



Sustainable

TRANSPORTATION

U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy

Transitioning the Transportation Sector:

Exploring the Intersection of Hydrogen Fuel Cell and
Natural Gas Vehicles

Mark S. Smith

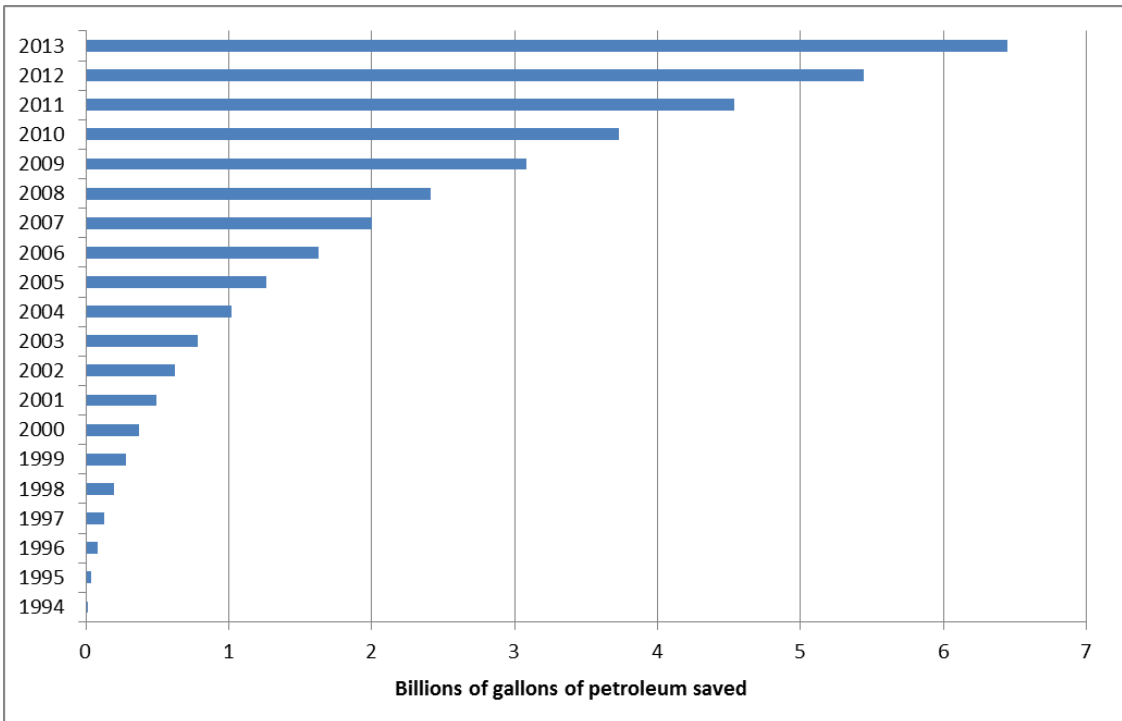
Vehicle Technologies Office/ Clean Cities Team

September 9, 2014

Alternative Fuel use during Clean Cities 20+ year history

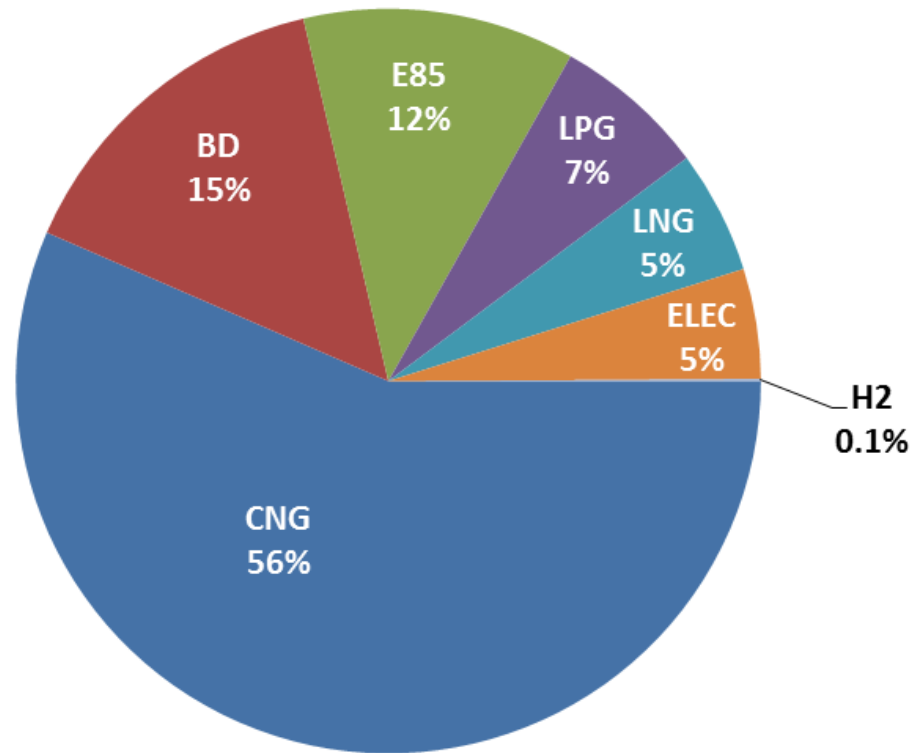
Nearly 6.5 Billion Gallons of Petroleum Reduction since 1993

- Nearly 600,000 AFVs on the road in the US
- Over 14,500 alternative fueling and charging stations
- Long term goal of 2.5B gal/year by 2020



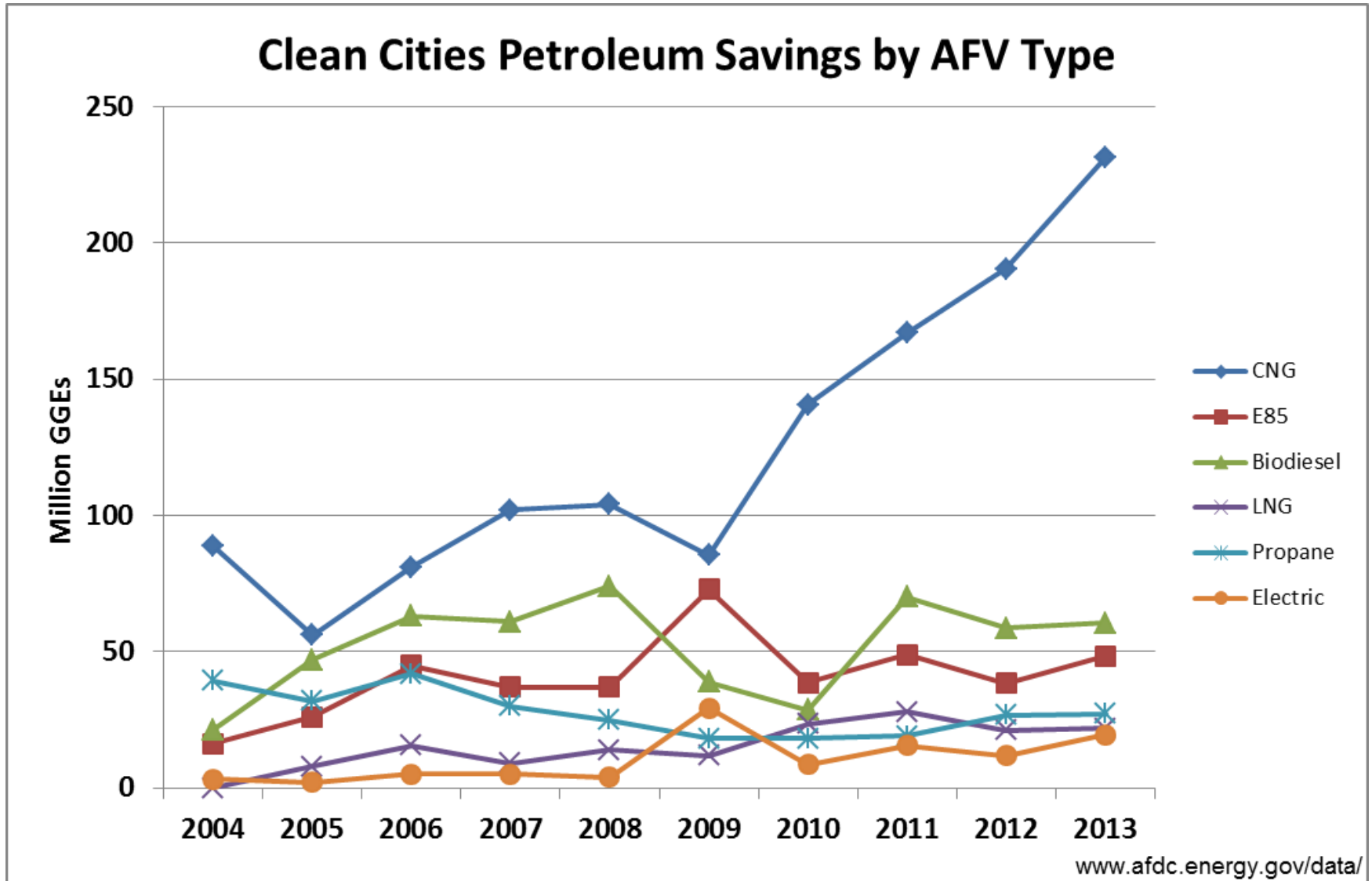
Natural Gas dominates current alt-fuel use

**Clean Cities 2013 Petroleum Reduction by AFV Type
(CNG + LNG > 60%)**

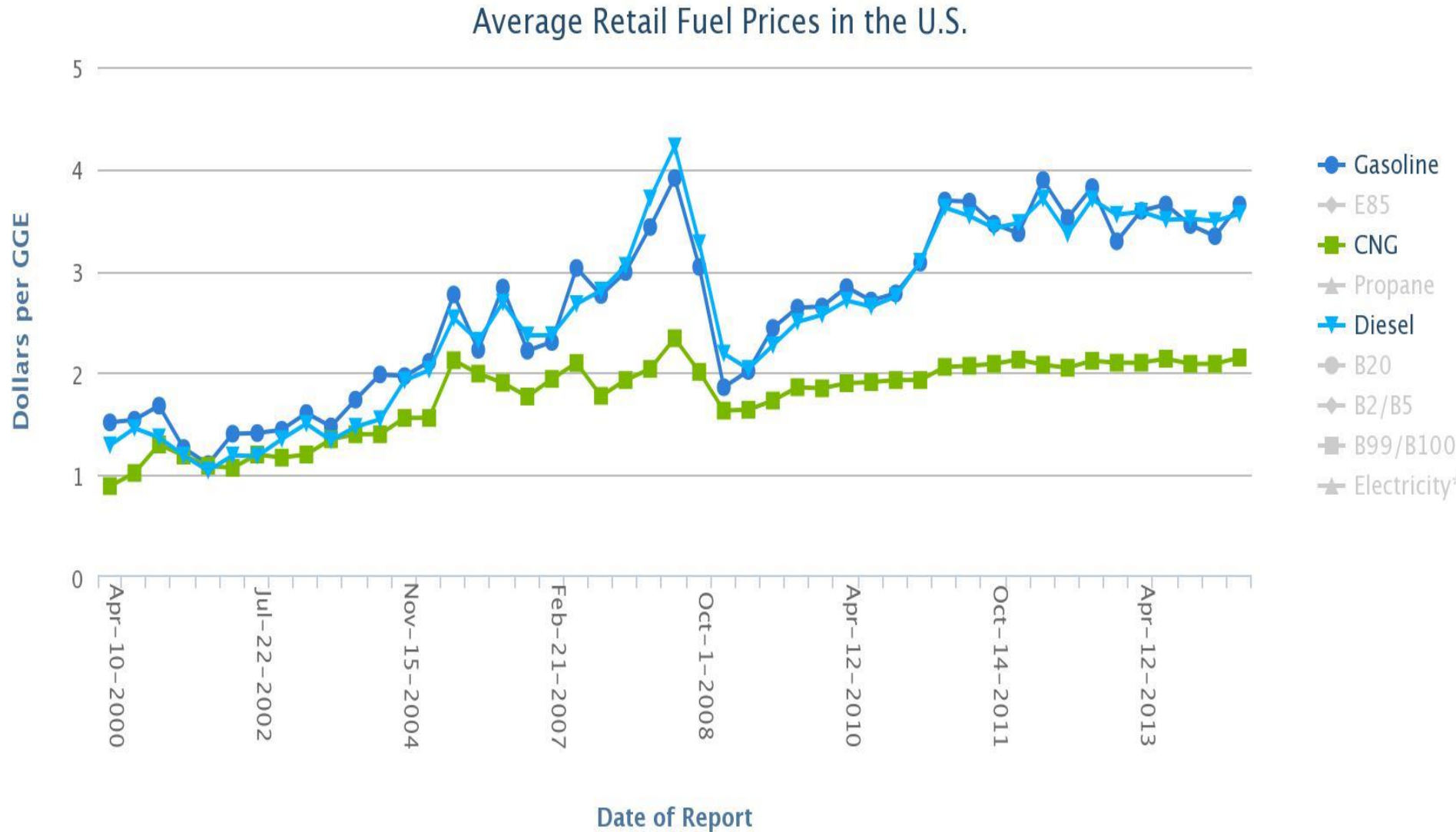


(based on reported fuel use in Clean Cities territories – for EPACT defined alternative-fuels)

Natural Gas use in Vehicles is Increasing



Low & Stable NG Prices = powerful market motivator



Source: [Clean Cities Alternative Fuel Price Reports](#)

Nearly every domestic truck/bus/car OEM now has LNG and CNG models serving important niche markets



Clean Cities deployment projects with NGVs

- **(2009 to present) \$300 M Clean Cities ARRA Awards** - 20 Awards in 36 states (~\$10 - \$15M per award); helped deploy over 150 CNG and LNG stations and over 3,600 NGVs (*Projects included EVs, CNG, LNG, LPG, H2, E85, and Biodiesel*).
- **(2012) \$11 M Clean Cities Alternative Fuel Implementation Awards** - 20 projects in 30 states + DC (~ \$500k - \$1M per award); to help communities establish action plans, implement sustainable policies, address barriers, and develop incentives (*Projects included EVs, CNG, LNG, LPG, H2, E85, and Biodiesel - did not fund vehicle costs or hardware*).
- **(FY14 FOA) \$4.5M – current funding opportunity for three topic areas**
 - 1: Alternative Fuel Vehicle Demonstration and Enhanced Driver Experience Projects
 - 2: Alternative Fuel Training for First Responders, Public Safety Officials, and Critical Service Providers
 - 3: Incorporating Alternative Fuels into Emergency Response and Preparedness Operations
 - *October 1, 2014 – deadline for proposals*



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FY14 Clean Cities Funding Opportunity

Areas of Interest:

- AOI 1: Alternative Fuel Vehicle Demonstration and Enhanced Driver Experience Projects
- AOI 2: Alternative Fuel Training for First Responders, Public Safety Officials, and Critical Service Providers
- AOI 3: Incorporating Alternative Fuels into Emergency Response and Preparedness Operations

Anticipated Awards:

\$4.5 million of Federal funding available for new awards under this FOA, subject to the availability of appropriated funds. This may allow 7 - 15 awards under this FOA ranging from \$250,000 to \$1,000,000.

EERE intends to issue awards in the following topic areas:

- AOI 1: 2-4 awards, \$250,000 to \$500,000.
- AOI 2: 4-10 awards, \$250,000 to \$1,000,000.
- AOI 3: 1 award, up to \$1,000,000.

Vehicle Technology Forums & User Groups

- **Natural Gas Transit and School Bus Users Group:**
 - Transit agencies, school bus fleets, and government agencies come together to receive technical assistance and share information about using natural gas
- **Natural Gas Vehicle Technology Forum:**
 - Supports development and deployment of commercially competitive natural gas engines, vehicles, and infrastructure.
 - Stakeholders include equipment manufacturers, national laboratories, government agencies, vehicle fleets, and industry groups.



Lessons Learned from CNG

- Develop Design and Integration Best Practices
- Develop Operational Best Practices
- Develop and Update Codes & Standards
- Create Effective Training Programs
- Establish Professional Certification Protocols
- Develop CNG Fuel Tank Tracking Procedures
- Enforce Code & Standard Compliance

