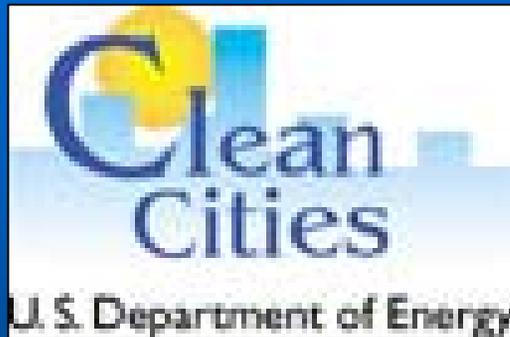


Advancing the use of Alternative Fuel Vehicles (AFVs) in Connecticut

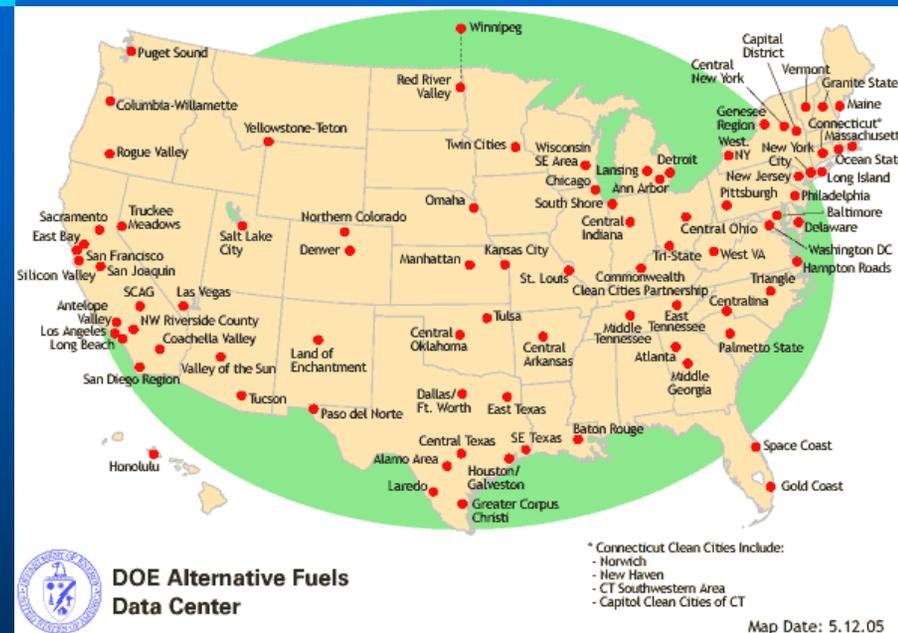
Clean Cities of Connecticut
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Clean Cities program was established by the 1992 Energy Policy Act to advance the nation's economic, environmental, and energy security by supporting local decisions to reduce petroleum consumption and air pollution caused by on-road vehicles.

The state of Connecticut has four "Clean Cities": Greater New Haven, Southwest Connecticut, Capital Area, and Norwich.



Clean Cities Coalitions Use Portfolio Approach to Meet Local Needs

- **Alternative Fuels**

- CNG, LNG, LPG, E85, B20, Electricity, H₂

- **Advanced Vehicles** --Hybrid Electric Vehicles

- **Fuel Blends**

- Biodiesel (< 20%), ethanol

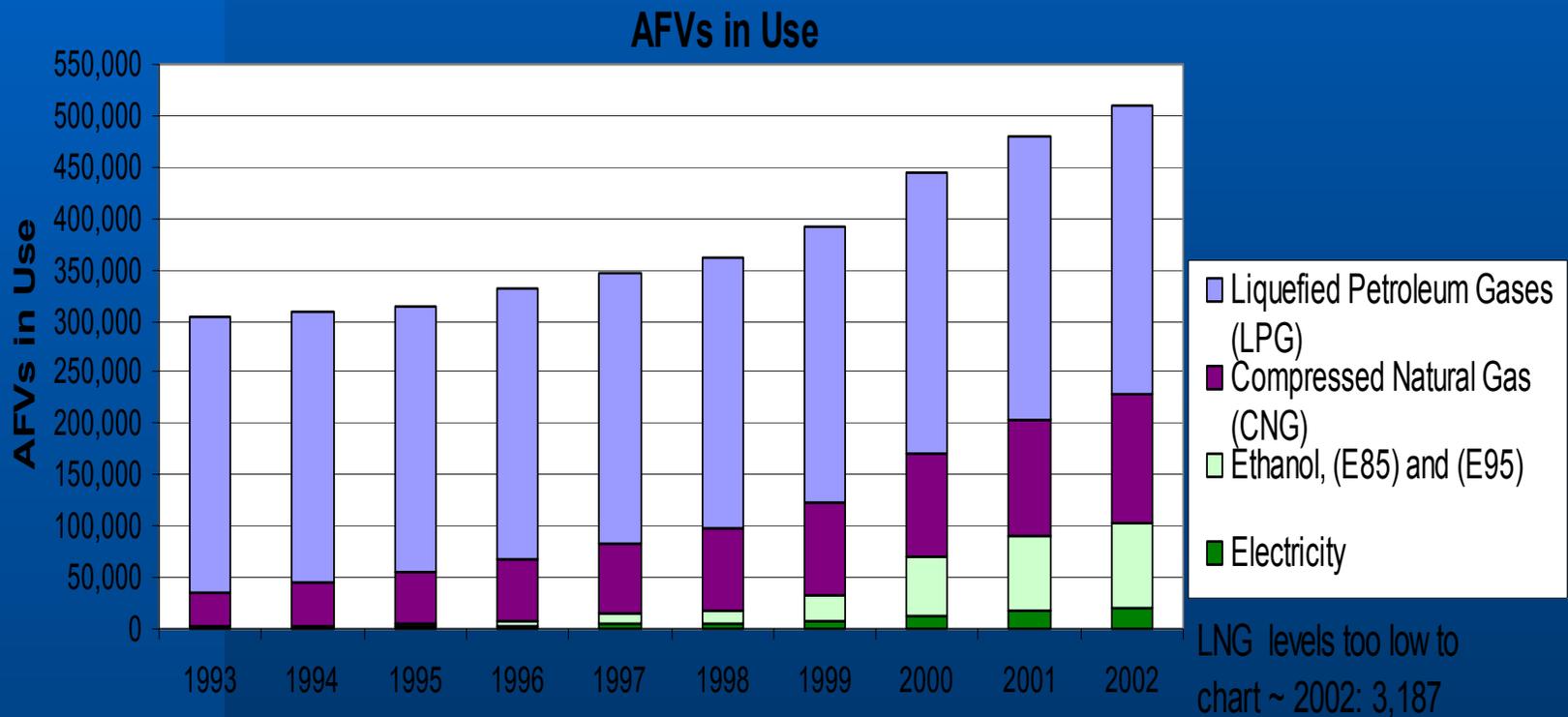
- **Truck Idle Reduction**

- On-board, truck-stop electrification, anti-idling policies

- **Fuel Economy**

- New cars, used cars, driver behavior

17% per year growth in AFVs in Clean Cities coalition areas compared to 2% per year growth in rest of the country



NOTE: 2,652,592 flex fuel (E85) vehicles in 2000. Chart shows estimated vehicles using E85 fuel.

Source: EIA, Alternatives to Traditional Transportation Fuels 2000

In Connecticut, the primary alternative fuels being used are natural gas & biodiesel.

Natural Gas is a high-quality fuel that is a viable substitute for gasoline and diesel.

Natural gas vehicles emit significantly fewer pollutants than diesel vehicles: 40% to 86% less PM and 38% to 58% less NOx

Over 12,000 heavy duty natural gas transit buses, school buses, refuse trucks and utility vehicles in operation nationwide.

Major obstacles to the expanded use of CNG vehicles are their moderately higher cost compared to conventional diesel vehicles and the cost of refueling infrastructure.

Biodiesel is a cleaner-burning version of diesel fuel made from natural, renewable sources such as vegetable oils rather than petroleum.

Biodiesel may be used as a blended fuel (as low as 5% to 20% biodiesel) or as a single neat fuel (100% biodiesel).

B100 and biodiesel blends generate less PM than conventional diesel (55% less PM from B100 and 18% less PM from B20). Nitrogen oxides may increase slightly without additional controls, but recent tests have shown there may be a NO_x decrease when vehicles are tested under a load.

Because biodiesel contains no sulfur it can be used with aftermarket control devices.

How can AFV's Benefit the State of CT?

Petroleum Reduction

Air Quality Improvement

Fosters Economic Growth for CT Companies

Petroleum Reduction

The U.S. imports more than 50 % of its crude oil and is expected to import more than 60% by 2010.

U.S. Consumers pay foreign countries over three billion dollars a week to satisfy the demand for imported oil.

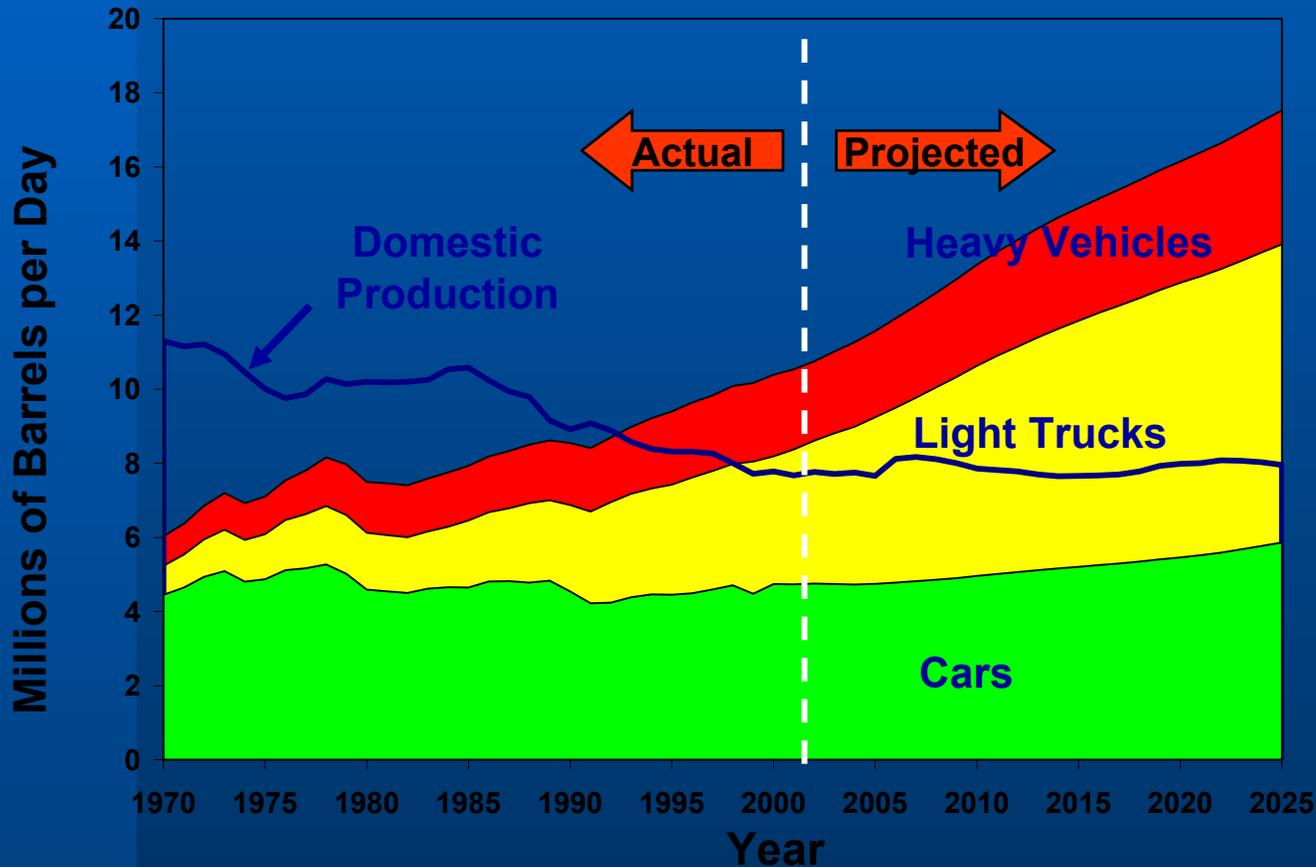
Much of our oil is imported from politically unstable areas of the world.

Unlike other sectors of our economy, the transportation sector is nearly totally reliant on oil as its sole energy source.

The increased use of domestically produced alternative fuels can help reduce the US reliance on foreign oil and help foster the development of new US industries

US Energy Dependence is Driven By Transportation

US Oil Use for Transportation



Source: [Transportation Energy Data Book: Edition 21](#), DOE/ORNL-6966, September 2001, and [EIA Annual Energy Outlook 2003](#), January 2003

Air Quality Improvement

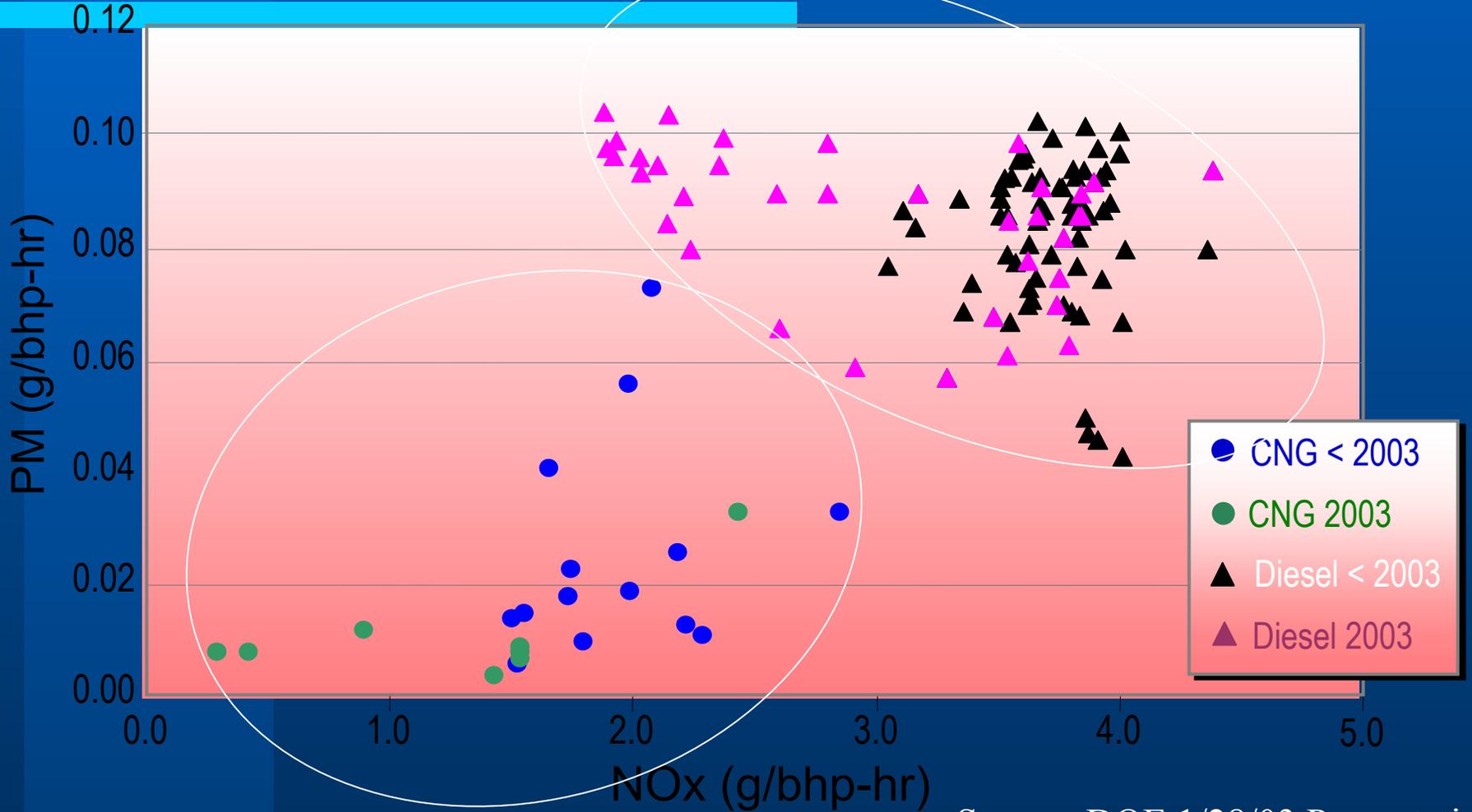
New heavy duty natural gas engines emit 50% less NOx than even the most advanced diesel trucks. New natural gas vehicles replacing older diesel technologies can reduce both NOx and particulate matter by up to 90% or more. Some light duty vehicle models also provide greenhouse gas reduction reductions (CO₂) of up to 25%.

Low emitting heavy duty natural gas vehicles are able to demonstrate diesel-like fuel economy and vehicle performance with a 90% reduction in noise.

Low emission diesel engines require low sulfur fuel, complex after treatment (some that lower fuel economy), and particulate ash disposal. Natural gas-powered engines have emission levels lower than the cleanest diesels and can achieve the EPA 2007 and 2010 particulate standards without complex after treatment systems.

Biodiesel and biodiesel blends generate less PM than conventional diesel. And because biodiesel contains no sulfur, vehicles powered by biodiesel will not damage aftermarket emission control devices.

Comparison of Existing Diesel and NG Engine Emissions



Source: DOE 1/28/03 Presentation

AFVs Foster Economic Growth for CT Companies

Connecticut-based companies that manufacturer and service alternative fuel vehicles and refueling stations, fuel suppliers and numerous related service industries can all benefit from the increased use of alternative fuels in the State of Connecticut.

Some of the CT Clean Cities' key business partners have included:

Manchester Honda (Honda CNG and Hybrid Vehicles)

Bell Power Systems (John Deere CNG Engines)

Cummins MetroPower (Cummins Westport CNG Engines)

Santa Energy (Biodiesel and CNG Fuel Retailer)

Connecticut Natural Gas/Southern Connecticut Gas (Fuel Supplier)

Yankee Gas (Fuel Supplier)

AVSG (CNG Station Installation/Maintenance)

Air & Gas Technologies (CNG Station Installation/Maintenance)

Avalence (Hydrogen Fueling for Vehicles)

Proton Energy System (Hydrogen Products and Infrastructure)

Electroenergy Inc. (Nickel Metal Hydride Batteries)

Norwich Public Utilities (Fuel Supplier)

Connecticut is home to:

1106 Compressed Natural Gas (CNG) vehicles

52 dedicated electric vehicles

648 Flexible Fuel Ethanol Vehicles

2 Ethanol Stations (E-85)

4 B-20 stations (1-New Haven and 3-CT DOT)

15 CNG Refueling Stations

We estimate that fuel displacement from CT's AFVs is approx. 75,000 gallons of diesel fuel and over 250,000 gallons of gasoline annually.

Most viable and widespread alternative fuels in use in Connecticut to date have been natural gas (CNG) and biodiesel (B-20).

CNG Stations-CT

Greenwich Exxon
Yankee Gas Service-Waterbury
Yankee Gas Service-Meriden
Brainard Road Shell-Hartford
Connecticut Natural Gas-East Hartford
Town of Trumbull
Town of Stratford

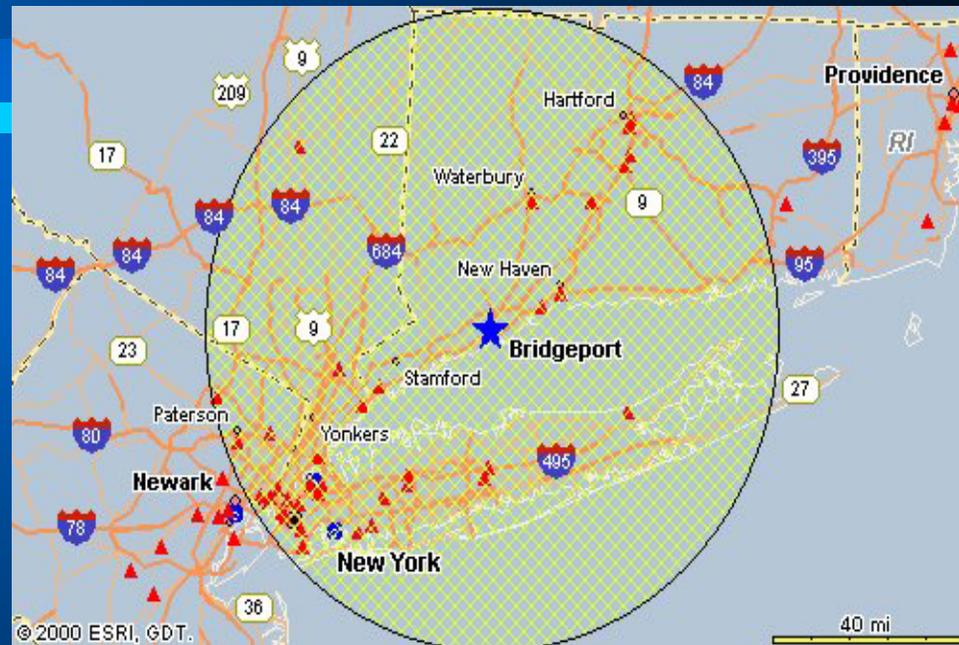
Town of Fairfield (by arrangement)
Town of Newington (by arrangement)
Town of Rocky Hill (by arrangement)
Norwich Public Utilities-Norwich
Santa Energy-Bridgeport (Opening Spring 2006)
City of New Haven
So CT Gas-Orange

Biodiesel Stations

New Haven (Public Access)
CT DOT Putnam, Trumbull and
Milford

E-85 Stations

CT DOT Newington
CT DOT Danbury



Highlights of Connecticut's AFV Fleets

City of Norwich/Norwich Public Utilities

Public access CNG fueling station

10 heavy duty CNG utility trucks

21 light duty CNG vehicles

3 hybrid-electric vehicles

1 electric vehicle

Two heavy duty CNG trucks on order

\$2.2M Advanced Technology BRT Program

Norwich Public Schools

3 CNG school buses

42 school buses that operate on ULSD

w/ DPFs & DOCs



Town of Fairfield

28 light duty CNG vehicles
4 school buses (2006)
Upgraded CNG station (2005)



Fairfield CNG Station

Town of Trumbull

2 light duty CNG vehicles
1 heavy duty truck (EPA grant 2005)
CNG station



Trumbull CNG Truck

Town of Stratford

2 Heavy Duty Trucks
2 light duty vehicles
CNG station



Trumbull CNG Station

City of Bridgeport

2 light duty CNG vehicles
Public Access Station with Santa Energy
Opening 2006



Stratford CNG Station

City of New Haven

4 Electric Trolleys

\$3.5 M Fuel Cell Vehicle Demo

Public Access B-20 Station

CNG Fueling Station



New Haven Electric Trolley

Advanced Hydrogen
Hybrid Electric Transit Vehicle-
Greater New Haven Transit



New Haven CNG Station

City of Hartford

20 CNG Honda Civics

“Hydrogen Roadmap” Planning

50+ CNG and HEV Taxis by

Yellow Cab of Bloomfield



Yellow Cab CNG Taxi

State of Connecticut Fleet

E-85 Program:

2 Locations: Newington and Danbury

25,000-30,000 Gallons Per Year
Usage of Ethanol (2004
estimate)

Biodiesel Program:

3 Locations: Putnam, Trumbull
and Milford

116,000 Gallons Per Year
Usage of Biodiesel (2004
estimate)



CT DOT E-85 Dispenser



CT DOT Bio-20 Dispenser

Projects in Development

Town of Glastonbury- CNG Vehicle & Station Project

City of Meriden- CNG Vehicle & Station Project

City of Hartford-CNG Vehicle & Station Project,

City of Bridgeport-CNG Paratransit Vehicle Project

Town of Rocky Hill- CNG Station Upgrade

Town of Fairfield- CNG School Bus Project

SE CT-Advanced Technology BRT Project

New Haven-Hydrogen Fuel Cell Bus Demo & CNG Station Upgrade

Yale University-NREL Tiger Team Assistance

**“Peer Exchange” Meeting For Town Leaders on “Green Fleets”
and Renewable Energy, Spring 2006**

Clean Cities Advance the Choice Event, Fall 2006

Highlights of AFV Activities in NY & Massachusetts

New York

Executive Order 111 (2001) requires 100% of new light duty vehicles purchased by the state to be alternative fuel or hybrid by 2010 and calls for the State to reduce emissions and petroleum use from all medium and heavy duty vehicles.

NY has entered into a public-private partnership to develop 60 CNG vehicle refueling stations at NYDOT facilities statewide.

NY State agencies operate 4334 light duty AFVs (30% of total fleet), including approximately 2200 CNG vehicles, 900 E-85 vehicles, and 760 neighborhood electric vehicles.

MTA operates 1000 CNG buses in NYC and Long Island. 800 hybrid electric buses will be in operation in NYC by 2007.

Massachusetts

SB 2176 requires 5% of all new vehicles purchased by state agencies and at least 50% of all vehicles in the state fleet are hybrid or AFVs by 2010. Directs the state to issue \$10 million in bond funds to establish an *Energy Independence Fund* grant program to cities and towns to purchase alternative fuel or hybrid vehicles.

State of MA has 12 Public CNG Stations, 358 CNG transit buses and over 1000 light duty CNG vehicles in operation statewide.

What Needs to Be Done to Advance the use of Alternative Fuel Vehicles (AFVs) in Connecticut?

1) ConnDOT should continue & expand AFV CMAQ Program, and amend rules to:

- a) allow all private companies to be eligible to apply for funds
- b) allow eligible entities to apply for costs of refueling infrastructure
- c) allow certified AFV conversions and alternative fuel repowers

2) DEP should include strong recommendations in support of natural gas and biodiesel vehicles in Diesel Mitigation Plan.

Best Available Control Technology (BACT) retrofit programs administered by the DEP or other agencies should define CNG and biodiesel as BACT where appropriate.

3) State should consider establishing new fund specifically dedicated to assisting municipalities and private companies implement AFV programs.

What Needs to Be Done to Advance the use of Alternative Fuel Vehicles (AFVs) in Connecticut?

4) State should consider greater use of CNG vehicles in the state fleet and should investigate opportunities to develop more fueling station stations on state property for its own fleet and other private users.

- a) Governor should require all state AFVs capable of running on an alternative fuel to operate on the alt fuel.
- b) CT Transit should complete a feasibility analysis for integrating CNG into CT Transit and Regional Transit Fleets
- c) Bureau of Aviation and Ports should move ahead with development of CNG/Alt Fuels station at Bradley Airport.

5) State should consider developing a program that fosters the research and development of AFV and related technologies in the state.

6) State should consider including more AFV programs into the State Implementation Plan.

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