) and Neighborhood Challenge. In addition, the program included two unique outreach and education initiatives: Marketing and Outreach Tour and Energy Code Workshops.



Homeowner Upgrades and Geothermal

HUG provided rebates to Missouri homeowners for energy audits and whole-house energy saving measures identified through the audit. The program was implemented in defined regional territories by six subgrantees, also referred to as program aggregators. Program aggregators were selected and awarded subgrants through a competitive process.

To ensure consistency in implementing HUG throughout the state, the program administrator developed and conducted department approved training sessions for home energy auditors. In order to become qualified, auditors were required to attend the training session provided by the program administrator, complete an in-class assessment and submit a field assessment within 15 days of attending the training session. Only home energy auditors that were already certified under the Building Performance Institute (BPI), RESNET or Missouri's Certified Energy Auditor List were permitted to attend the training and become qualified. When performing an audit under HUG, qualified auditors were required to use REM/Design™ software to model home energy use and to provide homeowners with all the files and reports necessary to complete an application.

The program rebate structure placed emphasis on cost-effective measures that delivered significant energy savings. Cost-effectiveness was encouraged by tying the rebate directly to savings, setting maximum funding amounts and requiring a comprehensive energy audit, which educated homeowners on the best upgrades for the home. There were three tier options; homeowners could have qualified for a rebate between \$2,000 and \$17,000 for improvements, and up to \$500 toward the cost of an energy audit. Actual rebate payments were determined as a percent of total project costs under the maximum incentive amount available for each tier. Although the maximum rebate amount was reserved for each approved project, the rebate payment was often less than the total reserved amount. This allowed additional projects to be completed from a "wait list."

Neighborhood Challenge



The Neighborhood Challenge program was established as a behavioral change program. Intended to increase awareness of the economic, environmental, and social benefits of energy efficiency and sustainability, this program proved to be successful for the two (2) communities that participated.

The Neighborhood Challenge program was unique on a national scale. The objective was to encourage participating homeowners to voluntarily reduce their energy use by informing them how their energy usage compared to that of their neighbors. There were two program categories under the program, which included Home Energy

Reports and In-Home Energy Monitoring Devices. Each offering revolved around the idea that if homeowners were able to visualize their usage, they would reduce their energy usage.

The first offering, Home Energy Reports, provided a test group of homeowners with a report regarding the energy usage of their home for a period of 12 consecutive months. A control group of select homeowners, at least 20 percent of the size of the test group, would not receive energy reports. The test group had to consist of a minimum 15,000 homes.

The Home Energy Reports platform was to create a competitive atmosphere among the various participants by the report comparing each participant's energy usage against his neighbors. Neighbors were defined as other homes in the community with a similar home square footage, number of occupants and record of energy usage. The objective was that if one household was capable of decreasing energy usage, then every home would recognize an opportunity for improvement.

The second offering was an In-Home Energy Monitoring Device program in which a test group of homeowners received devices that displayed home energy usage data in real time. For comparison purposes, the program also required a minimum control group to be at least 20 percent of the size of the test group and for this program only required a test group of at least 300 homes. The purpose of the program was to see if awareness of household energy usage and the associated cost prompted changes in behavior that resulted in reduced energy usage. Participating households had a power monitor, and received a Quarterly Energy Usage Report. The reports compared the homes' energy costs for each quarter of 2011 to the corresponding quarter of 2010, as well as a comparison of the homes' usage compared to that of their neighbors. The results of the Home Energy Monitoring Device Program indicated that the households with power monitors consumed less energy than those without power monitors.

Marketing and Outreach Tour

The Marketing and Outreach Tour was a mobile initiative developed to educate Missourians about the benefits of residential energy efficiency, personal income tax deductions for home energy audits, and the installation of home energy efficiency measures. A special purpose bus with built-in energy efficiency displays assisted with marketing of the HUG program's rebate offering to enroll



eligible participants. As the rebate program quickly demonstrated promise, the tour branched out from the HUG program and became a separate initiative.

A successful strategy implemented during the program was to contact the municipalities along the tour route to notify them of the local events that would be attended by the tour vehicle. A targeted email campaign was generated by the contractor and its subcontractors and dispersed to the municipalities.

Approximately 500,000 views were generated in the local media via online and television

sources. Local news stations and online news websites announced the upcoming tour dates with a targeted message about the tour offerings to homeowners. Staff posted tips to relevant “Foursquare” (a social networking site) pages to drive traffic to each tour stop. Staff posted to approximately 20 “Foursquare” pages at or near tour stop locations to drive traffic to the tour vehicle.

The tour was conducted over a six week period from September 2011 to October 2011. Approximately 26 community events were visited throughout the state in the six week time period, which meant approximately two (2) to three (3) cities were visited per week. Tour stops were selected in both suburban and rural areas in order to ensure statewide coverage. Event sites included local farmers markets, festivals, fairs, national home improvement retailers (e.g., Home Depot and Lowe’s), and home and garden shows. Event times and dates were selected to include weekday and weekends, daytime and evening time slots to reach a larger audience. A total of 2,570 consumers interacted with the education and outreach efforts. As the tour progressed, the team consulted with representatives from each venue to ensure that the display was located in the highest traffic areas available at each event.

The vehicle display allowed consumers to inspect features of construction-phase elements in a home. The exposed walls showed different types of insulation for consumers to observe varying R-values of fiberglass insulation. Informative placards were displayed throughout the interior of the space with information about energy use and energy savings. The room was also outfitted with a programmable thermostat, expanding foam window sealant, and an electric water heater timer. A ceiling display featured three types of light bulbs: incandescent, LED and CFL bulbs. In addition to the ceiling display, a panel of exposed bulbs was available for consumers to evaluate the lighting from each.

Other interactive tools included a thermal imaging “point and shoot” camera that allowed participants to take images of common household features. The images were transferred to an on-board television monitor where consumers could visually identify information about heat energy loss. A second monitor featured the short video “Did You Know” detailing home energy tips and facts. The video was featured online at the department website. Children visiting the display could also participate in the interactive online game “Energy Hog” to test their knowledge.

Tour staff included a tour manager whose main responsibility was the overall program execution and an energy efficiency expert who was an energy auditor. The energy expert served as an onsite

resource for consumer questions, demonstrations, engaging consumers, and communicating program information.

Building Standards Workshops

Shaw developed and offered a series of building energy standards workshops throughout Missouri. The target audience included local government officials, builders, architects, and other interested parties. The goal of the workshops was to provide participants with information and tools to make informed decisions about energy efficient building construction and code adoption.

A total of 15 workshops were offered in geographically-representative areas throughout the state. There were a total of seven (7) in-person workshops offered in four cities with the highest population in the state, and generated an attendance of 95 participants.

A total of eight (8) webinars were performed via online narrated PowerPoint presentations. A goal of the webinar offering was to have them dispersed around the same time as the in-person trainings. The online webinar trainings generated an attendance of 103 participants.

2. Implementing Partners (HUG)

Five key stakeholder groups provided services under HUG: the program administrator, program aggregators, EMH-qualified auditors, homeowners and contractors. Key stakeholders are described as follows:

Program Administrator

The program administrator includes staff from both the department and the contractor, Shaw Environmental & Infrastructure, Inc. The program administrator oversaw HUG program implementation throughout the life of the program.

Program Aggregators

The six program aggregators selected to implement HUG were responsible for program implementation activities and served as a local point of contact for participating homeowners. The program aggregators were responsible for determining homeowner and project eligibility, compliance with NEPA and NHPA. A list of the program aggregators is included in Appendix A.

Qualified Auditors

Energy audits conducted under HUG were performed by designated qualified home energy auditors. Auditors conducted energy audits to establish baseline energy use and identify cost-effective improvements to maximize home efficiency. Auditors also helped homeowners to complete and submit required paperwork.

Homeowners

Eligible program participants were residents of Missouri and owner-occupants of an eligible residential building. Homeowners were required to complete and submit a Homeowner Information Kit to the program aggregator corresponding with the county of residence.

Contractors

Missouri contractors or those who offered services related to home efficiency in the State of Missouri, assisted homeowners in completing desired energy efficiency upgrades. All contractors were required to have the necessary licenses, permits and insurance required at the local, state or federal level to perform recommended upgrades.

3. Implementing Partners (Neighborhood Challenge)

The City of Milan

This program was implemented in the City of Milan by the city municipality. The program undertook the In-Home Energy Monitoring Device program for 300 of their approximate 700 residences.

White River Valley Electric Cooperative

The subgrantee delivered bi-monthly energy reports to a test group of an estimated 20,000 residential consumers over a period of 12 months. During that period the consumers in the test group could also access their energy report(s) monthly via eDelivery or through the Web Portal.

4. Goals and Objectives Comparison

The HUG program was intended to assist approximately 1,200 Missouri homeowners with funding for energy audits and energy efficiency upgrades. Heavy participation in the geothermal option decreased the total number of participants and increased the total number of geothermal projects installed. In total, approximately 50 percent of approved projects included geothermal installation. This was higher than anticipated and affected the total who could participate due to the higher cost of the projects.

For the Neighborhood Challenge Program, participants within the City of Milan and White River Valley Electric Cooperative test group communities showed decreased energy usage during the programs. For the program period, White River Valley Electric Cooperative saved a total of 1,359,000 kWh. The subgrantee reported that the program was a success and had a positive impact on their community. Goals for the project were met.

The Neighborhood Challenge Program harvested more benefits for the environment than just kWh savings. There were 1025.27 MTCO_{2e} greenhouse gas emissions avoided, equivalent to 1,085 tons of carbon dioxide saved. On average, each household contributed to a reduction of 107 pounds of carbon dioxide. The energy savings equated to enough energy to power 85.2 homes, reduce landfill waste by 343 tons, and the reduced emissions is equal to taking 193 passenger vehicles off the road.

The main objective of the Building Codes workshop series was to enhance the number of communities that adopt current International Energy Conservation Codes. Additional objectives were to build statewide awareness about building energy codes, to create a local network for energy work, and to illustrate statewide involvement could lead to \$318 billion cost savings by 2030 if building energy codes were to be implemented state-wide.

Further, there were economic benefits contributed by all the programs in this market title. They stimulated the job market by creating and retaining 3.3 jobs to implement the Neighborhood Challenge program. At the same time, while not required, participants leveraged their own capital. Without the grant award it would have been impossible for the small municipality and cooperative to successfully acquire the capital to implement such a project.

5. Project Modifications

Neighborhood challenge – White River: Midway through the project the subgrantee was projected to complete the scope of work under budget. Therefore, they undertook program enhancements including testimonials and Interactive Voice Response (IVR) calls. The testimonials from participating homeowners were included in reports. Testimonial tips make behavioral changes easier to adopt by removing uncertainty and showing similarity. The IVR calls and text messages were sent out to participating homeowners to recommend efficiency tips. Messaging occurred during times of peak energy usage.

6. Notable Project Successes and Achievements

Under the HUG program, the program aggregators showed competency in being able to implement the program. The auditor training sessions were designed to fully equip the participating auditors to assist the homeowner throughout the program. Homeowners were also eager to participate. The active involvement by homeowners in the state was assisted by the marketing and outreach efforts. In addition to formal marketing efforts such as print materials and media, word of mouth also proved to be a highly effective marketing mechanism and was critical to the program's success. The program required initial investment from homeowners; therefore, there was additional incentive to make sure all the requirements were met.

In total, 1,500 homes were audited under HUG and although only 58 percent, or 875 applications for projects, were approved due to funding availability. All homeowners were provided with a detailed list of recommended improvements for their home. Projects completed under this 14 month program will save more than 16,500,000 kWh annually. These savings are equivalent to taking 2,252 passenger vehicles off the road for one (1) year.

The Marketing and Outreach tour resulted in 2,570 consumers interacting with staff and touring the unique display. Homeowners were given immediate takeaways that they could implement at home. There was good statewide coverage so many communities had the opportunity to participate and to learn more about energy efficiency.

7. Results, Major Findings and/or Conclusions

One challenge encountered through the course of the HUG program was the length of the NEPA review process conducted by DOE. Homeowners installing geothermal systems that were more than 5.5 tons were subject to a NEPA review that could last several months, and in some cases, over a year. Due to the extremely long review period required by DOE, a lesson for future programs might be to exclude altogether geothermal systems larger than 5.5 tons, and to emphasize to participants and auditors that only systems meeting the requirements for a categorical exclusion from NEPA will be accepted.

Another lesson learned was the extent of participation by vendors of geothermal systems. Some vendors were already conducting extensive marketing campaigns for geothermal systems in rural areas. The interest in energy efficient heating and air conditioning units generated by these companies may have played a large role in the high participation rate for the program. For future residential programs, including vendors and trade allies in program design may be beneficial.

FINANCIAL SUMMARY			
Aggregator	Homeowner Rebates	Rebates Paid (\$)	Leveraged Funds
Boonslick RPC	56	\$ 540,241.00	\$ 603,753.80
Kaysinger Basic RPC	172	\$ 1,485,285.00	\$ 1,380,417.96
Meramec RPC	77	\$ 756,747.00	\$ 823,145.88
Metropolitan Energy Center	237	\$ 1,970,916.00	\$ 1,729,866.47
Missouri Botanical Garden	186	\$ 1,591,203.00	\$ 1,543,865.95
White River Valley Electric Cooperative	147	\$ 1,168,445.00	\$ 962,025.50
Total	875	\$ 7,512,837.00	\$ 7,043,075.56

Table 2 - HUG Financial Summary

PROGRAM METRICS						
Aggregator	Audits Conducted	Audited Sq. Ft.	Retrofitted Sq. Ft.	Annual Energy Savings (kWh)	GHG Emission Reduction (MTCO2e)	Jobs Created/Retained (FTE)
Boonslick Regional Planning Commission	93	316,148.00	174,944.00	800,117.00	668.00	1.43
Kaysinger Basin Regional Planning Commission	217	564,850.00	466,502.00	2,918,523.00	2,436.00	3.97
Meramec Regional Planning Commission	115	351,477.00	230,621.00	1,291,413.00	1,078.00	0.91
Metropolitan Energy Center	522	1,361,491.00	628,275.00	5,101,764.00	4,258.00	6.39
Missouri Botanical Garden	375	1,205,705.00	588,406.00	4,000,000.00	3,338.00	5.47
White River Valley Electric Cooperative	172	515,973.00	434,712.00	2,546,600.00	2,125.00	3.19
Total	1,494	4,315,644.00	2,523,460.00	16,658,417.00	13,903.00	21.36

Table 3 - HUG Program Metrics

For the Neighborhood Challenge Program, participants within the City of Milan and White River Valley Electric Cooperative test group communities showed decreased energy usage during the programs. The results of the Milan Energy Awareness Program indicated that the households with power monitors consumed less energy than those without power monitors. Participants commented to the City of Milan that they were satisfied and better-informed about their energy usage. Additionally, those within the City of Milan test group who were given energy monitors showed an interest in keeping them to maintain their downward energy usage trend.

It should be noted that in addition to significant savings, the household residents learned valuable information about ways to increase energy savings in the future. Between the two (2) successful participants, the City of Milan used all budget allotted to them and met program goals. The White River Electric Cooperative met program goals, and finished under budget. The remaining funds were reallocated to other projects.

Regarding the Marketing and Outreach Tour, consumers at the events were impressed with the “House of Pressure” as a strong visual of the inner-workings of a home. Specifically, it helped people understand the importance of monitoring carbon monoxide, as the model illustrated how it circulates through a home. Kids and families loved the digital camera. Whether they were taking

pictures of energy efficiency features and reading about them on the television monitor or taking pictures of themselves, it provided increased interest and activity. Adults found the heat from the light bulbs to be very interesting and enlightening. Few participants were previously aware that the surface of a light bulb can reach 140 degrees. Also, when various light bulbs were tested on the display it was noticeable that there was an audible difference when incandescent bulbs were powered. Specifically, the generator ramp up could be heard louder than when the other light bulbs were tested.

For the Building Codes workshops, the contractor developed a comprehensive database detailing building energy code adoption throughout the State of Missouri. The database was utilized by the department to identify which communities have adopted building energy standards, the code enforcement capacity of the communities, and the technical assistance desired by them. A total of 1,413 individual cities and counties were polled to develop these statistics.

In order to help develop the database and gauge current code practices and knowledge, participants of the workshop completed a survey at the conclusion of each workshop regarding their building department processes. A summary of the survey results are as follows:

- Participants indicated that both commercial and residential energy codes were applicable within their jurisdictions.
- 23% had adopted the 2009 International Residential Code for residential, and as a result they modified their residential plan review process to incorporate the new standards;
- 15% had adopted the 2009 International Building Code for commercial, and as a result most had modified their commercial plan review process to incorporate the new code;

8. Post ARRA Project Status

The residential programs were one-time programs; however, since most projects were energy efficiency retro-fits, energy savings will be realized on an ongoing basis. State certification of Home Energy Auditors will continue. The department will continue to promote the adoption of building energy codes and will also pursue the adoption of a Missouri Home Energy Certification system.

Schools and Local Governments

1. Project Activities

The department made \$14,345,042 in ARRA funds available to the Schools & Local Governments (SLG) energy efficiency competitive revolving loan program. The loan program provided low-interest loans to what is referred to as the MUSH market: municipals/city governments, universities/colleges, K-12 schools and hospitals.

Eligible projects included energy efficiency retrofits, replacements and upgrades at K-12 public schools, public higher education institutions and local governments. Energy efficiency components associated with new construction were eligible contingent upon compliance with ARRA terms & conditions, including provisions of the NEPA and Section 106 of the National Historic Preservation Act (NHPA).

The loan program provided access to two (2) percent annual interest rate loans to implement energy efficiency retrofits, replacements, and upgrades that have up to 10 years simple payback. The amount of the loan could range from \$30,000 to \$2,500,000 per applicant. The initial loan award was made to 19 loan recipients. One hundred percent of each loan award was disbursed to the loan recipients in one installment.

The department worked diligently with sub-recipients to ensure compliance with ARRA terms & conditions, including provisions of Buy American Act, Davis-Bacon Act, NEPA and Section 106 of NHPA. Monthly reports were required to be submitted by loan recipients to report payments made, equipment purchased, progress, jobs created, and interest earned.

2. Implementing Partners

The department contracted with the Shaw Group to create documents for loan program guidelines, loan application forms and a loan program manual. The division loan manager administered the loan program internally.

3. Goals and Objectives Comparison

The purpose of the SLG energy loan program was to provide Missouri K-12 public schools, public higher education institutions and local governments the opportunity to implement and install energy efficient equipment and measures to realize measurable energy savings, which will result in reduced energy costs.

The specific goals of the SLG energy loan program included reducing total energy use, decreasing fossil fuel emissions, creating and retaining jobs, spurring economic growth, increasing the rate of adoption of energy efficient practices and improving the energy efficiency of Missouri's K-12 public schools, public higher education institutions and local governments. These goals and objectives were all met.

4. Project Modification(s)

The department originally anticipated up to \$10,000,000 of ARRA SEP funds to be awarded as loans under the program guidelines for the loan program. After other programs under ARRA SEP funds were finalized, additional funding was made available to the loan program from deobligation of the ARRA SEP funds. The final adjusted loan amount was \$14,345,042.

5. Notable Project Successes and Achievements

Loan Applicant	County	Loan Award	Estimated Savings	Scope of Work
Butler, City of	Bates	\$165,613.00	\$20,000.00	Lighting and envelope upgrades
Carroll County	Carroll	\$33,350.00	\$3,675.00	Lighting and boiler upgrades
Cedar County	Cedar	\$38,100.00	\$4,200.00	New boiler and roof insulation
Cole Co. R-I School District	Cole	\$448,000.00	\$55,244.00	Lighting
Cole Co. R-V School District	Cole	\$46,200.00	\$5,090.00	Lighting and sensors
Community Memorial Hospital District	St. Clair	\$314,425.00	\$50,267.00	HVAC and lighting upgrades
Harrisonville, City of	Cass	\$171,931.00	\$18,931.00	Lighting upgrades.
Hume R-VIII School District	Bates	\$102,470.00	\$9,243.00	Lighting upgrades and programmable t-stats, HVAC, dishwasher
Lee's Summit R-7 School District	Jackson	\$2,499,700.00	\$288,318.00	Building automation system
Lincoln University	Cole	\$1,863,000.00	\$205,120.00	HVAC and lighting
Missouri State University	Greene	\$958,000.00	\$136,843.00	HVAC upgrades and controls.
Mo Univ. of S & T	Phelps	\$2,480,549.00	\$373,495.00	HVAC and sensors
Northeast Vernon County R-I	Vernon	\$171,580.00	\$18,891.00	Lighting, thermostats, envelope upgrades
Rich Hill R-IV	Bates	\$107,800.00	\$11,871.00	HVAC upgrades, return air, lighting upgrades
Rock Port R-II School District	Atchison	\$391,591.00	\$41,115.00	Lighting upgrades, dishwasher, HVAC, cooler, web-based temp controls, stadium lighting
Rockhurst University	Jackson	\$1,126,000.00	\$123,981.00	Lighting, HVAC and envelope upgrades
Sikeston R-6 School District	New Madrid	\$1,351,100.00	\$148,806.00	Lighting upgrades and HVAC upgrades
State Fair Community College	Pettis	\$1,035,950.00	\$115,337.00	Lighting upgrades and HVAC controls/sensors.
University of Missouri-Kansas City	Jackson	\$1,039,683.00	\$151,912.00	Boiler turbulators, HVAC controls/sensors, chiller upgrade.
Total		\$14,345,042.00	\$1,782,339.00	

Table 4- Loan awards for Schools and Local Governments loan program

6. Results, Major Findings and/or Conclusions

The Schools & Local Governments Loan Program was a success with a total energy savings of \$1,782,339 annually. The loan funds were awarded to two city governments, two municipalities, eight school districts, one hospital and six universities/colleges.

7. Post ARRA Project Status

The loan program will continue past the ARRA. All 19 loan projects are currently active and have an anticipated deadline for construction of August 2013. As the loans are repaid, the ARRA funding of \$14,345,042 will be offered in future loan cycles. The program will be sustained for future eligible projects.

Schools Pilot (Independence School District)

1. Project Activities

This pilot project was managed in-house. The project allowed for the replacement of heating and cooling equipment in four facilities of the Independence School District with new, high efficient equipment, which resulted in lower energy costs. As a result of school district realignment and consolidation, the Independence School District in the Kansas City area came into custody of some old facilities with very outdated heating systems.

Following a technical review of the equipment by school officials and local contractors, it was determined that replacement of the equipment was more financially feasible than repair of the equipment.

Using funds provided through this grant, the district installed new, high efficient equipment with a projected energy savings of more than 25 percent compared to the existing equipment that was more than 10 years old.



2. Goals and Objectives of the Project

The goals and objectives of the school pilot program were to provide funding, implement strategies to increase the energy efficiency of the school facilities, and serve as a model for other school districts seeking to maximize the use of their resources. The district set an energy savings goal of 25 percent compared to the anticipated cost of operating the old system.

3. Implementing Partners

The implementing partner for this project was Independence #30 School District, Independence, MO.

4. Goals and Objectives Comparison

The goals and objectives of this project were fully met. By removing and replacing old, inefficient boilers that were 40 percent efficient with new, 80 percent efficient boilers, and installing two 200-ton high-efficiency chillers, the energy savings will far exceed the 25 percent goal. Compared to the old equipment, the energy savings will be the equivalent of more than 1,100,000 kWh per year. In addition, the new system will improve the comfort and safety level in the facilities. The school district provided \$1,500,000 in matching funds.

5. Notable Project Successes and Achievements

The project achieved significant energy savings for the school district and serves as a model for other districts.

6. Results, Major Findings and/or Conclusions

The project was completed on time with no deviations from the program plan. Data from the pilot can provide guidance for future energy upgrades within other Missouri schools.

7. Post ARRA Project Status

The replacement heating and cooling equipment will have a service life of many years post-ARRA; however, the project is a one-time project and is completed.

State Buildings

1. Project Activities

The department granted \$4,334,862.33 in ARRA funds to Office of Administration – Facilities Management, Design & Construction (OA-FMDC) to implement energy efficiency projects at state buildings including correctional centers, a rehabilitation center and the State of Missouri Environmental Laboratory (as referred to on the Department of Environmental Quality Environmental Services Program website). Energy conservation measures included HVAC upgrades, boiler tie upgrades, pump replacements, building automation controls, valve upgrades, boiler replacements, occupancy sensors, temperature controls, exhaust fan controls, heat trace on hot water pipes, and piping insulation. The department ensured that the projects met the ARRA terms and conditions through weekly conference calls, monthly/quarterly reports, monitoring visits, and project closeout procedures.

2. Implementing Partners

The department entered into an agreement with Office of Administration (OA) to implement energy efficiency projects. OA-FMDC bid state building projects to engineering firms, Energy Service Companies (ESCO), and construction firms.

	Final Project Cost	Energy Audit & Engineering Design	Construction
Crossroads/Western Missouri Correctional Center	\$1,459,108.70	Virocon	Stanger Industries
Eastern Reception & Diagnostic Correctional Center	\$13,362.65	Ameresco	Ameresco
Jefferson City Correctional Center	\$278,113.60	Ameresco	Ameresco
Northeast Correctional Center	\$397,942.24	Ameresco	Ameresco
South Central Correctional Center	\$209,455.76	MFEC	MMI
Southeast Correctional Center	\$280,783.00	Ameresco	Ameresco
Women's Eastern Reception & Diagnostic Correctional Center	\$129,798.51	Ameresco	Ameresco
Fulton Reception Diagnostic Center	\$86,732.00	CTS	CTS
St Louis Psychiatric and Rehabilitation Center	\$513,268.00	CTS	CTS
Environmental Laboratory	\$966,297.87	Ameresco	Ameresco

Table 5 - Final cost and firms implementing the energy efficiency projects for State Buildings

3. Goals and Objectives Comparison

The purpose of the energy efficiency projects at state building facilities was to reduce energy consumption with a 15 years simple payback and replace outdated equipment. In addition, the goal was to contribute to Missouri Governor Jeremiah (Jay) Nixon's Executive Order 09-18 goal to reduce energy consumption in state buildings by two percent per year for each of the next ten years using the 2009 baseline.

Energy efficiency projects at all state buildings using ARRA funding exceeded the goal of achieving energy savings reductions and energy savings of two percent in 2012. Through all energy conservation measures, the overall program simple payback is 8.5 years.

4. Project Modification(s)

Original ARRA SEP funding for the state building energy efficiency program was \$2,300,000. As a result of energy audits being conducted, OA, ESCOs and engineering firms discovered further energy savings opportunities. The final amended funding for this program was at \$4,334,862.33 for all energy efficiency measures at state building facilities.

5. Notable Project Successes and Achievements

Facilities	Total Energy Savings in kWh	Cost Savings (Annual)	Jobs Created (FTEs)	Annual GHG Emission Reduction (MTCO2 Equivalent)
Crossroads/Western Missouri Correctional Center	3,319,064	\$77,665.00	11.43	566
Environmental Laboratory	1,644,073	\$88,006.00	3.4	920
South Central Correctional Center	1,407,687	\$94,182.00	0.14	364
St. Louis Psychiatric and Rehabilitation Center	1,791,769	\$70,403.00	2.21	560
Fulton Reception Diagnostic Center	210,971	\$9,459.00	0.1	77
Eastern Reception & Diagnostic Correctional Center	436,530	\$14,908.00	0.53	154
Jefferson City Correctional Center	2,152,292	\$48,323.00	2.75	454
Northeast Correctional Center	2,546,531	\$44,397.00	0.7	435
Southeast Correctional Center	1,497,561	\$39,078.00	1.4	374
Women's Eastern Reception & Diagnostic Correctional Center	845,042	\$26,129.00	0.3	153
Total	15,851,520	\$512,550.00	22.96	4,057

Table 6 –Project Successes and Achievements for State Buildings projects



6. Results, Major Findings and/or Conclusions

The State Building energy efficiency program under ARRA SEP funding was a success. The program created 22.96 FTEs. The total energy reduction was 15,851,520 kWh equivalent or \$512,550 annually. The program was projected to reduce CO₂ emissions into the atmosphere by 4,057 Metric Tons. This is the equivalent of removing 767 passenger vehicles from the road each year. In addition to the energy savings at the Environmental Laboratory, the new HVAC system provides better comfort level to occupants. Humidity and noise issues were also resolved.

State Park Facilities



1. Project Activities

The department provided \$1,000,000 in ARRA funds to the Office of Administration (OA) to implement energy efficiency projects and educational exhibits about energy efficiency at Bennett Spring, Roaring River and Meramec state parks. Energy efficiency measures at three parks included solar heating water at shower houses, hybrid hot water tank upgrades, building insulation, LED lighting upgrades, T8 lighting upgrades, occupancy sensors, HVAC upgrades, temperature control improvements, window tinting, and efficient fireplace stove replacement. An energy

audit was conducted at Babler State Park, but due to a flood, the energy efficiency implementation was not carried out. The department worked diligently with OA and Division of State Parks (DSP) to ensure that the projects met the ARRA terms and conditions through pre-construction meetings, monthly/quarterly reports, monitoring visits, and project closeout procedures.

2. Implementing Partners

The department entered into an agreement with DSP to implement the energy efficiency projects. The Office of Administration - Facilities Management, Design & Construction (OA-FMDC) provided construction services for the energy efficiency projects at state parks. OA-FMDC bid the projects to engineering and construction firms. Vestal Corporation conducted an energy audit and engineering design for the Meramec State Park Project. Gaskin Hill Norcross conducted energy audits and engineering design for Bennett Spring and Roaring River state parks. Kellogg, Brown and Root Company provided construction services to all three state parks.

Vision Works design services designed the posters and brochure for inclusion of an educational element. Impact displays and graphics supplied 36" x 84" banners about energy efficiency.

3. Goals and Objectives Comparison

The purpose of the state park energy efficiency projects was to reduce energy consumption at state parks. In addition, the projects assisted the state to accomplish the Missouri Governor Jeremiah (Jay) Nixon's Executive Order 09-18 goal to reduce energy consumption in state facilities by two percent per year for each of the next 10 years using a 2009 baseline. The energy efficiency projects are also used as a demonstration tool for park visitors to promote energy efficiency. Exhibits and brochures were produced and distributed to promote energy efficiency at the three state parks.

Energy efficiency upgrades and educational elements at Meramec, Bennett Spring and Roaring River state parks were completed and met the goals of reducing energy consumption and educating Missouri citizens on energy efficiency, and will exceed energy savings of two percent in 2012. Babler State Park is in a flood plain, and due to unforeseen circumstances related to flooding, only the energy audit was completed.

4. Project Modification(s)

The original grant provided was \$1,000,000 for state parks facilities. The final spending amount for state park projects was under budget. The actual spending for energy efficiency projects, energy audits and educational elements was \$979,974.99.

5. Notable Project Successes and Achievements

Facilities	Total Energy Savings in kWh (kWh equivalent)	Cost Savings (Annually)	Jobs Created (FTEs)	Annual GHG Emission Reduction (MTCO2 Equivalent)
Meramec State Park	98,457	\$6,853.00	2.70	45
Roaring River State Park	140,015	\$8,913.50	1.43	85
Bennett Spring State Park	403,776	\$14,350.93	1.50	146
Big Lake State Park (Audit only)	52,986	\$10,875.00	0.18	15
Total	695,234	\$40,992.43	5.81	291

Table 7 - Project Successes and Achievements for State Parks Projects

Jobs Created	0.06
Total estimated school field trips to Meramec, Roaring River and Bennett Spring State Parks annually	270
Total estimated students attending annually	4550

Table 8- Metrics for Educational Element for State Parks Energy Efficiency Projects

6. Results, Major Findings and/or Conclusions

The energy efficiency and the educational components for state parks were a success. Under the state parks program, the ARRA SEP funding created 5.87 jobs. The total energy reduction was 642,248 kWh equivalents or \$30,117.43 annually for projects at Meramec, Roaring River and Bennett Spring state parks. The energy audit at Big Lake State Park can potentially produce savings of 52,986 kWh equivalent or \$10,875 annually. State parks will also meet the goal of teaching more than 4,550 students about energy efficiency projects installed at each of the three state parks locations.

ELECTRIC POWER AND RENEWABLE ENERGY

Anaerobic Digestion and Landfill Methane

1. Project Activities



This program was created to support agricultural and industrial projects that use anaerobic digestion-to-energy and landfill biogas-to-energy systems to produce biopower, bioheat or other forms of bioenergy in the State of Missouri. A total of \$2,250,000 was initially allocated for this program to support up to five biogas or landfill gas to energy projects. The maximum grant amount for individual projects was up to \$450,000 or 25 percent of total project costs, whichever was less.

This program was managed in-house without subcontractors' assistance. Major program management activities included Request for Proposals (RFP), proposals review, grant awarding, providing required information and facilitating NEPA review, monitoring progress of environmental permits, technical assistance, onsite and desk monitoring, reporting, completion verification and document and invoice review and

processing.

2. Implementing Partners

This program was administrated in house and had no sub-recipients. However, the close collaboration between federal, state and local governments, universities and private companies contributed - was essential to - the success of this program. For instance, the U.S. Environmental Protection Agency's AgSTAR and Landfill Methane Outreach Program (LMOP) provided tremendous assistance in reviewing proposals. Department staff also worked closely with environmental permitting agencies and University of Missouri-Columbia Extension to overcome regulatory barriers and solve technical difficulties in a timely manner.

3. Goals and Objectives Comparison

Manure management and odor reduction for Concentrated Animal Feeding Operations (CAFOs) have been impending issues in recent years. A number of CAFOs expressed interest in developing digester projects. However, due to the lack of financial assistance and high technical and economic risks, there was only one farm digester for heating project in Missouri prior to this program. One purpose of this program was to achieve both energy and environmental benefits by providing funding assistance for biogas projects. With this program and Section 1603 grant funding, one or more successful showcase farm digester projects would serve as role models for other CAFOs in the state.

Missouri's Renewable Energy Standard (RES) requires investor-owned utilities (IOUs) to procure a certain amount of electricity from renewable energy resources and landfill gas is an eligible

resource. Before this program, no IOUs either owned or operated any landfill gas to electricity facilities, though a number of good candidate landfill sites were available in the utilities' individual service territories. A goal of the project was to encourage utilities to take advantage of this opportunity by allowing IOUs to be eligible for the grant.

Five projects were initially selected for biogas grant awards in August, 2010. Two projects, including Hampton Feedlot farm digesters with cattle manure to electricity (300 kW) and St. Joseph landfill gas to electricity project (1.6 MW), were completed under this program. Ameren Missouri applied for and was offered funding, but even though the grant was declined, the 14.5 MW landfill gas to electricity project proceeded without grant assistance and became operational in 2012. Two other projects, including Johnson County egg farm digesters project and Maple Hill landfill gas to electricity project, even though terminated in early 2011 due to their inability to meet the program deadline, were revived in 2012 and are under development without grant funding.

Considering the limited timeframe and many uncertainties of large-scale renewable energy construction projects, the program is considered to have achieved the established goals. Two major IOUs (KCP&L Greater Missouri Operations and Ameren Missouri) own and operate landfill gas to electricity facilities and use them to meet Missouri's RES requirement. Hampton's successful story attracted press coverage and has been presented at conferences, shared with other farm owners, and may result in similar projects.

4. Project Modification(s)

There were no modifications during the implementation of this program. As one of the first digester projects on cattle feedlot farms in the nation, Hampton Feedlot encountered technical challenges during the commissioning of digesters and a few amendments were filed to extend the project deadline from February 28, 2012, to August 31, 2012, without other changes.

5. Notable Project Successes and Achievements

KCP&L Greater Missouri Operations Company (KCP&L GMO) held a ribbon cutting ceremony on March 8, 2012, and Missouri Governor Jeremiah W. (Jay) Nixon delivered remarks at the event. As the first farm digester biogas to electricity project in Missouri, Hampton Feedlot has attracted national attention. Two well-known publications in the bioenergy industry, *Biomass Magazine* and *Biocycle Magazine*, both reported Hampton projects in full articles.

At the Biocycle 12th Annual Conference on Renewable Energy from Organics Recycling in late October 2012, Mark Hague, acting deputy administrator of EPA Region 7, praised Hampton's effort in his keynote speech. Representatives from Hampton also presented sessions at the conference.

6. Results, Major Findings and/or Conclusions

With a total of \$900,000 in biogas grants, the combined leveraged funds from two private entities were over \$11,000,000. The two completed projects together created more than 25 temporary and approximately 10 permanent jobs, and produce nearly 250,000 MMBTU of biogas, and generate nearly 15,000,000 kWh of electricity annually. In addition to significant odor reduction and water pollution mitigation, these projects will reduce greenhouse gas emissions by more than 10,583 metric tons of CO₂ equivalent annually. This reduction is the equivalent of removing more than 2,000 passenger vehicles from the road.

7. Post ARRA Project Status

The Subgrant Assistance Agreement contains a provision that requires subgrantees to participate in follow-up surveys for its long-term impacts within three (3) years after the Biogas Grants program expires. The department plans to perform annual surveys to evaluate the energy savings and renewable electricity generation resulting from this program. The infrastructure on the St. Joseph landfill gas electricity plant was constructed in a way to readily allow four more similar sized electrical generators. Depending on project economics and potential changes in federal/state renewable portfolio standard (RPS) and environmental regulations, GMO may seek that expansion in the near future.

Hampton Feedlot's biogas digesters project is part of its still ongoing facility expansion. After digesters were operated successfully in September, 2012, Hampton purchased a dryer to convert the digestates from digester tanks to organic fertilizers for an additional revenue stream. Upon completion and operation of the dryer in 2013, Hampton will change from a traditional animal feeding operation to an industrial facility. Hampton also plans to work with university researchers to collaborate on research projects related to digestion process optimization, nutrient management and sustainable agriculture.

Since Hampton Feedlot is the first biogas to electricity project on a CAFO farm in Missouri, lessons and experience from this project will be extremely valuable to other CAFO facilities if they pursue similar projects. The department has been involved in educating CAFO owners and agricultural educators on biogas energy opportunities, and will continue to do so by working with universities, agricultural associations and environmental agencies.

Renewable Energy Feasibility Studies

1. Project Activities

The department offered grants for renewable energy resource assessments and project feasibility studies by Missouri residents, businesses, corporations, not-for-profit organizations, universities and research institutions, and county or city governments. The department accepted applications for funding through June 2, 2010 and received 39 proposals requesting more than \$1,750,000 in funding to support nearly \$2.4 million in project costs.

2. Implementing Partners

The department selected 17 projects for subgrant awards totaling nearly \$738,000 in support of more than \$900,000 in project costs to conduct five renewable energy resource assessments and 12 feasibility studies of renewable energy projects in the state. A wide range of renewable energy resources and technologies were proposed in the awarded studies including solar, geothermal, biomass, biofuels, low-head hydro power, landfill gas, municipal solid waste etc. The subgrant recipients included:

- **Washington University in St. Louis**, a private university, received \$50,000 to determine the application of solar thermal, solar electric and geothermal exchange loops on the Danforth Campus.
- **City of Springfield, Solid Waste Management Division** in Greene County, received \$39,938.88 to determine the use of waste heat and electricity generated from an existing landfill-gas-to-energy facility to operate a commercial greenhouse.
- **Missouri American Water Company**, a water utility in St. Louis County, received \$14,428.02 to ascertain the application of centrifugal pumps for energy recovery from pressure reduction between the St. Louis County and St. Charles County water distribution systems.
- **Microgrid Energy LLC**, a renewable energy consultant and contractor in St. Louis County, received two subgrants: \$48,150 to perform a complete assessment of solar electric systems at 20 sites throughout the City of Clayton in support of Clayton's Green Power Community Challenge; and \$35,550 for a complete assessment and prioritization plan of solar electric, solar thermal, and geothermal systems for 15 facilities owned and operated by St. Louis County.
- **Missouri University of Science and Technology**, a public university in Phelps County, received \$37,127.43 for the development of a gas generation and economic tool for anaerobic digester systems on concentrated animal feeding operations (CAFO).
- **University of Missouri**, a public university in Boone County, received two subgrants: \$40,000 to determine the feasibility of installing solar hot water to preheat make-up water at the university's combined heat and power plant; and \$47,405.51 to develop a protocol allowing objective evaluations of renewable energy projects based on economics, environment, energy and sustainability.

- **GlaxoSmithKline**, a pharmaceutical manufacturer in St. Louis County, received \$22,990.80 to determine the feasibility of installing solar electric photovoltaic systems at its TUMS manufacturing plant in downtown St. Louis.
- **Global Fuels LLC**, a biodiesel plant operator/owner in Stoddard County, received \$48,781 to determine the possibility of technology conversion or retrofit to update its biodiesel plant from a 1st generation design using only soybean oil to a 2nd generation design utilizing waste streams for biodiesel production.
- **Garnett Wood Products**, a wood products company in Howell County, received \$50,000 to determine the use of waste heat for electricity generation from their wood based activated carbon facility in the southern Ozark region town of Brandsville.
- **Tatanka Resources**, an environmental consultant in Boone County, received \$49,730 to determine the availability and application of grassy biomass to coal fired power plants for electric generation.
- **H2O'C Engineering**, an environmental engineering firm in Boone County, received \$50,000 to study the fate of sewer fat, oil and grease (FOG) and the possibility of locating green diesel conversion technology where FOG is available with emphasis on the Kansas City and St. Louis metropolitan areas.
- **Sunesis**, a consultant in Dent County, received \$26,016 to assess the availability of agricultural based biomass sources suitable for fuel pellet production in southwest Missouri. Sunesis is located in Salem.
- **Burns and McDonnell Engineering Company, Inc.** a full-service engineering, construction, and consulting firm in Jackson County, received \$47,552.92 to determine the possibility of a waste to energy plant in Kansas City, Missouri, using municipal solid waste.
- **Viburnum Economic Development Corporation**, a non-profit organization in Iron County, received \$50,000 to determine the possibility of a woody biomass fueled electrical generation plant in the Ozark region town of Viburnum.
- **Metropolitan Energy Center**, a non-profit organization in Jackson County, received \$50,000 to create a protocol to help homeowners and small business owners determine the most applicable renewable energy system for their property. Metropolitan Energy Center is in Kansas City.

3. Goals and Objectives Comparison

The Energize Missouri Renewable Energy Study Subgrant program was created to increase the ability of businesses, governments and organizations to make informed decisions about complex renewable energy systems by understanding and solving information deficiency and technical uncertainties. Through the completion of the 17 studies the subgrantees were able to make informed decisions about the renewable energy systems contemplated.

4. Project Modification(s)

While several subgrantees had modifications to specific scopes of work, the overall goals and objectives of the Energize Missouri Renewable Energy Study Subgrant program were not modified.

5. Notable Project Successes and Achievements

There were 17 professional studies completed of possible renewable energy technologies in Missouri.

6. Results, Major Findings and/or Conclusions

Seventeen professional feasibility studies and resource assessments were completed under the program. These studies provided valuable information to the entities performing the studies but beyond that the knowledge developed is available for the general public at the Missouri Department of Natural Resources' website:

<http://dnr.mo.gov/transform/EnergizeMissouriRenewableStudies.htm>.

7. Best Practices

Basic project management techniques such as monthly e-mail reminders to sub-recipients detailing expected reports and reminding them of scheduled deliverables was instrumental in keeping many projects on task and on time. Additionally creating template reports for consistency allowed subgrantees to easily provide the needed information.

8. Post ARRA Project Status

The Energize Missouri Renewable Energy Study Subgrants program was designed to be a one-time program under ARRA. However the impacts of a feasibility study may be on going. As a scoping and planning instrument of concrete projects, the studies may spur development of renewable energy systems. The sub-recipients will all be sent a 2-year post study survey to determine the impacts of the studies.

Algae Energy Roadmap

1. Project Activities

The Algae-Based Renewable Energy Study consisted of investigation into Missouri's potential as a leader of algae-based renewable energy. Activities consisted of literature review and interviews with Missouri-based leading algae developers.

2. Implementing Partners

MRI Global conducted the study for The Missouri Technology Corporation (MTC) with experts from Washington University in Saint Louis and the University of Missouri-Columbia.

3. Goals and Objectives Comparison

The objective of the grant was to produce a study to help define the development and commercialization of algae as a fuel source that would be a valuable adjunct to the state's energy planning efforts. The resulting study met the objective of the grant by emphasizing the potential benefits to the state economy from a commercial algae industry, opportunities for Missouri to become a leader, and the policy steps and collaborations that could be initiated.

4. Project Modification(s)

No major modifications were made during the project period of performance.

5. Notable Project Successes and Achievements

The most notable achievement is the completion of a comprehensive roadmap for algae research, development, demonstration and commercialization in Missouri.

6. Results, Major Findings and/or Conclusions

The project developed 7 task reports ranging from the potential of algae based fuels to recommended collaboration. In addition to the 7 task reports a complete report and summary report were developed and can be found on the department's website; <http://dnr.mo.gov/transform/energizemissourirenewable.htm>.

7. Best Practices

Not applicable

8. Post ARRA Project Status

The Energize Missouri: Algae-Based Renewable Energy Study program was designed to be a one-time program under ARRA. However the impacts of the study may be on going. As a scoping and planning instrument, that the study may spur development of algae based renewable energy. The sub-recipient will be sent a 2-year post study survey to determine the impacts of the study.

Geothermal Resource Assessment

1. Project Activities

The Geothermal Map of Missouri project consisted of the development of ground water temperature maps across the state. Project activities included the review of thousands of oil and gas drilling logs, water well logs, and site visits and measurements to hundreds of sites where documentation of ground water temperature was insufficient.

2. Implementing Partners

The Missouri Department of Natural Resources Division of Geology and Land Survey conducted a study that developed ground water temperatures for six physiographic regions of Missouri with a \$165,505 grant from the Division of Energy.

3. Goals and Objectives Comparison

The Energize Missouri Geothermal Map of Missouri project was created to enhance the understanding of ground source heat pump (GSHP) potential in the state. The maps and accompanying report enhance the understanding of GSHP potential in the state.

4. Project Modification(s)

While several schedule and personnel modifications occurred during the project period, the overall goals and objectives of the Energize Missouri Geothermal Map of Missouri program were not modified.

5. Notable Project Successes and Achievements

There were five (5) maps created detailing ground water temperatures across the six physiographic regions of Missouri.

6. Results, Major Findings and/or Conclusions

The Geothermal Map of Missouri provides valuable information to entities performing research, development, and installation of ground source heat pumps; identifying that there is local variation of ground water temperature across Missouri. The report and maps developed are available for the general public at the department's website:

<http://dnr.mo.gov/transform/energizemissourirenewable.htm>.

7. Best Practices

Basic project management techniques such as monthly e-mail reminders to the sub-recipient detailing expected reports and reminding them of scheduled deliverables was instrumental to keeping the project on task and on time.

8. Post ARRA Project Status

The Energize Missouri Geothermal Map of Missouri program was designed to be a one-time program under ARRA. However the impacts of the study may be on going. As a scoping and planning instrument of concrete projects, the maps may spur development of ground source heat pump systems. The sub-recipient will be sent a 2-year post study survey to determine the impacts of the study.

INDUSTRY

Energize Missouri Industries

1. Project Activities

The department provided funding, through a competitive grant process, to assist Missouri industrial and commercial businesses in reducing energy costs and increasing market competitiveness. The initiative provided Missouri industries with the opportunity to identify no-cost and low-cost energy saving opportunities through facility audits and to implement energy efficiency measures that will result in long-term savings. The Energize Missouri Industries (EMI) program was designed to create market



transformation through integrating several proven energy efficiency practices into three (3) funding opportunities: Industrial Energy Efficiency Program (IEEP), Best Price Energy Efficiency Program (Best Price), and Industrial Pilot Program. These program areas offered industry and process-specific assistance in implementing energy efficiency projects from inception to completion. Missouri energy auditors, trade allies, and energy efficiency providers were enlisted to help deliver energy savings.

Industrial Energy Efficiency Program (IEEP)

IEEP provided companies up to \$50,000 to conduct energy audits and up to \$750,000 to implement eligible energy efficiency projects. While incentives were given on a kWh saved per year basis, projects resulting in natural gas savings were also eligible to receive funding.

To insure a broad based distribution of grants, small and large industries competed for separate funds, and had different limitations. In general, energy audits and lighting upgrades were the most popular type of projects receiving grant funding, but projects also included a number of other measures such as boiler and chiller retrofits.

Best Price Energy Efficiency Program (Best Price)

This program was designed to reach industrial and commercial entities through a rapid deployment program at a market-driven lowest cost for energy efficiency savings.

The grant money was distributed to participants based on winning bids of an online reverse auction. Three (3) online reverse auctions were held early in the program. These auctions allowed for pre-qualified providers to bid on the available grant amounts by specifying the minimum amount of money that they would be willing to accept in order to provide energy efficiency services on a \$/kWh saved basis.

A reverse auction is a type of auction in which the role of the buyer and seller are reversed, with the primary objective of driving purchase prices downward. The sellers compete to provide a good or service by offering progressively lower quotes until no provider is willing to make a lower bid. In Best Price, the winners of the first auction were excluded from auctions two (2) and three (3). The winners of auction two (2) were excluded from auction three (3).

Only pre-qualified providers were able to participate in the online reverse auction. Grants were awarded to the lowest bidders, who were then tasked with identifying industrial and commercial customers to implement eligible energy efficiency projects to expend their allotment of incentive funds. The target industrial and commercial customers included both large energy consumers as well as smaller commercial sector customers.

The 16 providers that won the reverse auction became subgrantees to the department and had approximately two (2) years to identify industrial and commercial customers to implement energy efficiency projects that would expend their allotment of incentive funds and fulfill their energy savings obligation to the department.

This innovative program allowed the free market to drive the best price for energy efficiency incentives instead of the guess work typically involved with traditional energy efficiency program designs. Missouri viewed this as a new and exciting way to ensure our energy efficiency dollars were spent as cost-effectively as possible.

Industry Pilot (Noranda & 3M)

The Pilot Program provided funding for unique and innovative projects. While IEEP and Best Price replaced existing equipment with energy efficient equipment or funded audits to find energy savings opportunities, the Pilot Program funded new systems or processes. Two projects were funded under the Pilot Program. One of the projects funded a new feed system for an existing process which resulted in energy savings and production increases. The feed system was part of a *Six Sigma* effort by the subgrantee. The other project funded was the development of a new production line to produce a thin polymeric film for use in the production of photovoltaic solar collectors.

Applicants were encouraged to leverage other funding sources to the greatest extent possible. Leveraged funds are those funds made available to the project from sources other than the ARRA funds. Examples of leveraged funds included applicant contributions, utility rebates or incentives, bonds, state funds, and other federal funds as applicable to the project.

Industries' funds were allowed to be used in conjunction with other funding, but the applicants were required to track and report industries funds separately by appropriate accounting methods, to meet federal and state reporting requirements. The terms and conditions of the grant agreement specified the format, tools and information required for reporting programmatic and energy metrics as identified by DOE and the federal and state government.

2. Implementing Partners

A complete list of sub-recipients for the three *Energize Missouri Industries* (EMI) programs is provided in Appendix A and below:

Industrial Energy Efficiency Program (IEEP)

Bodine Aluminum Inc., Buckman USA, Continental Casting LLC, Continental Cement Company

LLC, Henniges Automotive, LMC Industries Inc., Anheuser-Busch Inc., Mallinckrodt/Covidien, Elantas PDG, Nestle Purina Petcare Company, New World Pasta, Rexam Food Containers, Sigma-Aldrich, SSM DePaul Hospital, Cascades Plastics Inc., Boulevard Brewing Company, Family Center Warehouse, Insteel Wire Products, Missouri Plating Company, Onesteel Grinding Systems, ABB Inc., Dura Automotive Systems, Everlast Sports Manufacturing Corporation, Hubbell Power Systems Inc., Unilever, Von Hoffman Corporation - dba RR Donnelley, Able Manufacturing, AC Buckhorn LLC, K & S Wire Products Inc., Springfield Remanufacturing Corp. ,Standard Transportation Services, Thorco Industries Inc., Buchheit Inc., Noranda Aluminum Inc., Unilever, Mississippi Lime Company.

Best Price Energy Efficiency Program (Best Price)

The winning bidders were: AmerenUE, The Gasket Guy dba Green Energy Masters, 8760 Energy Engineering LLC, Eco Engineering LLC, Missouri Enterprise, Murphy Company, HTE Technologies, Innovative Facilities Solutions, Schaeffer Marketing Group, Inc., Ozark Energy Services, Energy Solutions Inc., Zeller Technologies, Inc., and Blue Sky Lighting Products LLC.

Pilot Program

Noranda Aluminum Company – Missouri’s largest electricity user, Noranda is an aluminum company with a facility located in New Madrid, Missouri, received a grant award of \$1,000,000 to develop and install a new anode cover processing and distribution system. Total project cost was more than \$6,500,000.

3M Company – a manufacturing company with a facility in Columbia, Missouri, received a grant award of \$734,681.76 to install a thin film production line for solar collectors. The total project cost was more than \$8,000,000.

3. Goals and Objectives Comparison

The purpose of the Industries Program was to provide industries with the opportunity to realize measurable energy savings that would result in reduced energy costs and increased market competitiveness. The specific goals of the program included reducing total energy use, decreasing fossil fuel emissions, creating and retaining jobs, spurring economic growth, and improving Missouri industries energy efficiency.

Industrial Energy Efficiency Program (IEEP)

Through IEEP, the department provided small and large industries with the opportunity to identify energy savings opportunities available through the retrofitting of existing inefficient equipment and implementation of low-cost/no-cost energy savings solutions.

The IEEP program was very successful and met all program goals and objectives. Many of the subgrantees stated that their projects would not have been possible without the grant funding. Many also stated they were more efficient and competitive as a result. For example, one of the subgrantees, Covidien, stated that the availability of grant funding allowed them to obtain funding for their entire project that included new boilers which were outside of the scope of the grant. The IEEP grant allowed them to leverage more than \$20 million in capital funding for energy efficiency projects, and Covidien now plans to incorporate energy efficiency on an on-going basis at the plant.

Best Price Energy Efficiency Program (Best Price)

Through Best Price, the department provided incentives to energy efficiency service providers to

identify and install energy efficiency projects within the industrial and commercial sectors. This program was designed to reach industrial and commercial entities through a rapid deployment program at a market driven lowest cost for energy efficiency savings.

The purpose of Best Price was to provide industries with the opportunity to realize measurable energy savings which would result in reduced energy costs and increased market competitiveness. This objective was met.

The competitive nature of the online auction allowed the department to meet the goal of achieving the most cost-effective price the energy efficiency market could bear. The contending companies utilized numerous bidding strategies to settle on a price per kilowatt hour that was both competitive but also sufficient to move consumers toward executing energy efficiency projects. Therefore, this program design allowed the price of energy efficiency to be market driven and ensured cost-effectiveness. Through the online reverse-auction, a quantifiable market price of energy efficiency was achieved, which demonstrates that the participants believed the cost of delivering efficiency was lower than the cost of delivering power. This program demonstrated that the stakeholders in the market were ready and able to provide energy efficiency.

Best Price achieved a total of 63,954,187 kWh of energy savings utilizing \$2,316,096 in grant funding with an average cost of \$0.0362/kWh saved. A total of 1,067 projects were implemented under the program, which included lighting upgrades, gasket replacements, boiler replacement, compressed air upgrades, motor replacement, waste heat recovery, HVAC system upgrades, retro-commissioning and control upgrades, and chiller replacements. Approximately 98 jobs were created through program implementation and 44,100 metric tons of CO2 equivalent were avoided.

The grant funds (\$683,904) not utilized in Best Price, as some of the subgrantees' projects were not implemented, were transferred to another ARRA program, which also promoted energy efficiency projects.

Pilot Program

Through the Pilot Program, the department provided the opportunity for industrial companies to innovate and create a mechanism for energy savings and/or production efficiencies that could be realized directly or indirectly. The Pilot Program was very successful and met the program goals and objectives. Subgrantees stated that their projects would not have been possible without the EMI grant funding. One subgrantee stated the project was critical to their competitive position.

4. Project Modifications

There were no modifications to the scope of the original SEP ARRA grant. A time extension was requested and received by the department. This time extension allowed the completion of the original scope.

5. Notable Project Successes and Achievements

The reverse auction was executed through an online platform, and allowed pre-qualified providers to bid on incentives on a \$/kWh or \$/therm saved basis for expected energy efficiency projects. Available incentive dollars were allocated based on a lowest-price obtained, thus increasing the cost-effectiveness of the program and allowing the department to spread the dollars further. Grants were awarded to the lowest bidders, who then identified industrial and commercial customers to implement eligible energy efficiency projects to expend their allotment of incentive

funds. The targeted industrial and commercial customers included both large energy consumers as well as smaller commercial sector customers.

The competitive nature of the online auction allowed the department to utilize economic drivers to obtain the most cost-effective price the energy efficiency market could bear. As detailed below, competing companies utilized numerous bidding strategies to settle in on a dollar per kWh price that was both competitive and sufficient to move consumers toward executing energy efficiency projects. Beginning with a \$0.25 per kWh initial bid price, companies bid down to a price which they felt their organizations could effectively obtain from the market.

The on-line reverse auction held on July 28, 2010, allocated \$3 million of ARRA funding. The three separate one-hour auctions were held, resulting in an average \$0.0397 per kWh cost of saved energy. This represents a significant discount compared to the average cost of electricity generation in the United States, which is estimated to be about \$0.08 to \$0.10 per kWh for conventional coal and nuclear power plants.

More specifically, the three (3) auctions resulted in the following average energy efficiency pricing:

- Two (2) - \$500k Grants at an average \$0.0325/kWh;
- Four (4) - \$250k Grants at an average \$0.0286/kWh; and
- Ten (10) - \$100k Grants at an average \$0.1062/kWh.

The three (3) auctions combined were expected to result in a total of more than 75,500,000 kWh of energy efficiency savings. This equates to the electricity generated from an average U.S. nuclear power plant in 2.2 days. Of the twenty three (23) providers who were approved for participation in the reverse auction, there were 16 winning bidders. Most of the winning bidders, or subgrantees, were geographically distributed across Missouri. Those subgrantees that were located outside the state had already been implementing projects within Missouri.

An EMI Energy Efficiency Forum was hosted by the department and DOE on July 19, 2011, at Stoney Creek Inn in Columbia. The forum focused on energy efficiency innovations and tools to help companies save energy and money. The department provided topic development, marketing of the program and securing presenters from the IEEP and Best Price programs. Several EMI participants presented on their projects and shared best practices.

The forum facilitated dialogue and resource sharing among companies interested in energy efficiency throughout the state. Through local media coverage and video posting on the department website, the forum also provided for greater awareness of the department's programs.

6. Results, Major findings and/or Conclusions

The results of *Energize Missouri Industries* programs, including deliverables, are discussed below.

Industrial Energy Efficiency Program (IEEP)

The program achieved over 85 million kWh from installed energy efficiency projects and leveraged more than \$7.4 million. Additionally, over 213 million kWh were identified from energy efficiency audits conducted, including the reduction of 22,990 tons of coal (155 MWh) from a coal replacement study conducted. Overall program metrics indicated the following:

PROGRAM METRICS - IEEP	
Energy Audits	
Units	Total
kWh*	213,587,981
Energy Audits	36
Square Footage	9,533,910
Grants Awarded	\$ 405,764.15
Jobs Created	8.39
GHG Emissions Avoided*	58,692
Dollars Leveraged	\$ 137,423.00
* potential energy savings or emissions avoided if audit findings are implemented	
Retrofits	
Units	Total
kWh	85,260,853
Grants Awarded	\$ 5,091,757.92
Jobs Created	64.06
GHG Emissions Avoided	61,218
Dollars Leveraged	\$ 7,420,807.23
Totals	
Units	Total
Grants Awarded	\$ 5,497,522.07
Jobs Created	72.45
Dollars Leveraged	\$ 7,558,230.23

Table 9 – Summary of IEEP program metrics

Although the program was very successful, throughout the life of IEEP, lessons were also learned. One significant finding was that subgrantees felt overwhelmed by stringent ARRA requirements, and required a good deal of assistance with monthly reporting, submittals for reimbursement, and closeout requirements. Many subgrantees indicated that the requirements of ARRA were greater than that of other grants, and they had difficulty completing the Cash Requesting Form and other paperwork.

Other Concerns:

In spring 2011, the Missouri Legislature debated whether or not to renew the department’s appropriations authority for ARRA funding through the state’s next fiscal year. Although the department issued several clarifying letters, this uncertainty did result in some project delays and the withdrawal of two subgrantees.

Some challenges faced by subgrantees centered on reimbursement. One such challenge included understanding the leveraged fund requirements and properly documenting leveraged funds.

Another reimbursement challenge was that subgrantees chose to wait until closeout to submit a cash request. Since topics such as Davis-Bacon compliance and submittal of grant agreement attachments were verified during cash request review, these topics were generally addressed when the subgrantee submitted a cash request.

Best Price Energy Efficiency Program (Best Price)

Best Price achieved a total of 63,954,187 kWh of energy savings utilizing \$2,315,566 in grant funding with an average cost of \$0.0362/kWh saved. A total of 1,067 projects were implemented under the program. Approximately 98 jobs were created through program implementation, and 53,377 metric tons of CO2 equivalent were avoided. Program totals are summarized below:

PROGRAM METRICS – Best Price	
Program Totals	
Units	Total
kWh	63,954,187
Grants Awarded	\$ 2,315,566.38
Jobs Created	98.71
GHG Emissions Avoided (MTCO2e)	53,377
Total Number of Projects	1,067
Avg. Price of kWh in the Program (\$/kWh)	\$ 0.0362

Table 11 – Best Price metrics summary

A total of 77 percent of the funds were allocated to subgrantees for completed energy efficiency projects. The remaining grant dollars (\$683,904) were not utilized in Best Price as some of the subgrantees’ programs were not implemented. These funds were transferred to another ARRA energy efficiency program.

Pilot Program

The program achieved about 10 million kWh from installed energy efficiency projects and leveraged more than \$12.3 million. The Pilot Program varied from other EMI programs in that energy efficiency was not the only goal of the program. One of the projects (3M) was to aid in development and construction of a thin film production line. The thin film produced is used in the production of photovoltaic solar collectors. The other Pilot Program project (Noranda) did produce energy savings, but also improved production efficiency. It is estimated that the Noranda project improved production by 1,800 metric tons of aluminum annually. Overall program metrics indicated the following:

PROGRAM METRICS – Pilot Program	
Program Totals	
Units	Total
kWh	10,000,000
Grants Awarded (\$)	\$ 1,734,681.76
Jobs Created	67.30
GHG Emissions Avoided (MTCO ₂ e)	8,346
Dollars Leveraged	\$ 12,370,720.00

Table 12 – Pilot Program metrics summary

7. Post ARRA Project Status

Energize Missouri Industry programs were one-time programs. Since most projects were energy efficiency retro-fits, energy savings will be realized on an ongoing basis. Unused funds were transferred to an ARRA revolving loan program.

Water & Waste Water

1. Project Activities

The department made ARRA SEP funds of \$939,322 available for Water & Waste Water energy efficiency loans. The revolving loan program provided low-interest loans to municipals, city governments and sewer districts. The department announced the loan program on April 25, 2011.

Eligible projects were efficiency retrofits, replacements and upgrades at local governments and sewer districts. Example of projects included lighting retrofits, building envelope upgrades, refrigeration management, motor/drive upgrades, radiant heat upgrades, ventilation, compressor upgrades, HVAC upgrades, and anaerobic digester upgrades. Energy efficiency components associated with new construction were eligible contingent upon compliance with ARRA terms & conditions, including provisions of the National Environmental Protection Act (NEPA) and Section 106 of the National Historic Preservation Act (NHPA).

The loan program provided access to 2.5 percent annual interest rate loans to implement energy efficiency retrofits, replacements, and upgrades with up to a 10 year simple payback. The energy efficiency retrofits and upgrades will result in reduced energy costs and more efficient use of tax dollars. The loan awards were made to four loan recipients. One hundred percent of the loan award was disbursed to the loan recipients in one installment.

The division worked diligently with sub-recipients to ensure compliance with ARRA terms and conditions, including provisions of Buy American Act, Davis-Bacon Act, NEPA and NHPA. Monthly reports were required to be submitted by loan recipients to report payments made, equipment purchased, progress, jobs created, and interest earned.

2. Goals and Objectives of the Project

The purpose of the Water & Waste Water energy efficiency loans was to provide Missouri municipals, city governments and sewer districts the opportunity to implement and install energy efficient equipment and measures to realize measurable energy savings, which will result in reduced energy costs.

The specific goals of the Water & Waste Water energy efficiency loans included reducing total energy use, decreasing fossil fuel emissions, creating and retaining jobs, spurring economic growth, increasing the rate of adoption of energy efficient practices and improving the energy efficiency of Missouri's water treatment and waste water facilities.

3. Implementing Partners

The department contracted with Shaw Environmental & Infrastructure, Inc., to create documents for loan program guidelines, loan application forms and a loan program manual. The department administered the loan program internally.

4. Project Modification(s)

The department originally anticipated up to \$10,000,000 of ARRA SEP funds to be awarded as loans under these program guidelines for the Schools & Local Governments and Energize Missouri Water & Waste Water programs. The Water & Waste Water program provided a total loan amount

of \$939,322 to the City of Harrisonville, City of Maryville, Metropolitan St. Louis Sewer District, and Pulaski County Sewer District #1.

5. Notable Project Successes and Achievements

Loan Applicant	County	Loan Award	Estimated Savings	Scope of Work
Harrisonville, City of	Cass	\$380,000	\$42,832	Lighting upgrades, Lagoon pump upgrades, basin motor upgrades, VFD pump upgrade, and blower upgrade for waste water.
Maryville, City of	Nodaway	\$154,029	\$20,795	Replace 3 raw water pumps and install VFDs on each motor.
Metropolitan St. Louis Sewer District	St. Louis City	\$223,793	\$35,922	Lighting upgrades, insulation, vestibule, EMS, motion sensors at various buildings.
Pulaski County Sewer District #1	Pulaski	\$181,500	\$11,211	VFD on pumps for lift stations.
Total		\$939,322	\$110,760	

Table 13- Loan award under ARRA SEP Energize Missouri Water & Waste Water program

6. Results, Major Findings and/or Conclusions

The Water and Waste Water loan program was a success with a total energy savings of \$110,760 annually. The loan funds were awarded to two city governments and two sewer districts.

7. Post ARRA Project Status

The loan program will continue past the ARRA. All 4 loan projects are currently active and have an anticipated deadline for construction of November 2013. As the loans are repaid, the ARRA funding of \$939,322 will be offered in future loan cycles. The program will be sustained for future eligible projects.

ENERGIZE MISSOURI AGRICULTURE

Small Cost-Share Grants

1. Project Activities

The department offered cost-share grants to agricultural operations statewide for agricultural energy efficiency improvements and renewable energy equipment. The reimbursement element of the program was modeled after the county Soil and Water Conservation Program districts' cost-share programs. The program reimbursed farmers up to 75 percent of the purchase cost of qualifying energy efficient equipment and systems, up to \$5,000 per applicant. The program was administered in-house.



The department originally estimated there would be 600 applications requesting up to \$3 million based on a cap of \$5,000 per applicant. Based on an enthusiastic response, the department decided to allocate more money to the program so all valid applications could be funded. There were more than 1,600 signed agreements, and 1,535 projects completed.

2. Implementing Partners.

Soil and Water Conservation Program – The local districts were a key partner in publicizing the program and getting interested farmers to contact the department. The departments' Soil and Water Program central office staff were instrumental in selecting projects for the program.

The Missouri Department of Agriculture was also a key partner in selecting projects and evaluating applications for non-traditional projects. They also helped publicize the program. The local University Extension offices and Natural Resources Conservation Service (NRCS) offices also worked with the department to publicize the program and integrate the DNR program with programs offered by the United States Department of Agriculture.

3. Objectives and Goals Comparison

The objective of the Agriculture Cost-Share Program was to provide agricultural entities with the opportunity to implement and install energy efficient equipment and measures to realize measurable energy savings resulting in reduced energy costs. This objective was fully met. Energy efficient equipment was installed on 1,535 farms across the state. Monitoring confirmed that measurable energy savings were realized.

The goals of the cost share program included reducing total energy use, decreasing fossil fuel emissions, creating and retaining jobs, spurring economic growth, increasing the rate of adoption of energy efficient practices, and improving the energy efficiency of Missouri's extensive agricultural sector. These goals were also met. Since most of the sub-recipients were individuals with no or few employees, and not "businesses" in the traditional sense, it was difficult to quantify creation and retention of jobs. The energy savings equipment installed, however, reduced the operations cost for the individuals and made their operations more economically viable.

4. Project Modification

The original project was allocated \$3 million. Due to the enthusiastic response from the target audience, the amount of funding for the program was nearly doubled. Based on feedback from applicants, minor adjustments and clarifications were made regarding qualifying equipment in several of the project categories.

5. Notable Project Successes and Achievements

This was a unique program designed by specialists in agriculture specifically for Missouri farmers. We are not aware of any other state that had a comparable ARRA program. Sub-recipients resided in all parts of the state and were engaged in many different types of agriculture.

One type of Missouri farmer that has not had a high participation rate in typical farm conservation programs is the small cow-calf producer with a low-productivity soil. This program was able to help those farmers purchase 296 energy-saving insulated livestock waterers and 237 solar powered fencers.

The most popular item was a GPS system for precision guidance of tractors, combines and sprayers. These guidance systems prevent tillage overlap and reduce fuel usage by approximately 5 to 10 percent. They also achieve even greater savings in reduced use of seeds, pesticides and fertilizer. More than 800 of these systems were purchased through this program.

Overall, the annual energy savings from these projects will be more than 10,000 MWh of electricity, 900,000 gallons of fuel, and the projects will produce more than 41 kWh of renewable energy.

6. Results, Major Findings and/or Conclusions

The objectives and goals were fully met. Applications were more than double the anticipated number. An excellent geographic distribution was achieved with a wide variety of projects completed. Monitoring verified that the equipment was being properly used. Reviews by Office of Inspector General inspection teams were positive. Excellent energy savings were achieved. Feedback from the recipients was extremely positive. On every level, this program was a huge success.

7. Post ARRA Project Status

This program was a one-time project and will not continue post-ARRA. Although there are no financial incentives for the foreseeable future, we hope through publicizing the results of the program, we can demonstrate to the public that energy savings alone can make these types of projects economically feasible.

Field Day: Energy Training

1. Project Activities

The department developed a \$500,000 energy training program focused on the agriculture sector under Energize Missouri Agriculture (EMA). The department offered the agricultural energy training through a series of Field Day workshops developed and delivered by five different organizations. The Field Days were presented statewide in a variety of formats to fit the local agricultural sectors.



More than 2,800 people attended 51 sessions held across Missouri. At each Field Day, farmers were provided information on identifying opportunities for increasing their energy efficiency, how to conduct an energy assessment, and how to calculate energy savings and simple paybacks. The Field Days highlighted tools and resources that assisted farmers and agricultural operators on their individual farms.

Typical agendas for Field Day sessions included discussions for farmers to learn about energy saving practices, new energy efficient products, and programs that are available to help them to purchase or make changes to their current production systems to save energy. The training was held at a variety of agricultural venues, including colleges and universities, farms, and county fairs.

2. Implementing Partners

The primary contractor for the Field Days was Shaw Environmental Group. Shaw subcontracted with four different organizations located in different areas of the state to deliver the actual workshops. These four organizations were Butterfly Energy Works, Missouri Business Development Group, Kaysinger Basin Regional Planning Commission, and Curators of the University of Missouri (University Extension)

3. Objectives and Goals Comparison

The primary objective of the program was to identify energy savings opportunities available through the installation of energy efficiency measures and other low-cost energy savings solutions. In addition, the EMA initiative has achieved the department goal of increasing the rate of adoption of energy efficient practices at agricultural facilities.

The primary objective was fully met and the energy saving opportunities were identified for more than 2,800 farmers in Missouri.

The goals of the program were also met. Since most of the attendees at the Field Days were individuals with no or few employees, and not “businesses” in the traditional sense, it was difficult

to quantify creation and retention of jobs. The energy savings equipment installed, however, reduced the operations cost for the individuals and made their operations more economically viable.

4. Notable Project Successes and Achievements

The project goal for number of workshop attendees was 1,750. Actual attendance was 2,809. The workshops met the needs of a very diverse agricultural population and were tailored to match the local agricultural sector.

5. Results, Major Findings and/or Conclusions

Overall, the Field Day: Energy Training was well attended and represented good statewide coverage. The robust energy efficiency curriculum provided farmers with key takeaways to implement at their farms, as well as providing farmers with the understanding to analyze their own farming operations' energy usage.

6. Post ARRA Project Status

This program was a one-time project and will not continue post-ARRA. Although there are no financial incentives for the foreseeable future, we hope through publicizing the results of the program, we can demonstrate to the public that energy savings alone can make these types of projects economically feasible.

Farm Energy Management

1. Project Activities

As part of the Agriculture Program, our primary contractor (Shaw) developed agricultural energy audits and case studies to be used to determine energy potential savings (EPS) on individual farms, groups of farm types, and overall potential energy savings within the agricultural community. These audits and case studies demonstrated that substantial potential energy savings existed. These audits and case studies additionally supported requirements in the contract by providing a way to evaluate, measure, and verify the approaches and processes for the program.

Recruitment was based on those farmers who expressed interest in a proposed Agricultural Energy Loan program (which was not implemented), hosted or attended a Field Day: Energy Training session, or who did not qualify for other grant programs. Shaw also placed calls to manufacturers, equipment dealers, agricultural community organizations, and farms to encourage participation in the free EPS study.

Upon identification of the participants, Shaw partnered with EnSave, a specialized agricultural energy audit company, to perform the actual audits. An assessor was assigned to collect the information from the farm and receive the data. Data was then analyzed using the AutoAudit™ and Farm Energy Audit Tool (FEAT)™ software. Once the data was processed, a report was created and provided to the participants. This complete report enabled the farmer to set priorities for the investments.

2. Implementing Partners

EnSave is a leading designer and implementer of agricultural energy efficiency programs. EnSave assisted Shaw with the agriculture program by providing overall technical assistance, performing the actual audits, supporting program outreach efforts, and developing case studies of energy efficiency potential in Missouri's agricultural sector.

3. Objectives and Goals Comparison

The goal was to demonstrate potential energy savings by providing information to farmers that show the benefits of energy audits, to illustrate the potentially substantial savings to be had, and to estimate the magnitude of those savings for Missouri farms.

Since most of the recipients of the energy assessments were individuals with no or few employees, and not "businesses" in the traditional sense, it was difficult to quantify creation and retention of jobs. The energy savings equipment installed, however, reduced the operations cost for the individuals and made their operations more economically viable.

4. Notable Project Successes and Achievements

The contract between the department and Shaw required 25 assessments. EnSave actually completed 76 assessments and three case studies.

5. Results, Major Findings and/or Conclusions

Seventy-six (76) audit reports were completed for the program including dairy farms, swine nursery, cattle farms, a goat farm, poultry farms, and mixed-use grain drying and livestock operations. The farms ranged in age from four-year-old to over 150-year-old operations. Typical energy efficient improvements recommended by EnSave were related to lighting insulation, heating, and refrigeration (particularly in the dairy farms). Lighting was an improvement recommended for all but six (6) facilities audited and is identified as one of the easiest upgrades for these facilities and had the shortest payback time.

6. Post ARRA Project Status

This program was a one-time project and will not continue post-ARRA. Although there are no financial incentives for the foreseeable future, we hope through publicizing the results of the program, we can demonstrate to the public that energy savings alone can make these types of projects economically feasible.

POLICY, PLANNING AND ENERGY SECURITY

Stakeholder Process

1. Project Activities

The department conducted an Energy Stakeholder Process to elicit discussion on complex energy issues, trends, opportunities and challenges for the State of Missouri. The purpose of the Energy Stakeholder Process was to build long-term strategy and capacity for the Division of Energy and to identify future energy needs of Missouri by identifying key implementable energy recommendations through a stakeholder process.

The division held one-day meetings in Rolla, St. Louis and Kansas City in October and November 2011. There was a public stakeholder meeting held in Columbia on November 14, 2011. Topics of the three meetings were energy efficiency, traditional energy resources and renewable energy resources.

Participants in the Energy Stakeholder Process worked together with the department's project facilitator, The Cadmus Group, to identify and prioritize recommendations for where the Division of Energy should focus its efforts and expend its resources, post ARRA. A core group of 'advisors' participated in all the meetings; subject matter experts were also invited.

2. Implementing Partners

The Cadmus Group, Inc., was selected as a consultant for the Energy Stakeholder Process through a competitive procurement process. The contract period was July 26, 2011, through March 31, 2012, and the not-to-exceed budget was \$160,606.11. Cadmus subcontracted with GSM Development in St. Louis and with Plexus Logistics to assist with the stakeholder meetings. The team managers for Cadmus were Paul Parker and Amy Ellsworth. Cadmus officer was Ed Miller and principals were Julio Rovi and Jocelyn Turkel.

3. Goals and Objectives Comparison

The goals and objectives for the project were all met. The results of the stakeholder process will assist the division with its strategic planning, budget planning and resource allocation decisions in future years.

4. Project Modification(s)

There were no modifications to the project.

5. Notable Project Successes and Achievements

One of the stakeholder recommendations included in the final report was for the department to host 'adult' or 'candid' conversations with stakeholders on relevant energy topics. The department held its First Candid Conversation on November 7, 2012, in St. Louis to discuss energy efficiency, specifically related to the Missouri Energy Efficiency Investment Act (MEEIA). Twenty-one stakeholders and guests participated in the discussion, which focused on progress made under MEEIA, lessons learned to date, potential issues, and a path forward. Stakeholders generally

wanted to allow the two utilities to proceed with the approved MEEIA plans and did not identify legislative changes as an issue at this time. Issues discussed included convening a statewide collaborative with all investor-owned utilities and interested parties, coordinated communication of the benefits of energy efficiency, a focused communication strategy to customers of the two utilities that would be implementing programs starting in January 2013, cost-effectiveness and coordination of gas and electric measures, building energy codes and low-income customers. The Second Candid Conversation was held on March 27, 2013, in Columbia, Missouri on the topic of small solar development in Missouri.

The Division of Energy revised its mission statement in consultation with selected stakeholders to be: *The Missouri Department of Natural Resources' Division of Energy assists, educates, and encourages Missourians to advance the efficient use of diverse energy resources to provide for a healthier environment and to achieve greater energy security for future generations.*

6. Results, Major Findings and/or Conclusions

A report was issued in March 2012 with the following five key stakeholder recommendations:

1. Convene candid conversations, termed 'adult conversations' by stakeholders, on energy policy issues including energy efficiency resource standards and associated recovery, incentives and lost revenues.
2. Establish an energy information center for Missouri – a central clearinghouse for data and information.
3. Assess the costs, benefits, objectives and value of developing a state energy plan.
4. Review and modify the Division of Energy's mission statement, leveraging the stakeholder process to solicit input.
5. Continue to advocate for energy programming and policy in Missouri through existing programs and activities.

7. Post ARRA Project Status

The division is working with a consultant on contract with the State of Missouri to explore development of an energy clearinghouse that is visible and provides energy-related information of interest to Missourians.

The Division of Energy is in initial stages of assessment and review of documentation relating to an energy plan. The division continues its advocacy for energy programming and policy in Missouri through existing programs and activities including the Energy Revolving Loan Program, Weatherization Assistance Program, and participation in utility regulatory policy to encourage energy efficiency and renewable energy resources.

Energy Efficiency Opportunities Analysis

1. Project Activities

The department contracted with the American Council for an Energy Efficient Economy (ACEEE) to complete a Missouri study titled “Missouri’s Energy Efficiency Potential: Opportunities for Economic Growth and Energy Sustainability.” The report focused on the potential for energy efficiency in Missouri, and ACEEE conducted analysis and recommended policy opportunities that would benefit Missouri for the period 2010 through 2020.

At the beginning of ACEEE’s work in Missouri, they met with numerous energy stakeholders to explain the study’s scope and the kinds of policies that might be identified. Consistent with ACEEE’s process for other state studies, the schedule provided for distribution of a draft report to stakeholders for a two-week review before the report was finalized.

The department contributed \$80,000 for Missouri’s share of the cost of the report. ACEEE used other sources of funding to complete the Missouri analysis and report. The department held monthly conference calls to discuss progress, three in-person meetings and numerous additional phone conferences. ACEEE submitted quarterly progress reports and monthly invoices with documentation.

One of the data sources for ACEEE’s economic analysis was a Missouri study by KEMA Associates, under contract with the Missouri Public Service Commission (PSC) and co-funded by the department. As this study was underway in 2010, the project timeline for completion of the ACEEE study was adjusted. In addition, ACEEE conducted independent analysis, used numerous other sources of information and evaluated the KEMA analysis prior to considering it as one source for its report.

2. Implementing Partners

The American Council for an Energy Efficient Economy was an implementing partner. ACEEE was approved as a single feasible source provider of these energy efficiency assessment services to Missouri. The contract period was from September 24, 2010, through June 30, 2011, and was extended through July 31, 2011, to allow adequate time for stakeholder review and comment and development of the final report.

3. Goals and Objectives Comparison

The goal of the project was to identify energy policy recommendations that would be tailored to Missouri and quantify the benefits of those policies. The recommendations in the report will be used to inform future energy policy discussions as well as to guide future focus areas for the department. These goals were fully met.

4. Project Modification(s)

There were no modifications to the project.

5. Notable Project Successes and Achievements

ACEEE acknowledged that the energy efficiency policies and programs will require public and private investments, but they can yield a high return to Missouri consumers and the overall economy, saving consumers \$6.1 billion in net energy bill savings from energy efficiency and create 8,500 new, local jobs by 2025. (Both are cumulative direct and indirect economic impacts through 2025.)

6. Results, Major Findings and/or Conclusions

The ACEEE report examined the potential for cost-effective energy efficiency to meet electricity and natural gas needs in Missouri through the implementation of 10 policies and programs. ACEEE's analysis concluded that this comprehensive suite of policies has the potential to meet 17 percent of the state's electricity needs and about 10 percent of natural gas use by 2025.

Several policy areas were identified by ACEEE for consideration:

- Energy efficiency program savings targets for utilities
- Rural and agricultural initiative (increasing availability of grants, engaging private sector, leveraging other federal programs, encourage partnerships)
- Manufacturing initiative (government/utility/industrial collaborative to address barriers to energy efficiency)
- Manufactured homes (energy savings efficiency upgrades)
- Combined heat and power (addressing regulatory barriers such as interconnection standards, standby rates and other opportunities)
- Building energy codes and enforcement (local adoption/enforcement of building standards)
- Advanced new buildings program (encouraging voluntary high performance, i.e. Energy Star)
- Behavioral initiative (state/local lead by example building upgrades, customer financing, research and development)

7. Post ARRA Project Status

The final report was provided to the department by July 31, 2011 and was officially released to the public by ACEEE with a press announcement on August 25, 2011. The report is posted on the department's website at <http://dnr.mo.gov/energy/publications.htm>.

Public Service Commission Energy Study Component

1. Project Activities

The Missouri Department of Economic Development's Public Service Commission (PSC) sought the department as a partner in undertaking a Missouri Statewide Demand-Side Management Market Potential Study in 2010 to assess the types of demand side management (DSM) potential (technical, economic, achievable and naturally occurring potential) for Missouri. The department recognized the benefits of this study in supporting an analysis of policy opportunities for Missouri, as well as to inform the department's positions in regulatory cases before the PSC in support of utility investments in energy efficiency.

The department and the PSC signed a Memorandum of Understanding (MOU) on June 14, 2010, to co-fund the study at approximately \$100,000 from each agency. The budget included \$100,000 in ARRA SEP funds from the department and \$98,530 from the PSC from other funding sources. The MOU period was June 14, 2010, through March 31, 2011.

2. Implementing Partners

The Missouri Department of Economic Development's Public Service Commission (PSC) was an implementing partner with the department in undertaking the Missouri Statewide Demand-Side Management Market Potential Study.

The department served on the bid review and contractor selection team with PSC staff to select a consultant to design, conduct and produce the study. The PSC awarded the contract to KEMA, Inc.¹ (KEMA) following a competitive procurement process. The department participated in regular conference calls with PSC staff and KEMA throughout the study period and provided work-related guidance, direction and support. As the PSC held the contract with KEMA, the department's role was advisory in nature and the Public Service Commissioners had final decision-making authority related to providing direction to KEMA.

3. Goals and Objectives Comparison

This project's deliverables pursuant to the MOU between PSC and the department included monthly and quarterly written summaries of activities and expenditures for reporting purposes, and final completed Missouri Statewide DSM Market Potential Study including work papers.

The goals and objectives of the project were fully met.

4. Project Modification(s)

There were no modifications to this project.

5. Notable Project Successes and Achievements

The study was used by ACEEE as one of its sources in completing the Missouri Energy Efficiency Policy Opportunities report, which the department also funded under ARRA SEP.

¹ PSC's contract with KEMA, Inc., C310177001, contract period July 1, 2010 through June 30, 2011, total guaranteed not-to-exceed price of \$198,530.

6. Results, Major Findings and/or Conclusions

The PSC created a repository file for the study – EW-2011-0136². The docket contains extensive information including a workplan, status updates, data requests for measure-level data, draft work papers, presentations, transcripts, comments from parties and KEMA's responses, drafts of the report and documentation of directives from the commission. The PSC convened a public meeting on November 4, 2010, to allow parties to seek clarification on data inputs to KEMA's model, and a roundtable discussion on January 20, 2011, for KEMA to present draft results of the potential study to stakeholders.

The study provides KEMA's estimates of cumulative, potential statewide cost-effective demand-side energy savings by 2020 under three scenarios: three-year payback scenario, one-year payback scenario and 75 percent incentive scenario. The PSC directed KEMA to use the three-year payback and one-year payback scenarios in an effort to be comparable to Ameren Missouri's potential study that had just been completed. Due to challenges in making adjustments to KEMA's model, the 'payback' scenarios were not fully comparable to Ameren's scenarios and results. KEMA estimated a third scenario at the request of the department: the "75 percent incentive scenario" is included in the report and provides a basis for comparison to other KEMA potential studies and represents KEMA's standard modeling methodology for potential studies.

The scenarios estimated technical potential, economic potential, and scenario-specific achievable potential for demand-side reductions in statewide electricity use (in GWh), statewide electricity demand (in MW) and statewide natural gas use (in Dekatherms). KEMA regarded the study results as conservative estimates of potential in Missouri. By their nature, potential studies are quantitative estimates of the savings from actions utility customers have not taken. These estimates are necessarily uncertain.

7. Post ARRA Project Status

A final report was delivered to the PSC and the department on March 4, 2011, and subsequently revised on April 14, 2011. The completed report is posted on the department's website at <http://dnr.mo.gov/energy/publications.htm>

² <https://www.efis.psc.mo.gov/mpsc/>

Utility Regulatory Consultants

1. Project Activities

The project contracted with GDS Associates (GDS) to provide consulting services in support of the department's participation in Integrated Resource Plan (IRP) cases and Missouri Energy Efficiency Investment Act (MEEIA) cases before the Missouri Public Service Commission (PSC). Additionally, GDS provided expert review of utility reports and planning documents.

2. Implementing Partners

GDS subcontracted with two organizations, The Pharos Group and the AFRAM Corporation.

3. Goals and Objectives Comparison

The goals of the project included providing the department with expert opinion on IRP issues and on energy efficiency issues related to utility MEEIA filings, supplementing the in-house expertise that the department developed in its Energy Policy and Resources group. These goals were accomplished through meetings with the department and GDS staff, by GDS filing reports on behalf of the department, and by GDS participating in technical conferences and negotiating sessions in the above cases.

GDS participated in seven cases----four IRP cases and three MEEIA cases----during the project period. All the goals and objectives were met.

4. Project Modification(s)

There were no substantive modifications to the project. The original contract with GDS was authorized for one year, with the option of two annual renewals. The department has exercised both one-year renewal options. The GDS contract is scheduled to be rebid in 2013. After the expiration of ARRA funds, the expenses for the current contract year will be paid from regular SEP funds.

5. Notable Project Successes and Achievements

GDS participation in IRP and MEEIA cases has contributed to completion of four IRPs and the approval of two MEEIA cases by the PSC. GDS filed supporting documents in each of the IRP cases conducted between 2009 and 2012.

The MEEIA cases, for Ameren Missouri (approved on August 1, 2012) and for Kansas City Power & Light/Greater Missouri Operations (KCP&L/GMO)(approved on November 15, 2012), included financial arrangements to collect program costs and the throughput incentive in rates, and utility specific Technical Resource Manuals (TRM) to calculate deemed savings values. (One MEEIA case, for Kansas City Power and Light, was withdrawn by the company before it reached the hearing phase.) GDS completed technical reviews of each company's MEEIA application and demand-side investment mechanisms proposed by each company. GDS provided the technical review of Ameren Missouri's TRM, which is the first comprehensive deemed savings manual proposed in Missouri. The department and GDS have been the leading parties, among numerous

stakeholders, reviewing the proposed portfolio of measures and the deemed savings values proposed by Ameren. The Ameren TRM was effective in January 2013. This activity has provided the department with substantial experience and expertise in DSM measurement protocols, which it will use in the upcoming deliberations to develop a statewide TRM, expected to begin in 2013.

6. Results, Major Findings and/or Conclusions

The primary results of this contract are improved long-term resource planning by Missouri utilities, especially appropriate consideration of demand side management resources, and improvements in the technical reports on supply side resources, integrated analyses and renewable energy resources presented to the department in specific cases. Many of these reports have been submitted to the PSC on the department's behalf. GDS' review of deemed-savings methodologies proposed by Ameren Missouri was instrumental in securing PSC approval of the TRM in its MEEIA case.

GDS and the department have developed an effective working relationship through frequent communication and high-quality output and work products.

7. Post ARRA Project Status

This project is scheduled to continue through September 30, 2013. After the expiration of ARRA funds, the expenses for the current contract year will be paid from regular SEP funds (subject to available funds). GDS is expected to provide additional assistance in the review of KCP&L and GMO's upcoming DSM potential study and its "MEGA study" of supply side resources. GDS is scheduled to provide technical assistance in the review of Empire's 2013 triennial IRP filing and the review of KCPL and GMO's 2013 annual IRP update.

Utility Regulatory (Division of Energy Staff)³

1. Project Activities

Division of Energy staff participated in meetings, filed written comments and testimony, served as witnesses in evidentiary hearings, and worked collaboratively with parties to advance public policy goals. The division hired additional temporary staff to ramp up capacity and involvement in regulatory proceedings, with special emphasis on the Missouri Energy Efficiency Investment Act (MEEIA)⁴ that was enacted in 2009 with an effective date of August 28, 2009. MEEIA Section 393.1075, RSMo contains language very similar to the American Recovery and Reinvestment Act of 2009, HR 1, Section 410:

“3. It shall be the policy of the state to value demand-side investments equal to traditional investments in supply and delivery infrastructure and allow recovery of all reasonable and prudent costs of delivering cost-effective demand-side programs. In support of this policy, the commission shall:

(1) *Provide timely cost recovery for utilities;*

(2) *Ensure that utility financial incentives are aligned with helping customers use energy more efficiently and in a manner that sustains or enhances utility customers' incentives to use energy more efficiently; and*

(3) *Provide timely earnings opportunities associated with cost-effective measurable and verifiable efficiency savings.*

4. The commission shall permit electric corporations to implement commission-approved demand-side programs proposed pursuant to this section with a goal of achieving all cost-effective demand-side savings.” (*Emphasis added*)

The Division of Energy participated in the Public Service Commission's (PSC) rulemaking docket to implement MEEIA, playing a leadership role in workshops by researching and presenting other successful state models and proposing rule language to implement the provisions of the statute. Rules became effective on May 30, 2011, after a nearly 18-month process. Parties involved in the rulemaking did not agree on two issues that were included in the final rules and challenges were filed in court. These cases are still pending and deal with recovery of program costs between rate cases and the PSC rules' definition of lost revenues.⁵

2. Implementing Partners

Division of Energy staff worked extensively with the PSC and utilities, intervening in regulatory cases to encourage public policy and utility investments in energy efficiency and renewable

³ Division of Energy staff worked extensively with the Public Service Commission and utilities, intervening in regulatory cases to encourage public policies and utility investments in energy efficiency and renewable energy resources. This work was included under the Buildings market title so a narrative in this section of the report is appropriate. Note that a consultant was hired to do utility regulatory work for the Division of Energy and this has been included under the Policy, Planning and Energy Security market title.

⁴ Section 393.1075, RSMo

⁵ Missouri Court of Appeals, Western District, Case No. WD 74896 and WD 74676.

energy. These included numerous rate cases, rulemaking dockets and workshops, integrated resource planning cases and utility energy efficiency advisory groups.

3. Goals and Objectives Comparison

The MEEIA rules offer a set of savings goals designed to provide “incremental annual demand-side savings goals as a guideline to review progress toward an expectation that the electric utility’s demand-side programs can achieve a goal of all cost-effective demand-side savings.” Utilities then propose targets on which incentive awards are based. The targets agreed to by Ameren and KCPL-GMO are not identical but are close to the MEEIA goals and were accepted as significant steps forward for the first MEEIA 3-year period. These are substantial investments in energy efficiency by Missouri utilities.

Year	MEEIA Goals	Ameren Savings Target	KCPL-GMO Savings Target
2012	0.30%		
2013	0.50%	0.70%	0.51%
2014	0.70%	0.74%	0.63%
2015	0.90%	0.85%	0.63%
2016	1.10%		
2017	1.30%		
2018	1.50%		
2019	1.70%		
2020	1.90%		

Table 14- Results of savings based on MEEIA rules

4. Project Modification(s)

There were no modifications to the project

5. Notable Project Successes and Achievements

The Division intervened in the MEEIA cases and was a key force, facilitating and working with individual parties to resolve issues and offer solutions parties could agree to during difficult and lengthy negotiations and settlement processes over a 10-month period. For significant energy efficiency investments to be made in Missouri, the incentives for the investor-owned utilities needed to be balanced and sufficient to encourage the utilities to stay at the table. MEEIA is not mandatory and the energy efficiency savings goals in the PSC rules are not considered to be an energy efficiency resource standard (EERS) as in other states.

Features of the approved stipulation and agreements for Ameren Missouri and KCP&L-GMO include:

- Annual program cost recovery
- Performance incentives
- Compensation for lost revenues through net shared benefits structures
- Monthly true-ups, annual evaluation, monitoring & verification (EM&V) assessment
- Rate adjustments tied to rate cases, with provision for change to a rider approach if court appeal result approves rider as a legal option
- Ameren only: Deemed savings approach to measurement

6. Results, Major Findings and/or Conclusions³

In 2011 and 2012, Missouri's investor-owned electric utilities submitted plans under the new MEEIA rules. Dates and status are provided below. Approved MEEIA filings for two of the four regulated electric utilities in Missouri are notable successes that should result in significant investments in energy efficiency and levels of savings starting in 2013 and continuing for at least three years.

- Ameren Missouri filed January 20, 2012
Status: Unanimous stipulation and agreement filed August 1, 2012, and approved by the PSC August 11, 2012. Energy efficiency programs launched January 2013 with a target of achieving approximately 800,000,000 kWh of energy savings over a 3-year period and a total 3-year budget of \$145,000,000.
- KCP&L-Greater Missouri Operations (GMO) filed December 22, 2011
Status: Non-unanimous stipulation and agreement filed October 29, 2012, and approved by the PSC November 7, 2012. Energy efficiency programs launched January 2013 with a target of achieving approximately 111,000,000 kWh of energy savings over a 3-year period and a total 3-year budget of \$40,000,000.
- Kansas City Power & Light (KCP&L) filed December 22, 2011
Status: Withdrew application February 17, 2012. Some indications are it may re-file in 2014.
- Empire Electric filed February 28, 2012
Status: Withdrew application July 5, 2012. Per stipulation, Empire will re-file in 2013 in conjunction with filing its integrated resource plan.

7. Post ARRA Project Status

Division of Energy staff will continue to work with the PSC and utilities, intervening in regulatory cases to encourage public policies and utility investments in energy efficiency and renewable energy resources.

**APPENDIX A
LISTS OF SUBGRANTEES**

Grant	Sub-Recipient / Vendor	Amount Disbursed	Program
HOMEOWNER UPGRADES AND GEOTHERMAL	BOONSLICK REGIONAL PLANNING COMMISSION	568,363.17	Home energy efficiency upgrades (56)
	KAYSINGER BASIN REGIONAL PLANNING COMMISSION	1,597,284.28	Home energy efficiency upgrades (172)
	MERAMEC REGIONAL PLANNING COMMISSION	782,125.07	Home energy efficiency upgrades (77)
	METROPOLITAN ENERGY CENTER	2,148,622.77	Home energy efficiency upgrades (237)
	MISSOURI BOTANICAL GARDENS	1,722,442.86	Home energy efficiency upgrades (186)
	WHITE RIVER VALLEY ELECTRIC COOPERATIVE	1,218,452.33	Home energy efficiency upgrades (147)
NEIGHBORHOOD CHALLENGE	CITY OF MILAN	37,258.42	In-home real-time energy use devices for 300 test homes
	WHITE RIVER VALLEY ELECTRIC COOPERATIVE	358,692.75	Behavioral program for 20,000 test homes
SCHOOLS AND LOCAL GOVERNMENTS – REVOLVING LOANS	S&LG LOANS - RICH HILL R-IV	107,800.00	HVAC, lights
	S&LG LOANS - CITY OF HARRISONVILLE	171,931.00	Lighting
	S&LG LOANS - UNIV OF MO-KC	1,039,683.00	Boilers, HVA controls
	S&LG LOANS - MO STATE UNIV	958,000.00	HVAC
	S&G LOANS - STATE FAIR COMM	1,035,950.00	Lighting, HVAC
	S&LG LOANS - HUME R-VIII	102,470.00	Lighting, thermostats
	S&LG LOANS - ROCKPORT R-II	391,591.00	Lighting, dishwasher, HVAC
	S&LG LOANS - COLE CO R-V	46,200.00	Lighting
	S&LG LOANS - SIKESTON SD	1,351,100.00	Lights, HVAC, VFD
	S&LG LOANS - LEES SUMMI9T R-VII	2,499,700.00	BAS with controls
	S&LG LOANS - MO S&T	2,480,549.00	Fume hoods, sensors
	S&LG LOANS - CARROLL CO	33,350.00	Lighting, boiler
	S&LG LOANS - COMM HOSPITAL	314,425.00	Lighting, HVAC
	S&LG LOANS - CITY OF BUTLER	165,613.00	Lighting, building envelope
	S&LG LOANS - NE VERNON CO R-I	171,580.00	Lighting, building envelope
	S&LG LOANS - ROCKHURST UNIV	1,126,000.00	Lighting, HVAC
	S&LG LOANS - COLE CO R-I	448,000.00	Lighting
	S&LG LOANS - CEDAR COUNTY	38,100.00	Insulation, HVAC
	S&LG LOANS - LINCOLN UNIV	1,863,000.00	Lighting, boilers

PILOT - SCHOOLS AND GOVERNMENT	INDEPENDENCE SCHOOL DISTRICT	1,000,000.00	Boiler upgrade
STATE BUILDINGS	CROSSROADS/WESTERN CORR CNTR	1,437,860.52	Boiler tie
	EASTERN RECEPTION AND DIAGNOSTIC CORR CNTR	13,362.65	Heat trace system
	JEFFERSON CITY CORR CNTR	278,113.60	HVAC, building Automation
	NORTHEAST CORR CNTR	397,942.24	Boiler, HVAC, Building automation
	SOUTH CENTRAL CORR CNTR	209,455.76	Boiler, HVAC, Building automation
	SOUTHEAST CORR CNTR	280,783.00	Boiler, HVAC, Building automation
	WESTERN MO CORR CNTR	21,248.18	Building automation
	WOMEN'S EASTERN RECEPTION AND DISGNOSTIC CORR CNTR	129,798.51	HVAC, building Automation
	FULTON RECEPTION AND DIAGNOSTIC CNTR	86,732.00	HVAC, building Automation
	ST LOUIS PSYCHIATRIC CNTR	513,268.00	HVAC, building Automation
	ESP DEQ LABORATORY	966,297.87	HVAC, building Automation
STATE PARKS	STATE PARKS - ROARING RIVER	306,726.43	HVAC, building envelope, lighting
	STATE PARKS - MERAMEC	340,900.00	Solar PV, lighting, HVAC
	STATE PARKS - BIG LAKE	8,500.00	Energy audit
	STATE PARKS - BENNETT SPRINGS	310,800.59	Envelope, lighting, HVAC, hot water
	STATE PARKS - EDUCATIONAL COMPONENT	12,447.97	Poster, banner, brochures
ANAEROBIC DIGESTION AND LANDFILL METHANE	HAMPTON FEEDLOT	450,000.00	Anaerobic digester
	KCP&L GREATER MO OPERATIONS	450,000.00	Landfill biogas
RENEWABLE ENERGY STUDIES	BURNS & MCDONNELL ENGINEERING COMPANY	47,555.92	Waste-to Energy
	CITY OF SPRINGFIELD	39,938.88	Landfill heat and electricity
	CURATORS OF THE UNIVERSITY OF MISSOURI SOLAR	40,000.00	Solar water preheat
	CURATORS OF THE UNIVERSITY OF MISSOURI S&T	37,127.43	Tool for anaerobic digester
	CURATORS OF THE UNIVERSITY OF MISSOURI	47,405.51	Protocol for project evaluations
	GARNETT WOOD PRODUCTS	50,000.00	Waste heat for electricity
	GLAXOSMITHKLINE	22,990.80	Solar PV Electricity
	GLOBAL FUELS LLC	48,781.00	Conversion of biodiesel plant

RENEWABLE ENERGY STUDIES (cont.)	H2O'C ENGINEERING	50,000.00	Green diesel conversion
	METROPOLITAN ENERGY CENTER	50,000.00	Protocol for renewable energy
	MICROGRID ENERGY LLC	48,150.00	Solar electric systems
	MICROGRID ENERGY LLC	35,550.00	Prioritization plan
	MISSOURI AMERICAN WATER	14,428.02	Centrifugal pumps for energy recovery
	SUNESIS	26,016.00	Availability of biomass
	TATANKA RESOURCE	49,730.00	Grassy biomass for power plants
	WASHINGTON UNIVERSITY IN ST. LOUIS	50,000.00	Renewable application on campus
	VIBURNUM ECONOMIC DEVELOPMENT CORP	50,000.00	Woody biomass electricity gen.
ALGAE ENERGY ROADMAP	MO TECHNOLOGY CORP	180,000.00	Potential for algae based fuel
GEOHERMAL RESOURCE ASSESSMENT	DIVISION OF GEOLOGY AND LAND SURVEY	165,504.99	Groundwater temperature map
INDUSTRY - ENERGY EFFICIENCY	ABB INC	49,500.00	ASHRAE Level II Audit, HVAC
	ABLE MANUFACTURING	104,127.70	Lighting retrofit
	AC BUCKHORN LLC	159,859.00	Lighting upgrades
	ANHEUSER-BUSCH, INC	750,000.00	Lighting, boiler
	BODINE ALUMINUM INC.	605,000.00	Thermal oxidizer
	BOULEVARD BREWING COMPANY	33,769.43	Level II Audit, HVAC
	BUCHHEIT, INC.	40,196.04	Lighting upgrades
	BUCKMAN USA	45,261.00	insulation, boiler control
	CASCADES PLASTICS, INC	18,000.00	Lighting upgrades
	CASCADES PLASTICS, INC	50,000.00	Lighting upgrades
	CONTINENTAL CASTING LLC	123,850.00	Lighting, compressed air
	CONTINENTAL CEMENT COMPANY	50,000.00	Level III audit
	COVIDIEN (A)	500,000.00	Boiler
	COVIDIEN (B)	78,481.30	Chiller
	DURA AUTOMOTIVE SYSTEMS	15,000.00	Level II audit
	ELANTAS PDG INC.	46,480.30	Lighting, heat recovery
EVERLAST SPORTS MANUFACTURING	12,000.00	Level II audit	
FAMILY CENTER WAREHOUSE	8,912.76	Lighting upgrades	
HENNIGES AUTOMOTIVE	53,379.00	Air compressor	
HUBBELL POWER SYSTEMS (A)	125,585.03	Level II audit	

INDUSTRY - ENERGY EFFICIENCY (cont.)	HUBBELL POWER SYSTEMS (B)	15,000.00	Level II audit
	IVY STEEL & WIRE	71,672.52	Lighting retrofit
	K & S WIRE PRODUCTS	10,264.15	Level II audit
	LMC INDUSTRIES	50,000.00	Level II audit
	MISSISSIPPI LIME COMPANY	355,254.00	VFD, Fan upgrade
	MISSOURI PLATING COMPANY	112,479.00	Boiler replacement
	NESTLE PURINA PETCARE (B)	154,563.00	Level III audit
	NESTLE PURINA PETCARE (A)	481,651.25	Level III audit
	NEW WORLD PASTA (A)	500,000.00	Lighting and controls
	NEW WORLD PASTA (B)	62,647.30	Lighting and controls
	NORANDA ALUMINUM INCORPORATED	49,500.00	Level III audit
	ONESTEEL GRINDING SYSTEMS	250,000.00	Furnace recuperator
	REXAM FOOD CONTAINERS	24,460.99	Extrusion system
	SIGMA-ALDRICH	50,000.00	Level II and III audits
	SPRINGFIELD REMANUFACTURING CORPORATION	30,000.00	Level III audit
	SSM DE PAUL HOSPITAL	318,887.00	Boiler upgrade
	STANDARD TRANSPORTATION SERVICES	19,237.80	Lighting upgrades
	THORCO INDUSTRIES	15,000.00	Level II audit
	UNILEVER (A)	15,000.00	Level II audit
	UNILEVER (B)	15,000.00	Level II audit
	VON HOFFMAN CORPORATION	49,500.00	Level III audit
INDUSTRY - BEST PRICE	8760 ENERGY ENGINEERING LLC	225,000.00	Best Price achieved a total of 63,954,187 kWh of energy savings with an average cost of \$.0362/kWh saved. A total of 1,067 projects were implemented under the program which included lighting upgrades, gasket replacements, boiler replacement, compressed air upgrades, motor replacement, waste heat recovery, HVAC system upgrades, retro-commissioning. Control upgrades, and chiller replacements.
	AMEREN UE	499,999.01	
	BLUE SKY LIGHTING PRODUCTS	50,087.47	
	ECO ENGINEERING	20,582.29	
	ENERGY SOLUTIONS	100,000.00	
	GASKET GUY	495,638.36	
	HTE TECHNOLOGIES	100,000.00	
	INNOVATIVE FACILITIES SOLUTIONS	100,000.00	
	MISSOURI ENTERPRISE	185,838.49	
	MURPHY COMPANY MECHANICAL CONTRACTORS	238,420.77	
	OZARK ENERGY SERVICES	99,999.99	
SCHAEFFER MARKETING GROUP	100,000.00		
ZELLER TECHNOLOGIES	100,000.00		

INDUSTRY - PILOT	3 M	734,681.76	Thin film production line
	NORANDA	1,000,000.00	Process feed system
WATER AND WASTEWATER – REVOLVING LOANS	WWW LOANS - METROPOLITAN SD	223,793.00	Lighting, insulation
	WWW LOANS - PULASKI CO SD	181,500.00	VFD for pumps
	WWW LOANS - CITY OF HARRISONVILLE	380,000.00	Lighting, VFD, pumps
	WWW LOANS – CITY OF MARYVILLE	154,029.00	VFD, pump
AGRICULTURE - COST SHARE GRANTS	1,535 INDIVIDUALS	5,756,616.71	1535 grants up to \$5,000 each for energy efficiency and renewable energy projects. Projects/equipment included Solar Powered Water Pumps Solar Powered Fencers. Insulated or Frost Free Waterers, Global Positioning System (GPS) Irrigation Improvements Dairy Facility Improvements Swine Facility Improvements Poultry Facility Improvements Upgrade/New Grain Dryers Lighting Upgrades/Motion Sensors/Timers Conservation Tillage Equipment High Efficiency Electric Motors Biomass Furnaces/Boilers.
AGRICULTURE - FIELD DAY ENERGY TRAINING	BUTTERFLY ENERGY WORKS, LLC	39,345.40	Energy efficiency workshops (4) and conference (1)
	CURATORS OF THE UNIVERSITY OF MISSOURI	165,652.23	Energy efficiency workshops (29) and conference (1)
	KAYSINGER BASIN REGIONAL PLANNING COMMISSION	45,000.00	Energy efficiency workshops (7) and conference (1)
	MISSOURI BUSINESS DEVELOPMENT GROUP	117,356.17	Energy efficiency workshops (7) and conference (1)
POLICY, PLANNING AND ENERGY SECURITY	CADMUS GROUP, INC	159,996.09	Energy Stakeholder Process
	AMERICAN COUNCIL FOR ENERGY EFFICIENT ECONOMY	80,000.00	Energy efficiency policy potential
	KEMA, INC	100,000.00	Demand side management potential
	GDS ASSOCIATES	340,687.00	Cases before Public Service Commission