

# Innovative Energy Efficiency Projects Implemented by Local Governments in the Southwest

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**About SWEEP:** The Southwest Energy Efficiency Project is a public interest organization dedicated to advancing energy efficiency in Arizona, Colorado, Nevada, New Mexico, Utah and Wyoming. For more information, visit [www.swenergy.org](http://www.swenergy.org).

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## INTRODUCTION

In 2010, the buildings in which we work and live used roughly 40 percent of the energy in the U.S. economy at a cost of over \$400 billion. Through a variety of efficiency improvements (e.g., new lighting, greater insulation, more efficient heating and cooling) and proven approaches (clear information, access to financing, energy efficiency investment criteria), our nation can make these buildings more energy efficient and better places in which to live and work, while creating jobs and building a stronger economy.

Much can and is being done at the municipal level to save energy and money. Through innovative approaches to energy management, local governments are developing programs, implementing codes, retrofitting buildings and switching to renewable fuels that are saving energy, increasing comfort for residents and municipal employees while freeing up financial resources for homeowners, businesses and local governments.

The Southwest region (Arizona, Colorado, Nevada, New Mexico, Utah and Wyoming) experienced significant growth in funding to support energy efficiency in 2009-2010 as a result of the 2009 American Recovery and Reinvestment Act (ARRA). The U.S. Department of Energy (DOE) funding allocation to this region through the State Energy Program (SEP) for energy efficiency and renewable energy programs in 2008 was \$2,130,000. In 2009 this amount dramatically increased to \$231,507,000. In 2010 additional ARRA funding was added to the states through DOE's Energy Efficiency and Conservation Block Grants (EECBG) program, adding another \$205,334,400 to the region (see Table 1 below). Finally, an additional \$60 million was awarded to entities in three southwestern states (Arizona, Colorado and Nevada) in competitive grants through the EECBG Better Buildings Neighborhood Program. This dramatic influx of targeted funds enabled states, municipalities and nonprofit organizations to deliver energy efficiency programs and services in their communities to a degree never experienced before.

**Table 1: ARRA Funding for Energy Projects in Southwestern States**

STATE	2008 SEP appropriations (baseline DOE funding )	2009-2010 SEP supplemental appropriations (w/ ARRA funding)	2010 EECBG supplemental appropriations (w/ ARRA funding)
Arizona	\$476,000	\$55,447,000	\$72,722,900
Colorado	\$518,000	\$49,222,000	\$39,465,600
Nevada	\$279,000	\$34,714,000	\$32,529,800
New Mexico	\$297,000	\$31,821,000	\$22,272,500
Utah	\$327,000	\$35,362,000	\$26,035,300
Wyoming	\$215,000	\$24,941,000	\$12,308,800
<b>Regional Total</b>	<b>\$2,112,000</b>	<b>\$231,507,000</b>	<b>\$205,334,400</b>

Sources: [http://www1.eere.energy.gov/wip/recovery\\_act.html](http://www1.eere.energy.gov/wip/recovery_act.html)  
[http://www1.eere.energy.gov/wip/pdfs/state\\_allocations\\_fy2008.pdf](http://www1.eere.energy.gov/wip/pdfs/state_allocations_fy2008.pdf)

The EECBG program represented the Obama administration's priority to deploy the cheapest, cleanest, and most reliable energy resources available—energy efficiency and conservation—at the local level across the country. The program, authorized in Title V, Subtitle E of the 2007 Energy Independence and Security Act (EISA), is administered by the U.S. Department of Energy (DOE). It was intended to assist

U.S. cities, counties, states, territories, and Indian tribes to develop, promote, implement and manage energy efficiency and conservation projects and programs.

EECBG and SEP grants are used for communitywide energy efficiency and conservation programs and projects, as well as for renewable energy installations on government buildings. Activities eligible for use of funds include the following:

- Development of an energy efficiency and conservation strategy
- Building energy audits and retrofits, including weatherization
- Financial incentive programs for energy efficiency such as energy savings performance contracting, on-bill financing, and revolving loan funds
- Transportation programs to conserve energy and support renewable fuel infrastructure
- Building code development, implementation, and inspections
- Installation of distributed energy technologies such as combined heat and power, and district heating and cooling systems
- Material conservation programs including source reduction, recycling, and recycled content procurement programs
- Reduction and capture of greenhouse gas emissions generated by landfills or similar waste-related sources
- Installation of energy efficient traffic signals and street lighting
- Installation of renewable energy technologies on government buildings
- Any other appropriate activity that meets the purposes of the program and is approved by DOE.

In addition, using ARRA funds and annual appropriations, the “Better Buildings Neighborhood Program” provided \$508 million in one-time grants to 41 states and localities in 2010. Grantees work with nonprofits, building energy efficiency experts, financial institutions, utilities, and other organizations to develop and incubate community-based programs and incentives to spur demand building efficiency upgrades. According to the DOE, communities awarded funds through the Better Buildings Neighborhood Program will help achieve the following goals by the end of 2013:

- Develop sustainable energy efficiency upgrade programs
- Upgrade more than 150,000 residential and commercial buildings to be more energy efficient
- Save consumers approximately \$65 million annually on their energy bills
- Achieve 15% to 30% energy savings from energy efficiency upgrades
- Reduce the cost of energy efficiency program delivery by 20% or more
- Create or retain approximately 30,000 jobs
- Leverage more than \$3 billion in additional resources.

While most ARRA-funded grants were used by local communities for “tried and true” energy efficiency projects (e.g., retrofits to public buildings), several local governments implemented innovative projects or programs, in many cases leveraging resources and using creative means to accomplish program goals. To showcase these innovative efforts, SWEEP prepared this collection of case studies of energy efficiency initiatives by municipal governments in the Southwest. The featured programs are still underway and in some cases will continue beyond the ARRA grant period, but they already show significant achievements.

We believe that these examples provide models that other cities and counties may want to replicate in the future.

The eight communities and projects featured in this report include:

1. **City of Tempe, Arizona:** This \$8.7 million project used creative financing and engaged employee participation to save the City approximately \$550,000 annually.
2. **City of Flagstaff, Arizona:** This residential energy retrofit program helped residents lacking financial resources to invest in energy efficiency improvements, while developing job training opportunities in the community.
3. **Silver City & Grant County, New Mexico:** A new Joint Office of Sustainability offers energy efficiency programs leading to community self-reliance and community sustainability in mining communities.
4. **City of Mesa, Arizona:** Mesa's innovative energy code outreach and adoption process leads to a greater degree of community participation and support for new building codes.
5. **City of Reno, Nevada:** The city invested \$20 million in energy efficiency and renewable energy initiatives using a variety of creative approaches including grants, bonds, rebates and alternative financing mechanisms.
6. **Boulder County, Colorado:** This innovative energy efficiency retrofit program for the residential sector uses energy advisor/concierge services, rebates and program microloans.
7. **City of Espanola, New Mexico:** A smart building renovation plan converted City Hall from oil and natural gas fuel to geothermal heating & cooling, computer controlled thermostats, air handling systems and innovative insulation techniques.
8. **Salt Lake County, Utah:** The County reduces residential energy consumption by offering grants and low interest loan options for retrofits.

These profiles represent just a small sampling of innovative energy efficiency projects across the region. Collectively, by leveraging utility DSM programs, adopting creative financing and using ARRA funding, cities and counties continue to use energy efficiency as a key strategy to stimulate economic growth and employment, generate cost savings, promote technological innovation, and help to improve the environment.

## CITY OF TEMPE, ARIZONA

### *Creative Energy Financing and Employee Behavior*

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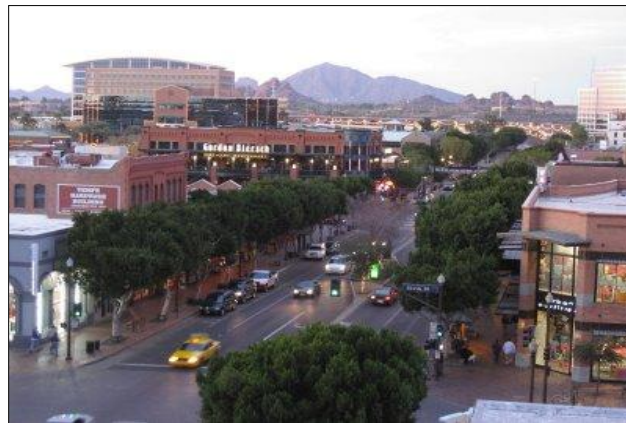
**Brief Description:** This \$8.7 million project leveraged \$930,000 in Energy Efficiency and Conservation Block Grant (EECBG) funds with \$7.3 Million in Qualified Energy Conservation Bonds (QECB) and \$375,000 in utility rebates. The entire project is estimated to save the City \$550,000 annually – \$440,000 each year from the building upgrade work and \$110,000 from changes to operations and maintenance procedures. In addition, a nine million pound reduction in carbon dioxide emissions is projected. The success of the project is attributed to the use of creative alternative financing, the involvement of an energy service company (ESCO) and employee participation.

#### **Background**

An energy savings performance contract (ESPC) is a partnership between a government entity and an energy service company (ESCO) that enables agencies to implement energy savings projects without the need for upfront capital or special governmental appropriations. Under an ESPC, the ESCO conducts a comprehensive energy assessment of facilities to identify energy saving opportunities. The ESCO then will design and implement projects to improve building energy efficiency. As part of the contract, the ESCO guarantees that building improvements will generate energy cost savings sufficient to pay for the project over the term of the contract. In turn, the agency pays the ESCO a share of its savings as a result of conservation improvements. Upon contract termination, all additional cost savings accrue to the agency. In the interim, the ESCO is responsible for maintaining the installed equipment and measuring building energy consumption and savings.

In 2010, the City of Tempe issued a request for proposal for an ESPC as a means to improve the energy efficiency of its facilities and drive down energy costs. Upon award of the contract, the ESCO conducted energy assessments of twenty-three buildings, including City Hall, five fire stations, one fire training facility, one police substation, three community centers, the Performing Arts Center, and Diablo Stadium (the spring training home of the Los Angeles Angels baseball team). Throughout the audit process, city staff met weekly with the ESCO to provide input and direction. The staff team came from a variety of different offices and departments including

Engineering, Finance, Public Works, and the City Attorney's Office. All were needed to ensure appropriate participation, review findings, and provide input throughout the process. Before the ESPC was accepted, the City Council reviewed and approved the Energy Performance Contract/Construction Agreement, Measurement and Verification Agreement, and the Davis-Bacon and "Buy-American" requirements (mandated for all ARRA-funded projects). The ESCO advised the City on the use of Qualified Energy Conservation Bonds (QECB) authorized by the Arizona Department of Commerce



*Downtown Tempe, Arizona*



(Energy Office). A QECB is a taxable bond issued by the local government to finance one or more qualified conservation projects. The Council approved use of QECBs for the project instead of traditional excise tax bonds, and QECBs provided the bulk of the financial resources needed to implement the energy efficiency projects.

### ***Energy Savings***

Energy conservation measures included lighting retrofits; heating, ventilation, and air conditioning (HVAC) retrofits; control system installations; retro-commissioning; water-saving opportunities; and operation and maintenance procedural changes. The ESCO is providing measurement and verification services for four years and equipment guarantee for fifteen years.

The \$8.7 million project was funded using \$930,000 in Energy Efficiency and Conservation Block Grant (EECBG) funds, \$375,000 in utility rebates, and \$7.3 million in QECBs. The entire project is estimated to save the City \$550,000 annually – \$440,000 each year from the energy efficiency retrofits and \$110,000 from changes to operations and maintenance procedures. In addition, the project is expected to reduce annual CO<sub>2</sub> emissions by nine million pounds. The first year of retrofit work created ninety construction jobs. The retrofits are 40 percent complete and are expected to be fully completed by May 2012.

### ***Energy Conservation Policy and Behavioral Changes***



*City of Tempe office building*

While equipment retrofits provided the bulk of energy savings, significant savings resulted from energy conservation policy and behavioral changes in operations and maintenance procedures. These changes were effectively implemented across the board in approximately one hundred city buildings.

For example, the custodial shift changed from nighttime to daylight hours in order to reduce evening HVAC and lighting loads. New thermostats were set to 75 degrees in summer and 68 degrees in winter. Employees can only adjust their office thermostats by three degrees up or down, instead of any range, to help save energy city and money. Employees also helped by emptying recycling and trash cans in common areas, vacuuming their own offices, and turning off computers and lights when not needed.

Individual behavior changes contributed to the project as a whole by involving the staff. According to Energy and Grants Project Manager, Grace DelMonte Kelly, the success of the endeavor could be attributed to good city leadership, staff participation and an experienced ESCO that facilitated good communication with all the staff and helped secure QECB bonds that were used to lower cost to finance projects. “The project could not have been as successful as it was without the outstanding and active participation and awareness of staff.”

### ***Project Future***

Looking forward, the City plans to conduct a second phase of energy assessments and work closely with the ESCO to identify other opportunities, track its energy savings, and celebrate its success!

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## CITY OF FLAGSTAFF, ARIZONA

### *Income-based Residential Energy Retrofit Program and Job Creation Opportunities*

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**Brief Description:** In 2009, the City of Flagstaff launched a Residential Energy Retrofit Program to help low-income residents save energy and money by identifying and addressing energy and water conservation opportunities in the home. The City contracted with Hope Construction and Regroup Performance Contracting to perform residential energy audits and retrofits. Both Flagstaff-based vendors worked closely with city staff and program participants to ensure consistency in project implementation, while offering job training and contributing to workforce development in the community.

#### *Introduction*

Supported by the City's ongoing commitment to energy efficiency, this program demonstrates a model for sustainable community action through on-going reductions in energy consumption and greenhouse gas emissions, while also promoting affordable living. Due to regional economic conditions, Flagstaff residents often lack fiscal resources that would spur investment in home energy efficiency improvements. Residential energy retrofits are complemented by job creation, workforce development, and a community-based educational model that prioritizes energy performance and individualized behavioral change education.



*Flagstaff home retrofitted for energy efficiency*  
Photo: Tom Boden

#### *Background*

In 2009, the City of Flagstaff Sustainability Program launched a Residential Energy Retrofit Program to help residents save energy and money by identifying and addressing energy and water conservation opportunities in the home. The program was developed to encourage all Flagstaff residents to invest in efficiency improvements regardless of income. The program was made possible by funding from Living Cities, LLC and the Department of Energy's (DOE) Energy Efficiency and Conservation Block Grant (EECBG) program.

Energy retrofits are available according to an income-based fee structure that leveraged EECBG funding with participant contributions toward the cost of assessments and upgrades. In order to participate, applicants must live within city limits, have been in their home for at least twelve months, have electric and gas utility records in their names, and prove US legal residency (per Arizona House Bill 2008). These requirements enable City staff to track the realized savings for each participant following the retrofit work, with the previous twelve months used as a baseline for accurate comparison. If the applicant is a renter they must obtain property authorization for the retrofit work.

As part of the program, participants receive a comprehensive home energy assessment to identify energy-saving opportunities, including a furnace inspection and carbon monoxide safety check. Conservation measures typically implemented include the installation of carbon monoxide detectors, compact fluorescent light bulbs, high-efficiency water fixtures, hot water heater insulation, hot water heater pipe insulation, and air sealing. The retrofit also includes comprehensive duct sealing. There is no insulation offered in the City's energy retrofit program; however, City staff and the building performance contractors educate residents about utility rebates available for insulation.

### ***Job Creation and Workforce Development***

The City of Flagstaff partnered with Energy Conservation Corps (ECC), a project of the Coconino Rural Environment Corps (CREC), to implement the Energy Retrofit Program as a public-private partnership that facilitates apprenticeship-style opportunities in the building science and performance industry. ECC crew members work alongside practicing building science professionals and contractors throughout the implementation of building retrofit services, gaining valuable skills which could lead to careers in energy efficiency and green building. ECC members also receive AmeriCorps Education Awards for use in pursuing post secondary education including energy efficiency certification programs.



*ECC members receive training on how to conduct an energy audit. Both members pictured were hired by local companies.*

ECC crew members participated in multiple training opportunities to advance their competitiveness in the energy efficiency field. Over the last year, ECC has successfully placed six newly trained individuals in the building energy performance workforce. New placements include Northern Arizona Council of Government's Weatherization Services, promotion within the ECC organization, and several local building performance companies.

### ***Energy Savings***

The City received \$587,100 through EECBG and has additional limited health and safety funds available for certain projects through a private foundation grant. Funding is expected to provide for roughly 360 retrofits. If an auditor finds a gas leak or high carbon monoxide levels at a combustion appliance, city staff will obtain a quote for mitigation of the health or safety issue and determine if the foundation health fund can pay for it.

Estimated savings are based on the energy auditor's report and retrofit measures installed. Before and after tracking is conducted on a monthly and accumulated basis to document energy, greenhouse gas, and cost savings resulting from energy retrofits. Savings realized during the first year of the program are influenced by total program participation and the date the energy retrofits were performed. The 165 energy retrofits performed during the program's first year result in an estimated annual savings of 592,603 kilowatt hours (kWh) and 912,608 pounds of carbon dioxide equivalent (CO<sub>2</sub>e). At the one-year benchmark, the



*Flagstaff community members participate in a Weatherization Clinic.*

City was at 49% completion. As the second year of the program started, 208 retrofits have been completed with EECBG funding, plus an additional 42 retrofits funded by other sources. More than 80% of EECBG funds have or will be directly infused into the Flagstaff community. The benefit to the community over the life of the retrofits (7 years) at year one is over \$1 million.

Energy savings rose sharply during the winter months when heating and lighting demands increase. During January-March, 2011, individual program participants reduced their energy costs by \$19 per month on average, compared to the same months in 2010 prior to the energy retrofits. Average electricity bills and use declined by \$7.48 (78 kWh) per month, while natural gas bills and use declined by about \$11 (9 therms) per month.

### ***Program Future***

The City Sustainability Program developed the Energy Retrofit Program to fill a niche in residential energy efficiency formerly not addressed by the utility companies. After ARRA funding ends in September 2012, the City intends to phase out the retrofit program and shift its focus to energy efficiency coaching and advocacy, while the local gas utility (Unisource) will begin providing incentives for residential energy efficiency upgrades.

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## SILVER CITY & GRANT COUNTY, NEW MEXICO

### *Energy Efficiency with New Joint Office of Sustainability*

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*Historic downtown Silver City*

**BRIEF DESCRIPTION:** Silver City and Grant County are closely tied to the copper mining industry, which has been impacted by downturns in the economy. These small communities received two Energy Efficiency and Conservation Block Grants (EECBG) and created a Joint Office of Sustainability with a broad goal of fostering a greater degree of community self-reliance through residential energy conservation, efficiency and large-scale renewable energy projects, as well as encouraging new green jobs, businesses, and economic development for the region.

#### ***Introduction***

In September 2007, the City Council of Silver City adopted a resolution to create a more sustainable community. It wasn't until April 2010, however, when Silver City and Grant County received federal stimulus funding through the 2009 American Reinvestment and Recovery Act (ARRA) that they could begin to implement this vision. Silver City and Grant County each received an Energy Efficiency and Conservation Block Grant (EECBG) from the U.S. Department of Energy (DOE). Silver City received \$341,298 in competitively awarded EECBG funding through the New Mexico Energy, Minerals, and Natural Resources Department (EMNRD); Grant County received \$126,400 as formula grant directly from DOE. From that funding, the Joint Office of Sustainability (JOS) was born.

The JOS coordinates energy efficiency, conservation and renewable energy activities for Silver City and Grant County, including the small mining communities of Bayard, Hurley, Hanover, Santa Clara, Tyrone and San Lorenzo, which have fewer resources or capacity to address energy efficiency and conservation.

The economic well-being of communities in Grant County is closely tied to the boom and bust cycles of the mining industry. Falling prices for copper have had a devastating economic impact, resulting in



layoffs of hundreds of workers. “Any attempt to save anybody money here is viewed as a very valuable thing,” comments JOS Director Nick Sussillo. “By being more efficient you’re going to save money.”

The JOS started by focusing on neighborhood energy efficiency programs, especially those for households with seniors, persons with disabilities, and those earning less than the median income. The *Energy Sense* program performed home energy assessments, basic weatherization improvements, and installation of clotheslines and compact fluorescent lights.

Sussillo notes that weatherization staff members offer energy education and outreach when they visit a home. “It’s an opportunity to have a focused conversation with the head of household or the family about the choices they have of changing their energy use behavior,” explains Sussillo. “They don’t have to rely on anybody else. They can simply choose to be more conscious about turning lights off after leaving the room, coordinating more closely with their kids, that kind of thing.”

The Joint Office of Sustainability also leveraged EECBG funds to improve the energy efficiency of public buildings and install a large-scale solar system. Most of the public buildings were built in the 1960s and 1970s, and those in the historic district were over 100 years old. An energy assessment of public buildings identified the need to replace lighting and HVAC systems with newer energy-efficient equipment. The City Council also approved plans for a one-megawatt solar photovoltaic (PV) system installed through a Solar Power Purchase Agreement, which uses a third-party company to build the solar system and connect it to the local utility's electricity grid. The system will be used for treating wastewater and pumping drinking water, which accounts for 80% of the city's utility bill.

### **Cost/Energy Savings**

Funding for the city building retrofits, new solar energy system and weatherization outreach effort included the two EECBG awards leveraged with \$1.19 million from Grant County and other sources.

As of October, 2011, the *Energy Sense* retrofit program had facilitated energy efficiency improvements in 384 homes (182 in the Town of Silver City, 45 in Grant County, and 157 in the Mining District). Most of the residents of the homes completed were low-income (76%), disabled (40%) and/or seniors (47%). The JOS estimates that the program generated total annual savings of 262,602 kWh of electricity and 55,950 therms of natural gas. At current rates that translates into total annual cost savings of \$63,785 (\$25,892 from electricity; \$37,893 from natural gas), reducing residential utility bills by \$166 per year on average.

### **Project Future**

Sussillo is confident that conservation, energy efficiency and renewable energy sources are the wave of the future for Silver City and Grant County. He sees this activity leading to new green jobs, businesses, and economic development for the region. “The broader goal here is to move to a greater degree of community self-reliance, because nobody knows where this nexus of energy, environment and economy is going. So the next time the shoe drops, hopefully the town will be little less impacted.”

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## CITY OF MESA, ARIZONA

### *Energy Code Outreach and Adoption Project*

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**Brief Description:** Because the City of Mesa had not previously adopted an energy code, and some contractors and designers who work in Mesa had little or no experience with energy codes, an aggressive Outreach and Strategic Development Plan was implemented involving a wide variety of stakeholders and organizations. The Development Plan included public forums to identify the benefits and costs of the energy code as well as common construction challenges so the City could provide reasonable alternatives to stakeholders. The Energy Code Outreach and Adoption Project successfully resulted in the City adopting the 2009 International Energy Conservation Code (IECC) in July 2011.

#### *Introduction*

The City of Mesa, Arizona is home to approximately 440,000 residents, making it the third most populous city in the state. In 2010, the City initiated a project to evaluate the adoption of an energy code as a means to improve the energy efficiency and indoor environment of its buildings and deliver significant energy bill savings for residents and businesses. Because Mesa had never before adopted an energy code, it recognized that community input was essential, especially from the building industry. To that end, Mesa developed a strategic roadmap for adoption of an energy code that included extensive research and stakeholder outreach. The goal was to fully understand how the adoption of an energy code citywide would impact Mesa's building industry, residents and businesses, and to determine which energy code would provide the most cost-effective energy savings.



*Panoramic view of Mesa, Arizona*

#### *Background and History of Project*

Because many policy makers and stakeholders in Mesa were not familiar with the requirements of an energy code, outreach and education efforts were essential before the city was willing to consider adoption of the code. As part of the year-long process, the City's development and sustainability staff facilitated a series of discussions with policy makers and stakeholders. Technical experts were available during some of these sessions to respond to code-specific questions. In total, the City engaged and solicited feedback from more than 75 stakeholders including property owners, residents, tenants, designers, engineers, contractors, home builders, commercial developers, reviewers, inspectors, facility managers, property managers, utility service providers, and trade organizations such as the Home Builders Association of Central Arizona, the Multi-Housing Association, and the Building Owners and Managers Association. In addition, the City used U.S. Department of Energy (DOE) Technical Assistance grant monies to work with the Pacific Northwest National Laboratory (PNNL) to assess the

potential impacts of the IECC on construction costs and energy savings for residential and commercial construction in Mesa. Finally, city staff contacted other jurisdictions across the United States to identify stumbling blocks and other lessons learned about to municipal energy code adoption.

In the spring of 2011, the staff presented their findings to the Council members and boards, in order to build support for this effort and recommend moving it forward to the full Council. Shortly thereafter, in the summer of 2011, the City Council voted in support of adoption of the 2009 IECC.

### ***Working in Partnership***



*New homes like this one built under the 2009 IECC include many energy-saving features.*

Although city staff members were knowledgeable about energy codes, they requested assistance from the DOE Technical Assistance Center (TAC) so they could learn about the best construction practices for compliance with the code in their climate zone. Through TAC, the Southwest Energy Efficiency Project (SWEET) assisted the City in developing a strategic outreach plan for implementation of the energy code. Challenges included limited knowledge of compliance techniques by builders and contractors; the higher cost of building to a state-of-the-art energy code; and changes to common construction methods. The staff's goal was to convince policy makers and stakeholders that compliance with the energy code is beneficial, achievable, and cost effective.

SWEET consulted with builders and representatives of related industries to assess their familiarity with the code and their areas of concern. They then contacted local jurisdictions across the United States inquiring about their outreach efforts to their local communities. The research found that none of them had documented their implementation plans, and that the majority of the jurisdictions had not documented their outreach process. SWEET also provided statistics and detailed information about construction technology related to the IECC. A facilitated discussion with stakeholders helped generate industry support for adoption of the 2009 IECC and is expected to increase the rate of compliance after adoption.

### ***Project Future***

According to the Building Codes Assistance Project (BCAP), average energy savings in a typical home are estimated at \$217 per year, with \$570 average incremental building cost, for a payback time of less than three years. At current rates, a new home is projected to save more than \$6510 in energy costs over the average 30-year life of appliances, HVAC and lighting.

The Energy Code Outreach Project resulted in the City adopting the 2009 IECC. Following this success, the City of Mesa is now considering adoption of the 2012 IECC and the International Green Construction Code (IGCC). The final Outreach and Strategic Development Plan will be placed on the PNNL website, where it will be available to other cities, states, and local jurisdictions developing their own plans for energy code adoption.

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## CITY OF RENO, NEVADA

### *Leveraged Financing for Energy Efficiency and Renewable Energy Initiative*

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**Brief Description:** In 2008, the City of Reno began an energy efficiency and renewable energy initiative that represented an investment of nearly \$20 million in clean energy projects. The City used a variety of approaches to financing energy saving and renewable energy projects including grants, bonds, rebates and alternative financing mechanisms. When the projects are completed, the impact on Reno's energy consumption will be significant.

#### *Introduction*

In an effort to reduce its carbon footprint and energy bills, the City of Reno began its Energy Efficiency and Renewable Energy Initiative under the City Council's Green Priority. The Initiative represents an investment of nearly \$20 million in energy efficiency and renewable energy projects in City buildings and facilities. The project was funded through a combination of Energy Efficiency & Conservation Block Grants (EECBG), Clean & Renewable Energy Bonds, Qualified Energy Conservation Bonds, Recovery Zone Economic Development Bonds, and NV Energy utility rebates. Energy savings are being used to pay off the bonds, with no impact to the city's general fund.

#### *Background*

Prior to receiving ARRA funding, the City of Reno was interested in implementing both cost-effective energy efficiency projects and some renewable energy projects in its buildings and facilities. The first step in the process was the selection of an Energy Services Company (ESCO) through a competitive bid process. The City contracted an ESCO in August of 2008 to conduct a yearlong energy and resource audit that included electricity, natural gas, and water use at all city facilities. The audit was completed in August of 2009.

In June and September of 2009, the City Council approved a series of Phase I and II projects which involved solar photovoltaic (PV) systems, small wind turbines, solar thermal heating systems, lighting retrofits, control systems, and a variety of HVAC upgrades. For Phase III the City contracted with a local solar company to install and operate eight new solar systems with a total of 1 MW generating capacity. In February 2010, the Nevada State Office of Energy (NSOE) started a streetlight retrofit program with ARRA funds. Among other projects,



*Energy-efficient LED bulbs light up the Reno Arch.*

the famous Reno Arch was retrofitted entirely with energy efficient LED bulbs. In addition, energy retrofits of City Hall will reduce its energy costs from \$4.54 to \$2.54 per square foot. Overall, the series of projects is expected to yield \$1.33 million in annual energy cost savings. A total of \$19.5 million has been spent on the project, including \$3.5 million for the renewable energy systems. “The renewable energy projects would not have been doable without the savings from the efficiency projects,” said Jason Geddes, Environmental Services Administrator with the City.

### ***Public-Private Partnership***

When the project was started, the intent was to have the ESCO provide third party financing. As the City advanced through the project, it was able to secure low-interest loans in the 1-4% range using new finance mechanisms such as Qualified Energy Conservation Bonds, Clean and Renewable Energy Bonds, and Recovery Zone Economic Development Bonds. The City used about \$2.7 million in EECBG and other ARRA funds to the project; however the ARRA funds represented only about 13% of the total investment in energy efficiency and renewable energy measures.

The City contracted with the ESCO to perform the energy audit and manage the first two phases of the project. All of the work performed by the ESCO utilized local private companies. The Solar Power Purchase Agreement (PPA) utilized third party financing, operation and maintenance, while the City provided an easement to the private company to locate the solar panels on City property and connect to the grid. This allowed the City to lower its purchase price by combining the utility rebates with the federal tax credit that the private company receives.

### ***Energy Savings***

When all the projects are completed, the City anticipates annual savings of about 6.3 million kWh of electricity and 225,000 therms of natural gas, while lowering its annual carbon footprint by roughly 17 million pounds of CO<sub>2</sub> each year. Energy efficiency measures will provide over 80 percent of the total electricity savings; renewable energy generation will provide about 18 percent.

The first solar PV array was installed in December 2008. The energy retrofits will be completed and commission by the spring of 2012. To date the projects have reduced the City’s energy use by over 20 percent, with several projects still to come on line. The Solar PPA will become active in November of 2011 and will provide 15 percent of the remaining power load of the City.

### ***Project Future***

As the City closes out the retrofit program and brings the solar projects on line, the staff is exploring more opportunities to save energy, such as installing additional solar thermal systems and ground source heat pumps at select locations through a PPA.

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## BOULDER COUNTY, COLORADO

### *Energy Advisory Service, Rebates and Microloans*

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**Brief Description:** The *EnergySmart* program is designed to stimulate local economic growth, increase energy efficiency investment in Boulder County, and advance energy independence through large-scale energy upgrades in both the commercial and residential sector. As of November 2011, more than 3,370 participants had enrolled in the residential program, with 1,371 upgrades completed. Participant survey results indicate high approval of the program.

#### **Background**

In 2006, the City of Boulder developed a Climate Action Plan (CAP) to serve as a roadmap for achieving Boulder's emissions reduction goals. One program concept that originated from Boulder's CAP focused on eliminating barriers to property owners making energy efficiency improvements to their buildings. This service included technical advisors sweeping through neighborhoods distributing information resources followed by an insulation truck initially known as "Two Techs and a Truck."

In May of 2010, a \$25 million ARRA grant was awarded to Boulder County and several sub-grantees, resulting in a significant expansion of the original program concept. After receiving the grant, Boulder County, the cities of Boulder and Longmont, and Xcel Energy collaborated to develop the original "Two Techs and a Truck" program design into the *EnergySmart* program.

#### **Energy Advisor**

Upon contacting the *EnergySmart* call center, homeowners are assigned an Energy Advisor who immediately establishes personal contact and visits the home to provide energy efficiency solutions. As a first step the Advisor installs efficient light bulbs, water saving showerheads and faucet aerators, insulation for water pipes and performs basic air sealing. The Advisor then connects homeowners with an Efficiency Specialist to perform an energy audit and create an *EnergySmart* Recommendations Report suggesting upgrades specific to the property.



*Energy Concierge/Advisor Service*

The Advisor then helps schedule at least three bids from pre-certified contractors, reviews proposals with the homeowners, and helps the homeowner apply for all available government and utility rebates, tax credits and financing options to lower the cost of these improvements. This full service, concierge approach leads to much higher implementation of recommended efficiency measures compared to what occurs in a typical energy audit program.

### ***Rebates and Financing Available for Homeowners***

Rebates of up to \$250 per home are available for participants for the measures listed below. For owners of multiple units, total rebates are limited to \$1000 per owner. Unless otherwise specified, any product or installation must meet current ENERGY STAR® standards at minimum, if such standards exist for that given product or application.

To help pay for the upgrades, the program offers special low-interest "microloans" of \$500-\$5000. The 2.5% interest rate on these loans covers administrative costs. *EnergySmart* Microloans are designed to help Boulder County residents overcome some of the financial barrier to investing in home energy upgrades. The loan repayment schedules are based on amount of the principal balance: one year for up to \$1,500; two years for \$1,501-\$3,000; and three years for \$3,001-\$5,000.

The *EnergySense* program uses a unique variety of program marketing techniques, including social media (Facebook, Twitter, and Groupon), newspaper, radio and online ads, interviews on public interest TV and radio, web video, fliers and door hangers. Contractor capacity ramped up due in large part to program's double rebate promotion running from May 1 – July 31, 2011.

The table below outlines three paths for homeowners in Boulder County to participate in *EnergySmart* at very moderate cost.

**Table 3: Paths for participation in EnergySmart**

OPTION	COST	DESCRIPTION
<b>Full Home Assessment</b>	\$120	A technical expert thoroughly assesses the home to pinpoint areas of energy waste and leakage. The Energy Advisor uses the results of that assessment to help make a plan for the home, plus gives out quick energy-saving items, helps with contractor selection, and assists with rebates and financing.
<b>Advisor-only Service</b>	\$30	If the homeowner is already working closely with a contractor or knows exactly what upgrades they would like to make in the home, an Advisor-only service is available. The homeowner gets quick energy-saving items, help with contractor selection (if needed), and assistance with rebates and financing. This option does not include a detailed energy assessment.
<b>Already had an audit</b>	FREE	If homeowner has had an audit in the last 3 years and can provide the audit report, the Energy Advisor services are free. This includes quick energy-saving items, help with contractor selection, and assistance with rebates and financing.

### **Project Results**

As of November, 2011, more than 3,370 homeowners had enrolled in the residential program, with 1,371 upgrades completed. Another 138 homeowners have retrofit work either scheduled or in the process of being completed. Annual energy savings average about 78 therms and 296 kWh per household. Of the households in which audits were completed, 55 percent move forward with at least one recommended retrofit project in addition to the quick energy-saving measures installed by the Advisor. Participant survey results indicate high approval of the program, especially the unique Energy Advisor services.

### **Project Future**

Boulder County continues to develop and market the *EnergySmart* Program to residents and businesses with a participation goal of at least 10,000 homes and 3,000 businesses by June 2013. The County is currently studying alternative options and strategies to continue implementation of the program after ARRA funding expires. For example, the County is exploring the possibility of establishing a revolving loan fund with partners such as local credit unions.

*“Having (an Advisor) is great. The process is so detailed and can be overwhelming even for an interested citizen. The relaxed, informed “we can find that out” attitude of Greg has been great. As a trained architect, all manner of things I could not find answers to — he has helped me with. And I appreciate having actual measurements and hard data to use to make choices. When I tried this on my own, it felt like a shot in the dark.”*

—Loraine Masterton, homeowner and program participant



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## CITY OF ESPANOLA, NEW MEXICO

### *City Hall Energy Retrofit*

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**Brief Description:** Federal stimulus funds of \$451,680 and supplemental funds of \$145,990 were used to install a geothermal heating and cooling system with computer-controlled thermostats and air handling system for the City of Espanola City Hall. In addition to saving the city 50% on heating and cooling bills, the improved office comfort has increased employee productivity.

#### *Background*

In February, 2011, New Mexico experienced its coldest weather in 40 years, resulting in a failure of the state's natural gas distribution system. Communities across New Mexico, including Espanola, lost their main heat source for multiple days during sub-zero temperatures. In the midst of this crisis, Espanola City Hall remained warm through a recent smart building renovation which included the installation of a new geothermal energy system, computer controlled thermostats, a new air handling system, and improved thermal insulation.

“Aging heating and cooling systems were taking their toll on the city budget and employee productivity”, said Joe Duran, a building official with the Planning Office. “Before this upgrade, employees and visitors hated to see cold weather coming.” A 30-year-old gas-fired boiler and forced air heating system at City Hall had reached the end of its life. Even after conversion to an electric boiler, the forced-air system was still inefficient and performed poorly. Many employees resorted to using small, electric space heaters to stay warm. The summer was just as bad. Evaporative “swamp” coolers barely cooled the 10,000 square-foot building during the summer. Neither system provided much comfort for the roughly 25 employees and the many daily visitors doing business with the City.

Using ARRA and supplemental funding, the City installed a geothermal heating and cooling system, new computer-controlled thermostats, and a new air handling system. The City also took the opportunity to implement other energy efficiency measures in order to maximize savings. The old evaporative cooling units were removed and the roof was repaired, coated with sprayed urethane foam insulation, and sealed. The insulation provides substantial protection against heating and cooling losses. Vestibules were also installed at all three entrances, with double sets of doors acting as airlocks to isolate the heated or cooled inside air from the outdoors.

### ***How Does the Geothermal Heating and Cooling System Work?***

A series of water-filled, high-density plastic tubes in a closed-loop system run through 200-ft-deep bore holes in the City Hall parking lot. Below frost line, the earth's temperature stays a constant 50 to 55 degrees year round. For heating, this water is pumped through a heat exchanger, where another closed system containing a compressor and refrigerant draws the heat from the geothermal-warmed water.

The entire system uses electricity, eliminating natural gas costs. Each of the 16 heat pumps is located near its distribution zone. A central computer regulates the 27 thermostats installed in each zone. City staff in each thermostat zone can choose their own level of comfort. The system automatically drops the temperature to 69 degrees after regular business hours, even if people forget to lower the thermostat at the end of the day. Duran especially likes the new smart system's ability to monitor units in real time. All of the data on heating, cooling, and energy consumption are available at his desktop computer.



*The array of 27 sensors that send thermostat information to the web-based tracking program (Inset: Zone thermostat that sends data to the sensors)*



*Water circulates through a closed-loop system of pipes buried in the parking lot behind City Hall.*

City employees were trained in the use of the new thermostatic controls. Mr. Duran is able to program and regulate both high and low temperature ranges system-wide. The thermostats are efficiently monitored using a web-based system. The monitoring reports also make the city's budgeting process easier and more predictable.

Duran said the geothermal system heats more efficiently than the boiler used over the last eight years and already has saved the city half its usual electricity cost. "There is no comparison," said Duran, who has worked for the city for 34 years. "Everyone is pretty comfortable with the heat. Even the public comes in and feels more relaxed."

### ***Energy Savings and Project Future***

The system cost about \$598,000 to install. The City used \$451,680 in ARRA funds and \$145,990 of its own funds to pay for the project. During the first two months the system was in operation, the building's electricity bill was 50% lower than the same two

months in the previous year. The estimated savings to the city in heating, cooling and electricity costs are \$42,000 annually, with estimated total savings of \$1.26 million over the projected 30-year life of the system. In addition, the project substantially improves employee comfort and productivity due to better heating and cooling, and greater controllability. According to estimates from the New Mexico Energy, Minerals and Natural Resources Department, the system also helped the city cut its greenhouse-gas emissions by approximately 680,000 pounds per year.

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## SALT LAKE COUNTY, UTAH

### *Energy Smart Loans*

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**Brief Description:** Salt Lake County's Energy Smart Loan program provides low interest loans to moderate and low-income homeowners for energy efficiency improvements.

#### **Background**

Salt Lake County's *Energy Smart* Loan program consists of about \$1 million for loans to homeowners in Salt Lake County who want to implement energy efficiency upgrades but don't have access to capital. The program supports any major retrofit project that is cost-effective, including furnace replacement, insulation, windows and renewable energy systems.



Interested property owners begin with a complete home energy assessment, whereby certified contractors review the age and condition of the furnace, water heater, air conditioner and other major appliances, and the condition of the thermal envelope. A blower door test is performed to assess the amount of air leaking through doors, windows and other accesses to the home. Following the assessment, a county representative reviews where energy is being wasted and works with the homeowner to identify the home's critical energy efficiency needs. After obtaining a contractor's bid for the project cost, the representative reviews the financing options available with an *Energy Smart* loan which would cover the full cost of the home improvement. Furnace upgrades and attic insulation are the most popular retrofit items. Each applicant is required to go through at least one hour of energy conservation training. After a retrofit project is completed, the homeowner is required to submit monthly utility bills for at least 18 months so the County can track energy savings.

The program offers loans from \$2,000 up to \$50,000. Borrowers must have a credit score of 600 or higher to qualify, and must have a combined household income that is 80% or less than the county median in order to qualify for the lowest interest rates. Loans are provided to homeowners with payment period of two to ten years at interest rates from zero to five percent. Rates are determined by income:

- 0% interest for homeowners earning less than 50% of Area Median Income (AMI);
- 3% interest for homeowners earning 50-80% AMI;
- 5% interest for homeowners earning greater than 80% AMI.

Representatives from the program help participants identify and apply for all tax credits and utility rebates. Rebates received by the homeowner are used to reduce the principal amount of the loan. All measures installed must be ENERGY STAR rated.

The loans are underwritten by the County and administered by Community Development Corporation of Utah, a nonprofit organization with the mission to develop sustainable and affordable housing, revitalize neighborhoods and communities, and promote self-sufficiency through home ownership. The loan pool was created using ARRA funds as well as financing provided by GE Capital and Morgan Stanley Bank, N.A.

### ***Program Results***

The loan program was launched in November of 2010. Due to a high level of interest, grant funding for low-interest loans was fully expended by April 1, 2011. However, *Energy Smart* loans were still available at 5% fixed interest as of October 2011. As of October 2011, *Energy Smart* loans had been provided to 83 households. While some program participants have realized energy savings of as high as 45 percent, the average savings is 21 percent.

### ***Project Future***

Salt Lake County is now developing a program as part of the national Green and Healthy Homes Initiative (GHHI) to implement an integrated approach to home weatherization, energy efficiency upgrades, and health and safety improvements. GHHI replaces stand-alone programs with a comprehensive approach in order to create safer and more stable homes, improve occupant health, cut energy costs, and provide high quality green jobs.



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## CONCLUSION

Federal funding under the 2009 American Recovery and Reinvestment Act provided a unique opportunity ramp up energy efficiency and renewable energy projects in most every major city and county across the country. The project profiles presented in this report represent a small but diverse sampling of the hundreds of projects in the Southwest, showcasing a variety of ways in which energy efficiency saves money, increases community economic development opportunities, and helps the environment.

The cities and counties profiled in this report demonstrated a number of innovative approaches to promoting and implementing energy efficiency improvements in residential and commercial buildings, including:

- leveraging federal funds through use of municipal bonding authority;
- adopting a state-of-the-art building energy code in a city that previously had no energy code;
- offering low-interest loans to facilitate residential retrofits;
- providing workforce training while emphasizing energy and water saving retrofits in low-income households; and
- utilizing the rapid economic payback of energy efficiency projects to justify longer-payback renewable energy measures for public buildings.

As part of the U.S. Department of Energy's Recovery Act Technical Assistance Program, SWEEP offered direct assistance to states, counties and cities in the Southwest to develop and implement effective energy efficiency projects. Although the ARRA funding period will soon be complete, SWEEP continues to advocate for the implementation and adoption of strong energy efficiency policies and proven technologies throughout the region.