

October 20, 2010

California Air Resources Board
Stationary Source Division
Criteria Pollutants Branch - 6th Floor
1001 I Street
P.O. BOX 2815
Sacramento, CA 95812

Re: Method 2A Application – Excluding Confidential Business Information

To: Messrs. John Curtis and Wes Ingram:

Herewith, please find our application and supporting documents, except for Confidential Business Information, for a fuel lifecycle GHG emissions pathway using the Method 2A application process described in “Establishing New Fuel Pathways under the California Low Carbon Fuel Standard Procedures and Guidelines for Regulated Parties” report by the ARB (California Air Resources Board) issued on March 25, 2010.

We request a new pathway for our Central City, Nebraska ethanol plant as a sub-pathway of the existing LCFS Lookup Table pathway: Ethanol from Corn Midwest; Dry Mill; Dry DGS, NG¹. The fuel lifecycle pathway of our Central City ethanol plant is the same as the referenced existing pathway except for lower power and energy consumption due to our modern plant design and production of modified distillers grain solubles (Modified DGS MDGS) at an average moisture content of 54%wt. rather than 10%wt. moisture for dry distillers grains solubles (Dry DGS or DDGS).

The attachment of this application provides the details and documentation of our application for a new pathway under Method 2A. Pages in the attachment with Confidential Business Information have been clearly marked as such, *but are not included in this non-confidential version of the application. In this version of the application, the points where elements of Confidential Business Information have been removed from the text or accompanying tables are indicated so as to inform the public that the*

¹ For reference, see CARB Report “Detailed California-Modified GREET Pathway for Corn Ethanol” February 27, 2009, Version 2.1. In this application this report is referred to as the “Corn Ethanol WTW Analysis.”

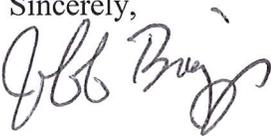
complete application to the ARB contained additional information to support this application, but that such information is considered by us to be Confidential Business Information.

We have used the CA-GREET Model 1.8b to calculate the lifecycle greenhouse gas emissions from this sub-pathway. Based on the input changes to the model described in the attachments, the carbon intensity value of this new pathway is **84.29 gCO₂e/MJ**. This CI intensity value is 14 gCO₂e/MJ lower than the reference pathway and our production volume of approximately 100 million gallons per year more than meets the “5-10” substantiality rule and the other requirements of a new pathway.

We request your approval and would be glad to answer any questions you may have about our application. Following please find the names and contact information of the persons who are available to answer any questions about our application. Please note that Houston BioFuels Consultants LLC are assisting us with the application and may be contacted if you have questions or comments about our application

Affiliation:	Green Plains Central City LLC	Houston BioFuels Consultants LLC
Name:	Mr. Jeff Briggs, COO	Mr. Logan Caldwell, Consultant
Telephone number:	1-402-884-8700	1-281-360-8515
e-mail address	jeff.briggs@gpreinc.com	lc@hbioc.net
Mailing Address	9420 Underwood Ave, Ste 100 Omaha, NE 68114	5707 Ridge Vista Drive Kingwood, TX 77345

Sincerely,



Jeff Briggs
Chief Operating Officer

Attachments

Attachments

Section Number and Contents

- I. WTW Diagram of Green Plains Central City LLC Sub-Pathway
Including:
 - Energy and Material Balance for the Plant Design
 - Current State of Nebraska Air Permit and Air Permit Application

- II. Green Plains Central City LLC Pathway Description/Background formation

- III. Table of CA-GREET Model Inputs for Green Plains Central City LLC Pathway

- IV. Basis for the Green Plains Central City LLC CA-GREET Input Values

- V. CA-GREET Model Output and Analysis of Results

- VI. Production Range of Green Plains Central City LLC Pathway

- VII. Sustainability of Green Plains Central City LLC Pathway

- VIII. Impact on Land Use

- IX. Documents supporting Production Period Quantities

**WTW Diagram of Green Plains Central City LLC Sub-Pathway
I. of the Corn Ethanol Pathway**

Figure 1: Green Plains Central City LLC Sub-Pathway is the Same
As the
WTW Components for the Corn Ethanol Pathway²

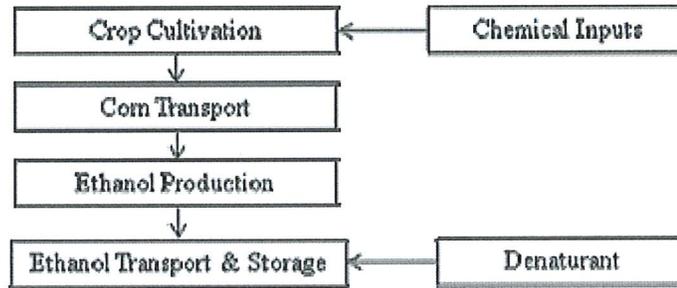


Figure 1. WTW Components for Ethanol Transported to California

² See CARB Report “Detailed California-Modified GREET Pathways for Corn Ethanol” February 27, 2009, Version 2.1, page 4.

II. Green Plains Central City LLC Pathway Description/Background

Green Plains Central City LLC Pathway Description/Background

1. Plant Location: This facility is located at 214 20th Street, Central City, Nebraska.
2. History – The facility started operation on May 6, 2004 with a capacity of 48 million gallons per year (MGY) of denatured ethanol. Expansion of the facility from 48 MGY to 100 MGY was completed and the expanded capacity was put into service in November 23, 2006. The facility was purchased by Green Plains Central City LLC on July 07, 2009.
3. Feedstock Type – Corn.
4. Product – Anhydrous Ethanol (denatured for fuel use).
5. Co-Products - Modified Wet Distillers Grains with Solubles with approximately 50-55% moisture.
6. Process fuel – Natural Gas supplied by US Energy through the Kinder Morgan Interstate Gas Transmission pipeline.
7. Power supply – Supplied by Southern Power District based in Grand Island, Nebraska.
8. Corn and Ethanol Transportation and Distribution – Corn is received by truck from local Midwest growers. Ethanol is shipped via rail to distant customers and by truck to local customers.
9. Technology – Dry Mill, Natural Gas Fired to produce anhydrous ethanol licensed from ICM Inc.
10. Process Flow Description – The following description and diagram of the dry mill process is from the ICM Inc. web site.

Delivery/Storage

Grain is delivered by truck or rail to the ethanol plant where it's loaded in storage bins designed to hold enough grain to supply the plant for 7–10 days.

Milling

The grain is screened to remove debris and ground into course flour.

Cooking (Hot Slurry, Primary Liquefaction, and Secondary Liquefaction)

During the cook process, the starch in the flour is physically and chemically prepared for fermentation.

Hot Slurry

The milled grain is mixed with process water, the pH is adjusted to about 5.8, and an alpha-amylase enzyme is added. The slurry is heated to 180–190°F for 30–45 minutes to reduce viscosity.

Primary Liquefaction

The slurry is then pumped through a pressurized jet cooker at 221°F and held for 5 minutes. The mixture is then cooled by an atmospheric or vacuum flash condenser.

Secondary Liquefaction

After the flash condensation cooling, the mixture is held for 1–2 hours at 180–190°F to give the alpha-amylase enzyme time to break down the starch into short chain dextrans. After pH and temperature adjustment, a second enzyme, glucoamylase, is added as the mixture is pumped into the fermentation tanks.

Simultaneous Saccharification Fermentation

Once inside the fermentation tanks, the mixture is referred to as mash. The glucoamylase enzyme breaks down the dextrans to form simple sugars. Yeast is added to convert the sugar to ethanol and carbon dioxide. The mash is then allowed to ferment for 50–60 hours, resulting in a mixture that contains about 15% ethanol as well as the solids from the grain and added yeast.

Distillation

The fermented mash is pumped into a multi-column distillation system where additional heat is added. The columns utilize the differences in the boiling points of ethanol and water to boil off and separate the ethanol. By the time the product stream is ready to leave the distillation columns, it contains about 95% ethanol by volume (190-proof). The residue from this process, called stillage, contains non-fermentable solids and water and is pumped out from the bottom of the columns into the centrifuges.

Dehydration

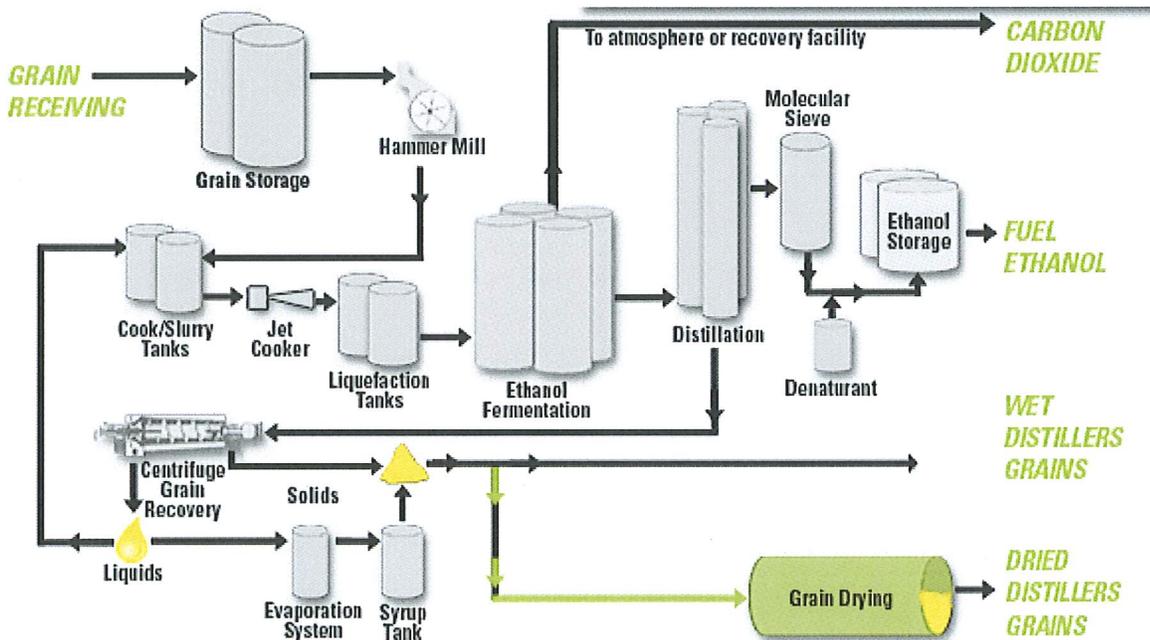
The 190-proof ethanol still contains about 5% water. It's passed through a molecular sieve to physically separate the remaining water from the ethanol based on the different sizes of the molecules. This step produces 200-proof anhydrous (waterless) ethanol.

Ethanol Storage

Before the ethanol is sent to storage tanks, a small amount of denaturant is added, making it unfit for human consumption. Most ethanol plants' storage tanks are sized to allow storage of 7–10 days' production capacity.

11. Process Flow Diagram (From ICM Inc. web-site)

Note that the diagram indicates Dried Distillers Grains co-product. In the case of Green Plains Central City LLC, the distillers grains are only partially dried in the Grain Drying equipment.



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ate of Nebraska Air Permit and Most Recent Air Permit Application – These documents are in separate files submitted together with this application file.

Energy and Material Balance Diagram - **Confidential Business Information and is not included in this non-confidential version of the application.**

III. Table of CA-GREET Model Inputs for Green Plains Central City LLC Pathway

The following table shows the calculation of the input variables that were changed for the calculation of the Green Plains Central City LLC Pathway using the CA-GREET model. The values shown in light green/lime color are the input variables.

Table 1: Calculation of Input Variables Changed for the Green Plains Central City LLC Pathway
Table 1 contains Confidential Business Information and is not included in this non-confidential version of the application.

The following table shows the CA-GREET corn ethanol dry mill default values and the modified values for the Green Plains Central City LLC Pathway:

Table 2: CA-GREET Model Inputs for the Green Plains Central City LLC Pathway

Table 2 contains Confidential Business Information and is not included in this non-confidential version of the application.

Discussion

The Green Plains Central City LLC sub-pathway differs from the existing Midwest Dry Mill, natural gas-fired, 100% dried distillers grains solubles (DDGS) as a result of less energy being needed to produce the modified distillers grains solubles (MDGS) for this sub-pathway. Less process fuel is needed because the distillers grains solubles are dried to approximately 54% moisture rather than approximately 10% for DDGS. Less power is needed, as well as less fuel, as a result of the Green Plains Central City LLC facilities being based on a modern design by ICM.

The last sentence contains of the preceding paragraph contained Confidential Business Information and is not included in this non-confidential version of the application.

IV. Basis for the Green Plains Central City LLC CA-GREET Input Values –

The input values presented in this application are based on the total corn, natural gas and power consumed and distillers grains and ethanol produced at the Green Plains Central City LLC, Nebraska ethanol plant from August 1, 2009 through June 30, 2010 (“Production Period”). Since the input values are in terms of per gallon of undenatured ethanol, the total of each utility value has been divided by the total gallons of undenatured ethanol produced during the Production Period.

Discussion of how the Production Period Was Selected

The Production Period used as the basis for the CA-GREET input values is eleven months due to two factors:

- Green Plains Renewable Energy, Inc (“GPRE”) purchased the Central City ethanol plant in early July 2009, from the lenders who had title to the plant after the original owners went bankrupt and shut down the plant in November 2008. On July 29, 2009, the plant was restarted.³
- The last month of operation before the application process was begun for the new sub-pathway was June 2010.

Plant operation during the eleven months of operation in the Production Period was steady with only minor variations to be expected from any manufacturing facility. The data collected during this period is an accurate representation of the new pathway. The figure below trends the moisture content of the MDGS during the Production Period. Once each week the MDGS was sampled and analyzed for moisture and other properties. **This last sentence of this paragraph contains Confidential Business Information and is not included in this non-confidential version of the application**

Figure 2: MDGS Weekly Moisture Content Trend during Production Period

Figure 2 contains Confidential Business Information and is not included in this non-confidential version of the application.

³ GPRE press releases on July 6th and 30th, 2009, recount the plant shut down, acquisition and start-up dates. The link to these press releases: <http://investor.gpreinc.com/releases.cfm?Year=&ReleasesType=&PageNum=2>

V. CA-GREET Model Output and Analysis of Results

The Green Plains Central City LLC pathway carbon intensity value is a sub-pathway of the existing CARB Lookup Table Corn Ethanol pathway shown in the table below.

Table 3: CARB Lookup Table Reference Pathway: Midwest Dry Mill, 100% DDGS, NG Fuel

CARB Lookup Table Reference Pathway: Midwest Dry Mill Ethanol Plant, 100% DDGS, NG Fuel Pathway							
IPPC factors	CA-GREET Model Output		Calculations to convert Output to g/CO ₂ e/MJ				
	Corn	Ethanol	Btu or Grams per mmbtu of Fuel Throughput			gCO ₂ e/mmbtu	gCO ₂ e/MJ
gCO ₂ e/g	US Avg Corn	100% DDGS	Corn w/loss	Total corn + EtOH			
Total energy	187,247	1,469,428	187,434	1,656,863			
VOC	16.8	55.5	17	72			
CO	151.3	31.4	151	183			
CH ₄	25	17.4	73.7	17	91	2,277.0	2.16
N ₂ O	298	41.7	0.4	42	42	12,571.0	11.92
CO ₂	1	15,064	41,354	15,079	56,433	56,433.4	53.49
Sub-total lifecycle CI before denaturant and lt. vehicle combustion						71,281.4	67.57
Denaturant and lt. vehicle combustion effects factor							0.80
Total Lifecycle CI before ILUC with denaturant and lt. vehicle combustion effects included							68.37
Indirect Land Use Change Factor (ILUC)							30
Total CI of Pathway including Indirect Land Use Change							98.37
Note: The calculated result of this pathway prior to making the input changes for the Green Plains Central City, LLC ethanol plant is 67.57 gCO ₂ e/MJ. This matches the Corn Ethanol WTW Analysis result of 67.6 gCO ₂ e/MJ (Table B. GHG Emissions Summary for Dry and Wet Mill Corn Ethanol, page 5) before the denaturant and light vehicl combustion factor of 0.8 gCO ₂ e/MJ is added.							

In the following table the Green Plains Central City LLC pathway carbon intensity value is calculated from the output of the CA-GREET model using the input parameters specific to the pathway.

Table 4: Green Plains Central City LLC Sub-Pathway

Green Plains Central City LLC Sub-Pathway of the Midwest Dry Mill Ethanol Plant, 100% DDGS, NG Fuel Pathway							
IPPC factors	CA-GREET Model Output		Calculations to convert Output to g/CO ₂ e/MJ				
	Corn	Ethanol	Btu or Grams per mmbtu of Fuel Throughput			gCO ₂ e/mmbtu	gCO ₂ e/MJ
gCO ₂ e/g	Midwest Corn	100% MDGS	Corn w/loss	Total corn + EtOH			
Total energy	192,088	1,253,100	192,280	1,445,380			
VOC	16.8	53.8	17	71			
CO	151.5	21.3	152	173			
CH ₄	25	18.1	48.3	18	66	1,662.2	1.58
N ₂ O	298	41.7	0.3	42	42	12,521.1	11.87
CO ₂	1	15,362	26,874	15,377	42,251	42,251.2	40.05
Sub-total lifecycle CI before denaturant and lt. vehicle combustion						56,434.5	53.49
Denaturant and lt. vehicle combustion effects factor							0.80
Total Lifecycle CI before ILUC with denaturant and lt. vehicle combustion effects included							54.29
Indirect Land Use Change Factor (ILUC)							30
Total CI of Pathway including Indirect Land Use Change							84.29

VI. Production Range of Green Plains Central City LLC Pathway

The new pathway should be applicable to the Green Plains Central City LLC plant for at least 40% to 114% of Nameplate Capacity.

Discussion

Please refer to the following letter from the Green Plains Renewable Energy, Inc. Director of Engineering for an explanation for the basis of the production range over which this pathway is applicable. **This letter contains Confidential Business Information and is not included in this non-confidential version of the application**

VII. Sustainability of Green Plains Central City LLC Pathway

The Green Plains Central City LLC pathway is based on well-established modern designs and agronomy practices and is managed by professional staff well-qualified⁴ to assure that over time the energy efficiency of and emissions from the pathway do not deteriorate. Any deterioration would result in a less profitable business. Thus the sustainability of the plant is well aligned with the business objectives of the owners.

The Central City ethanol plant one of six ethanol plants owned and operated by Green Plains Renewable Energy, Inc.⁵ This plant and four others have the same ICM technology and plant design that provides the opportunity for further improvements in energy efficiency and yield, and therefore carbon intensity, over time.

VIII. Impact on Land Use

The difference between the land use of this sub-pathway and that of the pathway described in the Corn Ethanol WTW Analysis is negligible.

⁴ The GPRE website has an overview of the management and ethanol production facilities. The web link is: <http://www.gpreinc.com/Overview>

⁵ Ibid.

IX. Documents supporting Production Period Quantities

Table 5: Summary of Inputs and Outputs during the Production Period of August 1, 2009 through June 30, 2010 **contains Confidential Business Information and is not included in this non-confidential version of the application**

The corn, ethanol and distillers grains co-product quantities during the Production Period are based on the GPRE Key Activity Report (“KAR”), which is used by GPRE for its official manufacturing accounting process. As such, these are the official quantities reviewed and approved by GPRE management. The electricity and natural gas quantities shown in the above table are also in the KAR system, but in addition can also be validated with invoices from the utility suppliers. The following letter by the executive vice-president and treasurer of Green Plains Renewable Energy, Inc provides evidentiary support for the amounts used in this pathway application.

August 10, 2010

Ladies & Gentlemen:

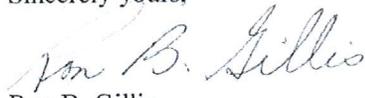
I have reviewed the attached quantities for Green Plains Central City LLC (Central City) for the months of August 2009 through June 2010 and, based upon this review, I hereby certify that to the best of my knowledge the attached quantities are accurate and complete for the periods reflected.

The quantities on the attached summary are sourced from various documents and processes as summarized below:

- Electricity and natural gas usage quantities are based on the usage information from the metered billing statements received each month from the utilities.
- Corn ground is based on our inventory control process. In summary, the amount of corn ground is equivalent to the beginning inventory of corn plus bushels delivered less ending inventory. The corn is weighed at delivery on a state certified scale.
- Ethanol produced and distillers grains produced are based on our inventory control process. In summary, the amount produced is equivalent to ending inventory plus shipments less beginning inventory for each commodity. Ethanol sold is measured through state certified flow meters. Distillers grains are weighed at shipment on a state certified scale.

Furthermore, the consolidated financial results, including inventory levels and expenses are subject to audit by our accounting firm, KPMG LLP.

Sincerely yours,



Ron B. Gillis
EVP-Finance, Treasurer

The following pages contain the invoices for electricity and natural gas during the production period. Natural gas invoices are on a calendar month basis, but electricity is invoiced on a semi-monthly (twice per month) basis. **These pages are not included in this non-confidential version of the application.** The following table has been prepared to show the semi-monthly invoice quantity of electricity used by Green Plains Central City LLC during the production period of August 1, 2009 through Jun 30, 2010.

Table 6: Semi-Monthly Electricity Invoice Quantities during the Production Period

This table contains Confidential Business Information and is not included in this non-confidential version of the application