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**Project Summaries of Municipal Programs for
Alternative Vehicles and Alternative Fuels,
Funded Through the
American Recovery and Reinvestment Act**

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1. Introduction

Local municipal programs play an important role in promoting the adoption of new vehicle technologies and fuels. Alternative vehicle technologies can improve the fuel efficiency of vehicles and reduce emissions for the six common air pollutants (also known as “criteria” pollutants) and greenhouse gases. Reducing municipalities’ fuel use through improvements in fuel economy can also bring economic benefits. Municipalities and government fleets often play an important role as early adopters of new technologies. In addition, funding from the American Recovery and Reinvestment Act of 2009 (ARRA) has provided an opportunity for many municipalities to upgrade their fleet vehicles, and/or their refueling infrastructure, with alternative technologies and fuels. Because governments often make large numbers of vehicle purchases, their early adoption of alternative technologies and fuels can significantly increase the market for these alternatives. And in a secondary effect to the market, when municipalities use alternative vehicles in their fleets, the public becomes more aware of these vehicles’ existence and viability.

Programs for alternative vehicles and alternative fuel infrastructure constitute an eligible use of many energy efficiency-related funds under ARRA. For example, under the Energy Efficiency and Conservation Block Grant (EECBG) program, Alternative Vehicle and Fuel Infrastructure programs fit into two of the Transportation category’s thirteen eligible activities. State Energy Program (SEP) grants also consider these programs an eligible use of funds. This document characterizes the general nature of alternative vehicles activities funded by these programs, and presents specific project summaries.

1.1 Alternative Vehicles and Alternative Fuels in ARRA Block Grants

Table 1 provides a snapshot of the funded transportation project types under SEP and EECBG, based on an ACEEE review of the original grantee list. Of more than 5,600 projects funded, 527 were related to transportation. Of these transportation-related projects, the most common project types, in descending order, were alternative vehicles, traffic light or street lighting improvements, programs to reduce vehicle miles traveled (VMT), and traffic management. In **Table 2**, the 146 Alternative Vehicle and Fuel Infrastructure projects are further broken into their respective sub-categories, generally by vehicle and fuel type. The amount of funding in each sub-category is also provided. (Note that **Table 1** does not reflect the final distribution of funds. Further, several of the grantees have amended their original grant requests to move funds to other projects.)

Table 1. ARRA-funded transportation projects, by type

Alternative vehicles	134
Traffic / street lighting upgrades	133
VMT reduction	125
Traffic management	92
Fuel infrastructure	12
Grant (multiple use)	8
Energy efficiency and conservation (EEC) strategy, transportation	6
Renewable energy	5
Other	6

Data collection	3
Education (general)	3

Table 2. Alternative Vehicles and Fuel Infrastructure projects, by type

Alternative Vehicles	134	
Hybrid	44	\$ 5,808,711
Electric vehicle (EV)	22	\$ 2,008,410
Controls	11	\$ 2,230,777
Compressed natural gas (CNG)	10	\$ 2,334,097
Trash	9	\$ 2,321,830
Biofuel	8	\$ 977,252
Fleet	5	\$ 519,700
Education	4	\$ 13,800
Propane	4	\$ 630,297
Plug-in hybrid electric vehicle (PHEV)	3	\$ 384,580
Tires	3	\$ 145,839
Technology addition	3	\$ 353,980
Other	8	\$ 1,418,797
Fuel Infrastructure	12	
Biofuel	5	\$ 225,000
CNG	3	\$ 749,033
EV	3	\$ 498,382
General	1	\$ 39,500

Of the more than 70 grantees contacted by ACEEE, 26 responded with information regarding their grants and activities. Four of the respondents stated that lack of matching municipal funds prevented the municipality from following through with the purchases of hybrid vehicles outlined in the original grant. Two other respondents stated that the funds originally intended for hybrid purchases had been shifted to other projects in which the municipality felt the money could be put to better use. Two grantees were unable to schedule an interview before the completion of the project summaries. Four grantees provided brief updates on the status of their projects, but because they felt they had little further information to share, they were not interviewed. One grantee was preparing to issue a request for proposals for the project, and therefore did not have information on implementation. Nine respondents from four different grantee categories were interviewed to provide information for the project summaries.

1.2 Alternative Vehicles

Requests for alternative vehicles were the most common among grantees. These types of projects included requests for funds to offset the incremental cost between the purchase or conversion of standard vehicles and more efficient and more expensive hybrid, electric, and compressed natural gas (CNG) vehicles. Almost a third of requests were from municipalities requesting funds to cover the incremental difference between the cost of hybrid vehicles and standard replacement vehicles for the fleet. Hybrid vehicles, which are classified as advanced technology vehicles, are the most established of the vehicle technologies considered. Popular brands such as the Toyota Prius were the most frequently purchased hybrid. At the time of the analysis, plug-in hybrid electric vehicles (e.g., the Chevy Volt) had not yet fully entered the market. PHEVs are able to operate on both electricity and gasoline – a capability that reduces drivers' concerns about the operating range of all-electric vehicles. Electric vehicles, such as the Nissan Leaf (also not yet available) are powered entirely by electricity and can have ranges between 50 and 100 miles (depending on the size of their batteries). CNG vehicles are available in light-duty and heavy-duty models, though the only CNG OEM-produced light-duty vehicle available at the time of the analysis was the Honda Civic GX.

1.3 Alternative Fuel Infrastructure

Infrastructure projects seek to provide alternative refueling capability for biofuels, compressed natural gas, propane, hydrogen and electricity. As refueling / recharging options become more available and accessible to both municipal fleets and the general public, alternative vehicles are likely to become more acceptable for drivers who are concerned about vehicle range. Biofuel infrastructure grants include projects for increasing the number of tanks and pumps equipped for E-85 (fuel that is 85% ethanol and 15% gasoline) and for expanding ethanol production facilities. Dedicated CNG refueling stations would serve both fleet vehicles and privately owned vehicles. Electric charging infrastructure would provide charging stations where EVs and PHEVs could plug in for several hours to refuel.

The cost of fuel infrastructure projects can be minimized if they are incorporated into a construction or retrofit project, as discussed in two of the project summaries below.

2. Project Summaries of ARRA-funded Alternative Vehicle and Alternative Fuel Projects

2.1 Compressed Natural Gas Fueling Facility Fullerton, California Alternative Fuel Infrastructure

2.1.1 Project Information

Grantee: **City of Fullerton, CA**
Grant Program: **EECBG**
Project Title: **Compressed Natural Gas Fueling Facility**
Location: **Fullerton, CA**
Project Type: **Transportation – Fuel Infrastructure – CNG**
Project Cost: **\$ 650,000**
Leveraged Cost: **\$ 550,000**



City of Fullerton's CNG Vacuum Truck

2.1.2 Project Description

Air quality regulations from the South Coast Air Quality Management District (the air quality agency for Orange County and urban areas of Los Angeles, Riverside, and San Bernardino counties) require that all new public fleet vehicles meet stringent emission standards that will shift fleets away from diesel vehicles and toward alternative fuel vehicles.

To meet the air quality regulations, the City of Fullerton decided that its Maintenance Department will use CNG vehicles for all of their new fleet vehicles. CNG was chosen over other alternative fuel types (liquefied natural gas, electricity, propane, hydrogen and biofuels) because the existing natural gas pipeline could already supply the necessary volume of natural gas. Further, as other fleets had undergone similar conversion, Fullerton was able to learn from their experiences.

Fullerton surveyed the area's CNG infrastructure to determine if they should invest in their own refueling station or if they should rely on using other local CNG refueling stations, which were 7 to 15 miles away in the neighboring cities of Placentia and Whittier. The City of Fullerton determined that it was more cost-effective to invest in its own refueling station, to be located at the Maintenance Services Corporate Yard.

A planned addition to the maintenance facility helped prompt the decision to locate the refueling station at the yard, since incorporating the CNG facility into the current plans would be much more efficient than adding it after the fact—or locating a refueling station elsewhere.

The total estimated cost for the refueling station project is between \$800,000 and \$1.2 million. The Department of Energy (DOE) is providing \$650,000, and \$400,000 is coming from the South Coast Air Quality Management District. The balance is being made up through city water and sanitation funds. The funding

from the DOE will allow for a more permanent structure that will also serve as a supply area for tools and equipment. The design costs are \$90,000, which have been split three ways among the DOE, the air quality agency, and local funds.

The final design of the CNG refueling facility and maintenance structure was scheduled for completion by the end of 2010. The city hopes to begin advertising for construction bids in the late spring or early summer of 2011, with construction to begin in the fall. The construction of the facility is estimated to take eighteen months so that the facility will be completed in late 2012 or early 2013.

Currently the maintenance fleet is operating one CNG vehicle, a heavy-duty vacuum truck that cleans out sewer lines and maintains the storm drain system. A second vacuum truck was scheduled for delivery by the end of 2010.

The facility will offer five slow-fill bays and four fast-fill bays for refueling, and the design will allow for increasing the number of bays if more are necessary. The Fullerton facility will provide 24-hour public refueling stations for both private CNG vehicles and other area fleets (possibly the Fullerton Elementary School District). These other customers will be able to use credit cards to pay for refueling.

Depending on economic conditions, the maintenance fleet is expected to turn over in fifteen to twenty years, at which point all Maintenance Department vehicles will be run on CNG.

2.1.3 Impacts and Outcomes

Heavy-duty vehicles powered by CNG are estimated to emit 25% less CO₂ than their diesel-powered equivalents. CNG vehicles will also reduce the emission of criteria pollutants such as carbon monoxide, nitrogen oxides, and particulate matter, compared to the emissions of diesel vehicles.

The project is expected to result in 24 new jobs in Fullerton.

2.1.4 What Worked

It was fortuitous that Fullerton was already planning to add on to their maintenance facility, just as the grant money became available to supplement the project. The city also notified the facility's neighboring businesses and residents early in the process so that they understand the impacts the refueling station might have on the neighborhood. In this way, construction efficiencies and an engaged public early in the process allowed adjustments to the project based on the public's concerns. Together, these factors created a nearly ideal environment for project success.

2.1.5 What Would be Done Differently

The facility needed approval from the local airport land use committee, because of the planned height of the facility. This approval process was not initiated as early as it could have been, and the length of the process resulted in additional work that was outside the original project scope. The land use committee meets infrequently, and this factor was not taken into consideration early enough to avoid a construction delay. So although the delay was slight, it could have been avoided altogether if the approval process had begun at the first opportunity.

2.1.6 Contact Information

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2.2 Alternative Vehicle Acquisition and Electric Vehicle Charging Infrastructure Cary, North Carolina Electric Vehicles

2.2.1 Project Information

2.2.2 Project Description

Grantee: **Town of Cary**

Grant Program: **EECBG**

Project Titles:

NC Get Ready!

Alternative Fuel Vehicle Acquisition

Location: **Cary, NC**

Project Type: **Transportation – Vehicles – Electric Vehicles**

Project Cost: **\$ 20,000 and \$ 100,000**

Leveraged Cost: **\$ 234,000**



Cary Town Hall, future site of charging station

The Town of Cary, NC, applied for EECBG funding for two grants: (1) to purchase and install four public electric vehicle charging stations around the city, and (2) to fund the incremental costs of purchasing hybrid and electric vehicles for the city vehicle fleet.

The town is currently in negotiations with a private entity that is also receiving funds from the DOE to form a partnership that will allow them to combine funds and provide more public charging stations. There are also discussions with a local store that is interested in installing additional stations outside its building.

Currently they have identified several sites around the town that they feel would be appropriate for the charging infrastructure, which is to be Level Two (220 to 240 volts). The idea is to provide “opportunity charging” for vehicles to top off their batteries, rather than parking and charging them for several hours. Generally, the town hopes to encourage people to charge at their homes during off-peak hours. One charging station is definitely planned for outside the town hall. This will allow for public charging as drivers come to the town hall / downtown area for short-term errands and business. After business hours, this charging station can then be used by the city’s electric vehicles to charge during off-peak hours.

Another charging station will likely be installed at a community arts building that is currently being retrofitted. The retrofit activity has allowed the city to incorporate the installation of the charging station, reducing the cost by coordinating conduit and wiring placements and without the problems associated with construction on an occupied building.

Another charging station toward the northern part of town (near Interstate 40) is under consideration. That area features a mixed-use community. A third possible charging station is envisioned for placement at a public parking deck.

Cary has worked extensively with Advanced Energy, a nonprofit that has been coordinating electric vehicle and electric vehicle infrastructure in the Raleigh and Research Triangle Park areas. Advanced Energy has

brought together local municipalities, utilities, and businesses to learn from each other and to coordinate infrastructure development across the wider area.

The town is currently considering two different types of nationally certified charging stations. The certification specification has limited the options, and because of the stations' design, several concerns have been raised about whether the aesthetics of the stations will fit with the town's aesthetics.

The town is planning to pay for the stations' installation, which will be completed by the local utility. It is unclear who will provide maintenance on the charging stations. The town has also not yet determined whether the charging stations will be available for general public use. The town is not the electricity provider and is therefore unable to charge for electricity consumption. However, the town might charge a small fee for use of the charging infrastructure's parking space.

Permitting for charging infrastructure in Cary is streamlined, an innovative practice that facilitates receipt of a permit within 24 hours.

The stations are scheduled to be installed by March 2011.

The stations will play a role in the North Carolina "Get Ready!" Project, which is developing electric vehicle charging infrastructure across Raleigh and its surrounding metropolitan areas. The project has worked with Progress Energy, Duke Energy, and the Rocky Mountain Institute to facilitate early purchase of electric vehicles and to establish a regional network of charging stations.

In parallel to the charging infrastructure, Cary is using another EECBG grant to fund the purchase of hybrid and electric vehicles for the town's fleet. The town plans to purchase twelve hybrid vehicles, one Nissan Leaf, and one all-electric Gator utility vehicle, using the EECBG funding to pay for the incremental costs of these vehicles.

So far, three Toyota Camry hybrids have been placed with police detectives, who have been pleased with the cars' performance. A Ford Escape hybrid and a Toyota Prius were placed with the Inspections and Permitting group. The electric Gator is being used by the Public Works and Utility Department.

A total of \$60,000 remains in the grant funds for the purchase of hybrids; the staff are working with city departments to determine where the hybrids will best fit their respective needs. The anticipated Nissan Leaf purchase is expected to be completed by April 2011.

2.2.3 Impacts and Outcomes

The fuel savings achieved by the purchased vehicles have not yet been calculated. The grant application calculated that the vehicle replacement program would reduce CO₂ emissions by 30% and would result in 18 metric tons, or 39,000 pounds, of annual CO₂ emissions reduction. This would save 1,855 gallons of gasoline, which will provide an annual savings of between \$4,500 and \$9,000, depending on the price of gasoline over the next ten years.

The all-electric vehicles will also reduce tailpipe emissions of NO_x and VOCs that contribute to ground-level ozone formation.

The EECBG grants are estimated to produce at least one new job in Cary.

2.2.4 What Worked

It was very helpful that the arts building was undergoing a major retrofit at the time this project started. The city saved a substantial amount of money through efficiencies in installing the charging station and its conduit, wiring, and other electric infrastructure during the retrofit. Sustainability Manager Emily Barrett suggests that municipalities consider installing conduits, at a minimum, in new construction or retrofit projects if the building has potential for a charging station in the future.

When placing hybrid vehicles in city fleets, it is important to use them in situations involving substantial amounts of driving, to maximize their benefits. It is also important to make sure that those who will be using them are enthusiastic about driving them. Some drivers are initially reluctant to use hybrids, but become used to them quickly because the vehicles do not require any significant shifts in behavior or thinking. Emily Barrett believes that more drivers are skeptical about electric vehicles because of a perception that electric vehicles do not work as well as regular vehicles. Drivers should be trained in the use, operation and charging of electric vehicles so they can overcome their range anxiety as well as any other concerns they may have.

Tallahassee, FL: Best Practices
When adding EVs to a fleet (or city in general), it is critically important to coordinate with the local utility to ensure that the charging infrastructure does not create problems for the local grid. Overloading local transformers or increasing peak loads are outcomes that can be avoided.

As the town of Cary considers where to place the Nissan Leaf in their city fleet, a priority will be to find an application with a consistent range of approximately 50 miles per day. It is important that the vehicle initially operate without range problems, so that the first application of EVs is seen as successful. As more experience is gained with EVs, the range can be extended, resulting in greater benefits.

2.2.5 Contact Information

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2.3 Hybrid Vehicle Purchase Program Fremont County, Wyoming Hybrid Vehicles

2.3.1 Project Information

2.3.2 Project Description

Grantee: **Fremont County**

Grant Program: **EECBG**

Project Title: **Fremont County Hybrid Vehicle Fleet
Program**

Location: **Fremont County, WY**

Project Type: **Transportation – Vehicles - Hybrids**

Project Cost: **\$ 115,000**

Leveraged Cost: **\$ 48,384**



Fremont County Libraries' Hybrid Vehicle

The County of Fremont discovered that Wyoming's county-by-county funding allocation process had designated \$115,000 in EECBG funds to it. The County decided to apply for transportation funds, since County staff felt there was sufficient time to put together a good proposal in this area.

The County proposed four different activities related to hybrid vehicles in their grant application. The first step would be to use the EECBG funding to offset the incremental cost between a standard vehicle and a hybrid vehicle. The County's application also proposed purchasing special service tool kits for mechanics working on hybrid vehicles, and providing certification and training to County mechanical staff on the repair of hybrid vehicles. The application additionally proposed education to staff driving hybrid vehicles on the optimal driving of the vehicles.

In 2010, the County purchased two hybrid vehicles. One was a Ford Escape hybrid, for use by the County Library. The incremental cost between the regular Ford Escape and the hybrid Escape was approximately \$9,500. This hybrid replaced a 1988 cargo van whose fuel economy was approximately 12 to 13 miles per gallon (mpg). The combined fuel economy of the Ford Escape hybrid is 39 mpg, at least a 300% improvement on the cargo van.

The second purchased hybrid vehicle was a 4-wheel drive Chevy Tahoe hybrid with a fuel economy of 21 mpg. The Tahoe replaced a Mercury Grand Marquis that had a fuel economy of approximately 18 mpg. Although this is only a 16.6% improvement in fuel economy, the Tahoe's 4-wheel drive is also an important improvement for driving conditions in the county. Further, the Tahoe's greater passenger capacity (6 to 8 passengers) allows the County to consolidate vehicle travel more often for staff travel. The incremental cost of the Chevy Tahoe hybrid was \$22,000.

In 2011, the County is planning to purchase four more hybrid vehicles for different governmental departments. Currently, it is expected that two GMC pickups will be placed with the Sheriff's department, a Ford Escape or Toyota Highlander will be placed with the Nurse's Office, and a Toyota Camry will be placed into the County vehicle pool. The law enforcement agency was initially skeptical that the hybrid GMC pickup

would perform as well as their existing conventional pickup. GMC actually arranged a demonstration of the two vehicles and the hybrid outperformed the regular pickup.

GMC and Ford provided training for the County’s mechanics on servicing hybrid vehicles. In addition, because hybrid vehicles require different tools and safety equipment, these items were purchased for the County’s two maintenance shops.

To maximize the benefit received from the investment in hybrid vehicles, a four-hour training course was developed for members from each department who would be driving the hybrids. The course focused on how the vehicles operate (and sound) under most driving conditions, and also provided an in-depth overall comparison to conventional vehicles. Fuel saving driving methods (e.g., gradual acceleration and braking) were also emphasized as techniques to further improve the fuel economy of the hybrids. The role and importance of green technology in general was also discussed so that hybrid drivers would be able to serve as community ambassadors of environmental awareness, and would be able to answer questions about the vehicles and why the County was using them.

College Station, TX: Success Story
The ARRA grants presented the city with the opportunity to try out hybrid vehicle technology without having to pay the incremental costs for an unknown technology. After using the EECBG funds to purchase its first three hybrid vehicles in 2010, the city was pleased with their performance and now plans to purchase thirteen more hybrids for their fleet in 2011.

Of the \$115,000 allocated to the County, \$52,000 was spent in 2010: \$32,000 for the hybrid vehicles and the remaining \$20,000 on the tools, training, and education. The balance of the EECBG funds will be spent on the additional hybrid vehicles to be purchased in 2011.

2.3.3 Impacts and Outcomes

The replacement of older vehicles with hybrid vehicles will reduce fuel consumption, as well as greenhouse gas and criteria pollutant emissions from the vehicle fleet, and save the County money over the lifetime of the vehicles. Over the first year of the two hybrid vehicles’ use, they are estimated to have reduced gasoline consumption by 592 gallons, CO₂ emissions by 11,495 pounds (5.2 tons), and gasoline expenditures by \$1,479.

The EECBG grant is estimated to produce at least one new job in Fremont County, in addition to providing additional skills to the County’s vehicle maintenance staff.

2.3.4 What Worked

It was critically important to make sure that the hybrid vehicles be placed in situations where they would more effectively serve the purpose of the departments using them. This consideration required discussions with department staff and research on different hybrid vehicles to see which would best fill the needs that each department had. The grant provided an opportunity for the County to purchase higher-cost hybrid vehicles, which would not have otherwise been possible (financially or politically). This initial purchase will give the County the opportunity to evaluate the benefits of hybrids and make a determination if they are worth the incremental cost for future fleet vehicles.

Canyon County, UT: Success Story
Since purchasing two hybrid Ford Fusions using EECBG funds, Canyon County has used the hybrids 6 times more frequently than the county’s average fleet vehicle.

2.3.5 What Would be Done Differently

Although the Alternative Vehicles program was approved in 2009, there was political resistance in 2010 to accepting federal funding for any purpose. Therefore, it is important to ensure that firm political support exists for the project being proposed, so that later shifts in politics do not adversely affect the project.

2.3.6 Contact Information

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