

EPA's GHG Rule



Presentation for DOE Biomass R&D
Technical Advisory Committee

November 27, 2007



Presentation Overview

- **EPA Fuels Program Responsibilities**
- **Impetus for GHG Rulemaking**
- **Rulemaking Process and Timeline**
- **Inputs, Drivers, Considerations**
- **Data Gathering and Stakeholders**
- **Overall Approach/Analyses**
 - **Endangerment**
 - **Vehicles**
 - **Fuels**
- **Questions?**

EPA Fuels Program Responsibilities



- **Systems approach to controlling mobile source emissions from vehicles and fuels**
- **Focus on fuels and fuel additives – program development and oversight**
 - Conventional fuels (gasoline, diesel)
 - Reformulated fuels (gasoline)
 - Renewable Fuel Standard (RFS) program
 - New fuels programs (GHG, other)
- **State fuels**
 - State-mandated fuels for air quality (SIP fuels, boutique fuels)



Impetus: State of the Union

- In his 2007 State of the Union address, the President called for a reduction in gasoline consumption by 20% in 10 years (Twenty-in-Ten plan)
 - 15% reduction through renewable and alternative fuels; equivalent to ~35B gallons
 - 5% reduction through vehicle efficiency improvements; equivalent to ~4% per year



Impetus: Supreme Court Decision

- On April 2, the Supreme Court ruled that EPA must take action under the Clean Air Act regarding greenhouse gas emissions from motor vehicles (Mass. v. EPA).

- The decision had three elements:
 - Mass. and other states had standing to bring suit
 - Greenhouse gases are a pollutant under the CAA
 - EPA must use different criteria to base decision on whether or not to regulate



Impetus: Executive Order

- On May 14, the President signed an Executive Order directing EPA:
 - To develop regulations to respond to the Supreme Court's decision
 - To use our existing authority under the CAA
 - To utilize the Twenty-in-Ten proposal as a framework
 - To work together with other Agencies (DOE, USDA, NHTSA) in doing so



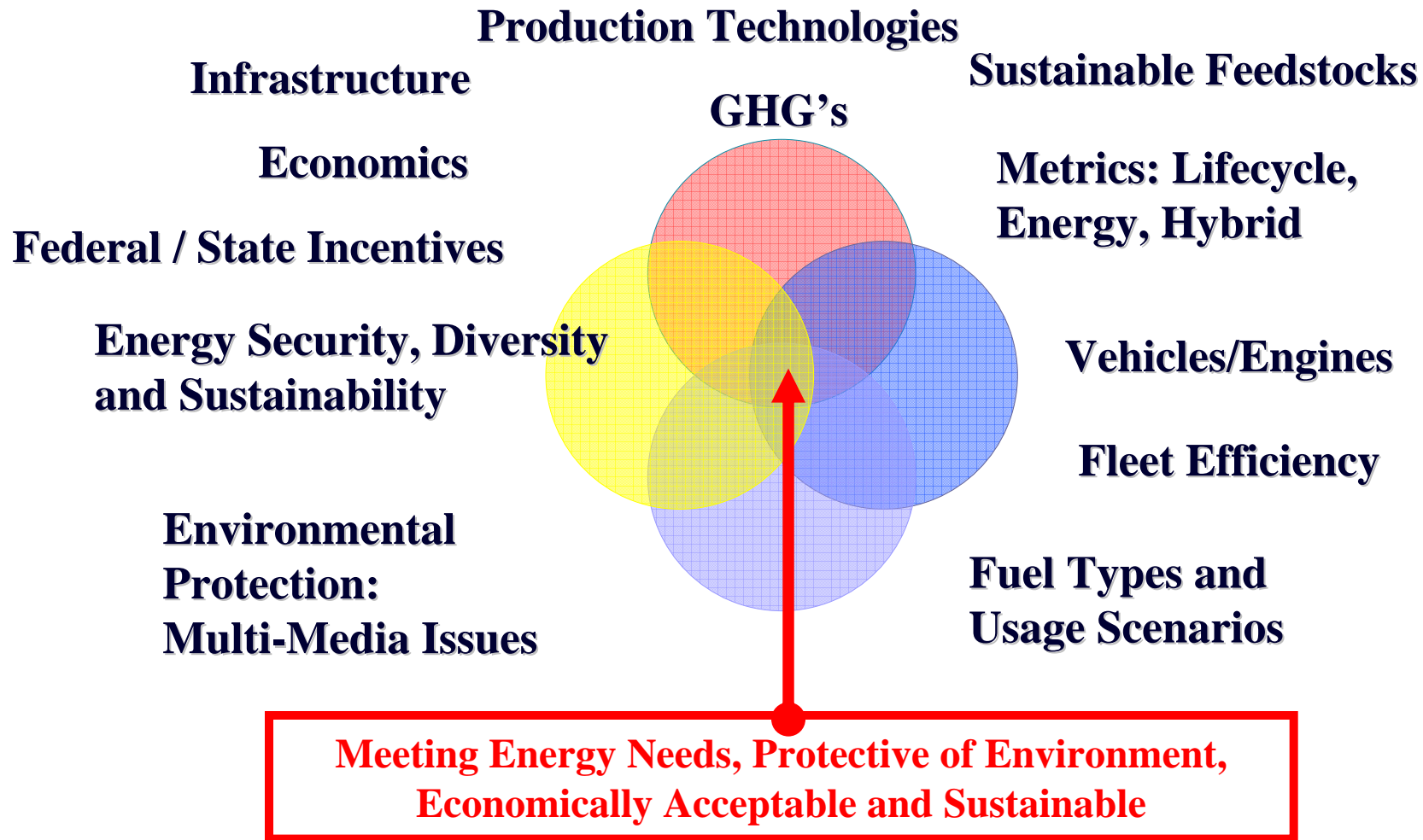
Process and Timeline for GHG Rule

- Looking at three major areas of work:
 - Endangerment finding
 - Vehicle regulations
 - Fuel regulations

- General process/consideration
 - Substantial dialogue and coordination with other Agencies (DOE, USDA, DOT, NHTSA, OMB)
 - Address both vehicles and fuels using a systems approach
 - When setting standards, need to consider
 - technology, cost, and lead time
 - safety, energy, benefits/impacts
 - flexible implementation mechanisms

- Schedule
 - Proposal by end of 2007
 - Final Rule by end of 2008

GHG Rulemaking Inputs





Data Gathering and Stakeholders

- Gathering input on key elements:
 - Form of standard
 - Trading & implementation mechanisms
 - Feasibility
 - Costs
 - Flexibilities
 - Timing; phase-ins
 - Safety

- Key stakeholders:
 - Oil companies
 - Renewable & alternative fuels industries, including coal and electricity
 - Fuel distributors
 - NGOs
 - States
 - Small refiners, small volume mfrs

Approach: Endangerment





Endangerment Finding

- Under CAA Section 202:
 - The Administrator shall by regulation prescribe standards applicable to the emission of any air pollutant(s) from motor vehicles, “which in his judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.”
- Endangerment finding is prerequisite to standard setting under statutory authority
- EPA will not be creating a new scientific assessment
- EPA will rely most heavily on recently published, consensus-based, peer-reviewed assessments and reports
 - IPCC Fourth Assessment Report, 2007
 - CCSP Synthesis and Assessment Products (as available)
 - National Academy of Sciences
- Timeframe will be consistent with effects of GHGs on climate (i.e., over next few decades and beyond to ~2100)

Approach: Vehicles





CAA Authority for Vehicles

- Again, primary authority to regulate motor vehicle emissions falls under Section 202(a)(1):
 - “The Administrator shall by regulation prescribe ...standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or motor vehicle engines which in his judgment cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare.”

- First EPA rule to regulate GHG emissions from cars and trucks

- EPA and NHTSA technical teams jointly evaluating potential vehicle technologies to reduce GHGs and improve fuel economy
 - Carefully assessing feasibility, lead time and costs



Vehicles: Key Analyses

- Scope
 - While CAA section 202 allows EPA to regulate other mobile sources such as heavy-duty or nonroad, current focus is on light-duty cars & trucks (incl. MDPVs)
- Program structure
 - Basis/form of standard
 - Credit trading & implementation mechanisms
- Technological feasibility assessment
 - Stringency
 - Safety
 - Lead-time
- Cost analysis
- Benefits analysis
- GHGs & air quality analysis
- Economic impact assessment



Possible CO2 Improvement Technologies

- Vehicles and accessories
 - Improved alternators, electrical & A/C systems and other accessories
 - Electric power steering
 - Improved low rolling resistance tires
 - Weight reducing material substitutions
 - Reduced aerodynamic vehicle drag, through design
- Engines
 - Reduced engine friction & improved lubricants
 - Variable valve timing and lift
 - Cylinder deactivation
 - Gasoline direct injection
 - Turbocharging with engine downsizing
 - Clean diesel technology
- Transmissions
 - 6-speed automatic
 - Automated manual “Dual Clutch” transmissions
- Hybrids (“micro,” “mild,” and “full”)

Approach: Fuels





CAA Authority for Fuels

- 211(c) allows EPA to set controls on fuels as a means for reducing emissions of an air pollutant that endangers public health or welfare

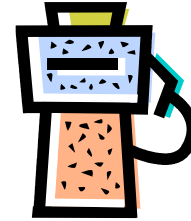
- 211(o) added by Energy Policy Act of 2005 would allow us to require greater volumes of renewable fuels, but by itself is limited in scope
 - Alternative fuels cannot be included
 - Higher volumes could not be specified prior to 2013
 - Several restrictions (e.g., 48 states, displace gasoline only)



Fuels: Key Analyses

- ❑ Basis/form of standard
- ❑ Trading & implementation mechanisms
- ❑ Lifecycle GHG and energy analysis
- ❑ Emissions inventories for criteria pollutants & GHGs
- ❑ Air quality analysis
- ❑ Benefits analysis
- ❑ Economic impacts
- ❑ Feasibility & costs
- ❑ Energy impacts, energy security
- ❑ Agricultural impacts
- ❑ Impacts on water quality, soil, pesticides, etc.

Fuels Rulemaking



- Rigorous analysis is warranted given volume goals
- 35 billion gallon feasibility
 - What are the potential fuel pathways for achieving 35 billion gallons?
 - What are the relative costs of these fuels?
 - What vehicle-fuel combinations may be needed?
 - How can these increased volumes be distributed? Will there be enough truck and rail capacity? How many E85 stations will be needed?
- Addressing issues identified in RFS, such as:
 - Lifecycle GHG model and assumptions
 - International impacts
 - Energy security assessment
- Air & water quality, and other factors relating to sustainability



Volume Feasibility & Costs

- Use available information from credible and public sources
- Evaluate values to estimate potential in 2017
- Add information based on additional discussions with experts
 - Held several meetings with DOE/USDA, agricultural sector consultations (Iowa State, etc.), and industry
- Analysis primarily focusing on:
 - Ethanol from U.S. corn and cellulose, and ethanol imports
 - Biodiesel/renewable diesel
 - CTL/CBTL with carbon capture and storage
- Evaluating on basis of:
 - Feedstock supply
 - Production capacity
 - Distribution and use capacity (incl. E85 infrastructure)
 - Costs (capital costs, fuel costs, corn ethanol, cellulosic, etc.)
 - Lead-time; refining modeling
- Best estimate for each of the primary fuel options
 - Input from DOE, USDA, industry before picking primary volume scenario for NPRM analysis

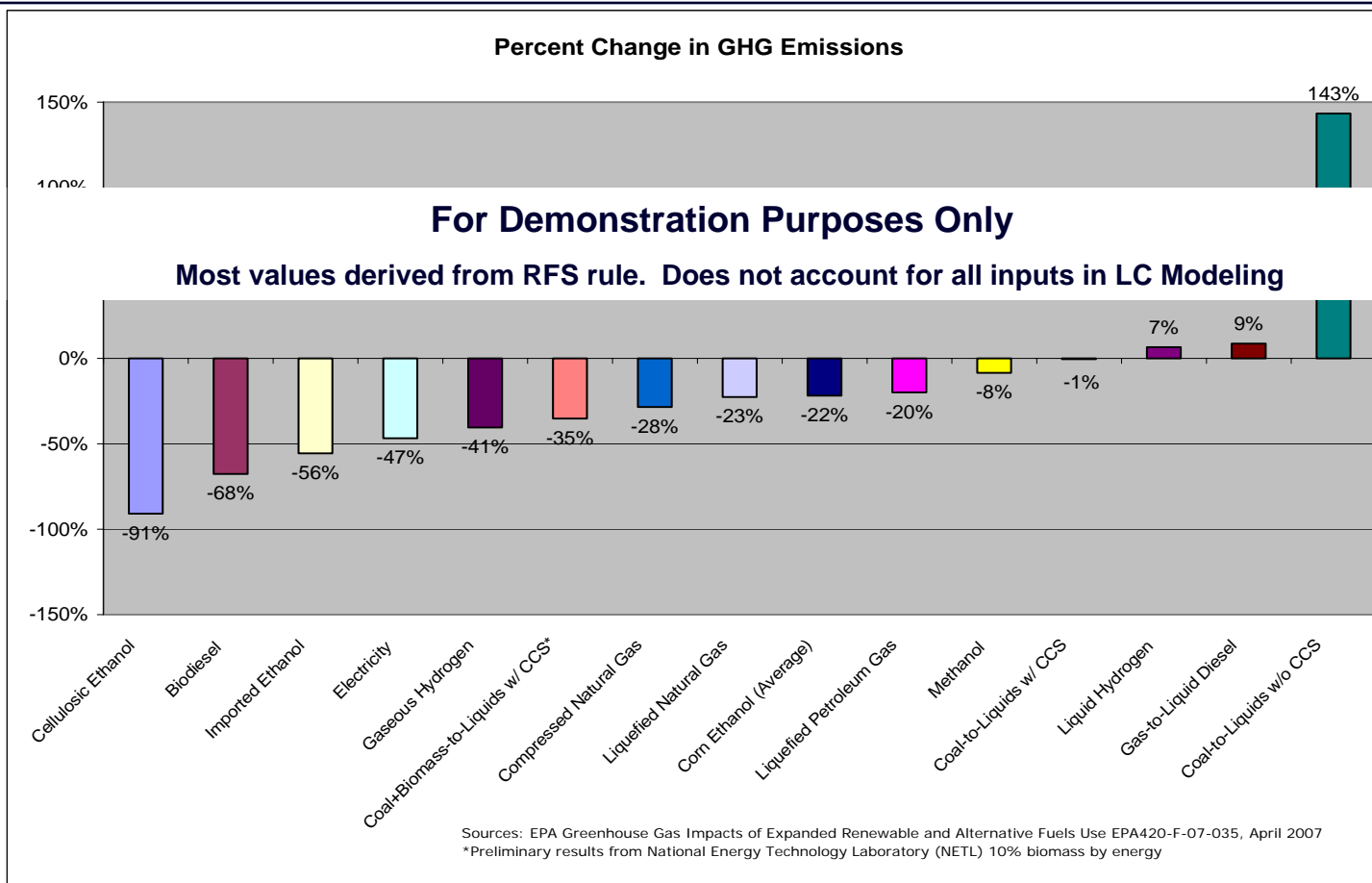


Fuel Volumes: A Key Issue for Energy and Environmental Goals

- When? Where? How?
 - E10 blends – full saturation of gasoline market at E10 level in 2017 will use ~ 15 billion gallons of ethanol
 - Increased use of E85 will play a role
 - Volume use limited by number of FFV's in 2017 and possibly by number of fueling stations

- Investigating mid-level ethanol blends such as E15 and E20 for opportunity for additional market penetration of ethanol
 - Requires extensive testing and EPA approval

Differentiating Between Fuels on a GHG Basis



Comparison Based on Baseline Product Being Replaced – Gasoline or Diesel



Co-Pollutant Emission Inventories

- Downstream: Quantifying emission impacts on gasoline on-road and off-road sources
 - PM_{2.5}, VOC, NO_x, CO, Toxics

- Upstream: Quantifying emission impacts of fuel changes on upstream processes
 - Reductions in gasoline fuel cycle emissions due to reduced demand
 - Emission impact of increased renewable/biofuels on agriculture, production, feedstock and fuel transportation



Co-Pollutant Air Quality Modeling

- Qualitative discussion of ambient air quality impacts for proposal
- Full-scale air quality modeling for the final rule
 - Using CMAQ
- Health impacts and monetized benefits/disbenefits for final rule
 - Ambient ozone and $PM_{2.5}$

Agricultural Sector Impacts



- Domestic impacts:
 - Evaluating key indicators used in the RFS
 - E.g. Commodity prices, land use changes, food prices, exports
 - For final rule, hope to evaluate impacts on water quality, water usage, soil erosion, and other environmental indicators
 - Using Texas A&M's U.S. Forest and Agricultural Sector Optimization Model (FASOM) to analyze domestic impacts
- International impacts:
 - Evaluating implications in the international agriculture & fuels market
 - E.g. international livestock, grains, oilseeds, and sugar trade, prices, and physical flows
 - Plan to use Center for Agricultural & Rural Development (CARD) suite of econometric models to analyze international production, consumption,²⁵ ending stocks and net trade

Energy Security



- U.S. energy security is broadly defined as protecting the U.S. economy against circumstances that threaten significant short- and long-term increases in energy costs
 - Most discussion revolves around the economic costs of U.S. dependence on oil imports
- Objective: To develop quantified estimates of the benefits of energy security due to reduced dependence upon foreign oil
 - Through diversification of transportation fuels and better fuel economy, the U.S. expects to import less oil
- EPA is using the Oak Ridge National Laboratory report, “Estimating the Energy Security Benefits of Reduced U.S. Oil Imports” (ORNL/TM-2007/028, March 2007)
 - Same report used to support analysis for the RFS
 - ORNL updating its report based on peer review comments
 - Estimates and report to be provided for the NPRM

Questions?



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