



EISA 2007: Renewable Fuel Standard Program

**Office of Transportation and Air Quality
US Environmental Protection Agency**

March 2009

Presentation Overview

- **Renewable Fuel Standard (RFS) Program established under Energy Policy Act of 2005**
- **RFS revised under Energy Independence & Security Act of 2007**
 - **General rulemaking development and timeline**
 - **Overview of major RFS2 provisions**
- **Notes on current RFS program**
 - **Implementation timeline**
 - **Compliance**
 - **Lessons learned**

First Successful High Impact Public Policy Set for Renewable Fuels: EAct 2005 RFS Program

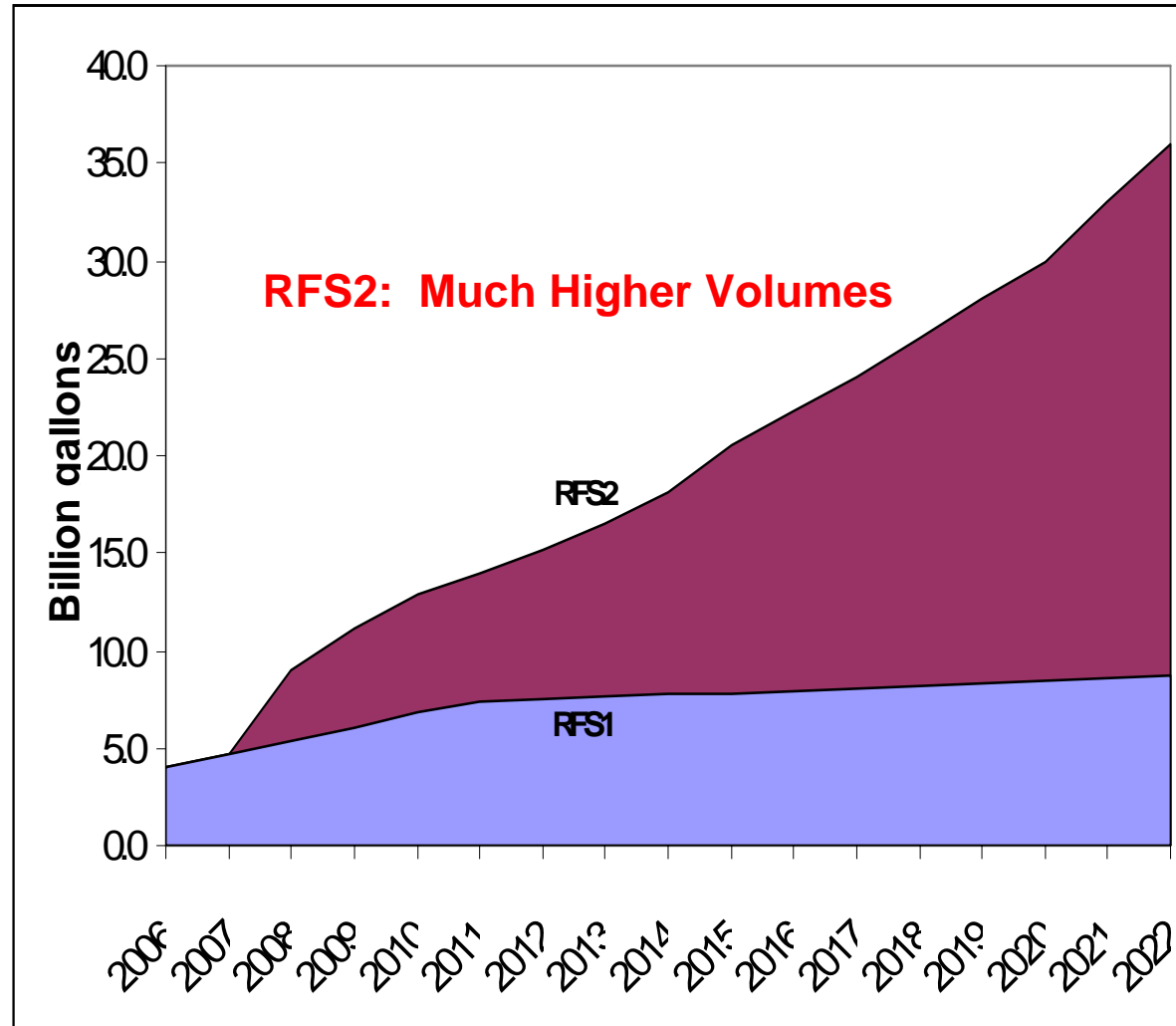
- **Program started Sept 1, 2007**
- **EPA converts Congressionally-mandated volumes of renewable fuel into percent of gasoline production**
 - 4.0 bgy in 2006 - growing to 7.5 bgy in 2012
 - Standard applies to refiners, importers, and blenders of gasoline blendstocks
- **Major compliance element - trading and banking provisions**
 - Program based on Renewable Identification Numbers (RINs), credits that represent renewable fuel produced or imported to U.S.
 - Allows flexibility for compliance
- **Renewable fuel volumes translate into RINs through Equivalence Values, determined based on volumetric energy content compared to corn ethanol**
 - Corn-ethanol: 1.0
 - Biodiesel (alkyl esters): 1.5
 - Cellulosic biomass ethanol: 2.5 (as specified in EAct)

EISA & RFS2 - General Rulemaking Development & Timeline

- **EISA signed by President Bush on December 19, 2007**
- **Final RFS2 Rule required by December 19, 2008**
- **Requires major modifications to the current RFS program beginning in 2009**
- **RFS2 – Built off the foundation of RFS1**
 - Rule development process similar to RFS 1

One Important Giant Step? EISA & RFS2

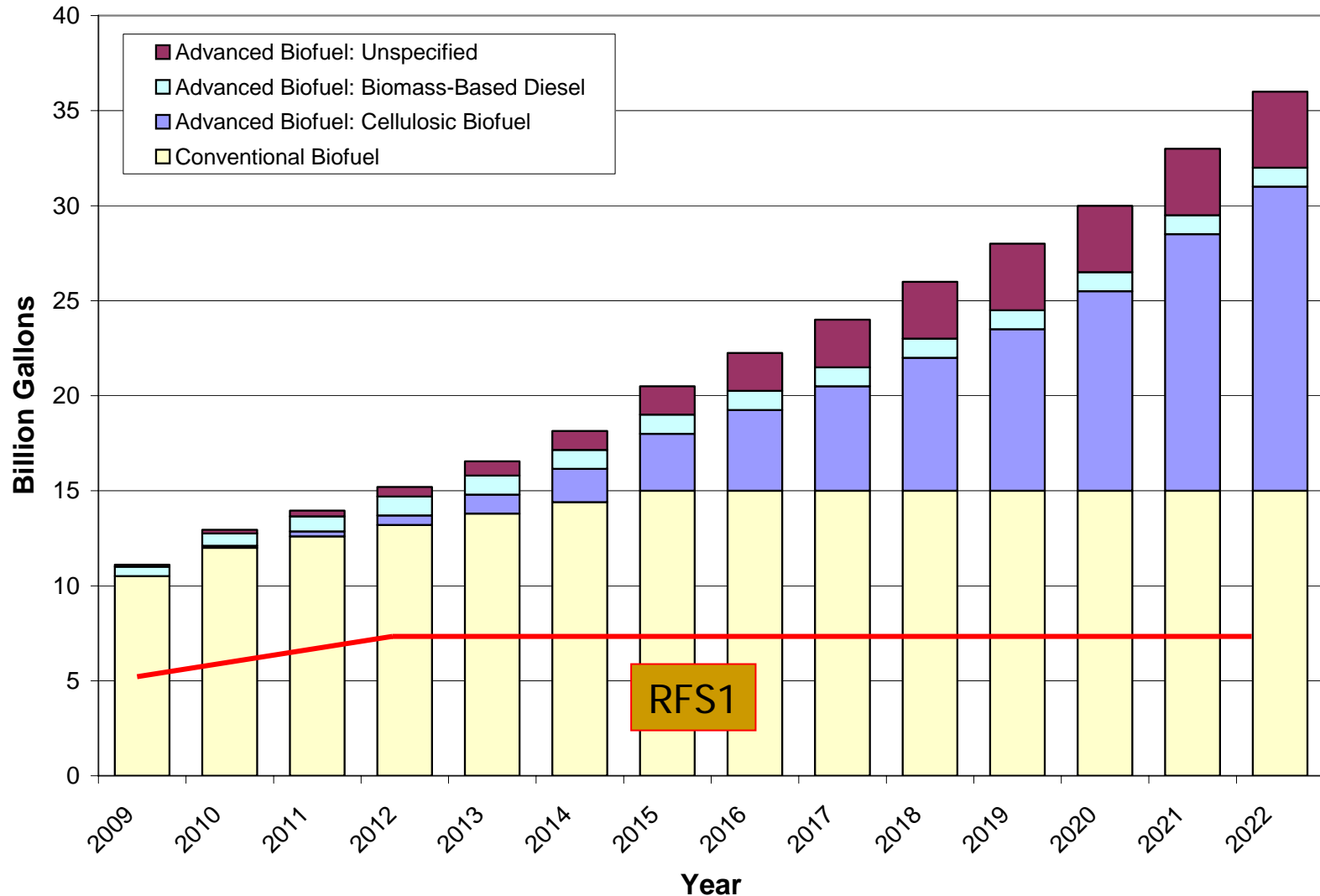
- EISA modified RFS1 program beginning in 2008
- Volumes increased to 9 bgy in 2008 – escalating to 36 bgy by 2022
- Establishes new renewable fuel categories and eligibility requirements, including GHG emission reduction thresholds!
- Provides new waivers and paper credit provisions
- Includes new obligation for fuels
- Includes new studies and reports



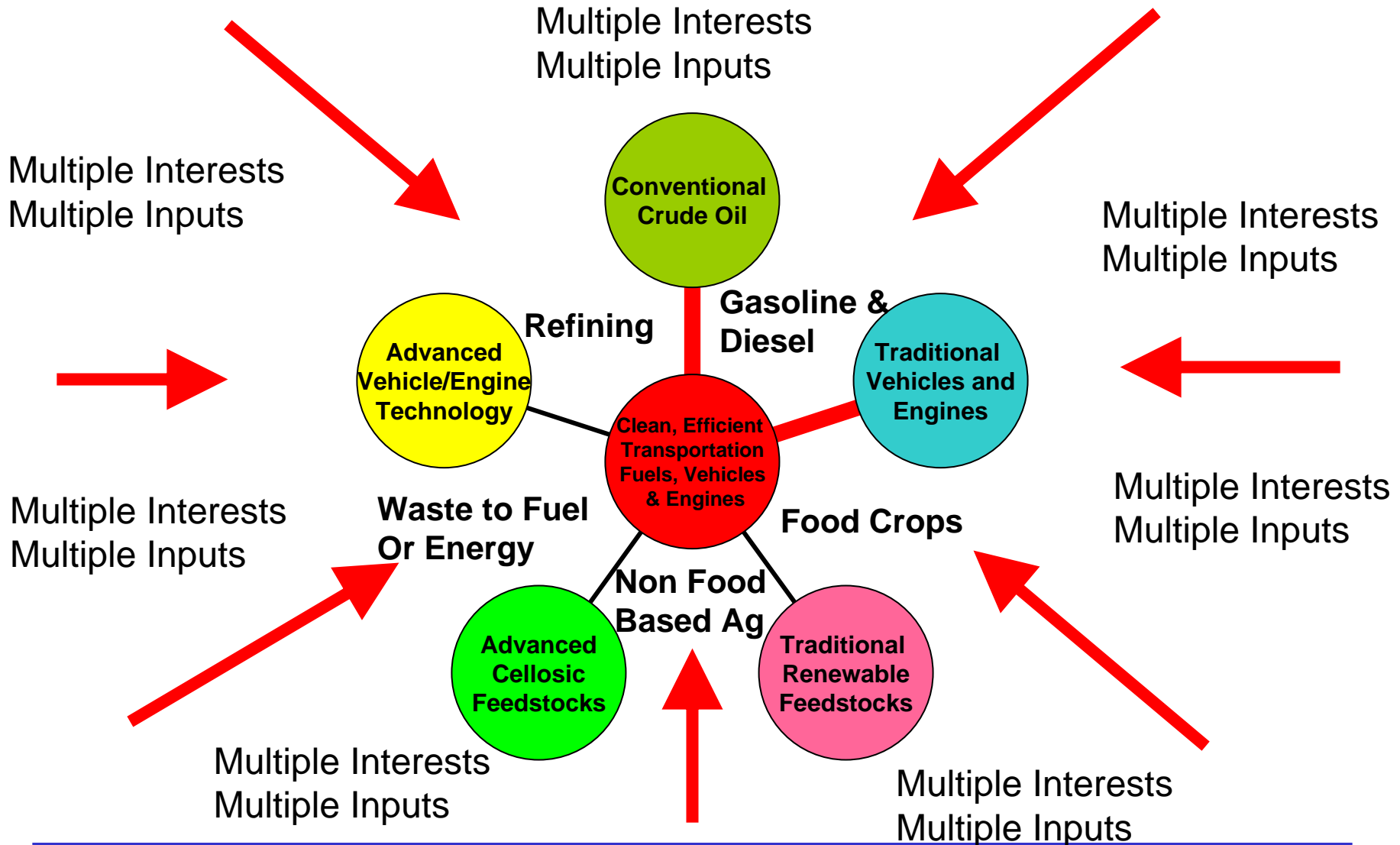
Key New Obligations and Definitions

- **Standard extended from gasoline to gasoline and diesel - nonroad fuel in addition to highway fuel**
 - Jet fuel and heating oil aren't covered, but renewable fuel sold into these markets can generate RINs
- **Definitions significantly changed from RFS1 and / or now include new elements**
 - Lifecycle defined and thresholds established
 - Facility grandfathering provisions
 - New renewable biomass definition (qualifying land)
- **Creates 4 new categories of renewable fuel with volume standards and green house gas thresholds**

Volume Increase is Almost All Cellulosic/Advanced Biofuel



Inputs Into Program Development and Analysis for Sustainable Transportation ---- (Fuels, Vehicles and Engines)



Critical Element of EISA: Lifecycle Assessment

- **Each fuel category required to meet mandated GHG performance thresholds (reduction compared to 2005 baseline petroleum fuel replaced)**
 - **Conventional Biofuel** (ethanol derived from corn starch)
 - Must meet 20% lifecycle GHG threshold
 - Only applies to fuel produced in new facilities
 - **Advanced Biofuel**
 - Essentially could be anything but corn starch ethanol
 - Includes cellulosic biofuels and biomass-based diesel
 - Must meet a 50% lifecycle GHG threshold
 - **Biomass-Based Diesel**
 - E.g., Biodiesel, “renewable diesel” as long as fats and oils are not co-processed with petroleum
 - Must meet a 50% lifecycle GHG threshold
 - **Cellulosic Biofuel**
 - Renewable fuel produced from cellulose, hemicellulose, or lignin
 - E.g., cellulosic ethanol, BTL diesel, green gasoline, etc.
 - Must meet a 60% lifecycle GHG threshold
- **EISA language permits EPA to lower the lifecycle GHG thresholds by as much as 10% -- (60% to 50%; 50% to 40%; 20% to 10%)**

Lifecycle Analysis – What's Considered?

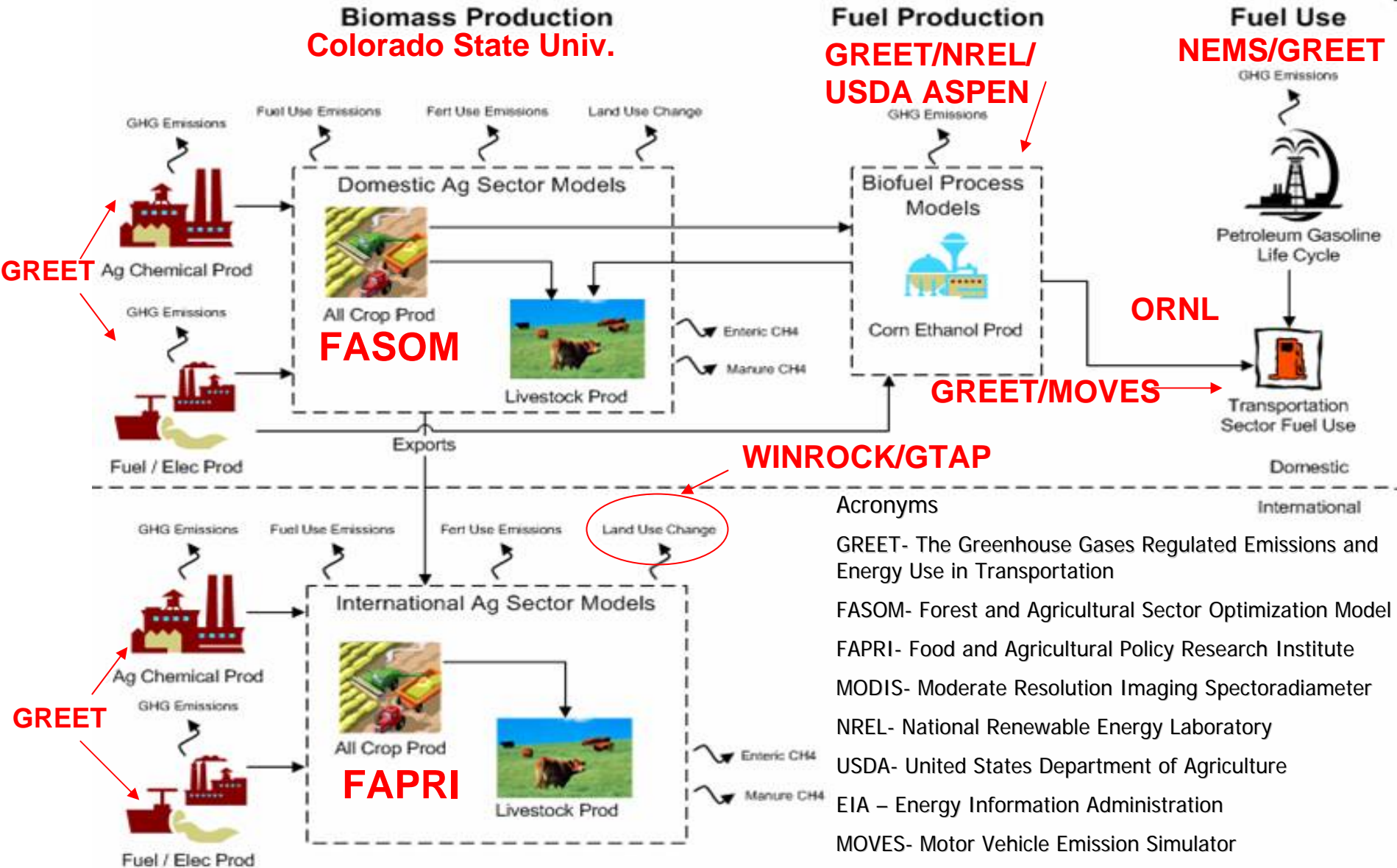
- **Domestic and international agricultural sector**
 - Direct GHG emissions from producing feedstock
 - Indirect impacts on other crops (e.g., less rice production), animals (fewer cattle), land use change
- **Fuel production**
 - Energy use and GHG emissions at production facility
- **Fuel / feedstock distribution**
 - Transporting feedstock to plant
 - Transporting fuel to end use
- **Tailpipe emissions**
 - Vehicle GHG emissions
- **Baseline petroleum fuel**
 - 2005 baseline crude
 - GHG emissions associated with producing gasoline and diesel fuel



Key Models and Data Sources

- Emission factors (GREET, Winrock, Woods Hole)
- Agricultural sector models (FASOM, FAPRI, GTAP, BESS)
- Land use changes (FASOM, FAPRI, Winrock, GTAP)
- Fertilizer N₂O modeling (CSU DAYCENT/CENTURY)
- Fuel production process models (GREET, USDA & NREL ASPEN models, BESS)
- Tailpipe emissions (MOVES)
- Energy sector modeling (NEMS)

Lifecycle Methodology Overview



Overview of What We Need

- Need to develop life cycle GHG values for each potential fuel and production pathway, for example:
 - Corn ethanol (dry mill, wet mill, coal, natural gas, etc.)
 - Biodiesel / Renewable Diesel
 - Soybean oil
 - Waste grease
 - Cellulosic Ethanol (enzymatic, thermochemical)
 - Agricultural residue (e.g., corn stover)
 - Forest wastes
 - Switchgrass / other energy crops
 - Imports
 - Sugarcane ethanol

- The components of the analysis are generally the same for all biofuels, but each has own set of assumptions and issues

Key Factors in Land Use Assessment

- **This analysis has revealed which factors have the most significant impact on the final results**
 - **What Type of Land is Converted?**
 - Use of historic satellite data to project type of land converted
 - Alternative approach to use economic models to predict type of land converted
 - **Treatment of Time Related Land Use Changes and Benefits**
 - Land use change results in stream of emissions that are changing over time
 - We need to define a life cycle GHG value that is applicable to all gallons across time
 - We are looking at a range of approaches for treating this issue
 - The two main decisions to be made are what time period to consider and what discount rate (if any) to apply to emissions over time

LCA – Summary and Next Steps

- In developing the lifecycle methodology, our approach has been to use the best models, tools and resources available
- In addition, we are using sensitivity analysis and examining multiple approaches to address key areas of uncertainty
- Uncertainty being framed in the preamble of the NPRM
- NPRM provides an important opportunity for EPA to present our work and to seek comment on proposed approaches and alternative approaches
- This input along with the additional analysis we will be conducting between now and the final rule will further improve our methodology

Regulatory Impact Analyses for Rulemaking

- Renewable fuel production and use projections, technology and cost assessments
- GHG Lifecycle Modeling, Inventory, and Benefits
- Other Pollutant Inventory, Air Quality and Benefits
- Agricultural Sector Impacts
- Water and Soil Impacts
- Macroeconomic Impacts
- Energy Security

RFS1 Implementation Timeline

- 2007
 - Final rule published May 1, 2007 allowing just four months for implementation
 - Compliance period was for the period September 1 – December 31
 - EPA encountered many data quality issues requiring interaction with submitters
 - EPA continues to receive corrected data
- 2008
 - 2008 standard was revised from 4.66% to 7.76% to comply with EISA
 - End of year reports due to EPA February 28, 2009
 - Overall, data quality is improving, however we still see substantial errors
- 2009
 - 2009 standard set at 10.21% to comply with EISA
 - Standard is based on 11.1 billion gallons of renewable fuel including 0.5 billion gallons of biodiesel and renewable diesel
 - 2009 RFS notice suggests acquiring biodiesel RINs in preparation for 2010 compliance

RFS1 Compliance

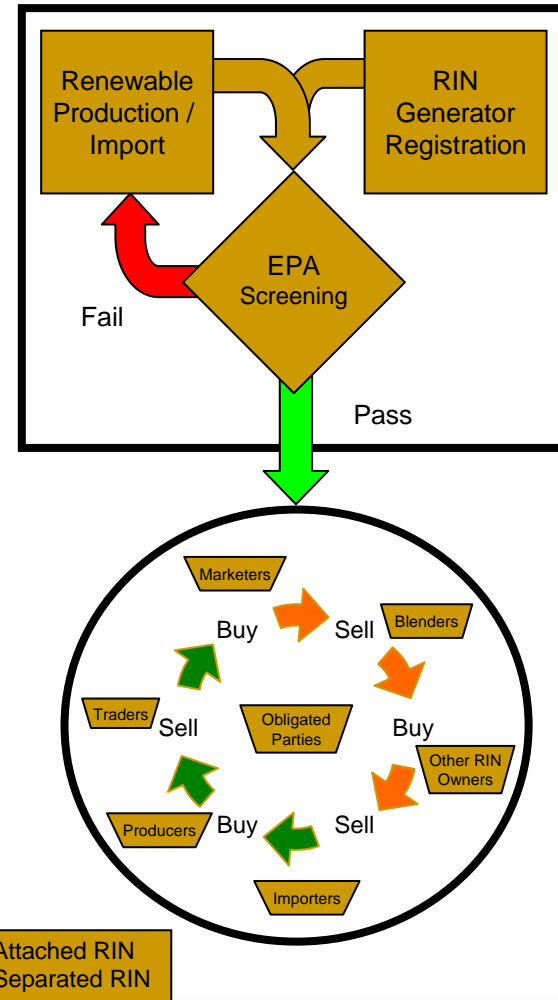
- For the period September 1 – December 31, 2007, initial numbers indicate
 - Over ½ million reports from well over 100,000 submissions
 - 1.6 bgal of renewable fuel represented by 1.7 billion RINs
 - Majority of obligated parties are meeting compliance; well under 1% are choosing to take a deficit
 - Approximately 1,500 parties are currently regulated under RFS1
 - About 1,000 are new submitters
 - Reporting errors are farther-reaching than anticipated

RFS1 Lessons Learned

- 38-digit RIN is confusing
 - Administrative Errors
 - Typos and number transposition
 - Regulated community uses a mix of manual and automated processing
 - Mishandling
 - RINs generated incorrectly
 - Transfer of the same RIN to multiple parties
 - Improper error correction methods - recalling RINs and substituting other RINs that may already belong to another party
 - Result is potentially invalid RINs
- RFS2 proposal includes changes to reporting system to alleviate challenges with RIN generation and handling

Introduction of EPA Monitored Transaction System (EMTS)

- EPA Monitored – creates an environment to track the universe of RIN credits; RIN credits are not permitted to exist outside of this environment
- Two-part continuous reporting system
 - First, screen renewable batches and the generation of RIN credits for renewable fuel produced or imported
 - Second, insert RINs into the structured RIN environment and moderate RIN transactions between the various buyers and sellers through the enforcement of business rules



Rulemaking Status

- Proposal is complete and undergoing OMB review
- Also continuing to meet with various stakeholders (e.g. industry, academic experts, CA/EU, environmental organizations, federal and state agencies), particularly with regards to lifecycle analyses
- Timing matters

Questions



www.epa.gov/otaq/renewablefuels

Thank you