National Renewable Energy Laboratory

Only national laboratory dedicated solely to energy efficiency and renewable energy

• Leading clean-energy innovation for 35 years

• About 1,700 employees with world-class facilities

• Campus is a living model of sustainable energy

• Owned by the Department of Energy

• Operated by the Alliance for Sustainable Energy
Alternative Fuel Market and Policy Trends

Synopsis

• Market Overview and Trends
• Market Barriers and State Policies

Key Points

• Market Forces and Policies are Increasing Opportunities for Alternative Fuels
• There is No One Size Fits All, Catch All, Silver Bullet to Do it All
• States Play a Critical Role in the Alternative Fuel Market and are Taking a Leading Role
People are Driving Less, but Spending More to Do So

Average Annual Vehicle Miles Traveled

Average Per Capita Annual Energy Expenditures

Source: U.S. Energy Information Administration and U.S. DOE Alternative Fuels Data Center
Newly Accessed Oil Supplies are Changing the Conversation

...kind of

Reduced Dependence on Foreign Oil
Decreasing Consumption
Possibility of Being Net Exporter of Petroleum

Market Growth Being Driven by Other Countries
Global Refining Capacity is Limited
Other Forces are Driving Us Away From Petroleum
We are Still Dependent on a Single Fuel

Annual U.S. Fuel Consumption

All Transportation
~93% comes from petroleum
4.9 Billion Barrels of Oil Annually

Light Duty Market
3.1 Billion Barrels of Oil Annually
63% of total petroleum use

Heavy Duty Market
1.1 Billion Barrels of Oil Annually
22% of total petroleum use

Electric Generation Capacity (2011)
- natural gas 39%
- coal 30%
- petroleum 9%
- renewable 6%
- conventional hydro 8%
- nuclear 10%
- other 2%

Transportation Fuels Portfolio (2011)
- petroleum 93%

Source: U.S. Energy Information Administration
Alternative Fuel Consumption Does not Correlate with Vehicle Availability

Estimated Consumption of Alternative Fuel by AFVs in the U.S. (2010)

- Liquefied Petroleum Gas (LPG) 27%
- Compressed Natural Gas (CNG) 46%
- Liquefied Natural Gas (LNG) 6%
- 85% Ethanol (E85) 20%
- Electric 1%

Estimated Alternative Fueled Vehicles in Use (2010)

- 85% Ethanol (E85) 66%
- Compressed Natural Gas (CNG) 12%
- Liquefied Natural Gas (LNG) 1%
- Liquefied Petroleum Gas (LPG) 15%
- Electric 6%

www.afdc.energy.gov/afdc/data/
Different Vehicle Classes Have Different Needs

Average Annual Fuel Use by Vehicle Type

- Motorcycle: 33 gallons/year
- Car: 453 gallons/year
- Light-Duty Vehicle: 531 gallons/year
- Light Truck: 898 gallons/year
- Police: 1,423 gallons/year
- School Bus: 1,896 gallons/year
- Delivery Truck: 2,029 gallons/year
- Taxi: 3,392 gallons/year
- Paratransit Vehicle: 3,434 gallons/year
- Refuse Truck: 9,877 gallons/year
- Transit Bus: 11,702 gallons/year
- Class 8 Truck: 12,950 gallons/year

Gallons per Year

www.afdc.energy.gov/data/
AFV Infrastructure is Growing...

...but has a long way to go. There were 157,000 gasoline stations in the United States in 2011.

U.S. Alternative Fueling Station Count

- Electric*
- Propane
- Methanol (M85)
- LNG
- Hydrogen
- Biodiesel**
- CNG
- E85

www.afdc.energy.gov/data/
National Policies are Shaping the Market

CAFE Standards

- Passenger Cars
- Light-Duty Trucks

Renewable Fuel Standard II

- Other Advanced Fuels
- Biomass-based Diesel
- Cellulosic
- Conventional (starch ethanol)

www.afdc.energy.gov/afdc/data/
Multi-State Memorandum of Understanding

- 16 Governors agreed to aggregate state vehicle procurement in a Joint RFP; utilize local distribution networks
- Engage local government in procurement to the extent practicable
- OEM NGV should have comparable performance and price to a gasoline vehicle
- Encourage private investment in NGV infrastructure
- Reach out to fellow Governors to encourage participation
- Vehicle orders are currently being filled for 1st year effort
States Taking the Lead – Zero Emission Vehicles

Zero Emission Vehicle Standards

- The Clean Air Act allows California to pass more stringent emissions standards than the federal government.

- California’s zero emissions vehicle standard requires that by 2025, 15.4% of all vehicles sold will need to produce zero emissions. This is estimated to be equivalent to 1.4 million vehicles.

- 10 states and Washington DC have adopted California’s zero emission vehicle requirements.

- ZEV states account for almost 1/3 of new car sales.

- Hydrogen and plug-in electric vehicles are being pursued by multiple automakers as a means to meet ZEV requirements.
Trends in State Policy for Alternative Fuels

2012 Laws, Regulations, and Incentives by State
Trends in State Policy for Alternative Fuels

-2012 Laws, Regulations, and Incentives by Type

Type of Incentive
- Tax Incentives: 13%
  - Grants: 19%
  - Loans and Leases: 19%
  - Other: 12%
- Rebates: 37%
- Other: 12%

Targeted Market
- AFV Manufacturer/Retrofitter: 4%
  - Alternative Fuel Dealer: 8%
    - Vehicle Owner/Driver: 20%
      - Other: 8%
  - Fleet Purchaser/Manager: 29%
    - Other: 18%

Regulatory Topic
- Tax Incentives: 13%
  - Fuel/Technology: 3%
    - Fuel Economy/Efficiency: 3%
  - Acquisition/Fuel Use: 15%
  - Air Quality/Emissions: 5%
  - Climate Change/Energy Initiatives: 7%
  - Idle Reduction: 2%
  - Fuel Product/Quality: 2%
- Registration/Licensing: 13%
  - Other: 34%
- Fuel Taxes: 7%

Fuel/Technology
- Natural Gas: 19%
  - Propane (LPG): 11%
  - Other: 4%
- NEVs: 1%
- EVs: 19%
- HEVs/PHEVs: 16%
- Hydrogen Fuel Cells: 6%
- Fuel Economy/Efficiency: 3%
  - Aftermarket Conversions: 7%
  - Biodiesel: 7%
  - Ethanol: 7%

www.afdc.energy.gov/afdc/data/
Sample Incentives for Infrastructure

Arizona
Up to $75,000 is available to public and private entities for the incremental cost of projects that result in new or converted biofuel storage and dispensing equipment.

Colorado
Provides grants for electric vehicle charging stations to government entities and multi-family dwellings. Initial funding was from DOE and is supplemented by a decal that EV owners purchase.

Wyoming
Provides low-interest loans of up to $750,000 for the installation on CNG infrastructure. Loans payments are not required in the first two years.

US DOT – CMAQ Funding
Federal formula funding that is distributed to the states for projects that support air quality improvements and congestion mitigation. Funding has been applied towards both alternative fuel stations and vehicles.

For more details on incentives, visit: www.afdc.energy.gov
Defining the Role of Utilities for NGVs and EVs

Transportation has significant, but uncertain, growth potential for electric and gas utilities

- Every electric car is a natural gas car is an electric car
- Electric demand is flat in most parts of the country
- Most state utility markets are regulated requiring a dialog between utilities, regulators, policymakers, and other stakeholders

Examples of key utility considerations in the development of alternative fuel infrastructure

- Electric demand charges
- Provisions for third-party sales of regulated services/products
- Infrastructure/construction allowances
• Increased efficiency and alternative fuel use is straining gas tax revenues

• Several states have decal programs for various alt fuels

• Some states provide discounted rates for alt fuels as an incentive

• If taxes are charged on a per gallon basis, defining energy content is needed to ensure parity

• There are no current programs that compensate directly for home fueling/charging
Questions?