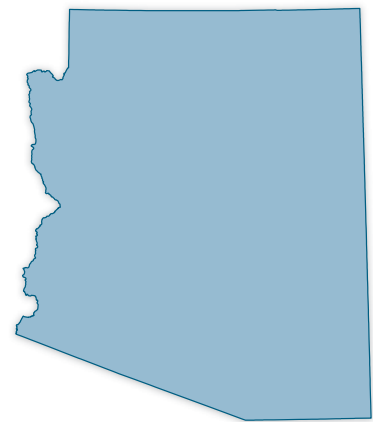




# Department of Energy Recovery Act State Memos

## Arizona



For questions about DOE's Recovery Act activities, please contact the DOE Recovery Act Clearinghouse:  
1-888-DOE-RCVY (888-363-7289), Monday through Friday, 9 a.m. to 7 p.m. Eastern Time  
<https://recoveryclearinghouse.energy.gov/contactUs.htm>.

*All numbers and projects listed as of June 1, 2010*



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# American Recovery and Reinvestment Act



## U.S. DEPARTMENT OF ENERGY • ARIZONA RECOVERY ACT SNAPSHOT

Funding for selected DOE projects: \$550.5 million

DOE Recovery Act projects in Arizona: 76

Clean energy tax credits and grants: 28

For total Recovery Act jobs numbers in Arizona go to [www.recovery.gov](http://www.recovery.gov)

Arizona has substantial natural resources, including coal, solar, and hydroelectric resources. The **American Recovery & Reinvestment Act (ARRA)** is making a meaningful down payment on the nation's energy and environmental future. The Recovery Act investments in Arizona reflect a broad range of clean energy projects, from energy efficiency and the smart grid to transportation, carbon capture and storage, and geothermal energy. Through these investments, Arizona's businesses, universities, non-profits, and local governments are creating quality jobs today and positioning Arizona to play an important role in the new energy economy of the future.

### EXAMPLES OF ARIZONA FORMULA GRANTS

Program	State Energy Program	Weatherization Assistance Program	Energy Efficiency Conservation Block Grants	Energy Efficiency Appliance Rebate Program
Award (in millions)	\$55.4	\$66.1	\$72.5	\$6.2
	The Arizona Department of Commerce has received \$55.4 million in State Energy Program funds to invest in state-level energy efficiency and renewable energy priorities.	The State of Arizona has received \$66.1 million in Weatherization Assistance Program funds to scale-up existing weatherization efforts in the state, creating jobs, reducing carbon emissions, and saving money for Arizona's low-income families. Over the course of the Recovery Act, Arizona expects to weatherize more than 6,400 homes. The program also includes workforce training and education as part of the state's efforts to develop a green workforce. The Navajo Nation has been granted \$9.1 million in Weatherization Assistance Program funds.	Fifty-two communities in Arizona received a total of \$72.5 million for Energy Efficiency and Conservation Block Grants (EECBG) to develop, promote, implement, and manage localized energy efficiency programs.	The Arizona Department of Commerce has received \$6.2 million for the Energy Efficient Appliance Rebate Program, which offers consumer rebates for purchasing certain ENERGY STAR® appliances. These energy efficient appliances reduce energy use and save money for families, while helping the environment and supporting the local economy.

### EXAMPLES OF ARIZONA COMPETITIVE GRANTS AND TAX CREDITS

Award	\$101.4 million	\$70.5 million	\$56.9 million	\$35 million	\$32.2 million
	<b>Electric Transportation Engineering Corp.</b> in Phoenix was awarded \$101.4 million for transportation electrification. ETEC will deploy 4,700 electric vehicles in five major cities across the U.S. and install various types of chargers in commercial and residential locations to gain a better understanding of electric vehicle operation.	<b>Arizona Public Service Company</b> in Phoenix was awarded \$70.5 million for <b>Industrial Carbon Capture and Storage Applications</b> . The company will use the funds to cultivate algae for fuel production with coal gasification.	The <b>Salt River Project</b> in Tempe was awarded a <b>Smart Grid Investment Grant</b> for \$56.9 million to install over 540,000 smart meters that will help consumers reduce their energy use and save money.	Arizona received <b>twenty-two 1603 payments for renewable energy generation</b> totaling \$35 million, which include solar electricity, solar thermal, and wind projects. For example <b>Dry Lake Wind Power LLC</b> received \$31.3 million for a wind facility.	<b>Southwest Transmission Cooperative, Inc.</b> , in Benson, was awarded a <b>Smart Grid Investment Grant</b> for \$32.2 million to perform digital upgrades to the electric grid, install smart meters for more than 44,000 consumers, and enhance the existing electrical infrastructure.

## Funding Allocation Table (Figure 1)

Total dollar amounts in this document are accurate as of June 1, 2010. Please note that Recovery Act Programs are ongoing and the dollar amounts are subject to change. Recipient locations are based on project sites rather than recipients' headquarters locations.

Recovery Act Pillar	Flagship Program Names & Funding Type <sup>1</sup>	Number of Selections	Selected Amount (in millions) <sup>2</sup>
Energy Efficiency	<i>Weatherization Assistance Program (F)</i>	2	\$66.1
	<i>State Energy Program (F)</i>	1	\$55.4
	<i>Energy Efficiency and Conservation Block Grant (F)</i>	52	\$72.5
	<i>BetterBuildings(CM)</i>	1	\$25.0
	<i>Energy Efficient Appliance Rebate (F)</i>	1	\$6.2
	<b>TOTAL Energy Efficiency</b>	<b>57</b>	<b>\$225.2</b>
Renewable Energy	<i>Solar (CM)</i>	2	\$0.9
	<i>Geothermal (CM)</i>	1	\$17.8
	<b>TOTAL Renewable Energy</b>	<b>3</b>	<b>\$18.7</b>
Electric Grid	<i>Smart Grid Investment and Demonstrations Project (CM)<sup>3</sup></i>	3	\$94.1
	<i>State and Local Energy Assurance and Regulatory Assistance (F)</i>	4	\$2.3
	<i>Smart Grid Workforce Training (CM)<sup>3</sup></i>	1	\$0.7
	<b>TOTAL Electric Grid</b>	<b>8</b>	<b>\$97.1</b>
Transportation	<i>Transportation Electrification (CM)</i>	1	\$101.4
	<b>TOTAL Transportation</b>	<b>1</b>	<b>\$101.4</b>
Carbon Capture and Storage	<i>CCS Projects (CM)</i>	1	\$70.5
	<b>TOTAL Carbon Capture and Storage</b>	<b>1</b>	<b>\$70.5</b>
Science and Innovation	<i>Advanced Research Projects Agency - Energy (ARPA-E) (CM)</i>	2	\$10.3
	<i>Energy Frontier Research Centers (CM)</i>	2	\$27.0
	<i>Small Business Research (SBIR/STTR) (CM)</i>	2	\$0.3
	<b>TOTAL Science and Innovation</b>	<b>6</b>	<b>\$37.6</b>
<b>TOTAL - DOE Programs<sup>4</sup></b>		<b>76</b>	<b>\$550.5</b>
Tax Credits/ Grants <sup>5</sup>	<i>Payments for Renewable Energy Generation in Lieu of Tax Credits (1603)</i>	22	\$35.0
	<i>Clean Energy Manufacturing Tax Credits (48C)</i>	6	\$29.8
	<b>TOTAL Tax Incentives</b>	<b>28</b>	<b>\$64.8</b>
<b>TOTAL - DOE/Treasury + DOE</b>		<b>104</b>	<b>\$615.3</b>
<sup>1</sup> F=Formula Grant, CM=Competitive Grant, C=Contract			
<sup>2</sup> "Selected" indicates DOE has selected a potential funding recipient, which begins the process of negotiating an agreement. This does not necessarily indicate that a final agreement has been reached			
<sup>3</sup> Projects may cross state boundaries, signifies HQ location.			
<sup>4</sup> Total does not include administrative funds.			
<sup>5</sup> Jointly administered by DOE and the U.S. Department of Treasury.			

## **ENERGY EFFICIENCY – 57 projects totaling \$225.2 million**

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*Helping millions of American families cut utility bills by making homes and appliances more energy efficient, expanding the home efficiency industry in sales and manufacturing. For more information, visit <http://www.energy.gov/recovery/energyefficiency.htm>.*

### **Award(s): 2 totaling \$66.1 million, Weatherization Assistance Program (WAP)**

#### **Location: Statewide**

Arizona received \$66.1 million in Weatherization Assistance Program funds to scale-up existing weatherization efforts in the state, creating jobs, reducing carbon emissions and saving money for Arizona's low-income families. Over the course of the Recovery Act, Arizona expects to weatherize more than 6,400 homes. The program also includes workforce training and education as part of the state's efforts to develop a green workforce. In addition, the Navajo Nation received \$9.1 million in Weatherization Assistance Program funds.

- **Arizona Department of Commerce, Statewide - \$57 million**

Arizona's Weatherization Assistance Program estimates it has saved \$65,123 for homeowners since the first Recovery Act home retrofit was completed by NACOG on Sept. 4, 2009. To date, 905 home energy retrofits have been completed statewide using stimulus funds. This has cut kWh usage in Arizona by 576,828 and reduced emission offsets equivalent to 1,052,971 miles not driven on Arizona roads.

- **Navajo Nation - \$9.1 million**

This program provides reduced heating and cooling costs for low income families by improving the energy efficiency of their homes and ensuring the health and safety of those that reside in the Arizona portion of the Navajo Nation.

### **Award(s): \$55.4 million, State Energy Program (SEP)**

#### **Location: Statewide**

The Arizona Department of Commerce received \$55.4 million in State Energy Program funds to invest in state-level energy efficiency and renewable energy priorities. Arizona is establishing a revolving loan program to provide a sustainable financing mechanism for small business owners who are looking to fund energy efficient building improvements or solar projects at their facilities. The state is also offering revolving loan funds for energy efficiency and renewable energy projects in commercial buildings. Other projects in this program include installing energy efficiency retrofits in K-12 school buildings, incentivizing public utility programs to implement energy efficiency and renewable energy technologies and providing competitive matching grants for biofuel infrastructure projects.

### **Award(s): 52 totaling \$66.2 million, Energy Efficiency and Conservation Block Grant Program (EECBG)**

#### **Location: Statewide**

**Recipients:** Ak-Chin Indian Community, Avondale, Bullhead, Bullhead, Casa Grande, Chandler, City Of Flagstaff, City Of Peoria, City Of Prescott, City Of Tucson, Cochise, Coconino, Cocopah Indian Tribe Colorado River Indian Tribe, County Of Apache, County Of Maricopa, County Of Pinal, Department Of Commerce Arizona, Ft Mc Dowell Yavapai Nation, Gila River Indian Community, Gilbert, Glendale, Goodyear, Hopi Tribal Housing Authority, Hualapai Tribal Council, Kaibab Paiute Tribal Council, Lake Havasu, Maricopa City, Maricopa City, Mesa, Mohave, Navajo Tribal Utility Authority Company,

Navajo, Oro Valley, Pascua Yaqui Tribe, Phoenix, Pima County, Prescott Valley, Quechan Indian Tribe, Salt River Pima-Maricopa Indian Community Social Service, San Carlos Apache Tribal Council, Scottsdale, Sierra Vista, Surprise, Tempe, Tohono O'odham Nation, White Mountain Apache Tribe, Yavapai Apache Nation, Yavapai Prescott Tribe, Yavapai, Yuma

Fifty-two communities in Arizona received a total of \$66.2 million for the Energy Efficiency and Conservation Block Grants Program (EECBG) to develop, promote, implement and manage localized energy efficiency programs. Four of these grants, totaling \$6.3 million, are shared by Arizona and at least one other state.

The project funds programs that reduce fossil fuel emissions in a manner that is environmentally sustainable, maximizes cost savings, reduces the total energy use of the eligible entities and improves energy efficiency in the transportation, building and other appropriate sectors. Examples of EECBGs include:

- **City of Phoenix - \$15.2 million**

The City of Phoenix is engaging an energy services company, through the city's annual services procurement process, to initiate the benchmarking activity of City facilities. In parallel, the city is reviewing a facility's solarization study draft report from Arizona State University (ASU) conducted this summer by ASU on behalf of the city.

- **City of Tucson - \$5.2 million**

The City of Tucson is using these funds for energy efficiency home retrofits, transportation efficiency programs, financial incentive programs and enhanced public education programs on energy efficiency and greenhouse gas reduction.

- **City of Mesa - \$4.2 million**

Mesa is using this funding for six main programs: the Energy Efficiency and Conservation Program is providing energy consultant/technical assistance, energy efficient retrofits, street lighting, the Transit Corridor Development Plan, solar installation at the CAP Water Treatment Plant and the adoption of an energy code. Mesa anticipates creating over 45 jobs, saving over 19 million kWh of electricity, generating over 5 million kWh of electricity and reducing greenhouse gas emissions by over 17,000 metric tons of Carbon Dioxide.

- **City of Glendale - \$2.3 million**

Glendale is installing LEDs in traffic signals, park ball fields, the Glendale Main Library, the police & city court building, and a water treatment plant. The library's lighting system is severely outdated and replacement bulbs are no longer available. The city estimates that the projects will save \$449,000 in electrical and repair bills each year because of these energy-efficiency stimulus improvements.

**Award(s): \$6.2 million, Energy Efficient Appliance Rebate Programs**

**Location: Statewide**

The Arizona Department of Commerce received \$6.2 million for the Energy Efficient Appliance Rebate Program, which offers consumer rebates for purchasing certain ENERGY STAR® appliances. These energy efficient appliances reduce energy use, save money for families, help the environment



and support the local economy. This project supports state-level rebate programs for residential ENERGY STAR appliance purchases by paying up to 50 percent of the administration costs of establishing and executing the rebate program. Although states and territories are determining which appliances apply, covered appliances typically include clothes washers, dishwashers, refrigerators, freezers, room air conditioners and water heaters.

**Award(s): \$25 million, BetterBuildings**

**Location: Phoenix**

Phoenix received \$25 million for a project entitled “*Energize Phoenix: Transformation through Behavior and Retrofits along the Green Rail Corridor.*” This project will focus on building retrofits along a ten mile stretch adjacent to the new Phoenix light-rail, including a number of diverse residential and commercial areas. The project seeks to retrofit 50 percent of all commercial and residential spaces in the Green Rail Corridor over three years. The project is advertising opportunities for energy savings and retrofits on the train itself and is utilizing a revolving loan program to continue energy retrofits in the years ahead. The City of Phoenix is partnering with the Arizona State University, Arizona Public Service, five banks, local businesses and a community college in the area.

## **RENEWABLE ENERGY – 31 projects totaling \$83.5 million**

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*Developing the clean renewable resources in order to double our supply of renewable energy and boost domestic renewable manufacturing capacity. For more information, visit <http://www.energy.gov/recovery/renewableenergy.htm>.*

**Award(s): 22 payments totaling \$35 million from DOE / Treasury, 1603 Payments for Renewable Energy Generation**

**Location: Statewide**

\*For current number of 1603 awards, see the weekly update at <http://www.treas.gov/recovery/1603.shtml>

Arizona received twenty-two 1603 payments for renewable energy generation totaling \$35 million, which include solar electricity, solar thermal and wind projects.

- **Dry Lake Wind Power, LLC, Heber - \$31.3 million**  
The Dry Lake Wind, LLC, in Heber received \$31.3 million for a wind facility.
- **National City Energy Capital, LLC, Tempe (2) - \$2.7million**  
National City Energy Capital, LLC, in Tempe received two awards totaling \$2.7 million for solar electricity projects.
- **BGH Commercial, Scottsdale - \$215,000**  
BGH Commercial in Scottsdale received \$215,000 for a solar electricity project.
- **Glendale Imperial, LLC, Glendale - \$198,000**  
Glendale Imperial, LLC, in Glendale received \$198,000 for a solar electricity project.
- **Green Choice Solar, LLC, Scottsdale (3) - \$147,000**  
Green Choice Solar, LLC, in Scottsdale received three awards totaling \$147,000 for solar electricity projects.

- **Christensen Computer Company, Fountain Hills - \$78,000**  
Christensen Computer Company in Fountain Hills received \$78,000 for a solar electricity project.
- **Renewables Energy - I, LLC, Tempe - \$47,000**  
Renewables Energy - I, LLC, in Tempe received \$47,000 for a solar electricity project.
- **Royal Covers of Arizona Inc., Mesa - \$42,000**  
Royal Covers of Arizona, Inc., in Mesa received \$42,000 for a solar electricity project.
- **Art of Solar Corporation, Willcox - \$40,000**  
Art of Solar Corporation in Willcox received \$40,000 for a solar electricity project.
- **Sweet Sunset dba Super Suds Car Wash, Benson - \$40,000**  
Sweet Sunset (dba Super Suds Car Wash) in Benson received \$40,000 for a solar electricity project.
- **American Tower Corporation, Tucson - \$34,000**  
American Tower Corporation in Tucson received \$34,000 for a solar electricity project.
- **Automated Environments, Mesa - \$33,000**  
Automated Environments in Mesa received \$33,000 for a solar electricity project.
- **Sycamore Ranch, Mayer - \$24,000**  
Sycamore Ranch in Mayer received \$24,000 for a solar electricity project.
- **Kevin B Howard Architects, Oro Valley - \$19,000**  
Kevin B Howard Architects in Oro Valley received \$19,000 for a solar electricity project.
- **BHE Financial, Inc., Phoenix - \$18,000**  
BHE Financial, Inc., in Phoenix received \$18,000 for a solar thermal project.
- **Grand Vista Hotel, Bullhead City - \$17,000**  
Grand Vista Hotel in Bullhead City received \$17,000 for a solar electricity project.
- **Marla A. Reckart, M.D., P.C., Tucson - \$12,000**  
Marla A. Reckart, M.D., P.C. in Tucson received \$12,000 for a solar electricity project.
- **Flagstaff KOA Kampground, Flagstaff - \$9,000**  
Flagstaff KOA in Flagstaff received \$9,000 for a wind facility.
- **Bottling Group, LLC, Phoenix - \$7,000**  
Bottling Group, LLC, in Phoenix received \$7,000 for a solar thermal project.

**Award(s): 6 totaling \$29.8 million from DOE / Treasury, Clean Energy Manufacturing Tax Credit (48C)**

**Location: Statewide**

- **Rioglass Solar Inc, Surprise - \$10.7 million**  
Rioglass Solar, Inc., in Surprise received \$10.7 million to manufacture tempered glass parabolic mirrors designated for use in concentrated solar power plants. In this technology, mirrors are specifically integrated to derive maximum electrical production from the sun. The resulting developments will aid domestic solar panel production.
- **Saint Gobain Solar Glass NA, Scottsdale - \$8 million**  
Saint Gobain Solar Glass NA in Scottsdale received \$8 million to manufacture mirrors used in concentrating solar power (CSP) technology. This process involves generating electricity by directing the light onto photovoltaic cells or other solar thermal technologies. The resulting product will help aid of the development of domestic solar technologies.
- **Yingli Green Energy Americas, Phoenix - \$4.5 million**  
Yingli Green Energy Americas in Phoenix received \$4.5 million to open a manufacturing facility to produce solar energy modules.
- **Amonix, Inc, Phoenix - \$3.6 million**  
Amonix, Inc., in Phoenix received \$3.6 million to manufacture low-cost solar electricity systems using inexpensive plastic lenses that concentrate sunlight into small, high efficiency solar cells.
- **Suntech, Tempe - \$2.1 million**  
Suntech in Tempe received \$2.1 million to manufacture a line of poly-crystalline solar modules as well as its new "Pluto" modules.
- **Sumco Phoenix, Phoenix - \$731,000**  
Sumco Phoenix in Phoenix received \$731,000 to slice, clean and inspect silicon wafers. These silicon wafers are integrated into solar power modules, and the resulting technologies will aid the domestic solar power industry.

**Award(s): \$1.45 billion from DOE / Treasury, Loan Guarantee Program**

**Location: Statewide**

Abengoa Solar, Inc., was offered a conditional commitment for a \$1.45 billion loan guarantee to finance the construction and start-up of a concentrating solar power generating facility. The Solana, Arizona plant will add 250 megawatts (MW) of capacity to the electrical grid using parabolic trough solar collectors and an innovative six-hour thermal energy storage system-the first of its kind in the country.

**Award(s): 2 totaling \$948,000, High-Penetration Solar Deployment**

**Location: Phoenix, Tucson**

- **Arizona Public Service Company, Phoenix - \$600,000**  
Arizona Public Service Company in Phoenix received \$600,000 to develop, construct, manage and study a high penetration of 1.5 MW of distributed photovoltaic (PV) generation on a typical

residential feeder in Flagstaff, Arizona, including a mix of residential and commercial systems, as well as a 0.5 MW utility system.

- **City of Tucson - \$348,000**

The City of Tucson received \$348,000 to explore innovative financing mechanisms for solar systems in Tucson's city facilities. This project is providing information and referral services for consumers, businesses and the solar industry, including training opportunities and permitting assistance. It is also coordinating with planning and permitting staff to integrate solar and solar-ready requirements into green building certification processes and long-range city infrastructure planning.

**Award(s): \$17.8 million, National Geothermal Database Resource Assessment and Classification System**

**Location: Tucson**

The Arizona State Geologic Survey, in collaboration with 40 other State Geologic surveys, is participating in populating the National Geothermal Data System (NGDS) with relevant state-specific geothermal data.

## **MODERNIZING THE ELECTRIC GRID – 8 projects totaling \$97.1 million**

*Harnessing clean energy sources and integrating them onto a modernized electric grid, while giving consumers better choices and more control over their energy use. For more information, visit <http://www.energy.gov/recovery/smartgrid.htm>.*

**Award(s): \$796,000, Enhancing State and Local Governments' Energy Assurance**

**Location: Phoenix**

The Arizona Department of Commerce in Phoenix received \$796,000 for State Energy Assurance Planning. This project focuses on building regional energy assurance capability by enhancing inter- and intra- state coordination and cooperation during energy emergencies. The project funds states to update or develop State Energy Assurance Plans incorporating new energy portfolios such as wind, renewables and biofuels. The project also funds cities to update or develop Local Energy Assurance Plans. The two sets of funding are used to hire or retrain staff to build in-house expertise in dealing with Smart Grid technologies, critical energy infrastructure interdependencies and cyber-security.

**Award(s): 3 totaling \$94.1 million, Smart Grid Investment Grant Program (EISA 1306)**

**Location: Tempe, Benson, Fort Defiance**

- **Salt River Project, Tempe - \$56.9 million**

The Salt River Project in Tempe received \$56.9 million to install 543,362 smart meters, associated back office data and customer management systems.

- **Southwest Transmission Cooperative, Inc., Benson - \$32.2 million**

Southwest Transmission Cooperative, Inc., in Benson received \$32.2 million for a project involving digital upgrades to the electric grid, smart meters for more than 44,150 customers and the upgrade or installation of infrastructure necessary to support the two-way flow of information.

- **Navajo Tribal Utility Association, Fort Defiance - \$5 million**  
The Navajo Tribal Utility Association in Fort Defiance received \$5 million to lead the implementation of advanced metering infrastructure (AMI) in its distribution network and Meter Data Management software integrated into the IT environment.

**Award(s): \$704,000, Smart Grid Workforce Development**

**Location: Fort Defiance**

Navajo Tribal Utility Association in fort Defiance received \$704,000 to develop a workforce that is well-trained and committed to the mission of modernizing NTUA's distribution services, including an expeditious and well-built Smart Grid system. The training program is designed to maximize employment opportunities for citizens of the Navajo Nation located on the reservation.

**Award(s): \$916,000, State Assistance on Electricity Policies**

**Location: Phoenix**

The Arizona Corporation Commission in Phoenix received \$916,000 for State Public Utility Commissions to assist in addressing its Recovery Act electricity workload by hiring staff trained to facilitate the review of time-sensitive requests approving electric utility expenditures.

**TRANSPORTATION – 1 project totaling \$101.4 million**

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*Investing in a new generation of advanced fuels and vehicles to reduce our dependence on foreign oil and revitalize domestic manufacturing. For more information, visit <http://www.energy.gov/recovery/vehicles.htm>.*

**Award(s): \$101.4 million, Transportation Electrification**

**Location: Phoenix**

EETC in Phoenix received \$101.4 million to deploy 4,700 electric vehicles in five major cities across the US. Slow and fast chargers, 11,170 total, are being installed in commercial and residential locations. Data is being collected on vehicle and charger use to gain a better understanding of electric vehicle operation.

**CARBON CAPTURE & STORAGE – 1 project totaling \$70.5 million**

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*Developing clean coal technologies so we can utilize America's coal resources sustainably. For more information, visit <http://www.energy.gov/recovery/ccs.htm>.*

**Award(s): \$70.5 million, Industrial Carbon Capture and Storage Applications**

**Location: Phoenix**

Arizona Public Service's Modification in Phoenix received \$70.5 million for the cultivation of algae for fuel production with coal gasification.

## **SCIENCE AND INNOVATION – 6 projects totaling \$37.6 million**

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*Renewing our commitment to science and innovation to ensure global competitiveness in the future. For more information, visit <http://www.energy.gov/recovery/innovation.htm>.*

**Award(s): 2 totaling \$10.3 million, Advanced Research Projects Agency - Energy (ARPA-E)**

**Location: Tempe**

- **Arizona State University, Tempe - \$5.2 million**  
Arizona State University (ASU) in Tempe received \$5.2 million to use cyanobacteria (specifically, synechocystis) to produce carbon-neutral, sustainable biofuels. Synechocystis grows on non-arable land and therefore does not compete with food crops. ASU intends to modify synechocystis to convert sunlight and carbon dioxide into fatty acids, which will be further transformed into liquid transportation fuels. If successful, this project will increase production of domestic renewable biofuels and reduce U.S. dependence on foreign sources of fossil fuels.
- **Arizona State University, Tempe - \$5.1 million**  
Arizona State University in Tempe received \$5.1 million for the Metal-Air Ionic Liquid (MAIL) battery program. The program seeks to create a safe, ultra-high energy density and low-cost battery technology that incorporates earth-abundant materials. The MAIL battery has the potential to increase the range of electric vehicles to distances approaching 1000 miles and to dramatically decrease the cost of electric vehicles. MAIL batteries will use domestically available earth-abundant materials to achieve lower cost and a more reliable supply of raw materials. MAIL batteries will have unparalleled safety because the primary chemicals will not be stored in the same space; hence, in the event of a crash involving a hybrid / electric vehicle, there would be little or no risk of catastrophic energy release and fire. If successful, this project will enable the rapid and widespread deployment of long-range, low-cost plug-in hybrid / electric vehicles and the use of the U.S. electric grid as the source of transport energy in place of imported fossil fuels.

**Award(s): 2 totaling \$27 million, Energy Frontier Research Centers**

**Location: Tempe, Tucson**

- **Arizona State University, Tempe - \$14 million**  
Arizona State University in Acres Mobile Home received \$14 million to adapt the fundamental principles of natural photosynthesis to the man-made production of hydrogen or other fuels from sunlight.
- **University of Arizona, Tucson - \$13 million**  
The University of Arizona in Tucson received \$13 million to conduct research to enhance the conversion of solar energy to electricity using hybrid inorganic-organic materials.

**Award(s): 2 totaling \$294,000, Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR) Round 1**

**Location: Tucson**

- **Mer Corporation, Tucson - \$150,000**

Mer Corporation in Tucson received \$150,000 for SBIR / STTR. The low-cost titanium manufacturing being developed in this program will provide a dramatic reduction in the cost of heat exchangers used for desalination. In addition to increasing the availability of potable water, this project will provide a major commercial advantage for domestic corporations for the sale and operation of these plants.

- **Mer Corporation, Tucson - \$145,000**

Mer Corporation in Tucson received \$145,000 for SBIR / STTR. An enhanced thermodynamic cycle to improve performance and simultaneously reduce cost of magnetic refrigerators and air conditioners is being tested in a breadboard prototype refrigerator. Results of the tests are being applied to design a new generation magnetic refrigerator that can compete favorably with modern commercial devices.

ENERGYEMPOWERS.GOV

# Recovery Act Success Stories

Energy Empowers is a U.S. Department of Energy clean energy information service. Our team produces stories featuring the people and businesses that are fueling the energy transformation and economic recovery in America. For more stories from your state, go to [energyempowers.gov/Arizona](http://energyempowers.gov/Arizona)

## LEAFing through new vehicle technology

Oil and gas price fluctuations and environmental concerns are driving innovators to find new ways to power our vehicles. That's the focus of The EV Project, a new program of ECOtality North America, which was awarded a \$114.8 million Recovery Act grant from the U.S. Department of Energy. The EV Project will create a network of charging stations for participants' electric vehicles and gather data on the stations' usage.

"As [Energy] Secretary [Steven] Chu rightly pointed out, the only way this next wave of electric vehicles will be successful is if there is a robust network of charging stations to support them," says ECOtality CEO and President Jonathan Read. "Through The EV Project, we are learning what we will need to do to build out that strong infrastructure nationwide."

### Driving demand for EV

To drive demand to the stations, ECOtality is partnering with Nissan North America and Chevrolet to deploy up to 8,300 electric vehicles and more than 15,000 charging systems in six states - Arizona, California, Oregon, Tennessee, Washington and Texas - and the District of Columbia.

According to The EV Project's website, consumers who participate in the program will spend between 50 cents to \$1.50 per day to charge their LEAFs, which they'll obtain by reserving the vehicles online. The LEAF is a five-passenger hatchback, powered by advanced lithium-ion batteries — with a range of more than 100 miles on a single charge. The vehicle will cost drivers about \$25,000 after a federal tax credit. The lease price is about \$349 per month.

Project executives estimate that up to one-third of participants may be for business fleet purposes, but the majority will be private citizens. Many participants will work with Nissan to have charging stations installed at their homes as well, which the company estimates will cost about \$2,200, but that amount may also be offset a 50-percent tax credit.

Oregon has the most target cities participating in The EV



An artist's rendering of a Nissan LEAF charging outside a café. | Courtesy of The EV Project

Project with Portland, Eugene, Corvallis and Salem all on board. Officials in the state are conducting community outreach efforts to determine where in those cities the charging stations will be installed.

### Location, location, location

"This demonstration project is primarily a study to look at places where charging behavior is likely to be focused so we can find out, aside from peoples' homes, where would there be a lot of people plugging in frequently?" says David Mayfield, area manager for ECOtality North America stakeholder services in Oregon. He adds, "We're very interested in who is raising their hands for these vehicles and where we can have public infrastructure that will best serve them."

Because the average charge will take one to three hours, charging station locations are a key consideration. Mayfield says charging stations need to be at places where drivers will be comfortable spending time, such as grocery stores, coffee shops, movie theaters and civic centers. There are plans to also install some fast-charge stations, probably near areas of high traffic such as interchanges on state and federal road systems.

### Driving EVs with data

"I think the data collection and information developed will help inform battery and car manufacturers, cities, states and private companies relative to the appropriate emerging infrastructure, and we can understand more about driver behavior from initial activities during brand-new adoption to after participants have been driving a couple of years and are more comfortable with their electric vehicles," Mayfield says.

Jeanine L'Ecuyer, vice president for communications at ECOtality, says that data will be available to parties who wish to access it. "It's a science-based experiment," she says. "ECOtality knows a lot about electric vehicles, but what The EV Project does is to show us how people will use the vehicles — what we learn from this deployment will inform the way the infrastructure is built for the next 5 million electric vehicles in America and beyond."

## The EV Project

99.8 M Recovery Act grant from DOE
4,700 LEAF electric vehicles (EV)
10,950 220V charging stations
260 fast-charge stations
750 new jobs by 2012
5,500 new jobs by 2017
11 major cities
4,700 EV cars will save more than 2 million gallons of gasoline per year



## FLAGSTAFF

**Ariz. residential rooftops key to unlocking the potential of distributed solar**

Nestled in the mountains of northern Arizona and just 75 miles from Grand Canyon National Park, the city of Flagstaff, Ariz. is an ideal city for the Arizona Public Service (APS) to pilot a high concentration of solar photovoltaic energy systems.

“Flagstaff is unique electrically,” says Eran Mahrer, Director of Renewable Energy for APS. “It’s also a very green community, very willing to adopt [alternative energy], so we thought the power project would gain traction there.”

That’s the Community Power Project, which APS hopes will be designed to learn how best to handle high concentrations of power generation from distributed solar energy sources.

Households that generate their own solar energy can potentially strain the larger electrical grid, which is set up for centralized generation and distribution, by demanding or feeding in energy at unpredictable times. That’s a concern for APS, because the state’s Renewable Energy Standard requires utilities to generate at least 15 percent of their power from renewable sources by 2025, with 30 percent of that coming from distributed generation.

APS also plans a utility-scale solar farm of its own, plus wind turbines and a limited installation of solar water heaters in 50 low-income homes. In all, the project will install 1.5 MW of renewable energy capacity. According to APS, the project could produce an estimated 2,350 megawatt hours of solar electricity annually. This is the equivalent of avoiding an estimated 1540 tons of CO2 emissions annually, using U.S. Department of Energy emissions calculators.

**Pilot project**

To get ready, APS is launching a pilot project installing photovoltaic panels on the rooftops of homes and businesses in a specific area of northeast Flagstaff. APS will install solar panels on qualifying rooftops at its own expense, and own and maintain them.

Using the data generated by those panels, it will then study how their high concentration of photovoltaic panels affects the power grid, and how to maximize the benefits of distributed energy generation.

The study will be funded by a \$3.3 million grant from the U.S. Department of Energy, through the American Recovery and Reinvestment Act. Much of the rest of the approximately \$15 million capital cost will be funded by the company, using Renewable Energy Surcharges already collected from APS customers. As a result, APS says, the surcharge should not go up. Private contractors will handle the installation and maintenance, creating and maintaining “green” jobs.

**DG benefits and 20 year-rates**

With its study, APS is hoping to bolster its “smart grid”: a distribution system that can respond to changes in real time. It’ll look at management of the various technical challenges created by distributed energy, such as variations in the flow of power created by weather conditions.

APS will also look at whether the anticipated benefits of distributed generation, such as less strain on conventional distribution equipment, will be delivered. The goal is to be able to respond to these challenges in a way that maximizes economic benefits to the utility and its customers.

Meanwhile, in return for hosting the solar panels, building owners are guaranteed the same rate for use of that solar electricity for the next 20 years. Locking in the solar energy rate not only guarantees



APS will install solar photovoltaic panels like these in Castro Valley, Calif. for a pilot project studying distributed energy in Flagstaff, Ariz. | Photo courtesy of APS

a stable bill, Mahrer says, but also reduces energy costs in the long run. And, Mahrer notes, the project removes the up-front cost to customers of installing the solar panels, which can be \$10,000 or even higher, and worries about maintenance.

“We as a utility can help deploy more total solar than I think the industry can without utility participation. We can drive down the cost of solar for ourselves as well as customers,” he says. “The mere increased adoption will drive down costs through economies of scale.”

**Solar hot water creates savings for homeless shelters**

“This project will save us a huge amount of money,” says Paul Williams, House of Refuge Sunnyslope’s Executive Director. Williams is referring to a recent partnership between the state of Arizona and House of Refuge Sunnyslope to install solar hot water systems at five Phoenix-area housing sites for homeless men, which will make an immediate difference at the shelters.

The Arizona Department of Commerce, which oversees the state’s energy office, recently awarded House of Refuge Sunnyslope — a nonprofit dedicated to helping homeless men rebuild their lives — \$50,000 to complete the solar hot water systems project. The money is part of \$637,000 in State Energy Program funding Arizona received from the U.S. Department of Energy through the American Recovery and Reinvestment Act.

Once the new systems are installed, the facilities will save an estimated \$4,000 annually because the new systems.

Williams notes, “Our housing sites go through a lot of hot water on a daily basis.”

**Saving energy while rebuilding lives**

“This is a worthwhile project because it provides benefits in several areas,” says Jim Westberg, with the Arizona state energy office.

Westberg, a twenty-year veteran with the Arizona state energy office who has overseen renewable energy and energy efficiency projects is excited about the partnership and the project. “It will save House of Refuge Sunnyslope a significant amount of money, allowing the organization to provide additional services to individuals in need. It will provide jobs to the individuals hired to install the solar hot water systems; and it will benefit society by reducing energy consumption and reducing Arizona’s carbon footprint.”

“Solar hot water systems are especially beneficial because they

provide a better return on investment than other systems that utilize solar power,” says Westberg. “Typically, 30 percent of a person’s energy bill goes to heating water. So, solar hot water systems significantly reduce the amount of money that has to be spent on this expensive utility.”

The housing sites provide shelter to men who are unable to afford housing on their own. The housing is provided at a minimal charge, but residents must meet several eligibility requirements including being able to work a minimum of 28 hours per week.

Installation has been completed at four of the housing sites, and installation at the fifth site is scheduled to be completed before August 1.

“There is personal satisfaction in working in the energy field,” says Westberg, “especially on projects that help individuals have a better life.”

#### PINAL COUNTY

### Agency’s work having ripple effect in in Arizona

When water is plentiful in the Picacho Reservoir in Pinal County, a suburbanizing rural area in Arizona between Phoenix and Tucson, you can throw a stone in the water and watch the ripples make their way in concentric circles across the aquatic surface. This is not unlike the effect seen by residents in the county that is a result of work being done there to make the community more energy-efficient.

The Community Action Human Resources Agency of Pinal County has been doing weatherization work since the mid-1980s. Reducing energy costs for families is a natural part of CAHRA’s mission of fighting poverty in Pinal County. The agency is administering \$2.1 million in Recovery Act funding to weatherize the homes of low-income people in the county.

Mary Lou Rosales, director of CAHRA, says the money has allowed her organization to add multi-family projects to the single-family weatherization it was already doing. The organization has already completed the weatherization of two domestic violence shelters owned by Against Abuse Incorporated of Casa Grande, Ariz.

Like many nonprofits, AAI doesn’t have much money to spare. But CAHRA recently helped AAI trim its utility bills by weatherizing its women’s and children’s shelters and adding solar water heaters. Despite this year’s much cooler weather, the women’s shelter still shows a savings of close to 10 kWh, which represents almost \$155 in savings each month, according to Lucy Rangel, housing Programs Manager for CAHRA.

Mary Lou says weatherization has improved dramatically since CAHRA began the work more than 20 years ago.

“Before, we ... just made sure the home was really tight,” she says. “It has morphed more into building science.”

Tightening the envelope is still a priority, but CAHRA’s work is aimed at finding other ways to promote energy efficiency as well. The agency’s in-house weatherization staff starts by doing a full diagnostic on the home to see where heating and air-conditioning is escaping. In addition to fixing those leaks and cracks, the agency also considers installing more energy-efficient appliances and fixtures. Typically, CAHRA’s work can save the home’s occupants 20 to 25 percent of their existing utility bills.

For the expansion into multi-family housing weatherization, CAHRA will hire contractors rather than using its own technicians. However, the funding has already contributed to local job creation. Not only has it created work for third-party contractors, but also

CAHRA itself has been able to hire five weatherization employees.

### DOE awards \$24 million for algae research

Algae is a promising biofuel, but making it accessible for drivers has proven difficult. It’s expensive and converting it to usable energy is time consuming.

To tackle this, the Department of Energy has awarded \$24 million to three research groups of universities and biotech companies tasked with figuring out how to make algae-based biofuels commercially viable.

Assistant Secretary Cathy Zoi of the Office of Energy Efficiency and Renewable Energy called the funding the “latest investment to accelerate algal biofuels” at the 2010 World Congress on Industrial Biotechnology and Bioprocessing conference on Monday.

“Biofuels derived from blue green algae, microalgae and macroalgae hold great potential but are far from being cost competitive,” Zoi said. “Many technical and economic challenges must be overcome.”

The three consortiums will address these challenges in separate projects that will last up to three years.

#### Roadmap to the future

Zoi said each project will tackle key hurdles in areas such as biochemical conversion of algae to fuels and products, algal crop protection and recycling, and integration of new algal harvesting technologies.

The assistant secretary also announced the release of the DOE’s National Algal Biofuels Technology Roadmap, the first report in almost 15 years that summarizes the industry, the research needed and the roadblocks to clear to make this green fuel cost competitive.

“While algae gives us a look at the innovative future, scale up of today’s technology remains a high-priority,” Zoi said about the report.

According to the roadmap, algae technology has the potential to produce up to 6,500 gallons of oil per acre each year, which is 60 times higher than soybeans and 15 times more productive than jatropha, a flowering plant native to North America.

#### Funding research

The American Reinvestment and Recovery Act allowed the United States to invest nearly \$800 million in biofuel and biopower research. This most recent funding is the second award this year given to algal research consortiums to identify barriers.

Zoi said that scaling up production of biofuels is among the DOE’s primary goals.

“This administration is fully committed to biofuels and to tripling production in the next 12 years,” Zoi said. “As you know, biofuels are a critical component of our nation’s renewable energy portfolio.”

### The research groups receiving DOE funding

- Sustainable Algal Biofuels Consortium (Mesa, Ariz.) - Led by Arizona State University, this consortium will focus on testing the acceptability of algal biofuels as replacements for petroleum-based fuels.
- Consortium for Algal Biofuels Commercialization (San Diego, Calif.)
- Led by the University of California, San Diego, this consortium will concentrate on developing algae as a robust biofuels feedstock.
- Cellana, LLC Consortium (Kailua-Kona, Hawaii) - Led by Cellana, LLC, this consortium will examine large-scale production of fuels and feed from microalgae grown in seawater.