This document is scheduled to be published in the
Federal Register on 12/17/2012 and available online at
http://federalregister.gov/a/2012-30100, and on **FDsys.gov**

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 80

[EPA-HQ-OAR-2011-0542; FRL-9760-2]

Supplemental Determination for Renewable Fuels Produced Under the Final RFS2 Program From Grain Sorghum

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final Rule.

SUMMARY: EPA is issuing a supplemental rule associated with the Renewable Fuel Standard (RFS) program. This final rule contains a lifecycle GHG analysis for grain sorghum ethanol and a regulatory determination that grain sorghum ethanol qualifies as a renewable fuel under the RFS Program. EPA's analysis indicates that ethanol made from grain sorghum at dry mill facilities that use natural gas for process energy meets the lifecycle greenhouse gas emissions reduction threshold of 20 percent compared to the baseline petroleum fuel it would replace, and therefore qualifies as renewable fuel. It also contains our regulatory determination that grain sorghum ethanol produced at dry mill facilities using specified forms of biogas for both process energy and most electricity production, has lifecycle GHG emission reductions of more than 50 percent compared to the baseline petroleum fuel it would replace, and that such grain sorghum ethanol qualifies as an advanced biofuel under the RFS Program.

DATES: This final rule is effective on [**insert date of** publication in the Federal Register].

ADDRESSES: EPA has established a docket for this action under Docket ID No. **EPA-HQ-**

OAR-2011-0542. All documents in the docket are listed in the www.regulations.gov index. Although listed in the index, some information is not publicly available, e.g., CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, will be publicly available only in hard copy. Publicly available docket materials are available either electronically in www.regulations.gov or in hard copy at the Air and Radiation Docket and Information Center, EPA/DC, EPA West, Room 3334, 1301 Constitution Ave., NW, Washington, DC 20004. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566-1744, and the telephone number for the Air Docket is (202) 566-1742.

FOR FURTHER INFORMATION CONTACT: Jefferson Cole, Office of Transportation and Air Quality, Transportation and Climate Division, Environmental Protection Agency, 1200 Pennsylvania Ave., NW, Washington, DC 20460 (MC: 6041A); telephone number: 202-564-1283; fax number: 202-564-1177; email address: cole.jefferson@epa.gov.

SUPPLEMENTARY INFORMATION:

Outline of This Preamble

I. General Information

A. *Does this Action Apply to Me?*

Entities potentially affected by this action are those involved with the production, distribution, and sale of transportation fuels, including gasoline and diesel fuel or renewable fuels such as biodiesel and renewable diesel. Regulated categories include:

Category	NAICS[1] Codes	SIC[2] Codes	Examples of Potentially Regulated Entities
Industry	324110	2911	Petroleum Refineries
Industry	325193	2869	Ethyl alcohol manufacturing
Industry	325199	2869	Other basic organic chemical manufacturing
Industry	424690	5169	Chemical and allied products merchant wholesalers
Industry	424710	5171	Petroleum bulk stations and terminals
Industry	424720	5172	Petroleum and petroleum products merchant wholesalers
Industry	454319	5989	Other fuel dealers

[1] North American Industry Classification System (NAICS)

[2] Standard Industrial Classification (SIC) system code.

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to engage in activities that may be affected by today's action. To determine whether your activities would be affected, you should carefully examine the applicability criteria in 40 CFR Part 80, Subpart M. If you have any questions regarding the applicability of this action to a particular entity, consult the person listed in the preceding section.

II. Analysis of Lifecycle Greenhouse Gas Emissions

A. Methodology

1. *Scope of Analysis*

On March 26, 2010, the Environmental Protection Agency (EPA) published changes to the Renewable Fuel Standard program regulations as required by 2007 amendments to CAA 211(o). This rulemaking is commonly referred to as the "March, 2010 RFS2 final rule". As part of the March, 2010 RFS2 final rule we analyzed various categories of biofuels to determine whether the complete lifecycle GHG emissions (domestic and international) associated with the production, distribution, and use of those fuels meet minimum lifecycle greenhouse gas reduction thresholds as specified in CAA section 211(o) (i.e., 60% for cellulosic biofuel, 50% for biomass-based diesel and advanced biofuel, and 20% for other renewable fuels). Our final rule focused our lifecycle analyses on fuels that were anticipated to contribute relatively large volumes of renewable fuel by 2022 and thus did not cover all fuels that either are contributing or could potentially contribute to the program. In the preamble to the final rule, EPA indicated that it had not completed the GHG emissions impact analysis for several specific biofuel production pathways but that this work would be completed through supplemental rulemaking processes. Since the final rule was issued, we have continued to examine several additional pathways. On June 12, 2012, we published a Notice of Data Availability Concerning Renewable Fuels Produced From Grain Sorghum Under the RFS Program (*see* 77 FR 34915). In that notice of data availability, we provided an opportunity for comment on EPA's analysis of grain sorghum used as a feedstock to produce ethanol under the RFS program. Today's final rule describes our lifecycle analysis of ethanol made from grain sorghum ("grain sorghum ethanol") and presents our determination that grain sorghum ethanol qualifies as renewable fuel (20% lifecycle GHG reduction as compared to baseline fuel) or as advanced biofuel (50% lifecycle GHG reduction as compared to baseline fuel) if produced pursuant to specified pathways. The modeling approach EPA used in this analysis is the same general approach used in the March, 2010 RFS2 final rule for lifecycle analyses of other biofuels.[1] The March, 2010 RFS2 final rule preamble and Regulatory Impact Analysis (RIA) provides further discussion of our approach.

2. *Models Used*

The analysis EPA has prepared for grain sorghum ethanol uses the same set of models that was used for the March, 2010 RFS2 final rule. To estimate the domestic agricultural impacts presented in the following sections, we used the Forestry and Agricultural Sector Optimization Model (FASOM) developed by Texas A&M University. To estimate the international agricultural sector impacts, we used the Food and Agricultural Policy and Research

[1] EPA. 2010. Renewable Fuel Standard Program (RFS2) Regulatory Impact Analysis. EPA-420-R-10-006. http://www.epa.gov/oms/renewablefuels/420r10006.pdf

Institute international models as maintained by the Center for Agricultural and Rural Development (FAPRI-CARD) at Iowa State University. For more information on the FASOM and FAPRI-CARD models, refer to the March, 2010 RFS2 final rule preamble (75 FR 14670) or the March, 2010 RFS2 final rule Regulatory Impact Analysis (RIA).[2] The models require a number of inputs that are specific to the pathway being analyzed, including projected yields of feedstock per acre planted, projected fertilizer use, and energy use in feedstock processing and fuel production. The docket includes detailed information on model inputs, assumptions, calculations, and the results of our assessment of the lifecycle GHG emissions performance of specified pathways for producing grain sorghum ethanol.

3. *Scenarios Modeled for Impacts of Increased Demand for Grain Sorghum*

To assess the impacts of an increase in renewable fuel volume from business-as-usual (what is likely to have occurred without the RFS biofuel mandates) to levels required by the statute, we established a control case and other cases for a number of biofuels analyzed for the March, 2010 RFS2 final rule. The control case included a projection of renewable fuel volumes that might be used to comply with the RFS renewable fuel volume mandates in full. The other cases are designed such that the only difference between a given case and the control case is the volume of an individual biofuel, all other volumes remaining the same. In the March, 2010 RFS2 final rule, for each individual biofuel, we analyzed the incremental GHG emission impacts of increasing the volume of that fuel to the total mix of biofuels needed to meet the EISA requirements.

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[2] EPA. 2010. Renewable Fuel Standard Program (RFS2) Regulatory Impact Analysis. EPA-420-R-10-006. http://www.epa.gov/oms/renewablefuels/420r10006.pdf. Additional RFS2 related documents can be found at http://www.epa.gov/otaq/fuels/renewablefuels/regulations.htm.

For the analysis of grain sorghum ethanol, we applied the same methodology as in the March, 2010 RFS2 final rule. In this case, we compared a scenario that included 200 million gallons of grain sorghum ethanol to another scenario that included 300 million gallons of grain sorghum ethanol, ensuring that all other renewable fuel volumes are equal between the two scenarios. The scenario with 200 million gallons of grain sorghum ethanol will henceforth be referred to as the "control case," which was developed to account for the current production of grain sorghum ethanol which is approximately 200 million gallons per year (*see* Chapter 1 of the March, 2010 RFS2 final rule RIA). All other volumes for each individual biofuel in this new control case remain identical to the control case used in the March, 2010 RFS2 final rule. The scenario with 300 million gallons of grain sorghum ethanol will be referred to as the "grain sorghum" case. For the grain sorghum case, our modeling assumes approximately 300 million gallons of sorghum ethanol would be consumed in the United States in 2022. The modeled scenario includes 2.06 billion lbs of grain sorghum to be used to produce the additional 100 million gallons of ethanol in 2022.

Our volume scenario of approximately 200 million gallons of grain sorghum ethanol in the control case, and 300 million gallons in the grain sorghum case in 2022, is based on several factors including historical volumes of grain sorghum ethanol production, potential feedstock availability and other competitive uses (e.g., animal feed or exports). Our assessment is described further in the inputs and assumptions document that is available through the docket (EPA 2011). Based in part on consultation with experts at the United States Department of Agriculture (USDA) and industry representatives, we believe that these volumes are reasonable for the purposes of evaluating the impacts of producing additional volumes of ethanol from grain sorghum.

The FASOM and FAPRI-CARD models, described above, project how much grain sorghum will be supplied to ethanol production from a combination of increased production, decreases in others uses (e.g., animal feed), and decreases in exports, in going from the control case to the grain sorghum case.

4. *Model Modifications*

Based on information from industry stakeholders, as well as in consultation with USDA, both the FASOM and FAPRI-CARD models assume perfect substitution in the use of grain sorghum and corn in the animal feed market in the U.S. Therefore, when more grain sorghum is used for ethanol production, grain sorghum that is used in feed decreases. Either additional corn or additional sorghum production will be used in the feed market to make up for this decrease, depending upon the relative cost of additional production. This assumption is based on conversations with industry and the USDA, reflecting the primary use of sorghum in the U.S. as animal feed, just like corn. We received a number of comments in response to our Notice of Data Availability (NODA) for Renewable Fuels Produced from Grain Sorghum Under the RFS Program (77 FR 34915, June 12, 2012) that support this assumption.

The United States is one of the largest producers and exporters of grain sorghum. Two other large producers of grain sorghum, India and Nigeria, do not actively participate in the global trade market for sorghum. Rather, all grain sorghum in those two countries is produced for domestic consumption. Therefore, as the U.S. diverts some of its exports of grain sorghum for the purposes of ethanol production, we would expect close to no reaction in the production levels of grain sorghum in India and Nigeria. Historical data on prices, production, and exports from USDA, FAOSTAT (the Statistics Division of the Food and Agriculture Organization of the U.N.), and FAPRI support this assumption.[3] We received several comments in response to our NODA that supported our proposed assumption that production of grain sorghum in India and Nigeria is not impacted by changes in production and trade of grain sorghum in the U.S. It should be noted that India and Nigeria are unique in this behavior in regards to grain sorghum production, consumption and trade. Other countries are expected to vary their harvested area in response to changes in U.S. grain sorghum exports, which can be seen in Table II-4 below.

B. Results

As we did for our analysis of other feedstocks in the March, 2010 RFS2 final rule, we assessed what the GHG emissions impacts would be from the use of additional volumes of sorghum for biofuel production. The information provided in this section discusses the assumptions and outputs of the analysis using the FASOM and FAPRI-CARD agro-economic models to determine changes in the agricultural and livestock markets. These results from FASOM and FAPRI-CARD are then used to determine the GHG emissions impacts due to land use change and other factors. Finally, we include our analysis of the GHG emissions associated with different processing pathways and how the choice of technologies affect the lifecycle GHG emissions associated with grain sorghum ethanol.

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[3] *See* Memo to the Docket, Docket Number EPA–HQ–OAR–2011–0542, Dated May 18, 2012 and personal communication with USDA.

As discussed in the March, 2010 RFS2 final rule and the accompanying peer review, there are inherent challenges in reconciling the results from two different models. However, using two models provides a more complete and robust analysis than either model would be able to provide alone. We have attempted to align as many of the key assumptions as possible to get a consistent set of modeling results although there are structural differences in the models that account for some of the differences in the model results. For example, since FASOM is a long-term dynamic optimization model, short-term spikes are smoothed out over the five year reporting period. In comparison, the FAPRI-CARD model captures annual fluctuations that may include short-term supply and demand responses. In addition, some of the discrepancies may be attributed to different underlying assumptions pertaining to elasticities of supply and demand for different commodities. These differences, in turn, affect projections of imports and exports, acreage shifting, and total consumption and production of various commodities.

1. *Agro-Economic Impacts*

EPA received no significant comments regarding the results from the FASOM and FAPRI-CARD models, nor did EPA receive recommendations that the models be re-run with different assumptions. Therefore, the results from these two models are identical to those results presented and discussed in the NODA. For more detailed results, please refer to the NODA. Given the importance of the land use change results for our emissions analysis we are presenting these identical results for reference in this final rule.

In the FASOM model, the increase in grain sorghum area harvested is relatively modest, at an additional 4 thousand acres, due to the fact that demand for grain sorghum for use in ethanol production is being met by a shift of grain sorghum from one existing use (in the animal feed market) to another (ethanol production). Meeting the subsequent gap in supply of animal feed, however, leads to an increase of 141 thousand corn acres in 2022. Another way to describe this interaction is that it is relatively more profitable to take grain sorghum out of the feed market for ethanol production and grow more corn, than it is to simply grow more grain sorghum for ethanol production. Due to the increased demand for corn production and harvested area, soybean harvested area would decrease by 105 thousand acres (corn and soybeans often compete for land). Other crops in the U.S., such as wheat, hay, and rice, are projected to have a net increase of 53 thousand acres.

Table II-1. Summary of Projected Change in Crop Harvested Area in the U.S. in 2022 in the FASOM Model

(Thousands of Acres)

	Control Case	Grain Sorghum Case	Difference
Sorghum	11,108	11,111	4
Corn	77,539	77,680	141
Soybeans	69,896	69,791	-105
Other	154,511	154,564	53
Total	313,054	313,146	92

As demand for grain sorghum increases for ethanol production in the U.S., the FAPRI-CARD model estimates that the U.S. will decrease exports of grain sorghum and increase exports of corn to partially satisfy the gap of having less grain sorghum in the worldwide feed market. This combination of impacts on the world trade of grain sorghum and corn has effects both on major importers, as well as on other major exporters. For example, Mexico, one of the largest importers of grain sorghum, decreases its imports of grain sorghum and increases its imports of corn. Brazil also contributes more corn to the global market by increasing its exports.

The change in trade patterns directly impacts the amount of production and harvested crop area around the world. Harvested crop area for grain sorghum is not only predicted to increase in the U.S., but also in Mexico (7.8 thousand acres) and other parts of the world. Worldwide grain sorghum harvested area outside of the U.S. would increase by 39.3 thousand acres. Similarly, the increase in the demand for corn would lead to an increase of 36.8 thousand harvested acres outside of the U.S. While soybean harvested area would decrease in the U.S., Brazil would increase its soybean harvested area (18.4 thousand acres) to satisfy global demand. Although worldwide soybean harvested area decreases by 11.7 thousand acres, non-U.S. harvested area increases by 11.2 thousand acres.

Overall harvested crop area in other countries also increase, particularly in Brazil. Brazil's total harvested area is predicted to increase by 32.6 thousand acres by 2022. This is mostly comprised of an increase in corn of 18.1 thousand acres, and an increase in soybeans of 18.4 thousand acres, along with minor changes in other crops. More details on projected changes in world harvested crop area in 2022 can be found below in Table II-2, Table II-3, Table II-4, and Table II-5.

Table II-2. Summary of Projected Change in International (non-U.S.) Harvested Area by Country in 2022 in the FAPRI-CARD Model

(Thousands of Acres)

	Control Case	Grain Sorghum Case	Difference
Brazil	137,983	138,016	33
China	272,323	272,334	11
Africa and Middle East	315,843	315,892	48
Rest of World	1,301,417	1,301,441	24
International Total (non-U.S.)	2,027,567	2,027,682	115

Table II-3. Summary of Projected Change in International (non-U.S.) Harvested Area by Crop in 2022 in the FAPRI-CARD Model

(Thousands of Acres)

	Control Case	Grain Sorghum Case	Difference
Sorghum	95,108	95,148	39
Corn	307,342	307,379	37
Soybeans	202,980	202,991	11
Other	1,422,137	1,422,165	28

International Total (non-U.S.)	2,027,567	2,027,682	115

Table II-4. Summary of Projected Change in International (non-U.S.) Grain Sorghum Harvested Area by Country in 2022 in the FAPRI-CARD Model (Thousands of Acres)

	Control Case	Grain Sorghum Case	Difference
Mexico	4,569	4,576	8
Argentina	1,915	1,917	2
India	22,261	22,261	0
Nigeria	18,841	18,841	0
Other Africa and Middle East	37,833	37,856	23
Rest of World	9,689	9,695	6
International Total (non-U.S.)	95,108	95,148	39

Table II-5. Summary of Projected Change in International (non-U.S.) Corn Harvested Area by Country in 2022 in the FAPRI-CARD Model (Thousands of Acres)

	Control Case	Grain Sorghum Case	Difference
Africa and Middle East	77,220	77,223	4
Asia	108,751	108,764	13
Brazil	20,935	20,953	18

India	20,176	20,180	5
Other Latin America	39,599	39,594	-5
Rest of World	40,661	40,664	2
International Total (non-U.S.)	307,342	307,379	37

More detailed information on the agro-economic modeling can be found in the accompanying docket.

2. International Land Use Change Emissions

The methodology used in today's assessment of grain sorghum as an ethanol feedstock is the same as that used in the March, 2010 RFS2 final rule for analyses of other biofuel pathways. However, we have updated some of the data underlying the GHG emissions from international land use changes; therefore, we are providing additional detail on these modifications in this section.

In our analysis, GHG emissions per acre of land conversion internationally (i.e., outside of the United States) are determined using the emissions factors developed for the March, 2010 RFS2 final rule, following IPCC guidelines. In addition, estimated average forest carbon stocks were updated based on a new study which uses a more robust and higher resolution analysis. For the March, 2010 RFS2 final rule, international forest carbon stocks were estimated from several data sources each derived using a different methodological approach. Two new peer-reviewed analyses on forest carbon stock estimation have been completed since the release of the March, 2010 RFS2 final rule, one for three continental regions by Saatchi et al.[4] and the other for the EU by Gallaun et al.[5] We have updated our forest carbon stock estimates based on these new studies because they represent significant improvements as compared to the data used in the March, 2010 RFS2 final rule. These updated forest carbon stock estimates were previously used in EPA's Notice of Data Availability Concerning Renewable Fuels Produced From Palm Oil Under the RFS Program (77 FR 4300, January 27, 2012). Forest carbon stocks across the tropics are important in our analysis of grain sorghum ethanol because a significant amount of the land use changes in the scenarios modelled occur in tropical regions such as Brazil. In the scenarios modelled, there are also much smaller amounts of land use change impacts in the EU related to grain sorghum ethanol production. In the interest of using the best available data, we have incorporated the improved forest carbon stocks data in our analysis of lifecycle GHG emissions related to grain sorghum ethanol.

Preliminary results for Latin America and Africa from Saatchi et al. were incorporated into the March, 2010 RFS2 final rule, but Asia results were not included due to timing considerations. The Saatchi et al. analysis is now complete, and so the final map was used to calculate updated area-weighted average forest carbon stocks for the entire area covered by the analysis (Latin America, sub-Saharan Africa and South and Southeast Asia). The Saatchi et al. results represent a significant improvement over previous estimates because they incorporate data from more than 4,000 ground inventory plots, about 150,000 biomass values estimated from forest heights measured by space-borne light detection and ranging (LIDAR), and a suite of

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[4] Saatchi, S.S., Harris, N.L., Brown, S., Lefsky, M., Mitchard, E.T.A., Salas, W., Zutta, B.R., Buermann, W., Lewis, S.L., Hagen, S., Petrova, S., White, L., Silman, M. And Morel, A. 2011. Benchmark map of forest carbon stocks in tropical regions across three continents. *PNAS* doi: 10.1073/pnas.1019576108.

[5] Gallaun, H., Zanchi, G., Nabuurs, G.J., Hengeveld, G., Schardt, M., Verkerk, P.J. 2010. EU-wide maps of growing stock and above-ground biomass in forests based on remote sensing and field measurements. *Forest Ecology and Management* 260: 252-261.

optical and radar satellite imagery products. Estimates are spatially refined at 1-km grid cell resolution and are directly comparable across countries and regions.

In the March, 2010 RFS2 final rule, forest carbon stocks for the European Union were estimated using a combination of data from three different sources. Issues with this 'patchwork' approach were that the biomass estimates were not comparable across countries due to the differences in methodological approaches, and that estimates were not spatially derived (or, the spatial data were not provided to EPA). Since the release of the final rule, Gallaun et al. developed EU-wide maps of above-ground biomass in forests based on remote sensing and field measurements. MODIS data were used for the classification, and comprehensive field measurement data from national forest inventories for nearly 100,000 locations from 16 countries were also used to develop the final map. The map covers the whole EU, the European Free Trade Association countries, the Balkans, Belarus, the Ukraine, Moldova, Armenia, Azerbaijan, Georgia and Turkey.

For both data sources, Saatchi et al. and Gallaun et al., we added belowground biomass to reported aboveground biomass values using an equation in Mokany et al.[6]

In our analysis, forest stocks are estimated for over 750 regions across 160 countries. For some regions the carbon stocks increased as a result of the updates and in others they declined. For comparison, we ran our grain sorghum analysis using the old forest carbon stock values used in the March, 2010 RFS2 final ruleand with the updated forest carbon values described above.

[6] Mokany, K., R.J. Raison, and A.S. Prokushkin. 2006. Critical analysis of root:shoot ratios in terrestrial biomes. Global Change Biology 12: 84-96.

Using the updated forest carbon stocks increased the land use change GHG emissions related to grain sorghum ethanol by approximately 1.2 kilograms of carbon dioxide equivalent emissions per million British thermal units of grain sorghum ethanol ($kgCO_2e$/mmBtu). Table II-6 includes the international land use change GHG emissions results for the scenarios modeled, in terms of $kgCO_2e$/mmBtu. International land use change GHG emissions for grain sorghum are estimated at 30 $kgCO_2e$/mmBtu.

Table II-6. International Land Use Change GHG Emissions

($kgCO_2e$/mmBtu)

Region	Emissions
Africa and Middle East	9
Asia	5
Brazil	14
India	1
Other Latin America	1
Rest of World	1
International Total (non-U.S.)	30

More detailed information on the land use change emissions can be found in the accompanying docket.

3. Grain Sorghum Ethanol Processing

The dry milling process is the ethanol production process considered here for producing ethanol from grain sorghum. In the dry milling process, the grain sorghum is ground and fermented to produce ethanol. The remaining distillers grains (DG) are then either left wet if used in the near-term or dried for longer term use as animal feed.

For this analysis, the amount of grain sorghum used for ethanol production as modeled by the FASOM and FAPRI-CARD models was based on yield assumptions built into those two models. Specifically, the models assume sorghum ethanol yields of 2.71 gallons per bushel for dry mill plants (yields represents pure ethanol).

As per the analysis done in the March, 2010 RFS2 final rule, the energy consumed and emissions generated by a renewable fuel plant must be allocated not only to the renewable fuel produced, but also to each of the by-products. For grain sorghum ethanol production, this analysis accounts for the DG co-product use directly in the FASOM and FAPRI-CARD agricultural sector modeling described in the NODA. DG are considered a replacement animal feed and thus reduce the need to make up for the grain sorghum production that went into ethanol production. Since FASOM takes the production and use of DG into account, no further allocation was needed at the ethanol plant and all plant emissions are accounted for there.

As described in the NODA, the GHG emissions from production of ethanol from grain sorghum were calculated in the same way as other fuels analyzed as part of the March, 2010 RFS final rule. The GHG emissions were calculated by multiplying the amount of the different types of energy inputs at the grain sorghum ethanol plant (e.g., natural gas, coal, biogas, electricity) by emissions factors for production and use of those energy sources.

The NODA described how purchased fuel and electricity use for grain sorghum ethanol production was based on the energy use information for corn ethanol production from the March, 2010 RFS final rule analysis. These numbers reflect future plant energy use to represent plants that would be built to meet future requirements for increased renewable fuel use, as opposed to current or historic data on energy used in ethanol production. The numbers also reflect adjustments to account for the fact that converting grain sorghum to ethanol will result in slightly different energy use based on the difference in the grains and how they are processed.

Process energy at the plant includes natural gas, coal, or biogas used in boilers to produce steam, in dryers, in thermal oxidizers or used in other production or process equipment. Process electricity is used for running pumps, conveyers, fans, lights, and other electrical equipment. Specifically related to the fuel production process, electricity can be produced on-site or purchased/received from an off-site supplier.

The emissions associated with energy used at grain sorghum ethanol facilities, varies significantly among plants with respect to the production process, type of fuel used (e.g., coal versus natural gas), and whether electricity used at the facility comes from the grid or is produced from low-GHG emissions fuels such as biogas from landfills, waste treatment plants and/or waste digesters. Variation also exists between the same type of plants using the same fuel source based on the design of the production process such as the technology used to separate the ethanol from the water, the extent to which the DG are dried and whether other co-products are produced. Such different pathways were considered for ethanol made from corn. Since for the most part these same production processes are available for ethanol produced from sorghum, our analyses considered a similar set of production pathways for grain sorghum ethanol production. Our focus was to differentiate among facilities based on key differences, namely the type of plant, the type of fuel used and source of electricity.

For grain sorghum, we analyzed several combinations of different process technologies and fuels to determine their impacts on lifecycle GHG emissions. This section describes the different GHG impacts associated with alternative processing technology and fuel options and outlines specific process pathways that would be needed to meet different GHG threshold requirements.

The NODA discussed how several technologies and fuel choices affect emissions. Process energy fuel choice has a significant impact on emissions from a sorghum ethanol plant. Switching from natural gas to biogas from landfills, waste treatment plants and/or waste digesters, for example, was shown to reduce lifecycle GHG emissions by approximately 20 percentage points. Therefore, use of such biogas provides a way for grain sorghum ethanol plants to reduce their GHG emissions. However, in order for the biogas to count as a GHG reduction mechanism under the grain sorghum ethanol pathways discussed in this rulemaking it has to come from landfills, waste treatment plants, or waste digesters. The reason for this is that those sources of biogas are assumed to have zero upstream GHG impacts.

We received comments on the GHG emissions associated with the use of biogas as a process energy source, specifically for biogas from manure digesters. Development and operation of a manure digester system results in fugitive methane and other emissions, though their use also means emissions associated with alternative manure disposal methods are avoided. Putting in place a manure digester and capturing methane will result in a change of emissions from the existing disposal method. There is guidance available for calculating these emission changes.[7] Based on one application of this guidance, one commenter indicated that the upstream GHG impacts of biogas production from a manure digester would be a net increase in GHG emissions. Another commenter using their own application of the guidance indicated that there would be a net reduction in upstream GHG emissions from the use of biogas from a manure digester.

The differences in net emission estimates from manure digesters depend upon the assumptions about the alternative manure disposal methods. If the alternative disposal methods would not have resulted in significant emissions (e.g., if no methane were generated or if the methane generated were captured and destroyed) then the installation of a manure digester could lead to an increase in emissions. On the other hand, if there would have been significant emissions from an alternative disposal method that would be avoided, then the installation of a manure digester would result in a decrease in net emissions. EPA's approach for projecting the net emissions from manure digesters for the sorghum lifecycle GHG calculations was to assume effectively zero net emissions from digester biogas. This assumption is consistent with our

[7] *See, e.g.,* "Protocol for Quantifying and Reporting the Performance of Anaerobic Digestion Systems for Livestock Manures," Prepared for the U.S. Environmental Protection Agency AgSTAR Program, Prepared by: Eastern Research Group, Inc., March 2011, and "Climate Leaders Greenhouse Gas Inventory Protocol Offset Project Methodology for Project Type: Managing Manure with Biogas Recovery Systems," Climate Protection Partnerships Division/Climate Change Division, Office of Atmospheric Programs, U.S. Environmental Protection Agency, August 2008, Version 1.3.

treatment of biogas emissions in previous RFS rulemakings.

Given the uncertainty in the range of possible alternative manure disposal emissions, we feel this approach is reasonable. In order for biogas from manure digesters to result in positive net GHG emissions, the emissions from the alternative disposal method would have to be close to zero. This would only be the case with limited types of disposal in which the decomposition of the manure was mainly aerobic and does not result in methane emissions, such as land application. Although the majority of manure in the United States is handled as a solid, producing little CH4, the general trend in manure management is one of increasing use of liquid systems. The shift in manure management practices is due in part to a shift toward larger livestock facilities which typically use liquid manure management systems. Liquid systems have higher potential CH4 emissions than dry systems[8]. Alternatively, the existing disposal methods could have emissions close to zero if they were capturing methane emissions and destroying them, which is not generally happening in current practice.[9] It is possible that use of manure digesters could provide a net GHG benefit as compared to alternative disposal methods. However, we also do not have enough information to include a generic GHG offset reduction for manure digesters at this time. Assuming zero net emissions for present purposes appears reasonable given the range of possibilities. We plan to seek comment on the possible use of manure digester offsets as part of a future rulemaking and clarify their use for this and other pathways in Table 1 to §80.1426. Interested parties using manure digesters may also submit a petition under the 40 CFR §80.1416 petition process.

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[8] Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2010, U.S. EPA Section 6.2

[9] Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2010, U.S. EPA Annex 3 Section 3.10, the emissions factors used in calculating methane emissions from manure management do not include methane capture. EPA is not aware of any current or planned regulations that would require methane capture and destruction from existing manure management activities.

We also received comments to expand the discussion to include “biomass energy” that is not restricted to only biogas in the context of a fuel source from landfills, waste treatment plants, and waste digesters. The comments point to existing pathways in Table 1 to §80.1426 that include the use of biogas or biomass. We plan to clarify the meaning of the term biomass through a separate rulemaking and will consider the comments of adding biomass as a process energy source to the grain sorghum ethanol pathway at that time. In the interim, we believe it is preferable to issue today’s rule identifying two qualifying grain sorghum ethanol pathways without delay. Doing so allows producers using these pathways the opportunity to generate RINs while EPA evaluates adding a definition of biomass as an energy source for use in biofuel production.

Another factor that influences GHG impacts from process energy use is the percentage of DG that are dried. If a plant is able to reduce the amount of DG it dries, process energy use and GHG emissions decrease. The impact of going from 100% dry DG to 100% wet DG is larger for natural gas plants (approximately a 10% reduction in overall GHG emissions relative to the petroleum baseline) compared to biogas plants because biogas plants already have low emissions from process energy.

The NODA also discussed how production facilities that utilize combined heat and power (CHP) systems can also reduce GHG emissions relative to less efficient system configurations. The CHP system configuration considered in the NODA calculations were based on using a boiler to power a turbine generator unit that produces electricity, and using waste heat to produce process steam. There are provisions in our regulations stating that combined heat and power (CHP), also known as cogeneration, refers to industrial processes in which waste heat from the production of electricity is used for process energy in the renewable fuel production facility. Table 2 to §80.1426 includes combined heat and power such that, on a calendar year basis, at least 90% of the thermal energy associated with ethanol production (including thermal energy produced at the facility and that which is derived from an off-site waste heat supplier), exclusive of any thermal energy used for the drying of distillers grains and solubles, is used to produce electricity prior to being used to meet the process heat requirements of the facility.

We received comments that these current provisions only describe 'top cycle' (high pressure) CHP systems. Commenters requested that we also allow other types of CHP configurations (e.g., 'low pressure' CHP systems). EPA recognizes that there are many different types of CHP configurations and that some types that do not fit our current regulatory provisions could have similar GHG reductions.

Although not exhaustive, Table II-7 shows the amount of process fuel and electricity from the grid used at a grain sorghum ethanol facility for the different technology and fuel options in terms of Btu/gal of ethanol produced.

The energy use at dry mill ethanol plants was based on ASPEN models developed by USDA and updated to reflect changes in technology out to 2022 as described in the March, 2010 RFS2 final rule Regulatory Impact Analysis (RIA) Chapter 1. The work done on grain ethanol production for the March, 2010 RFS2 final rule was based on converting corn to ethanol.

Converting grain sorghum to ethanol will result in slightly different energy use based on difference in the grains and how they are processed. The same ASPEN USDA models used for corn ethanol in the final rule were also developed for grain sorghum ethanol. Based on the numbers from USDA, a sorghum ethanol plant uses 96.3% of the thermal process energy of a corn ethanol plant (3.7% less), and 99.3% of the electrical energy (0.7% less).

Table II-7. Process Fuel and Electricity Options at Grain Sorghum Ethanol Facilities (Btu / Gallon of Ethanol Produced)

Fuel Type and Technology	Natural Gas Use	Biogas Use	Grid Electricity Use
Sorghum Ethanol – Dry Mill Natural Gas			
No CHP, 100% Wet DG	16,449		2,235
Yes CHP, 100% Wet DG	18,605		508
No CHP, 0% Wet DG	27,599		2,235
Yes CHP, 0% Wet DG	29,755		508
Sorghum Ethanol – Dry Mill Biogas			
No CHP, 100% Wet DG		16,449	2,235
Yes CHP, 100% Wet DG		18,605	508
No CHP, 0% Wet DG		27,599	2,235
Yes CHP, 0% Wet DG		29,755	508

As shown in Table II-7, the difference between CHP and non-CHP plants is reflected in their use of different amounts of primary energy (natural gas or biogas) and the amount of electricity used from the grid. The difference in electricity used from the grid is independent of the quantity of dry DG. Furthermore, as the GHG calculations are based on the amount of fuel used times an emission factor plus the amount of electricity used from grid times an emissions factor, the use of CHP versus some other type of electricity generation system only matters for natural gas plants. Although less biogas would be needed if CHP is used versus standard electricity generation using biogas, the GHG emissions are the same since the emission factor for biogas (when it comes from landfills, waste treatment plants and/or waste digesters) is zero. Therefore, because the only advanced biofuel pathway we are adopting today for the production of grain sorghum ethanol involves use of biogas for on-site electricity production, we do not need to specify that CHP be used. We have therefore modified the final rule to instead specify that for the advanced biofuel grain sorghum pathway, biogas from landfills, waste treatment plants and/or waste digesters must be used for on-site electricity production, and we have provided an allowance for a certain amount of grid-purchased electricity that would still be consistent with a finding of 50% lifecycle GHG reduction as compared to baseline fuel. Any configuration of CHP, or a non-CHP system, could be used for the on-site generation of electricity using biogas. We have also included conforming changes to the regulatory registration, recordkeeping and reporting requirements, to require verification of the amount of grid electricity used at facilities using this pathway.

The conforming changes include adding a new paragraph (f)(13) to Section 80.1426 describing detailed requirements for the purchase, measurement and use of biogas and electricity from the grid for facilities using the advanced biofuel grain sorghum pathway. We have also amended Section 80.1450 describing registration requirements for facilities using the advanced biofuel grain sorghum pathway. Sections 80.1451 and 80.1454 are also amended to specify reporting and recordkeeping requirements for this pathway.

The following Table II-8 shows the mean lifecycle GHG reductions compared to the baseline petroleum fuel for a number of different grain sorghum ethanol production technology pathways including natural gas and biogas fired plants. In the following section, we provide detailed analysis of the lifecycle GHG emissions for two scenarios. The first is for a dry mill grain sorghum ethanol plant that uses natural gas for process energy; the second is for a dry mill grain sorghum ethanol plant that uses biogas for both process energy and for on-site electricity production. These two scenarios were chosen as examples of feasible technology that a plant can use to generate either conventional or advanced fuel.

Table II-8. Lifecycle GHG Emission Reductions for Certain Dry Mill Grain Sorghum Ethanol Facilities

(% change compared to petroleum gasoline)

Fuel Type and Technology	% Change
Sorghum Ethanol – Dry Mill Natural Gas	
No On-Site Electricity Production, 100% Wet DG	-33%
On-Site Electricity Production, using 0.15 kWh electricity from the grid per gallon of ethanol, 100% Wet DG	-36%
No On-Site Electricity Production, 0% Wet DG	-22%
On-Site Electricity Production, using 0.15 kWh electricity from the grid per gallon of ethanol, 0% Wet DG	-25%
Sorghum Ethanol – Dry Mill Biogas	
No On-Site Electricity Production, 100% Wet DG	-48%
On-Site Electricity Production, using 0.15 kWh electricity from the grid per gallon of ethanol, 100% Wet DG	-53%
No On-Site Electricity Production, 0% Wet DG	-47%
On-Site Electricity Production, using 0.15 kWh electricity from the grid per gallon of ethanol, 0% Wet DG	-52%

The 0.15 kWh was based on data in Table II-7 converted to kWh per gallon.

The docket for this final rule provides more details on our key model inputs and assumptions (e.g., crop yields, biofuel conversion yields, and agricultural energy use). These inputs and assumptions are based on our analysis of peer-reviewed literature and consideration of recommendations of experts from within the grain sorghum and ethanol industries, USDA, and academic institutions.

4. Results of Lifecycle Analysis for Ethanol from Grain Sorghum (Using Dry Mill Natural Gas)

Consistent with our approach for analyzing other pathways, our analysis for grain sorghum ethanol includes a mid-point estimate as well as a range of possible lifecycle GHG emission results based on uncertainty analysis conducted by the Agency. The graph below (Figure II-1) depicts the results of our analysis (including the uncertainty in our land use change modeling) for grain sorghum ethanol produced in a plant that uses natural gas and produces the current industry average of 92% wet DG.

Lifecycle GHG emissions equivalent to the statutory gasoline fuel baseline are represented on the graph by the zero on the X-axis. The midpoint of the range of results is a 32% reduction in GHG emissions compared to the 2005 gasoline baseline.[10] As in the case of other biofuel pathways analyzed as part of the March, 2010 RFS2 final rule, the range of results shown in Figure II-1 is based on our assessment of uncertainty regarding the location and types of land that may be impacted as well as the GHG impacts associated with these land use changes (*see* Section II.B.1. for further information).

[10] The 95% confidence interval around that midpoint results in range of a 19% reduction to a 44% reduction compared to the 2005 gasoline fuel baseline.

Figure II-1. Distribution of Results for Grain Sorghum Ethanol Produced in Dry Mill Plants that Use Natural Gas for Process Energy and Produce 92% Wet Distillers Grains

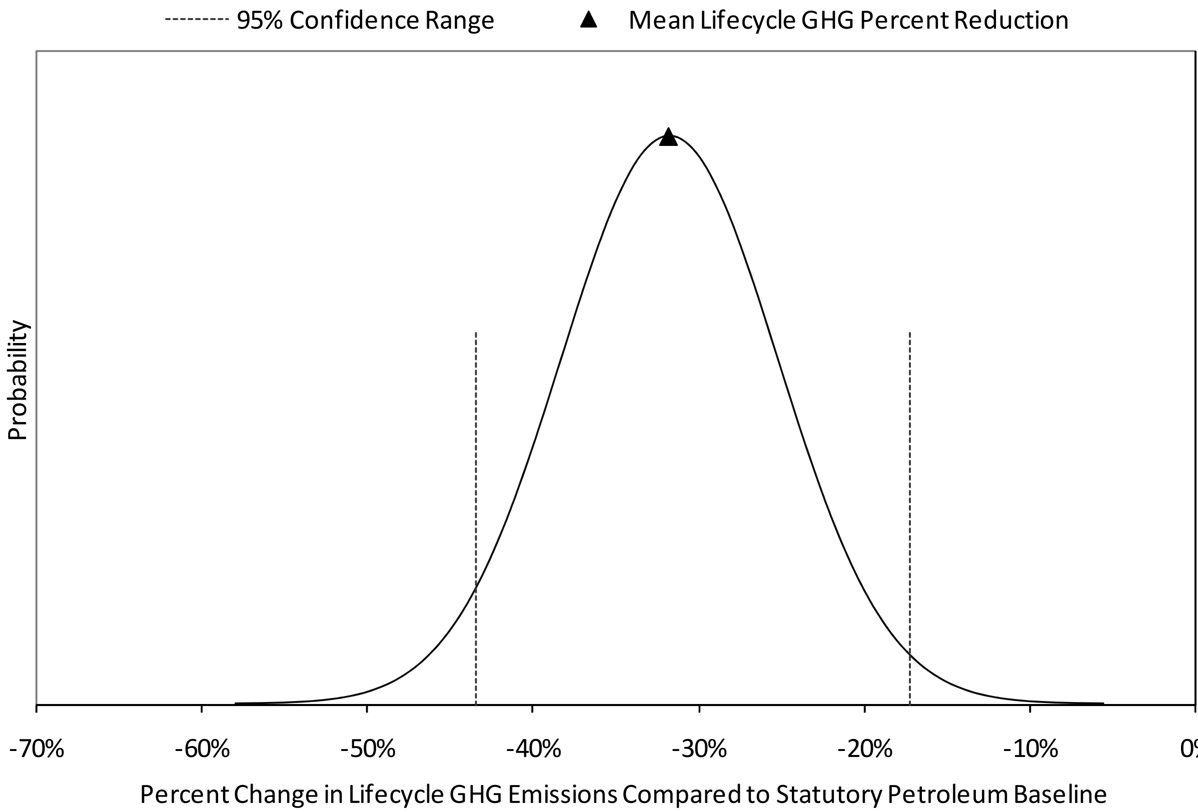

Table II-9 breaks down by stage the lifecycle GHG emissions for a natural gas fired grain sorghum ethanol plant with 92% wet DG in 2022 and the statutory 2005 gasoline baseline.[11] Results are included using our mid-point estimate of land use change emissions, as well as with the low and high end of the 95% confidence interval. Net agricultural emissions include impacts related to changes in crop inputs, such as fertilizer, energy used in agriculture, livestock production and other agricultural changes in the scenarios modeled. The fuel production stage includes emissions from ethanol production plants including drying 8% of the DG. Fuel and feedstock transport includes emissions from transporting bushels of harvested grain sorghum

[11] Totals in the table may not sum due to rounding.

from the farm to the ethanol production facility, as well as the emissions associated with transporting ethanol from the production facility to the fuel-blending facility.

Table II-9. Lifecycle GHG Emissions for Grain Sorghum Ethanol Produced in Dry Mill Plants that Use Natural Gas for Process Energy and Produce 92% Wet Distillers Grains (gCO_2e / mmBtu)

Fuel Type	Grain Sorghum Ethanol	2005 Gasoline Baseline
Net Agriculture (w/o land use change), Domestic and International	12,698	
Land Use Change, Mean *(Low/High),* Domestic and International	27,620 *(16,196/41,903)*	
Fuel Production	22,111	19,200
Fuel and Feedstock Transport	3,661	*
Tailpipe Emissions	880	79,004
Total Emissions, Mean *(Low/High)*	**66,971 *(55,547/ 81,254)***	**98,204**
Midpoint Lifecycle GHG Percent Reduction Compared to Petroleum Baseline	**32%**	

*Emissions included in fuel production stage.

5. *Results of Lifecycle Analysis for Ethanol from Grain Sorghum (Using Biogas for Process Energy and On-Site Electricity Production)*

The graph below (Figure II-2) depicts the results of our analysis (including the uncertainty in our land use change modeling) for grain sorghum ethanol produced in a dry mill plant that produces 0% wet DG and uses biogas for process energy and for on-site production of all electricity other than s 0.15 kWh of grid electricity per gallon of ethanol produced.

Figure II-2 shows the percent difference between lifecycle GHG emissions for the 2005 petroleum gasoline fuel baseline and for 2022 grain sorghum ethanol produced in a plant that dries 100% of its DG, uses only biogas as process energy and uses biogas to produce all electricity used on site except for 0.15 kWh of grid electricity per gallon of ethanol produced. Lifecycle GHG emissions equivalent to the statutory gasoline fuel baseline are represented on the graph by the zero on the X-axis. The midpoint of the range of results for this sorghum ethanol plant configuration is a 52% reduction in GHG emissions compared to the 2005 gasoline baseline.[12] As in the case of other biofuel pathways analyzed as part of the March, 2010 RFS2 final rule, the range of results shown in Figure II-2 is based on our assessment of uncertainty regarding the location and types of land that may be impacted as well as the GHG impacts associated with these land use changes (*see* Section II.B.1). These results justify our determination that sorghum ethanol produced in dry mill plants that dry any amount of DG and use only biogas (from landfills, waste treatment plants and/or waste digesters) for process energy and production of electricity used on site, other than 0.15 kWh of electricity from the grid per

[12] The 95% confidence interval around that midpoint results in range of a 38% reduction to a 64 % reduction compared to the 2005 gasoline fuel baseline.

gallon of ethanol produced, meet the 50% lifecycle GHG reduction threshold required for the generation of advanced renewable fuel RINs.

Figure II-2. Distribution of Results for Grain Sorghum Ethanol Produced in Dry Mill Plants that Produce 0% wet DG and Use Only Biogas (from Landfills, Waste Treatment Plants, and/or Waste Digesters) for Process Energy and Electricity Production, Except for 0.15 kWh of Electricity from the Grid per Gallon of Ethanol Produced

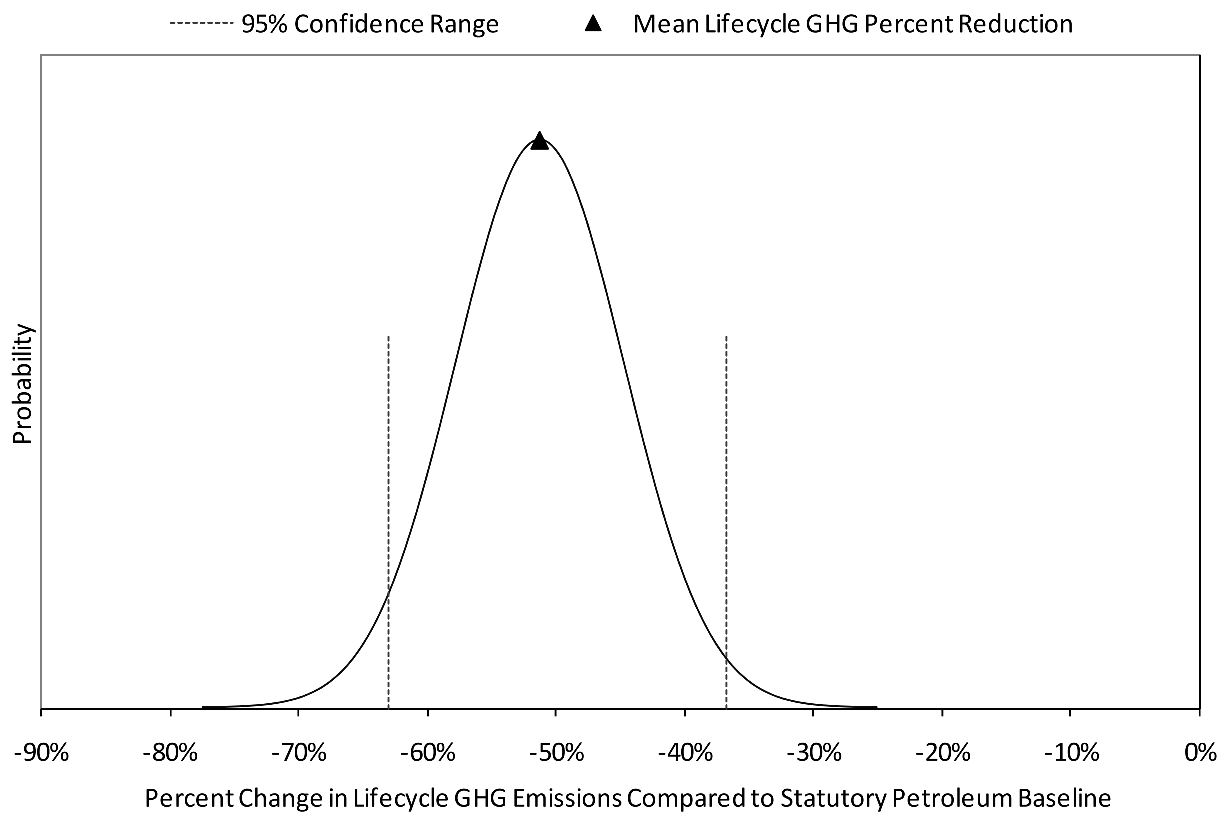

Table II-10 breaks down by stage the lifecycle GHG emissions for grain sorghum ethanol in 2022 produced through this pathway and the statutory 2005 gasoline baseline.[13] Results are included using our mid-point estimate of land use change emissions, as well as with the low and

[13] Totals in the table may not sum due to rounding.

high end of the 95% confidence interval. Net agricultural emissions include impacts related to changes in crop inputs, such as fertilizer, energy used in agriculture, livestock production and other agricultural changes in the scenarios modeled. Emissions from fuel production include emissions from ethanol production and drying 100% of the DG. Fuel and feedstock transport includes emissions from transporting bushels of harvested grain sorghum from the farm to ethanol production facility, as well as the emissions associated with transporting ethanol from the production facility to the fuel-blending facility.

Table II-10.

Lifecycle GHG Emissions for Grain Sorghum Ethanol Produced in Dry Mill Plants that Produce 0% Wet DG and Use Only Biogas (from Landfills, Waste Treatment Plants, and/or Waste Digesters) for Process Energy and Electricity Production, Except for 0.15 kWh of Electricity from the Grid per Gallon of Ethanol Produced (gCO_2e / mmBtu)

Fuel Type	Grain Sorghum Ethanol	2005 Gasoline Baseline
Net Agriculture (w/o land use change), Domestic and International	12,698	
Land Use Change, Mean *(Low/High),* Domestic and International	27,620 *(16,196/41,903)*	
Fuel Production	1,612	19,200
Fuel and Feedstock Transport	4,276	*
Tailpipe Emissions	880	79,004
Total Emissions, Mean *(Low/High)*	**47,086 *(35,662/61,369)***	**98,204**
Midpoint Lifecycle GHG Percent Reduction Compared to Petroleum Baseline	**52%**	

*Emissions included in fuel production stage.

6. Other Ethanol Processing Technologies

In the NODA we stated our intention to address other broadly applicable ethanol production technologies that have the potential to reduce lifecycle GHG emissions through a separate rulemaking. In the NODA, we provided a brief description of the use of electricity that is derived from renewable and non-carbon sources, such as wind power, solar power, hydropower, biogas or biomass as power for process units and equipment, and capturing and sequestering CO_2 emissions from an ethanol plant. We received comments supporting the use of electricity that is derived from renewable and non-carbon sources as power for process units and equipment. We also received comments supporting the use of capturing and sequestering CO_2 emissions as part of the RFS2 program. Due to the range of issues before us, and the fact that these issues can pertain to more than just the sorghum pathways, we intend to assess these technologies in a separate action and will consider at that time the comments received in response to the NODA and whether to broaden the number of grain sorghum ethanol pathways that may qualify for RIN generation.

C. Consideration of Lifecycle Analysis Results

1. Implications for Threshold Determinations

As discussed above, EPA's analysis shows that, based on the mid-point of the range of results, ethanol produced from grain sorghum using biogas (from landfills, waste treatment plants and/or waste digesters) for process heat and to produce all electricity used on-site, other than 0.15 kWh of electricity from the grid per gallon of ethanol produced at a dry mill plant drying any amount of DG would meet the 50 percent GHG emissions reduction threshold needed to qualify as an advanced biofuel (D-5 RINs). Grain sorghum ethanol meets the 20% lifecycle GHG emissions reduction threshold for conventional biofuels (D-6 RINs) when natural gas or biogas is used for process energy at a dry mill plant, regardless of how much DG is dried. Therefore, Table 1 to Section 80.1426 is modified to add these new pathways. Table II-11 illustrates how these new pathways are included in the existing table.

Table II-11.

Pathways and Applicable D Codes for Grain Sorghum Ethanol

Fuel Type	Feedstock	Production Process Requirements	D-Code
Ethanol	Grain Sorghum	Dry mill process using biogas from landfills, waste treatment plants, and waste digesters, and/or natural gas, for process energy	6
Ethanol	Grain Sorghum	Dry mill process, using only biogas from landfills, waste treatment plants, and waste digesters for process energy and for on-site production of all electricity used at the site other than up to 0.15 kWh of electricity from the grid per gallon of ethanol produced.	5

2. Consideration of Uncertainty

EPA's threshold determinations for grain sorghum ethanol are based on the weight of evidence currently available. For this pathway, the evidence considered includes the mid-point estimate as well as the range of results based on statistical uncertainty and sensitivity analyses conducted by the Agency. EPA has weighed all of the evidence, while placing the greatest weight on the best-estimate value for the scenarios analyzed.

As part of our assessment of the grain sorghum ethanol pathway, we have identified key areas of uncertainty in our analysis. Although there is uncertainty in all portions of the lifecycle modeling, we focused our analysis on the factors that are the most uncertain and have the biggest impact on the results. The indirect international emissions are the component of our analysis with the highest level of uncertainty. The type of land that is converted internationally and the emissions associated with this land conversion are critical issues that have a large impact on the GHG emissions estimates.

Our analysis of land use change GHG emissions includes an assessment of uncertainty that focuses on two aspects of indirect land use change – the types of land converted and the GHG emissions associated with different types of land converted. These areas of uncertainty were estimated statistically using the Monte Carlo analysis methodology developed for the March, 2010 RFS2 final rule.[14] Figure II-1 and Figure II-2 show the results of our statistical uncertainty assessment.

The docket for this final rule provides more details on all aspects of our analysis of grain sorghum ethanol.

[14] The Monte Carlo analysis is described in EPA (2010a), Section 2.4.4.2.8

D. Other Comments Received

We received other comments that suggested that if we are to calculate certain indirect emissions and costs of renewable fuels (e.g., land use, and energy used for extraction), the same should be included for petroleum fuels that are being displaced. These comments were similar to comments we responded to in the March, 2010 final RFS rule. Commenters did not provide any new information or data that would cause us to re-evaluate our methodology that was described in more detail in the March, 2010 RFS2 final rule. Therefore, we are not making the suggested modifications to our lifecycle analysis at this time.

We also received comments regarding the situation where a facility could be characterized under two or more separate pathways. For example a facility co-processing different feedstocks, like corn and sorghum, and using two different process energy sources simultaneously, like natural gas and biogas with on-site electricity production. The commenters asked if different RINs could be produced based on the different pathways represented by the different feedstocks and process energy sources used. In response, we note that 40 CFR §80.1426(f)(3)(i)-(vi) addresses a number of options for the generation of RINs when renewable fuel production can be described by two or more pathways. In situations not covered by the regulations, parties may submit a petition to EPA pursuant to 80.1416.

E. Summary

Based on our GHG lifecycle analysis as discussed above, today's rule includes two pathways for ethanol produced from grain sorghum feedstocks. One pathway will allow the generation of D code 6 RINs for grain sorghum ethanol produced by a natural gas or biogas fired dry mill facility that dries any amount of DG. A second pathway will allow producers of grain sorghum ethanol to generate advanced (D code 5) RINs if they use only biogas for process energy and on-site electricity production and use no more than 0.15 kWh of electricity from the grid per gallon of ethanol produced. In both cases, of course, RINs may only be generated if the fuel meets other definitional criteria for renewable fuel (e.g., produced from renewable biomass as defined in the March, 2010 RFS2 final rule regulations, and used to reduce or replace the quantity of fossil fuel present in transportation fuel, heating oil or jet fuel). In order to qualify for RIN generation, the fuel must meet all other requirements specified in the Clean Air Act and the RFS regulations at 40 CFR Part 80 Subpart M. Parties that produce ethanol through either pathway must do so in a matter that is consistent with current regulations. Failure to do so may result in invalid RINs and penalties.

III. Statutory and Executive Order Reviews

A. Executive Order 12866: Regulatory Planning and Review and Executive Order 13563: Improving Regulation and Regulatory Review

This action is not a "significant regulatory action" under the terms of Executive Order 12866 (58 FR 51735, October 4, 1993) and is therefore not subject to review under Executive Orders 12866 and 13563 (76 FR 3821, January 21, 2011).

B. Paperwork Reduction Act

This action does not impose any new information collection burden. The corrections, clarifications, and modifications to the March, 2010 RFS2 final regulations contained in this rule are within the scope of the information collection requirements submitted to the Office of Management and Budget (OMB) for the March, 2010 RFS2 final regulations.

OMB has approved the information collection requirements contained in the existing regulations at 40 CFR part 80, subpart M under the provisions of the *Paperwork Reduction Act,* 44 U.S.C. 3501 *et seq.* and has assigned OMB control numbers 2060– 0637 and 2060-0640. The OMB control numbers for EPA's regulations in 40 CFR are listed in 40 CFR part 9.

C. Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA) generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions.

For purposes of assessing the impacts of today's rule on small entities, small entity is defined as: (1) A small business as defined by the Small Business Administration's (SBA) regulations at 13 CFR 121.201; (2) a small governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of less than 50,000; and (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.

After considering the economic impacts of this action on small entities, I certify that this rule will not have a significant economic impact on a substantial number of small entities. This rule will not impose any new requirements on small entities. Rather, we expect that this rule may have a positive impact on entities that would now have the opportunity to generate advanced RINs, where they may have been unable to prior to this rule. The relatively minor corrections and modifications this rule makes to the March, 2010 RFS2 final regulations do not impact small entities.

D. Unfunded Mandates Reform Act

This rule does not contain a Federal mandate that may result in expenditures of $100 million or more for State, local, and tribal governments, in the aggregate, or the private sector in any one year. We have determined that this action will not result in expenditures of $100 million or more for the above parties and thus, this rule is not subject to the requirements of sections 202 or 205 of UMRA.

This rule is also not subject to the requirements of section 203 of UMRA because it contains no regulatory requirements that might significantly or uniquely affect small governments. It only applies to gasoline, diesel, and renewable fuel producers, importers, distributors and marketers.

E. Executive Order 13132: Federalism

This action does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. This action only applies to gasoline, diesel, and renewable fuel producers, importers, distributors and marketers. Thus, Executive Order 13132 does not apply to this action.

F. Executive Order 13175: Consultation and Coordination with Indian Tribal Governments

This rule does not have tribal implications, as specified in Executive Order 13175 (65 FR 67249, November 9, 2000). It applies to gasoline, diesel, and renewable fuel producers, importers, distributors and marketers. This action does not impose any enforceable duties on communities of Indian tribal governments. Thus, Executive Order 13175 does not apply to this action.

G. Executive Order 13045: Protection of Children From Environmental Health Risks and Safety Risks

EPA interprets EO 13045 (62 FR 19885, April 23, 1997) as applying only to those regulatory actions that concern health or safety risks, such that the analysis required under section 5–501 of the EO has the potential to influence the regulation. This action is not subject to EO 13045 because it does not establish an environmental standard intended to mitigate health or safety risks.

H. Executive Order 13211: Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use

"This action is not subject to Executive Order 13211 (66 FR 28355 (May 22,2001)), because it is not a significant regulatory action under Executive Order 12866."

I. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (‘‘NTTAA’’), Public Law 104–113, 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards.

This action does not involve technical standards. Therefore, EPA did not consider the use of any voluntary consensus standards.

J. Executive Order 12898: Federal Actions To Address Environmental Justice in Minority

Populations and Low-Income Populations

Executive Order (EO) 12898 (59 FR 7629 (Feb. 16, 1994)) establishes Federal executive policy on environmental justice. Its main provision directs Federal agencies, to the greatest extent practicable and permitted by law, to make environmental justice part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations in the United States.

EPA has determined that this rule will not have disproportionately high and adverse human health or environmental effects on minority or low-income populations because it does not affect the level of protection provided to human health or the environment. These amendments would not relax the control measures on sources regulated by the RFS regulations and therefore would not cause emissions increases from these sources.

K. Congressional Review Act

The Congressional Review Act, 5 U.S.C. 801 et seq., as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. A major rule cannot take effect until 60 days after it is published in the Federal Register. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule the Federal Register. This action is not a “major rule” as defined by 5 U.S.C. 804(2).

IV. Statutory Provisions and Legal Authority

Statutory authority for the rule finalized today can be found in section 211 of the Clean Air Act, 42 U.S.C. 7545. Additional support for today's rule comes from Section 301(a) of the Clean Air Act, 42 U.S.C. 7414, 7542, and 7601(a).

List of Subjects in 40 CFR Part 80

Environmental protection, Administrative practice and procedure, Agriculture, Air pollution control, Confidential business information, Diesel Fuel, Energy, Forest and Forest Products, Fuel additives, Gasoline, Imports, Labeling, Motor vehicle pollution, Penalties, Petroleum, Reporting and recordkeeping requirements.

Dated: November 30, 2012

Lisa P. Jackson,

Administrator

For the reasons set forth in the preamble, 40 CFR part 80 is amended as follows:

PART 80 — REGULATION OF FUELS AND FUEL ADDITIVES

1. The authority citation for part 80 continues to read as follows:

Authority: 42 U.S.C. 7414, 7521(1), 7545 and 7601(a).

2. Section 80.1426 (f)(1) is amended by adding two new entries in Table 1 for "Ethanol" to the end of the table and adding paragraph (f)(13) to read as follows:

§80.1426 How are RINs generated and assigned to batches of renewable fuel by renewable fuel producers or importers?

* * * * *

(f) * * *

Table 1 to §80.1426—Applicable D Codes for Each Fuel Pathway for Use in Generating RINs

Fuel type	Feedstock	Production process requirements	D Code
**	**	**	*
Ethanol	Grain Sorghum	Dry mill process using biogas from landfills, waste treatment plants, and/or waste digesters, and/or natural gas, for process energy	6
Ethanol	Grain Sorghum	Dry mill process, using only biogas from landfills, waste treatment plants, and/or waste digesters for process	5

		energy and for on-site production of all electricity used at the site other than up to 0.15 kWh of electricity from the grid per gallon of ethanol produced, calculated on a per batch basis.	

* * * * *

(13) In order for facilities to satisfy the requirements of the advanced biofuel grain sorghum pathway all of the following conditions (in addition to other applicable requirements) apply.

(i) The quantity of electricity used at the site that is purchased from the grid must be measured and recorded by continuous metering.

(ii) All electricity used on-site that is not purchased from the grid must be produced on-site from biogas from landfills, waste treatment plants, and/or waste digesters.

(iii) For biogas directly transported to the facility without being placed in a commercial distribution system, all of the following conditions must be met:

(A) The producer has entered into a written contract for the procurement of biogas that specifies the volume of biogas, its heat content, and that the biogas must be derived from a landfill, waste treatment plant and/or waste digester.

(B) The volume of biogas was sold to the renewable fuel production facility, and to no other facility.

(C) The volume and heat content of biogas injected into the pipeline and the volume of gas used at the renewable fuel production facility are measured by continuous metering.

(iv) Reserved

(v) For biogas that has been gathered, processed and injected into a common carrier pipeline, all of the following conditions must be met:

(A) The producer has entered into a written contract for the procurement of biogas that specifies a specific volume of biogas, with a specific heat content, and that the biogas must be derived from a landfill, waste treatment plant and/or waste digester.

(B) The volume of biogas was sold to the renewable fuel production facility, and to no other facility.

(C) The volume of biogas that is withdrawn from the pipeline is withdrawn in a manner and at a time consistent with the transport of fuel between the injection and withdrawal points.

(D) The volume and heat content of biogas injected into the pipeline and the volume of gas used at the renewable fuel production facility are measured by continuous metering.

(E) The common carrier pipeline into which the biogas is placed ultimately serves the producer's renewable fuel facility.

(vi) No party relied upon the contracted volume of biogas for the creation of RINs.

*   *   *   *   *

3. Section 80.1450 is amended by adding paragraph (b)(1)(ix) to read as follows:

§ 80.1450 What are the registration requirements under the RFS program?

*   *   *   *   *

(b) *   *   *

(1) *   *   *

(ix) (A) For a producer of ethanol from grain sorghum or a foreign ethanol producer making product from grain sorghum and seeking to have it sold as renewable fuel after addition of denaturant, provide a plan that has been submitted and accepted by U.S. EPA that includes the following information:

(1) Locations from which the biogas used at the facility was produced or extracted.

(2) Name of suppliers of all biogas used at the facility.

(3) An affidavit from each biogas supplier stating its intent to supply biogas to the renewable fuel producer or foreign ethanol producer, the quantity and energy content of the biogas that it intends to provide to the renewable fuel producer or foreign ethanol producer, and that the biogas will be derived solely from landfills, waste treatment plants, and/or waste digesters.

(4) If the producer intends to generate advanced biofuel RINs, estimates of the total amount of electricity used from the grid, the total amount of ethanol produced, and a calculation of the amount of electricity used from the grid per gallon of ethanol produced.

(5) If the producer intends to generate advanced biofuel RINs, a description of how the facility intends to demonstrate and document that not more than 0.15 kWh of grid electricity is used per gallon of ethanol produced, calculated on a per batch basis, at the time of RIN generation.

(B) [Reserved]

*   *   *   *   *

4. Section 80.1451 is amended by redesignating paragraph (b)(1)(ii)(S) as (b)(1)(ii)(T) and adding a new paragraph (b)(1)(ii)(S) to read as follows:

§ 80.1451 What are the reporting requirements under the RFS program?

*   *   *   *   *

(b)   *   *   *

(1)   *   *   *

(ii)   *   *   *

(S) Producers of advanced biofuel using grain sorghum shall report all of the following:

(1) The total amount of electricity that is purchased from the grid and used at the site, based on metering, in kWh.

(2) Total amount of ethanol produced

(3) Calculation of the amount of grid electricity used at the site per gallon of ethanol produced in each batch.

(4) Each batch number as specified in §80.1452(b).

(5) Reference ID for documents required by §80.1454(k)(2)(D).

*   *   *   *   *

5. Section 80.1454 (k) is revised to read as follows:

§ 80.1454 What are the recordkeeping requirements under the RFS program?

*   *   *   *   *

(k) (1) biogas and electricity in pathways involving feedstocks other than grain sorghum. A renewable fuel producer that generates RINs for biogas or electricity produced from renewable biomass (renewable electricity) for fuels that are used for transportation pursuant to §80.1426(f)(1) and (11), or that uses process heat from biogas to generate RINs for renewable fuel pursuant to §80.1426(f)(12) shall keep all of the following additional records:

(i) Contracts and documents memorializing the sale of biogas or renewable electricity for use as transportation fuel relied upon in § 80.1426(f)(10), § 80.1426(f)(11), or for use of biogas for use as process heat to make renewable fuel as relied upon in § 80.1426(f)(12), and the transfer of title of the biogas or renewable electricity and all associated environmental attributes from the point of generation to the facility which sells or uses the fuel for transportation purposes.

(ii) Documents demonstrating the volume and energy content of biogas, or kilowatts of renewable electricity, relied upon under § 80.1426(f)(10) that was delivered to the facility which sells or uses the fuel for transportation purposes.

(iii) Documents demonstrating the volume and energy content of biogas, or kilowatts of renewable electricity, relied upon under § 80.1426(f)(11), or biogas relied upon under § 80.1426(f)(12), that was placed into the common carrier pipeline (for biogas) or transmission line (for renewable electricity).

(iv) Documents demonstrating the volume and energy content of biogas, or kilowatts of renewable electricity, relied upon under § 80.1426(f)(12) at the point of distribution.

(v) Affidavits from the biogas or renewable electricity producer and all parties that held title to the biogas or renewable electricity confirming that title and environmental attributes of the biogas or renewable electricity relied upon under § 80.1426(f)(10) and (11) were used for transportation purposes only, and that the environmental attributes of the biogas relied upon under § 80.1426(f)(12) were used for process heat at the renewable fuel producer's facility, and for no other purpose. The renewable fuel producer shall create and/or obtain these affidavits at least once per calendar quarter.

(vi) The biogas or renewable electricity producer's Compliance Certification required under Title V of the Clean Air Act.

(vii) The biogas or renewable electricity producer's Compliance Certification required under Title V of the Clean Air Act.

(viii) Such other records as may be requested by the Administrator.

(2) Biogas and electricity in pathways involving grain sorghum as feedstock.

(i) Contracts and documents memorializing the purchase and sale of biogas and the transfer of biogas from the point of generation to the ethanol production facility.

(ii) If the advanced biofuel pathway is used, documents demonstrating the total kilowatt-hours (kWh) of electricity used from the grid, and the total kWh of grid electricity used on a per gallon of ethanol basis, pursuant to §80.1426(f)(13).

(iii) Affidavits from the producer of biogas used at the facility, and all parties that held title to the biogas, confirming that title and environmental attributes of the biogas relied upon under §80.1426(f)(13) were used for producing ethanol at the renewable fuel production facility and for no other purpose. The renewable fuel producer shall obtain these affidavits at least once per calendar quarter.

(iv) The biogas producer's Compliance Certification required under Title V of the Clean Air Act.

(v) Such other records as may be requested by the Administrator.

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[FR Doc. 2012-30100 Filed 12/14/2012 at 8:45 am; Publication Date: 12/17/2012]