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

FEB 6 2013

OFFICE OF
AIR AND RADIATION

Mr. Gregory Ridderbusch
President, Dakota Spirit AgEnergy
12300 Elm Creek Boulevard
Maple Grove, Minnesota 55369

Dear Mr. Ridderbusch:

You petitioned the Agency on behalf of Dakota Spirit AgEnergy, LLC, to approve their pathway for the production of renewable fuel RINs (D-code 6) under the renewable fuel standard ("RFS") program. Dakota's facility produces ethanol using corn as a feedstock; a dry mill process; imported steam (derived from an offsite combined heat and power system at an adjacent power plant and up to 4,000 Btu of steam per gallon of ethanol derived from an offsite natural gas boiler) for all steam needs including drying all distillers grains; natural gas for emissions controls; grid electricity; and generates up to 100% co-product distillers dry grains with solubles (the "Dakota Process").

Through the petition process described under 40 CFR § 80.1416, Dakota submitted data to the Environmental Protection Agency to perform a lifecycle greenhouse gas emissions analysis of the Dakota 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 ("the March 2010 RFS Rule"). EPA performed its assessment of the Dakota Process based on the modeling done for the corn starch ethanol pathways performed as part of the March 2010 RFS Rule. The attached document "Dakota Spirit AgEnergy Request for Fuel Pathway Determination under the RFS Program" describes the data submitted by Dakota, the analysis conducted by the EPA, and our determination of the lifecycle greenhouse gas emissions associated with the fuel production pathway described in Dakota's petition.

Based on our assessment, fuel produced pursuant to the Dakota Process qualifies under the Clean Air Act (CAA) for renewable fuel (D-code 6) RINs, assuming that the fuel meets the other definitional criteria for renewable fuel (e.g., produced 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.

This approval applies specifically to Dakota Spirit AgEnergy, LLC, and to the process, materials used, fuel produced, and process energy sources as outlined and described in the petition request submitted by Dakota.

The OTAQ Reg: Fuels Programs Registration and OTAQEMTS: OTAQ EMTS Application will be modified to allow Dakota to register and generate RINs for the production of ethanol from corn feedstock using a production process of "Dakota Process."

If you have additional questions about this or related issues, please contact Venu Ghanta of my staff at 202-564-1374.

Sincerely,

Christopher Grundler, Director
Office of Transportation and Air Quality

Enclosure

Dakota Spirit Ag Energy Request for Fuel Pathway Determination under the RFS Program
Office of Transportation and Air Quality
February 6, 2013

Summary: Dakota Spirit AgEnergy ("Dakota") petitioned the Agency to approve their pathway for production of renewable fuel RINs (D-code 6) under the renewable fuel standard ("RFS") program. Dakota's facility produces ethanol using corn as a feedstock; a dry mill process; imported steam (derived from an offsite combined heat and power system at an adjacent power plant and up to 4,000 Btu of steam per gallon of ethanol derived from an offsite natural gas boiler) for all steam needs including drying all distillers grains; natural gas for emissions controls; grid electricity; and generates up to 100% co-product distillers dry grains with solubles (the "Dakota Process").

Through the petition process described under 40 CFR § 80.1416, Dakota submitted data to EPA to perform a lifecycle greenhouse gas emissions analysis of the Dakota 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 is the evaluation of a modified fuel production process. Dakota's proposed process is unlike those used in pathways modeled for the March 2010 RFS Rule in that they intend to meet their steam needs by importing steam from the adjacent Spiritwood Station coal-fired power plant. The power plant would operate in a combined heat and power[1] (CHP) mode most of the time. However, Dakota states in their petition that steam may be supplied from a backup natural gas boiler that operates in steam-only mode for up to 1,000 hours per year (out of a total of 8,760 hours of operation annually), which amounts to approximately 4,000 Btu steam from the backup boiler per gallon on an annual basis. As EPA had not previously considered the treatment of steam from an offsite CHP plant under the RFS program in a lifecycle emissions accounting analysis, it was necessary to determine emissions associated with the imported steam to the Dakota plant. EPA outlined an approach for determining the emissions associated with the steam extracted for use at the Dakota plant in a *Federal Register* notice published on September 11, 2012 ("the Dakota Federal Register notice"),[2] to provide the public an opportunity to comment.

As outlined in the preamble to the March 2010 RFS Rule, the Dakota Process is the type of new pathway that EPA envisioned would be evaluated by comparing the applicant's fuel pathway to pathway(s) that have already been analyzed. EPA performed its assessment of the Dakota Process based on the modeling done for the corn starch ethanol pathways performed as part of the March 2010 RFS Rule (the "RFS corn ethanol pathways"). Based on the data submitted and the existing modeling for the RFS corn ethanol pathways, EPA conducted a lifecycle assessment and determined that the

[1] As defined in 40 CFR § 80.1401, combined heat and power "refers to industrial processes in which byproduct heat that would otherwise be released into the environment is used for process heating and/or electricity production".
[2] 77 FR 55834

Dakota Process meets the 20% lifecycle greenhouse gas (GHG) threshold based on the discussions below and subject to all conditions noted below. For the Dakota Process, the result is a 20% reduction in GHG emissions compared to the gasoline fuel baseline. Based on our assessment, the fuel produced through the Dakota Process qualifies for generating RINs for renewable fuel (D-code 6).

This document is organized as follows:

- *Section I. Required Information and Criteria for Petition Requests*: This section contains information on the background and purpose of the petition process, the criteria EPA uses to evaluate the petitions and the information that is required to be provided under the petition process as outlined in 40 CFR § 80.1416. This section is not specific to Dakota's request and applies to all petitions submitted pursuant to 40 CFR § 80.1416.
- *Section II. Available Information*: This section contains background information on Dakota and describes the information that Dakota provided and how it complies with the petition requirements outlined in Section I.
- *Section III. Analysis and Discussion*: This section describes the lifecycle analysis done for the Dakota Process and identifies how it differs from the analysis done for the corn starch ethanol pathway analyzed as part of the March 2010 RFS Rule. This section also describes how we have applied the lifecycle results to determine the appropriate D-Code for the Dakota Process.
- *Section IV. Conditions and Associated Regulatory Provisions:* This section describes the regulatory provisions associated with this petition.
- *Section V. Public Participation*: This section describes our administrative process to consider Dakota's petition and explains how this petition analysis is an extension of the analysis done as part of the March 2010 RFS Rule.
- *Section VI. Conclusion*: This section summarizes our conclusions regarding Dakota's petition, including the D-code Dakota may use in generating RINs for ethanol produced using the Dakota Process.

I. Required Information and Criteria for Petition Requests

A. Background and Purpose of Petition Process

As a result of changes to the Renewable Fuel Standard program in Clean Air Act ("CAA") Section 211(o) required by the Energy Independence and Security Act of 2007 ("EISA"), EPA adopted new regulations, published at 40 CFR § 80.1400 *et. seq*. The RFS program regulations specify the types of renewable fuels eligible to participate in the RFS program and the procedures by which renewable fuel producers and importers could generate Renewable Identification Numbers ("RINs") for the qualifying renewable fuels they produce through approved fuel pathways. See 75 FR 14670 (March 26, 2010); 75 FR 26026 (May 10, 2010); 75 FR 37733 (June 30, 2010); 75 FR 59622 (September 28, 2010); 75 FR 76790 (December 9, 2010); 75 FR 79964 (December 21, 2010); 77 FR 1320 (January 9, 2012); and 77 FR 74592 (December 17, 2012).

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, paragraph (f)(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 third 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 §§ 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.

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. In the event that EPA determines that the pathway described in a petition qualifies for a D-code, EPA will extend a similar approval to other petitioners utilizing the same fuel pathway upon verification that the pathway is indeed the same and assuming all other requirements are met.

B. Required Information in Petitions

As specified in 40 CFR § 80.1416(b)(1), petitions must include all of the following information, and should also include as appropriate supporting documents such as independent studies, engineering estimates, industry survey data, and reports or other documents supporting any claims:

- The information specified under 40 CFR § 80.76 (Registration of refiners, importers or oxygenate blenders).
- A technical justification that includes a description of the renewable fuel, feedstock(s), and production process. The justification must include process modeling flow charts.
- A mass balance for the pathway, including feedstocks, fuels produced, co-products, and waste materials production.
- Information on co-products, including their expected use and market value.
- An energy balance for the pathway, including a list of any energy and process heat inputs and outputs used in the pathway, including such sources produced off site or by another entity.

- Any other relevant information, including information pertaining to energy saving technologies or other process improvements.
- Other additional information as requested by the Administrator to complete the lifecycle greenhouse gas assessment of the new fuel pathway.

In addition to the requirements stated above, parties who use a feedstock not previously evaluated by EPA must also include the following, and should also include as appropriate supporting information such as state, county, or regional crop data, commodity reports, independent studies, industry or farm survey data, and reports or other documents supporting any claims:

- Type of feedstock and description of how it meets the definition of renewable biomass.
- Market value of the feedstock.
- List of other uses for the feedstock.
- List of chemical inputs needed to produce the renewable biomass source of the feedstock and prepare the renewable biomass for processing into feedstock.
- Energy needed to obtain the feedstock and deliver it to the facility. If applicable, identify energy needed to plant and harvest the source of the feedstock and modify the source to create the feedstock.
- Current and projected yields of the feedstock that will be used to produce the fuels.
- Other additional information as requested by the Administrator to complete the lifecycle greenhouse gas assessment of the new fuel pathway.

II. Available Information

A. Background on Dakota

Dakota submitted a petition requesting authorization to generate D-code 6 RINs for fuel produced through the Dakota Process. A petition is required because the Dakota Process is not included as an approved process in Table 1 to 40 CFR § 80.1426. Table 1 includes pathways for ethanol from corn starch, but requires that fuel producers utilize two advanced technologies if they do not take a limit on the amount of distillers dry grains with solubles (DDGS) that they produce. An excerpt of Table 1 is reproduced below. The list of advanced technologies can be found in Table 2 to 40 CFR § 80.1426 and includes combined heat and power, as shown below.

Table 1: Relevant Existing Corn Ethanol Fuel Pathways from 40 CFR § 80.1426

Fuel Type	Feedstock	Production Process Requirements	D-Code
Ethanol	Corn Starch	All of the following: Dry mill process, using natural gas, biomass, or biogas for process energy and at least two advanced technologies from Table 2 to this section	6 (Renewable Fuel)
Ethanol	Corn Starch	All of the following: Dry mill process, using natural gas, biomass, or biogas for process energy and at least one of the advanced technologies from Table 2 to this section plus drying no more than 65% of the distillers grains with solubles it markets annually	6 (Renewable Fuel)
Ethanol	Corn Starch	All of the following: Dry mill process, using natural gas, biomass, or biogas for process energy and drying no more than 50% of the distillers grains with solubles it markets annually	6 (Renewable Fuel)

Table 2: Reproduction of Table 2 to 40 CFR § 80.1426

Corn oil fractionation that is applied to at least 90% of the corn used to produce ethanol on a calendar year basis.
Corn oil extraction that is applied to the whole stillage and/or derivatives of whole stillage and results in recovery of corn oil at an annual average rate equal to or greater than 1.33 pounds oil per bushel of corn processed into ethanol.
Membrane separation in which at least 90% of ethanol dehydration is carried out using a hydrophilic membrane on a calendar year basis.
Raw starch hydrolysis that is used for at least 90% of starch hydrolysis used to produce ethanol instead of hydrolysis using a traditional high heat cooking process, calculated on a calendar year basis.
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.

In the March 2010 RFS Rule, EPA evaluated a corn ethanol production facility that utilized an onsite CHP system as part of the ethanol production process. The process evaluated a CHP system

installed at the production facility that generated steam and electricity for use in the process for producing ethanol. Dakota's proposed approach is different in that instead of operating an onsite CHP system, they plan to import steam generated by the adjacent Spiritwood Station power plant that will usually operate in CHP mode, and will use electricity purchased from the grid. EPA did not consider an offsite CHP system configuration in the March 2010 RFS Rule and did not intend to include an offsite CHP system as an advanced technology in Table 2 to 40 CFR § 80.1426. Since Dakota does not use two advanced technologies or take a limit on the quantity of DDGS that they produce, they do not qualify for any of the existing pathways in Table 1 to 40 CFR § 80.1426.

B. Information Available Through Existing Modeling

A fuel pathway under the RFS regulations is defined by three components: (1) fuel type; (2) feedstock; and (3) production process. For the pathway addressed in Dakota's petition, Dakota would use a feedstock – corn starch – that has already been analyzed as part of the March 2010 RFS Rule, as noted in Table 1. As a result, no new feedstock modeling was required as modeling for corn starch was already done as part of the March 2010 RFS 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 pathways noted above was used to analyze the Dakota Process. The preamble to the March 2010 RFS Rule describes the modeling approach used to estimate lifecycle GHG emissions from corn starch 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 ethanol analysis to reflect the Dakota fuel pathway, the only change required was replacing the corn ethanol production process data with the Dakota process data. This resulted in changing the modeling (described in more detail in the following sections) to reflect the amount of energy used by the fuel production process and associated emissions from fuel production and use as provided in Dakota's energy balance.

This was a straightforward analysis based on existing modeling done for the March 2010 RFS Rule and substituting Dakota's proprietary process data, which only altered the amounts of inputs and outputs. The analyses completed for EPA's response to Dakota's petition utilizes the same fundamental modeling approach as was used in the March 2010 RFS Rule analyses.

C. Information Submitted by Dakota

Dakota has supplied all the required information on their production process that EPA needs to analyze the lifecycle GHG emissions associated with the Dakota Process. Information submitted includes a technical justification that has a description of the fuel, feedstocks used, and their proprietary production process with modeling flow charts, a detailed mass and energy balance of the process with information on co-products as applicable, and other additional information as needed to complete the lifecycle greenhouse gas assessment.

III. Analysis and Discussion

A. Lifecycle Analysis

Determining a fuel pathway's compliance with the lifecycle GHG reduction thresholds specified in the CAA for different types of renewable fuel requires a comprehensive evaluation of the renewable fuel, as compared to the gasoline or diesel fuel that it replaces, on the basis of its lifecycle GHG emissions. As mandated by the CAA, the GHG emissions assessments must evaluate the aggregate quantity of GHG emissions (including direct emissions and significant indirect emissions such as significant emissions from land use changes) related to the full fuel lifecycle, including all stages of fuel and feedstock production, distribution, and use by the ultimate consumer.

In examining the full lifecycle GHG impacts of renewable fuels for the RFS program, EPA considers the following:

- Feedstock production – based on agricultural sector models that include direct and indirect impacts of feedstock production.
- Fuel production – including process energy requirements, impacts of any raw materials used in the process, and benefits from co-products produced.
- Fuel and feedstock distribution – including impacts of transporting feedstock from production to use, and transport of the final fuel to the consumer.
- Use of the fuel – including combustion emissions from use of the fuel in a vehicle.

EPA's evaluation of the lifecycle GHG emissions of the Dakota Process under this petition request is consistent with the CAA's applicable requirements, including the definition of lifecycle GHG emissions and threshold evaluation requirements. It was based on information regarding Dakota's production process that was submitted under a claim of Confidential Business Information (CBI) by Dakota on May 4, 2012. The information provided included the mass and energy balances necessary for EPA to evaluate the lifecycle GHG emissions of the Dakota Process.

The lifecycle GHG emissions of fuel produced pursuant to the Dakota Process were determined as follows:

Feedstock production – The Dakota Process uses corn starch as a feedstock for the production of ethanol. As previously noted, corn starch is one of the feedstocks already listed in Table 1 to 40 CFR § 80.1426 of the RFS regulations. Since corn starch has already been evaluated as part of the March 2010 RFS Rule, no new feedstock production modeling was required.

The FASOM and FAPRI models were used to analyze the GHG impacts of the feedstock production portion of the fuel's 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 this analysis of the Dakota Process. These results represent agriculture / feedstock production emissions for a certain quantity of corn produced. For the analysis in the March 2010 RFS Rule, we found that roughly 960 million bushels of corn is used to produce 2.6 billion gallons of fuel, and we calculated GHG emissions from feedstock production for that amount of corn. Dakota's process for converting corn into ethanol is the same as that modeled as part of the March 2010 RFS Rule. Therefore, the existing agricultural sector modeling analyses for corn as a feedstock remain valid for use in estimating the lifecycle impact of renewable fuel produced using the Dakota Process. Dakota submitted information indicating that their expected process yield in terms of gallons of fuel produced per bushel of corn is slightly greater than what was modeled as part of the March 2010 RFS Rule. However, for this analysis we conservatively assumed that Dakota's process yield is the same as that modeled as part of the March 2010 RFS Rule.

For the RFS corn ethanol pathways, the use of 960 million bushels of corn resulted in approximately 197,480,000 mmBtu of corn ethanol produced, based on a yield of 2.71 gallons ethanol per bushel corn and a lower heating value (LHV) of 76,000 Btus per gallon of ethanol. 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.

Fuel production – Dakota's fuel production method involves the production of ethanol from corn starch in a dry mill process. However, the amount of energy used in the Dakota Process is different than in the corn ethanol pathways that were analyzed under the March 2010 RFS Rule.

To analyze the GHG impacts of Dakota's process, EPA utilized the same approach that was used to determine the impacts of processes in the corn starch ethanol pathways analyzed in the March 2010 RFS Rule, taking into account the differences noted above. The GHG emissions for the fuel production component of the Dakota Process were based on an assessment of the type and amount of energy used and associated emissions per mmBtu of fuel produced.

The amount and type of energy used was taken from information submitted to EPA on Dakota's mass balance and energy balance. Dakota submitted energy data on imported steam (in mmBtus), natural gas (in mmBtus) and electricity (in MWhs) inputs, as well as gallons of fuel produced. Dakota based their imported steam use in the energy balance on the heat required for all steam needs, including for drying distillers grains. Imported steam is derived from two different sources, as described below. Natural gas is used to operate emission controls. Electricity for process needs is purchased from the grid.

The emissions from the use of energy were calculated by multiplying the amount of energy by emission factors for fuel production and combustion, based on the same method and factors used in the March 2010 RFS Rule, with the exception of imported steam. The emission factors for imported steam were derived based on information submitted in Dakota's petition, as described below.

The emission factors for natural gas and grid electricity are from GREET and were based on assumed carbon contents of the different process fuels.

Emission Factor for Imported Steam

Steam will be imported from the Spiritwood Station power plant, located adjacent to Dakota. The Spiritwood plant maintains two boilers capable of providing steam to Dakota: a main boiler that operates on coal and a backup boiler that operates on natural gas. When the main boiler at Spiritwood is out of service (either due to planned or unplanned outages), the backup boiler at Spiritwood will provide steam to Dakota. Since the backup boiler operates in steam-only mode, its emissions will be comparable to an onsite boiler. Therefore, the backup boiler emissions were calculated using the backup boiler energy use provided in the Dakota petition and the natural gas production and combustion GHG emission factors from the March 2010 RFS Rule, assuming that the backup boiler operates for 1,000 hours per year.

The main boiler will operate in a CHP configuration to provide electricity for the grid and steam for Dakota's production process by combusting coal to generate steam at high temperature and pressure. This high pressure steam will be sent through a high-pressure steam turbine (HPST), where energy will be extracted to produce electricity. The steam will exit the HPST at lower pressure and temperature, at which point some of the steam will be diverted to the Dakota plant to provide thermal energy for the ethanol production process. The remaining steam at Spiritwood will be sent through a low-pressure steam turbine (LPST) to produce additional electricity. The extraction steam diverted for use at the ethanol plant will result in a decrease in the amount of electrical power to be generated from the power plant. Therefore, although the amount of electricity generated is reduced, the total fuel consumed and the resulting GHG emissions of the power plant remain unchanged.

As EPA has not previously considered the treatment of steam from an offsite CHP plant under the RFS program in a lifecycle emissions accounting analysis, it was necessary to determine emissions

associated with the imported steam to the Dakota plant. The Spiritwood power plant in a CHP mode produces both steam and electricity; therefore, the total emissions of the Spiritwood power plant had to be allocated between the electricity production and the steam extracted for use at the Dakota ethanol plant. Since EPA was not aware of a previous regulatory context where an allocation approach was applied to determine the emissions associated with steam from an offsite facility, the Agency considered it appropriate to publish a *Federal Register* notice to solicit comment on EPA's preferred approach for allocating emissions for use in evaluating Dakota's petition.

In a *Federal Register* notice published on September 11, 2012[3] ("the Dakota Federal Register notice"), EPA outlined an approach for determining the emissions associated with the steam extracted for use at the Dakota plant. In that notice, EPA indicated that currently there is no one recommended approach for allocating emissions to the energy outputs (electrical and thermal) from a CHP system. Based on the Dakota plant configuration, EPA selected the "work potential" approach to allocate steam emissions for the Dakota plant life cycle analysis. The notice also indicated that the most appropriate allocation approach for a CHP system is dependent on the type of CHP configuration in use, as well as the primary use of the system's electrical and thermal outputs. In the Dakota Federal Register notice, EPA solicited comment on its choice of the work potential approach and whether there were alternative approaches more suitable for allocating emissions to the Dakota plant.

EPA received nine comments in response to the Dakota Federal Register notice, many of which were supportive of EPA's choice of the work potential approach for allocating emissions to the Dakota plant under the RFS program. In general, commenters wanted EPA to clarify that whichever methodology the Agency chose would be applicable only for this specific CHP system configuration and only under the RFS program and thus would not have broader applicability to other EPA programs. In addition, some commenters stated that EPA may have applied the work potential approach incorrectly and that a different allocation method might be more appropriate. A summary of our answers is below, and responses to specific comments will be provided in an Addendum[4] to this decision document.

Comment: EPA should explicitly indicate that the allocation approach ultimately chosen in this situation does not set precedent for other future applications.

Response: As stated in the Dakota Federal Register notice, EPA must determine emissions associated with imported steam to the Dakota plant in the context of lifecycle emissions accounting. EPA has chosen the work potential methodology due to the specific characteristics of the CHP system configuration outlined in the Dakota petition. In this decision, EPA is deciding how to allocate emissions from this specific offsite CHP system for purposes of the RFS program. EPA is not making

[3] 77 FR 55834

[4] EPA-HQ-OAR-2012-0636-0013

any decision at this time as to how offsite CHP emissions should be allocated for purposes of any other regulatory program.

Comment: The work potential method is not appropriate for the Dakota petition because the steam will be used for process heating, not for mechanical energy or electricity. Instead, EPA should consider using the efficiency allocation approach because it allocates GHG emissions from CHP systems according to the amount of fuel energy used to produce each final energy stream. Because the steam exported will be used for process heating at the Dakota plant, we also believe that use of the energy content method would be more appropriate.

Response: EPA undertook a deliberative process in which numerous methodologies for allocating emissions were reviewed. The three most common approaches for allocating emissions are the efficiency, energy content and work potential approaches. The work potential approach was chosen to allocate emissions to the Dakota plant because EPA determined that it was the method most representative of Dakota's operations. EPA recognizes that none of the methodologies are universally applicable because emissions differ based on the type of CHP system, the type of technology and the fuel combusted in the system. However, EPA's review indicated that other approaches were not representative of the Dakota plant's operations. Under both the efficiency and energy content allocation approaches, the emissions allocation would result in a lower emissions factor (in terms of lbs/MWh) for the remaining electricity generation at the Spiritwood power plant in CHP mode than the original emissions factor for electricity generated from the plant in power-only mode, making the power appear to be cleaner than it actually is.

EPA considered the work potential approach to be most appropriate in this case because this approach allocates emissions based on the amount of useful energy (defined as the ability of energy to do work). In the Dakota configuration, the original purpose of the steam is to create useful energy through power generation. Emissions allocated to the extracted steam were based on the emissions attributed to the electricity that the steam would have produced had the steam not been diverted for use at the Dakota plant. As the ethanol plant is using energy from the steam that the power plant is now unable to use, the emissions associated with that steam are now taken into account in the Dakota lifecycle analysis. This approach is also consistent with other portions of the lifecycle analysis where we have based emissions on changes from what would have happened without biofuel production in place. In their petition, Dakota outlined an approach similar to the work potential method for allocating emissions for the purpose of lifecycle emissions accounting. However, EPA's analysis concluded that the work potential approach was superior and more representative of the plant's operations than Dakota's proposed approach.

EPA determined the GHG emission factor associated with imported steam for the Dakota facility using the work allocation approach. A Memorandum to the Docket entitled "Regarding the Application of the Work Allocation Methodology to the Dakota Spirit Ag Energy Proposed Ethanol

Plant"[5] describes how the GHG emission factor per mmBtu of steam energy was calculated. For the configuration outlined in the Dakota petition, EPA's analysis determined that the imported steam from the Spiritwood main boiler has an emission factor of 53,175 grams CO_2-eq/mmBtu steam.

Table 3 summarizes the emission factors used in the Dakota analysis. As noted above, the backup boiler emissions were calculated using the natural gas production and combustion GHG emission factors from the March 2010 RFS Rule, and are included in Table 3 under the natural gas rows.

Table 3: Fuel Production Emission Factors for Natural Gas and Electricity in 2022

Fuel Type	Emission Factor (gCO_2e/mmBtu input)
Natural Gas Production	**9,392**
Natural Gas Combustion	**59,183**
Electricity	**219,824**
Imported Steam from main coal boiler	**53,175**

Individual process input and output mass and energy flows within the production plant were not needed for this analysis; rather, as was done for the March 2010 RFS Rule analyses, total input and output mass and energy flows from the entire plant were used. No additional raw materials were required in the Dakota Process and thus no emissions were calculated for additional raw materials for this analysis.

Dakota's process produces DDGS as a co-product. The corn starch ethanol pathways analyzed for the March 2010 RFS Rule included an estimate for DDGS co-product production which we similarly applied to the Dakota production process. Since DDGS impact the agricultural markets, such inclusion was modeled as part of the FASOM and FAPRI modeling as already described in the feedstock production section above. Thus no additional co-product credits are applied for the fuel production stage of the analysis.

The estimated fuel production emissions from the Dakota Process are shown below in Table 4. In their petition, Dakota estimated that the ethanol plant would operate 8,760 hours per year. Of that total, steam would be imported from the main coal boiler for 7,760 hours per year and from the backup natural gas boiler for 1,000 hours per year, which amounts to approximately 4,000 Btu steam from the backup boiler per gallon on an annual basis. The fuel production emissions in Table 4 are calculated based on that estimate.

[5] EPA-HQ-OAR-2012-0636-0002

Table 4: Fuel Production Emissions for Dakota

Fuel Production Source	Pathway for Corn Ethanol, Natural Gas Fired, Dry Mill, 100% Dry DDGS, No Advanced Technologies **(g CO_2-eq./mmBtu ethanol produced)**	Dakota (assuming backup boiler operates 1,000 hours per year) **(g CO_2-eq./mmBtu ethanol produced)**
Imported Steam from main coal boiler		18,292
Imported Steam from backup natural gas boiler		3,516
On-Site Emissions (natural gas)	22,317	332
Upstream (natural gas and electricity production)	10,052	6,566
Total Fuel Production Emissions:	**32,369**	**28,706**

Fuel and feedstock distribution – We used the same feedstock distribution emissions assumptions considered for the corn ethanol pathways analyzed in the March 2010 RFS Rule for Dakota's corn feedstock. The fuel type, ethanol, and hence the fuel distribution for ethanol, was already considered as part of the March 2010 RFS Rule. Therefore, the existing feedstock and fuel distribution lifecycle GHG impacts for corn ethanol were applied to our analysis of the Dakota Process.

Use of the fuel – Dakota's process produces a fuel that was analyzed as part of the March 2010 RFS Rule. Thus, we applied the fuel combustion emissions calculated as part of the March 2010 RFS Rule for ethanol to our analysis of the Dakota Process.

Dakota's fuel was then compared to baseline gasoline, using the same value for baseline gasoline as in the March 2010 RFS Rule analysis. The analysis indicates that the Dakota Process would result in a GHG emissions reduction of 20% compared to the gasoline it would replace, as shown in Table 5.

B. Application of the Criteria for Petition Approval

Dakota's petition request involved a fuel pathway with a modified production process, using similar feedstocks and producing a fuel product already considered as part of the March 2010 RFS Rule. Dakota provided all the necessary information that was required for this type of petition request.

Based on the data submitted and information already available through analyses conducted for the March 2010 RFS Rule, EPA conducted a lifecycle assessment and determined that the Dakota Process meets the 20% lifecycle GHG threshold requirement specified in the CAA for renewable fuel.

Dakota's process results in a 20% reduction in GHG emissions compared to the gasoline baseline. These results justify authorizing the generation of renewable fuel RINs for fuel produced by the Dakota Process, assuming that the fuel meets the other definitional criteria for renewable fuel (e.g., produced 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.

Table 5 below breaks down by stage the lifecycle GHG emissions for the Dakota Process, 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 DDGS, 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.

Table 5: Lifecycle GHG Emissions for Dakota Process, (kg CO2-eq./mmBtu ethanol produced)

Fuel Type	Pathway for Corn Ethanol, Natural Gas Fired, Dry Mill, 100% Dry DDGS, No Advanced Technologies	Dakota (assuming backup boiler operates 1,000 hours per year)	RFS 2005 Gasoline Baseline
Net Domestic Agriculture (w/o land use change)	4	4	
Net International Agriculture (w/o land use change)	12	12	
Domestic Land Use Change	-4	-4	
International Land Use Change, Mean (*Low/High*)	32 (*21/46*)	32 (*21/46*)	
Fuel Production	32	29	19
Fuel and Feedstock Transport	4	4	*
Tailpipe Emissions	1	1	79
Total Emissions, Mean *(Low/High)*	**82 *(71/96)***	**78 *(67/92)***	**98**
% Reduction	**17%**	**20%**	

*Emissions included in fuel production stage.

IV. Conditions and Associated Regulatory Provisions

As part of the registration process, Dakota must submit a description of how the facility intends to demonstrate and document for all time periods after its first year of RIN generation (364 consecutive days following its first day of RIN generation) that, for fuel produced pursuant to the Dakota Process, the backup natural gas boiler at the Spiritwood power plant accounts for no more than 4,000 Btu of steam per gallon of ethanol produced, calculated as an average across the sum of all gallons of ethanol produced in the batch plus all gallons in other batches for which RINs were generated pursuant to the Dakota Process in the preceding 364 days. At the time of registration, Dakota must advise EPA if it wishes to use this same averaging approach (option 1) in its first year of RIN generation, or if it would prefer to calculate the 4,000 Btu of natural gas-derived steam per gallon of ethanol produced limitation as an average across the sum of all gallons for which RINs are generated in its first year of RIN generation (option 2). If Dakota chooses option 2 for its first year of RIN generation, it shall also submit at the time of registration a description of how the facility intends to demonstrate and document compliance with the option; should Dakota choose option 2 and fail to satisfy the 4,000 Btu limitation as calculated at the end of the first year of RIN generation, all RINs generated during that first year of RIN generation shall be invalid. Once Dakota selects an averaging approach for its first year of RIN generation as part of the registration process, and EPA accepts Dakota's registration, Dakota will not thereafter be allowed to modify its averaging approach for the first year of RIN generation. If Dakota chooses option 2 for its first year of RIN generation, Dakota must report for that first year of RIN generation, on a quarterly basis, the energy used in Btu of steam from the backup natural gas boiler per gallon of ethanol for which RINs are generated, pursuant to 40 CFR § 80.1451(b)(1)(T). Dakota should report this information in the RFS2 Renewable Fuel Producer Supplemental Report.

Dakota is also subject to the general registration, recordkeeping and reporting provisions in 40 CFR subpart M that apply to renewable fuel producers. In addition, the authority for Dakota to generate RINs pursuant to the Dakota Process for any batch of fuel is expressly conditioned on Dakota demonstrating through records available as of the date of RIN generation and maintained by the producer that the batch of ethanol for which RINs were generated was produced pursuant to the following requirements:

1. Corn was used as the only feedstock;

2. The ethanol was produced by a dry mill process;

3. The backup natural gas boiler at the Spiritwood power plant accounted for no more than 4,000 Btu of steam per gallon of ethanol produced, calculated as an average across the sum of all gallons of ethanol produced in the batch plus all gallons in other batches for which RINs were generated pursuant to the Dakota Process in the preceding 364 days (or, for fuel produced in the first year of RIN generation, calculated pursuant to option 2 described above if Dakota chooses option 2 at the time of registration);

4. All steam other than that provided by the natural gas boiler at the Spiritwood power plant was derived from the CHP process of the Spiritwood power plant.

If Dakota fails to comply with this demonstration requirement, or fails to meet the elements of the approved Dakota Process for any batch of fuel for which it generates RINs pursuant to this pathway, all RINs generated for the affected batches shall be considered improperly generated under 40 CFR § 80.1431(a).

V. Public Participation

As part of the March 2010 RFS Rule, we took public comment on our lifecycle assessment of the RFS corn ethanol pathways, including all models used and all modeling inputs and evaluative approaches. We also acknowledged that it was unlikely that our final regulations would address all possible qualifying fuel production pathways, and we took comment on allowing the generation of RINs using a temporary D-code in certain circumstances while EPA was evaluating such new pathways and updating its regulations. After considering comments, we finalized the current petition process, where we allow for EPA approval of certain petitions without going through additional rulemaking if we can do so as a reasonably straightforward extension of prior analyses, whereas rulemaking would be conducted to respond to petitions requiring new modeling. *See* 58 FR 14797 (March 26, 2010).

In responding to Dakota's petition, we have relied on the corn ethanol modeling that we conducted for the March 2010 RFS Rule, and have simply adjusted the analysis to account for Dakota's production process. This includes relying on the same agricultural sector modeling (FASOM and FAPRI results) that was conducted and commented on as part of the March 2010 RFS Rule to represent feedstock production. This also includes use of the same emission factors and types of emission sources that were used in the March 2010 RFS Rule analysis. In addition, EPA solicited notice and comment on the approach for determining the emissions associated with the steam extracted for use at the Dakota plant in a *Federal Register* notice published on September 11, 2012.[6] Thus, the fundamental analyses relied on for this decision have already been made available for public comment as part of the March 2010 RFS Rule and the Dakota Federal Register notice. Our approach today is also consistent with our description of the petition process in the preamble to the March 2010 RFS Rule. Our evaluation in response to the petition is a logical extension of analyses already conducted for the March 2010 RFS Rule.

[6] 77 FR 55834

VI. Conclusion

Based on our assessment, fuel produced pursuant to the Dakota Process qualifies under the CAA for renewable fuel (D-code 6) RINs, assuming that the fuel meets the other definitional criteria for renewable fuel (e.g., produced 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.

This approval applies specifically to Dakota Spirit AgEnergy, and to the process, materials used, fuel produced, and process energy sources as outlined and described in the petition request submitted by Dakota. EPA will extend a similar approval to other petitioners utilizing the same fuel pathway as Dakota upon verification that the pathway is indeed the same, assuming all other requirements are met. This approval is effective as of February 6, 2013. Fuel produced pursuant to the Dakota Process does not meet the requirements for delayed RIN generation outlined in 40 CFR § 80.1426(g)(1)(ii), because the complete petition was not received by EPA by January 31, 2011, as required by 40 CFR § 80.1426(g)(1)(i)(A).

The OTAQ Reg: Fuels Programs Registration and OTAQEMTS: OTAQ EMTS Application will be modified to allow Dakota to register and generate RINs for the production of ethanol from corn feedstock using a production process of "Dakota Process."