

Regulatory Impact Analysis: Renewable Fuel Standard Program

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Statement of Need

The United States currently consumes about 190 billion gallons of gasoline and diesel fuel annually to meet its transportation fuel needs. Of this volume, about 65 percent, or 124 billion gallons, is derived from foreign sources. The United States' dependence on imported petroleum to meet its growing demand for transportation fuel exacts a cost on the nation in terms of energy security. In addition, petroleum-based fuel exacts a cost on the nation with respect to environmental quality. The Renewable Fuel Standard (RFS) program increases national energy security by creating a market for renewable fuel as a substitute for petroleum-based fuel. By incorporating incentives for investing in research and development of renewable fuels, the RFS program also seeks to accelerate the nation's progress toward energy independence. In addition, the RFS program helps to reduce the country's greenhouse gas emissions, thereby reducing the nation's contribution to global climate change and its potential effects on the U.S. economy, security, and public health.

Overview

EPA is proposing standards which would implement a renewable fuel program as required by the Energy Policy Act of 2005 (the Act). The Act specifies the total volume of renewable fuel that is required to be used each year, and directs EPA to adjust this amount under certain circumstances. The resulting standards represent a level of renewable fuel that each refinery or importer must account for relative to its annual volume of gasoline produced or imported. In reality, however, renewable fuel use is forecast to exceed the RFS standards due to market forces. The analyses of the impacts associated with this increase in renewable fuel use are discussed in this Regulatory Impact Analysis (RIA).

Chapter 1: Industry Characterization

This chapter discusses current gasoline, diesel and renewable fuel production, importation, marketing and distribution, as well as likely future changes as a result of increased renewable fuel use.

Chapter 2: Changes to Motor Vehicle Fuel Under the RFS Program

This chapter discusses our gasoline and renewable fuel consumption predictions (compared to a 2004 base year), and the expected impacts of various ethanol blends on gasoline properties.

Chapter 3: Impacts on Emissions from Vehicles, Nonroad Equipment, and Fuel Production Facilities

This chapter evaluates the impacts on vehicle and nonroad equipment emissions under various oxygenate assumptions, specifically increasing ethanol and decreasing MTBE, and different modeling techniques. The effect of biodiesel use on diesel-powered vehicle emissions is also presented. Finally, emissions from ethanol and biodiesel production facilities are discussed.

Chapter 4: National Emissions Inventory Impacts

This chapter discusses the methods used to develop the national emissions inventories, and quantifies the impact of expanded ethanol and biodiesel use on those inventories.

Chapter 5: Air Quality Impacts

This chapter discusses the impacts of expanded renewable fuel use on ozone and particulate matter formation.

Chapter 6: Lifecycle Impacts on Fossil Energy and Greenhouse Gases

This chapter discusses our fuel lifecycle modeling, that is, analysis which accounts for all energy and emissions of the fuel production process. A description of the model we used, how we used it, and the results are presented. Impacts on greenhouse gases, including CO₂, fossil fuel use, and petroleum use are presented. The effects on petroleum imports, import expenditures, and domestic energy security are also discussed.

Chapter 7: Estimated Costs of Renewable Fuels, Gasoline and Diesel

This chapter contains our analysis of the cost of corn and cellulosic ethanol. We also discuss biodiesel and renewable diesel production costs. Costs associated with distributing the volumes of ethanol necessary to meet the requirements of the proposed program, and the costs to prepare gasoline and diesel blendstocks (for blending with renewable fuels) are also presented. Finally, we present the overall fuel cost impacts of expanded renewable fuel use.

Chapter 8: Agricultural Sector Impacts

This chapter discusses the likely economic impacts on the agricultural sector that may occur as a result of the large expansion of renewable fuel production and use expected in the future. Ongoing work using the FASOM model is also described.

Chapter 9: Small Business Flexibility Analysis

This chapter discusses our Small Business Flexibility Analysis (SBFA) which evaluates the proposed rule to ensure that concerns regarding small businesses, which would be affected by the rule, are sufficiently considered.

List of Acronyms and Abbreviations

AAM	Alliance of Automobile Manufacturers
ABT	Averaging, Banking, and Trading
ACE	American Coalition for Ethanol
The Act	Energy Policy Act of 2005 (also the Energy Act)
ADM	Archer Daniels Midland
AEO	Annual Energy Outlook (an EIA publication)
ANL	Argonne National Laboratory
AQIRP	Auto/Oil Air Quality Improvement Research Program
ARMS	Agricultural Resource Management Survey
B0, B5, B20, etc	Percent of biodiesel, e.g., B5= 5% biodiesel, 95% diesel
bbl	Barrel
BEA	Bureau of Economic Analysis
Bgal, bgal, bilgal, billgal, bg	Billions of gallons
BGY	Billions of gallons per year
BPCD	Barrels Per calendar day
BPSD	Barrels per stream day
bpd, bbls/day	Barrels Per Day
BTU	British Thermal Unit
BU	Bushel
Bu/acre	Bushels per acre
BZ	Benzene
CA	California
CAA	Clean Air Act
CAIR	Clean Air Interstate Rule
CARB	California Air Resources Board
CaRFG3	California Phase 3 RFG
CBG	Cleaner Burning Gasoline
CBI	Caribbean Basin Initiative
CD	Census Division
CFEIS	EPA's Certification and Fuel Economy Information System
CFR	Code of Federal Regulations
c/gal	Cents per gallon
CG	Conventional Gasoline
CHP	Combined Heat and Power Technology
CO	Carbon Monoxide
CO2	Carbon Dioxide
Co-op	Cooperative
CRC	Coordinating Research Council
DDGS	Distillers' Dried Grains with Solubles
DOE	Department of Energy
DRIA	Draft Regulatory Impact Analysis
E&C	Engineering and Construction
E0	Gasoline Blend which Does Not Contain Ethanol
E10	Gasoline Blend containing a nominal 10 percent ethanol by volume
E85	Gasoline Blend containing 85 percent ethanol by volume
E200	Percent of Fuel Evaporated at 200 Degrees F (ASTM D 86)
E300	Percent of Fuel Evaporated at 300 Degrees F (ASTM D 86)
EIA	Energy Information Administration (part of the U.S. Department of Energy)

Energy Act	Energy Policy Act of 2005 (also the Act)
EO	Executive Order
EPA	Environmental Protection Agency
EPAAct	Energy Policy Act of 2005 (also 'the Energy Act' or 'the Act')
ETBE	Ethyl Tertiary Butyl Ether
ETOH	Ethanol
ex CA	Excluding California
F, °F	Fahrenheit
FAPRI	Farm and Agricultural Policy Research Institute
FASOM	Forestry and Agriculture Sector Optimization Model
FBP	Feed Boiling Point (also Final Boiling Point)
FCC	Fluidized Catalytic Cracker
FCCU	Fluidized Catalytic Cracking Unit
FHWA	Federal Highway Administration
FOEB	Fuel Oil Equivalent Barrel
FR	Federal Register
FRM	Final Rulemaking
F RTP	Fixed Reduction Trigger Point
FFV	Flexible Fuel Vehicle
FTP	Federal test procedure
GAL	Gallon
g/Btu	Grams per Btu
g/day	Grams per day
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GPA	Geographic Phase-in Area
GREET	Greenhouse Gas, Regulated Emissions, and Energy Use in Transportation model
GWP	Global warming potentials
HC	Hydrocarbon(s)
HCO	Heavy Cycle Oil (a refinery stream)
HDN	Naphtha Hydrotreater (also Hydro-Denitrogenation Unit)
HSR	Heavy Straight Run (a refinery stream)
HVGO	Heavy Vacuum Gas Oil (a refinery stream)
IBP	Initial Boiling Point
k	Thousand
kbbl	Thousand barrels
kwh	Kilowatt Hour
Lb	Pound
LCO	Light Cycle Oil (a refinery stream)
LEV	Low emission vehicle
LLE	Liquid-Liquid Extraction
LNS	Light Naphtha Splitter
LP	Linear Programming (a type of refinery model)
LSR	Light Straight Run (a refinery stream)
mg/m ³	Milligrams per cubic meter
MGY, MMgy	Million Gallons per Year
MM	Million
MMBTU	Million British Thermal Units
MMbbls/cd	Millions of barrels per calendar day
MMGal/yr	Millions of gallons per year
MOBILE (5, 6, 6.2)	EPA's Motor Vehicle Emission Inventory Model (versions)
MON	Motor Octane Number
MOVES2006	EPA's Next Generation Highway Vehicle Emission Model

MSAT	Mobile Source Air Toxics
MSAT1	2001 Mobile Source Air Toxics Rule
MSAT2	2006 Proposed Mobile Source Air Toxics Rule
MTBE	Methyl Tertiary-Butyl Ether
NAAQS	National Ambient Air Quality Standards
NAICS	North American Industrial Classification System
NASS	National Agricultural Statistics Service
NBB	National Biodiesel Board
NCSU	North Carolina State University
NGL	Natural gas plant liquids
NMHC	Non-Methane Hydrocarbons
NMIM	National Mobile Inventory Model (EPA software tool)
NMOG	Non-methane organic gases
NONROAD	EPA's Non-road Engine Emission Model
NONROAD2005	EPA's Non-road Engine Emission Model Released in 2005
NO _x	Oxides of nitrogen
NPRM	Notice of Proposed Rulemaking
NREL	National Renewable Energy Laboratory
OMB	Office of Management and Budget
OMHCE	Organic Material Hydrocarbon Equivalent
ORNL	Oak Ridge National Laboratory
OTAQ	Office of Transportation and Air Quality
Oxy-fuel, oxyfuel	Winter oxygenated fuel program
PADD	Petroleum Administration for Defense District
PM	Particulate Matter
PM ₁₀	Coarse Particle
PM _{2.5}	Fine Particle
PMA	Petroleum Marketing Annual (an EIA publication)
POM	Polycyclic Organic Matter
PONA	Paraffin, Olefin, Naphthene, Aromatic
ppb	Parts per billion
ppm	Parts Per million
P RTP	Percentage Reduction Trigger Point
PSI	Pounds per Square Inch
QBtu	Quadrillion btu
Quadrillion	10 ¹⁵
(R+M)/2	Octane calculation (RON+MON)/2
RBOB	Reformulated Blendstock for Oxygenate Blending
RFA	Regulatory Flexibility Act
RFG	Reformulated Gasoline
RFS	Renewable Fuels Standard
RIA	Regulatory Impact Analysis
RIMS	Regional Input-Output Modeling System
RIN	Renewable Identification Number
RON	Research octane number
RPMG	Renewable Products Marketing Group
RSM	Response Surface Model
RVP	Reid Vapor Pressure
S	Sulfur
SBA	Small Business Administration
SBAR Panel, or 'the Panel'	Small Business Advocacy Review Panel
SBFA	Small Business Flexibility Analysis
SBREFA	Small Business Regulatory Enforcement Fairness Act (of 1996)

scf	Standard cubic feet
SOA	Secondary Organic Aerosol
SOx	Oxides of Sulfur
SULEV	Super ultra low emission vehicle
T50	Temperature at which 50% (by volume) of fuel evaporates (ASTM D 86)
T90	Temperature at which 90% (by volume) of fuel evaporates (ASTM D 86)
TAME	Tertiary Amyl Methyl Ether
ULEV	Ultra low emission vehicle
U.S.C.	United States Code
USDA	U.S. Department of Agriculture
VGO	Vacuum Gas Oil (a refinery stream)
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound
vol%	Percent by volume, volume percent
wt%	Percent by weight, weight percent
yr, y	Year