



U.S. Department of Energy  
**Energy Efficiency  
and Renewable Energy**

Bringing you a prosperous future where energy  
is clean, abundant, reliable, and affordable

# Technology Integration Overview

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## Activities

- Clean Cities – A voluntary, locally based government/ industry partnership
- Graduate Automotive Technology Education
- Advance Vehicle Competitions
- Legislative & Rulemaking
- Education (Thursday)
- Safety Codes & Standards (Friday)





# Clean Cities

*A voluntary, locally-based government/industry partnership*

***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.**

- Established in 1993 in response to the Energy Policy Act (EPAct) of 1992
- Companion program to the EPACT mandates requiring certain fleets to acquire AFVs (Federal, State, and Fuel provider fleets)
- Focus on **Deployment** (next steps after R&D is completed)



# What's Included ?

## **Technology Portfolio:**

- Alternative (non-petroleum) Fuels & Vehicles
- Advanced vehicles (e.g., HEVs, PHEVs)
- Vehicles and Driver choices that Increase Fuel Economy
- Idle Reduction

## **Strategies:**

- Partner with states & local organizations
- Provide Outreach, Education, & Information resources
- Facilitate Infrastructure Development
- Coordinate efforts with EPA-regulated fleets
- Provide Technical & Financial assistance



# National Laboratory Support

**National Energy Technology Lab** (NETL – Project Management and Regional coordination of key Clean Cities activities)

**National Renewable Energy Lab** (NREL – Colorado) – Clean Cities Core program technical support , AFDC, technical communications, publications, Clean Cities Web sites, Hotline Response Service

**Oak Ridge National Lab** (ORNL - Tennessee) – Federal Fuel Economy Guide, FuelEconomy.Gov websites, National Fuel Economy consumer education and outreach efforts

**Brookhaven National Lab** (BNL – New York) - BioMethane and Land fill gas recovery

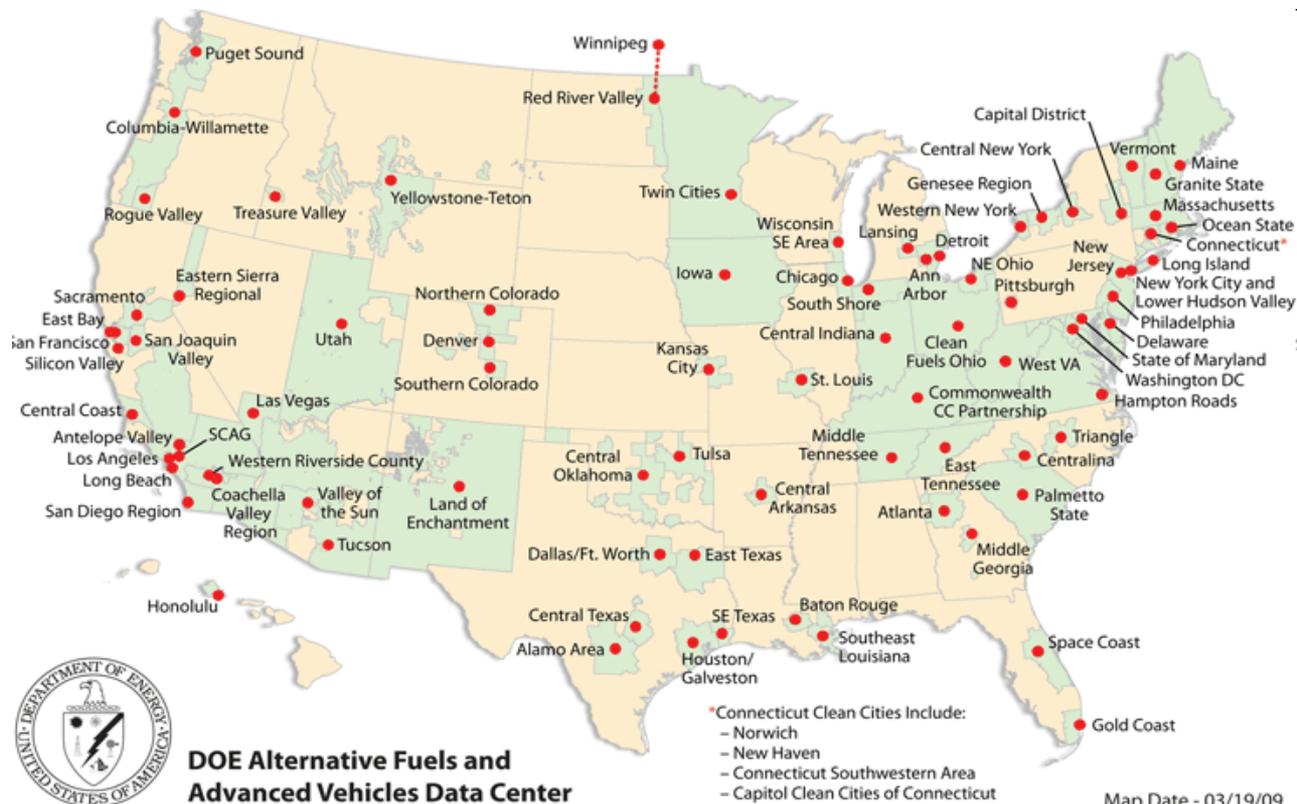
**Argonne National Lab** (ANL – Illinois) - Emissions Modeling (GREET and AIRCRED) and Idle Reduction analysis



# Top Accomplishments

## Established a National Network of Coalitions

- ~100 coalitions & partnerships
- > 5,700 stakeholders from businesses, city & state governments, transportation industry, community organizations, fuel providers



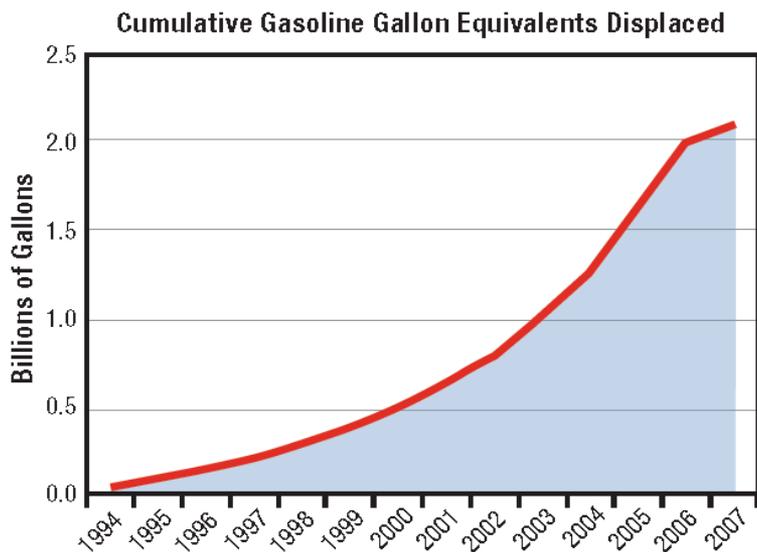
**Bottom line:** Created expert community to lead transportation initiatives



# Top Accomplishments

## Displaced 2 Billion Gallons of Petroleum

- > 2 billion GGE displaced by coalitions since 1993
- 15 million GGE in 1994, 375 million GGE last year (28% annual growth)
- 580,000 new AFVs on the road
- Over 6000 alternative fueling stations (CC helped build >70% of them)



NREL stock photo 7

**Bottom line:** > 2 billion GGE displaced, best yet to come



# Top Accomplishments

## Major Increase in Alternative Fuel Transit Buses

- 6% alternative fueled in 1997
- 20% in 2007
- Coalitions responsible for > half



NREL stock photos

## Helping to Green National Parks

- Air-quality improvements
- Visitor education/inspiration
- Wildlife preservation
- Effective industry partnerships





# Top Accomplishments

## Created Alternative Fuel Corridors

- \$35 million for infrastructure since 1998
- Biofuels I-65, OR, NY, PA, MD, VA, DC
- Other fuels, e.g., natural gas in CA, UT, NY



## Turning Garbage into Gas

- Deployed biomethane technology from DOE R&D
- Successful refuse truck tests
- Potential 300 landfills each producing 20,000 gal/day LNG



NREL stock photo



# Top Accomplishments

## Partnered with National Media

- Collaboration with PBS-TV
- > 50 segments on alt fuels, advanced vehicles, fuel economy
- FuelEconomy.gov uses segments
- Enhanced CC legitimacy among automotive journalists

## Leveraged Funding 25:1

- \$43 million from Clean Cities
- Matched by \$214 million
- Resultant partnerships brought in additional \$845 million

MotorWeek segments provided by Maryland Public Television

	<b>NEW!</b> Car Keys - Fuel Sippers <a href="#">Flash Video</a> (14.7 MB) <a href="#">Quicktime Movie</a> (30.9 MB) <a href="#">Text Version (pdf)</a>
	<b>NEW!</b> Big Green SUVs <a href="#">Flash Video</a> (8.5 MB) <a href="#">Quicktime Movie</a> (17.9 MB) <a href="#">Text Version (pdf)</a>
	<b>NEW!</b> Best Eco-Friendly Award - GM Hybrid SUVs <a href="#">Flash Video</a> (3.4 MB) <a href="#">Quicktime Movie</a> (7.3 MB) <a href="#">Text Version (pdf)</a>



# Fuel our Future Now

- Partnered with the Automotive X Prize and Discovery Education
- Launched at the Washington DC Auto Show in February
- Curriculum available for K-12
  - Grades K-2: *Vroom! Vroom! What Makes Cars Go?*
  - Grades 3-5: *Designed for Efficiency*
  - Grades 6-8: *Designing a Vehicle for the Year 2020*
  - Grades 9-12: *Transport to the Future: Making a Plan for Positive Change*

**FUEL OUR FUTURE NOW**  
Igniting Imaginations to Empower the Next Generation

PROGRESSIVE AUTOMOTIVE X PRIZE  
Discovery EDUCATION

Home Elementary Middle School High School Teachers Parents News & Events

**HIGH SCHOOL**  
Teachers: Put your students behind the wheel! Discover factors that impact fuel efficiency and engineer vehicles that will transform where we're going and how we'll get there.  
GO!  
Fuel up on videos – watch now!

**MIDDLE SCHOOL**  
Go the extra mile with your students! Investigate alternative fuels and determine which vehicles exhibit ultimate energy efficiency.  
GO!  
What's your Speed IQ? Test your need for speed in a Virtual Lab!

**ELEMENTARY**  
Teachers: Get your classroom moving! Explore motion, forces, and sources of energy.  
GO!  
Students: Conduct your own race car experiment!

**About the Progressive Automotive X PRIZE Revolution Through Competition**  
Teams from around the globe are competing to design the first Super-efficient vehicle that we could be driving one day. Get up to speed on the world's foremost engineering competition, the future of our planet and \$10 million are riding on it.  
LEARN MORE!

**News & Events**  
Sign up to receive updates and be the first to hear what's new! Keep checking back regularly for webinars, local race info and more coming soon!  
LEARN MORE!

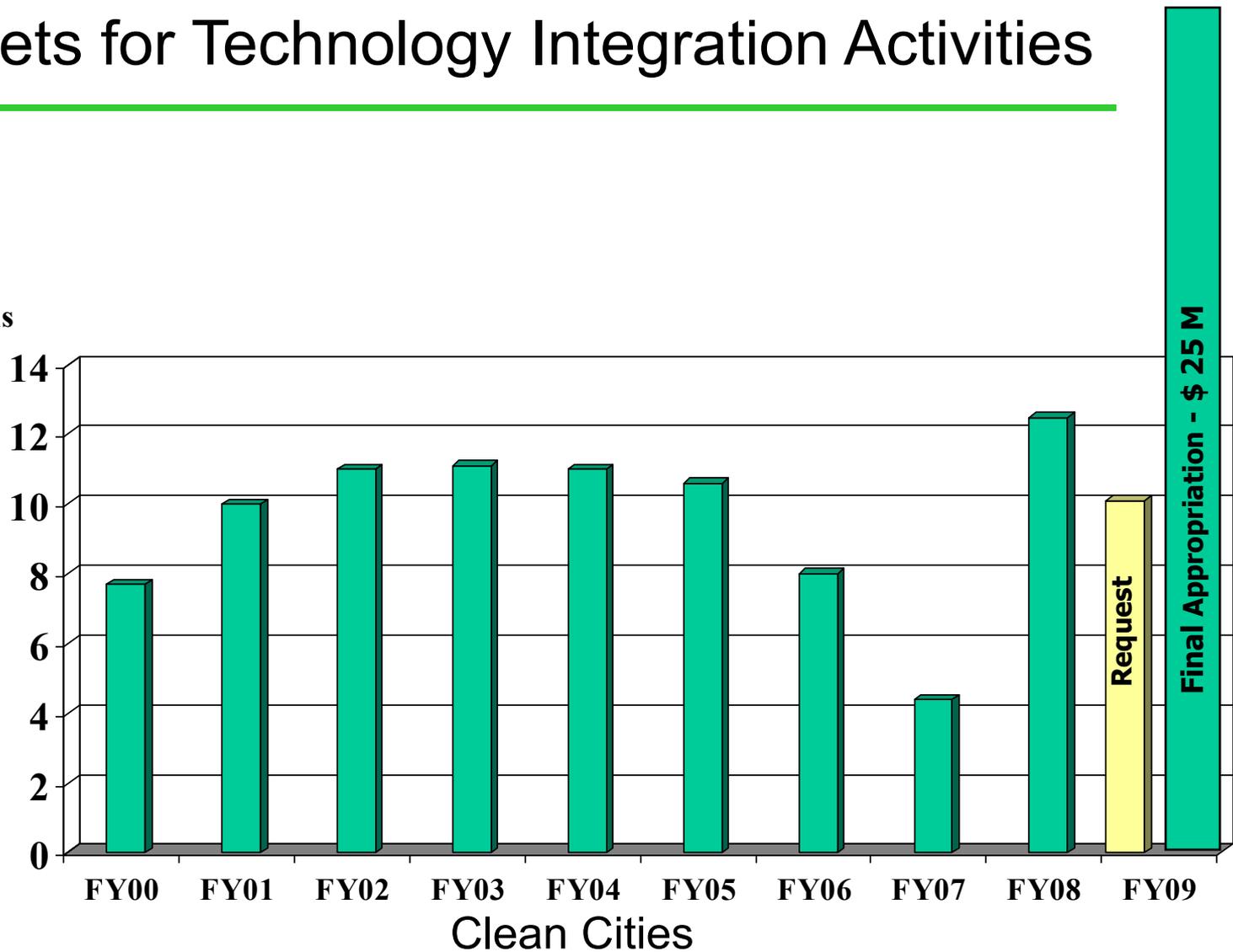
**Parent Corner**  
Drive home the fun and energize students with activities, energy conservation tips and more!  
LEARN MORE!

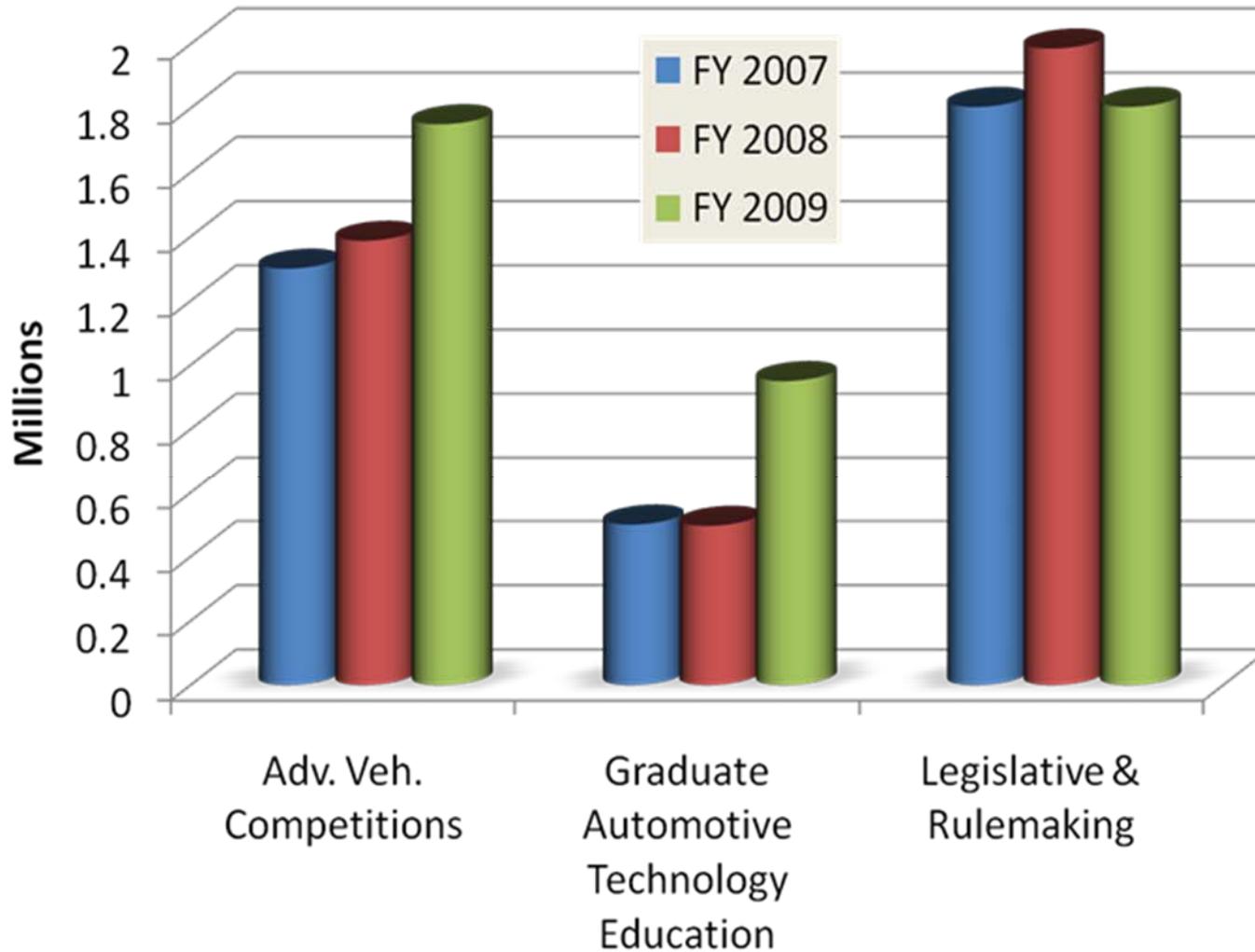
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# Budgets for Technology Integration Activities

\$ Millions







Provide a new generation of engineers with knowledge and skills in developing and commercializing advanced automotive technologies.

## Advanced Vehicle Competitions

- ❑ Since 1987, DOE has sponsored more than two dozen university-level advanced vehicle technology competitions.
  - ❑ Provides college engineering students an opportunity to conduct hands-on research and development with leading-edge automotive propulsion, fuels, materials, and emissions control technologies.
- 
- ❑ 17 North American universities are re-engineer a Saturn VUE to increase efficiency, reduce emissions and outperform its production counterpart while maintaining its consumer acceptability.
  - ❑ Teams pursuing variety of advanced vehicle technologies
    - ❑ **Extended Range Electric Vehicle – 8**
    - ❑ **Plug-In Hybrid Electric Vehicles (PHEV) – 6**
    - ❑ **Full Function Electric Vehicle (FFEV) – 1**
    - ❑ **Fuel Cell Plug-in Hybrid Electric Vehicle (FCPHV) - 2**



## Graduate Automotive Technology Education

- ❑ Centers established in 1998, expanded in 2005.
- ❑ Receive DOE funding for student fellowships and curriculum development.
- ❑ Each center has established a graduate engineering education program that offers courses emphasizing that center's technology specialty.

## Eight Centers of Excellence Awarded in 2005

- ❑ University of California-Davis  
**(fuel cell hybrids)**
- ❑ Virginia Tech **(fuel cell hybrids)**
- ❑ Pennsylvania State University  
**(energy storage)**
- ❑ Ohio State University **(HEV systems)**
- ❑ University of Michigan-Dearborn  
**(advanced materials)**
- ❑ University of Tennessee **(HEV systems)**
- ❑ University of Illinois, Champaign-Urbana  
**(biofuels/combustion)**
- ❑ University of Alabama-Birmingham  
**(advanced materials)**



Mainly Consists of:

- Replacement Fuel Program
  - Replacement Fuel Goal
- Alternative Fuel Transportation Program
  - State & Fuel Provider (SFP) Fleet Mandate
- Alternative Fuel Petitions
- Legislative Analysis
- Congressional Reports



- ❑ Annually 300+ SFP Entities Must Meet Annual Requirements
- ❑ Compliance Options
  - Standard Compliance
    - Procurement of AFVs
    - Biodiesel (Capped at 50% of Requirements)
  - Alternative Compliance
    - Petroleum reduction equal to or greater than full compliance with Standard Compliance Option



*[www.vehicles.energy.gov](http://www.vehicles.energy.gov)*



## Legislative & Rulemaking

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