Policy Implications of Achieving Technology Goals

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Electric Powertrains: Opportunities and Challenges in the U.S. Light-Duty Vehicle Fleet

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2030/2035 Technology Comparison

Petroleum Consumption

2006 Baseline:
8.85 L/100 km
252 g CO₂/km

Plug-in hybrid and conventional hybrid offer same GHG on U.S. average grid

2030/2035 Technology Comparison

Toyota Camry with projected 2030/2035 technology

- Spark Ignition
- Diesel
- Gasoline Turbo
- > 45 mpg
- > 70 mpg

Source: 2007 MIT Study
Assumptions for 2030 Fuel Cost Projections

- New vehicle fuel economy (car and light truck fleet combined)
  - EPA FE Trends Report through 2008 (removes FFV credits)
  - 34.8 mpg in 2016 (35.5 discounted for A/C provisions)
  - 4% increase every year after 2016
  - Yields 60 mpg in 2030 and 73.3 in 2035
    - MIT 2007: 76.4 mpg in 2030 for Camry-size HEV - equivalent to 71 mpg for fleet

- Future oil prices, future electricity rates, growth in disposable income
  - Updated AEO 2009 Reference Case Reflecting Provisions of the American Recovery and Reinvestment Act and Recent Changes in the Economic Outlook
    - Electricity - 9.3 cents/kW-hr in 2020, 10.1 cents in 2030 (2007$)
    - Real disposable income growth: 1.7%/yr from 2010 to 2020, 2.1%/yr from 2020 to 2030
  - Historical disposable income: BEA, Table 2.1, Personal Income and It’s Disposition

- EV electricity consumption from 2008 EPRI-NRDC report
  - 2006 cars - 237 Wh/mile on test cycles, 280 in-use, and 318 from AC socket.
  - 2006 smaller trucks (< 6000 GVWR) - 296 Wh/mile on test cycles
  - Consumption is reduced by 0.5% per year (vehicle load improvements)
    - Yields 205 Wh/mi in 2035 for cars on test cycles, similar to MIT’s 190-200
New Vehicle Fuel Economy

New Vehicle MPG (CAFE values)
Combined car and light truck

34.8 in 2016
plus 4% per year

Car + Light Truck mpg

2008 EPA FE Trends Report

New Vehicle Gasoline Cost per Mile

Real Gasoline Cost for New Vehicles - Cents per Mile
(2007 $ per gallon)

$3.82/gal
New Vehicle Gasoline Cost per Mile

Real Gasoline Cost for New Vehicles - Cents per Mile
(2007 $ per gallon)

Electricity cents/mile

- < X 2
  - 3 cents/mi
- X 3
  - 6 cents/mi

Cars

Trucks < 6000 GVWR
Real Fuel Cost - % of Disposable Income

$3.82/gal
In gauging the potential for advanced vehicles, remember that the competition is changing.

What looks good against today’s (conventional) car may not look so good against tomorrow’s.

Slide from Steve Plotkin, Argonne National Lab, based on ANL’s Multi-Path project
Low Driving Cost Implications

• Customers: Will demand more features and will not want smaller vehicles

• VMT: Limited only by congestion and value of personal time

• Mass transit and land use: Policies must focus on being more convenient and saving time

• Alternative fuels & technologies: Difficult to force on customers without significant fuel savings
Vehicles are the same as 80 years ago for one simple reason:
Fuel costs are a small part of the overall cost of owning a vehicle
- and they are getting smaller

Litmus test: Vision, Leadership, and Will
- Triple gasoline price
Thank You