UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

FEB 4 2013

OFFICE OF
AIR AND RADIATION

Mr. Kelly Kjelden
General Manager
POET Biorefining - Groton
40425 133rd Street
Groton, South Dakota 57445

Dear Mr. Kjelden:

You submitted an *Efficient Producer* petition to the Agency on behalf of POET Biorefining - Groton (POET) to approve a pathway for the generation of renewable fuel (D-code 6) Renewable Identification Numbers (RINs) under the renewable fuel standard (RFS) program for the production of non-grandfathered ethanol. The ethanol is produced through a dry mill process at your production facility located in Groton, South Dakota using corn starch as feedstock (the "POET Groton Corn Process"). POET also uses grain sorghum as a feedstock to produce ethanol; however, this petition only requests a new fuel pathway for the generation of D-code 6 RINs for non-grandfathered ethanol produced using corn starch as feedstock.

Through the petition process described under 40 CFR 80.1416, POET submitted data to the U.S. Environmental Protection Agency to perform a lifecycle greenhouse gas (GHG) emissions analysis of the fuel produced through the POET Groton Corn Process. This analysis involved a straightforward application of the same methodology and much of the same modeling used for the final rule published on March 26, 2010 (75 FR 14670)(the "March 2010 RFS rule"). The difference between this analysis and the analyses completed for the March 2010 RFS rule was the evaluation of a more efficient fuel production process.

The attached document "POET Biorefining - Groton Fuel Pathway Determination under the RFS Program" describes the data submitted by POET, the analysis conducted by the EPA, and our determination of the lifecycle greenhouse gas emissions associated with the fuel production pathway described in the POET petition.

Based on our assessment, the non-grandfathered corn starch ethanol produced through the POET Groton Corn Process qualifies under the Clean Air Act (CAA) for renewable fuel (D-code 6) RINs, assuming the fuel meets the conditions and associated regulatory provisions discussed in the attached document, and the other definitional criteria for renewable fuel (e.g., production from renewable biomass, and used to reduce or replace petroleum-based transportation fuel, heating oil or jet fuel) specified in the CAA and EPA implementing regulations.

POET Biorefining - Groton Fuel Pathway Determination under the RFS Program
Office of Transportation and Air Quality

Summary: POET Biorefining - Groton (POET) submitted an *Efficient Producer* petition (the "POET petition"), dated October 16, 2018 to the Agency to approve their generation of renewable fuel (D-code 6) Renewable Identification Numbers (RINs) under the Renewable Fuel Standard (RFS) program for non-grandfathered ethanol produced through a dry mill process[1] at their production facility located in Groton, South Dakota using corn starch as feedstock (the "POET Groton Corn Process"). POET also uses grain sorghum as a feedstock to produce ethanol; however, this document only addresses POET's request for EPA to approve a new fuel pathway for their generation of D-code 6 RINs for non-grandfathered ethanol produced using corn starch as feedstock.

Although POET intends to document on an ongoing basis that the non-grandfathered corn ethanol it produces at its Groton, South Dakota facility through the POET Groton Corn Process meets the appropriate greenhouse gas (GHG) emissions reduction requirements, EPA has performed a threshold lifecycle GHG emissions analysis based on the information in the POET petition to determine if it appears that corn ethanol produced at the facility may achieve the required GHG reductions, if certain conditions are met. This lifecycle analysis, the results of which are explained in this document, involved a straightforward application of the same methodology and modeling used for the final rule published on March 26, 2010 (75 FR 14670) (the "March 2010 RFS rule"). The difference between this analysis and the analyses completed for the March 2010 RFS rule was the evaluation of a more efficient fuel production process, in terms of the amount of feedstocks and amount/type of energy used to produce a certain quantity of corn ethanol. Based on the data provided in the POET petition, our analysis found that non-grandfathered corn ethanol produced through the POET Groton Corn Process may be able to qualify as renewable fuel if POET satisfies all of the conditions specified in this document to demonstrate that such ethanol meets the minimum 20% lifecycle GHG reduction requirement of the Clean Air Act (CAA).[2]

In this determination EPA is specifying certain conditions designed to ensure that RINs are only assigned to volumes of non-grandfathered corn ethanol produced through the POET Groton Corn Process if the fuel satisfies the corresponding GHG reduction requirements. The EPA is specifying the condition that to generate renewable fuel (D-code 6) RINs for non-grandfathered corn ethanol produced through the POET Groton Corn Process, POET must demonstrate that all corn starch ethanol (including both grandfathered and non-grandfathered corn ethanol) produced during an averaging period (defined as the prior 365 days or the number of days since EPA activated the D-code 6 pathway associated with the POET Groton Corn Process, whichever is less)[3] meets the 20% GHG reduction requirement. To make these demonstrations, POET must keep records on the feedstocks used and the

[1] For purposes of this decision document a "dry mill process" is a process as defined in section I.C of this document.
[2] Per the RFS regulations at 40 CFR 80.1401, ethanol derived from corn starch does not qualify as advanced biofuel.
[3] The full definition of the "averaging time period" is specified in section IV of this document.

participate in the RFS program and the procedures by which renewable fuel producers and importers may generate RINs for the qualifying renewable fuels they produce through approved fuel pathways.[4]

Pursuant to 40 CFR 80.1426(f)(1):

> *Applicable pathways.* D-codes shall be used in RINs generated by producers or importers of renewable fuel according to the pathways listed in Table 1 to this section, subparagraph 6 of this section, or as approved by the Administrator.

Table 1 to 40 CFR 80.1426 lists the three critical components of a fuel pathway: (1) fuel type; (2) feedstock; and (3) production process. Each specific combination of the three components, or fuel pathway, is assigned a D-code. EPA may also independently approve additional fuel pathways not currently listed in Table 1 for participation in the RFS program, or a party may petition for EPA to evaluate a new fuel pathway in accordance with 40 CFR 80.1416. In addition, producers of facilities identified in 40 CFR 80.1403(c) and (d) that are exempt from the 20% GHG emissions reduction requirement of the Act may generate RINs with a D-code of 6 pursuant to 40 CFR 80.1426(f)(6) for a specified baseline volume of fuel ("grandfathered fuel"[5]) assuming all other requirements are satisfied.

The petition process under 40 CFR 80.1416 allows parties to request that EPA evaluate a new fuel pathway's lifecycle GHG reduction and provide a determination of the D-code for which the new pathway may be eligible.

On September 30, 2014, EPA announced a new expedited *Efficient Producer* petition process for corn starch and grain sorghum ethanol producers using a dry mill process that can demonstrate superior process efficiency through reduced onsite energy consumption, increased fuel output and/or use of biomass or biogas from certain sources to reduce process energy greenhouse gas emissions. For example, this *Efficient Producer* process, intended to cover a subset of the petitions received pursuant to 40 CFR 80.1416, would provide a streamlined, facility-specific review for certain ethanol producers petitioning to generate RINs for the production of ethanol beyond their grandfathered volume. EPA considers *Efficient Producer* petitions to be those seeking EPA evaluation of fuel pathways involving certain fuel types, feedstocks and fuel production technologies that EPA has evaluated previously. Petitions that seek EPA evaluation of new/creative fuel production technologies will require additional analysis, and therefore will not be able to use this expedited review process.

---

[4] See EPA's website for information about the RFS regulations and associated rulemakings: http://www2.epa.gov/renewable-fuel-standard-program/statutes-and-regulations-under-renewable-fuel-standard-program

[5] "Grandfathered fuel" refers to a baseline volume of renewable fuel produced from facilities that commenced construction before December 19, 2007 and which completed construction within 36 months without an 18 month hiatus in construction and is thereby exempt from the minimum 20% GHG reduction requirement that applies to general renewable fuel. A baseline volume of ethanol from facilities that commenced construction after December 19, 2007, but prior to December 31, 2009, qualifies for the same exemption if construction is completed within 36 months without an 18 months hiatus in construction and the facility is fired with natural gas, biomass, or any combination thereof.

certifications (with appropriate facility-specific adjustments reflecting feedstocks and energy sources used by the facility and/or to be used in the proposed pathway to be evaluated):

- Certification by the petitioner that the production process for the requested pathway is an ethanol production process where corn and/or grain sorghum feedstock is ground into a coarse flour, also known as "meal"; the meal is cooked into a hot slurry with the addition of enzymes to produce a mixture commonly known as "mash"; the mash is fermented with the addition of yeast to produce ethanol, carbon dioxide and solids from the grain and yeast, known as "fermented mash"; the fermented mash is distilled to produce a mixture of ethanol and water, and a residue of non-fermentable solids, also known as "stillage"; the mixture of ethanol and water is dehydrated to produce 200-proof ethanol; and co-products produced include distillers grains, but may also include carbon dioxide, solubles syrup and vegetable oil (a "dry mill process").
- Certification by the petitioner that the co-product distillers grains are intended for use as animal feed.
- Certification by the petitioner that the dry mill process for the requested pathway uses one or a combination of the following sources for all of its process energy: electricity from the grid, natural gas, coal, biogas or biomass, and that any biomass used as process energy meets the RFS regulatory definition for crop residue at 40 CFR 80.1401.
- Certification by the petitioner that the ethanol production facility uses only corn starch, only grain sorghum or only corn starch and grain sorghum as feedstocks to produce ethanol.
- Certification by the petitioner that all of the information provided in the petition is accurate and complete.

II. Available Information

A. Background on the Petitioner

POET submitted an *Efficient Producer* petition, requesting approval for their generation of RINs for non-grandfathered ethanol produced by a dry mill process from corn starch feedstock at their Groton, South Dakota facility. A petition is required because the pathway associated with the POET Groton Corn Process is not included in Table 1 to 40 CFR 80.1426, and has not otherwise been approved by EPA. Table 1 (relevant portions of which are reproduced below) includes pathways for ethanol from corn starch, but provides only three options for fuel producers using a dry mill process and natural gas, biomass or biogas for process energy: (1) use two advanced technologies from Table 2 to 40 CFR 80.1426, (2) dry no more than 50% of the distillers grains with solubles (DGS) that they produce, or (3) dry no more than 65% of the DGS they produce and use one of the advanced technologies listed in Table 2 to 40 CFR 80.1426. The POET Groton Corn Process does not match any

C. Information Available Through Existing Modeling

For the pathway addressed in their petition, POET would use a feedstock (corn starch) that has already been analyzed as part of the March 2010 RFS rule, as noted in Table 1. POET also uses grain sorghum feedstock to produce ethanol, a fuel pathway that EPA previously evaluated in the final rule published on December 17, 2012 (77 FR 74592) ("the December 2012 grain sorghum rule").[7] As a result, no new feedstock modeling was required to evaluate the POET petition, as modeling for corn starch was already done as part of the March 2010 RFS rule, and modeling for grain sorghum was done for the December 2012 grain sorghum rule. Similarly, no new emissions impact modeling of using ethanol as a transportation fuel was required as that was already done as part of the March 2010 RFS rule. This petition only requires EPA to evaluate a modified fuel production process for an existing fuel type.

The same analytical approach that was used to evaluate the lifecycle GHG emissions of the existing corn ethanol pathways noted above was used to analyze the pathway described in the POET petition. The preamble to the March 2010 RFS rule describes the modeling approach used to estimate lifecycle GHG emissions from corn ethanol. The preamble describes the models and data used as well as the input and output streams from those models to calculate the emissions for each of the lifecycle stages. To modify the corn starch analysis to reflect the process described in the POET petition, the only change required was replacing the production process data with the POET Groton Corn Process data. This resulted in the following changes to the modeling (described in more detail in the following sections):

- Amount of corn used in the fuel production process was modified to reflect the POET Groton process yield in terms of bushels of feedstock input per gallons of ethanol produced; and
- Amount of energy used by the fuel production process was changed to reflect data provided in the POET Groton energy balance.

This was a straightforward analysis based on existing modeling done for the March 2010 RFS rule and substituting the POET Groton process data, which only altered the amounts of certain inputs and outputs of the fuel production process.

---

[7] Although the POET Groton Corn Process analyzed in this petition response uses only corn as a feedstock, because POET Groton also uses grain sorghum EPA's prior modeling of grain sorghum is relevant to determine the lifecycle GHG emissions associated with the corn ethanol produced by POET Groton.

RFS rule, and the existing agricultural sector modeling analyses for corn as feedstock remains valid for use in estimating the lifecycle impact of renewable fuel produced using the POET Groton Corn Process.

The Forest and Agricultural Sector Optimization Model (FASOM) and Food and Agricultural Policy Research Institute (FAPRI) models were used to analyze the GHG impacts of the feedstock production portion of the ethanol lifecycle. The same FASOM and FAPRI results representing the emissions from an increase in corn production that were generated as part of the March 2010 RFS rule analysis of the corn ethanol pathways were used in our analysis of the corn ethanol production process described in the POET petition.

In the corn ethanol analysis for the March 2010 RFS rule, we projected approximately 960 million bushels of corn (assuming 56 pounds per bushel at 15.5 percent moisture) used to produce 2.6 billion additional gallons of ethanol compared to a baseline scenario (based on a yield of 2.71 gallons per bushel), and we calculated GHG emissions from feedstock production for that amount of corn. The FASOM and FAPRI agricultural sector GHG results were divided by the total energy value of fuel produced to get emissions per mmBtu of ethanol.[8] For the modeled scenario we estimated lifecycle GHG emissions of 9.73 $kgCO_2e$ per bushel of corn used to make ethanol. This includes the upstream emissions associated with producing the corn feedstock and transporting it to the ethanol production facility, and also includes significant direct and indirect emissions (such as emissions from land use change). Therefore, to estimate the lifecycle GHG emissions from the corn feedstock used to make ethanol in the POET Groton Corn Process, the bushels of corn used as feedstock provided in the POET petition were multiplied by the emissions factor of 9.73 $kgCO_2e$ per bushel. In the same manner as described in section IV.D. of this document, these emissions were then normalized by the mmBtu of ethanol produced from the same amount of bushels of corn.

POET also uses grain sorghum as a feedstock to produce ethanol at their POET Groton facility. EPA's analysis in this determination considers the amount of grain sorghum used by POET Groton and the total amount of all ethanol produced at the facility in order to establish the yield of ethanol per bushel of corn starch feedstock used in the process. Specifically, EPA used a mass-based allocation approach over all ethanol gallons to determine the yield of ethanol per standard bushel of corn. For example, if three hundred bushels of corn and one hundred bushels of grain sorghum (assuming standard 56 pounds per bushel) were used to produce 1,000 gallons of ethanol, EPA would consider three quarters of the ethanol (750 gallons) to be derived from corn feedstock and the other quarter (250 gallons) to be derived from grain sorghum feedstock, and EPA's analysis would consider the corn ethanol yield to be 2.5 gallons per bushel of corn.[9] This approach is valid because per EPA's analysis

[8] For the purposes of this determination document, Btus are expressed on a lower heating value (LHV) basis, gallons of ethanol are expressed on an undenatured (neat) basis, and bushels of corn are expressed in terms of 15.5% moisture content unless otherwise specified.

[9] The numbers provided in this example are for illustrative purposes only.

adjustments were made so that each gallon of grain sorghum ethanol produced used 3.7% less thermal energy and 0.7% less electrical energy than each gallon of corn ethanol.[10]

The lifecycle GHG emissions factors used for process energy were the same emissions factors used in the modeling for the March 2010 RFS rule:

- Natural gas = $6.86*10^{-5}$ $kgCO_2e$/Btu
- Coal = $1.12*10^{-4}$ $kgCO_2e$/Btu
- Biogas CH_4 = $3.64*10^{-7}$ $kgCO_2e$/Btu
- U.S. average grid electricity = 0.750 $kgCO_2e$/kWh
- Crop residue biomass used onsite for process energy upstream emissions = $5.40*10^{-3}$ $kgCO_2e$ per dry pound (based on the corn stover lifecycle analysis for the March 2010 RFS rule)

Fuel distribution and use (downstream emissions) – The fuel type, ethanol, and hence the fuel distribution and use for ethanol, was already considered as part of the March 2010 RFS rule. Therefore, we applied the existing fuel distribution and use lifecycle GHG impacts for corn ethanol to our analysis of the POET petition. The emissions factor for ethanol distribution and use, otherwise known as downstream emissions, is 2.1 $kgCO_2e$ per mmBtu of ethanol.

Lifecycle GHG emissions – The lifecycle GHG emissions associated with POET Groton's fuel were then compared to the baseline lifecycle GHG emissions, using the same value for baseline gasoline as in the March 2010 RFS rule analysis. Based on the data submitted by POET, our analysis indicates that corn ethanol produced using the POET Groton Corn Process would result in at least a 20 percent GHG emissions reduction compared to the baseline lifecycle GHG emissions.

Table 2 below breaks down by stage the lifecycle GHG emissions for corn ethanol produced using the POET Groton Corn Process, compared to such emissions for a corn ethanol pathway analyzed as part of the March 2010 RFS rule that does not use any of the advanced technologies specified in the RFS regulations and dries all of its co-product DGS, and the 2005 gasoline baseline. This table demonstrates the contribution of each stage in the fuel pathway and its relative significance in terms of GHG emissions.

In the table, upstream emissions include the GHG emissions associated with producing the corn feedstock and transporting it to the fuel production facility. Process emissions include the GHG emissions associated with the corn ethanol production process. Downstream emissions include the GHG emissions associated with distributing and using the finished fuel. Table 2 provides EPA's mean estimate of GHG emissions for each of these stages of the lifecycle.

[10] For details on how this calculation was performed see the equation to calculate GHG_{Pc} in section IV of this document.

renewable fuel and renewable fuel producers set forth in the RFS regulations. The conditions in this section are enforceable under the CAA. They are established pursuant to the informal adjudication reflected in this decision document, and also pursuant to regulations cited below and 40 CFR 80.1416(b)(1)(vii), 80.1450(i), and 80.1451(b)(1)(ii)(W). In addition or in the alternative to bringing an enforcement action under the CAA, EPA may revoke this pathway approval if it determines that POET has failed to comply with any of the conditions specified herein.[12]

The pathway for corn ethanol approved in this document is in addition to the existing pathways for corn ethanol listed in rows A, B, C and D of Table 1 to 40 CFR 80.1426. POET may also generate RINs under 40 CFR 80.1426(f)(6) for fuel that qualifies for the "grandfathering" exemption under 40 CFR 80.1403. This document does not impact the ability of POET to generate RINs for volumes of fuel pursuant to 40 CFR 80.1426(f)(6) or the approved pathways in Table 1 to 40 CFR 80.1426.

This section details the registration, compliance monitoring, lifecycle GHG computation, recordkeeping, reporting, attest engagement and other requirements that apply to the non-grandfathered corn ethanol pathway associated with the POET Groton Corn Process and it is organized as follows:

- *Sub-section A*: definitions
- *Sub-section B*: registration requirements
- *Sub-section C*: compliance monitoring
- *Sub-section D*: lifecycle GHG conditions and associated computational requirements
- *Sub-section E*: recordkeeping requirements
- *Sub-section F*: reporting requirements
- *Sub-section G*: additional requirements

As described in the following sections, one condition for POET to generate RINs for non-grandfathered ethanol produced through the POET Groton Corn Process during a specified averaging period (typically 365 days) is documentation by POET that RINs are only generated if, on average, all ethanol produced during the specified averaging period satisfies the 20% lifecycle GHG reduction requirement. The 365-day (or shorter in certain circumstances) rolling average is calculated based on the daily data monitored and collected by POET and the formula specified in section IV.D.

A. Definitions

For the purposes of this petition approval, the following terms are defined as follows:

[12] As with all pathway determinations, this approval does not convey any property rights of any sort, or any exclusive privilege.

POET Groton must comply with all registration provisions in 40 CFR Part 80, Subpart M that apply to renewable fuel producers to register for the production of non-grandfathered corn ethanol through the POET Groton Corn Process. The description of the POET Groton production process that is required for registration pursuant to 40 CFR 80.1450(b)(1)(ii) shall contain the following:[16]

a. A Compliance Monitoring Plan including technical specifications detailing how POET will accurately and reliably measure and record all of the daily data required in section IV.D. and calculate and record the 365-day rolling average lifecycle GHG emissions.

b. A process flow diagram showing all of the following:

    1. The supply and continuous monitoring of all energy used for feedstock, fuel and co-product operations.

    2. The continuous monitoring of bushels of corn and grain sorghum used in fuel production processes for all of the ethanol produced by POET Groton, including non-grandfathered ethanol for which RINs are generated, ethanol for which RINs are not generated and ethanol that is exempt from the 20% GHG reduction requirement per 40 CFR 80.1403.

    3. The continuous monitoring of volume and temperature[17] for all of the ethanol produced by POET Groton, including non-grandfathered ethanol for which RINs are generated, ethanol for which RINs are not generated and ethanol for which RINs are generated that is exempt from the 20% GHG reduction requirement per 40 CFR 80.1403.

    4. Information for each of the continuous monitoring systems (e.g., scales, fuel flow meters and electricity meters) shown in the process flow diagram including the name of the manufacturer, the manufacture date and all relevant serial numbers.

c. A certification signed by a Responsible Corporate Officer containing the following statement: "I hereby certify that: (1) I have reviewed and understand the process flow diagram submitted with this application for registration as required pursuant to section IV.B.b of the petition approval document for the pathway associated with the POET Groton Corn Process; (2) To the best of my knowledge the process flow diagram is accurate and complete; (3) All monitoring devices specified in the process flow diagram will be calibrated and maintained according to the manufacturer specifications or more frequently (if the manufacturer does not provide calibration or maintenance records then the company shall meet standards for similar monitoring devices); and (4) All of the monitoring devices included in the process flow diagram monitor all of the information specified in sections

[16] All of the registration materials required by 80.1450(b)(1), including those specifically described in this document, must be reviewed and verified pursuant to the independent third party engineering review required in 80.1450(b)(2).
[17] Temperature readings must take place at the same time the volume is measured.

minimum of five years from the date of RIN generation that it has satisfied all of the following requirements:

a. All of the ethanol produced at POET Groton was produced by a dry mill process using only corn starch, grain sorghum or a combination of corn starch and grain sorghum as feedstocks during the averaging time period.

b. The 365-day rolling average lifecycle GHG emissions are calculated using the following formula, and do not exceed 78.56 kgCO2e/mmBtu of corn ethanol:[19]

$$LC_{GHGc} = GHG_{Uc} + GHG_{Pc} + GHG_{D}$$

Where:

LC_{GHGc} = Lifecycle GHG emissions, in $kgCO_2e$/mmBtu, of the volume of all corn ethanol produced at the facility during the averaging time period.

GHG_{Uc} = Upstream GHG emissions, in $kgCO_2e$/mmBtu, related to the production and transport of the volume of corn starch feedstock used to produce all corn ethanol produced at the facility during the averaging time period, calculated per section IV.D.c.

GHG_{Pc} = Process GHG emissions, in $kgCO_2e$/mmBtu, related to the processes used for conversion of corn into ethanol during the averaging period, including energy used for feedstock, fuel and co-product operations; calculated per section IV.D.d.

GHG_{D} = Downstream GHG emissions, in $kgCO_2e$/mmBtu, related to the distribution and use of all corn ethanol produced during the averaging period, calculated per section IV.D.e.

c. For the purposes of the formula in section IV.D.b, GHG_{Uc} is calculated according to the following formula:

$$GHG_{U_C} = \frac{9.73 * B_C}{\left(V_S * 0.076 * \left[\frac{B_C}{B_C + B_{GS}}\right]\right)}$$

Where:

9.73 = Upstream emissions factor for corn, in $kgCO_2e$ per bushel, based on the lifecycle GHG modeling done by EPA for the March 2010 RFS rule.

B_C = Bushels of corn used by POET Groton as feedstock to produce ethanol during the averaging time period in terms of a standard bushel at 15.5% moisture.

[19] The statutory petroleum gasoline baseline estimated for the March 2010 RFS final rule was 98.2 $kgCO_2e$/mmBtu. Fuel meeting the twenty percent lifecycle GHG reduction threshold produces 78.56 $kgCO_2e$/mmBtu or less.

m_{gs} = Average moisture content of grain sorghum, in mass percent, for the grain sorghum delivered to POET Groton for use as feedstock to produce ethanol during the averaging time period. The moisture content tests performed by POET shall sample grain sorghum that, based on good engineering judgment, is representative of each delivery of grain sorghum feedstock to POET Groton. POET shall test the moisture content of the grain sorghum delivered in each and every truck load, train load, or other delivery of grain sorghum to POET Groton, and for any given delivery must measure the grain sorghum moisture content no less frequently than once for every 10,000 bushels. For moisture content, POET shall use a DICKEY-john GAC 2500UGMA or Perten AM 5200-A moisture meter, as certified by the National Type Evaluation Program, and follow the device's operating instructions, or use alternative test methods as specified by POET in their Compliance Monitoring Plan accepted by EPA. POET shall calculate the average moisture content as a weighted average, by summing the products of the mass and corresponding moisture content of each grain sorghum delivery, and then dividing by the total mass of grain sorghum feedstock delivered to POET Groton during the averaging time period.

0.13 = Moisture content of a standard bushel of grain sorghum at 56 pounds per bushel.

V_S = Standardized volume of all ethanol produced at the POET Groton facility during the averaging time period (including both corn starch and grain sorghum ethanol), in gallons of undenatured ethanol. In determining the standardized volume, the actual volumes of ethanol shall be adjusted to a standard temperature of 60 degrees Fahrenheit using the following formula:

$$V_S = V_A * \left(1 - \left(0.00114 * \left(\left[\{T + 459.67\} * \frac{5}{9}\right] - \left[\{60 + 459.67\} * \frac{5}{9}\right]\right)\right)\right)$$

Where:

V_A = Actual volume of undenatured ethanol, in gallons.

T = Actual temperature of ethanol, in degrees Fahrenheit, measured at the same time that V_A is measured.

0.00114 = Coefficient to standardize volumes of undenatured ethanol.

60 = Standard temperature, in degrees Fahrenheit, for volumes of ethanol.

459.67 and 5/9 = Conversion factors for Fahrenheit to Kelvin

0.076 = Energy content of ethanol, in mmBtu/gallon (lower heating value).

$LHV_{PE,3}$ = 19,546,300 Btu per ton of coal.

$EF_{PE,p}$ = Lifecycle GHG emissions factor for fuel type p, (based on lower heating value) as follows:

$EF_{PE,1} = 6.86 * 10^{-5}$ $kgCO_2e$ per Btu of natural gas.

$EF_{PE,2} = 3.64 * 10^{-7}$ $kgCO_2e$ per Btu of biogas CH_4.

$EF_{PE,3} = 1.12 * 10^{-4}$ $kgCO_2e$ per Btu of coal.

BIO = Dry pounds (0% moisture) of biomass used as energy used for feedstock, fuel and co-product operations, as measured by POET by continuous monitoring.

$EF_{bio} = 5.40*10^{-3}$ $kgCO_2e$ per dry lbs of crop residue biomass.

0.963 = Adjustment factor for grain sorghum processing using 3.7% less thermal energy than corn ethanol processing.

0.993 = Adjustment factor for grain sorghum processing using 0.7% less electrical energy than corn ethanol processing.

$R_{GS} = \left(\frac{B_{GS}}{B_C+B_{GS}}\right)$ which is the ratio of grain sorghum feedstock used, on a mass basis.

$R_C = \left(\frac{B_C}{B_C+B_{GS}}\right)$ which is the ratio of corn feedstock used, on a mass basis.

GHG_{ELEC} = The greenhouse gas emissions, in $kgCO_2e$, associated with electricity used for feedstock, fuel and co-product operations, as measured by POET by continuous monitoring, and calculated according to the following formula:

$$GHG_{ELEC} = ELEC * EF_{elec}$$

Where:

ELEC = kWh of Grid electricity used as energy used for feedstock, fuel and co-product operations, as measured by POET by continuous monitoring.

EF_{elec} = 0.750 $kgCO_2e$ per kWh of grid electricity, based on the United States grid average.

e. For the purposes of the formula in section IV.D.b, GHG_D is calculated to be 2.1 kgCO2e per mmBtu of ethanol.

f. For the purposes of section IV.D., for all corn ethanol produced by POET during a day where POET has missing data on any of the factors described in this section, POET shall assess the corn ethanol produced on all such days as having lifecycle GHG emissions of

G. Additional Conditions

The authority for POET to generate RINs for non-grandfathered corn ethanol produced pursuant to the POET Groton Corn Process is expressly conditioned on POET satisfying all of the following additional conditions:

a. For any biogas energy used for feedstock, fuel and co-product operations, POET must satisfy the requirements specified at 40 CFR 80.1426(f)(12)(i) and/or (ii), as applicable, of the RFS regulations.

b. All of the biomass used onsite as process energy used for feedstock, fuel and co-product operations must be one or any combination of the types of biomass that is a crop residue, as defined at 40 CFR 80.1401 in the RFS regulations.[25]

POET may not generate RINs for non-grandfathered corn ethanol produced through the POET Groton Corn Process if POET fails to comply with any of the conditions in this section IV. However, this does not prevent POET from generating RINs for fuel produced pursuant to any of the pathways specified in Table 1 to 40 CFR 80.1426, or pursuant to 40 CFR 80.1426(f)(6), to the extent that POET is authorized to do so under applicable regulations.

If POET chooses to generate grandfathered RINs pursuant to 40 CFR 80.1426(f)(6), and generate RINs for non-grandfathered corn ethanol produced pursuant to the POET Groton Corn Process during any calendar year, POET may only generate RINs for non-grandfathered corn ethanol after it generates RINs for all of its grandfathered baseline volume. In other words, POET must first produce and generate RINs for its grandfathered volume before generating RINs under the pathway being approved in this document.[26]

Per the existing RFS regulations, if POET Groton generates D-Code 6 RINs for ethanol made from corn starch feedstock and also generates advanced biofuel (D-Code 5) RINs for grain sorghum ethanol, the appropriate subparagraphs of 40 CFR 80.1426(f)(3) shall be used to allocate RINs.

---

[25] See the July 2014 RFS rule (79 FR 42128) for more details on what EPA considers to be residue.

[26] There are several reasons for the inclusion of this condition. There are data reliability benefits associated with requiring the generation of grandfathered RINs first. Since POET will be required to start tracking energy use once this pathway is activated in EMTS, they will have a more robust set of data that contributes to their 365-day rolling average, compared to having just one data point on the first day of approval. In addition, this condition will help to reduce the Agency's administrative burden related to enforcement and compliance. If POET were able to switch back and forth between generating grandfathered and non-grandfathered RINs, auditing their records would require EPA to do a more complex review of historical data. Furthermore, alternating between the grandfathered and non-grandfathered RIN generation creates more opportunities for errors in the calculations required to meet the GHG emission reduction threshold, and also provides more opportunities for errors when generating RINs in EMTS. EPA has approved pathway petitions in the past with conditions allowing parties to switch back and forth between the production of grandfathered and non-grandfathered volume during a calendar year. However, for the reasons described above, we have decided not to grant additional petitions allowing such an approach.

This document specifies conditions designed to ensure that D-code 6 RINs are generated for non-grandfathered corn ethanol produced pursuant to the POET Groton Corn Process only if the ethanol satisfies the 20% lifecycle GHG reduction requirements specified in the CAA for renewable fuel. The fuel must also meet other applicable requirements specified in the CAA and EPA implementing regulations to qualify for RIN generation, including being produced from renewable biomass, and for use as transportation fuel, heating oil or jet fuel.

This approval applies specifically to the POET Groton facility and to the process, materials used, fuel and co-products produced, and process energy sources as outlined and described in the POET petition. Although POET Groton also uses grain sorghum as a feedstock to produce ethanol, this document only addresses POET's request for EPA to approve a new fuel pathway for their generation of D-code 6 RINs for non-grandfathered ethanol produced from corn starch feedstock. This approval is effective as of signature date. However, RINs may only be generated for non-grandfathered corn ethanol produced pursuant to the POET Groton Corn Process that is produced after the date of activation of POET's registration for this pathway.

The OTAQ Reg: Fuels Programs Registration and OTAQEMTS: OTAQ EMTS Application (OTAQ Reg and EMTS) will be modified to allow POET to register to generate RINs for the production of non-grandfathered ethanol from corn starch feedstock using a production process of "POET Groton Corn Process." This document has no impact on the ability of POET to use the OTAQ Reg and EMTS to register and generate RINs for the facility's baseline volume of grandfathered ethanol fuel or to register and generate RINs for ethanol produced using any of the pathways specified in Table 1 to 40 CFR 80.1426.