
Comments on the Paper by de Gorter and Just

American Tax Policy Institute Conference on U.S.
Energy Policy

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My Key Thoughts on the Paper

- Value of ξ
 - Per-mile greenhouse gas emissions of biofuels vs. gasoline
- Role of tax incentive in addition to motivating production
 - Mandate alone may not provide enough certainty for fuel producers
- Other ways to value externalities:
 - Cap-and-Trade / Carbon Tax
 - Low-Carbon Fuel Standard

What are the Environmental Externalities of Ethanol?

Per-Mile Greenhouse Gas Emissions

$$\xi_E = 0.8 \times \xi_G$$

$$\xi_E = 0$$

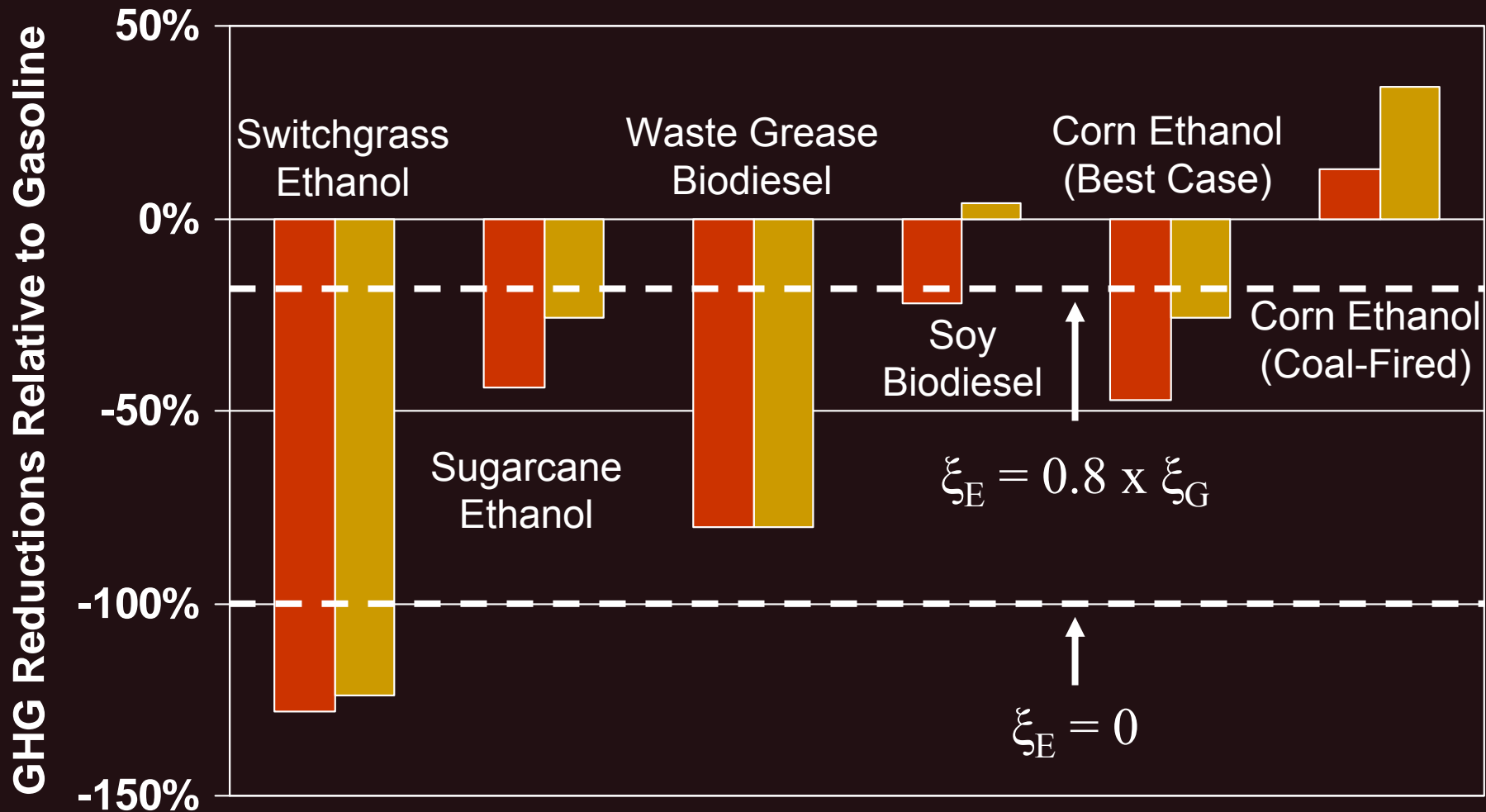
$$\xi_E = ?$$

Lifecycle Emissions

- Estimates vary widely
 - Land use effects very difficult to estimate
- Corn Ethanol: 20% reduction (relative to gasoline) to 90% increase
- Cellulosic Ethanol: 70% reduction to 50% increase
 - Sources: Delucchi, UC Davis; Searchinger, Princeton

Assumptions Drive the Analysis

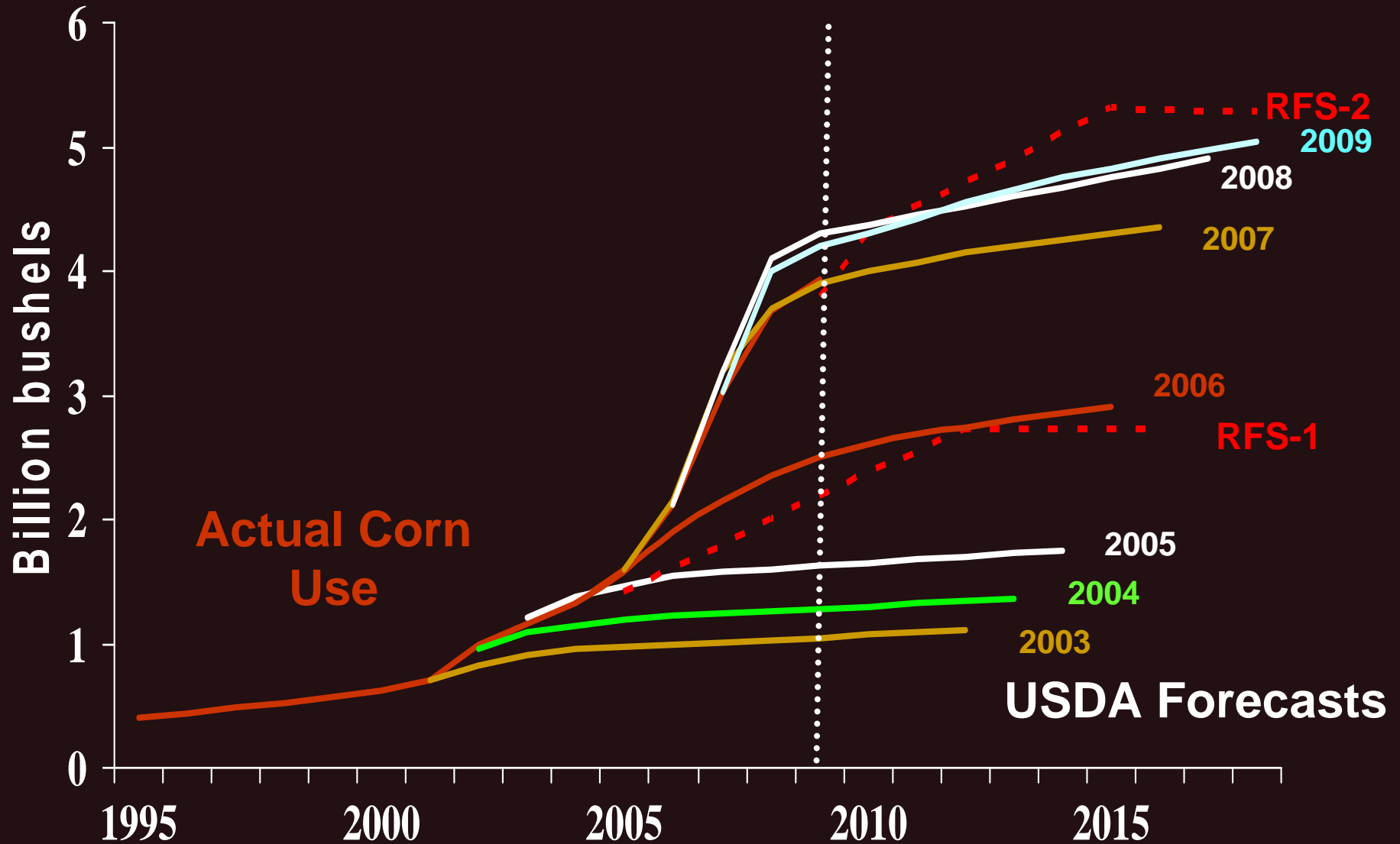
Lifecycle Emissions



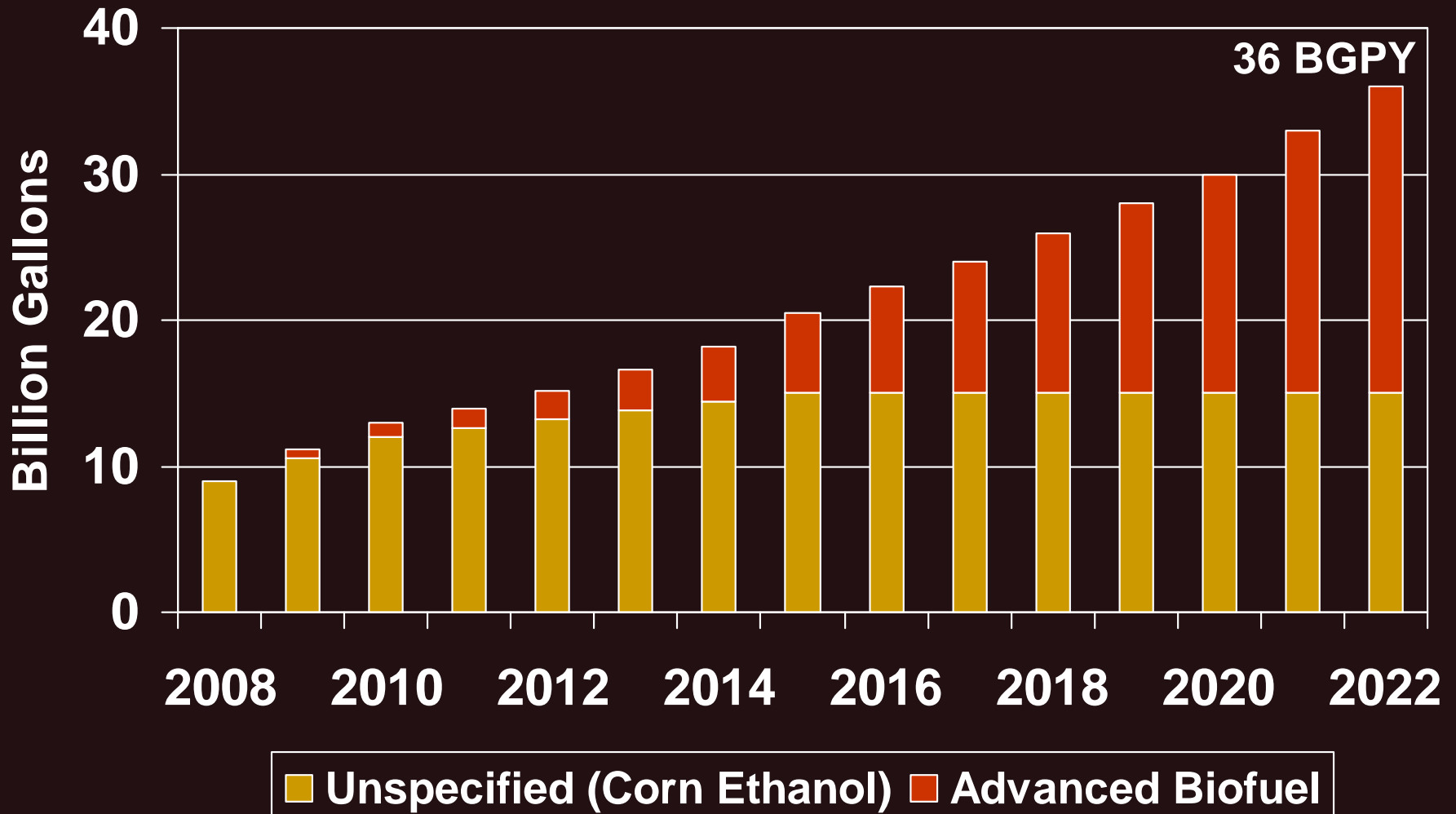
Myriad of Incentives Provide More Certainty Than Mandate Alone

- Tax incentives have been extended for decades
 - Renewable Fuel Standard grants EPA Administrator with waiver authority
 - What is the likelihood of a waiver?
 - Look at mandate for cellulosic fuels
 - History of other mandates, e.g., California Zero Emission Vehicle (ZEV) mandate
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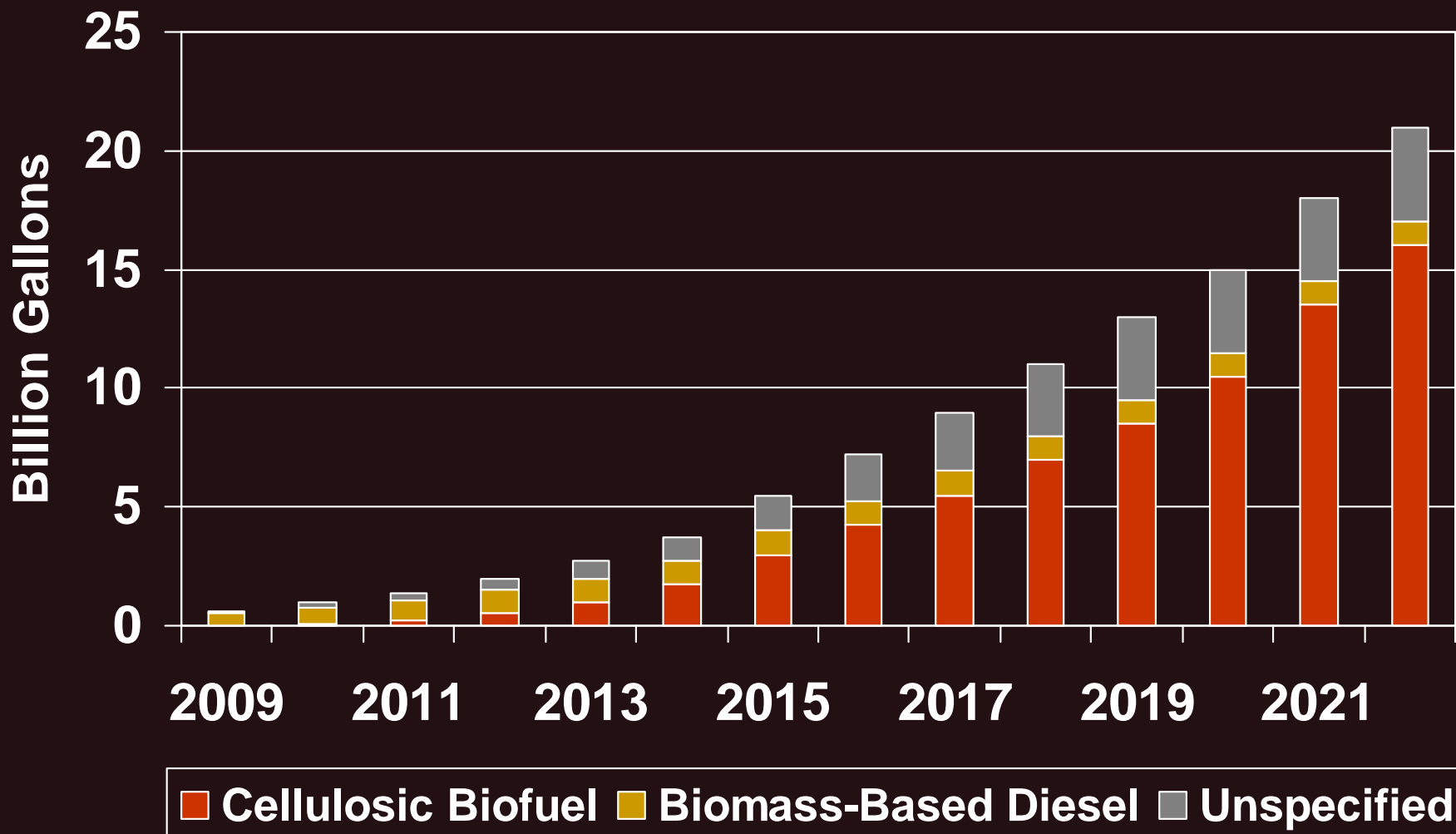
U.S. Corn-Use for Ethanol: Actual & Projected



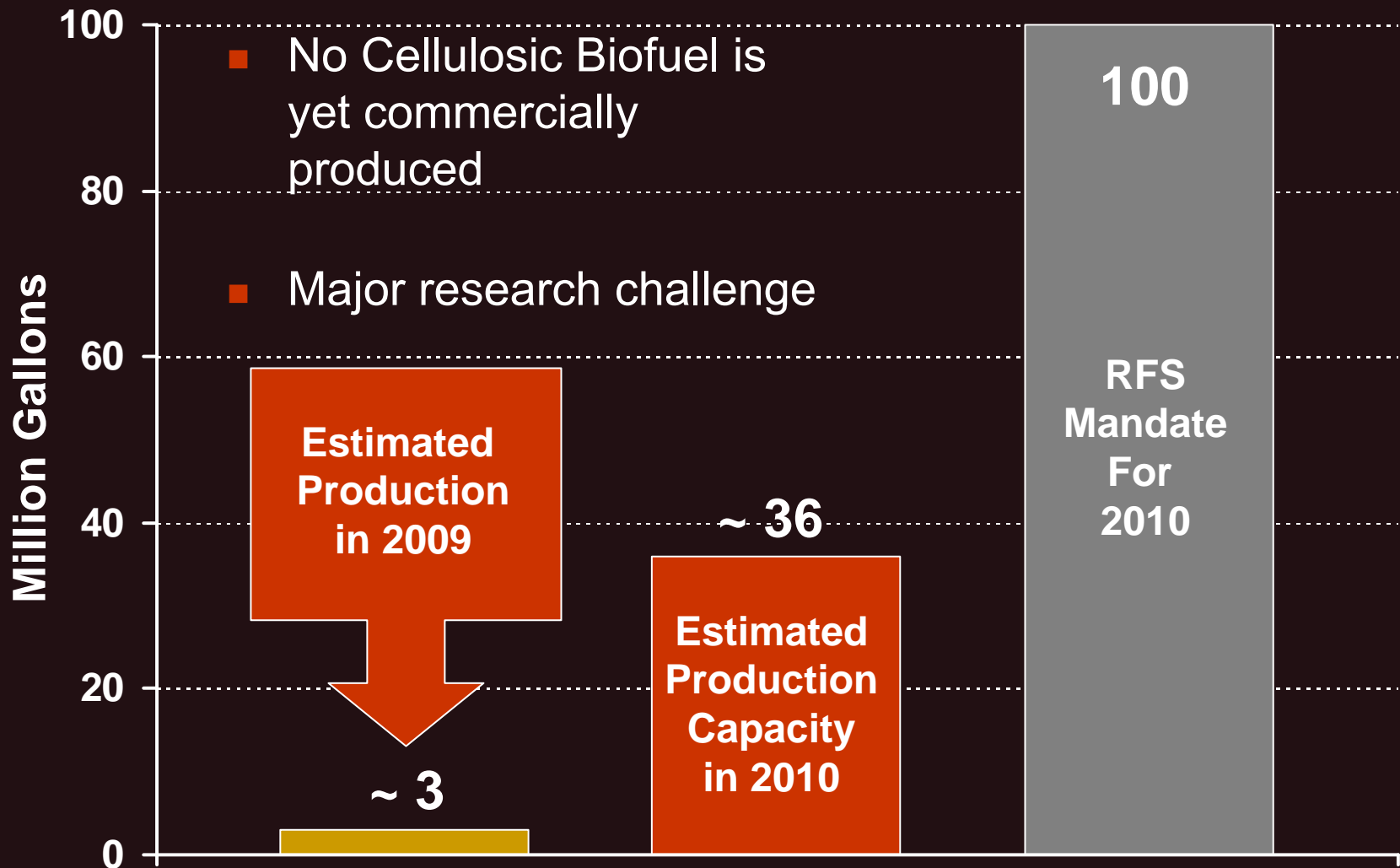
Expanded RFS Under EISA



“Advanced Biofuel” Mandate Under RFS



Cellulosic Biofuel RFS for 2010



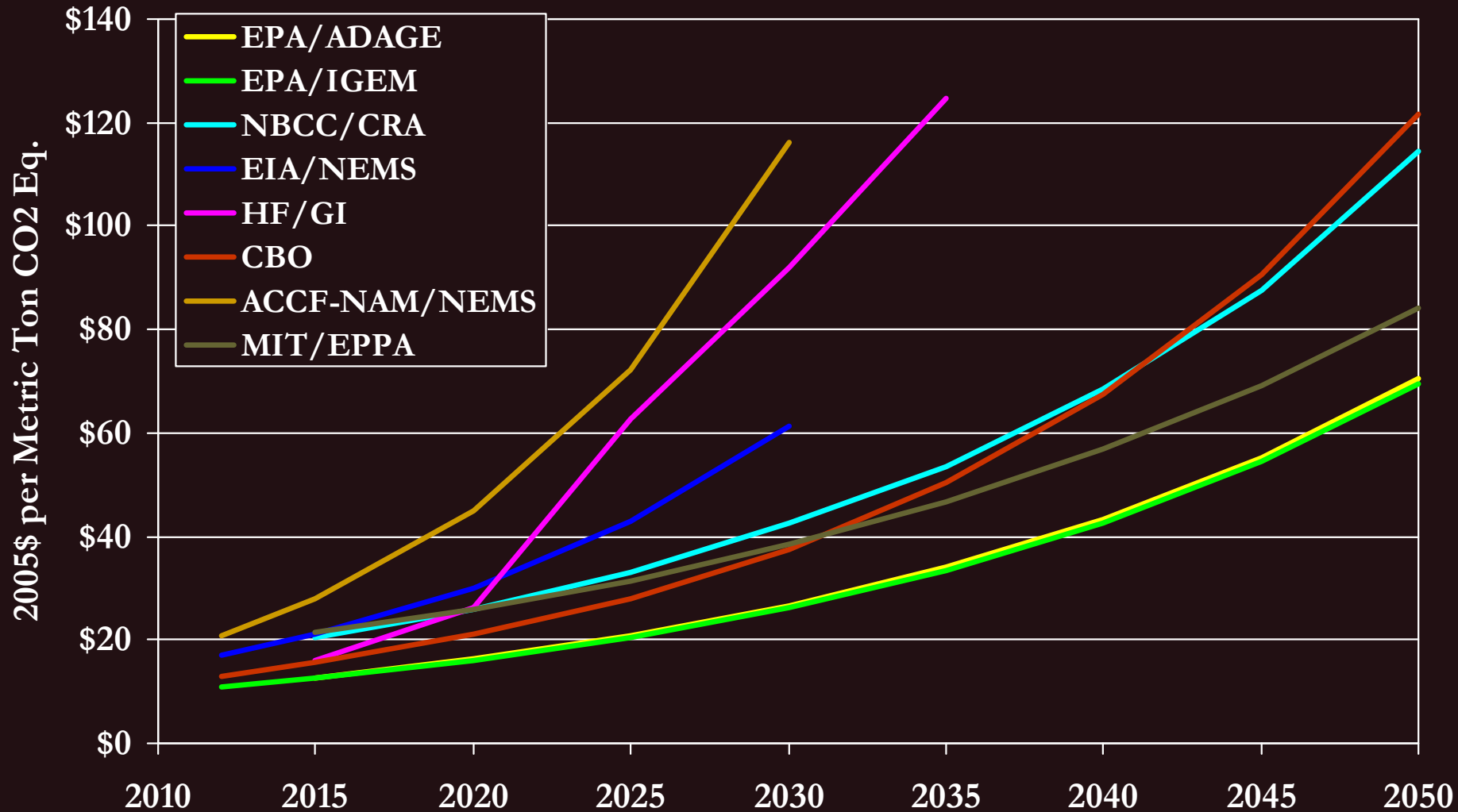
Key Policy Proposals

- Cap-and-trade or carbon tax to reduce greenhouse gas emissions
 - Cap-and-trade is preferred approach of Obama Administration, key Congressional leaders
 - Low Carbon Fuel Standard (LCFS)
 - Proposed California Regulation
 - Proposed national standard (e.g., Waxman-Markey draft)
 - Likely a major impetus for expanded use of biofuels
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Cap-and-Trade Legislation

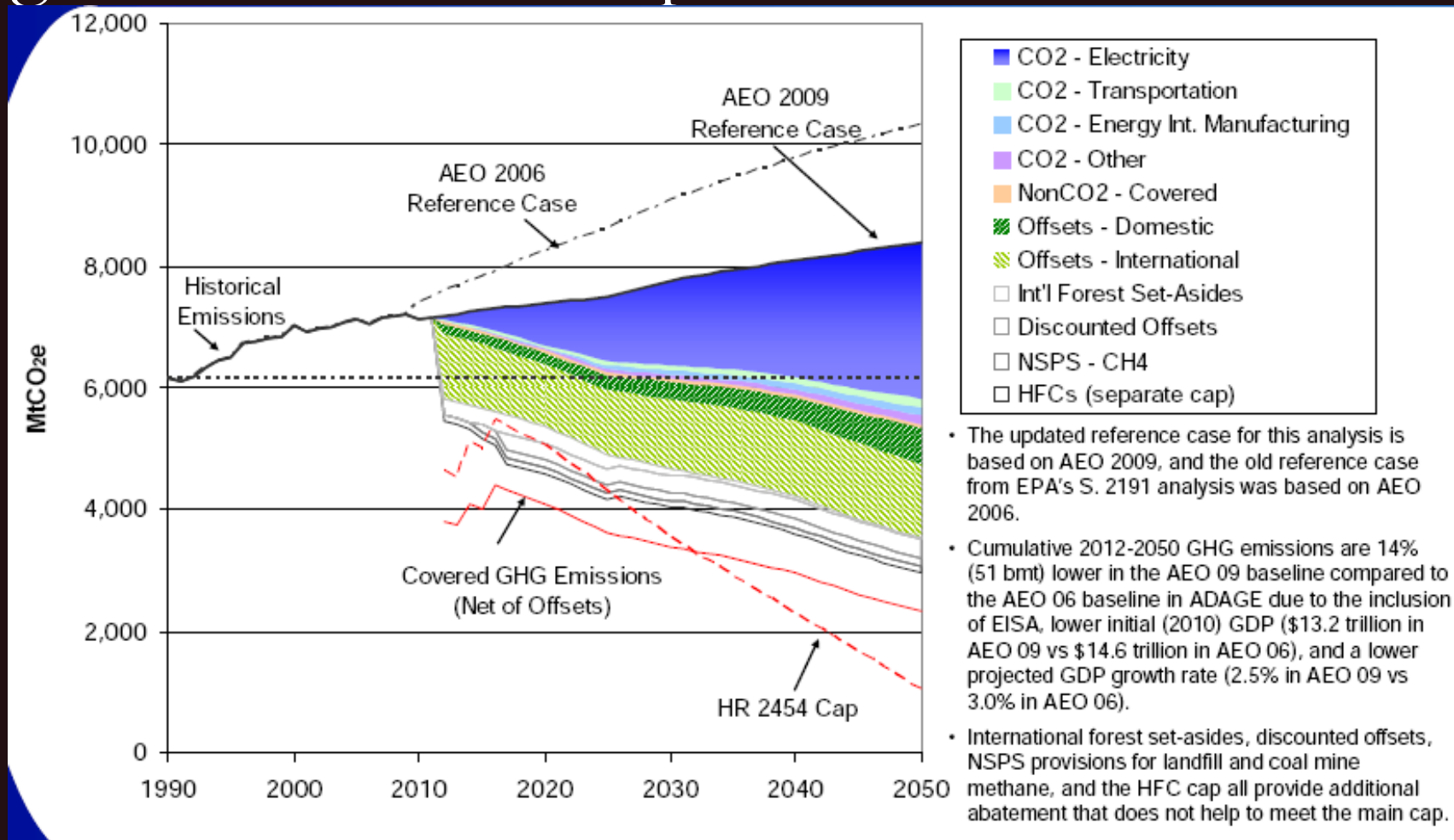
- Preferred approach of Obama Administration, key Members of Congress
- General approach of most 111th Congress proposals
 - But carbon tax—or a price collar—is still of interest to many members
- Could be a key opportunity for biofuels
 - But potential pitfalls (e.g., lifecycle assessment, competition for acreage) could limit biofuels' role

Range of Allowance Price Estimates for Waxman-Markey



Source: CRS Report R40809, Climate Change: Costs and Benefits of the Cap-and-Trade Provisions of H.R. 2454

“Not politically feasible to raise the gasoline tax to its optimal level...”



U.S. EPA, EPA Analysis of the American Clean Energy and Security Act of 2009, June 23, 2009. http://www.epa.gov/climatechange/economics/pdfs/HR2454_Analysis.pdf

Low Carbon Fuel Standard

- Pursuant to Gov. Schwarzenegger's Executive Order and A.B. 32, California is working to establish a low-carbon fuel standard (LCFS)
 - 10% reduction in fuel carbon content by 2020 from baseline
 - i.e., in addition to current biofuel use
 - There is interest in similar legislation at the federal level
 - Various proposals in the 110th Congress, including as part of the Lieberman-Warner climate bill
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Determinations on Lifecycle Emissions Will Directly Affect Supply/Demand of Low-Carbon Fuel

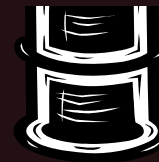
- Transport fuel consumption in 2025
 - Roughly 200 billion gallons per year
 - 10% greenhouse gas reduction equivalent to displacing carbon in roughly 20 billion gallons of gasoline
 - But most biofuels (esp. ethanol) have lower energy content than petroleum fuels
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Low Carbon Fuel Standard (LCFS)

- Assuming a 90% lifecycle reduction from cellulosic ethanol, U.S. would need ~ 35 billion gallons by 2025
- Assuming only a 50% reduction, U.S. would need ~ 60 billion gallons



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Equivalent energy: 1 gallon ethanol (corn or cellulosic) ~ 2/3 gallon gasoline



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CO₂ Reduction: 1 gallon ethanol with 20% reduction ~ 1/8 gallon gasoline



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CO₂ Reduction: 1 gallon ethanol with 90% reduction ~ 1/2 gallon gasoline

An Additional Thought: Volumetric Tax Rates Could Further Distort Markets in Future

- Tax credits are per gallon
 - \$0.45 per gallon for corn ethanol
 - \$1.00 per gallon for biodiesel/renewable diesel
 - \$1.01 per gallon for cellulosic fuel
 - But the cellulosic credit does not vary by emissions reduction or energy content
 - Gasoline has roughly 50% more energy per gallon than ethanol
 - Diesel fuel has roughly 70% more energy
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Volumetric Tax Credit (cont.)

- Cellulosic tax credit works out to roughly:
 - \$1.53 per gasoline-equivalent gallon of cellulosic ethanol
 - \$0.90 per gasoline-equivalent gallon of cellulosic diesel
- Significant incentive to produce more gallons of a fuel with lower energy content
- And if the per-mile greenhouse gas (GHG) savings are equal for cellulosic ethanol and other options, then the subsidy per ton of GHGs reduced has also gone up

Thank you

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