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(or How Not to Transition to the Fuels of the Future)

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Washington, D.C.

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"The New Basics"

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What Do Policy Makers Believe?

Petroleum import dependence is a good measure of vulnerability

Petroleum likely to be in short supply – need directed and crash program to transition to the fuels of the future (peak oil).

Alternative fuels/technologies yield high environmental benefits, improve energy security, are cost-effective---and generate lots of jobs.

….but a look at the numbers does not support the belief structure and policies supporting these assumptions are increasing the financial risk to the industry.

THIS IS YOUR TAKE AWAY!!!!!!!!!!!!!

Conventional Wisdom -- Just 5 Short Years Ago

World to Face Large Scale Shortages in Refining Capacity

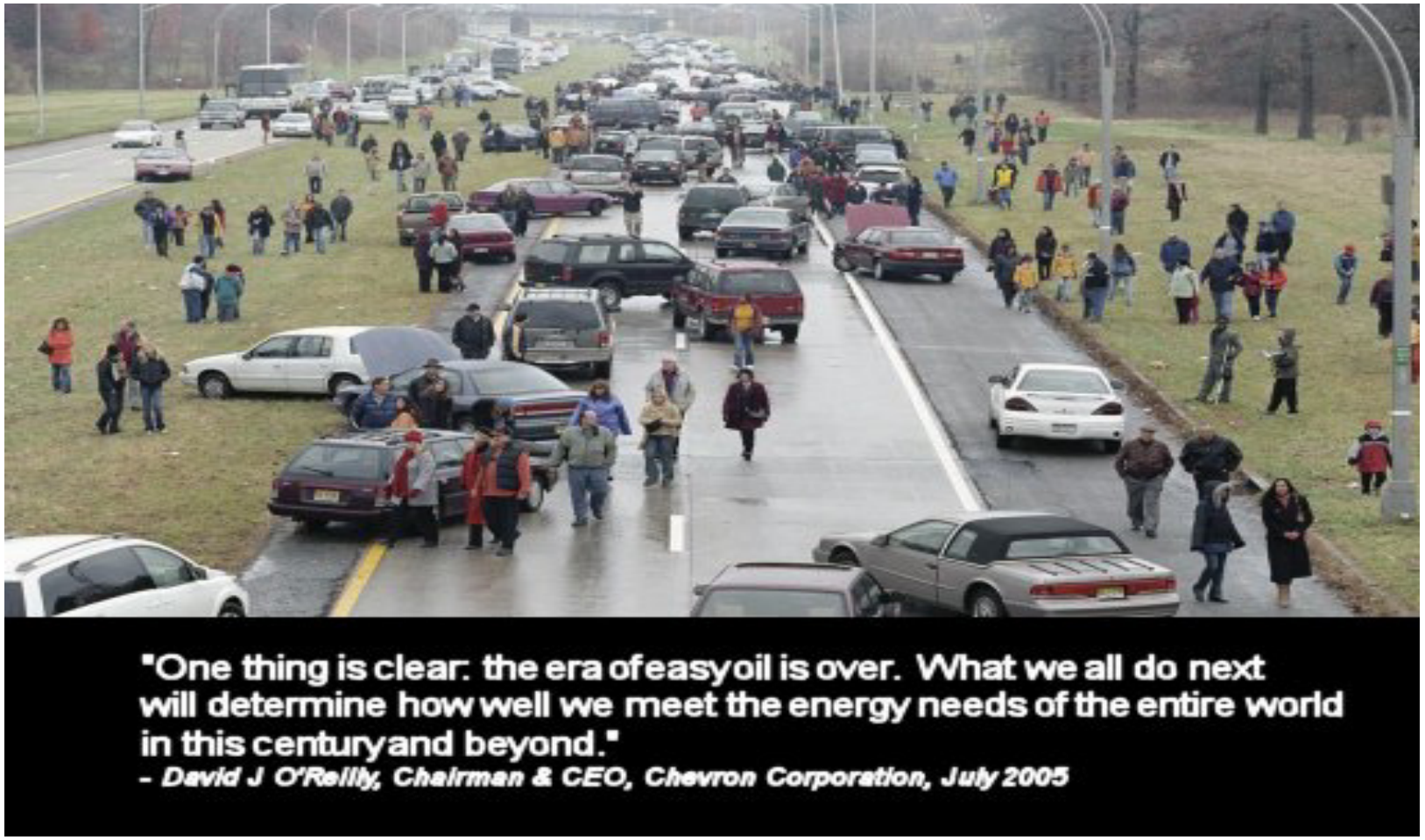
No Major Large Scale Additions Likely in Petroleum Reserves (peak oil) – prices will rise to well over $100/bbl.

U.S. to Face Natural Gas Shortages – Massive Commitment to Domestic LNG Receiving Facilities

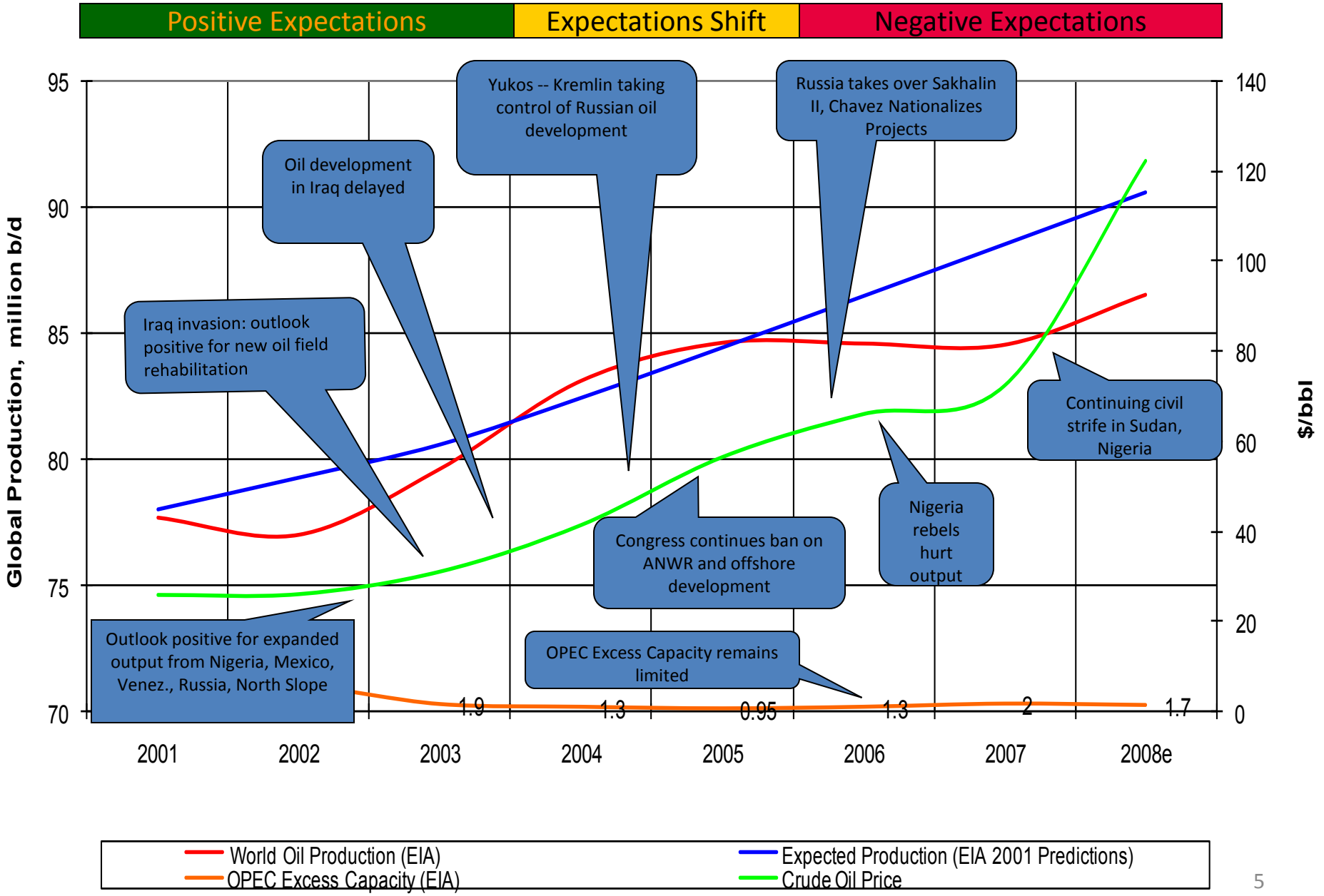
Developing World (particularly China, India) – Liquids Demand to Double in 10 years

Latin America has been Fully Explored

The Peak Oil Problem: How Serious?



A Series of Unfortunate Events Leading to New Expectations



Permian Basin

Testing Hubbard-Method Predictions for Reserves and Production (Billions of Barrels)

	1964	1982	2000
Cumulative Discoveries	17.6	27.9	35.2
Percent Attributable to 1950	85%	86%	84%
Cumulative production as of	19-27.5	28.5-30.5	35.8-37.5
Year 2000 production projected in: (mb/d)	162-479	326-479	910(actual)

Source: EPRINC, October 2006. *Does the Hubbard Method Provide a Reliable Means for Predicting Future Oil Production*, Richard Nehring, October 2006,

IRAQ

A Series of Fortunate Events Leading to New Expectations ?

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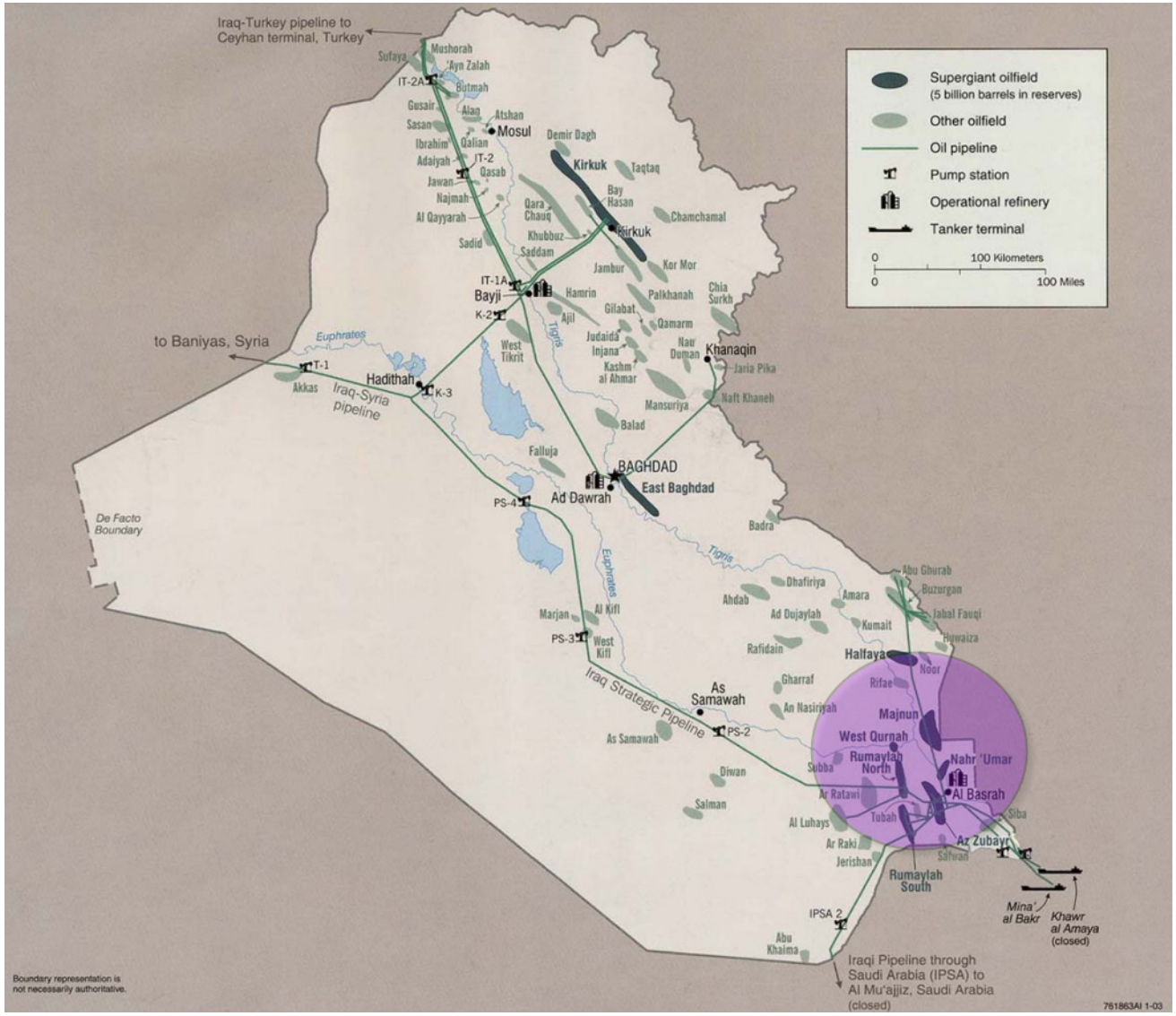
The world's largest concentration of oil - 60 billion barrels of oil within 100 km radius



"We did a private evaluation of Iraq's oil resources for the government …We believe they are probably greater than Saudi Arabia's."

–an executive of one of the original Aramco partners, and an Aramco Board member, in a private conversation in 1987

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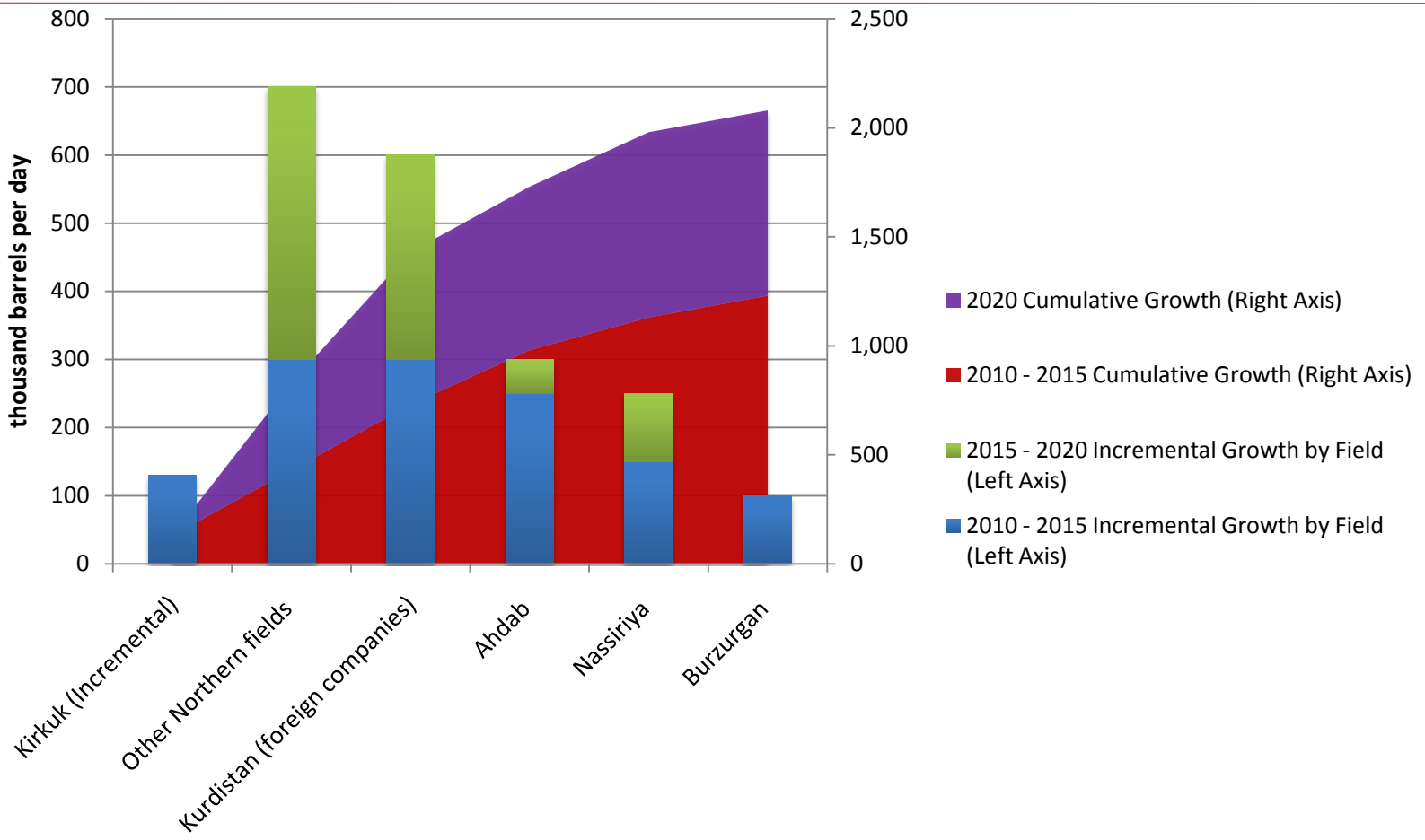
Expected Iraqi Production Growth Excluding Auctioned Projects



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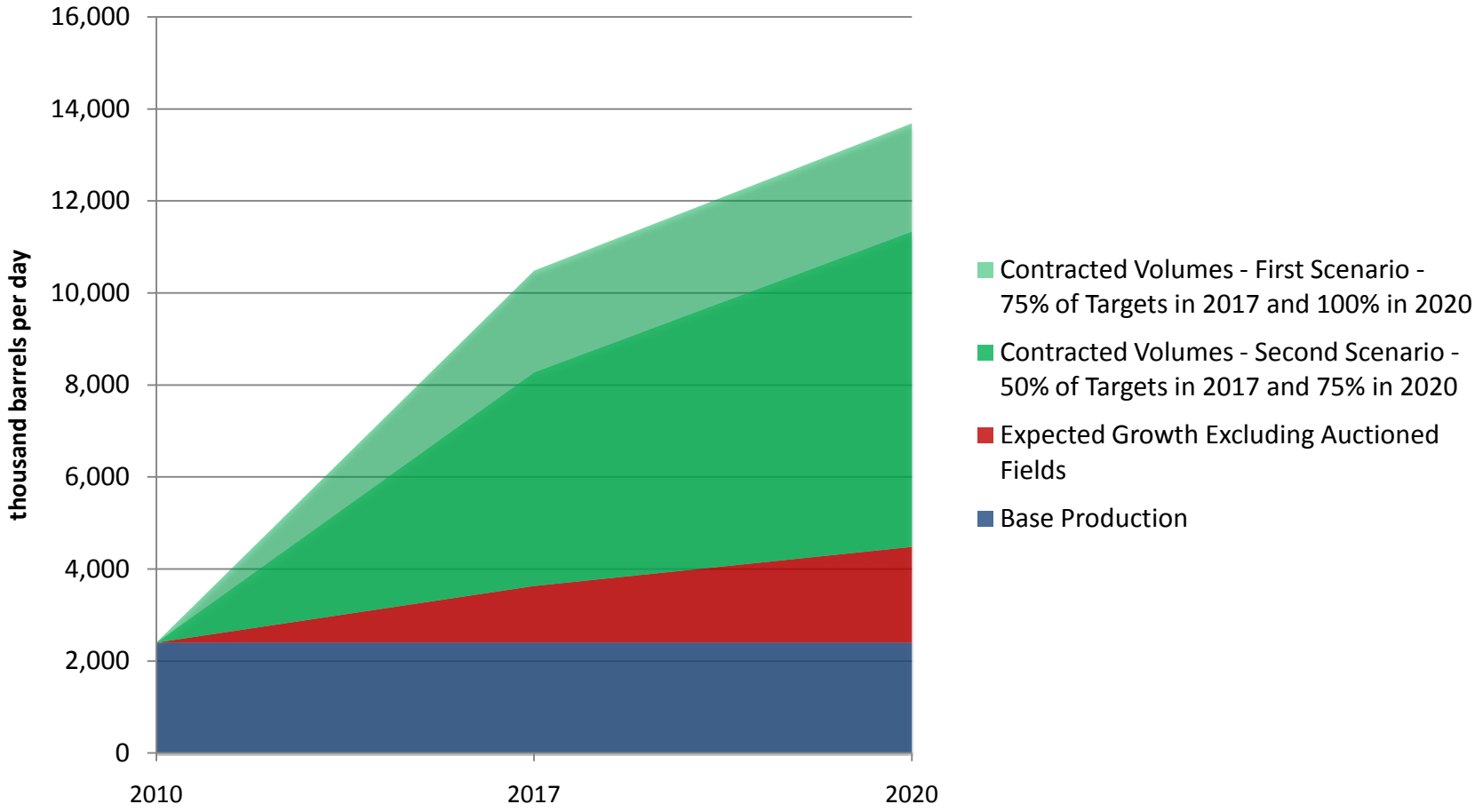
Iraqi Production Growth Under Several Scenarios



What Happened to the Natural Gas Shortage?

January 28, 2010
Davos, Switzerland

*Unconventional gas will transform the entire energy production landscape in the United States.....and alters the U.S. energy outlook for probably a hundred years**

Tony Hayward
Chief Executive Officer
BP plc

In 2009 the United States became the world's largest producer of natural gas

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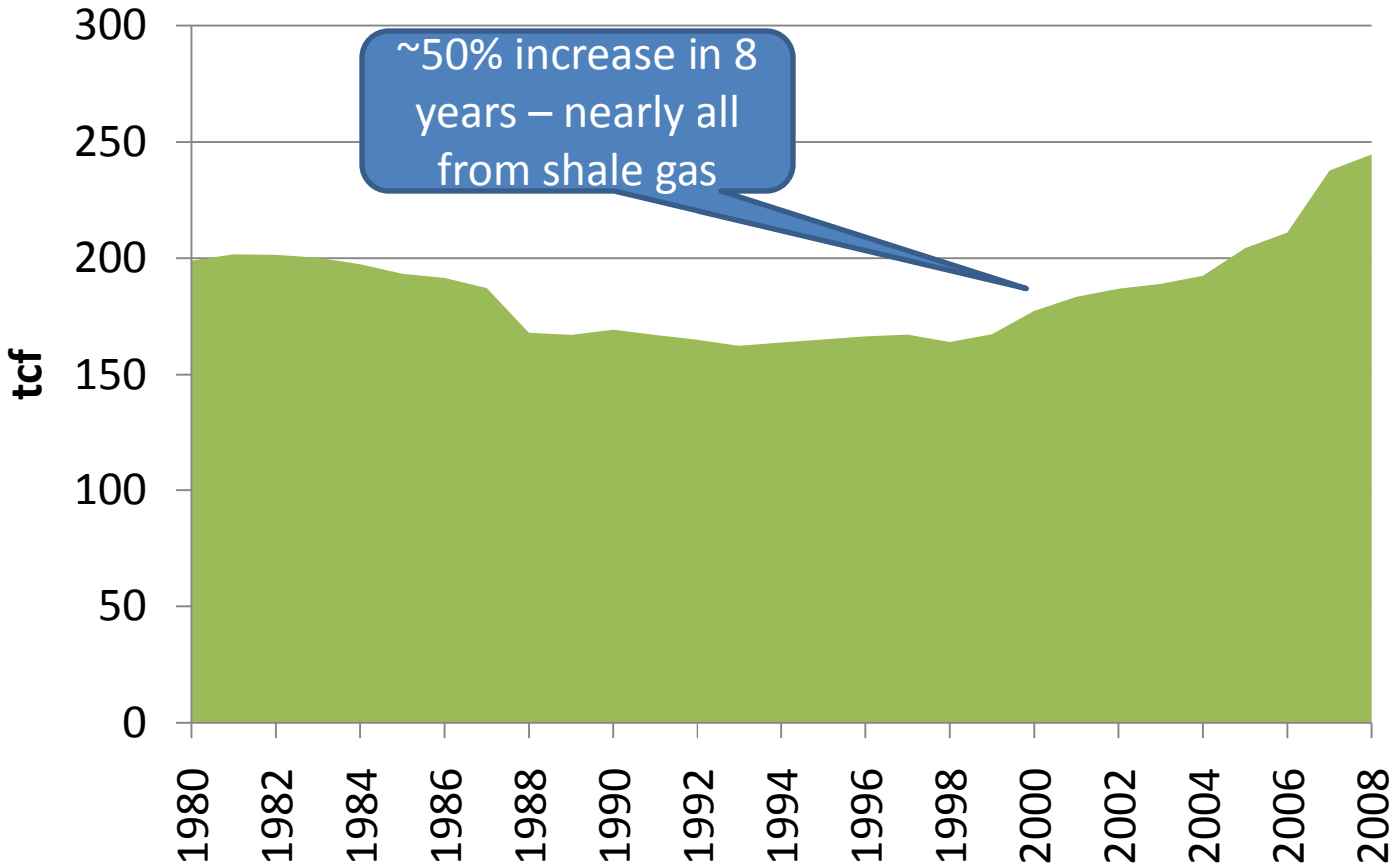
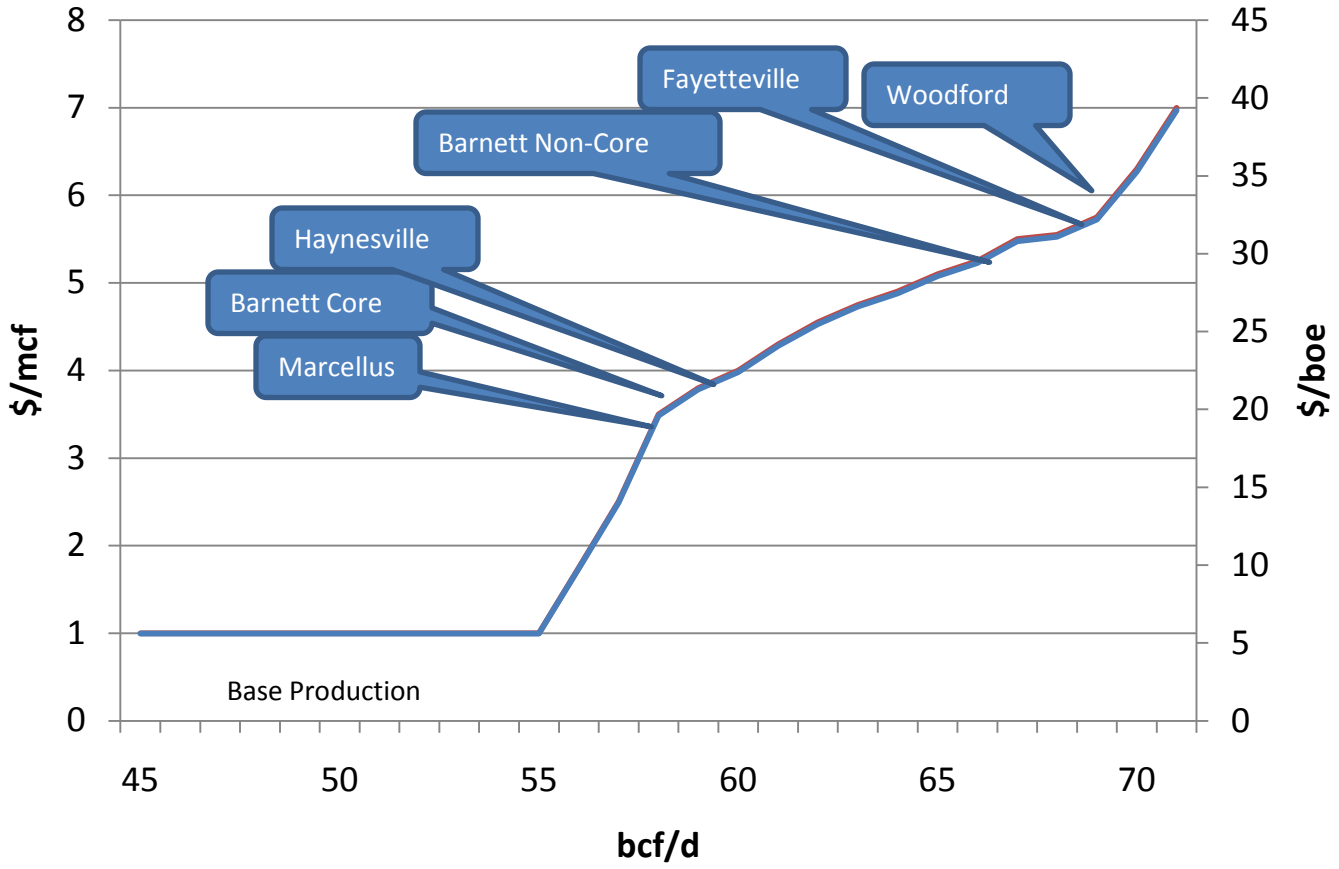
U.S. Proven Gas Reserves Since 1980

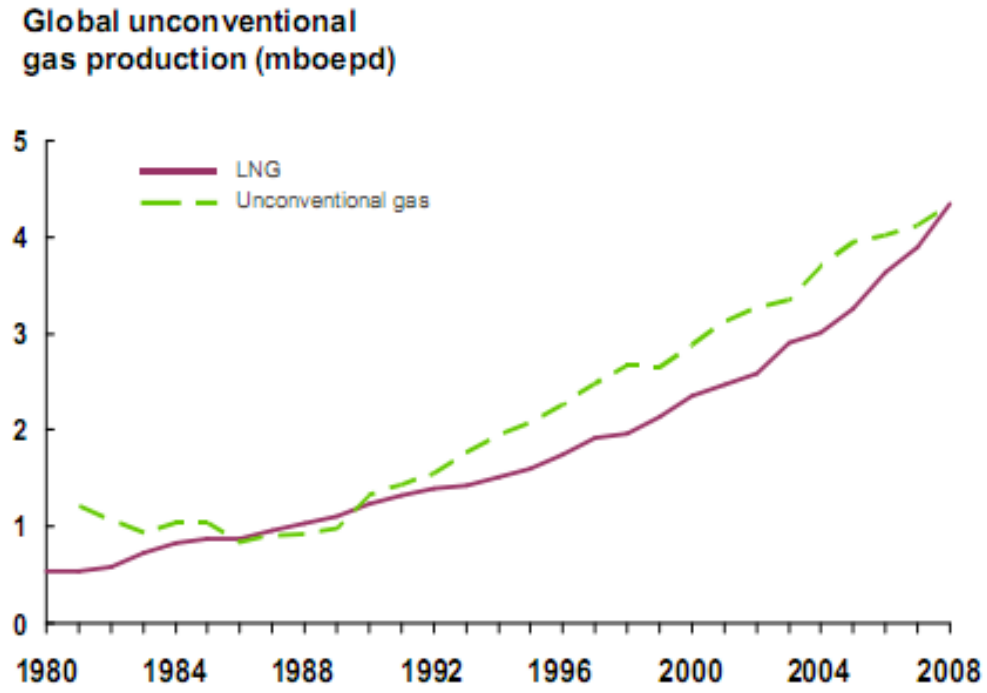


U.S. Shale Supply Cost Curve



Source: Wood Makenzie, EPRINC calculations

World LNG and Unconventional Gas Production



- 10% of global gas production (most of it in the US)
- 44% of US gas production
- Australia, India, Indonesia, and other places
- Europe now receiving attention

Source: SH

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A Quick Look at America's Most Successful Alternative Fuels Program

…….ethanol

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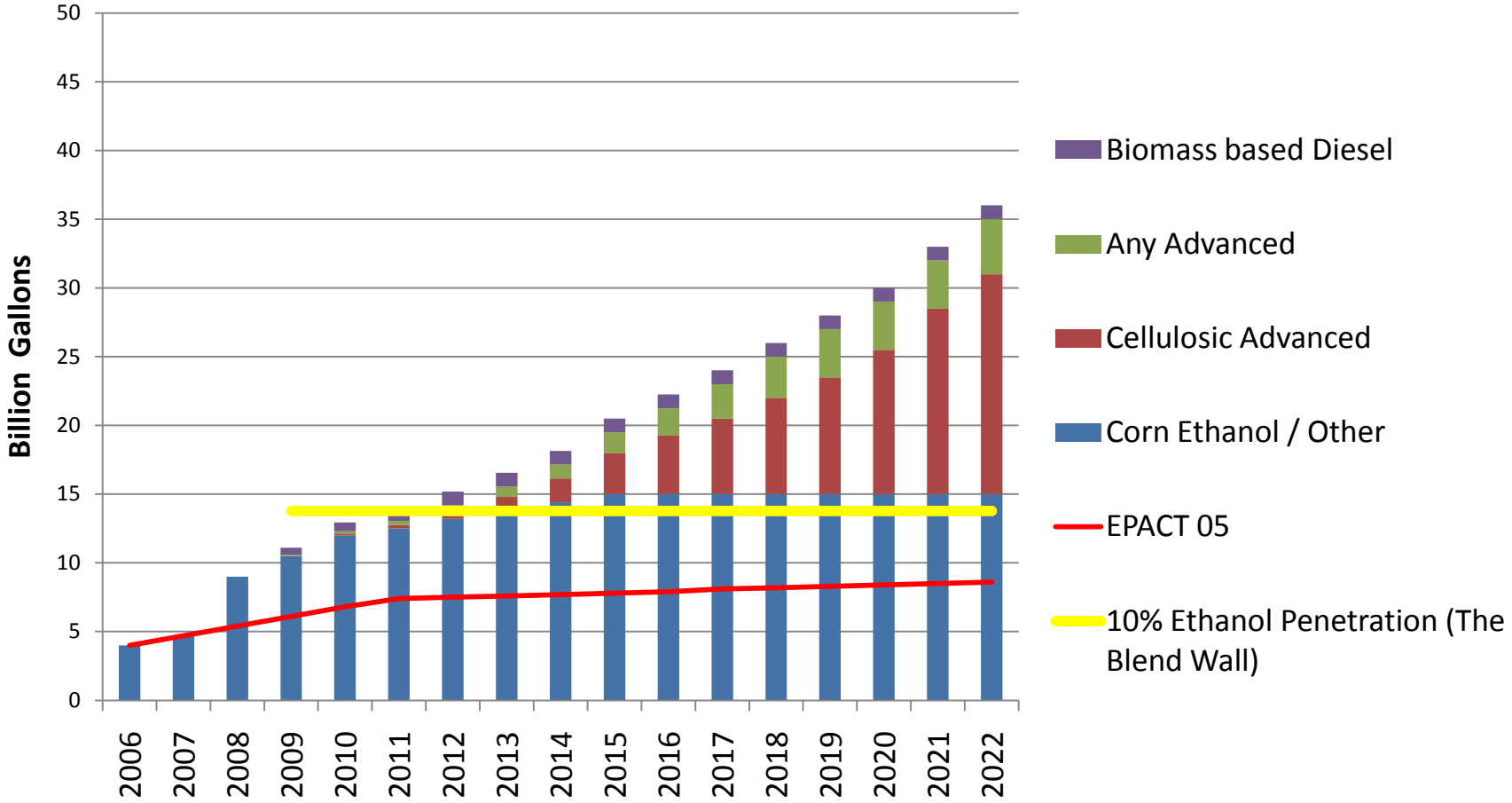
EISA '07 Renewable Fuels Standard



Source: DOE, EIA Data and June 2009 STEO. Blend wall assumes projected 2009 gasoline consumption found in the June 2009 EIA STEO.

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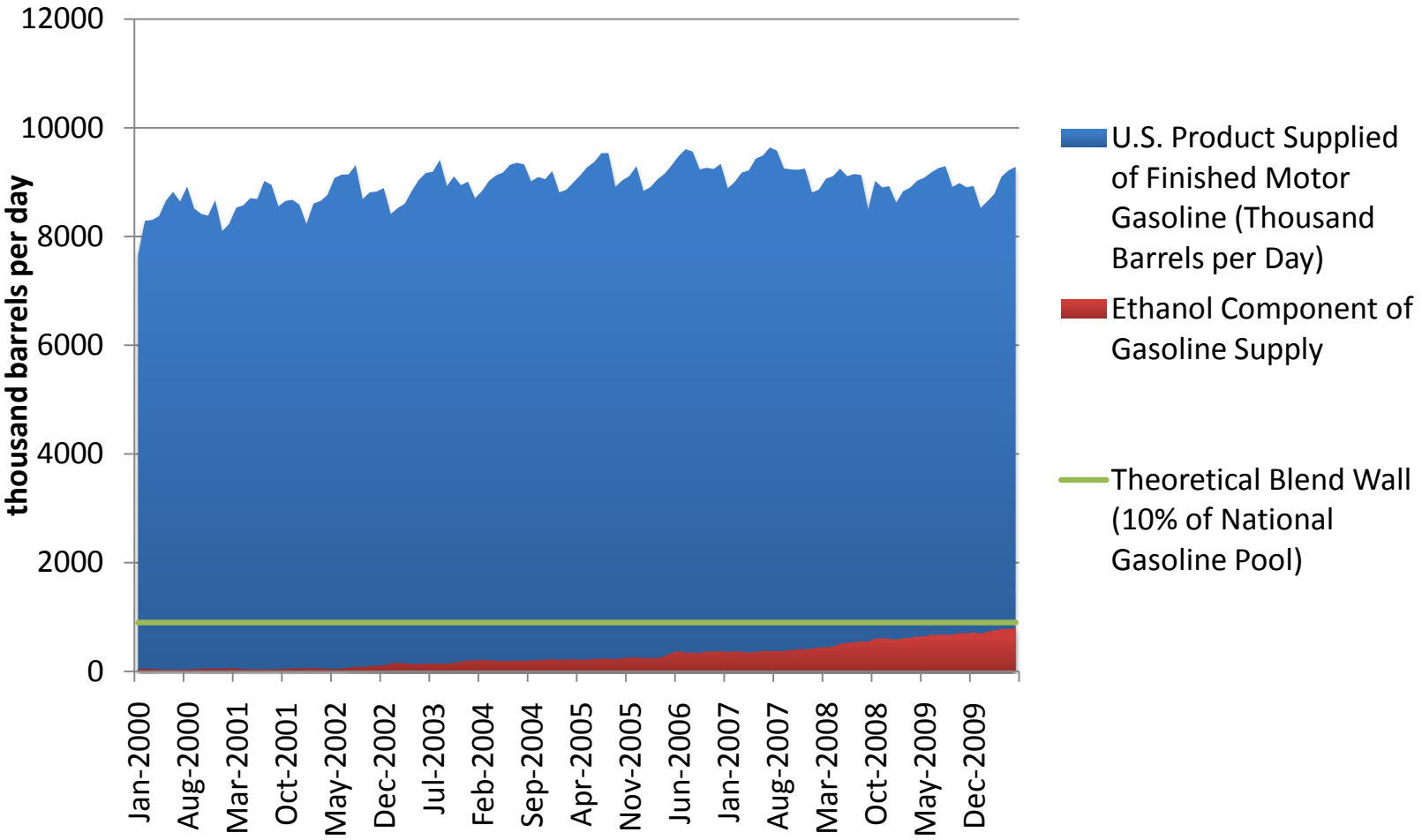
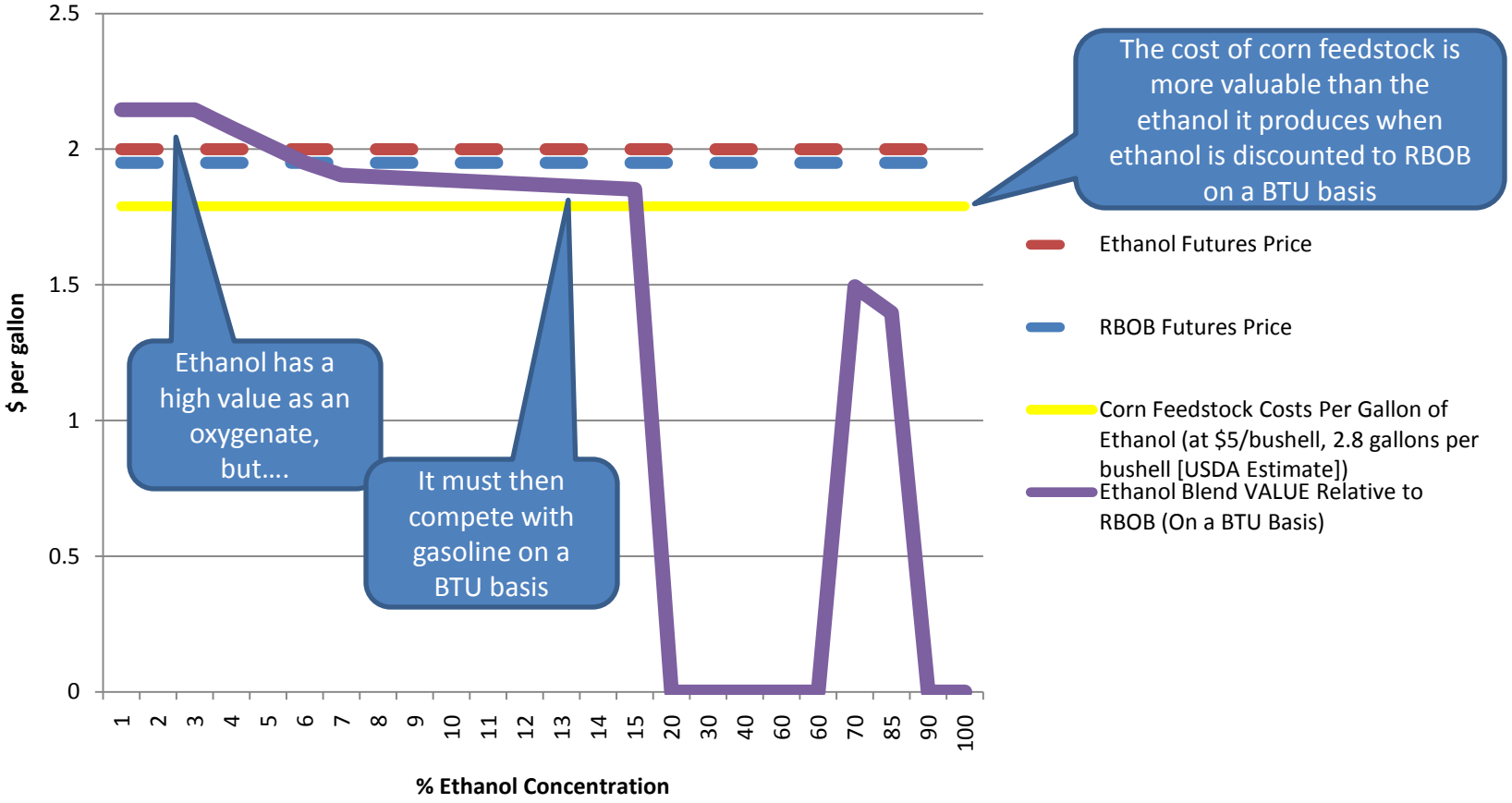
Approaching the Blend Wall



The Blend Wall and the Value of Ethanol



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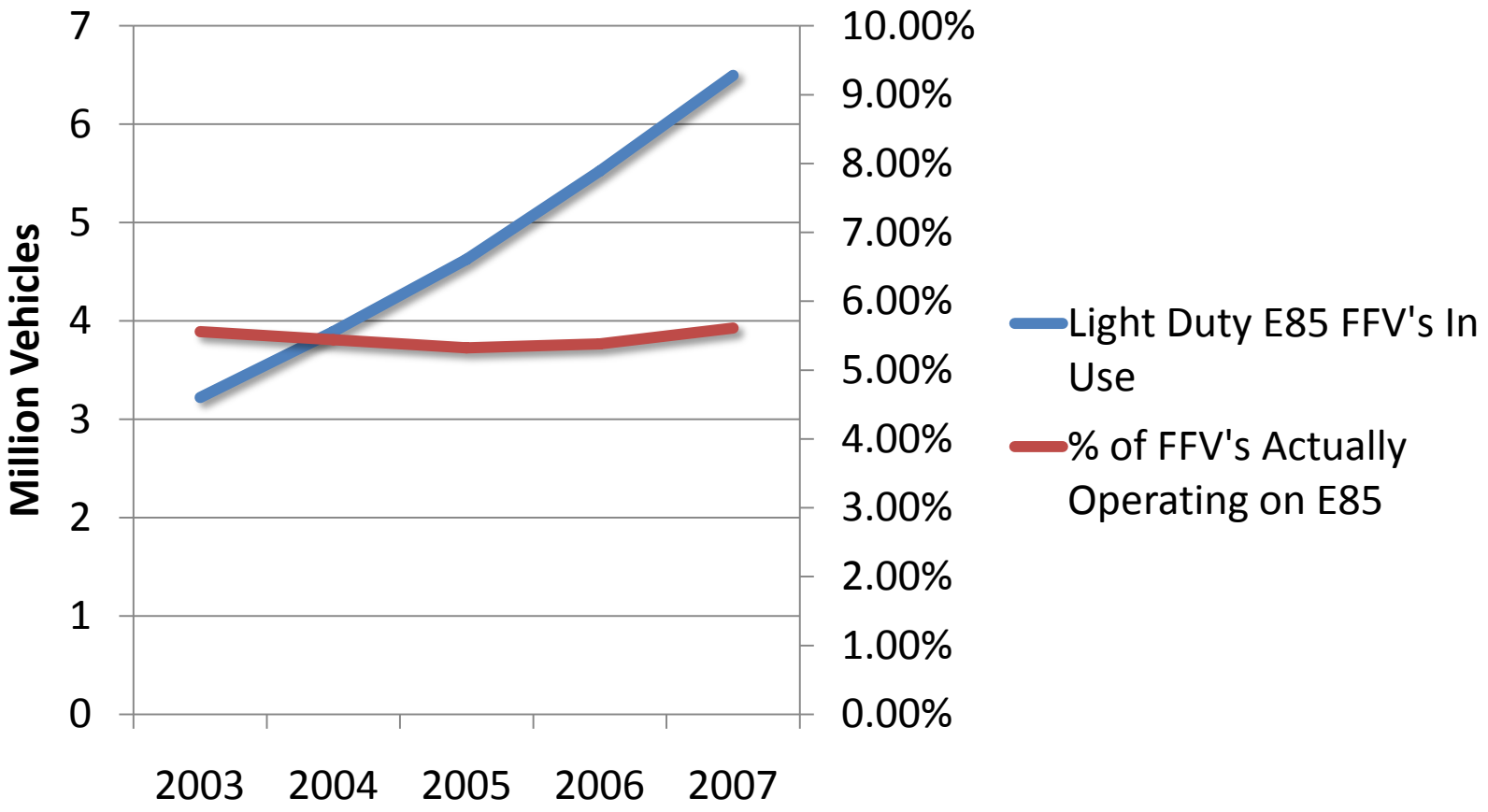
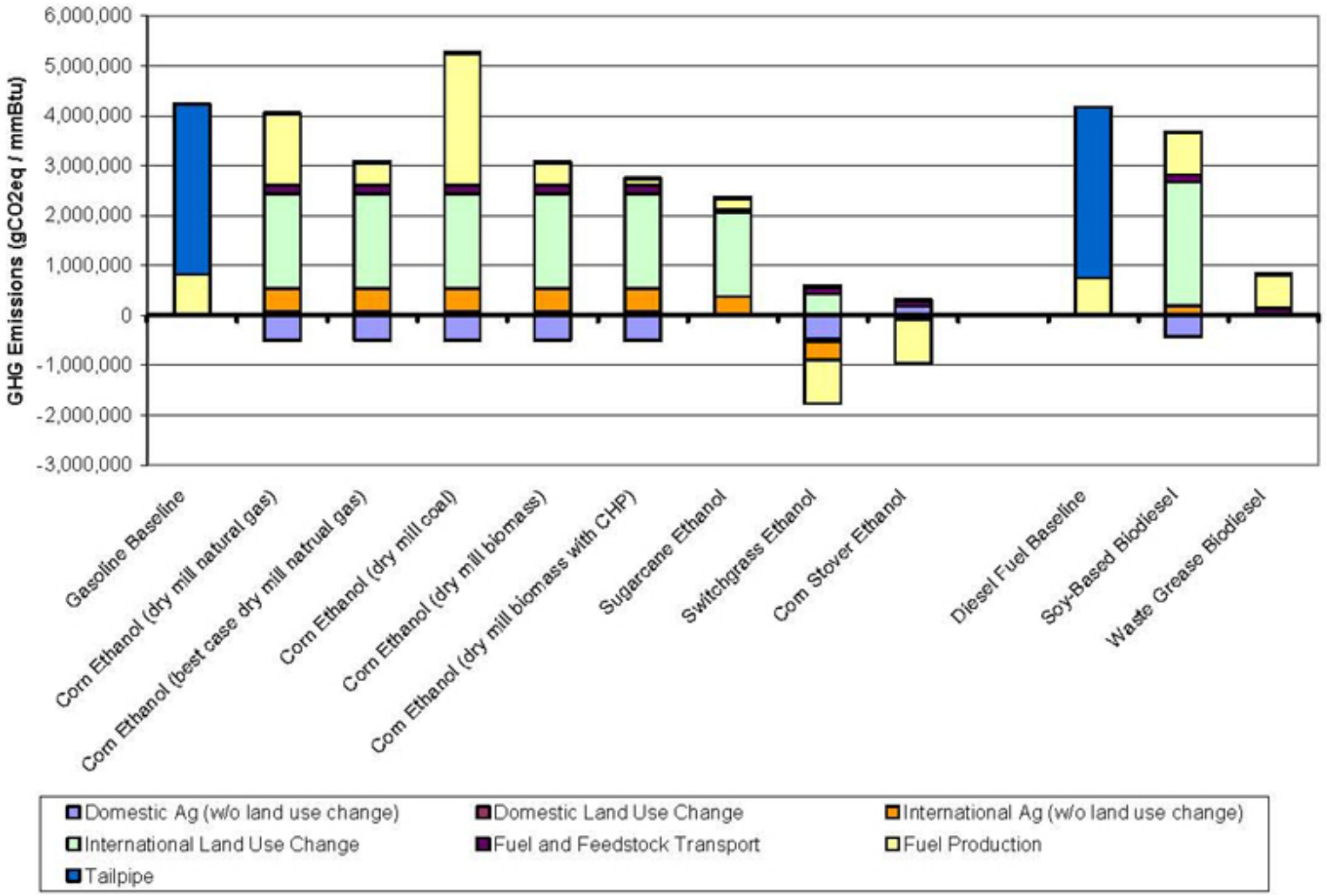
FFVs and E85 Usage



Source: EIA Data, DOE Data, EPRINC Calculations

Figure 1. Net Lifecycle Greenhouse Gas Emissions By Lifecycle Component With 100 Year Time Horizon And 2% Discount Rate.



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What Were They Thinking?

- 15 billion gallon mandate easily achievable with growing gasoline demand -- blend wall would not exceed 10% (2007 forecast environment).
- Gasoline prices would rise – making ethanol cost competitive – an antidote to high gasoline prices.
- Mandates were needed to overcome resistance from the petroleum industry.
- Rural renaissance.
- And besides – it would deliver substantial benefits in lower emissions of GHGs.

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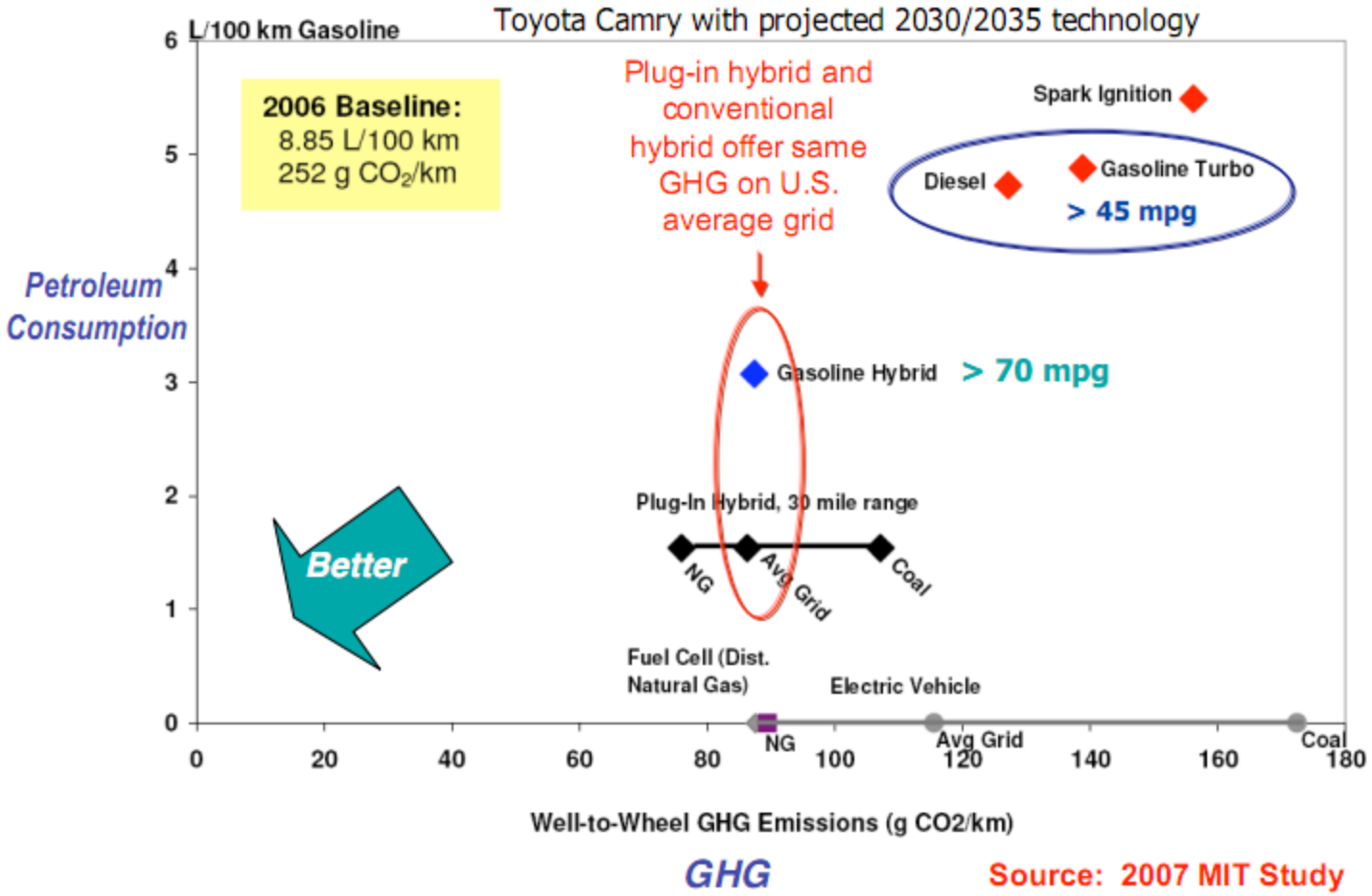
What did they miss?

- Gasoline demand did not grow, prices fell
- RFS mandates were volumetric – driving fuel sector to the blend wall in next year or two.
- Ethanol not cost competitive under most scenarios.
- Ethanol substitutes for gasoline -- not crude oil -- leading to refinery output inefficiencies
- Food versus fuel problem.
- Carbon benefits under attack from ILUC.

OK That's Not So Great…

But What About Electric Cars, Cash for Clunkers, and LCFS

2030/2035 Technology Comparison



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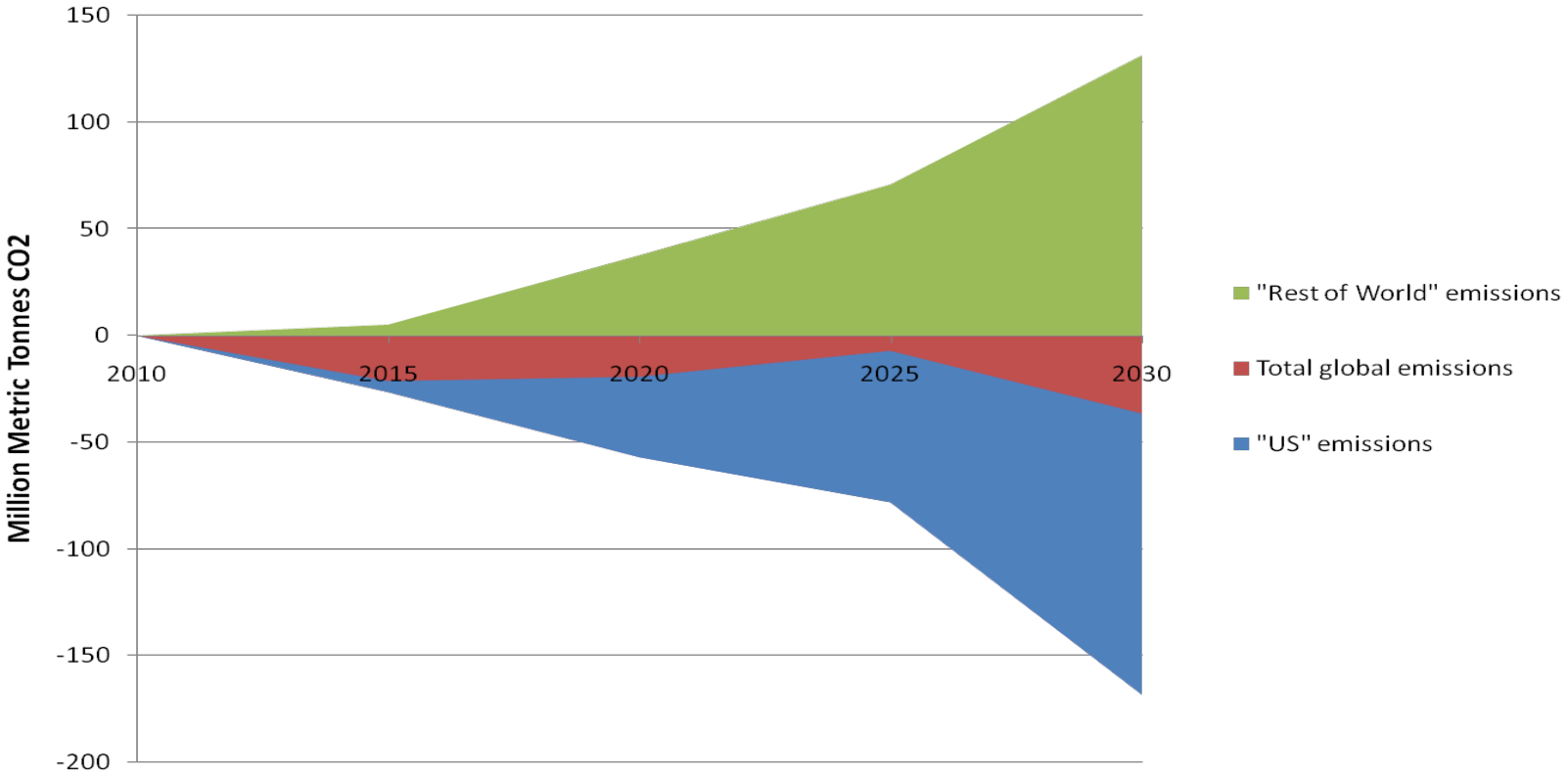
Cost and Effectiveness of Cash for Guzzlers Program

Baseline=18 mpg, 12,000 VMT	Voucher Value	Program Cost for One Million Vehicles	Gallons Saved Per Vehicle, Annually	Total Fuel Savings for One Million Vehicles Over Eight Years, Gallons	Cost Per Gallon Saved Over Eight Years	Fleet Fuel Consumption Reduction Compared to 2008 Rate
New Car, +4 MPG	$3,500	$3,500,000,000	121.2	969,600,000	$3.61	0.0882%
New Car, +10 MPG	$4,500	$4,500,000,000	238.1	1,904,800,000	$2.36	0.1733%
New Light Truck/SUV, +2 MPG	$3,500	$3,500,000,000	66.7	533,600,000	$6.56	0.0485%
New Light Truck/SUV, +5 MPG	$4,500	$4,500,000,000	144.9	1,159,200,000	$3.88	0.1054%
Sources: EIA Data, EPA Data, EPRINC Calculations						

Net Effect of National LCFS



Note: US LCFS limits leads to significant reductions in emissions attributed to the LCFS, but these reductions are largely offset by increased emissions in the rest of the world: Canadian oil sands go elsewhere & most increased biofuel use is at the expense of biofuel use elsewhere.

Source: Unpublished research from US DOE.

Policy Implications

Energy Security – more closely linked to volatility instead of dependence.

Oil Shortages and Peak Oil—backstop price for petroleum likely to be well below $100/bbl. Iraq, and abundance of natural gas likely to drive down and/or limit large increase in backstop price.

Expensive and state directed strategies (e.g., US commitment to electric cars, ethanol, bio-diesel) pose severe and difficult to manage financial risks----potential for paradigm shifts and failure modes remain high.

America's largest renewable fuels program (ethanol) is broken, expensive, and facing growing fiscal fatigue.

Market developments (in the real world) will force a much slower and lower cost transition to the fuels of the future. ***Proceed with Caution!!***