



Clean Cities Program Overview

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Clean Cities' Mission

To advance the energy, economic, and environmental security of the U.S. by supporting local decisions to adopt practices that contribute to the reduction of petroleum consumption in the transportation sector.

- Sponsored by the DOE's Office of Energy Efficiency and Renewable Energy's Vehicle Technologies program
- Provides a framework for businesses and governments to work together as a coalition to enhance markets
- Coordinate activities, identify mutual interests, develop regional economic opportunities, and improve air quality

- 87 active coalitions in 45 states
- 632,000 AFVs using alternative fuels
- 5,600 AFV stations
- 6,500+ stakeholders



Coalitions are made up of local and national stakeholders.

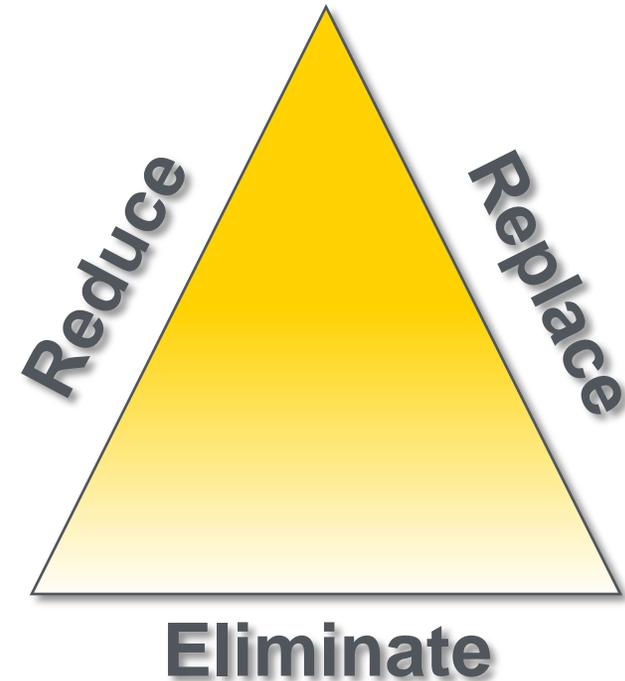
AVSG



NGVAMERICA
Natural Gas Vehicles for America



- **Replace** petroleum with alternative fuels and low-level blends.
- **Reduce** by promoting energy efficiency in vehicles through advanced technologies and more fuel efficient vehicles.
- **Eliminate** by promoting idle reduction, greater use of mass transit, trip elimination, and other congestion mitigation approaches.



Alternative Fuels and Vehicles

- Biodiesel (B100)
- Electricity
- Ethanol (E85)
- Hydrogen
- Natural gas
- Propane

Fuel Blends

- Biodiesel/diesel blends (B2, B5, B20)
- Ethanol/gasoline blends (E10)
- Hydrogen/natural gas blends (HCNG)

Fuel Economy

- Fuel efficiency
- Behavioral changes
- Vehicle maintenance initiatives
- Vehicle miles traveled (VMT)

Hybrids

- Light- and Heavy-duty HEVs
- PHEVs

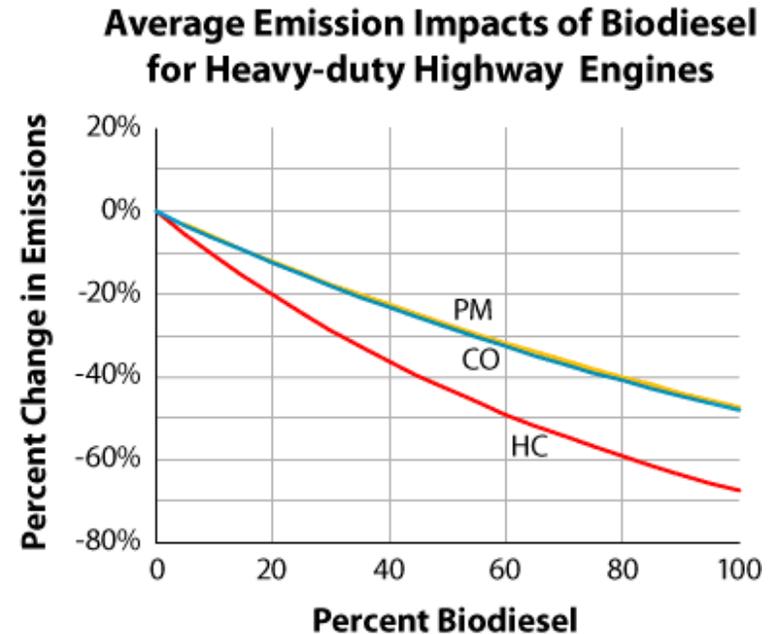
Idle Reduction

- Heavy-duty trucks
- School buses
- Truck stop electrification

- Produced from renewable sources such as new and used vegetable oils and animal fats.
- Physical properties are similar to petroleum diesel.
- Higher flashpoint makes it safer to handle, store, and transport.



- Nontoxic and biodegradable
- Reduction of unburned hydrocarbons, carbon monoxide and particulate matter
- Greenhouse gas and air quality benefits
- More lubricity than petroleum diesel
- Positive energy balance
- Cold weather starting and storage issues
- 8% less energy per gallon than petroleum diesel



Source: <http://www.epa.gov/otaq/models/analysis/biodsl/p02001.pdf>

- B20 is the most common blend in U.S.
- Used in all unmodified diesel engines.
- Has similar payload capacity, range, horsepower, and torque as diesel.
- Used to fuel compression-ignition (diesel) engines.
- Promises rural and urban microeconomic benefits.



Biodiesel Truck

- Mixture of hydrocarbons, predominantly methane (CH₄)
- High octane rating
- Nontoxic, noncorrosive, and noncarcinogenic
- Not a threat to soil, surface water, or groundwater
- Compressed natural gas (CNG) and liquefied natural gas (LNG)
- Lower ozone-forming emissions than gasoline
- From gas and oil wells

- Natural gas supplies originate in North America
- Environmental Benefits:
- CNG vehicles emit:
- 95% less particulate matter (PM)
- 90% less carbon monoxide (CO)
- 75% less nitrogen oxide (NOx) and
- 20% less carbon dioxide (CO₂) compared to their diesel-fueled counterparts
- 30% less carbon dioxide (CO₂) compared to their gasoline-fueled counterparts
- 50% quieter than their diesel-fueled counterparts
- Source: http://www.afdc.energy.gov/afdc/vehicles/emissions_natural_gas.html



- There are two types of natural gas vehicles: bifuel and dedicated.
- There is widespread natural gas distribution and refueling infrastructure.
- CNG refueling stations are either slow-fill or fast-fill.
- CNG can be used in light-, medium-, and heavy-duty vehicles.
- LNG fuel systems are used with heavy-duty vehicles and locomotives.



CNG Vehicle

- By-product of natural gas processing and crude oil refining
- Known as liquefied petroleum gas (LPG)
- High octane
- 33%-41% less energy content per gallon than gasoline
- 60% reduction in ozone-forming emissions compared with gasoline

Pollutant	% Reduction HDV
Total HC	>80
CO	>90
NO _x	~60
PM	~100

- Nontoxic and no threat to soil, surface water, or groundwater
- High energy density = good driving range
- Stored onboard a vehicle in a tank pressurized to around 300 psi
- Range vs. payload reduction issue caused by larger fuel tanks
- A gallon of propane about 25% less energy than a gallon of gasoline
- Liquid Propane Injection engines—higher fuel efficiency
- Widespread infrastructure



Propane Forklift

The US DOE offers a bi-annual grant solicitation, primarily targeted to Clean Cities stakeholders

2009 Solicitation Included:

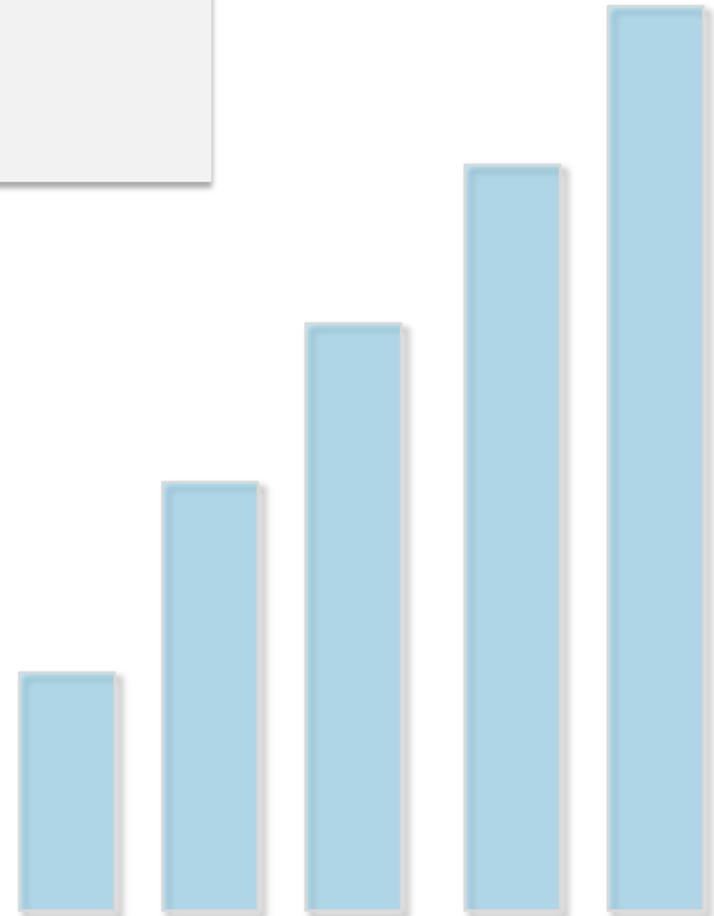
- Infrastructure for Alternative Fuels:
 - intend to fund a percentage of the infrastructure cost associated with developing alternative fuel fueling capability.
- 2. Incremental Cost of Alternative Fuel Vehicles
 - intend to fund a percentage of the incremental cost associated with purchase of dedicated alternative fuel vehicles.
- 3. Education/Workshops
 - intend to provide stakeholders opportunity to create national scale workshop, partnering with Clean Cities Coalition for alternative fuel education

Approximately \$13.6M awarded for FY 2008

\$300M in ARRA funding

Next Solicitation anticipated at end of 2010 Calendar Year

2008 Performance Metrics



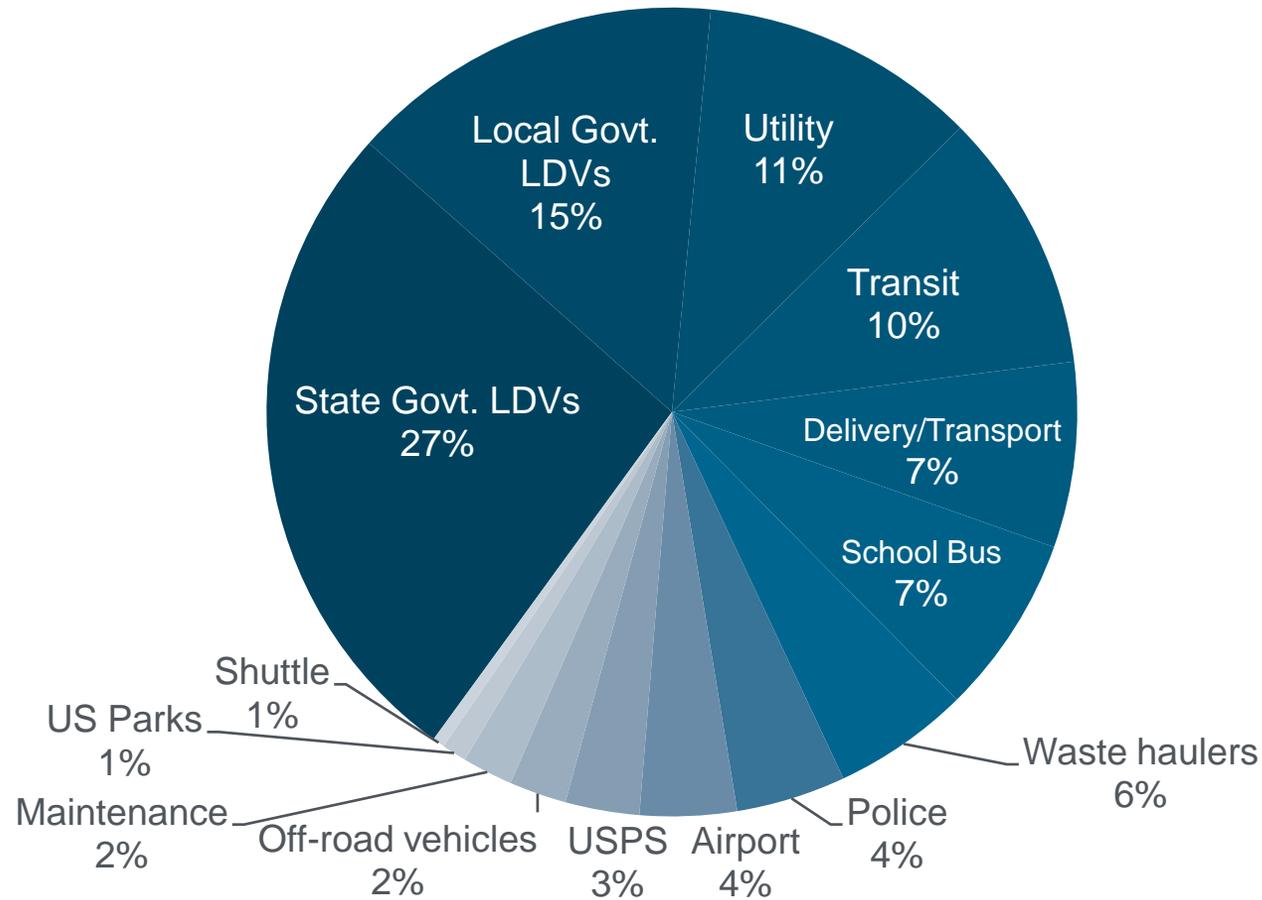
Petroleum Displacement of Each Portfolio Element

Technology	Million GGEs	Percent of Coalitions' Total	Change from Last Year*
AFV	198	69%	-2%
Blends	63	22%	31%
Hybrid Electric Vehicles	12	4%	-26%
Idle Reduction	8	3%	28%
Fuel Economy/VMT Reduction	4	1%	-25%
Off Road	1	0%	na
Coalitions Total	287	100%	3%
ORNL Fuel Economy	125		55%
Grand Total	412		14%

*To enable a direct comparison, changes from last year were calculated from 2007 displacement numbers adjusted to remove E10 and transfer B20 from AFV section to blends.

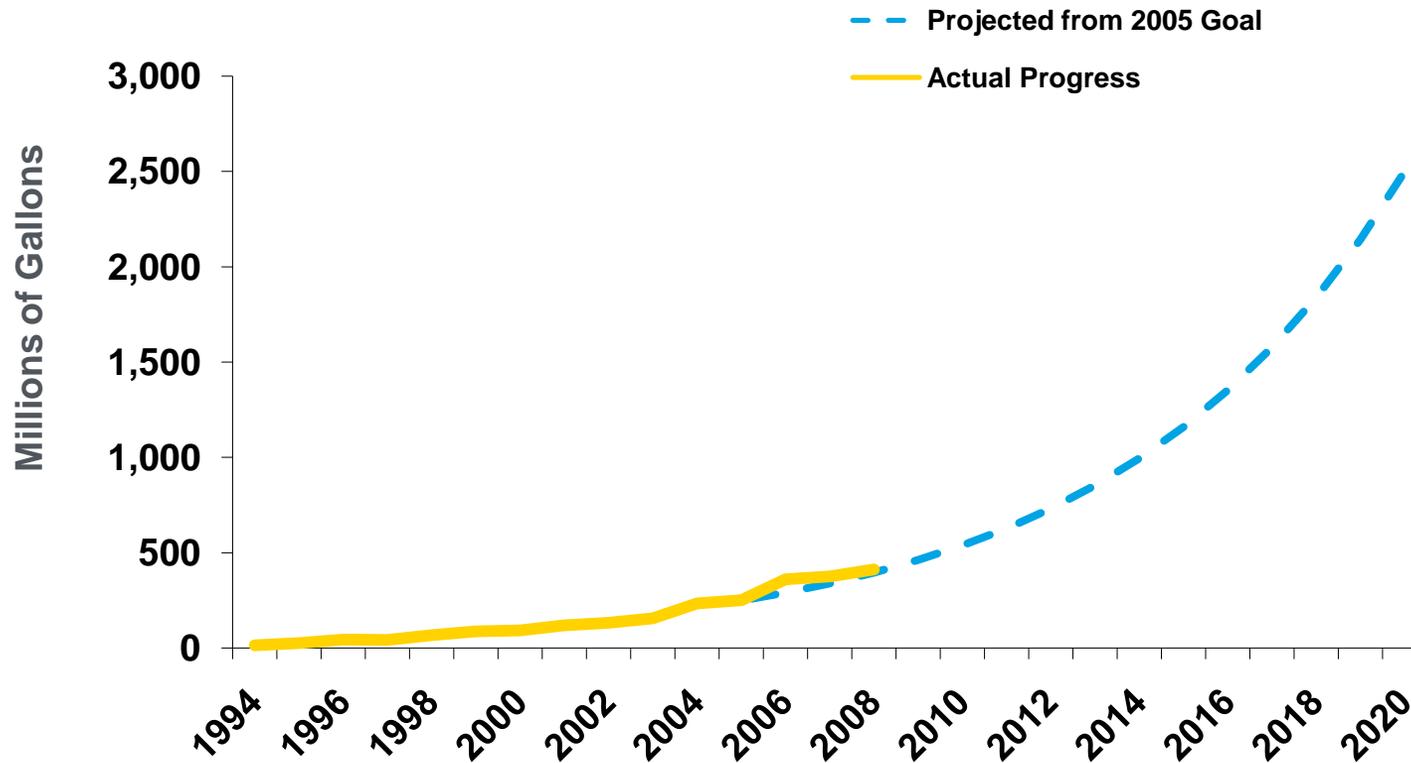
Source: Clean Cities Annual Metrics Report 2008, August 2009

Percentage of Total AFVs and HEVs by Niche Market



Source: Clean Cities Annual Metrics Report 2008, August 2009

Annual Displacement Projection - Goal and Progress



Source: Clean Cities Annual Metrics Report 2008, August 2009

U.S. DEPARTMENT OF **ENERGY** | Energy Efficiency & Renewable Energy

Alternative Fuels & Advanced Vehicles Data Center

About the AFDC | Fuels | Vehicles | Fleets | Incentives & Laws | Data, Analysis & Trends | Information Resources | Home

Help | Methodology

Petroleum Reduction Planning Tool

The Petroleum Reduction Planning tool helps fleets, consumers, and business owners create a strategy to reduce conventional fuel use in fleet and personal vehicles. This interactive tool allows users to evaluate and calculate petroleum reductions by choosing one or a combination of the following methods:

- Alternative Fuels
- Hybrid Electric Vehicles
- Biodiesel Blends
- Fuel Economy
- Vehicle Miles Traveled Reduction
- Truck Stop Electrification
- Idling Time Reduction
- Onboard Idle Reduction

Get Started

Guest User: No password is required. Full planning functionality is provided but scenarios cannot be saved.

Registered User: Create and save one or more scenarios, which can be accessed for editing and analysis.

Register Now: Registering allows users to create, save, and edit scenarios for further analysis.

[Password Reminder](#)

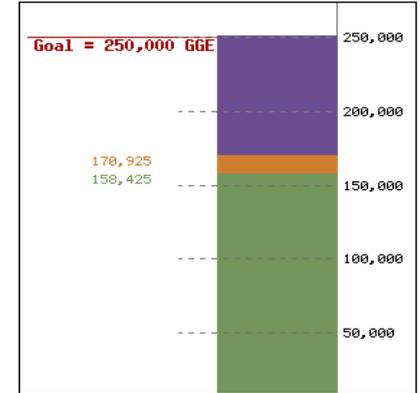
www.afdc.energy.gov/afdc/prep.index.php

Petroleum Reduction Plan

Scenario Name: Test2
Annual Petroleum Reduction Goal: 250000 GGE

Based on your inputs, this is your petroleum reduction goal and associated plan. You may print the information on this page and use it to help you reach your goal. If you are a registered user, this scenario is saved in the system and you may make changes at a future time.

To alter your plan, return to [Step 2](#).



Alternative Fuels

AFV Type	AFV Fuel	Number of AFVs	Average VMT	Fuel Economy (mpg)	Fraction of Fuel Use	GGE Reduced
Large Pickup/Utility	LPG	50	10000	20	1	25000
Midsize Car	E85	100	15000	25	1	47400
HD Truck > 26k lb	CNG	25	15000	5	1	86025
TOTAL GGE						158425

Hybrid Electric Vehicles (HEVs)

Fuel Type	Number of Vehicles	Average VMT	Fuel Economy of new HEVs	Fuel Economy of Old Vehicles	GGE Reduced
Gasoline	75	15000	45	30	12500
TOTAL GGE					12500

Biodiesel Blends

Vehicle Type	Blend Type	Number of Vehicles	Average VMT	Fraction of Fuel Use	Fuel Economy	GGE Reduced
HD Truck > 26k lb	B50	50	15000	1	5	80777
TOTAL GGE						80777

Clean Cities Web site

www.eere.energy.gov/ccities

Alternative Fuels & Advanced Vehicles Data Center Web site

www.eere.energy.gov/afdc

DOE EERE Information Center and Technical Response Service

Web Site: <http://www.eere.energy.gov/afdc/informationcenter.html>

Phone: 1-800-EERE-INF (1-877-337-3463)

Email: technicalresponse@icfi.com

Hours: 9:00 a.m. – 6:00 p.m. EST

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<http://www.uri.edu/cels/ceoc/ec/osccc.html>

