American Recovery and Reinvestment Act

Clean Cities Project Awards
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Introduction

Clean Cities advances the nation’s economic, environmental, and energy security by supporting local actions to cut petroleum use in transportation. Clean Cities carries out this mission through a network of nearly 100 coalitions, which bring together stakeholders in the public and private sectors to deploy alternative and renewable fuels, idle-reduction measures, fuel economy improvements, and emerging transportation technologies. The program also administers the Alternative Fuels Data Center (AFDC) website (afdc.energy.gov) and contributes to the FuelEconomy.gov website (fueleconomy.gov).

Since 1993, Clean Cities has awarded nearly $400 million in cumulative funding for hundreds of projects across the country that contribute to the program’s primary goal of reducing petroleum use in the U.S. by 2.5 billion gallons per year by 2020.

Clean Cities-funded projects have included:

- Introducing all-electric and hybrid electric vehicles into public and private fleets
- Converting conventional vehicles to run on natural gas and propane
- Installing idle-reduction equipment in school buses and tractor trailers
- Developing fueling stations for alternative and renewable fuels, including biodiesel, ethanol, electricity, natural gas, and propane.

Visit cleancities.energy.gov/partnerships/ to learn more about Clean Cities-funded projects.

American Recovery and Reinvestment Act Project Awards

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million in federal government investment, a significant portion of the program’s cumulative funding. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Vehicles Deployed

Clean Cities efforts under the Recovery Act deployed 9,035 vehicles overall. These vehicles comprised roughly even numbers of light-duty vehicles (4,542 vehicles) and medium- and heavy-duty vehicles (4,493 vehicles).
Figure 3 displays the reduction of petroleum consumption by vehicle fuel type and weight class for Clean Cities Recovery Act projects through December 2014. The deployed advanced technology vehicles achieved more than a 56 million gasoline gallon equivalent (GGE) reduction in petroleum consumption. The large numbers of CNG and LPG vehicles in both the light-duty and medium- and heavy-duty weight classes were responsible for the largest reductions in petroleum use. The 360 LNG vehicles represented just 4% of the overall 9,035 vehicles, but the vehicles displaced more than 10 million GGEs of petroleum use or 18% of the total petroleum displacement.

Medium- and heavy-duty vehicles typically use more fuel on a per vehicle basis than light-duty vehicles, and although there were nearly equal numbers of light-duty and medium- and heavy-duty vehicles deployed by the Recovery Act efforts, medium- and heavy-duty vehicles accounted for 75% of the petroleum displacement.

Figure 4 displays greenhouse gases (GHGs) reduced by vehicle fuel type and weight class through December 2014. In total, vehicles reduced more than 69,000 short tons of GHGs, with medium- and heavy-duty HEVs having the greatest impact. Medium- and heavy-duty HEVs were responsible for 66% of vehicle GHG reductions, despite representing only 8% of vehicles deployed overall.

### Installed Infrastructure

The Clean Cities Recovery Act efforts were responsible for the installation of 1,380 alternative fuel stations. Figure 5 displays the number of installed stations by fuel type. EV charging stations dominated with 62% of the installed stations. A significant number of LPG and CNG stations were installed (19% and 10% of stations, respectively). Smaller numbers of E85 (5%), biodiesel (3%), and LNG (1%) stations were installed.

The installed infrastructure was responsible for the avoidance of 98 million GGEs of petroleum use (Figure 6). Although representing just 10% of the stations, the CNG stations represented 65% of the petroleum displacement. E85 stations and LPG
stations displaced significant amounts of petroleum (14% and 12%, respectively). The biodiesel and LNG stations displaced lower amounts of petroleum (5% and 4%, respectively). The EV stations were responsible for less than 1% of the petroleum displacement due to installed infrastructure.

The installed infrastructure was responsible for reducing more than 185,000 tons of GHGs (Figure 7). CNG refueling stations represented 40% of infrastructure-related GHG reductions, while E85 and Biodiesel represented 27% and 25%, respectively. LNG and LPG stations each represented 4% of infrastructure GHG reductions. It should be noted that a single CNG station at the Fair Oaks Dairy Farm in Indiana using renewable natural gas (see page 21) accounted for nearly 40% of the CNG station reductions.

**Clean Cities Recovery Act Project Award Impacts**

Each individual Clean Cities Recovery Act project award included a diverse group of stakeholders who worked together to lay the foundation for their communities to adopt alternative fuels and petroleum reduction strategies. Although each Recovery Act project benefited from large funding amounts, most projects included multiple sub-projects that met specific fleet and community needs. This document provides a snapshot of the impact of each project and highlights the partners and Clean Cities coalitions that helped transform local and regional transportation markets through 25 projects that impacted 45 states.
Heavy-Duty Natural Gas Drayage Truck Replacement Program

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Project Summary:
The South Coast Air Quality Management District (SCAQMD) Heavy-Duty Natural Gas Drayage Truck Replacement Program addressed a significant need to reduce diesel emissions and associated public health risks from goods movement at the Ports of Los Angeles and Long Beach. The two ports, located adjacent to one another, constitute America’s largest port complex and are ranked among the busiest container ports in the world. This project replaced 219 older, heavy-duty diesel trucks servicing the ports or other goods-movement operations in the region with new liquefied natural gas (LNG) and compressed natural gas (CNG) trucks powered by cleaner natural gas engines. The project also included education, outreach, and training activities to promote the use of alternative fuel vehicles. Learn more at [afdc.energy.gov/case/1203](afdc.energy.gov/case/1203).

Technology Types:
- LNG and CNG

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<th>EV</th>
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Congressional Districts:
- Arizona’s 4th Congressional District
- California’s 8th, 24th-53rd Congressional Districts
- Indiana’s 4th-7th and 9th Congressional Districts

Lessons Learned and Impact
In the initial year of the project, maintenance issues and lack of qualified technicians resulted in long wait times for repairs. This proved problematic for small owner/operators without back-up trucks available. Over the course of the project, mechanic training workshops offered at community colleges and dealer training programs increased the number of qualified technicians to meet growing demand. In addition, once the 12L CNG engines became available, drivers reported fewer maintenance issues and less downtime because the engines were better matched to the trucks’ drayage duty cycle.

1 Congressional district information was generated using United States Census Bureau TIGER/Line® Shapefiles. Districts for infrastructure projects are listed based upon the physical address of the refueling location. For vehicles, they are listed based upon the census places and congressional districts that intersect a limited driving radius from the garage location of the vehicle.
Partners:
- California Air Resources Board
- California Energy Commission
- Clean Cities Coachella Valley Region
- Long Beach Clean Cities Coalition
- Los Angeles Clean Cities Coalition
- Port of Long Beach
- Port of Los Angeles
- South Coast Air Quality Management District
- Southern California Association of Governments Clean Cities Coalition
- Western Riverside County Clean Cities Coalition

Case Studies:

Pacific 9 Transportation Success Story
The drayage truck project helped Pacific 9 Transportation acquire its first 14 LNG trucks, which it uses to move shipping containers from the ports. When SCAQMD issued a later solicitation, the company applied for funding to purchase an additional four heavy-duty LNG trucks. The funds covered about $100,000 for each of the new vehicles, which each cost $153,135. Pacific 9 obtained financing to cover the balance of the purchase price. Learn more at afdc.energy.gov/case/1203 and www.pac9.com.

SCAQMD has helped deploy more than 700 LNG vehicles operating at the ports and along major goods-movement corridors in the region. Photo from Port of Los Angeles
Low Carbon Fuel Infrastructure Investment Initiative (LCFI13)

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Project Summary:
The California Department of General Services (DGS) and Propel Fuels built 36 alternative fuel stations to provide public access to low-carbon alternative fuels for more than 600,000 flexible fuel vehicles (FFVs) statewide. The project included a comprehensive development program focused on identifying and establishing lease agreements for station locations; designing, engineering, and permitting plans for infrastructure and signage; engaging contractors to manage construction and build stations; and marketing the stations to the public and fleets to increase adoption of the fuels. These stations serve the public, as well as government and private fleets, by distributing fuels such as ethanol (E85) for use in FFVs and biodiesel. Learn more at cleancities.energy.gov/partnerships/search?utf8=%E2%9C%93&project_search=california#arra-low.

Technology Types:
- Biodiesel and E85

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Partners:
- California Department of General Services
- CALSTART, Inc.
- East Bay Clean Cities
- Long Beach Clean Cities
- Propel Fuels, Inc.
- Sacramento Clean Cities
- San Diego Regional Clean Cities
- San Joaquin Valley Clean Cities
- Silicon Valley Clean Cities
- Western Riverside County Clean Cities

Lessons Learned and Impact
This project doubled the number of biofuel stations available to California drivers. By leveraging available credits through the California Low Carbon Fuel Standard (LCFS) and RINS and by purchasing fuel under advance contracts to avoid spot-market pricing, project partner Propel Fuels was able to keep fuel prices low. Strong branding, communication, and education efforts resulted in the Propel Fuel stations having among the highest renewable fuel sales volumes in the country.

1 Congressional district information was generated using United States Census Bureau TIGER/Line® Shapefiles. Districts for infrastructure projects are listed based upon the physical address of the refueling location. For vehicles, they are listed based upon the census places and congressional districts that intersect a limited driving radius from the garage location of the vehicle.
Case Studies:

**California Ramps Up Biofuels Infrastructure**

New Propel Fuels biodiesel and E85 fueling stations are cropping up across California as Clean Cities stakeholders work to expand the availability of biofuels. The stations have the potential to support the displacement of 39 million gallons of petroleum and 187,500 tons of carbon dioxide emissions per year, and they will create more than 450 green jobs. Learn more at [afdc.energy.gov/case/1056](http://afdc.energy.gov/case/1056).
San Bernardino Associated Governments Alternative Fuel Truck Project

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Project Summary:
San Bernardino Associated Governments (SANBAG) partnered with the California Energy Commission (CEC) and Ryder Systems, Inc., to deploy 204 state-of-the-art compressed natural gas (CNG) and liquefied natural gas (LNG) heavy-duty tractor-trailer trucks in leased service. The project demonstrated the feasibility of using cleaner-burning, lower-carbon natural gas in commercial trucking operations. It also supported the development of a low-carbon supply-chain transportation solution for Ryder customers seeking to displace petroleum diesel fuel with domestically produced natural gas. Ultimately, the project helped achieve a substantial, quantifiable reduction in ozone precursor and greenhouse gas air pollutant emissions within the jurisdiction of the South Coast Air Quality Management District. In addition to the deployment of the heavy-duty natural gas tractors, the project also constructed two publicly accessible fueling stations in Fontana and Orange, California, offering CNG and LNG, and a CNG/LNG maintenance facility in Rancho Dominguez, California. Learn more at cleancities.energy.gov/partnerships/search?utf8=%E2%9C%93&project_search=sanbag#arra-sanbernardino.

Lessons Learned and Impact
Ryder successfully introduced a significant number of alternative fuel vehicles to national-scale trucking fleets and learned the importance of tailoring trucks to the specific needs of each user. Because tank space and weight play important roles in individual fleet operations, the company determined developing correct vehicle specifications for the customer is critical to success. CNG achieved economic parity with conventional fuel for the majority of participating fleets.

Technology Types:
- CNG and LNG
- Driver training
- Facility modifications

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1 Congressional district information was generated using United States Census Bureau TIGER/Line® Shapefiles. Districts for infrastructure projects are listed based upon the physical address of the refueling location. For vehicles, they are listed based upon the census places and congressional districts that intersect a limited driving radius from the garage location of the vehicle.
Golden Eagle Distributors Inc. to Convert Entire Fleet to CNG

Golden Eagle Distributors, Inc., in partnership with Ryder Systems, Inc., is converting its entire heavy-duty fleet in Tucson, Arizona, to CNG. To support distribution operations, Golden Eagle agreed to lease 23 CNG vehicles by the end of 2011. The vehicles are part of a strategic alternative fuel program focused on reducing transportation-generated emissions and fuel costs. The Tucson fleet conversion is the first step in a larger, multi-year CNG plan; Golden Eagle will convert all fleet vehicles to CNG in their six branch operations throughout the state. To service this growing fleet, Golden Eagle is working toward opening its own CNG fueling stations in Tucson and at several other branch locations, including Casa Grande and Buckeye. Learn more at afdc.energy.gov/case/1059.

Ryder Opens Natural Gas Vehicle Maintenance Facility

Ryder opened its first natural gas vehicle maintenance facility in Rancho Dominguez, California, which meets the stringent industry and government safety standards for natural gas maintenance. The facility includes two natural gas fueling stations and three maintenance facilities. Ryder will deploy a total of 202 heavy-duty natural gas vehicles in the region and at completion, the Ryder/SANBAG project will displace more than 1.5 million gallons of diesel annually with 100% domestically produced low-carbon natural gas. Learn more at afdc.energy.gov/case/1063.
Clean Cities Recovery Act Project Awards

UPS Ontario—Las Vegas Corridor Extension—Bridging the Gap

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Project Summary:
The UPS Ontario—Las Vegas Corridor Extension—Bridging the Gap project provided funding to partially offset the cost to purchase liquefied natural gas (LNG) trucks and construct a publically accessible LNG fueling station in Las Vegas, Nevada, located adjacent to McCarran International Airport and the intersection of Interstates 215 and 15. As a result, UPS deployed 48 heavy-duty Class 8 LNG tractor trucks. The station also supports an additional 150 LNG vehicles in UPS’s California, Nevada, and Utah operations. The project also included an outreach effort to generate additional usage at the LNG station and ensure continued viability of the LNG corridor. Learn more at cleancities.energy.gov/partnerships/search?utf8=ü&project_search=ontario#arra-ups.

Technology Types:

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Lessons Learned and Impact

Although the incremental cost of an LNG truck is expensive, UPS found the operational costs can be lower due to lower fuel and maintenance costs compared to diesel. UPS placed the LNG tractors on its highest mileage routes to ensure maximum savings.

Partners:

- Clean Energy Fuels, Inc.
- Eastern Sierra Regional Clean Cities Coalition
- South Coast Air Quality Management District (SCAQMD)
- Southern California Association of Governments Clean Cities Coalition
- United Parcel Service (UPS)

1 Congressional district information was generated using United States Census Bureau TIGER/Line® Shapefiles. Districts for infrastructure projects are listed based upon the physical address of the refueling location. For vehicles, they are listed based upon the census places and congressional districts that intersect a limited driving radius from the garage location of the vehicle.
Case Studies:

Southern California Natural Gas Success Story

The Southern California Clean Cities coalition is working to reduce emissions in the South Coast Air Basin region by converting heavy-duty truck fleets to clean-burning LNG. This project helped UPS with the purchase of 48 new LNG tractor-trailer trucks, as well as the construction of a new LNG fueling station in Las Vegas, NV. The station supports a long-planned 700-mile regional LNG fueling corridor across the southwestern United States along one of the nations’ most heavily traveled truck routes. Learn more at youtube.com/watch?v=GA3uWS0zVuY.

Shipping company UPS purchased 48 new LNG-powered heavy-duty tractor trailer trucks and constructed a new LNG fueling station in Las Vegas to serve these trucks. Photo from UPS, NREL 12409
Connecticut Clean Cities Future Fuels Project

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Project Summary:
The Greater New Haven Clean Cities Coalition, together with its partners, developed and implemented a state-wide, fuel-neutral effort that deployed 276 alternative fuel vehicles and 18 public- and private-access fueling stations for fleets. The project deployed a diverse array of alternative fuels and advanced vehicles, including compressed natural gas (CNG), liquefied natural gas (LNG), hybrid electric vehicles, electric vehicle (EV) charging stations, and biodiesel. The Connecticut Clean Cities Future Fuels Project displaced more than 5.3 million gasoline gallon equivalents of petroleum and strengthened the availability of alternative fuels for fleets and commercial consumers along major corridors in the state. The effort also included a targeted outreach and education effort, which raised awareness and fostered greater understanding of alternative fuels and advanced vehicle technologies. Learn more at www.ct-futurefuels.com/.

Technology Types:
- CNG and LNG
- Biodiesel
- Hybrid electric vehicles
- Driver training
- EV charging stations

Lessons Learned and Impact
While large fleets get a lot of attention, a majority of fleets across the country are small and often rely on other small fleets for inspiration and advice on the best ways to increase the efficiency of their operations. In this project, every partner fleet grew as a result of participation—with some purchasing as many as 70% more alternative fuel vehicles than they originally anticipated. During the process, partners also realized environmental benefits, public relations benefits, and reduced maintenance and fuel costs that have continued over time.
Case Studies:

Natural Gas Fueling Station Success Story
In December 2010, Clean Cities coalitions in Connecticut, in partnership with Enviro Express, opened the first LNG transportation fueling center east of the Mississippi. The station also provided CNG fueling facilities. Learn more at afdc.energy.gov/case/1048 and afdc.energy.gov/case/403.

Norwich Public Utilities Success Story
Norwich Public Utilities assembled the largest municipal fleet of natural gas vehicles in Connecticut, with 33 CNG vehicles, as well as a hybrid electric bucket truck, two hybrid SUVs, and 15 biodiesel vehicles. Learn more at afdc.energy.gov/case/203.

Metro Taxi Success Story
Metro Taxi, operator of Connecticut’s largest taxi fleet, launched 110 CNG-fueled Ford Transit Connects and Honda Civics into service. Learn more at www.ct-futurefuels.com/2014/05/metro-taxi-fleet.html and youtube.com/watch?v=aT3yaoRSesc.

Partners:
- Capitol Clean Cities of Connecticut
- City of Bridgeport
- City of Meriden
- Connecticut Southwestern Area Clean Cities
- CTTRANSIT
- Enviro Express, Inc.
- Greater New Haven Clean Cities Coalition
- JRC Services LLC
- Metro Taxi
- NANA Corporation (Ella Grasso Turnpike Shell Station)
- Norwich Clean Cities
- Norwich Public Utilities
- Russo Lawn & Landscape, Inc.
- The Yellow Cab Company
- Town of Fairfield
- Town of Glastonbury
- Yale University
DeKalb County / Metropolitan Atlanta Alternative Fuel and Advanced Technology Vehicle Project

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Project Summary:
Clean Cities-Georgia, along with its partners, collaborated on the DeKalb County / Metropolitan Atlanta Alternative Fuel and Advanced Technology Vehicle Project. The effort aimed to increase the use of alternative fuel and advanced technology vehicles in Metro Atlanta and bolster fueling infrastructure to reduce U.S. dependence on imported petroleum, increase fuel economy, and reduce emissions. As a result of the project, the region gained a landfill gas conversion facility capable of producing renewable natural gas (RNG) at a DeKalb County landfill, five publicly accessible compressed natural gas (CNG) fueling stations, and upgraded one station to accommodate additional CNG fueling capacity. More than 200 alternative fuel and advanced technology vehicles have also been deployed by Metro Atlanta-based companies, as well as city and county governments. In addition to the environmental and health benefits, this project has helped maintain Atlanta’s competitiveness to attract new businesses and jobs. Learn more at cte.tv/project/dekalb-countymetropolitan-atlanta-alternative-fuel-and-advanced-vehicle-project.

Lessons Learned and Impact
The project was a catalyst for CNG growth in Georgia. Even though the project funded only seven stations, CNG availability grew from a single station in 2009 to nearly 30 public stations (nearly all of which were funded due to local market momentum and without government support)—either open or in the planning stages—by the conclusion of the project. Participating fleets have continued to grow their CNG fleets to take advantage of expanding infrastructure options and other fleets have also started deploying CNG vehicles.

Technology Types:
- CNG and RNG
- Hybrid electric vehicles
- Hydraulic hybrid vehicles

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<th>States: Georgia and Texas</th>
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Grand Total Petroleum Displacement | Grand Total GHG Reductions
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2,621,490.42 | 3,525.81

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<td>Texas’ 3rd-5th, 24th, 30th, 32nd, and 33rd Congressional Districts</td>
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¹ Congressional district information was generated using United States Census Bureau TIGER/Line® Shapefiles. Districts for infrastructure projects are listed based upon the physical address of the refueling location. For vehicles, they are listed based upon the census places and congressional districts that intersect a limited driving radius from the garage location of the vehicle.
Case Studies:

**Clean Cities-Atlanta Success Story**
The goal of the Clean Cities-Atlanta Petroleum Reduction program is to increase the use of alternative fuels and alternative fuel vehicles in the Atlanta metro area. The project has tripled the number of natural gas refueling stations in the metro area and has funded 40 natural gas vehicles for the DeKalb County Sanitation Department, 36 shuttle buses that are used at Hartsfield-Jackson Atlanta International Airport, 30 vehicles for Coca-Cola Refreshments, as well as 70 vehicles for UPS. Learn more at youtube.com/watch?v=qpP00682lZQ.

**Coca-Cola Success Story**
As part of their commitment to the environment, Coca-Cola has added more than 750 hybrid electric delivery trucks to their U.S. and Canadian fleets. The hybrid electric delivery trucks represent about 10 percent of Coca-Cola’s overall North American fleet. Learn more at youtube.com/watch?v=v9GlvJZEMco.

**The Parking Spot Success Story**
In 2012, the Parking Spot, an off-site airport shuttle bus company, began adding 31 compressed natural gas buses to their three lots near the Hartsfield-Jackson Atlanta International Airport. The project has fielded more than 200 alternative and advanced technology vehicles, six CNG refueling stations, and a landfill gas to renewable natural gas processing facility. Since then, the company estimates they have displaced more than 725,000 gallons of petroleum fuel. Learn more at youtube.com/watch?v=3CDLMc77DTQ.

**Snapping Shoals EMC Success Story**
Snapping Shoals Electric Membership Corporation first began adding alternative fuel vehicles to their fleet in 1998. The utility started by purchasing 23 CNG vehicles. The utility has saved an estimated $550,000–$600,000 in fuel costs since 1998 and has displaced 236,347 gallons of petroleum since mid-2002. Learn more at afmi.cleancitiesgeorgia.org/images/Case%20Studies/NG%20Case%20Study%20-%20Snapping%20Shoals%20EMC.pdf.

**Funding for this project increased the availability of alternative fuels with the development of six public-access, CNG fueling stations in the metropolitan Atlanta region. Photo from Center for Transportation and the Environment**

**The county sanitation trucks that unload solid waste at the Seminole Road Municipal Landfill in DeKalb County fuel up on renewable natural gas produced from landfill gas dispensed on-site. Photo by Roberto Gordon/DeKalb County, NREL 26760**

---

**Partners:**
- American Fueling Systems
- Atlanta Airport Marriott
- Atlanta Airport Renaissance
- Atlanta Gas Light
- City of Atlanta
- Clean Cities-Georgia
- Coca-Cola Refreshments
- DeKalb County
- PS Energy Group
- Snapping Shoals EMC
- The Parking Spot
- United Parcel Service (UPS)
Idaho Petroleum Reduction Leadership Project

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Project Summary:
The Idaho Petroleum Reduction Leadership Project served to assist with establishing compressed natural gas (CNG) fuel availability and use throughout the state. To accomplish this, Treasure Valley Clean Cities and Republic Services worked together to achieve a significant reduction in diesel fuel use by converting a portion of Republic Services’ trash and recycling truck fleet in the Boise area to run on CNG. The effort also led to the installation of the first permanent, public CNG fueling stations in Idaho, which were located at the company’s fleet facilities in Boise and Nampa. Another component of the project included outreach efforts to encourage other fleet operators and the public in the Boise area to use CNG. Learn more at shifttocng.com.

Technology Types:

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<thead>
<tr>
<th></th>
<th>LPG</th>
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<th>CNG</th>
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</table>

Partners:
- City of Boise
- City of Caldwell
- Republic Services
- Treasure Valley Clean Cities

Lessons Learned and Impact
The success of this project resulted in a national commitment from Republic Services to transition their entire refuse fleet to CNG. The availability of public infrastructure and a prolonged and robust marketing campaign highlighting the benefits of shifting to CNG also led to a number of small, local fleets and private citizens also making the transition. Dealerships and conversion shops have since started training their technicians to meet growing demand.

Congressional Districts:
- Idaho’s 1st and 2nd Congressional Districts

State: Idaho
Funding:
- $5,519,862 Award
- $6,839,077 Local matching funds

VEHICLE TECHNOLOGIES OFFICE | cleancities.energy.gov
Case Studies:

Republic Services Success Story
Clean Cities Recovery Act funding helped Republic Services, one of the largest waste and recycling companies in the country, acquire 87 CNG refuse and recycling trucks, train maintenance technicians, and conduct community outreach. Learn more at afdc.energy.gov/case/1425 and afdc.energy.gov/uploads/publication/casestudy_cng_refuse_feb2014.pdf.

Republic Services hauls more than 100 million tons of refuse annually for 13 million customers. Photo from Republic Services, NREL 25212.
Chicago Area Alternative Fuels Deployment Project

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Project Summary:
The Chicago Area Alternative Fuels Deployment Project increased the number of alternative fuel and hybrid vehicles on the road and installed alternative fueling and electric vehicle charging stations throughout the Chicago region. The project brought together a wide variety of project partners representing large and small private companies, municipalities, nonprofits, and utilities. Together, they deployed a diverse array of alternative fuels and advanced vehicles, including electric vehicles (EVs), compressed natural gas (CNG), propane, E85, and hybrid technologies. By embracing all types of partners and fuels, Chicago’s transportation landscape was transformed through the addition of green vehicles and fueling stations that helped promote energy security, reduce transportation costs, and improve air quality. In total, the project deployed more than 400 clean vehicles and 235 alternative fueling stations. Learn more at chicagocleancities.org/success-stories/planting-the-seed.

Technology Types:
- EVs and EV charging stations
- CNG
- Propane
- E85
- Hybrid electric vehicles
- Driver training

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Illinois

Case Studies:

Ethanol Flex Fuel Success Story
Chicago funded the purchase of E85 flex fuel vehicles. The City now has 1,861 E85 vehicles, representing more than 25% of its 7,000 vehicle fleet. Learn more at chicagocleancities.org/success/ethanol-flex-fuel/ and http://www.afdc.energy.gov/case/1844.

Green Taxi Program Success Story
Chicago’s Green Taxi Incremental Cost Allowance Program put 120 new taxis on the road, including 49 new hybrids and 71 CNG vehicles. The program helped the taxi industry purchase cost-effective hybrid and alternative fuel vehicles, which moved the City closer to reaching carbon emission goals set out in the Chicago Climate Action Plan. Learn more at www.chicagocleancities.org/success-stories/green-taxi-program.

Ozinga Success Story
Ozinga worked with Chicago to purchase 14 CNG concrete mixer trucks. The critical first-hand experience gained through these grant vehicles allowed them to quickly expand their alternative fuel plans using their own funds. Learn more at chicagocleancities.org/success/ozinga/.

Foodliner Success Story
Foodliner, a national carrier of bulk food products, had been considering a move to CNG. Recovery Act funding spurred the company to action and helped them purchase six dedicated CNG Class 8 Freightliner chassis trucks (M2-112) equipped with Cummins Westport (CWI ISL-G) 9-liter heavy-duty natural gas engines. Learn more at chicagocleancities.org/success/foodliner/.

Partners:
• Chicago Area Clean Cities
• Chicago Area Electric Vehicle Charging Station Project
• City of Chicago, Department of Fleet and Facility Management
• City of Chicago, Department of Transportation
• Clean Energy
• ComEd
• Doreen’s Pizza
• DuPage County – Division of Transportation
• Exel-Diageo
• Foodliner
• Forest Preserve District of DuPage County
• Gas Technology Institute
• GO Airport Express
• Green Taxi Program
• Groot Industries
• I-Go Car Sharing
• Ozinga Ready Mix
• Peoples Gas
• SCR Medical Transportation
• Village of Downers Grove
• Waste Management

Chicago has three fueling stations for E85 flex fuel vehicles that help fuel a fleet of 1,861 E85 vehicles. Photo by Heather Proc, NREL 19956.

Chicago’s Department of Business Affairs and Consumer Protection implemented the successful Green Taxi Incremental Cost Allowance Program using $1 million of its Recovery Act funding. Thanks to this effort, 120 new taxis were put on the road, including 49 new hybrids and 71 CNG vehicles. Photo from Chicago Area Clean Cities.
No One Silver Bullet, But a Lot of Silver Beebees

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Project Summary:
Through the No One Silver Bullet, But a Lot of Silver Beebees project, the Indiana Office of Energy Development and the Greater Indiana Clean Cities Coalition partnered with nine public- and private-sector organizations to implement a comprehensive alternative fuels plan for their state. The initiative focused on developing a plan designed to assist with the creation and retention of jobs, as well as growing Indiana’s alternative fuels market. To accomplish this, the effort focused on fuel neutrality—implementing the right fuel with the right fleet—based on fleet function, budgetary needs, and desired results. The involvement of Sysco Food Distribution expanded the reach of the project well beyond Indiana. The project resulted in the deployment of 19 compressed natural gas (CNG) vehicles, 250 propane vehicles, and 88 hybrid vehicles, along with 115 propane stations, three CNG stations, and three E85 stations. Learn more at cleancities.energy.gov/partnerships/search?utf8=&project_search=beebees.

Lessons Learned and Impact
This project focused on matching the right fuel with the right fleet based on function, budget, and desired results. Maintaining an open dialogue between fleets and the local Clean Cities coalition, along with fostering strong relationships with technical experts and manufacturers allowed any issues to be addressed quickly. This resulted in not only a resolution for the fleet with the issue, but in many cases, an improvement to future product offerings from the manufacturer. The coalition continues to receive inquiries about how to replicate successful projects from this award with other fleets.

Technology Types:
- CNG and RNG
- Propane
- E85
- Hybrid electric vehicles

Funding:
- $10,125,000 Award
- $12,046,731 Local matching funds

Congressional Districts:
- Alabama’s 1st and 2nd Congressional Districts
- Arizona’s 3rd and 4th Congressional Districts
- Arkansas’ 4th Congressional District
- California’s 1st-53rd Congressional Districts
- Connecticut’s 1st-5th Congressional Districts
- Delaware’s At Large Congressional District
- Florida’s 1st-27th Congressional Districts
- Georgia’s 1st, 2nd, and 8th Congressional Districts
- Iowa’s 1st, 2nd, and 4th Congressional Districts
- Illinois’ 1st-18th Congressional Districts
- Indiana’s 1st-9th Congressional Districts
- Kentucky’s 1st-4th Congressional Districts
- Louisiana’s 3rd and 4th Congressional Districts
- Massachusetts’ 1st and 2nd Congressional Districts
- Maryland’s 1st and 6th-8th Congressional Districts
- Michigan’s 6th and 7th Congressional Districts
- Minnesota’s 1st-8th Congressional Districts
- Missouri’s 1st-3rd, 6th, and 8th Congressional Districts
- North Dakota’s At Large Congressional District
- Nevada’s 2nd-4th Congressional Districts
- New Jersey’s 1st, 3rd-5th, 7th-9th, and 12th Congressional Districts
- New Mexico’s 2nd and 3rd Congressional Districts
- New York’s 1st-27th Congressional Districts
- Ohio’s 1st, 5th, 6th, 8th, 13th, and 14th Congressional Districts
- Oklahoma’s 2nd-4th Congressional Districts
- Oregon’s 2nd, 4th, and 5th Congressional Districts
- Pennsylvania’s 1st-18th Congressional Districts
- Rhode Island’s 2nd Congressional District
- South Dakota’s At Large Congressional District
- Texas’ 1st-36th Congressional Districts
- Vermont’s At Large Congressional District
- Wisconsin’s 1st-3rd and 7th Congressional Districts
- West Virginia’s 1st Congressional District

1 Congressional district information was generated using United States Census Bureau TIGER/Line® Shapefiles. Districts for infrastructure projects are listed based upon the physical address of the refueling location. For vehicles, they are listed based upon the census places and congressional districts that intersect a limited driving radius from the garage location of the vehicle.
Case Studies:

Natural Gas Powers Milk Delivery Trucks in Indiana

The 15,000-acre Fair Oaks farm built a public-access CNG station to service its fleet of 42 CNG milk-delivery trucks. The majority of the fuel comes from a 4.5-mile pipeline that transports renewable natural gas (RNG) to an underground anaerobic digester. The digester breaks down waste from the farm’s 11,000 cows into methane gas. Learn more at afdc.energy.gov/case/503.

Alternative Fuels Save Money in Indy

The City of Indianapolis is using alternative fuels and advanced vehicles to save taxpayer dollars, lower emissions, and bolster energy security. The city joined forces with the Greater Indiana Clean Cities Coalition to implement a host of fleet-efficiency measures. Photo from Motorweek/Maryland Public TV, NREL 17176

Indianapolis CNG Fueling Station Attracts Local Fleets, Turns into Profit Center

When an Indianapolis business owner converted his 50-vehicle fleet to CNG to reduce fuel costs, he also constructed a new CNG station with support from an infrastructure grant that stipulated the station be open to the public. Along with his own vehicles, CNG fleet vehicles from AT&T and the Indiana Department of Transportation fill up at the station, making this business owner’s foray into alternative fuels a lucrative one. Learn more at afdc.energy.gov/case/1823.

Fair Oaks’ waste-to-wheels fueling effort is helping the farm reach its goal of reducing its long-haul carbon footprint by 25%. The fuel is used in Class 8 trucks that deliver milk to processing plants in Indiana, Tennessee, and Kentucky. Photo from MotorWeek

Partners:

- Citizens Energy Group
- City of Ft. Wayne
- City of Indianapolis
- Greater Indiana Clean Cities Coalition
- Indiana Department of Transportation
- Indiana Office of Energy Development
- KACKO
- Lassus Brothers
- Renewable Dairy Fuels
- Sysco Food Distribution
- Tippecanoe School Corporation
Midwest Region Alternative Fuels Project

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Project Summary:
Metropolitan Energy Center (MEC) and the Kansas City Regional Clean Cities Coalition, along with 19 sub-recipients, received funding support to build alternative fuel stations, purchase alternative fuel vehicles, and convert conventionally fueled vehicles to an alternative fuel. The project included metropolitan areas in four states: Missouri, Kansas, Iowa, and Nebraska. Together, the project partners deployed 376 alternative fuel and advanced technology vehicles, including electric (EVs), compressed natural gas (CNG), propane, hybrid, biodiesel, and E85. The project also included 29 fueling station installations. The stations encourage fleets in the area to further invest in alternative fuel vehicles and create CNG travel corridors between and within the target metropolitan areas. The project also used success stories to educate the public about alternative fuels. Learn more at cleancities.energy.gov/partnerships/search?utf8=%E2%9C%93&project_search=missouri#arra-midwest.

Technology Types:
- CNG
- EVs and EV charging stations
- Hybrid electric vehicles
- Propane
- Biodiesel and E85

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Grand Total Petroleum Displacement: 3,081,484.69
Grand Total GHG Reductions: 3,238.16

Lessons Learned and Impact
This project built workable CNG travel corridors with grant funds, which were later expanded through private investments. Upgrades to aging CNG equipment, including the installation of additional compressors, and new dispensers and credit card readers were found to be particularly successful. The upgraded stations experienced improved performance and less time was required to achieve a full fill, resulting in a 400% increase in fuel sales.
Partners:
- Black Hills Energy
- City of Kansas City
- City of Lawrence
- City of Lee’s Summit
- City of Wichita
- Happy Cab Co.
- Johnson County Government
- Kansas City, Kansas School District
- Kansas City Regional Clean Cities Coalition
- Kansas Gas Service
- KCP&L
- Lee’s Summit R-7 School District
- Lincoln Airport Authority
- Margo Leasing
- Metropolitan Community Colleges of Omaha
- Metropolitan Utilities District
- New Bern-Pepsico
- O’Daniel Honda
- University of Missouri at Kansas City
- Zarco 66

Case Studies:

**Kansas City, Kansas Public Schools Invests in CNG Buses**

Kansas City, Kansas Public Schools (KCKPS) received 47 new CNG school buses in March 2011. The project has spurred interest in CNG use by other fleets in Kansas and Missouri. In the face of looming budget cuts, this project is saving KCKPS thousands of dollars. Learn more at afdc.energy.gov/case/1016.

![Photo from Kansas City Public Schools](image)

**Lee’s Summit R-7 School District Delivers with Electric Trucks**

In a years-long effort to reduce costs and its environmental footprint, Lee’s Summit R-7 School District embarked on a path to become the first U.S. public school district to operate an all-electric distribution fleet. In 2010, the district purchased four all-electric Smith Newton delivery trucks. The fleet of trucks is used to transport items such as school supplies and cafeteria food products from the district’s warehouse to schools and other facilities. The all-purpose delivery trucks also provide in-district mail delivery among all R-7 facilities. Each truck travels about 500 miles per month. From July 2010 through May 2012, the four trucks logged a combined 42,700 miles, and electricity was their fuel. Learn more at afdc.energy.gov/case/1009.

![A Happy Cab Co. taxi fuels up with CNG at a new fueling station in Omaha, Nebraska. Photo from MotorWeek](image)
Clean Cities Recovery Act Project Awards

Hybrid Horsepower for Kentucky Schools

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Project Summary:
Through the Hybrid Horsepower for Kentucky Schools project, the Kentucky Clean Fuels Coalition and The Kentucky Department of Education worked together to incorporate hybrid electric technology as a specification in the bus procurement process available to all 174 school districts in the state. This resulted in the purchase of 157 hybrid electric school buses during the course of the project. In addition, the project supported education and outreach targeting the general public, teachers, local officials, first responders, local media, and others. Learn more at afdc.energy.gov/case/1045.

Technology Types:
- Hybrid electric vehicles
- Driver training

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<td>■ $15,336,000 Local matching funds</td>
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<td>■ Indiana’s 9th Congressional District</td>
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<td>■ Kentucky’s 1st-6th Congressional Districts</td>
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<td>■ Ohio’s 1st Congressional District</td>
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Lessons Learned and Impact
Utilizing a master purchase agreement streamlined paperwork and allowed many districts to order hybrid school buses. The districts observed the hybrid buses performed at their peak with an appropriate route selection and driver training. A friendly rivalry between districts encouraged further petroleum reduction as drivers competed to see who could get the best fuel economy with their buses.

<table>
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<tr>
<th>Technology Types:</th>
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<th>CNG</th>
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Partners:
- Kentucky Clean Fuels Coalition
- Kentucky Department of Education

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1 Congressional district information was generated using United States Census Bureau TIGER/Line® Shapefiles. Districts for infrastructure projects are listed based upon the physical address of the refueling location. For vehicles, they are listed based upon the census places and congressional districts that intersect a limited driving radius from the garage location of the vehicle.
Case Studies:

**Hybrid Electric School Buses**

**Success Story**

The Kentucky Clean Fuels Coalition and its partners replaced 156 aging diesel school buses across Kentucky with new hybrid electric school buses that average 35% greater fuel efficiency. Learn more at kentuckycleanfuels.org/projects/hybrid-horsepower/, kentuckycleanfuels.org/wp-content/uploads/2013/10/Hybrid-Horsepower-for-KY-Schools-Summary-2014.pdf and youtube.com/watch?v=phADd-nyGC7c.

Kentucky students were active participants in the project, benefiting from hands-on learning experiences. Illustration from Kentucky Clean Fuels Coalition.
Maryland Hybrid Truck Goods Movement Initiative

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Project Summary:
Maryland Energy Administration and Maryland Clean Cities, along with their partners, joined together to implement the nation’s largest deployment of heavy-duty hybrid trucks in goods-moving applications under the Maryland Hybrid Truck Goods Movement Initiative. This project provided financial and technical assistance to fleets from ARAMARK, Efficiency Enterprises, Nestle Waters of North America, Sysco Corporation, and United Parcel Service (UPS) to facilitate the implementation of the largest collaborative hybrid truck project in the nation. The project resulted in the purchase and deployment of 143 Freightliner hybrid electric vehicles and hydraulic hybrid vehicles across 29 states.

Lessons Learned and Impact
Training programs designed for a variety of audiences proved essential to the success of deploying significant numbers of hybrid electric vehicles during the course of this project. Training for fleet staff focused on providing education about hybrid technology to determine optimal operating environments for the vehicles based on route type, duty cycle, and product mix. Thorough and sustained driver training programs were necessary to maximize fuel economy and promote on-going correct usage of the vehicles. The addition of a comprehensive maintenance program also ensured an efficient process for addressing maintenance issues and repairs.

Technology Types:
- Hybrid electric vehicles
- Driver training
- Hydraulic hybrid vehicles

Funding:
- $5,924,190 Award
- $10,075,175 Local matching funds

1 Congressional district information was generated using United States Census Bureau TIGER/Line® Shapefiles. Districts for infrastructure projects are listed based upon the physical address of the refueling location. For vehicles, they are listed based upon the census places and congressional districts that intersect a limited driving radius from the garage location of the vehicle.
Case Studies:

### Hybrid Trucks Success Story

In 2012, five big-name fleets hit the roads across the country with cutting-edge vehicles to demonstrate the cost benefits of hybrid electric and hybrid hydraulic technologies. The 143 trucks are highly efficient and have demonstrated a 20% to 60% reduction in fuel consumption, engine noise, and less greenhouse gases emitted into the air. Learn more at youtube.com/watch?v=YFBuuXppZMg.

ARAMARK is one of five fleets that switched to highly efficient hybrid electric vehicles. Photo from CleanCitiesTV

The fuel savings for the companies, which includes hybrid trucks from the Nestle Waters fleet, is estimated at nearly 140,000 gallons a year. Photo from CleanCitiesTV

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Grand Total Petroleum Displacement | Grand Total GHG Reductions
354,073.27 | 3,523.16
Michigan Green Fleets

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Project Summary:
The Clean Energy Coalition—including the Ann Arbor Clean Cities Coalition, Detroit Area Clean Cities, and Greater Lansing Area Clean Cities—collaborated with its partners on The Michigan Green Fleets program to promote advanced transportation technologies and alternative fuel solutions to fleets throughout the state. The effort resulted in a diverse cross-section of fleets choosing to adopt more than 500 electric (EVs), hybrid, propane, liquefied natural gas (LNG), and compressed natural gas (CNG) vehicles and install 60 new alternative fueling stations. In addition to improved air quality and reduced dependency on imported petroleum, the program supported the commercialization of cutting-edge technology and manufacturing capabilities, which led to the creation of new jobs throughout Michigan. Learn more at http://cec-mi.org/mobility/programs/green-fleets/.

Technology Types:
- CNG and LNG
- Propane
- Hydraulic hybrid vehicles
- Hybrid electric vehicles
- EVs and EV charging stations
- Driver training

Lessons Learned and Impact
Support networks among alternative fuel users, coupled with feedback mechanisms from fleets to manufacturers, proved to be critical to the success of deploying AFVs in a way that was sustainable and made sound business sense during this project. In addition to fueling infrastructure availability, project partners also recognized the importance of having access to capable service and maintenance technicians.
Michigan

Partners:
- Ann Arbor Clean Cities Coalition
- Ann Arbor Downtown Development Authority
- Clean Energy Coalition
- City of Ann Arbor
- City of Detroit
- Detroit Area Clean Cities
- DTE Energy
- Frito Lay
- Greater Lansing Area Clean Cities
- Metro Cars
- Schwan’s Home Service
- UBCR
- University of Michigan
- Western Michigan University
- Wright & Filippis

Case Studies:

Hydraulic Hybrids: A Success in Ann Arbor

Recovery Act funding helped the City of Ann Arbor purchase four hydraulic hybrid recycling trucks at the launch of its single-stream recycling program. The vehicles, which feature regenerative braking, save the city nearly 1,800 gallons of fuel each year. Learn more at afdc.energy.gov/case/1055.

Metro Cars’ alternative fuel fleet displaces more than 520,000 gallons of petroleum annually. As a leading transporter of passengers, they are also leading the way in green fuel use in the Motor City and beyond. Photo from MotorWeek

Clean Energy Coalition Powers Up Local Utility Fleet

Michigan Consolidated Gas, a unit of DTE Energy, received $5.4 million in Recovery Act funding to convert more than 170 gasoline-powered utility vehicles to CNG and to build two new CNG fueling stations and refurbish 13 others across Michigan. Learn more at cec-mi.org/clean-energy-coalition-powers-up-local-utility-fleet/.

Through this Recovery Act investment, DTE displaces about 250,000 gallons of petroleum each year. Photo from Clean Energy Coalition

UBCR Reduces Fuel Costs 37% by Adopting CNG


UBCR’s use of CNG has led to a 37% reduction in fuel costs and a 29% reduction in greenhouse gas emissions, with 285,698 gallons of diesel displaced a year. Photo from UBCR

Michigan Converts Vehicles to Propane, Reducing Emissions

Detroit-based Metro Cars, which offers limo and shuttle services, leveraged local dollars with a federal grant to expand its propane operations to Grand Rapids. The company installed additional propane stations and converted 90 vehicles—including luxury sedans, SUVs, and shuttle buses—to run on propane. Learn more at afdc.energy.gov/case/623.

The City of Ann Arbor was one of the first municipalities in the country to deploy hydraulic hybrid technology, which uses hydraulic tanks to store energy that would otherwise be lost to braking. The stored energy is then used to power the vehicle when it moves again. Photo from Government Fleet

Metro Cars’ alternative fuel fleet displaces more than 520,000 gallons of petroleum annually. As a leading transporter of passengers, they are also leading the way in green fuel use in the Motor City and beyond. Photo from MotorWeek

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New Jersey Compressed Natural Gas Refuse Trucks, Shuttle Buses, and Infrastructure Project

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Project Summary:
The New Jersey Clean Cities Coalition, along with its partners, led The New Jersey Compressed Natural Gas (CNG) Refuse Trucks, Shuttle Buses, and Infrastructure Project, the first statewide alternative fuel vehicle deployment program in New Jersey. The project deployed more than 300 CNG refuse haulers and shuttle buses belonging to 15 public and private fleets. The effort also supported the installation of six new CNG fueling stations throughout the state—in Newark, Camden, Trenton, Morris County, and Egg Harbor Township. In addition to the deployment activities, the initiative aimed to educate the public and other fleets about the benefits of using domestically produced natural gas in vehicles. Learn more at cleancities.energy.gov/partnerships/search?utf8=&project_search=new+jersey.

Technology Types:

- **CNG**

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Lessons Learned and Impact

Although this project focused on deploying CNG for refuse and shuttle fleets, participating fleets were also inspired to transition to CNG for other vehicles within their operations. In addition, outreach events and marketing efforts generated significant interest from outside fleets and municipalities seeking to pursue alternative fuels. As a result, the project stimulated an ongoing conversation about alternative fuels in New Jersey and placed the Clean Cities coalition as the go-to resource for these efforts.
New Jersey Utility Saves with Alternative Fuel

The Atlantic County Utilities Authority is a strong proponent of alternative fuels. Many of its fleet vehicles run on biodiesel. It also operates a CNG station used by its 15 CNG refuse trucks as well as the 190 private jitney buses that transport visitors around Atlantic City. Learn more at afdc.energy.gov/case/384.

Atlantic City relied on CNG-powered jitney minibuses for its evacuation and recovery efforts during and after Hurricane Sandy. Photo from MotorWeek
Long Island Regional Energy Collaborative “Promoting a Green Economy through Clean Transportation Alternatives”

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Project Summary:
The Greater Long Island Clean Cities Coalition, along with its partners, promoted the use of a variety of alternative fuels for vehicles through the Long Island Regional Energy Collaborative “Promoting a Green Economy through Clean Transportation Alternatives” initiative. The effort has spurred the low-carbon vehicle industry to grow and expand throughout Long Island by offering businesses and municipalities the flexibility to use alternatives that meet specific business needs. The project supported the installation of five compressed natural gas (CNG) stations and the deployment of 157 alternative fuel vehicles throughout Nassau and Suffolk counties. Learn more at cleancities.energy.gov/partnerships/search?project_search=American+Recovery+and+Reinvestment+Act+Project+Awards#arra-long.

Lessons Learned and Impact
Because CNG fueling stations require ongoing maintenance, participants in this project learned that a key factor to ensuring success from the beginning is to provide training on how to service and maintain the fueling equipment for fleets that operate stations. To prevent prolonged downtime if fueling equipment is in need of repair, it’s also important to have an established agreement in place that outlines who (ideally a local resource) will provide station repair and maintenance service.

Technology Types:
- CNG
- Facility modifications

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Partners:
- Engineered Energy Solutions
- Family Essential Enterprises
- Greater Long Island Clean Cities
- Manhattan Beer Distributors
- National Grid
- Rides Unlimited of Nassau/Suffolk
- Suffolk County
- Town of Hempstead
- Town of Huntington
- Town of Oyster Bay
- Town of Smithtown
- V. Garofalo Carting, Inc.
- Village of East Rockaway

Case Studies:

**V. Garofalo Carting Cleans up New York with Natural Gas Trucks**

V. Garofalo Carting, a family-owned waste and recycling company in Long Island, successfully transitioned to CNG. The company made the clean-fuel switch thanks in part to $600,000 in Recovery Act funding. Learn more at [afdc.energy.gov/case/167](http://afdc.energy.gov/case/167).

![Image of CNG truck](image1.jpg)

**In operation since 1958, the eco-friendly waste and recycling company V. Garofalo Carting has invested $6.5 million to green its fleet with alternative fuels. Photo from MotorWeek**

**CNG Refuse Haulers Do Heavy Lifting in New York**

In 2006, the City of Smithtown turned to CNG for its trash haulers to combat the rising cost of fuel. Since then, federal funding has helped the city purchase a variety of natural gas and electric vehicles—adding to Long Island’s fast-growing, municipal alternative fuel fleet. Learn more at [afdc.energy.gov/case/223](http://afdc.energy.gov/case/223).

![Image of CNG truck](image2.jpg)

**One of 21 CNG fueling stations in Oyster Bay available to local fleets of CNG vehicles. The CNG station was funded with help from the Recovery Act. Photo from Greater Long Island Clean Cities, NREL 23853**

**CNG Fleets Aid in Superstorm Recovery**

When Superstorm Sandy hit the East Coast in 2012, it flooded streets, cut power, and stranded vehicles. Many drivers—including first responders—struggled to find diesel fuel or gasoline. With its underground pipelines, however, CNG supply was uninterrupted and many CNG fuel stations remained operational. On Long Island, fleets of CNG trucks and cars kept operating in the storm’s aftermath, helping with recovery efforts. Learn more at [afdc.energy.gov/case/1426](http://afdc.energy.gov/case/1426).

![Image of CNG truck](image3.jpg)

**After testing out a CNG vehicle, the City of Smithtown made it mandatory for all contracted trash haulers to use the alternative fuel. The switch helped lock in cheaper fuel prices and led to construction of a new CNG station. Photo from MotorWeek**
New York State Alternative Fuel Vehicle and Infrastructure Deployment Program

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Project Summary:
The New York State Energy Research and Development Authority’s (NYSERDA’s) Alternative Fuel Vehicle and Infrastructure Deployment Project expanded the use of many different alternative fuels to a wide variety of fleets across New York. NYSERDA worked with sub-recipients in the public and private sectors that used vehicles ranging from small electric vehicles (EVs), such as neighborhood electric vehicles (NEVs), to long-haul, heavy-duty compressed natural gas (CNG) trucks. In total, project partners purchased 395 alternative fuel vehicles. The large majority of light-duty vehicles were CNG-fueled, thanks in large part to a major initiative by Verizon to convert much of its New York fleet to natural gas. Heavy-duty vehicles were split between CNG, propane, hybrid electric, and hydraulic hybrid. The project also supported the installation of 100 new fueling locations, which consisted primarily of electric vehicle charging stations, but also included four large CNG fueling stations and three propane fueling stations. Learn more at cleancities.energy.gov/partnerships/search?utf8=%E2%9C%93&project_search=new+york+state+alternative+#arra-newyork.

Technology Types:
- CNG
- Hybrid electric vehicles
- Hydraulic hybrid vehicles
- Propane
- EVs and EV charging stations
- Driver training

<table>
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<tr>
<th>Technology Type</th>
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<th>LNG</th>
<th>CNG</th>
<th>EV</th>
<th>Biodiesel</th>
<th>E85</th>
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<th>Total GHG Reductions</th>
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<td>HEV</td>
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<td>265</td>
<td>0</td>
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<td>395</td>
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</table>

Grand Total Petroleum Displacement 2,239,813.88  Grand Total GHG Reductions 2,335,97

1 Congressional district information was generated using United States Census Bureau TIGER/Line® Shapefiles. Districts for infrastructure projects are listed based upon the physical address of the refueling location. For vehicles, they are listed based upon the census places and congressional districts that intersect a limited driving radius from the garage location of the vehicle.

Lessons Learned and Impact
Alternative fuels can provide great opportunities for petroleum reductions, emissions reductions and cost savings. However, this project proved that a technology that makes sense for one fleet may not make sense for another. Similar fleets using the same technology often experienced very different outcomes based on infrastructure availability, driving routes, duty cycles, driver behavior, and climate. Fleets that experienced the greatest success often attributed the outcome to providing the right support for the technology they chose, such as training drivers and mechanics, providing a well-designed route based on the traits of the vehicle and ensuring proper maintenance.
Case Studies:

Leadership Drives Alternative Fuel Success at National Grid
National Grid has established itself as a leader in the energy sector, but this utility company is also proving to be a leader in the alternative fuels arena through its investment in natural gas vehicles (NGVs); the company’s inventory has grown to approximately 425 as of early 2012. Currently, the fleet includes propane forklifts, hybrid electric vehicles, and EVs in addition to CNG vans, sedans, dump trucks, and crew trucks. But National Grid’s commitment to alternative fuels doesn’t stop at the corporate level—the company also enables customers to adopt beneficial transportation alternatives by developing infrastructure for public use. Learn more at afdc.energy.gov/case/1004.

Green Fueling Station Powers Fleets in Upstate New York
Monroe County in upstate New York has a Green Alternative Fueling Station that dispenses a variety of fuels—B20, E20, E85, CNG, propane, and hydrogen. The county’s entire fleet of vehicles—including those driven by workers at the county’s public safety department, public works department, and airport—all use the station. Major support for this project came from the American Recovery and Reinvestment Act, the Voluntary Airport Low Emissions Program (VALE), the Congestion Mitigation and Air Quality Improvement Program (CMAQ), and NYSERDA. Learn more at afdc.energy.gov/case/1082.

Partners:
• AAA of Western and Central New York
• Albany International Airport Authority
• Ballston Spa Central School District
• Bard College
• Capital District Clean Communities
• Casella Waste Systems
• Cayuga County
• Central Hudson Gas and Electric
• Charlotte Valley Central School District
• City of Albany
• City of Rochester
• City of Syracuse
• City of White Plains
• Clean Communities of Central New York
• Clean Communities of Western New York
• Coca-Cola Enterprises
• CuseCar, Inc.
• Demon Logistics
• East Greenbush Central School District
• Empire Clean Cities
• Fairport Central School District
• Ferrario Ford, Inc.
• Genesee Region Clean Communities
• Gilboa-Conesville Central School District
• Harbec Plastics
• Hoosic Valley Central School District
• Malone Central School District
• Manhattan Beer Distributors
• Modern Disposal
• Monroe County
• National Grid
• New York Power Authority
• New York State Energy Research and Development Authority (NYSERDA)
• NYS Department of Environmental Conservation
• NYS Division of Homeland Security and Emergency Services
• Palmyra-Macedon Central School District
• SUNY Albany
• Town of Dobbs Ferry
• Town of Mamaroneck
• Tompkins County
• Trumansburg Central School District
• Verizon
• Village of Minoa
• Village of Warwick
• Wayne Central School District
• Westchester Ambulette
• Willow Run Foods
Clean Cities Recovery Act Project Awards

Carolina Blue Skies and Green Jobs Initiative

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Project Summary:
Palmetto State Clean Fuels Coalition and Land-of-Sky Clean Vehicles Coalition, along with their partners, led the Carolina Blue Skies and Green Jobs Initiative. The Initiative was a two-state effort aimed at increasing the availability and use of alternative fuels, while simultaneously deploying alternative fuel vehicles and advanced technology vehicles in North and South Carolina. The project successfully deployed a total of 519 alternative fuel vehicles, including 389 propane vehicles, 81 compressed natural gas (CNG) vehicles, 40 hybrid vehicles, and nine neighborhood electric vehicles (NEVs). The project also supported the installations of 141 alternative fueling stations, including 111 EV charging stations, 11 ethanol stations, 8 biodiesel stations, 6 CNG stations, and 5 propane stations. Learn more at cleancities.energy.gov/partnerships/search?utf8=&project_search=carolina+blue+skies.

Technology Types:
- EVs and EV charging stations
- Propane
- Hybrid electric vehicles
- Biodiesel
- CNG
- Driver training

<table>
<thead>
<tr>
<th>Technology Type</th>
<th>Total Infrastructure Installations</th>
<th>Total Petroleum Displacement</th>
<th>Total GHG Reductions</th>
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</table>

Lessons Learned and Impact
Project leaders were able to effectively tailor training to the needs of each partner thanks to performing training assessments at the start of this project. Although workshop-style training proved beneficial for influencing a fleet’s transition to alternative fuels, once a decision to adopt alternative fuels was made, project partners saw the most success through more direct and intensive training. This approach allowed training programs to address the unique idiosyncrasies and policies of each fleet’s location. First-responder training was also vital to fostering trust between first responders and the alternative fuel community.

<table>
<thead>
<tr>
<th>Primary recipient state</th>
<th>Additional state impacted</th>
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<tr>
<td>North Carolina</td>
<td>South Carolina</td>
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</tbody>
</table>

Funding:
- $12,004,175 Award
- $19,509,710 Local matching funds

Congressional Districts:
- North Carolina’s 1st, 2nd, 4th, and 6th-13th Congressional Districts
- South Carolina’s 1st-7th Congressional Districts

1 Congressional district information was generated using United States Census Bureau TIGER/Line® Shapefiles. Districts for infrastructure projects are listed based upon the physical address of the refueling location. For vehicles, they are listed based upon the census places and congressional districts that intersect a limited driving radius from the garage location of the vehicle.
Case Studies:

**Asheville Success Story**
Asheville, North Carolina, built on its decade-long history of working to green its fleet by adding 25 CNG vehicle conversions, a first-responder alternative fuel training, and CNG fueling station upgrades. This resulted in significant progress toward meeting a municipal carbon-footprint reduction goal of 80% by 2050. Learn more at [afdc.energy.gov/case/2084](http://afdc.energy.gov/case/2084) and [afdc.energy.gov/case/1945](http://afdc.energy.gov/case/1945).

![Asheville CNG vehicles reduced greenhouse gas emissions by about 41 tons. Photo by Bill Eaker. NREL 32063](image)

**Charlotte Douglas International Airport Success Story**
At North Carolina’s Charlotte Douglas International Airport, plug-in hybrid buses lowered diesel use, maintenance costs, and pollution. Learn more at [afdc.energy.gov/case/103](http://afdc.energy.gov/case/103).

![These 35-foot plug-in hybrid buses at Charlotte Douglas International Airport run in full-electric, zero-emissions mode over a third of the time. Photo from MotorWeek](image)

**North Carolina Partners:**
- Biogen Idec
- BuildSense
- Centralina Council of Governments – Centralina Clean Fuels Coalition
- Charlotte Mecklenburg Utilities
- Charlotte Solid Waste Services
- City of Asheville
- City of Charlotte
- City of Charlotte Airport
- City of Fayetteville
- City of Greensboro
- City of Hendersonville
- City of Raleigh
- City of Rock Hill
- City of Rocky Mount
- City of Winston-Salem
- County of Chatham
- County of Durham
- County of Greenwood
- County of Guilford
- County of Henderson
- County of Orange
- Duke Energy
- FL Transportation, Inc.
- Forest Foundation
- Garvin Oil
- God Bless the USA, Inc.
- Land-of-Sky Regional Council – Land-of-Sky Clean Vehicles Coalition
- Mainor Legacy
- Midlands Biofuels
- Mission Healthcare Foundation, Inc.
- Monroe Oil
- North Carolina Advanced Energy Corporation
- North Carolina Propane Gas Association
- North Carolina State University – North Carolina Solar Center
- OM Biofuels
- Palmetto Gas
- Pentair Aquatic Systems
- Piedmont Biofuels
- Plug-In Carolina
- South Carolina Energy Office – Palmetto State Clean Fuels Coalition
- Spinx Company
- Time Warner Cable
- Town of Cary
- Town of Knightdale
- Triangle J Council of Governments – Triangle Clean Cities Coalition
- University of South Carolina – South Carolina Research Foundation
- York County Natural Gas
The Ohio Advanced Transportation Partnership

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Project Summary:
The Ohio Advanced Transportation Partnership involved Clean Fuels Ohio and a diverse array of partners from across the state, including city and county government, private and non-profit fleets, and other industry partners in a broad-based project to help transform Ohio’s transportation sector. Funds for this project were used for the purchase or conversion of 314 alternative fuel vehicles including compressed natural gas (CNG), liquefied natural gas (LNG), propane, hybrid electric, and all-electric vehicles (EVs). The project also helped to support the construction of 74 alternative fueling stations. These included EV charging stations, CNG stations, propane stations, and a renewable natural gas (RNG) station that processes organic waste into a vehicle fuel. Learn more at cleanfuelsohio.org/.

Technology Types:
- EVs and EV charging stations
- Hybrid electric vehicles
- CNG, LNG, and RNG
- Propane

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<th>Infrastructure</th>
<th>LPG</th>
<th>LNG</th>
<th>CNG</th>
<th>EV</th>
<th>Biodiesel</th>
<th>E85</th>
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<th>Total Petroleum Displacement</th>
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<td>5,095,332.93</td>
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Lessons Learned and Impact
This project was intentionally broad in scope in order to leverage as many resources as possible. Despite being a challenge to manage, the project resulted in significant alternative fuel market growth. By funding one alternative fueling station and identifying an anchor fleet to fuel there, the overall station network was able to grow and benefit a wider variety of local and national fleets. Smaller fleets also made significant strides once they were able to acquire a couple of vehicles and access fueling without an issue.
Case Studies:

**Frito-Lay Success Story**
Snack food giant and National Clean Fleets partner Frito-Lay launched a fleet of Smith Newton electric trucks with zero tailpipe emissions and a virtually silent drive to make deliveries in Columbus, Ohio. Learn more at [afdc.energy.gov/case/404](https://afdc.energy.gov/case/404) and [youtube.com/watch?v=IRy3BsLt434](https://www.youtube.com/watch?v=IRy3BsLt434).

**Melink Success Story**
Melink Corp. added a fleet of electric vehicles along with solar-powered charging stations to its LEED-certified, net zero-energy building. Learn more at [youtube.com/watch?v=q-0o58HpTsw&list=PLWAT-EvB9Tl-PKr1E5yzdDiCJscdk-htop](https://www.youtube.com/watch?v=q-0o58HpTsw&list=PLWAT-EvB9Tl-PKr1E5yzdDiCJscdk-htop).

**quasar Biogas Conversion Success Story**
quasar energy, an Ohio-based waste-to-energy company, developed an innovative anaerobic digestion system to break down organic materials and convert them into about 3,600 gasoline gallon equivalents of RNG each day. Learn more at [afdc.energy.gov/case/1443](https://afdc.energy.gov/case/1443).

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**Partners:**
- 350Green/Car Charging
- Ansonia Local School District
- Bowling Green State University
- Capitol Square Review and Advisory Board
- City of Akron
- City of Bowling Green
- City of Centerville
- City of Cincinnati
- City of Columbus
- City of Dayton
- City of Dublin
- City of Hamilton
- City of Logan
- City of Tipp City
- Clean Energy
- Clean Fuels Ohio
- Cleveland Ace Taxi Service
- Columbus Green Cabs
- Columbus Regional Airport Authority
- Dillon Transport
- The Electrical Trades Center
- FirstEnergy
- Franklin County
- Franklin County Board of Developmental Disabilities
- Friends Business Source
- Frito-Lay
- Findlay Machine and Tool, Inc.
- Heritage Day Health Center
- Mayer
- Melink
- Northwest State Community College
- Ohio Agricultural and Research and Development Center
- Ohio State University
- Peabody Landscape Group
- Pike-Delta-York Local Schools
- Rumpke
- Sharp Community Resources (Bexley Beat)
- Stark Area Regional Transit Authority
- Vectren
- Vermont Energy Investment Corp. (VEIC)
- Zanesville Energy (quasar)
Texas Alternative Fuels Pilot Project

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Project Summary:
The Texas Alternative Fuels Pilot Project was led by the Railroad Commission of Texas and its partners. The Commission partnered with 45 school districts and other public entities across the state of Texas to fund the deployment of 608 alternative fuel vehicles, including propane and compressed natural gas (CNG) school buses, medium-duty trucks and vans, and light-duty vehicles. To enhance the project’s sustainability, the Commission also awarded grants to install or upgrade 30 propane fueling stations on properties owned by partner fleets. The stations allowed the fleets to lower their costs by buying fuel in bulk, receive federal motor fuel excise tax credits, and refuel at the times most convenient to their schedules. Concurrently, the Commission designed and implemented a two-part public education program for Clean Cities stakeholders, fleet operators, and the general public, which involved all of the Clean Cities coalitions in Texas. Learn more at cleancities.energy.gov/partnerships/search?utf8=&project_search=texas#arra-texas.

Technology Types:
- CNG
- Propane
- Driver training

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Lessons Learned and Impact
School bus drivers accustomed to driving diesel buses were educated on how to modify their driving habits to maximize the fuel economy of propane buses. A key strategy was training drivers to avoid using heavy pressure on the pedal when accelerating from a dead stop. The project led to the development of a driver training video and an innovative tachometer cling to install on the propane buses. This served to remind drivers to stay within the optimum revolutions per minute (RPM) range. School districts that took advantage of these tools reported better fuel economy.

Congressional Districts:
- New Mexico’s 2nd Congressional District
- Texas’ 1st-12th, 14th-18th, and 20th-36th Congressional Districts

1 Congressional district information was generated using United States Census Bureau TIGER/Line® Shapefiles. Districts for infrastructure projects are listed based upon the physical address of the refueling location. For vehicles, they are listed based upon the census places and congressional districts that intersect a limited driving radius from the garage location of the vehicle.
Case Studies:

Propane School Bus Fleets Success Story

Four school districts in Texas now use propane-fueled school buses. Some of the school districts save nearly 50% on a cost per mile basis for fuel and maintenance relative to diesel. The total petroleum displacement was 212,000 diesel gallon equivalents per year for 110 buses, while greenhouse gas reductions were approximately 770 tons per year. Learn more at afdc.energy.gov/uploads/publication/case-study-propane-school-bus-fleets.pdf.

Alvin ISD upgraded its on-site propane fueling station with a higher-volume pump and dispenser to save time and money refueling their 28 buses. Photo credit: Texas Railroad Commission. Photo from Texas Railroad Commission

Partners:

- Alamo Area Clean Cities (San Antonio)
- Alvin Independent School District (ISD)
- Angleton ISD
- Arlington ISD
- Austin ISD
- Barbers Hill ISD
- Capitol Area Rural Transportation System
- City of Arlington
- City of Cedar Park
- City of El Paso
- City of Garland
- City of Haltom City
- City of Lake Jackson
- City of Laredo
- City of San Antonio
- City of Temple
- City of Tyler
- Conroe ISD
- Dallas County
- Dallas County Schools
- Dallas-Fort Worth Clean Cities
- Dickinson ISD
- Eanes ISD
- Friendswood ISD
- Grapevine-Colleyville ISD
- Greater East End Management District
- Gregory-Portland ISD
- Houston-Galveston Clean Cities
- Houston Gateway Academy
- Houston ISD
- Humble ISD
- Leander ISD
- Lone Star Clean Fuels Alliance (Central Texas)
- Manor ISD
- Midland ISD
- New Braunfels ISD
- Northside ISD
- Orange County
- Prosper ISD
- Railroad Commission of Texas
- Ramirez Common School District
- Sheldon ISD
- Silsbee ISD
- South Texas ISD
- Southwest ISD
- Splendora ISD
- Texas Department of Transportation
- Williamson County
- Ysleta ISD
Development of a National Propane Refueling Network, Clean School Bus/Vehicle Incentive, and Green Jobs Outreach Program

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

**Project Summary:**
The Development of a National Propane Refueling Network, Clean School Bus/Vehicle Incentive, and Green Jobs Outreach Program brought together several partners including Texas State Technical College and the Lone Star Clean Fuels Alliance in central Texas. The effort helped advance the installation of propane fueling infrastructure in metropolitan areas throughout the United States. The effort also supported the purchase of new and retrofitted propane buses, vans, and trucks. Finally, the project provided an innovative outreach program designed specifically for veterans and out-of-work, or at-risk service technicians, to provide training to work in the alternative fuels industry. The program resulted in the opening of 85 operational fueling stations, the purchase and deployment of 677 propane vehicles, and many successful training sessions.

**Lessons Learned and Impact**
The objective for each fleet that participated in this project was to primarily save money on fuel costs. As fuel cost savings accumulate over time, many fleets have since been able to purchase more propane vehicles. Fuel providers welcomed the opportunity to provide propane refueling options to meet demand. Clean Cities coalitions were instrumental in facilitating these partnerships. As a result of this project and others like it in Texas, propane school buses have become mainstream additions to school district fleets.


**Funding:**
- **$12,333,940 Award**
- **$42,151,401 Local matching funds**

**Congressional Districts:**
- Arizona's 3rd and 5th-8th Congressional Districts
- California's 1st, 3rd, 6th, 7th, 10th, 24th-35th, 37th, 39th-48th, 50th, 52nd, and 53rd Congressional Districts
- Colorado's 1st, 2nd, 6th, and 7th Congressional Districts
- Connecticut's 1st and 5th Congressional Districts
- Florida's 16th Congressional District
- Georgia's 2nd, 5th, 6th, 9th, 11th, and 13th Congressional Districts
- Illinois' 1st-4th, 6th, 8th, 10th, 18th Congressional Districts
- Indiana's 2nd and 3rd Congressional Districts
- Kansas' 1st Congressional District
- Louisiana's 3rd Congressional District
- Michigan's 2nd, 3rd, and 12th Congressional Districts
- New Hampshire's 2nd Congressional District
- Ohio's 3rd Congressional District
- Oregon's 1st and 3rd-5th Congressional Districts
- Pennsylvania's 5th-7th, 12th, 14th, and 18th Congressional Districts
- Texas' 2nd, 4th, 7th-11th, 17th, 18th, 20th-23rd, 25th, 28th-31st, 35th, and 36th Congressional Districts
- Washington's 1st, 3rd, 4th, 7th, 9th, and 10th Congressional Districts
- Wisconsin's 3rd Congressional District
- West Virginia's 2nd and 3rd Congressional Districts

**Technology Types:**
- Propane
- Driver training

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1. Congressional district information was generated using United States Census Bureau TIGER/Line® Shapefiles. Districts for infrastructure projects are listed based upon the physical address of the refueling location. For vehicles, they are listed based upon the census places and congressional districts that intersect a limited driving radius from the garage location of the vehicle.
Texas

Case Studies:

Menards Success Story

Propane vehicle drivers are now able to refuel at 32 new locations throughout Illinois and Wisconsin, thanks to collaboration among CleanFUEL USA, Ferrellgas, and Menards home improvement stores. Menards plans to convert 140 new pickups to propane operation for these stores, which will also receive propane forklifts to replace their existing diesel equipment. Learn more at afdc.energy.gov/case/1428.

Menards store manager Kyle Krause fuels one of the company’s new propane pickup trucks. Photo by Greg Zilberfarb, NREL 24347

Partners:

- CleanFUEL Holdings
- Lone Star Clean Fuels Alliance (Central Texas)
- Public Solutions Group
- Texas State Technical College – Waco

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Grand Total Petroleum Displacement | Grand Total GHG Reductions
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Clean Cities Recovery Act Project Awards

North Central Texas Alternative Fuel and Advanced Technology Investments

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Project Summary:
The North Central Texas Council of Governments, along with its partners, worked to deploy hundreds of alternative fuel and advanced technology vehicles, and install a variety of alternative fueling stations in the Dallas-Fort Worth area via the North Central Texas Alternative Fuel and Advanced Technology Investments project. Together, they developed a strategy to deploy a variety of different technologies and fuels, including biodiesel, ethanol, compressed natural gas, and electricity. In total, the project deployed 290 vehicles and 13 refueling stations across 17 fleets, including those operated by cities, independent school districts, a major commercial airport, private fleets, and a faith-based nonprofit. Learn more at cleancities.energy.gov/partnerships/search?utf8=&project_search=north+central+texas.

Technology Types:
- Biodiesel and E85
- CNG
- EVs and EV charging stations
- Hybrid electric vehicles

State: Texas

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<td>■ $23,197,585 Local matching funds</td>
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Lessons Learned and Impact
This project proved that even a single fueling station placed in the right location can have an enormous impact on regional use of a particular alternative fuel. For example, one publicly-accessible CNG fueling station utilized by an anchor fleet that was constructed during this project has since grown to regularly serve 27 local and national fleets at this critical location. State grant programs continue to support the purchase of natural gas vehicles and this station will continue to be a key resource.

Technology Types:
- Biodiesel and E85
- CNG
- EVs and EV charging stations
- Hybrid electric vehicles

Infrastructure

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Grand Total Petroleum Displacement | Grand Total GHG Reductions
5,218,796.19 | 36,889.09

¹ Congressional district information was generated using United States Census Bureau TIGER/Line® Shapefiles. Districts for infrastructure projects are listed based upon the physical address of the refueling location. For vehicles, they are listed based upon the census places and congressional districts that intersect a limited driving radius from the garage location of the vehicle.
Case Studies:

Clean Energy Station Opening

The number of alternative fuel vehicles and stations in the Dallas-Fort Worth area grew considerably with the influx of $13.2 million in Recovery Act funding. The North Central Texas Council of Governments used the grant money to help fund a portfolio of different technologies and fuels, including three biofuel (B20) stations, two E85 stations, three compressed natural gas (CNG) stations, and five electric charging sites, along with 112 CNG vehicles, 32 (EVs), 145 hybrid electric vehicles, and one plug-in hybrid electric vehicle. Learn more at youtube.com/watch?v=FFrg5V0nbM.
Utah Clean Cities Transportation Sector Petroleum Reduction Technologies

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Project Summary:
The Utah Clean Cities Transportation Sector Petroleum Reduction Technologies project aimed to increase the use of alternative fuel and advanced technology vehicles throughout the state to increase U.S. energy security, benefit local air quality, and install alternative fueling infrastructure. As a result of the effort, 568 new alternative fuel vehicles were purchased and deployed in Utah fleets, 36 new alternative fueling stations were installed, and 18 fueling stations were upgraded to accommodate alternative fuels. Learn more at utahcleancities.org/uccc-grant.

Technology Types:
- EVs and EV charging stations
- CNG and LNG
- Driver training
- Hybrid electric vehicles
- Biodiesel

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Grand Total Petroleum Displacement: 37,827,348.65
Grand Total GHG Reductions: 39,827.31

Lessons Learned and Impact
A culture of peer-to-peer exchanges contributed to the overwhelming success of this project. Fleets with alternative fuel experience were able to successfully mentor other fleets during their transition. In turn, those fleets served as mentors to others and created a vast network of groups with first-hand alternative fuel experience. Vehicle conversion shops that diversified their business to provide services for multiple fuel types, in addition to standard automotive repairs, have also thrived since the project’s completion.
Utah Paperbox Success Story
In 2012, Utah Paperbox installed five electric vehicle (EV) charging stations and added three plug-in electric vehicles to its fleet. In just one example of the fuel savings gained, the company’s vice president of finance drove more than 18,000 miles and only purchased 58 gallons of gas. Learn more at afdc.energy.gov/case/1569.

Salt Lake City Success Story
Utah’s first liquefied natural gas (LNG) refueling station, located in Salt Lake City, can fill a wide variety of vehicles that run on either liquefied or compressed natural gas (CNG). The station has been joined by five others in Utah and two in Idaho to form a continuous long-haul truck alternative fuel corridor from the region all the way to the Southern California coast. Learn more at afdc.energy.gov/case/383.
Southeast Propane Autogas Development Program

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Project Summary:
Multiple Clean Cities coalitions—including Alabama Clean Fuels Coalition, Clean Cities Atlanta, Georgia Clean Fuels Coalition, Gold Coast Clean Fuels Coalition, Maryland Clean Cities, Palmetto State Clean Cities, and Tennessee Clean Fuels Coalition—along with their partners, worked together under the Southeast Propane Autogas Development Program. The effort was a large-scale alternative fuel project aimed at building propane infrastructure in the Southeast United States and encouraging public and private fleets to adopt propane. The program converted 1,189 vehicles from conventional gasoline to run on propane, and opened 11 propane fueling stations in 10 states. This resulted in millions of gallons of petroleum displacement. In addition, the project included a wide-ranging communications campaign to increase awareness and usage of propane in the Southeast. Learn more at cleancities.energy.gov/partnerships/search?utf8=&project_search=southeast#arra-southeast.

Lessons Learned and Impact
Converted vehicles experienced safety and performance issues because of a lack of qualified conversion personnel and ineffective quality control mechanisms early in the project. A combination of technical assistance and partners who were committed to finding a solution led to a more robust and successful process. The wide variety of fleets involved in the project demonstrated the viability of propane in multiple vehicle applications. The propane market in Virginia has continued to grow largely due to personal testimonials among fleet managers.

Technology Types:

Propane

1 Congressional district information was generated using United States Census Bureau TIGER/Line® Shapefiles. Districts for infrastructure projects are listed based upon the physical address of the refueling location. For vehicles, they are listed based upon the census places and congressional districts that intersect a limited driving radius from the garage location of the vehicle.
Ethanol Flex Fuel Success Story
Community Counseling Services, a comprehensive community mental health center that operates in seven Mississippi counties, acquired 29 propane vans to transport hundreds of clients each week. Learn more at usepropaneautogas.com/fleet-resources/case-studies/.

Virginia

Case Studies:

Veolia Transportation Success Story
In Baltimore, Maryland, Veolia Transportation converted 300 Checker and Yellow Cab taxis from gasoline to propane. Learn more at afdc.energy.gov/case/1122.

Spotsylvania Vehicle Conversion Success Story
Virginia’s Spotsylvania County converted 20 sheriff’s cruisers and four school district trucks to run on propane. The county also has five school buses that run exclusively on propane. Learn more at usepropaneautogas.com/wp-content/uploads/2014/03/06_Spotsylvania-County-Case_Study.pdf.

Partners:
- Airport Shuttle
- Alabama Clean Fuels Coalition
- Alliance Autogas (Blossman)
- American Alternative Fuels
- Augusta County
- Baker Equipment
- Brooks Chevrolet
- Buncombe County
- Bus Group
- Carroll County, GA
- Carrollton
- City of Vestavia Hills
- Clean Cities Atlanta
- Community Counseling
- County of Greenville, SC
- Culpeper
- Force 911
- Frederick County
- Georgia Clean Fuels Coalition
- German Motor Works
- Gold Coast Clean Fuels Coalition
- Groome Transportation
- Jackson County
- Keystone
- Kingsport
- Lee County
- Lewis Pest Control
- Light N Up
- Limousine Livery
- Maryland Clean Cities
- Mississippi Economic Development Partnership
- Muscogee County Sheriff
- Newport News
- Palmetto State Clean Cities
- Pearl River
- Peninsula Propane, LLC
- Pickins County, SC
- Propane Education and Research Council (PERC)
- Red Top Cab
- Sandy Springs
- Southeast Louisiana Clean Fuels Partnership
- Spotsylvania
- Tennessee Clean Fuels Coalition
- Veolia Transportation
- Villa Rica
- Virginia Clean Cities at James Madison University
- Virginia Department of Mines Minerals and Energy
- Virginia Premier
Puget Sound Clean Cities Coalition Petroleum Reduction Project

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Project Summary:
The Puget Sound Clean Cities Coalition Petroleum Reduction Project was an ambitious and multi-faceted effort led by many partners to generate lasting petroleum displacement across Washington. The project allowed for the deployment of more than 650 alternative fuel and advanced technology vehicles and the development of infrastructure for biodiesel, E85, compressed natural gas (CNG), and electric vehicles (EVs). The effort also helped deploy more than 200 light-duty CNG taxis and supported a large roll-out of electrified ground-support equipment and corresponding charging infrastructure at the Seattle-Tacoma International Airport. Additionally, the project included multiple efforts to inform audiences in the Puget Sound region about strategies to further reduce petroleum use. Learn more at cleancities.energy.gov/partnerships/search?utf8=&project_search=puget+sound.

Technology Types:
- CNG
- Biodiesel and E85
- EVs and EV charging stations
- Propane
- Hybrid electric vehicles

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Lessons Learned and Impact
While the high mileage of CNG taxi cabs resulted in significant petroleum reductions, the CNG market in Washington continues to struggle amid inconsistent incentives. In contrast, while EVs didn’t displace much petroleum during the course of the project, the installation of EV charging stations for pool car and commuter vanpool applications has allowed many people to experience EVs firsthand. This factor, coupled with the state’s EV purchase incentives, has influenced a significant number of personal EV purchases.

Congressional Districts:
- Idaho’s 1st Congressional District
- Oregon’s 1st-3rd Congressional Districts
- Washington’s 1st-10th Congressional Districts

1 Congressional district information was generated using United States Census Bureau TIGER/Line® Shapefiles. Districts for infrastructure projects are listed based upon the physical address of the refueling location. For vehicles, they are listed based upon the census places and congressional districts that intersect a limited driving radius from the garage location of the vehicle.
municipalities contract out waste-hauling services to private companies. Eager to win the Seattle contract, which required bidders to demonstrate “cleaner than diesel” fuel use, two leading waste-hauling companies—Waste Management and CleanScapes—integrated CNG vehicles into their fleets. Learn more at [afdc.energy.gov/case/1053](http://afdc.energy.gov/case/1053).

Seattle Rideshare Fleet Adds Electric Vehicles, Enjoys Success
Since 1979, Seattle-based King County Metro Rideshare Operations has managed the largest publicly owned and operated commuter van program in the nation. In 2011, the organization acquired its first all-electric fleet vehicles—20 Nissan Leafs—and soon after added five more. Recovery Act funding supported the deployment with the installation of three electric vehicle charging stations. Learn more at [afdc.energy.gov/case/1843](http://afdc.energy.gov/case/1843).

Sea-Tac Airport Goes Green
Recovery Act funding supported the installation of hundreds of electric charging stations throughout the Seattle-Tacoma International Airport (Sea-Tac) for ground-support equipment such as baggage tugs, bag ramps, and pushback vehicles. The bright yellow charging corrals feature fast-charging vehicle plug-ins. Learn more at [youtube.com/watch?v=IuPWQ62cQtw](https://youtube.com/watch?v=IuPWQ62cQtw).

Case Studies:

**Clean Air Taxi**
Taxi drivers in the Puget Sound region tapped into Recovery Act funding to convert their cabs to run on CNG or to switch to more fuel-efficient hybrid electric cabs. To reduce air pollution and encourage cleaner transportation options in the area, Western Washington Clean Cities created the Clean Air Taxi program, which allows any cab company to opt in if at least 20 percent of its vehicles are hybrid electric, fully electric, CNG, and/or propane vehicles. Learn more at [cleanairtaxi.org](http://cleanairtaxi.org) and [youtube.com/watch?v=qAjP0DROm_k](https://youtube.com/watch?v=qAjP0DROm_k).

**Seattle’s Waste Haulers are Going Green**
Together, the cities of Seattle and Issaquah spurred a green revolution in Washington’s waste-hauling industry. In the Puget Sound region, most taxi companies that join the Clean Air Taxi program have made a voluntary commitment and investment in cleaner cars. Photo from Clean Air Taxi

Since Waste Management made the switch to CNG, related fuel infrastructure in the Puget Sound region has grown. Photo from Western Washington Clean Cities, NREL 19681

Since 1979, Seattle Rideshare added 25 electric vehicles to its fleet, it reduced its greenhouse gas emissions by about 24 metric tons per month. Photo by Jessie Lin/Washington State DOT, NREL 29160

Sea-Tac converted baggage tugs, bag ramps, and pushback vehicles from fossil fuels to electricity and added nearly 600 electric charging stations throughout the airport. Photo from Western Washington Clean Cities

Seattle’s Waste Haulers contract out waste-hauling services to private companies. Eager to win the Seattle contract, which required bidders to demonstrate “cleaner than diesel” fuel use, two leading waste-hauling companies—Waste Management and CleanScapes—integrated CNG vehicles into their fleets. Learn more at [afdc.energy.gov/case/1053](http://afdc.energy.gov/case/1053).
Wisconsin Clean Transportation Program

In 2009, the American Recovery and Reinvestment Act (Recovery Act) funded 25 cost-share projects under the Clean Cities program totaling nearly $300 million. These projects have advanced the transformation of vehicle fleets across the nation by establishing 542 alternative fueling stations and putting more than 9,000 alternative fuel and advanced vehicles on the road. Together, these projects support U.S. energy independence, contribute to regional economic development, and reduce harmful vehicle emissions.

Project Summary:
The Wisconsin Clean Transportation Program (WCTP) was a four-year initiative aimed to significantly reduce petroleum consumption and emissions in Wisconsin. The initiative focused on increasing the use of alternative fuel or advanced technology vehicles, including compressed natural gas (CNG), propane, biodiesel, E85, electric vehicles (EVs), and hybrid electric vehicles, and installing supporting infrastructure. The WCTP also aimed to maximize the preservation and creation of jobs by investing in the technology and training necessary to maintain a strong alternative fuels industry. The project deployed 177 light-duty vehicles, 200 medium- and heavy-duty vehicles, and installed three publicly accessible and 19 private alternative fuel stations. Learn more at www.wicleancities.org/about_us/wctp.php.

Technology Types:
- Propane
- Hybrid electric vehicles
- CNG
- Biodiesel and E85
- Driver training
- EVs and EV charging stations

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Lessons Learned and Impact
The involvement of a variety of partners and fuel types in this project demonstrated that alternative fuels can be used in any application and growth in one alternative fuel market can lead to growth in others. By raising awareness of a particular fuel, the project team encouraged greater conversation about the availability of all alternative fuel options. As a result, fleets selected the fuel that best suited their needs and budget, in many cases opting for propane because of its low implementation cost.
Case Studies:

Leadership in CNG Propels Paper Transport Inc.

Paper Transport Inc., a 350-truck regional freight company out of Green Bay, Wisconsin, recently began a transition from diesel fuel to CNG to help cut its petroleum use and emissions. The transition also helped the company meet U.S. Environmental Protection Agency ozone standards along its main shipping corridor. Each of the 15 trucks currently in the fleet travel about 100,000 miles per year. Learn more at afdc.energy.gov/case/1006.

Compressed Natural Gas Refuse Fleets

Three organizations used heavy-duty refuse trucks fueled by CNG to explore the potential for saving money on fuel while taking advantage of other benefits, such as low-criteria pollutant emissions, lower greenhouse gas emissions, and quieter operation. Republic Services, a national waste and recycling services company; Groot Industries, Inc. a smaller residential trash pick-up and disposal company operating regionally in northern Illinois; and the City of Milwaukee’s Department of Public Works (DPW), a municipal agency, all share lessons learned in this case study. Learn more at afdc.energy.gov/uploads/publication/casestudy_cng_refuse_feb2014.pdf.
Authors:
Kay Kelly and Mark Singer
National Renewable Energy Laboratory

For more information, visit: cleancities.energy.gov

Clean Cities Technical Response Service
800-254-6735 • technicalresponse@icfi.com

To view this and other Clean Cities publications online, visit cleancities.energy.gov/publications.

Prepared by the National Renewable Energy Laboratory (NREL), a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy; NREL is operated by the Alliance for Sustainable Energy, LLC.

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