Regulatory Announcement

EPA Finalizes Regulations for the National Renewable Fuel Standard Program for 2010 and Beyond

The U.S. Environmental Protection Agency is finalizing revisions to the National Renewable Fuel Standard program (commonly known as the RFS program). This rule makes changes to the Renewable Fuel Standard program as required by the Energy Independence and Security Act of 2007 (EISA). The revised statutory requirements establish new specific annual volume standards for cellulosic biofuel, biomass-based diesel, advanced biofuel, and total renewable fuel that must be used in transportation fuel. The revised statutory requirements also include new definitions and criteria for both renewable fuels and the feedstocks used to produce them, including new greenhouse gas (GHG) emission thresholds as determined by lifecycle analysis. The regulatory requirements for RFS will apply to domestic and foreign producers and importers of renewable fuel used in the U.S.

Key Actions

This final action lays the foundation for achieving significant reductions of greenhouse gas emissions from the use of renewable fuels, reductions of imported petroleum and further development and expansion of our nation's renewable fuels sector.

This action is also setting the 2010 RFS volume standard at 12.95 billion gallons (bg). Further, for the first time, EPA is setting volume standards for specific categories of renewable fuels including cellulosic, biomass-based diesel, and total advanced renewable fuels. For 2010, the cellulosic standard is being set at 6.5 million gallons (mg); the biomass-based diesel standard is being set at 1.15 bg, (combining the 2009 and 2010 standards as proposed).

EPA United States Environmental Protection Agency

Office of Transportation and Air Quality
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In order to qualify for these new volume categories, fuels must demonstrate that they meet certain minimum greenhouse gas reduction standards, based on a lifecycle assessment, in comparison to the petroleum fuels they displace.

For its final determinations, EPA is using the best available models and has incorporated updated information based on:

- significant new scientific data available to the agency
- rigorous independent peer review
- extensive public comments

For the fuel pathways modeled, the following meet or exceed the respective required minimum GHG reduction standards:

- corn based ethanol plants using new efficient technologies
- soy based biodiesel
- biodiesel made from waste grease, oils, and fats
- sugarcane based ethanol

Fuels derived from cellulosic materials meet, and generally significantly exceed, the minimum GHG reduction standard.

Additional information on these and other key changes can be found below.

New Renewable Volume Standards

This final rule revises the annual renewable fuel standards (RFS2) and makes the necessary program modifications as set forth in EISA. Of these modifications, several are notable. First, the required renewable fuel volume continues to increase under RFS2, reaching 36 bg by 2022. The following chart shows the volume requirements from EISA:

EISA Renewable Fuel Volume Requirements (billion gallons)

Year	Cellulosic biofuel requirement	Biomass-based diesel requirement	Total Advanced biofuel requirement	Total renewable fuel requirement
2008	n/a	n/a	n/a	**9.0**
2009	n/a	0.5	0.6	**11.1**
2010	0.1	0.65	0.95	**12.95**
2011	0.25	0.80	1.35	**13.95**
2012	0.5	1.0	2.0	**15.2**
2013	1.0	a	2.75	**16.55**
2014	1.75	a	3.75	**18.15**
2015	3.0	a	5.5	**20.5**
2016	4.25	a	7.25	**22.25**
2017	5.5	a	9.0	**24.0**
2018	7.0	a	11.0	**26.0**
2019	8.5	a	13.0	**28.0**
2020	10.5	a	15.0	**30.0**
2021	13.5	a	18.0	**33.0**
2022	16.0	a	21.0	**36.0**
2023+	b	b	b	**b**

[a] *To be determined by EPA through a future rulemaking, but no less than 1.0 billion gallons.*

[b] *To be determined by EPA through a future rulemaking.*

EISA Expands Coverage to Include Diesel and Nonroad Fuels

EISA expanded the RFS program beyond gasoline to generally cover all transportation fuel. This now includes gasoline and diesel fuel intended for use in highway vehicles and engines, and nonroad, locomotive and marine engines. These provisions continue to apply to refiners, blenders, and importers of transportation fuel (with limited flexibilities for small refiners), and their percentage standards apply to the total amount of gasoline and diesel they produce for such use.

2010 Standards

For 2010, EISA set a total renewable fuel standard of 12.95 billion gallons. This total volume, presented as a fraction of a refiner's or importer's gasoline and diesel volume, must be renewable fuel. The final 2010 standards are shown in below.

Standards for 2010

Fuel Category	Percentage of Fuel Required to be Renewable	Volume of Renewable Fuel (in billion gal)
Cellulosic biofuel	0.004%	0.0065
Biomass-based diesel	*1.10%	*1.15
Total Advanced biofuel	0.61%	0.95
Renewable fuel	8.25%	12.95

**Combined 2009/2010 Biomass-Based Diesel Volumes Applied in 2010*

Setting the 2010 Cellulosic Standard

EISA requires the Administrator to evaluate and make an appropriate market determination for setting the cellulosic standard each year. Based on an updated market analysis considering detailed information from pilot and demonstration scale plants, an Energy Information Administration analysis, and other publically and privately available market information, we are setting the 2010 cellulosic biofuel standard at 6.5 million ethanol-equivalent gallons. While this volume is significantly less than that set forth in EISA for 2010, a number of companies and projects appear to be poised to expand production over the next several years. Since the cellulosic standard is lower than the level otherwise required by EISA, we will also make cellulosic credits available to obligated parties for end-of-year compliance, should they need them, at a price of $1.56 per gallon (gallon-RIN). In addition, while we have lowered the cellulosic standard below the level otherwise required in the Act, we have maintained the advanced biofuel and total renewable standards as that set in EISA for 2010. We are continuing to assess the growth of the cellulosic biofuel industry and intend to issue a notice of proposed rulemaking (NPRM) each spring and a final rule by November 30 of each year to set the renewable fuel standards for each ensuing year.

Treatment of Biomass-based Diesel in 2010

This rule also includes special provisions to account for the 2009 biomass-based diesel volume requirements in EISA. As described in the final rule, in November 2008 we used the new total renewable fuel volume of 11.1 billion gallons from EISA as the basis for the 2009 total renewable fuel standard that we issued under the RFS1 regulations. While this approach ensured that the total mandated renewable fuel volume required by EISA for 2009 was used, the RFS1 regulatory structure did not provide a mechanism for implementing the 0.5 billion gallon 2009 requirement for biomass-based diesel. We are addressing this issue in this rule combining the 2010 biomass-based diesel requirement of 0.65 billion gallons with the 2009 biomass-based diesel requirement of 0.5 billion gallons to require that obligated parties meet a combined 2009/2010 requirement of 1.15 billion gallons by the end of the 2010 compliance year.

Greenhouse Gas Reduction Thresholds

EISA established new renewable fuel categories and eligibility requirements, including setting the first mandatory GHG reduction thresholds for the various categories of fuels. A significant aspect of the RFS2 program is the requirement that the lifecycle GHG emissions of a qualifying

renewable fuel must be less than the lifecycle GHG emissions of the 2005 baseline average gasoline or diesel fuel that it replaces. Four different levels of reductions are required for the four different renewable fuel standards. These lifecycle performance improvement thresholds are listed in the table below:

Lifecycle GHG Thresholds Specified in EISA

(Percent reduction from 2005 baseline)

Renewable fuel[a]	**20%**
Advanced biofuel	**50%**
Biomass-based diesel	**50%**
Cellulosic biofuel	**60%**

[a] The 20% criterion generally applies to renewable fuel from new facilities that commenced construction after December 19, 2007.

Compliance with each threshold requires a comprehensive evaluation of renewable fuels, as well as the baseline for gasoline and diesel, on the basis of their lifecycle emissions. As mandated by EISA, the greenhouse gas emissions assessments must evaluate the aggregate quantity of greenhouse gas emissions (including direct emissions and significant indirect emissions such as significant emissions from land use changes) related to the full lifecycle, including all stages of fuel and feedstock production, distribution and use by the ultimate consumer.

EPA's lifecycle methodology required breaking new scientific ground and using analytical tools in new ways. Throughout the development of EPA's lifecycle analysis, the Agency employed a collaborative, transparent, and science-based approach. EPA recognizes that as the state of scientific knowledge continues to evolve in this area, the lifecycle GHG assessments for a variety of fuel pathways are likely to be updated. Therefore, while EPA is using its current lifecycle assessments to inform the regulatory determinations for fuel pathways in this final rule, as required by the statute, the Agency is also committing to further reassess these determinations and lifecycle estimates.

Based on the Agency's current modeling of specific fuel pathways, which incorporated comments received through the third-party peer review process, and data and information from new studies and public comments, EPA has determined that:

- Ethanol produced from corn starch at a new (or expanded capacity from an existing) natural gas-fired facility using advanced efficient technologies that we expect will be most typical of new production facilities complies with the 20% GHG emission reduction threshold
- Biobutanol from corn starch complies with the 20% GHG threshold
  Ethanol produced from sugarcane complies with the applicable 50% GHG reduction threshold for the advanced fuel category
- Biodiesel from soy oil and renewable diesel from waste oils, fats, and greases complies with the 50% GHG threshold for the biomass-based diesel category
- Diesel produced from algal oils complies with the 50% GHG threshold for the biomass-based diesel category
- Cellulosic ethanol and cellulosic diesel (based on currently modeled pathways) comply with the 60% GHG reduction threshold applicable to cellulosic biofuels

In addition to finalizing a threshold compliance determination for those pathways shown above that we specifically modeled, our technical judgment indicates certain other pathways are likely to be similar enough to modeled pathways that we are also assured these similar pathways qualify. Further, for other fuels we are establishing a process whereby a biofuel producer can petition the Agency to consider whether their product would be eligible for use in complying with an EISA standard. For additional information on the lifecycle GHG emissions methodology and results for renewable fuel pathways, and details on the petition process, please refer to the Lifecycle GHG Analysis Fact Sheet, EPA420-F-10-006 or the RFS2 preamble.

Requirements for Feedstock Producers

EISA changed the definition of renewable fuel to require that it be made from feedstocks that qualify as "renewable biomass." EISA's definition of the term "renewable biomass" limits the types of biomass as well as the types of land from which the biomass may be harvested. The definition generally applies restrictions to two feedstock sectors: the agricultural sector (planted crops and crop residues) and the non-agricultural sector (planted trees and tree residues, animal waste material and byproducts, slash and pre-commercial thinnings). These definitions affect feedstock use for production of compliant renewable fuels.

In the RFS2 rule, EPA is finalizing details applicable to renewable fuel producers which are necessary to implement this requirement. For both domestic and foreign non-agricultural sector feedstocks, renewable fuel producers can comply with specific recordkeeping and reporting requirements for their individual facilities by collecting and maintaining appropriate records from their feedstock suppliers that their feedstocks comply with the renewable biomass requirement. Producers may also, as an alternative to these individual recordkeeping and reporting requirements, opt to form a consortium to fund an independent third party to conduct annual renewable biomass quality-assurance surveys, based on a plan approved by EPA.

For agriculturally-based feedstocks produced in the U.S., renewable fuel producers will be in compliance based on EPA's aggregate compliance determination. EPA will monitor agricultural land data yearly and should the baseline level of approved agricultural land be exceeded, the individual recordkeeping and reporting requirements imposed on the non-agricultural sector would then be required. The program also provides an option for a similar, future aggregate determination for renewable fuel produced from foreign-based agricultural feedstocks, if the source region can provide sufficient data to support an effective aggregate analysis and monitoring program. Otherwise, foreign producers must verify using one of the approaches applied in the non-agricultural sector.

Overview of Impacts of Increasing Volume Requirements in the RFS2 Program

The increased use of renewable fuels required by the RFS2 standards is expected to reduce dependence on foreign sources of crude oil, increase domestic sources of energy, while at the same time providing important reductions in greenhouse gas emissions that contribute to climate change.

Petroleum Consumption, Energy Security and Fuel Costs

We estimate that the increased use of renewable fuels needed to reach the 36 billion gallons mandated by 2022 relative to market projections in the absence of the mandate will displace about 13.6 billion gallons of petroleum-based gasoline and diesel fuel. This represents about 7 percent of expected annual gasoline and diesel consumption in 2022. Furthermore, we expect the rule to decrease oil imports by $41.5 billion, and to result in additional energy security benefits of $2.6 billion. By 2022, the increased use of renewable fuels is expected to decrease gasoline costs by 2.4 cents per gallon and to decrease diesel costs by 12.1 cents per gallon.

Greenhouse Gas Emissions

The expanded use of renewable fuels is expected to reduce greenhouse gas emissions by 138 million metric tons when the program is fully implemented in 2022. The reductions would be equivalent to taking about 27 million vehicles off the road.

Emissions and Air Quality

The increased use of renewable fuels will also impact emissions with some emissions such as hydrocarbons, nitrogen oxides (NOx), acetaldehyde and ethanol expected to increase and others such as carbon monoxide (CO) and benzene expected to decrease. However, the impacts of these emissions on criteria air pollutants are highly variable from region to region. Overall the emission changes are projected to lead to increases in population-weighted annual average ambient PM and ozone concentrations, which in turn are anticipated to lead to up to 245 cases of adult premature mortality.

Agriculture Sector and Related Impacts

In 2022, the increased use of renewable fuels is expected to expand the market for agricultural products such as corn and soybeans and open new markets for advanced biofuels. We estimate that the RFS2 program would increase net farm income by $13 billion dollars in 2022. We also expect corn exports to decrease by 8 percent, and soybean exports to decrease by 14 percent.

The rule is expected to increase the cost of food $10 per person in 2022.

For More Information

For more information on the final RFS2 rule please visit the RFS website at:
www.epa.gov/otaq/renewablefuels/index.htm

Contact EPA's.Offic.of.Transportation.and.Air.Quality,.Assessment.and.Standards.Division information line at: asdinfo@epa.gov, or (734) 214-4636