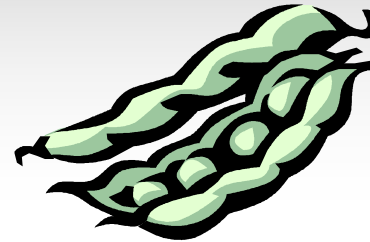
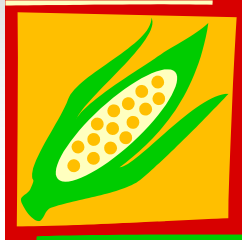


Emerging Alternative Fuel Issues



May, 2007

Agricultural Air Quality Task Force Meeting

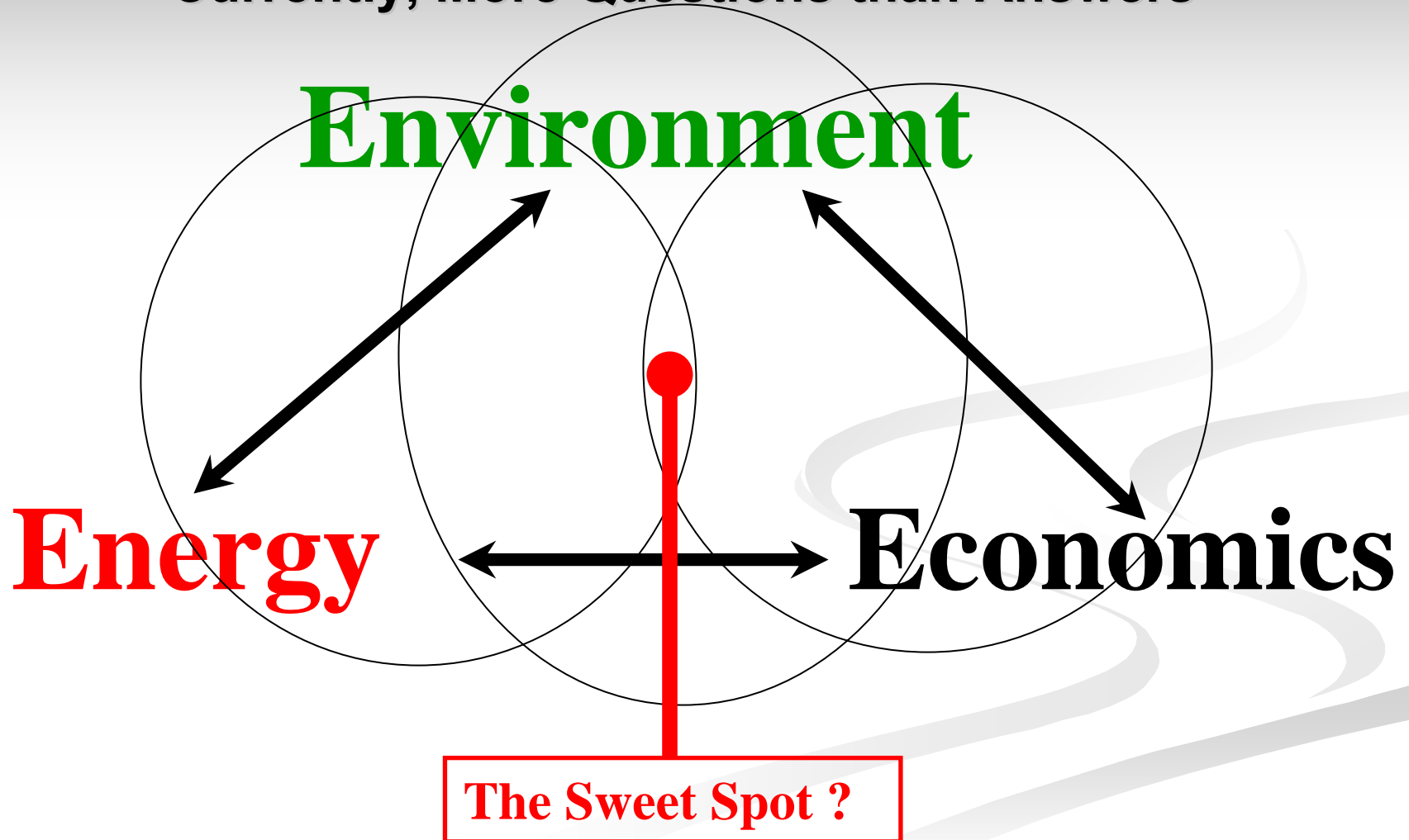
Paul Argyropoulos, Senior Policy Advisor
EPA's Office of Transportation and Air Quality



Future for Fuels

Meeting in the Middle?

- Currently, More Questions than Answers -



Existing and Emerging Issues That Will Impact the Fuels Mix



Production Technologies

Infrastructure

Sustainable Feedstocks

Economics

**Metrics: Lifecycle,
Energy, Hybrid**

Federal / State Incentives

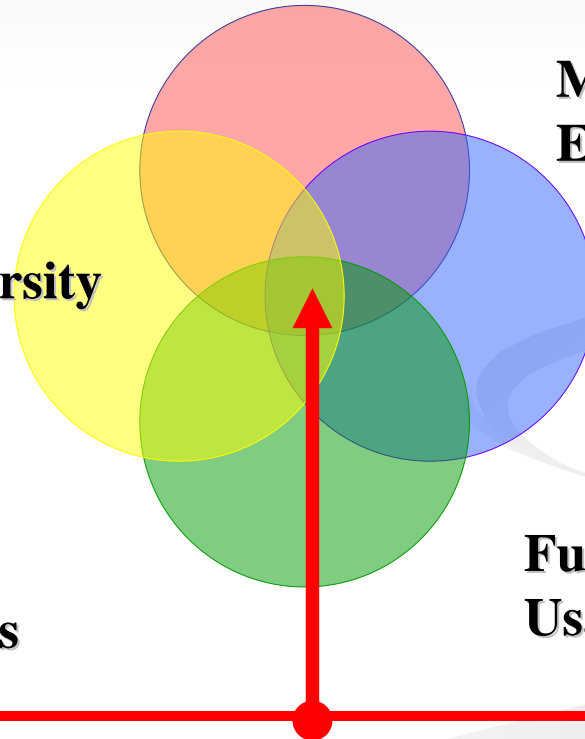
**Energy Security, Diversity
and Sustainability**

Vehicles/Engines

Fleet Efficiency

**Environmental
Protection:
Multi-Media Issues**

**Fuel Types and
Usage Scenarios**



The Sweet Spot?

**Meeting Energy Needs, Environmental Protection
Economically Sustainable**

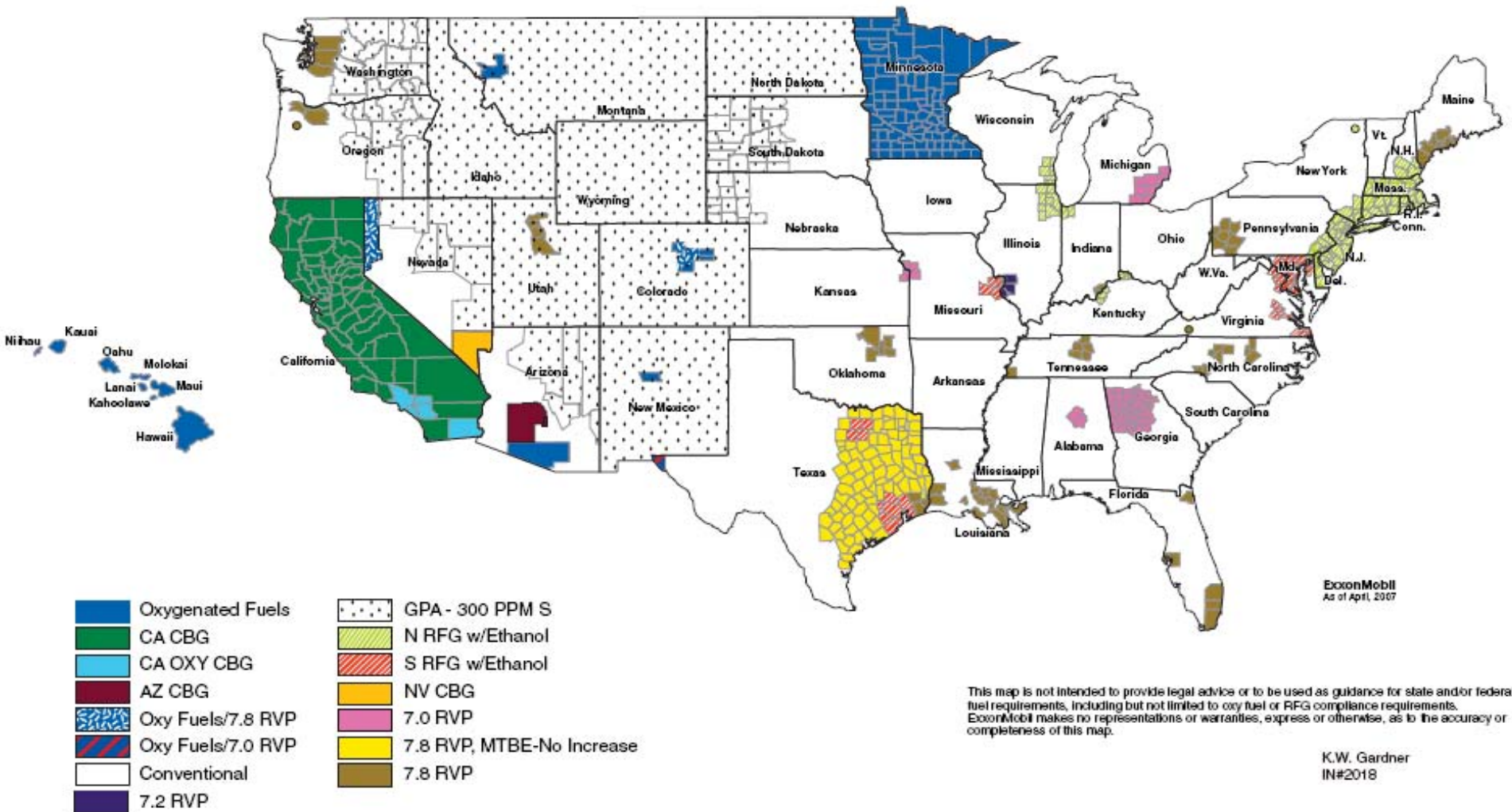
Where Are We Now?

- Federal Fuels – Systems / Integrated Approach
 - Final National RFS – April 10, 2007
 - Reformulated Fuels
 - Impact of Removal of Oxy Requirement
 - Conventional Fuels
 - The Re-emergence of “Alternative Fuels”?
 - New/Future Fuels
- State Fuels
 - State Air Quality Fuels (SIP Fuels)
 - State Renewable and Alternative Fuels
- Other
 - EPC Act Section 1509 – Fuels Harmonization vs. Trend Toward Diversification
 - National Biofuels Action Plan
 - Biomass Research and Development Board
 - National Advisory Council for Energy Policy and Technology

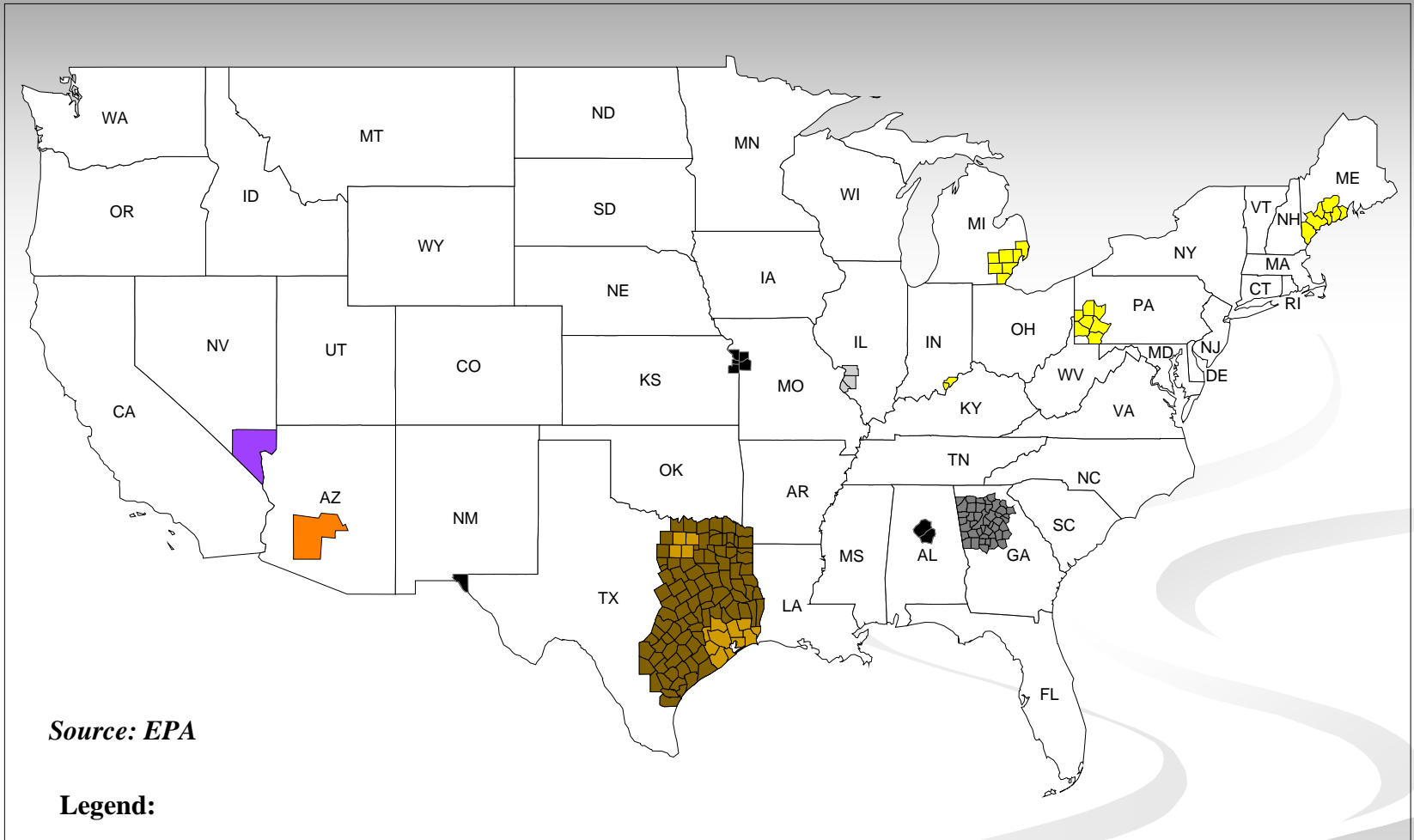


Overview of 2006 U.S. Fuel Requirements

U.S. Gasoline Requirements



Boutique Fuels from State SIPs



Source: EPA

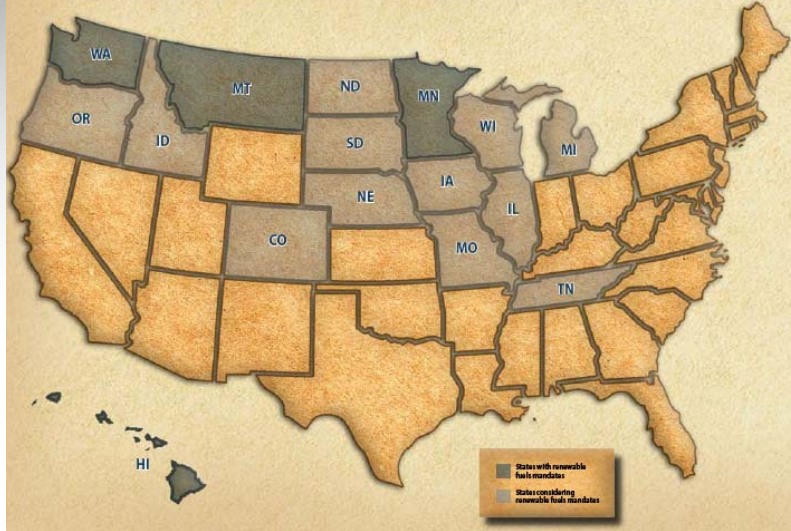
Legend:

- RVP of 7.0psi w/Sulfur Content
- RVP of 7.0psi
- RVP of 7.2psi
- RVP of 7.8psi
- Cleaner Burning Gasoline
- Winter Gasoline
- Texas Low Emission Diesel Fuel & State RVP Controls of 7.8psi
- Texas Low Emission Diesel and Federal RFG or RVP Control

BioFuels: State Mandates, Incentives, Production and Use

Source: ACE

Renewable Fuels Mandates



Ethanol Production Incentives

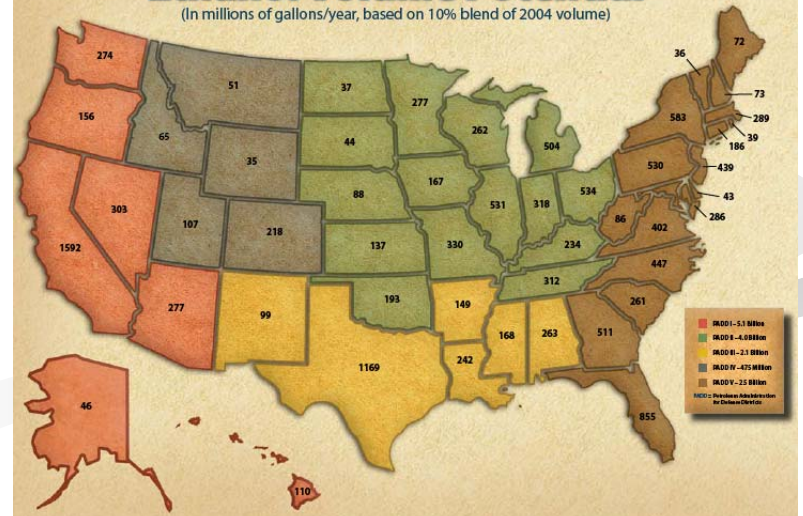


Retail Pump Incentives



Ethanol Volume Potential

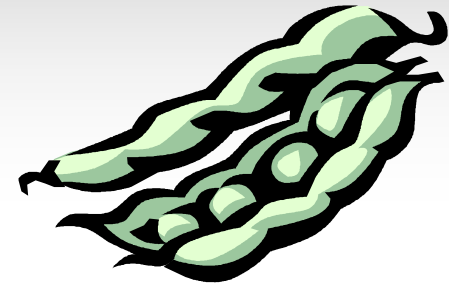
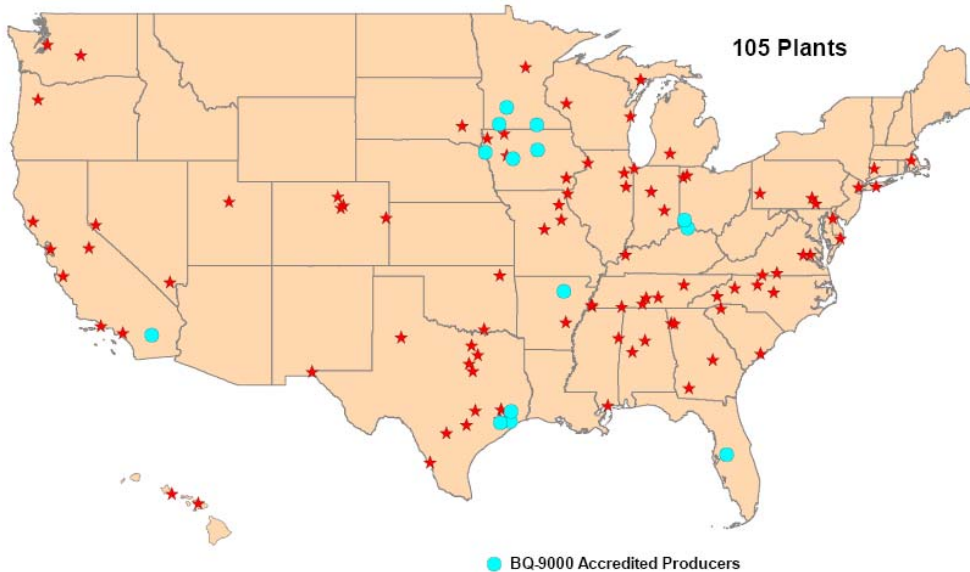
(In millions of gallons/year, based on 10% blend of 2004 volume)



Biodiesel: Production and Sales

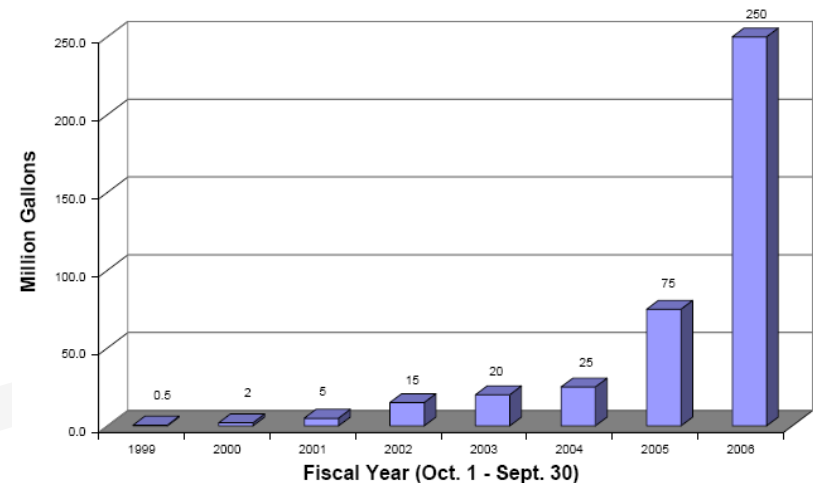
-Source: National Biodiesel Board-

Commercial Biodiesel Production Plants (January 31, 2007)



- Discussions Continue on:
 - Emissions – Collaborative Testing Program
 - Market Potential
 - Fuel Quality

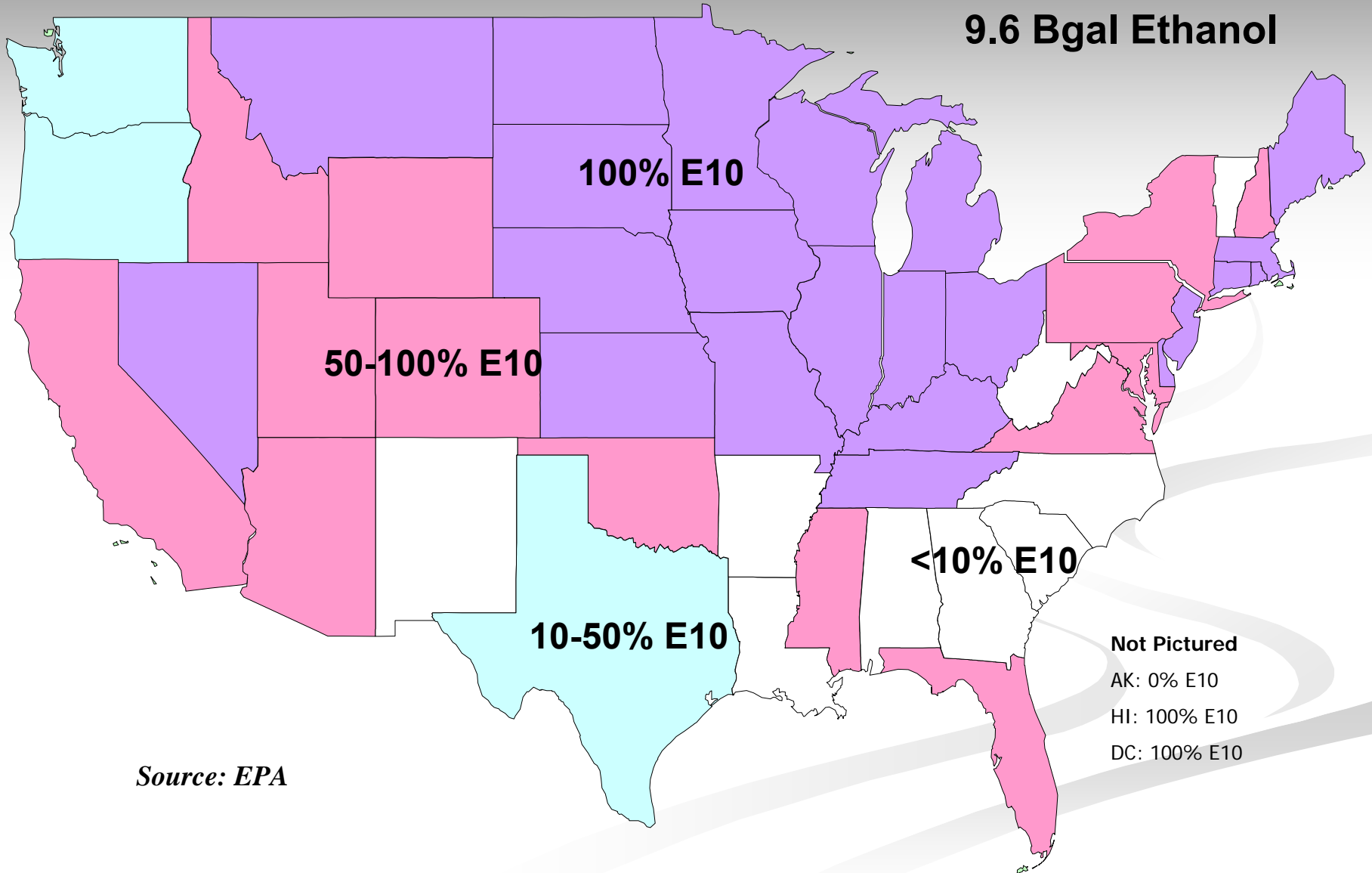
Estimated US Biodiesel Sales



What The Country May Look Like in 2009

- An RFS Scenario -

9.6 Bgal Ethanol



Source: EPA

Federal Roles

- Research and Development
- Regulatory
 - The Clean Air Act and EPA
 - The Energy Policy Act and EPA
- New Policies – Mandatory and Voluntary Approaches
 - Incentives, credits, flexibilities, grants, other
- International Activities and Coordination Efforts
- Communication



Office of Transportation and Air Quality

- Biofuels Responsibilities -

■ Regulatory

- Clean Air Act gives EPA authority in a number of areas:
 - Fuel quality standards, fuel and additive registration
 - Vehicle certification – Conventional, FFVs and AFV's



- Energy Policy Act EPA has authority to:
 - Implement the Renewable Fuel Standard (RFS)
 - Perform studies on the emissions impact of renewable fuels

■ Voluntary Programs

- SMART WAY Transportation Partnerships, National Clean Diesel Campaign and Grow and Go Programs



■ Research, Development & Analysis

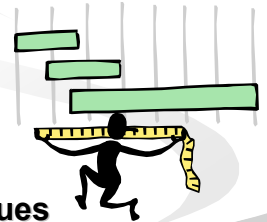
- Advanced Technology Development and Review (National Motor Vehicle and **Fuel** Lab in Ann Arbor Michigan)
- Analysis – Including life cycle assessment of renewable fuel and environmental and economic impacts of increased biofuel production
- Authorization for Grants for R & D and demonstration programs for production of cellulosic ethanol



The Final RFS: Flexible, Adaptable Program Design

- Signed on April 9th: Program Requires Growing Renewable Use from 4 BG / Year beginning in 2006 to 7.5 BG Year by 2012
- Major Compliance Element - Trading and Banking Provisions
 - Design supports maximum flexibility
 - Allows for compliance when, where and how it makes the most sense
 - Utilizes existing fuel program compliance mechanisms to greatest extent possible
- Renewable values based on volumetric energy content in comparison to corn ethanol (adjusted for renewable content)

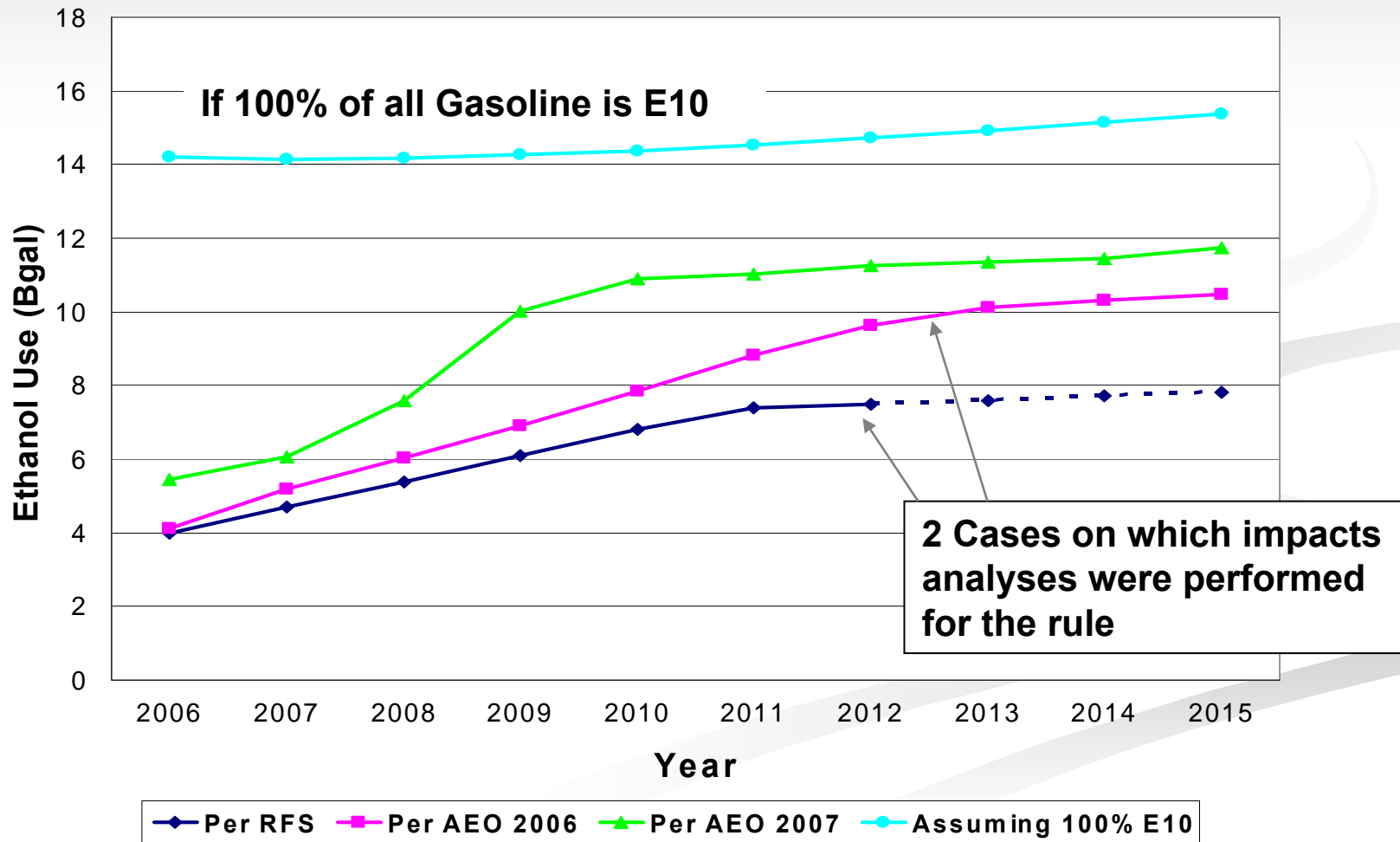
■ Corn-ethanol:	1.0
■ Cellulosic biomass ethanol:	2.5
■ As specified in EPCAct	
■ Biodiesel (alkyl esters):	1.5
■ Renewable diesel:	1.7
■ Biobutanol:	1.3
- Sought comment on life cycle energy, petroleum, GHG emissions
- Values can be adjusted in the future if metrics change
 - Provisions already in the regulations for adding new fuels and modifying existing values
- Program Starts September 1, 2007



Projected Renewable Use

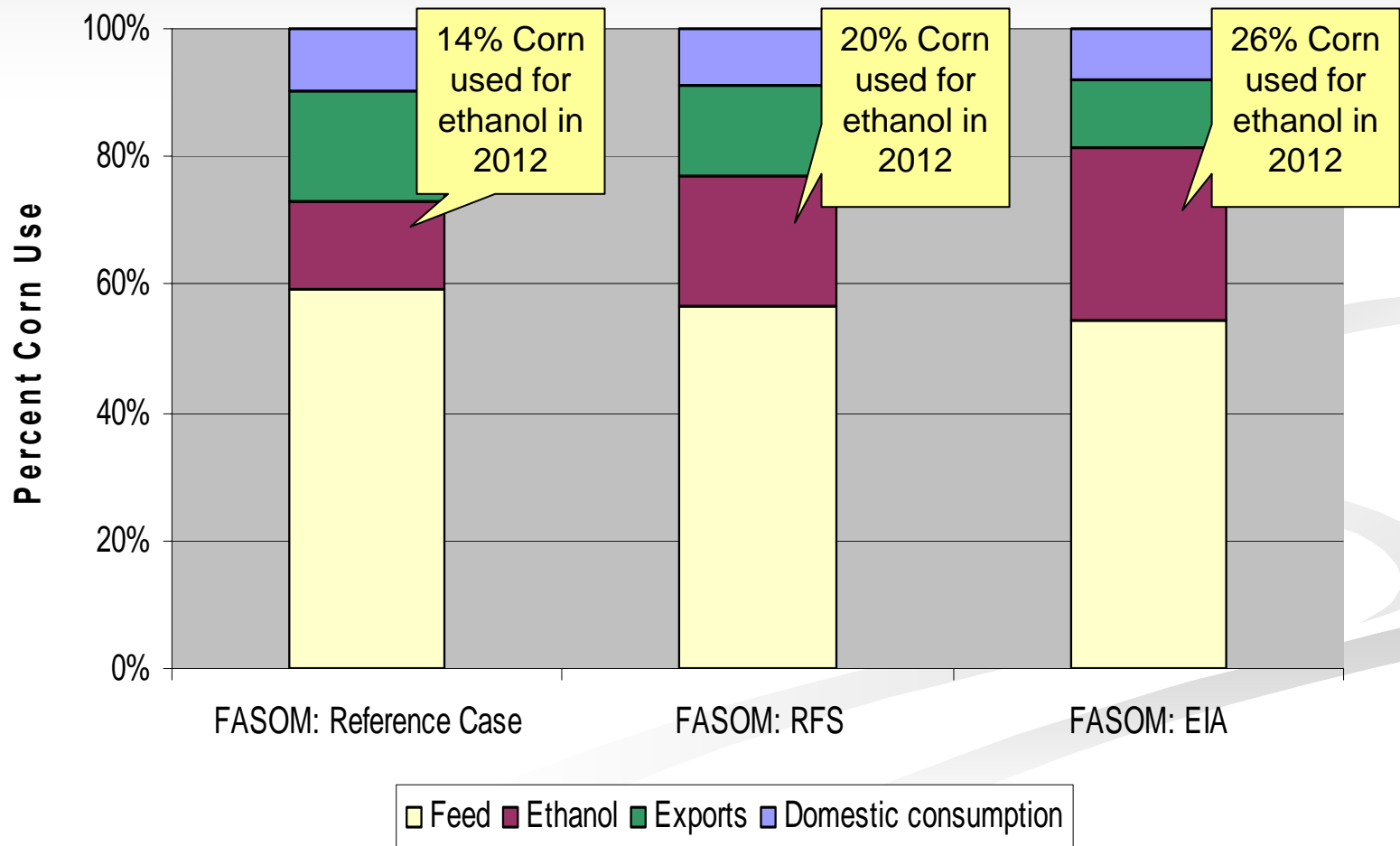


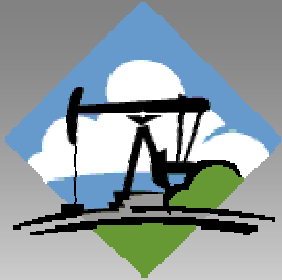
- RFS program standard provides important foundation for ongoing investments
- Demand for renewable fuels are projected to outpace the RFS requirements
- Unclear what impacts new policies may have on altering national fuels landscape



More U.S. Corn is Used for Ethanol Production

Corn Use in 2012





The RFS - Energy & Environment – An Air Quality Snapshot -

	Nationwide
CO	↓
Benzene	↓
NO _x + VOC	↑
Ozone	Slight Increases on National Average Basis

NOTE: Impacts will vary by region since renewable fuel use varies

2004 Base Reference Year

Incremental Impacts From Base Reference Year to 2012 Cases

Lifecycle GHG Analysis

- Used the Greenhouse Gases, Regulated Emissions, and Energy use in Transportation (GREET) model developed by Argonne National Laboratory
- Analysis represented marginal fuel production e.g., new fuel required to meet requirements
- Focused on corn ethanol and biodiesel (majority of the fuels used to meet the mandate)
- Used data from the rule cost / agricultural sector modeling as inputs to the lifecycle work
 - Ethanol and biodiesel production energy use
 - Land use change acres
 - Mix of fuels used for biofuel production process energy

	Corn ethanol	Corn ethanol (biomass fuel)	Cellulosic ethanol	Imported ethanol	Biodiesel
GHG	21.8%	54.1%	90.9%	56.0%	67.7%

The use of 1 Btu of corn-ethanol instead of 1 Btu of gasoline reduces lifecycle GHG emissions by 21.8%

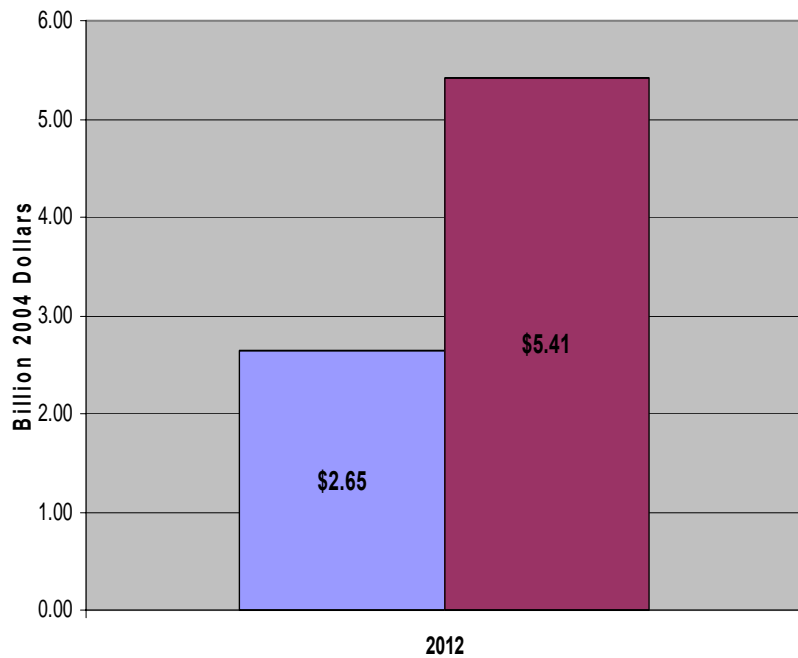


Environmental Indicators Examined in Agricultural Sector

	Nationwide
Nitrogen	↑
Phosphorous	↑
CRP Lands	↓

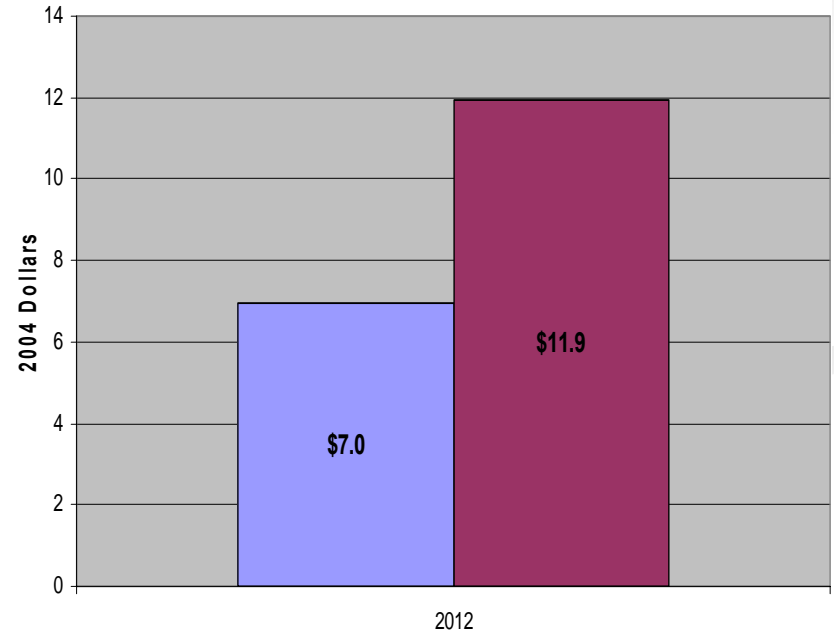
- Modest increase in fertilizer use; U.S. nitrogen use increases by less than 2% and U.S. phosphorous use increases by about 1%
- CRP withdrawals of 2.3 - 2.5 million acres; total CRP lands today are roughly 39 million acres
- In time frame of rulemaking, not enough time to look at other agricultural sector environmental impacts

U.S. Farm Income Increases While Food Costs Increase Modestly



FASOM RFS FASOM EIA

Change in Net Farm Income in 2012

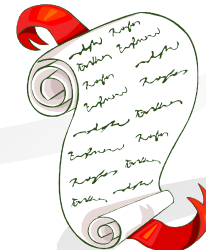


FASOM RFS FASOM EIA

Increase in Annual Food Costs Per Person in 2012

State of the Union 2007

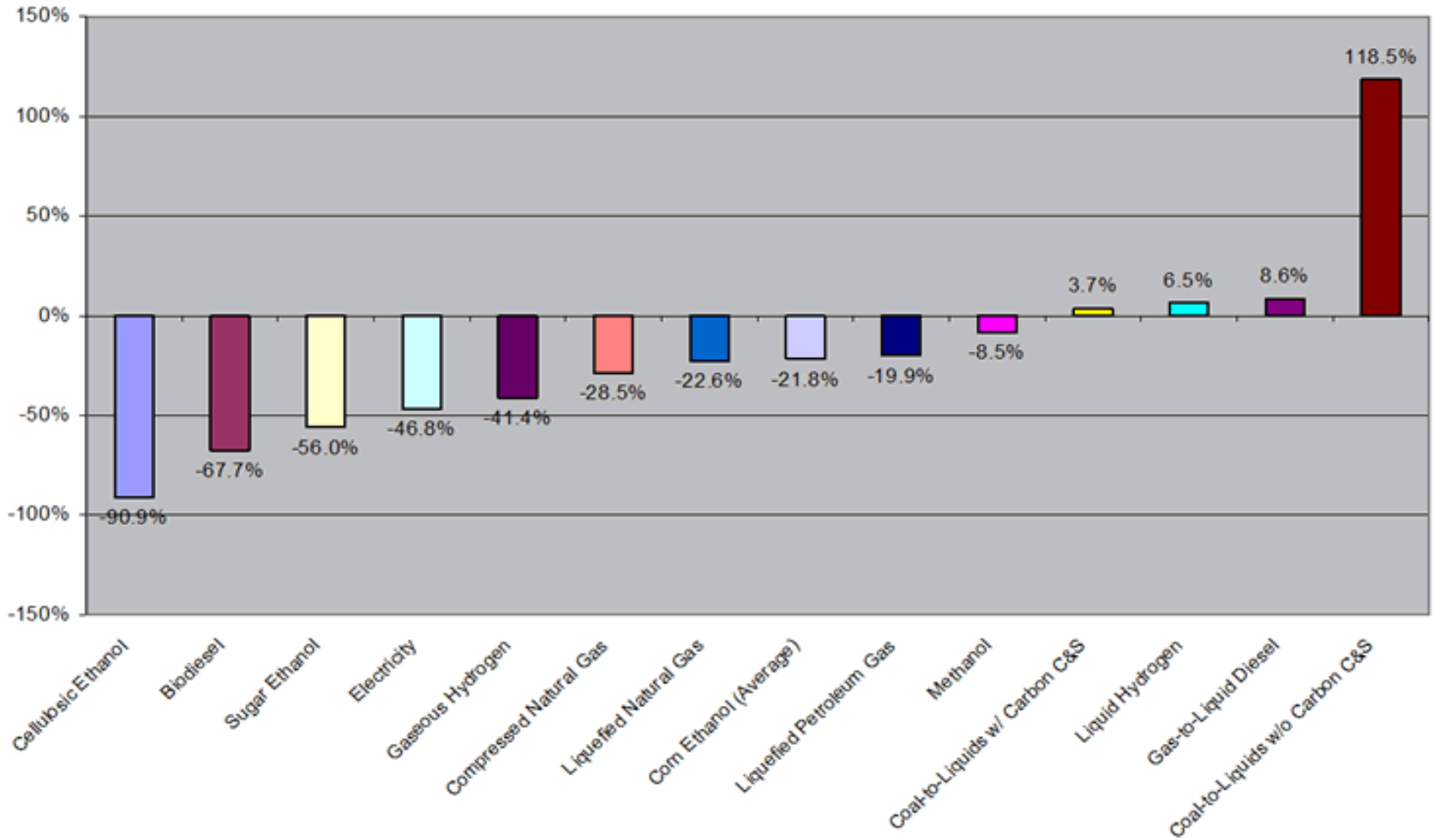
- The President called for a commitment to reduce petroleum-based gasoline consumption by 15% by 2017 through renewable plus alternative fuels
- 15% reduction in 2017 translates into a target of ~35B gallons of renewable plus alternative fuel use in transportation system
- To reach goal, must consider several issues:
 - Available fuel feedstock sources
 - Production and Fueling infrastructure
 - Appropriate fuels and fuel blends
 - Impacts / Other
- NEW POLICY
 - Alternative Fuels Standard – President Sent New Legislation to Congress
 - Senator Inhofe Introduced Administrations Legislation Last Week
 - Biofuels for Energy Security Act of 2007 – Senators Domenici and Bingaman
 - Advance Clean Fuels Act of 2007 – Senator Boxer
 - Other.....



Emissions Overview

The background features several thick, light gray wavy lines that flow from the bottom right towards the center, creating a sense of movement and depth.

Percent Change in GHG Emissions

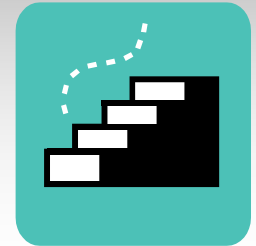


Source: EPA

This chart represents best available information about current or projected production practices and the impact of those practices on lifecycle greenhouse gas emissions. The numbers presented for renewable fuels were used in the analysis of the Agency's Renewable Fuel Standard rulemaking. EPA along with other Federal agencies and stakeholders are committed to continuing to improve lifecycle analysis techniques.

Next Steps

- **NEW POLICIES → New Regulations?**
 - **Alternative Fuels Standard and Beyond**
- **Evolve AFS program from foundation set by current RFS**
- **EPA to continue technical and regulatory expertise to assist policy makers to implement goals while protecting the environment**
- **International Efforts**
 - **Standardization?**
 - **Cooperative Arrangements**



Web page and Links: <http://www.epa.gov/otaq/>

Paul Argyropoulos

Email: argyropoulos.paul@epa.gov

Phone: 202-564-1123

