



Biofuels, Fueling the Future

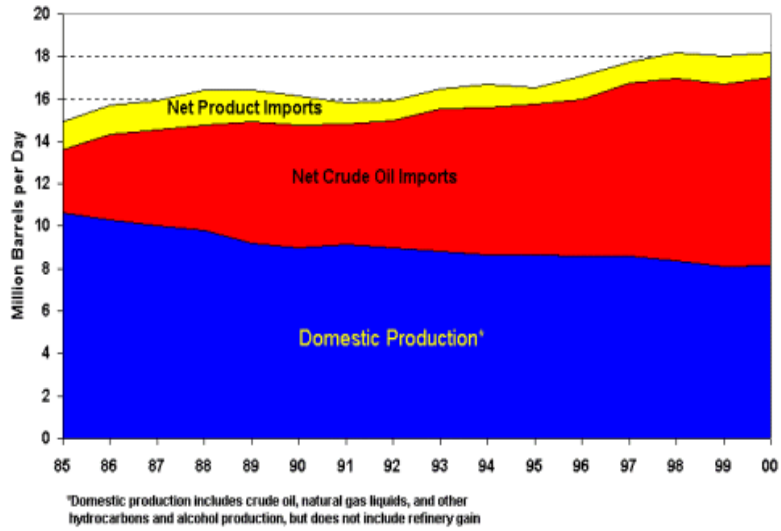
Phillip Lampert



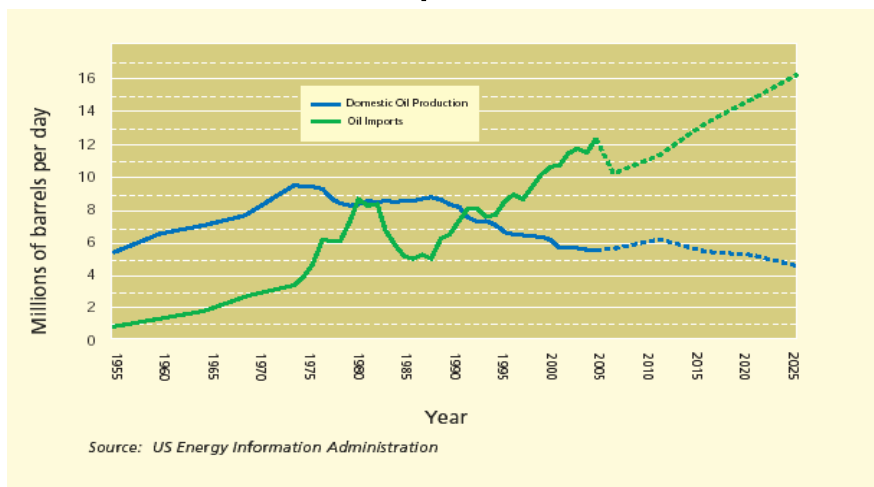
Why Biofuels?



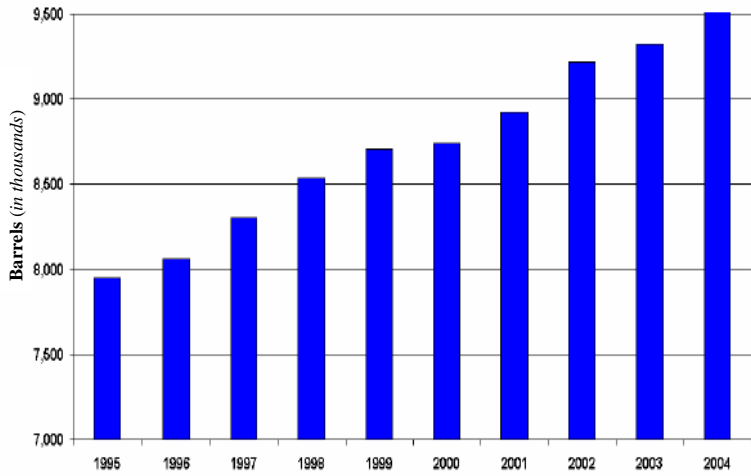
U.S. Oil Production and Imports



U.S. Crude Oil Production & Imports

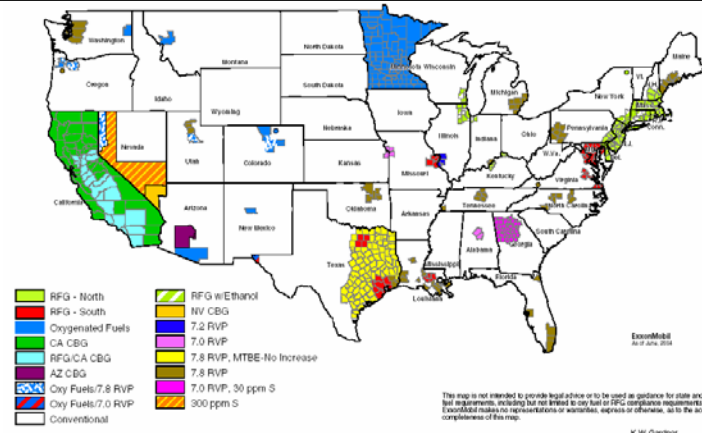


U.S. Motor Gasoline Demand



Source: US Energy Information Administration

Gasoline Varies Depending On Where You Are



The map is not intended to provide legal advice or to be used as guidance for state and/or federal fuel requirements, including but not limited to the fuel or RFG compliance requirements. ExxonMobil makes no representations or warranties, express or otherwise, as to the accuracy or completeness of this map.

K. W. Gaudin

Who we represent:



- 31 Governors
- General Motors
- Ford Motor Company
- DaimlerChrysler
- National Agricultural Assns.
- State Agricultural Assn.
- Petroleum Marketers
- Ethanol Producers/Marketers
- Consumer Groups

What we do:



- Advocate the use of E85 as a form of alternative transportation
- Educate consumers, organizations, media as to benefits of E85.
- Serve as a technical consultant
- Promote the use of E85 in the political arena.
- Provide information regarding tax incentives available to reduce price of E85.
- Sometimes – provide financial assistance to build fueling systems.
- Support all forms of alternative fuels.

What we Don't do:



- Don't sell Ethanol.
- Don't sell E85.
- Don't sell equipment such as dispensers, tanks, etc.
- Don't work on commission.
- Don't represent multi-national agricultural conglomerates.
- In terms of alternative fuels, E85 doesn't try to be everything to everybody.

So What's Ethanol?



E10-can be used in any vehicle sold in N. America since early '70s.

E85-can be used in selected vehicles manufactured since 1996.

FFV-Flexible Fuel Vehicle-capable of operating on any combination of ethanol or unleaded gasoline.

No incremental cost-no switches to flip, completely transparent to driver.

Serviced by any OEM Dealer.

Why Alternative Fuels?



Federal Requirements: Energy Policy Act of 1992

Federal Fleets:

- 75% of new vehicles acquired for MSA use must be AFVs
- Executive Order 13149 April 21, 2000
- "Greening the Government" Reduce consumption of petroleum by 20% from 1999 to end of FY 2005

State Fleets:

75% of new vehicles acquired for MSA use must be AFVs

What is E85?



- E85 is a blend of 85% ethanol and 15% gasoline
- High octane, liquid, domestic and renewable fuel
- Ethanol is produced from corn, cheese whey, wheat, sorghum and beverage wastes
- Many producers are farmer-owned cooperatives located in rural communities
- Total U.S. production approx. 3.8 billion gallons in 2004

What is E85?



- Burns cleaner than gasoline
- Contains ~80% less of the potential contaminants found in gasoline (example: benzene, xylene, sulfur)
- Contains ~80% less of the gum-forming compounds found in gasoline (example: olefins)
- Gallon for gallon, E85 has 73% of the energy content of gasoline
- Loss of fuel mileage of 5 to 10 percent

Consumer Benefits of E85



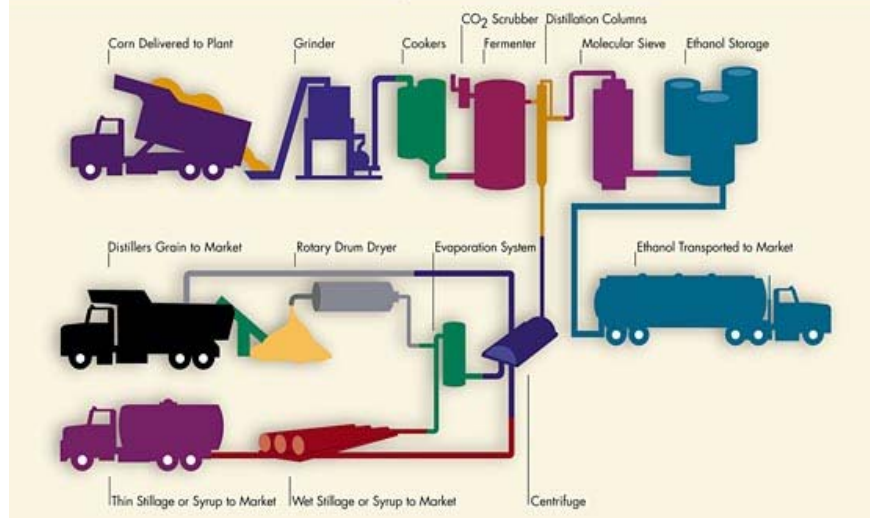
- Many times, costs less to fuel an FFV with E85 than with gasoline E85 is typically priced less than gasoline at the pump
- Increased horsepower (+5%)
- No additional cost to own a FFV
- OEM produced & warranted same as gasoline-only models
- Fuels just like gasoline, requires no additional training

Consumer Benefits of E85



- 25% reduction in smog-forming pollutants
- 35% - 40% reduction in greenhouse gas emissions
- Increased life-expectancy/cleaner engine & fuel system
- Renewable fuel made from agricultural crops & wastes
- Reduction in our dependence on overseas oil imports
- Bottled water of the 21st century and beyond

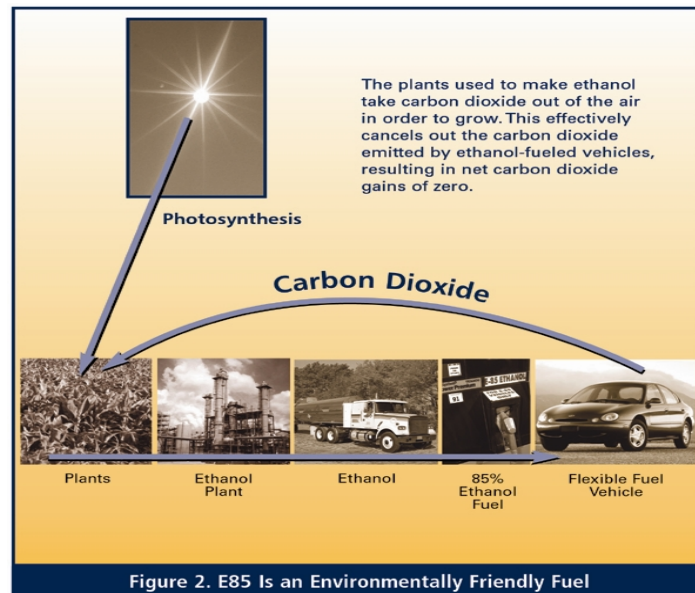
The Ethanol Production Process (Dry Mill)



What is Ethanol?



- When corn is used to produce ethanol:
 - Only the starch is used.
 - **100% of the protein, vitamins, and minerals remain and are used for feed.**





General Motors Strategic Initiative

- GM commissioned Well-to-Wheels life cycle analysis of energy use and greenhouse gas emissions
 - Compares 15 propulsion technologies and 75 different fuel “pathways”
 - Ethanol (E85) reduces greenhouse gas emissions more than any other alternative fuel

What is an FFV?



- Flexible fuel vehicle (FFV) specially designed to run on any ethanol blend up to 85%.
- FFVs may use any mix of gasoline or E85 – from 100% unleaded gasoline to 100% E85
- FFVs experience a mileage reduction on E85 vs gasoline
- The Engine Control Module “reads” the fuel blend, enabling drivers to fuel with E85 or gasoline in any combination.
- No on-board storage tanks other than OEM tank

What is an FFV, cont.?



- The computer adjusts the FFV's fuel injection and ignition timing to compensate for different fuel mixtures.
- There are no switches, no mixing or blending required.
- All fueling done in same fuel "filling system".
- No special training needed to fuel vehicle.
- No additional fuel tanks or loss of trunk space.

What is an FFV?



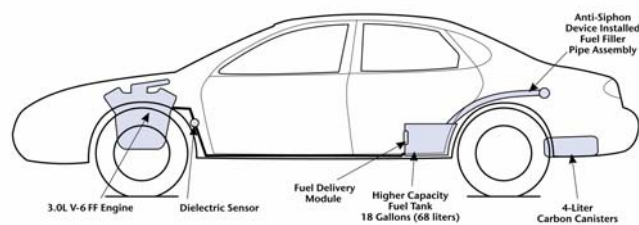
- The computer adjusts the FFV's fuel injection and ignition timing to compensate for different fuel mixtures.
- There are no switches, no mixing or blending required.
- All fueling done in same fuel "filling system".
- No special training needed to fuel vehicle.
- No additional fuel tanks or loss of trunk space.

What's different in an FFV?



- Fuel sensor that detects ethanol/gasoline ratio
- Stainless steel fuel tank
- Teflon lined fuel hoses
- Slight modifications to:
 - Fuel injectors
 - Computer system
 - Anti-siphon device
- Customer 'flexibility' to choose either fuel

Flexible Fuel System



E85 Range: 250-340 miles

Gasoline Range: 340-470 miles

A mileage reduction will be experienced with E85 compared to gasoline

What about FFVs:



•Alternative Motor Fuel Act of 1988

- Incentives provided by the Congress to encourage automakers to consider production of alternative fuel vehicles.
- Incentives: 1.2 MPG credit towards meeting CAFE.
- Prior to AMFA, NO production of AFVs.
- Since AMFA, in excess of 5 million AFVs have been produced.

From 271 1992 Luminas



Ford Motor Company Mercury Mountaineer



**4.0 Liter
engine**

**New for 2003-No incremental
cost**

Ford Motor Company Explorer



**4.0 Liter
engine**

**New for 2003-No
incremental cost**

Ford Motor Company Ranger



**3.0 Liter
engine**

No incremental cost

Ford Motor Company Taurus



**3.0 Liter
engine**

No incremental cost

Taurus Corn Car



General Motors Tahoe



**5.3 Liter
engine**

New for 2002-No incremental cost

General Motors Suburban



**5.3 Liter
engine**

New for 2002-No incremental cost



DaimlerChrysler- Minivan



**3.3 Liter
engine**

No incremental cost

General Motors S-10



**2.2 Liter
engine**

No incremental cost

General Motors Silverado-Sierra



**5.3 Liter
engine**

New for 2003-\$256 incremental cost

DaimlerChrysler Sebring



**2.7 Liter
engine**

New for 2003-No incremental cost

DaimlerChrysler Stratus



**2.7 Liter
engine**

New for 2003-No incremental cost

Results of AMFA



- Tremendous success story as the incentives have worked!
- No industry embraces mandates but has willingness to respond to incentives.
- Automakers responded to AMFA in a very positive manner.

Shortcomings of AMFA



- **No legislative relationship established between vehicles and fueling.**
 - **Congress did not address the fueling infrastructure.**
 - **No incentives, no mandates to petroleum industry to build the fueling system to service the AFVs.**

Current Response:



- **Mandate automaker development of AFV fueling infrastructure.**
 - **Automakers are not in the fueling business.**
 - **Petroleum industry not receptive to mandates.**
 - **Attempted in California with Methanol program and failed.**

NEVC Response:



- Establish incentives to support development of infrastructure.
- Three primary actions
 1. Tax Credits to support station development. 50% federal income tax credit to maximum of \$30K per station. Written to provide eligibility to units of govt.
- **Approved in U.S. Senate 3 times in past 18 months.**

NEVC Response:



- Establish incentives to establish GGE for E85 vs. RUL.
 2. Additional \$0.35 per gallon federal income tax incentive for use of E85 and other types of alt. fuels, i.e. LPG, CNG, LNG, Methanol.
- **Approved in U.S. Senate 3 times in past 18 months.**

What's a BTU?



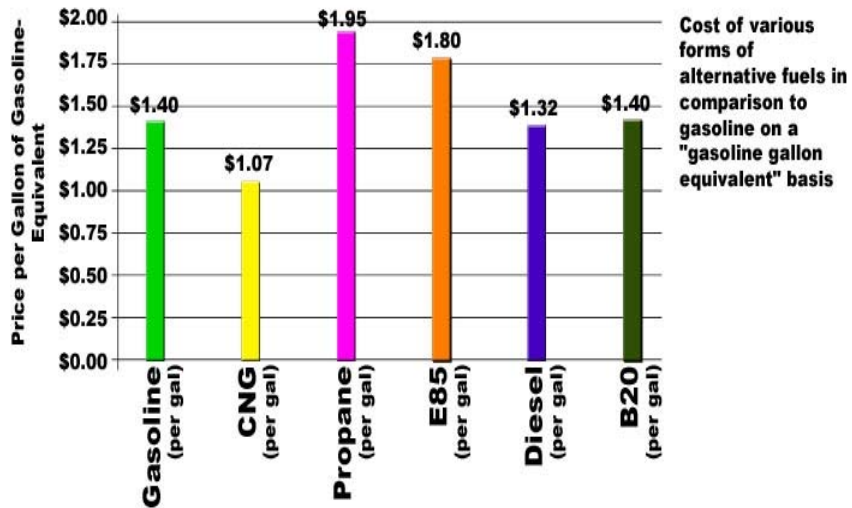
British Thermal Unit-
standard tool to measure
energy content

1-BTU = approx. Energy
content of a kitchen match

E85 contains 73% of BTUs as
unleaded on arithmetic basis

E85=83,263 BTUs
gasoline=114,000 BTUs
2 diesel=129,000 BTUs

Selected Fuel Prices in the U.S. April 15, 2002



NEVC - Automaker Response:



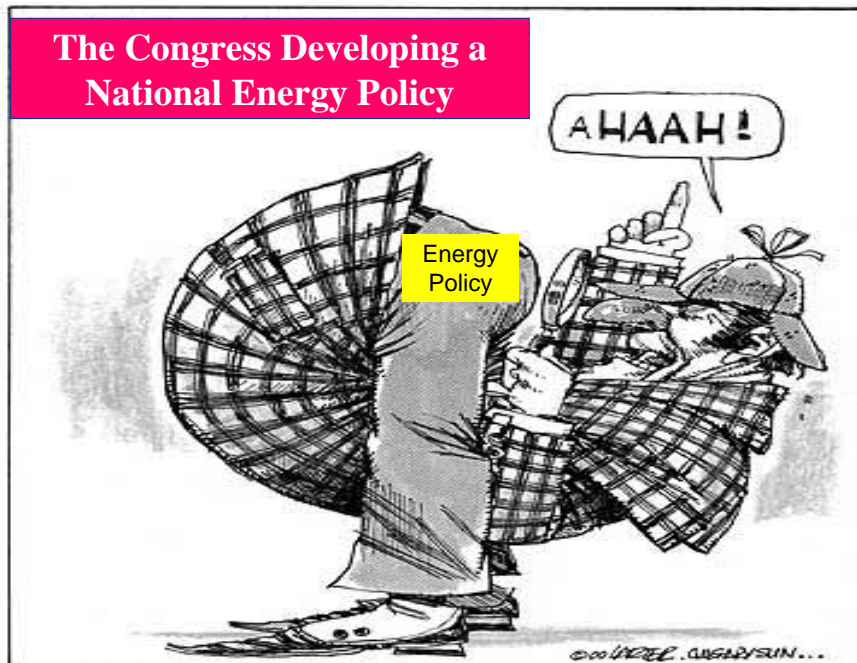
- **Consideration of Low Cost-No Cost Actions**
- **Factory fill of E85 in FFVs.**
- **Intensive dealer training program.**
- **Follow up mailings to FFV owners.**
- **Identify all FFVs with visible logo.**
- **All under consideration by Big 3**

NEVC Response:



- 3. Extend CAFE credits to promote continued production of**
 - **Approved in Senate Energy Bill.**
 - **Approved in House Energy Bill.**

The Congress Developing a National Energy Policy



Pending Legislation:



- **CLEAR ACT** introduced on April 28, 2005. Supported by NEVC, Natural Gas, Propane, Ford, Toyota, environmental organizations
- **S.971**
- Chances of passage as introduced?
 - **ZERO**

Pending Legislation:



S.918 E-85 Utilization and Infrastructure Development Incentives Act of 2005

Chance of Passage as introduced?

- 50%

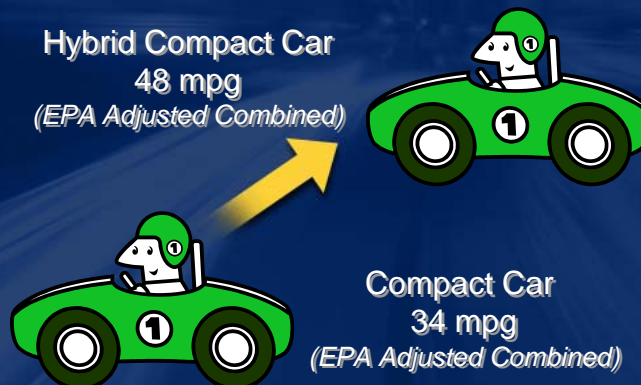
So what's next?

- **Highway Bill**
 - **Obama Amendment SA 595**

Petroleum Displacement

Annual Gasoline Savings of 94 Gallons/Year

(Assumes 11,000 miles/year)*



* Personal Transportation Study - Oak Ridge Nat. Lab Data Book

Petroleum Displacement

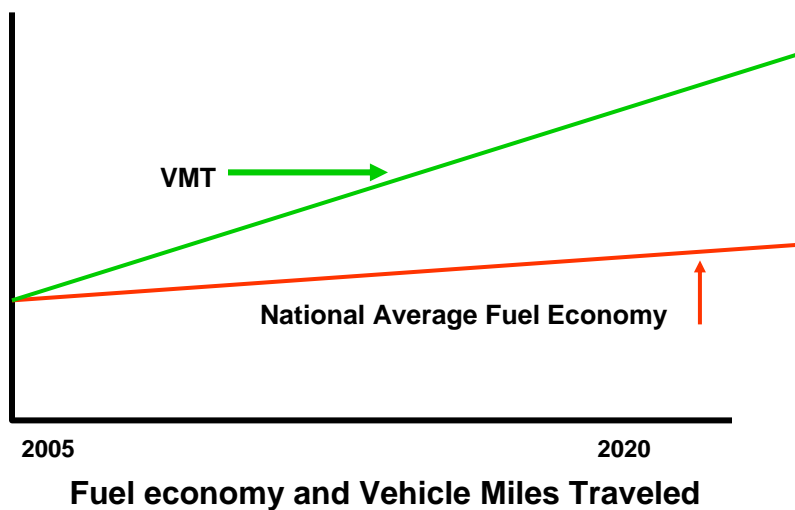
Annual Gasoline Savings of 477 Gallons/Year

(Assumes 11,000 miles/year)*

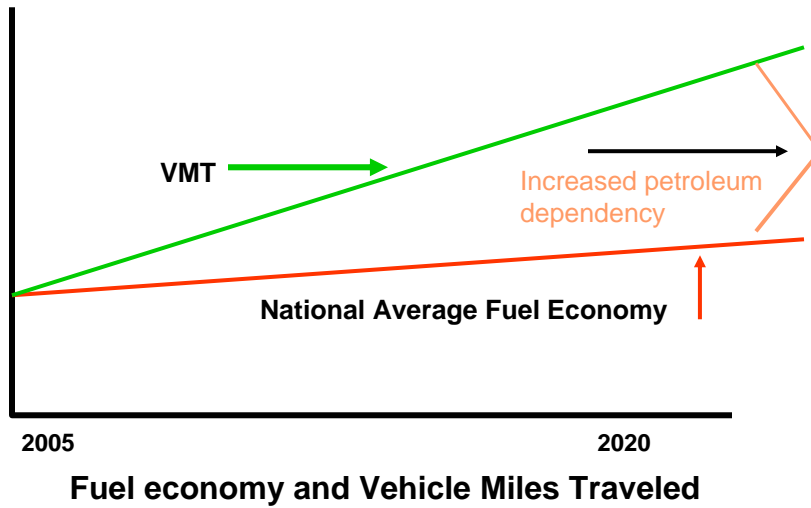


** Personal Transportation Study - Oak Ridge Nat. Lab Data Book*

Hybrid Myth:



Hybrid Myth Results:



Hybrid Goals:



Produce FFV Hybrids

Pure Hybrid incremental cost \$5,000

Added cost for FFV? \$50.00

