



Refueling the future with Alcohol Fuels

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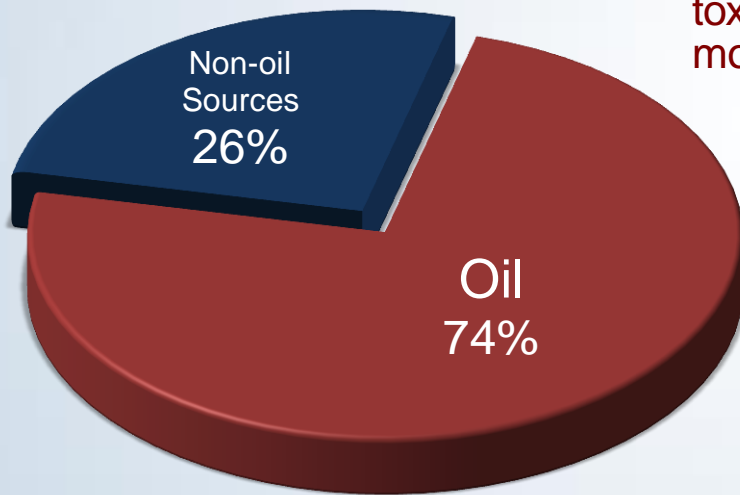
Co-founder, Fuel Freedom Foundation

June 18, 2014

TEDx Chapman University

Oil's Impact on California

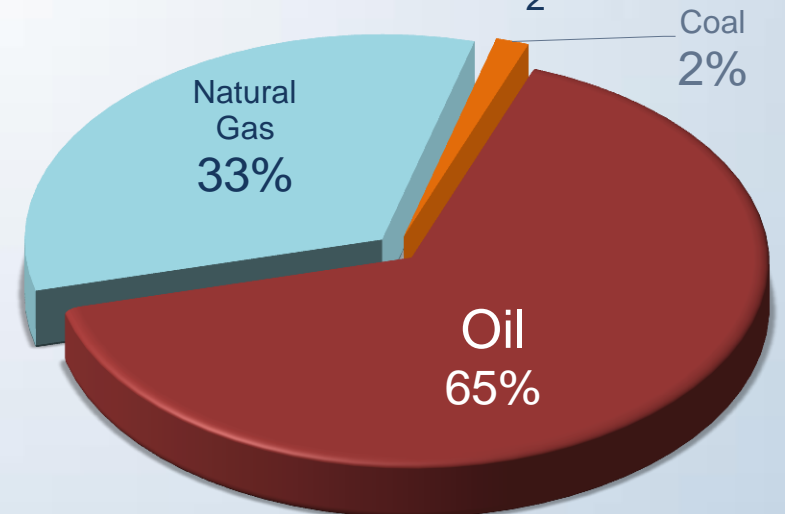
California Emissions



3/4 of California's emissions (including CO₂, toxic pollutants, ozone forming emissions and more) come from petroleum

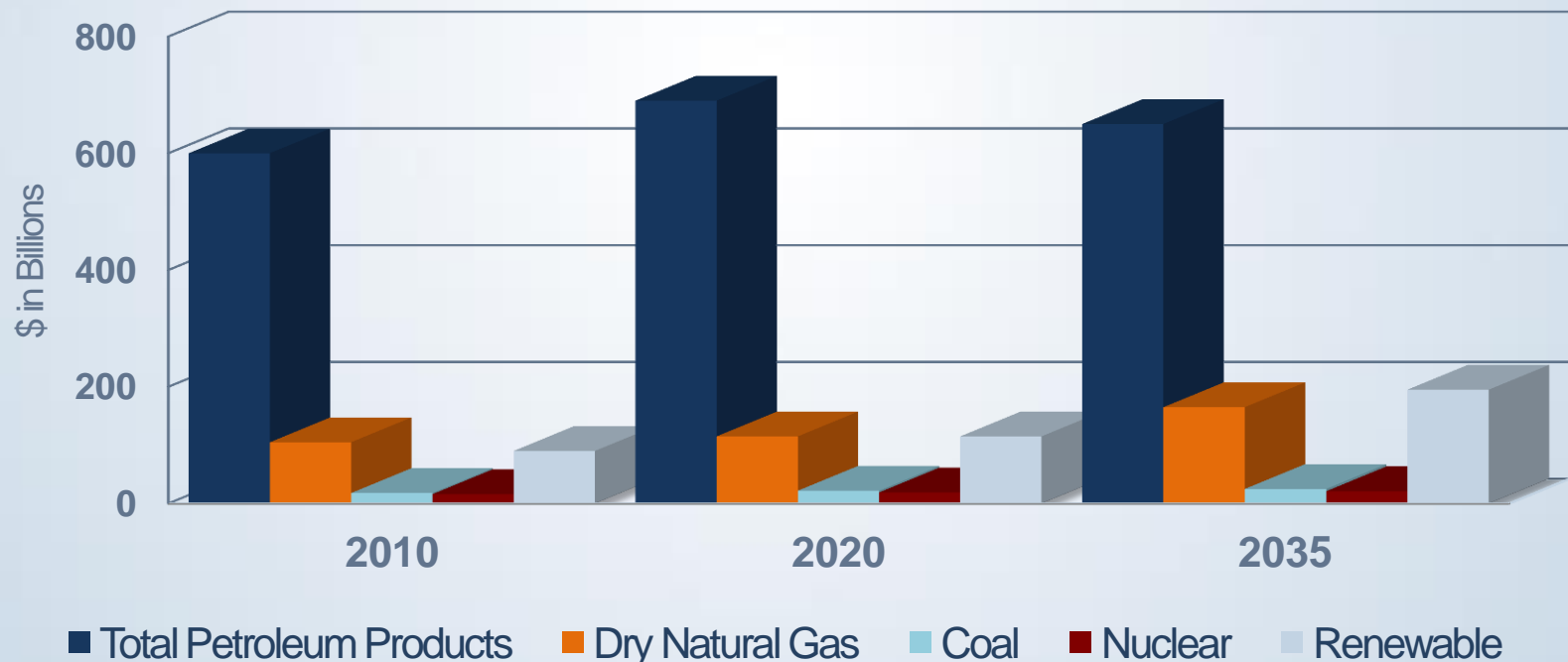
Nearly two-thirds of California's CO₂ emissions come from petroleum

California CO₂ Emissions



Oil is also 6x more expensive

U.S. Energy Consumption (in 2011 dollars)



Source: International Energy Agency



So how do we solve this?

Popular solutions include:

- Increased efficiency
- Public transportation
- Taxation
- Electrification
- Alternative fuels

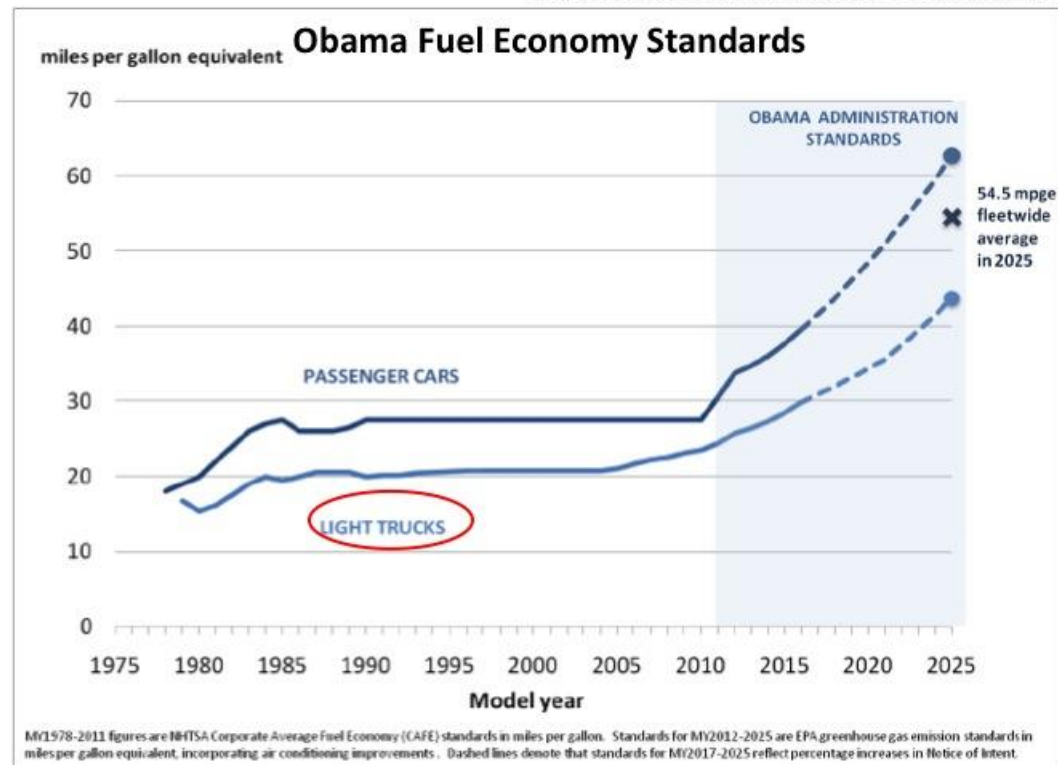
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54.5 Fuel Economy Standard

http://www.whitehouse.gov/sites/default/files/fuel_economy_report.pdf



- Standards shown are industry-wide. Individual manufacturer standards will vary based on average vehicle "footprint" (wheelbase x average track width), weighted by model volumes.

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Will Taxation do it?

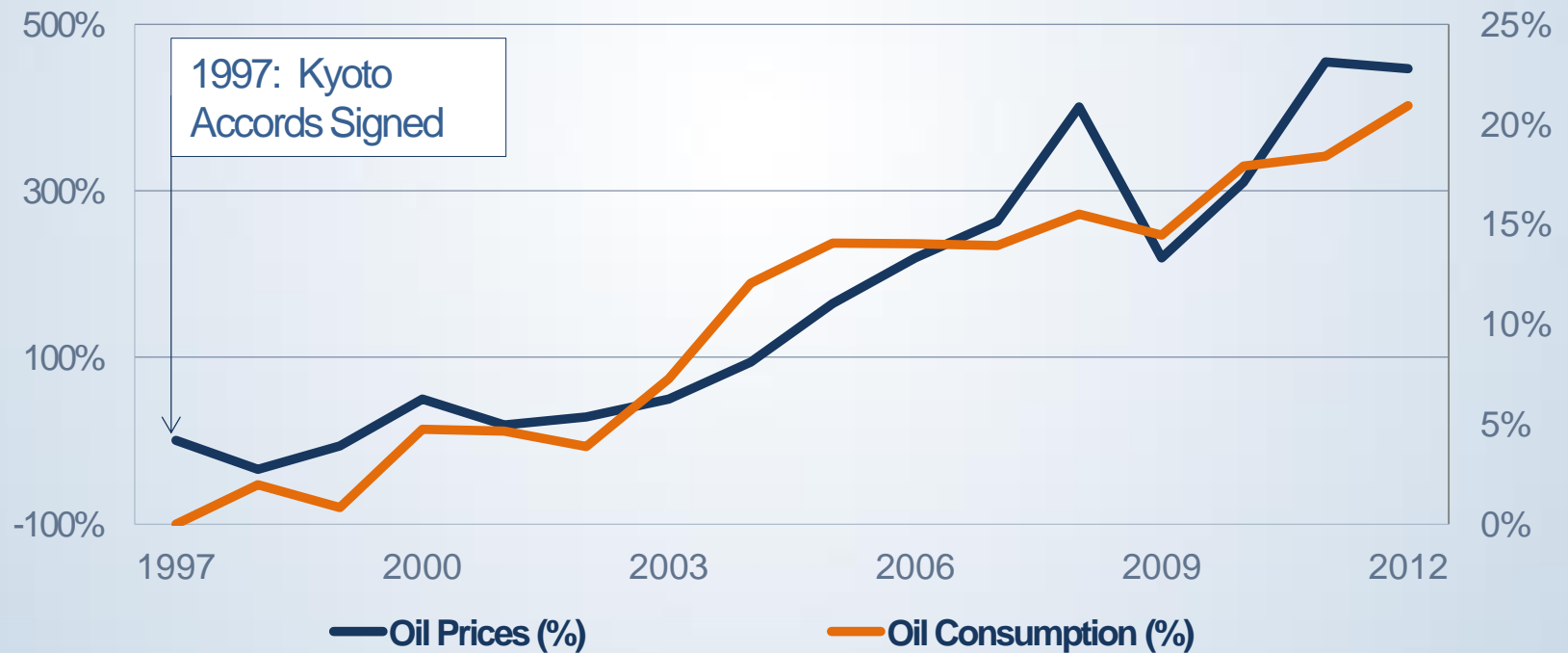
Oil Prices



Source: EIA and USDA

Will Taxation do it?

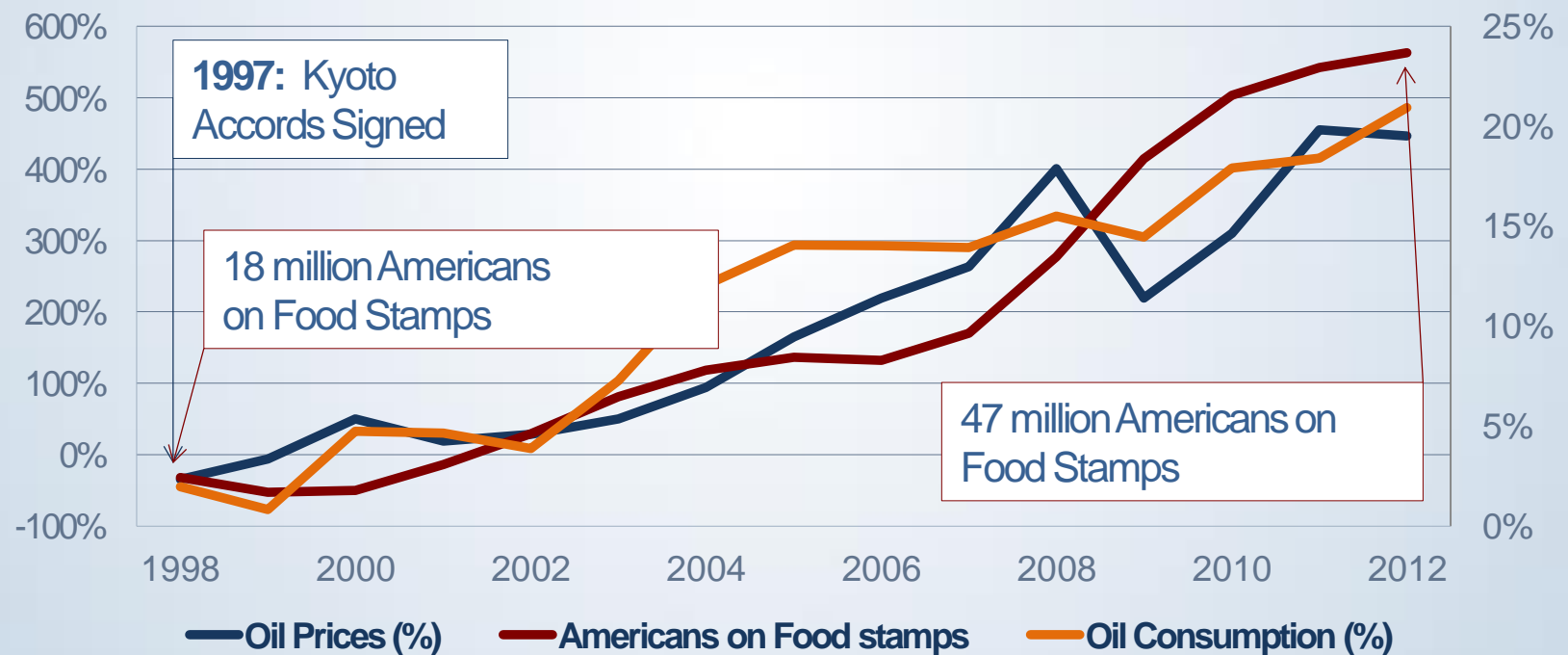
Oil Prices vs Oil Consumption



Source: EIA and USDA

Will Taxation do it?

Oil Prices vs Oil Consumption and Food Stamps



Source: EIA and USDA

Average
Margin of
Victory in a
Presidential
Election

6.3
MILLION VOTES

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- **Electrification**
- Alternative fuels



What about Electrification?

Electric cars as a portion of the U.S. vehicle fleet
(Assuming optimistic 33% annual compounding growth rate)



Source: Source: EIA Annual Energy Outlook 2014

So how do we solve this?

Popular solutions include:

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- Taxation
- Electrification
- **Alternative fuels**

Fuel Replacement

- Can we make replacement fuels that are better than oil for the environment?
- Can these fuels compete with oil in the marketplace?
- How long will it take them to make a real impact?

The key is
fuels that work with
your existing car

Alcohol fuels are high octane, liquid fuels used today for racing cars and...

**Can work on
YOUR car**



Natural Gas? doesn't that mean Fracking?

- Fracking is no longer only a gas thing
- 90% of all new **OIL** wells use fracking

Choosing to do
nothing is
choosing oil
and choosing oil is
choosing
fracking

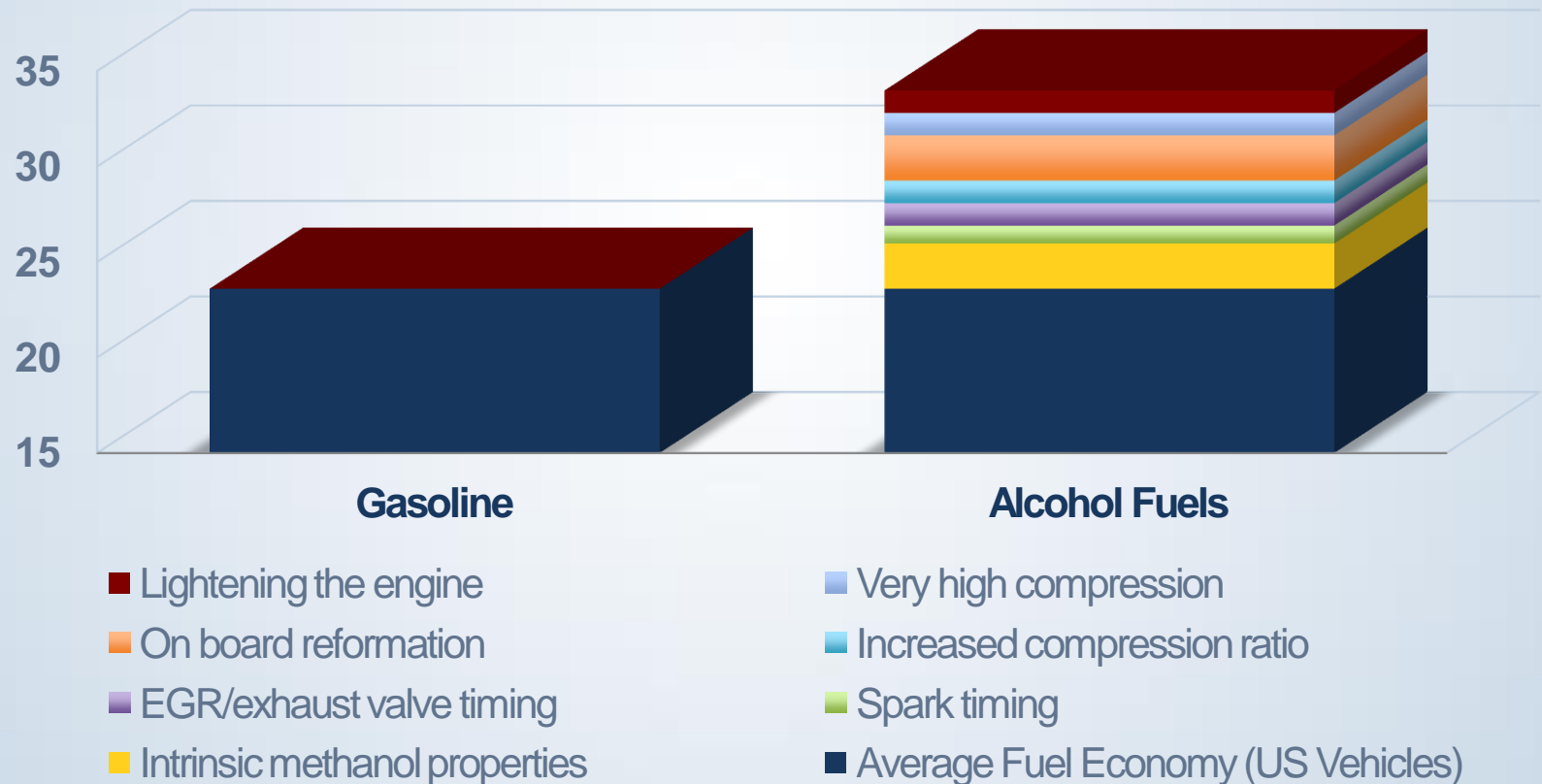
Natural gas is a byproduct of oil fracking



Alcohol Fuels: Environmental Advantages

- Dissolve in water, biodegradable
- Reduce smog
- Replace toxic aromatics in gasoline
- High octane means even higher efficiency engines
- Fewer GHG emissions
- Many possibilities for renewable sources

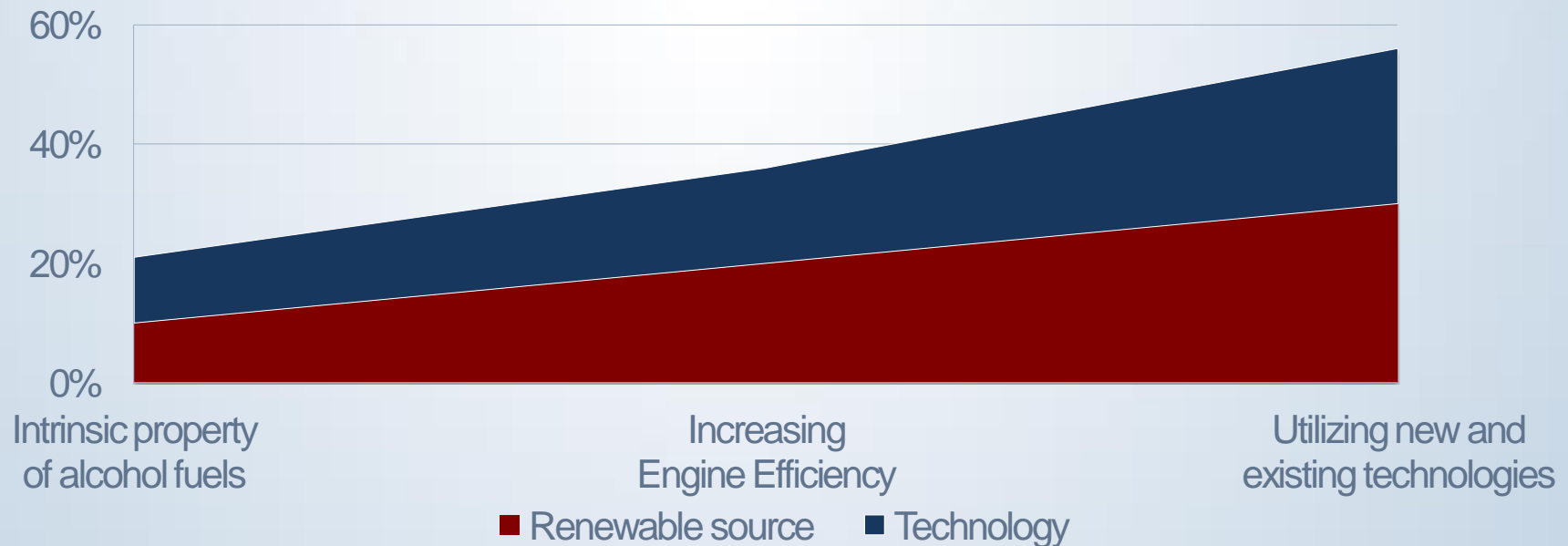
Alcohol Fuels: Engine Advantages



Source: MIT and EPA

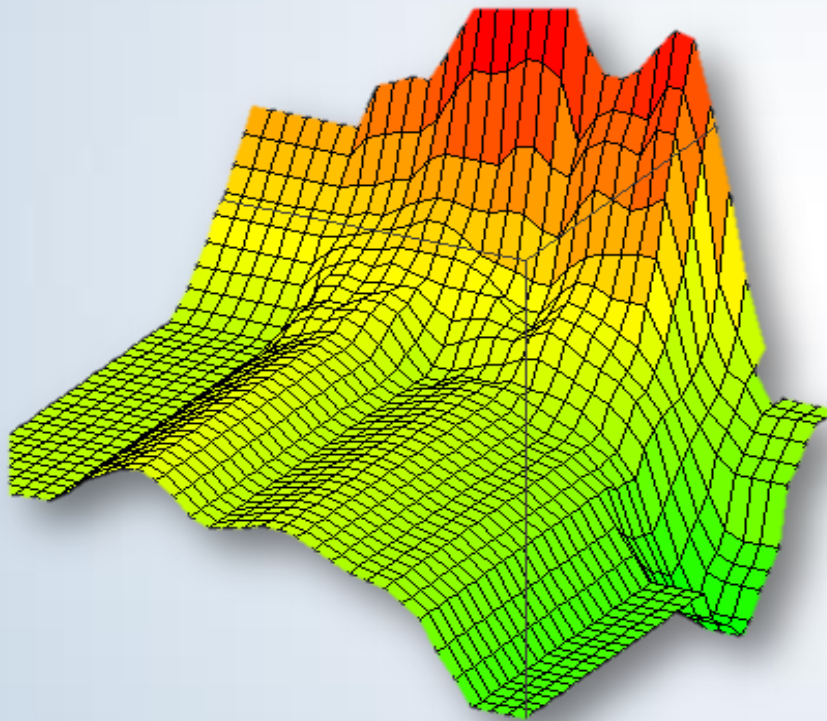
Alcohol Fuels: GHG Advantages

Assuming 30% of fuel is made from renewable, waste or methane by-product sources.

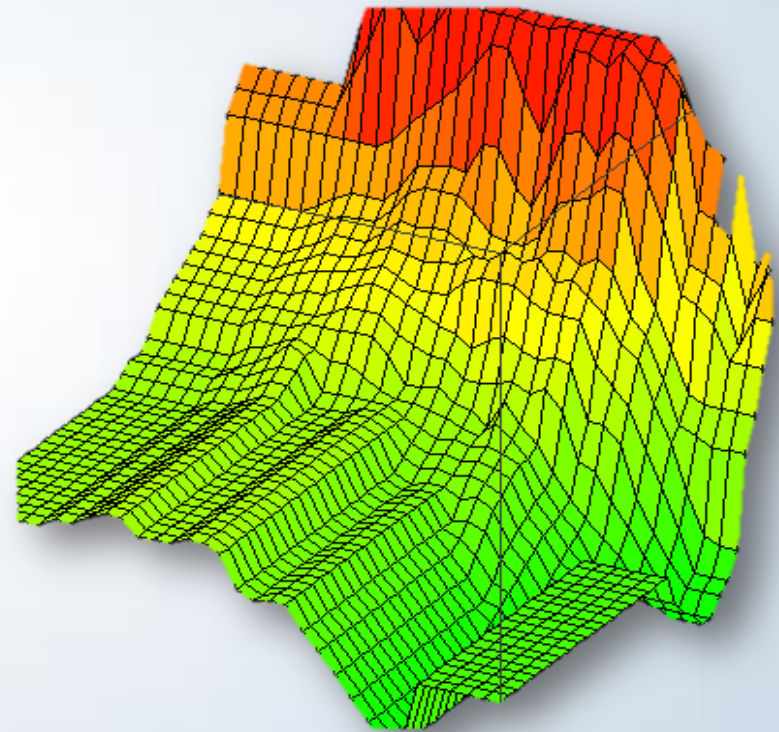


Source: Argonne MIT and Fuel Freedom Study

So how come driving on E85 is so lousy?



Stock engine optimization sucks, because it is only optimized for gasoline



We achieved a 20% increased fuel economy after optimizing for both alcohol and gasoline

Getting there is easier than you think

The screenshot shows the EFILive Tune V7.5 software interface. The title bar reads "EFILive Tune V7.5 - 2007 Cobalt 22L.ctd - [{B0178} Engine Operation, Fuel, Flex Fuel: Flex Fuel Option]". The menu bar includes File, Edit, View, Calibration, Flash, Window, and Help. The toolbar contains various icons for file operations and calibration. The Navigator pane on the left shows a tree structure with "Calibrations" and "Favorites" tabs. Under "Calibrations", the "Engine Operation" folder is expanded, showing sub-folders like "Fuel", "General", "Cranking", "DFCO / CFCO", "Power Enrichment", "Dynamics", "O2 Trims", "Open Loop", "Purge", "Fuel Protection", "Flex Fuel", and "Parameters". The "Flex Fuel" folder is selected and circled in red. A red circle highlights the "Possible values:" section, which contains a radio button labeled "No" (selected) and a button labeled "Yes". Below this, a table titled "Flex Fuel Option" lists parameters and their values. A red banner at the bottom right contains the text "As easy as turning on a feature on your car's computer".

EFILive Tune V7.5 - 2007 Cobalt 22L.ctd - [{B0178} Engine Operation, Fuel, Flex Fuel: Flex Fuel Option]

File Edit View Calibration Flash Window Help

Navigator:

Group: (All)

Calibrations Favorites

Calibrations

EFILive Custom Calibrations

Engine Operation

Fuel

General

Cranking

DFCO / CFCO

Power Enrichment

Dynamics

O2 Trims

Open Loop

Purge

Fuel Protection

Flex Fuel

Parameters

Possible values:

☒ No

Yes

Description User notes

Indicates whether the vehicle is capable of running an Ethanol / gas blended fuel.

Only the following values may be entered into this table:

- No

- Yes

Description	Value
{B0178} Flex Fuel Option	No
{B0184} Flex Fuel Sensor Type	Calculated
{B0185} Flex Fuel Default Percentage	5.00
{B0186} Flex Fuel Sensor Diagnostic	Disabled
{B0187} Flex Fuel Diagnostic Run Time	60

Flex Fuel Option

As easy as turning on a feature on your car's computer

So what about the
economy of this
transition?

The Spread

- In the last 3 years we consumed about **\$400** billion in gasoline a year
- All of that could be replaced with **\$80** billion of natural gas
- Converted to alcohol (methanol) with 50% efficiency say, **\$160** billion
- That is a **\$240** billion arbitrage opportunity!

COMING SOON

In iTunes/NetFlix
January, 2015:

PUMP

TheMovie.com

VISIT OUR WEBSITE:

www.fueelfreedom.org

FUEL **FREEDOM**TM
FOUNDATION