Why the Time is Right to Deploy Alternative Fuels

Tucson Leadership Forum
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Oil Use
Globally 80 MB/day
Nationally 21 MB/day

Data Source: EIA Annual Energy Review 2006
U.S. Consumption Grows While Production Declines

Overview, 1949-2005

- Consumption¹
- Production²
- Net Imports

1. Petroleum products supplied is used as an approximation for consumption.
2. Crude oil and natural gas plant liquids production.

1973: 35%
1985: 27%
2005: 60%

Million Barrels per Day

Energy Information Administration / Annual Energy Review 2005

National Renewable Energy Laboratory
U.S. Oil Production Peaked in Mid-70's


Source: Texas Railroad Commission US Energy Information Administration
Strategic Petroleum Reserve

Sources:
China – Significant Growth

Currently 45-50% imported

EIA forecasts demand of 14.2 MB/day with 10.7 MB/day imported by 2025

Source: EIA *International Petroleum*

*2006 is Jan-Aug only*
India’s Growth

India's Oil Production and Consumption, 1980-2005

- **Consumption**
- **Net Imports**
- **Production**

Source: EIA

Map showing India and surrounding areas.
Peak Oil Production

Gene Cooperman,
http://www.ccs.neu.edu/home/gene/peakoil/node1.html

World excl. OPEC, former Soviet Union and non-conventional Canadian oil (tar sands). (Peak years for each country are shown.). The peak 35 million barrels per day is 42% of world production. SOURCE: Salzburg 2003 Summer School

NGL = Natural Gas Liquids including ethane, propane, butane, and sulfur, are derivatives of natural gas, extracted during gas refining.
Proven Reserves, 2006
World Total ~1.3 Trillion Barrels

20.6% Percent of Total World Reserves

U.S. Reserves (Billion Barrels)
- 21BB current estimate
- 13BB remain Prudhoe Bay (vs. 10BB pumped)
- 10BB Alaska Nat’l Wildlife Refuge
- 45BB Optimistic Gulf of Mexico

Current forecast is 7.3BB/yr U.S. consumption

Canada
4.8BB w/o tar sands

OPEC Member:
Excludes Indonesia
What’s Happened with Fuel Economy?

CAFE Estimates (Adjusted EPA)

... from 1981 to 2003, fuel economy dropped by 1%, weight is 24% heavier, horsepower is 93% higher and 0-60 time is 29% faster

Source: Hellman and Heavenrich, EPA 2003
Federal Incentives

- **EPAct of 1992 as amended by EPAct of 2005**
  - Requires certain regulated fleets of 50 or more LDV’s, located in Metropolitan Service Areas, and centrally fueled to buy alt fuel LD vehicles

- **Executive Order (E.O.) 13423 signed in 2007**
  - Requires certain federal fleets to decrease petroleum consumption by 2% per year relative to their fiscal year (FY) 2005 baseline through FY 2015. Also requires agencies to increase alternative fuel use by 10% per year relative to the previous year.

- **Infrastructure tax credits**
  - 30% up to $30,000

- **Hybrid and Alternative fuel vehicle tax credits (EPAct 2005)**
  - Depending on model and # of units sold
  - Hybrid tax credits ranges from $400 to $2,400 for LD and $7,500 to $30,000 for HD
  - Alternative Fuel vehicle credits are 50% of incremental cost with an additional 30% available if vehicle meets rigorous emission standards. Maximum tax credits by weight class range from $4,000 for up to 8,500 pounds to $32,000 for more than 26,000 pounds.

- **Excise and fuel use tax credits**
  - Excise tax credit for non-taxable use
    - Biodiesel- 24.3 cents per gallon of biodiesel, E85- 18.4 cents per gallon, CNG & LPG- 18.3 cents per GGE, LNG- 24.3 cents per GGE
  - Fuel use credit
    - Biodiesel- 50 cents or $1.00 per gallon of biodiesel depending on feedstock, E85- 51 cents per gallon, CNG, CNG & LPG- 50 cents per GGE
Proposals In Front of the 110th Congress

GHG Emissions
• H. Con. Res. 96: Concurrent resolution expressing the sense of the Congress that there should be enacted a mandatory national program to slow, stop and reverse GHG emissions.
• H.R. 620: Climate Stewardship Act
• H.R. 823: A bill to authorize Federal agencies and legislative branch offices to purchase GHG offsets
• S. 6: National Energy and Environmental Security Act
• S. 280: Climate Stewardship and Innovation Act of 2007
• S. 309: Global Warming Pollution Reduction Act
• S. 317: electric Utility Cap and Trade Act of 2007
• S. 485: Global Warming Reduction Act of 2007

Transportation Emissions
• H.R. 182: TEAM up for Energy Independence Act
• H.R. 370: Coal-to-Liquid Fuel Promotion Act
• H.R. 670: Dependence Reduction through Innovation in Vehicles and Energy (DRIVE) Act
• H.R. 1215: A bill to authorize the Secretary of Energy to make certain loan guarantees for advanced conservation projects
• H.R. 1300: Program for Real energy Security (PROGRESS) Act
• S. 133: American Fuels Act of 2007
• S. 339: Dependence Reduction through Innovation in Vehicles and Energy (DRIVE) Act
• S1073: Clean Fuels & Vehicles Act of 2007
Federal Alternative Fuel Consumption

Federal Alternative Fuel Consumption by Fuel Type

Source: Federal Automotive Statistical Tool (FAST)
GGE Displacement

Clean Cities Petroleum Displacement by AFV Type

Source: Clean Cities Coordinator Annual Reports, 2004-2006
Vehicles

Alternative Fueled Vehicles in Use

Total # of vehicles on the road in 2005 - over 230 million

Source: EIA's Annual Energy Review, Table 10.4. Available at www.eia.doe.gov/emeu/aer/renew.html
Station Counts

In 2007, there were 2,459 LPG stations reported.

Total # of conventional retail stations in 2005-over 168 thousand.

Source: Alternative Fuels Data Center (AFDC), either directly or from historical Transportation Energy Data Books (www.osti.gov/bridge/basicsearch.jsp)
Grants

Grants for Clean Cities Projects

Source: Clean Cities program office
Tucson Clean Cities Alternative Fuel Vehicles

These AFV’s displaced over 4.2 million GGE’s

Source: Clean Cities Coordinator Survey, 2006
Some Sensible Solutions

• Reduce VMT
  – Mass transit, carpool, bike, walk, telecommute

• Replace Fuels
  – Biofuels, natural gas, propane, diesel, hydrogen, electricity

• Reduce Vehicle Fuel Consumption
  – All vehicles
    • Reduce mass, aerodynamic drag, rolling resistance
  – Conventional vehicles
    • Cylinder deactivation, 6-speed transmissions
  – Advanced powertrains
    • Hybrid-electric vehicles
    • Plug-in HEVs
    • Fuel cell vehicles

Could reduce fuel by 30%
Could reduce fuel by 60%

– Consider replacing light-duty gasoline vehicles with more efficient clean diesel/biodiesel vehicles
Avoid the Fuel Economy Trap
What’s better to do? (12,000 miles/yr)

16 mpg to 20 mpg
(4 mpg gain, 25% incr.)

50 mpg to 100 mpg
(50 mpg gain, 100% incr.)
Avoid the Fuel Economy Trap
What’s better to do? (12,000 miles/yr)

16 mpg to 20 mpg
(4 mpg gain, 25% incr.)

Fuel Consumption
750 gal to 600 gal
150 gal saved, 20%

50 mpg to 100 mpg
(50 mpg gain, 100% incr.)

Fuel Consumption
240 gal to 120 gal
120 gal saved, 50%

Better yet – go from 16 mpg to 50 mpg & save 510 gal/yr
Conclusions

- Our country requires a reliable transportation system
  - Our current transportation system is inflexible, depending on one fuel from increasingly limited sources in politically unstable regions
- Oil
  - Production is flat or declining
  - Demand is increasing (domestically and globally)
  - Reserves are diminishing and are in politically unstable areas
- Oil infrastructure is vulnerable
  - Natural disasters, equipment failures, terrorism/war, politics
- Multiple solutions are available and required
  - Fewer VMT
  - More efficient vehicles
  - Diverse sources of fuel including electricity, biodiesel, ethanol, natural gas, propane
- Multiple sources of funding are available

This is a national issue requiring national and state level attention.