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# Biofuels Lifecycle Analysis – A Congressional Perspective

American Chemical Society Briefing: How Do  
Biofuels Impact Greenhouse Gas Emissions?

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Brent Yacobucci

Specialist in Energy and Environmental Policy  
Congressional Research Service

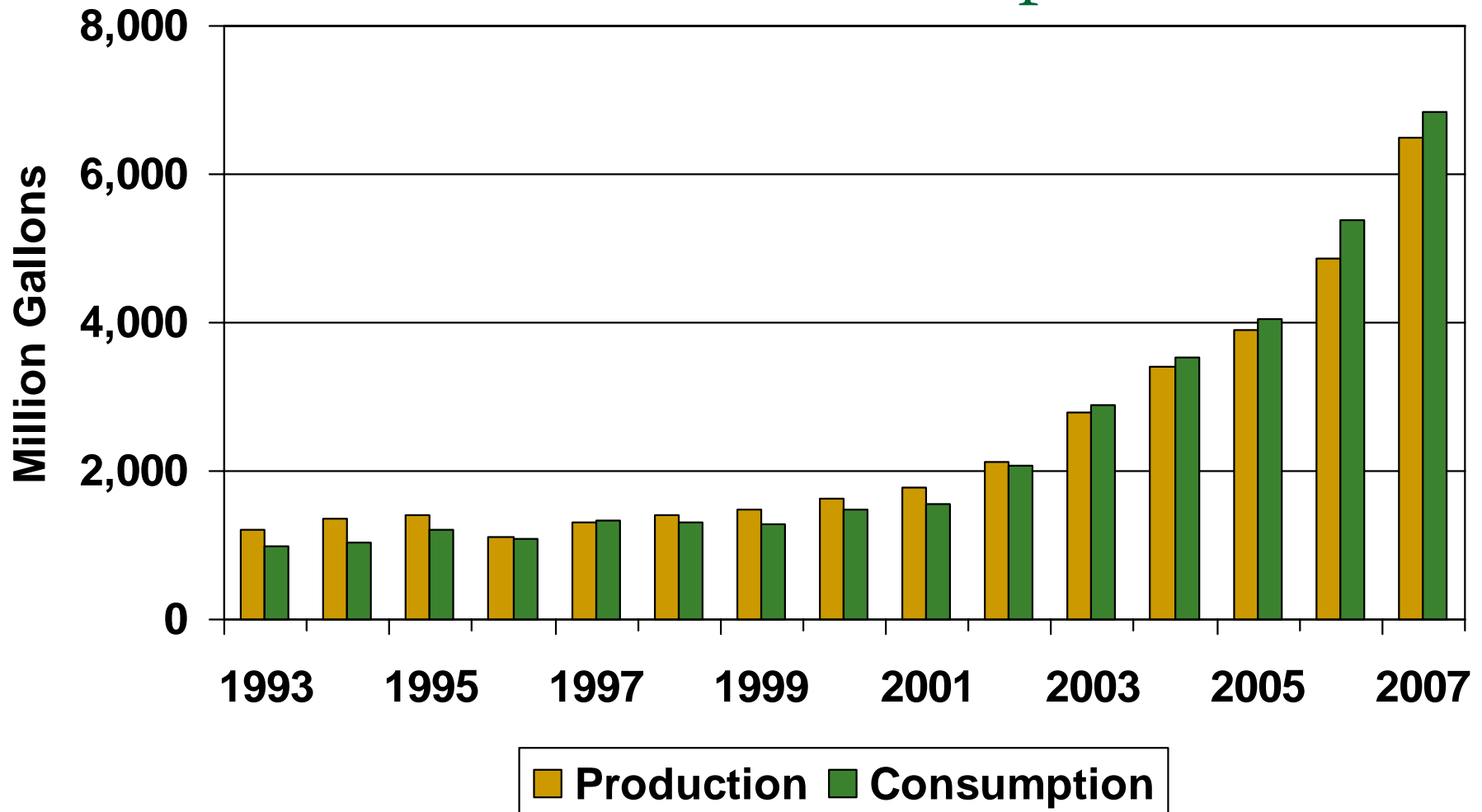
Washington, DC – August 1, 2008

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# Significant Growth in Annual U.S. Ethanol Production, Consumption

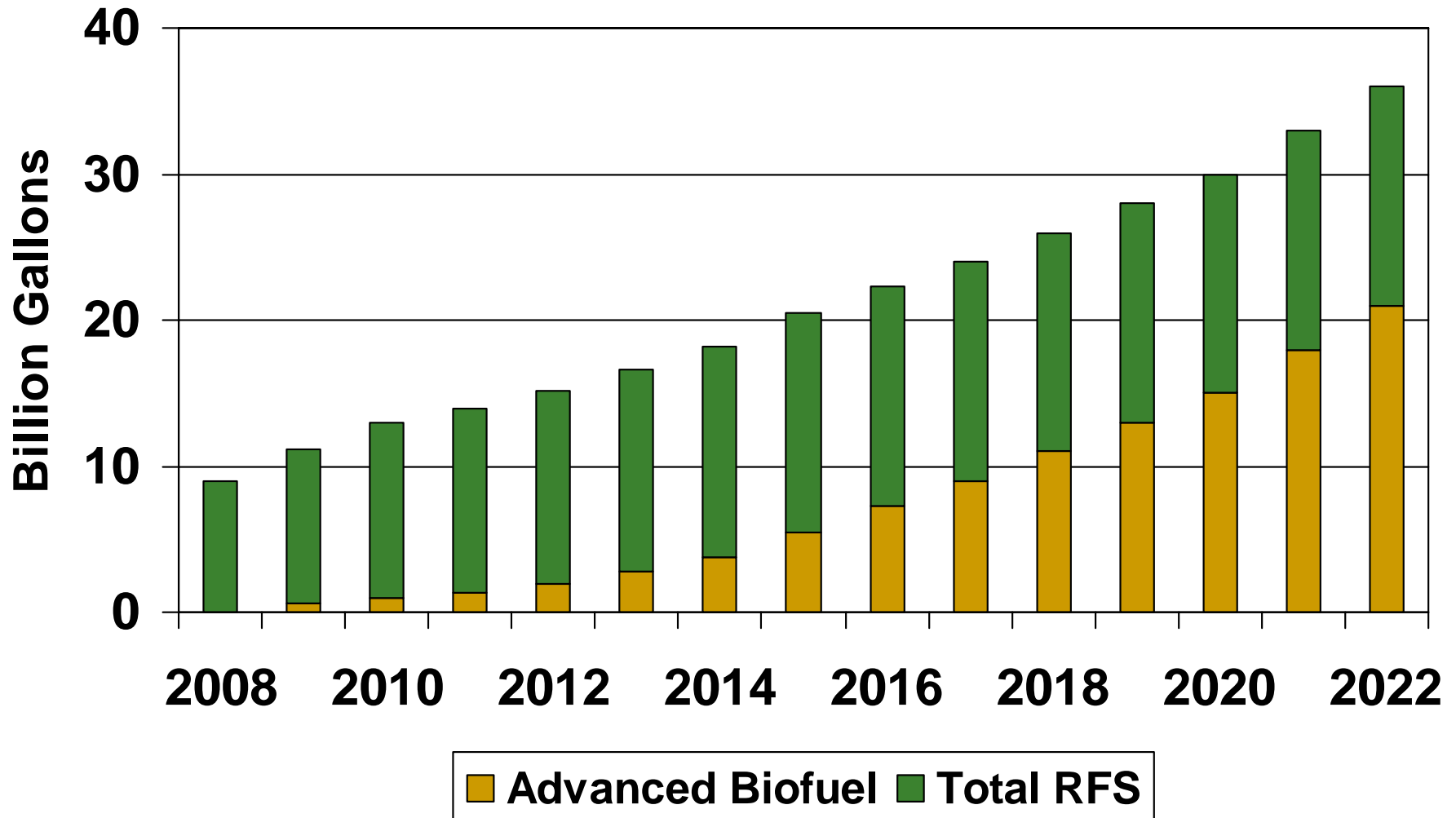


Sources: Federal Highway Administration; Renewable Fuels Association

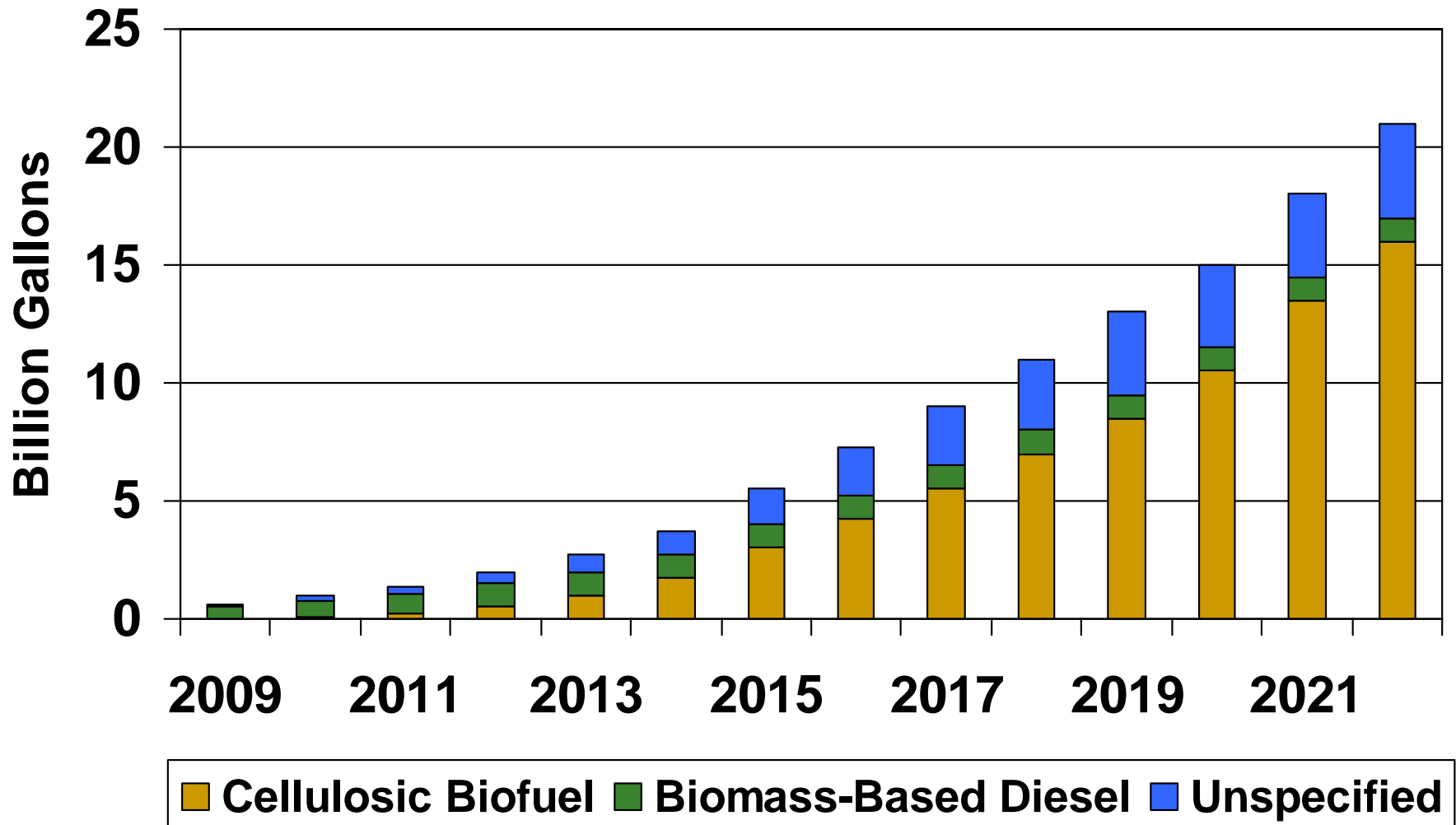
# Energy Independence and Security Act of 2007 (EISA, P.L. 110-140)

- Significant expansion of Renewable Fuel Standard (RFS) established in Energy Policy Act of 2005 (P.L. 109-58)
    - EPA required 5.4 B gal. in 2008, increasing to 7.5 B gal. in 2012
    - EISA requires 9.0 B gal. in 2008, increasing to 36 B gal. in 2022
    - Specific carve-outs for “advanced biofuels,” cellulosic ethanol, etc.
  - Under EISA, lifecycle greenhouse gas emissions of fuels and vehicles must be considered – specific reductions (relative to gasoline) include:
    - 20% reduction for conventional ethanol from new plants
    - 50% reduction for advanced biofuels
    - 60% reduction for cellulosic fuels
  - EPA has sole authority to determine actual reductions
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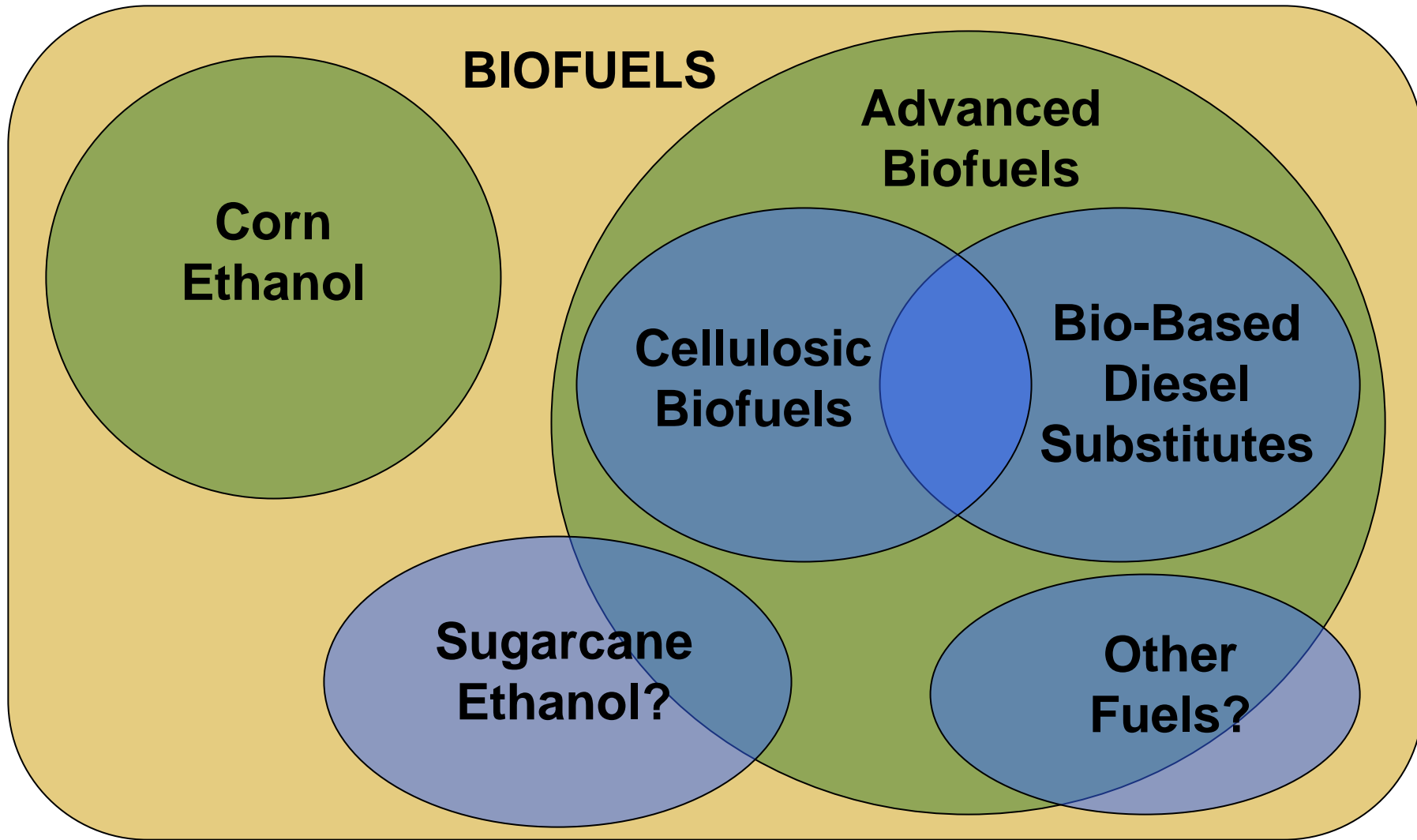
# Expanded RFS Under EISA



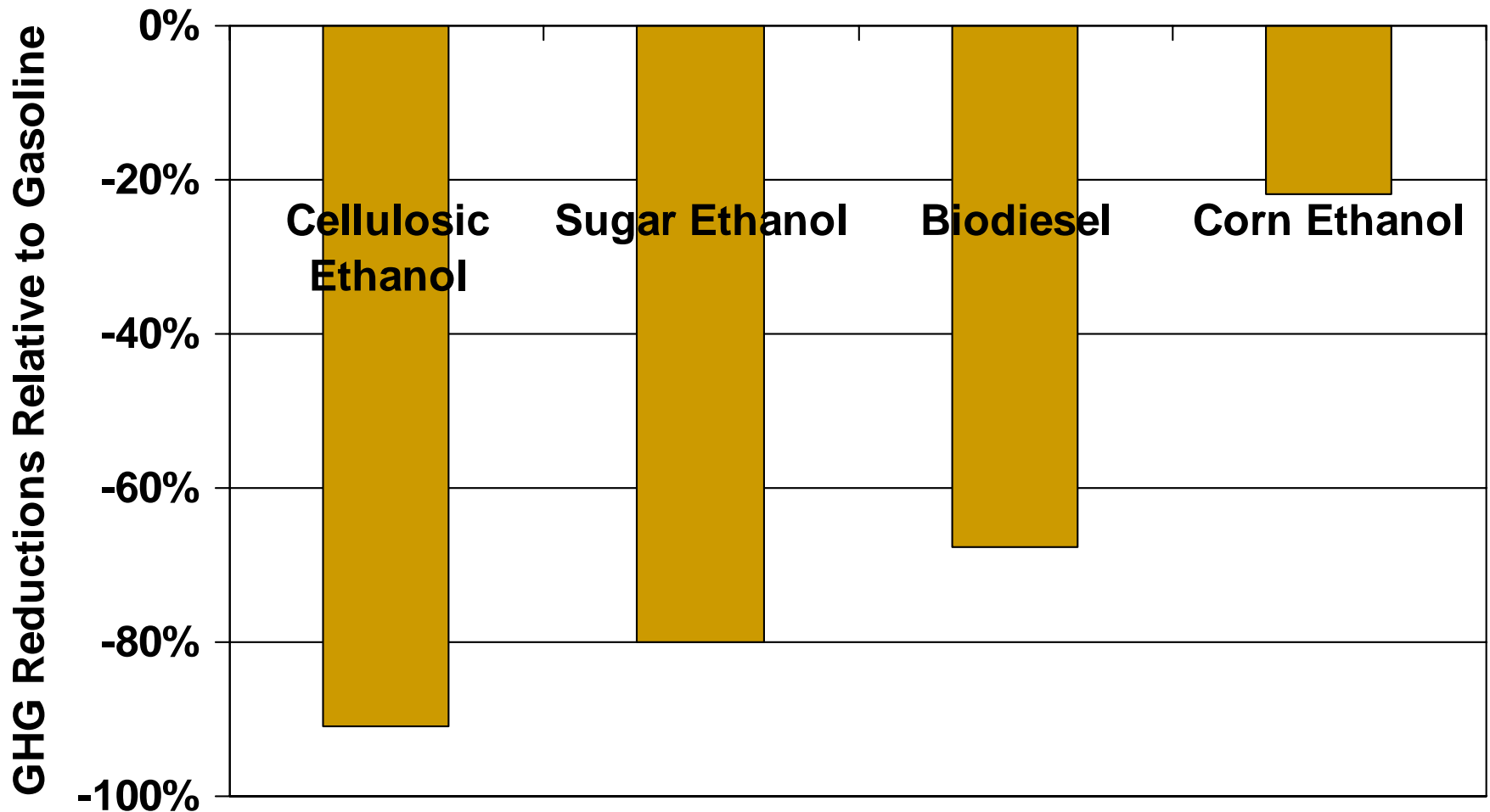
# “Advanced Biofuel” Mandate Under RFS



# Types of Biofuels



# Fuel-Cycle Emissions



U.S. EPA, *Greenhouse Gas Impacts of Expanded Renewable and Alternative Fuels Use*, April 2007. <http://epa.gov/otaq/renewablefuels/420f07035.htm>; Argonne National Lab

# 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***

# Cellulosic Biofuels

- Generally better environmental footprint than corn ethanol or soy diesel
  - Wider range of feedstocks
- Significant fuel cycle GHG reductions (up to ~90%)
  - Lifecycle reductions may be lower
- Industry is still in R&D stage
  - First commercial scale U.S. demonstration plants online 2009-2011, with significant government support
- Concerns over invasive species, etc.



# What Are the Policy Goals?

- Lower pollutant emissions?
  - Urban pollution?
  - Rural pollution?
- Lower GHG emissions?
- Better water quality?
- Improved soil quality?
- Reduced energy dependence?



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# There are *ALWAYS* Tradeoffs

## Factors

- Cost
- Greenhouse Gases
- Pollutant Emissions
- Runoff, Other Water Issues
- Petroleum Reductions
- Etc.

## Energy Alternatives

- Nuclear
- Wind
- Oil Shale, Tar Sands
- Biomass
- Solar
- Hydroelectric
- Etc.

What Tradeoffs Are We Willing to Accept?

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# Other Environmental Concerns

- Ethanol and other Biofuels can positively or negatively affect air quality
    - depends on specific fuels, vehicles, and local conditions
  - Potentially significant water concerns
    - runoff, water use
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# Conclusion

- There are no “Silver Bullets”
  - All alternatives lead to tradeoffs
    - Environmental, Social, Economic
  - Decisions must weigh these tradeoffs – Corn ethanol:
    - displaces petroleum (good for security)
    - raises corn demand (good for corn farmers, bad for food prices)
    - may raise or lower greenhouse gases
    - may raise or lower pollutant emissions
    - may affect water supply and quality
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Thank you

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[byacobucci@crs.loc.gov](mailto:byacobucci@crs.loc.gov)