SELC

September 16, 2011

Re: Method 2A Application - Excluding Confidential Business Information

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

To: The Executive Officer

Herewith, please find our application and supporting documents 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 ARB (California Air Resources Board) issued on March 25, 2010.

We seek a pathway for our Siouxland Energy and Livestock Cooperative ("SELC") ethanol plant located near Sioux Center, Iowa. At our facility, we produce ethanol from locally grown corn. Our facility uses natural gas for its process energy and electricity from the local grid. We do not have a distillers grains dryer and all of our distillers grains co-product (100%) is wet distillers grains solubles (WDGS). We extract corn oil that is used as animal feed or biodiesel feedstock.

The CARB LCFS regulations stipulate that only pathways lower in carbon intensity value than the main pathway they deviate from can use the Method 2A application. Our pathway is a sub-pathway of the Corn Ethanol (Midwest; Dry Mill; Dry DGS, NG) Pathway because, except for the points of deviation summarized below, our pathway is identical to the Corn Ethanol (Midwest; Dry Mill; Dry/Wet DGS, NG) Pathway described in the Detailed California-Modified GREET Pathway for Corn Ethanol Well-to-Wheel (WTW) lifecycle analysis.[1]

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 82.34 gCO2e/MJ. This CI intensity value and

[1] Detailed California-Modified GREET Pathway for Corn Ethanol Well-to-Wheel (WTW) lifecycle analysis, Version 2.1, published February 27, 2009

our production volumes more than meet the "5-10" substantiality rule and the other requirements of a new pathway.

The following sections to this application provide the details and documentation of our application for a new pathway under Method 2A. Portions of the following information that we consider 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 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 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:	Siouxland Energy and Livestock Cooperative	Houston BioFuels Consultants, LLC
Name:	Mr. Jeff Altena	Mr. Logan Caldwell, Consultant
Telephone number:	1-712-722-4904	1-281-360-8515
e-mail address	jaltena@selc1.com	lc@hbioc.net
Mailing Address	3890 Garfield Ave Sioux Center, IA 51250	5707 Ridge Vista Drive Kingwood, TX 77345

Attachments

Attachments

Section Number and Contents

I. WTW Diagram of SELC Sub-Pathway of the Corn Ethanol (Midwest; Dry Mill; Dry DGS, NG) Pathway

II. SELC Plant Information

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VIII. Impact on Land Use

IX. Documents supporting Annual Quantities of Corn, DGS, Ethanol, Natural Gas and Power

I. WTW Diagram of SELC Sub-Pathway of the Midwest Corn Ethanol Pathway

Figure 1: WTW Components of the SELC Pathway are Identical
to the Corn Ethanol (Midwest; Dry/Wet Mill; Dry DGS, NG) Pathway[2]

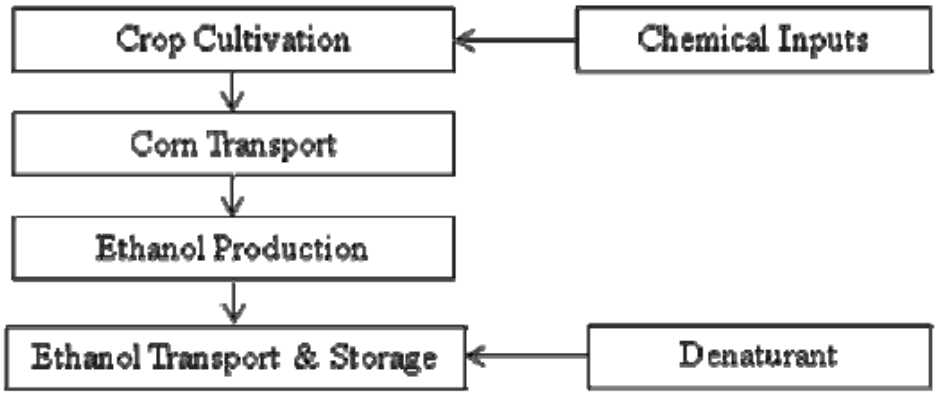


Figure 1. WTT Components for Ethanol Transported to California

[2] Detailed California-Modified GREET Pathway for Corn Ethanol Well-to-Wheel (WTW) lifecycle analysis, Page 4, Version 2.1, published February 27, 2009.

II. SELC Plant Information - Confidential Business Information

SELC Plant Info

1. EPA Facility ID Number - 70112
2. Plant Location – Sioux Center, IA
3. History – Began as 14 million gallons per year farmer owned ethanol plant. Expanded to 65 million gallons per year in 2007.
4. Capacity Notes – 60 million gallons per year nameplate
5. Technology – ICM
6. Feedstock Type - Corn
7. Product - Ethanol
8. Co-Products – Wet Distillers
9. Process fuel – Natural Gas
10. Power supply - Electrical

11. 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 6-8 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 dextrins. 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 dextrins to form simple sugars. Yeast is added to convert the sugar to ethanol and carbon dioxide. The mash is then allowed to ferment for 40-50 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

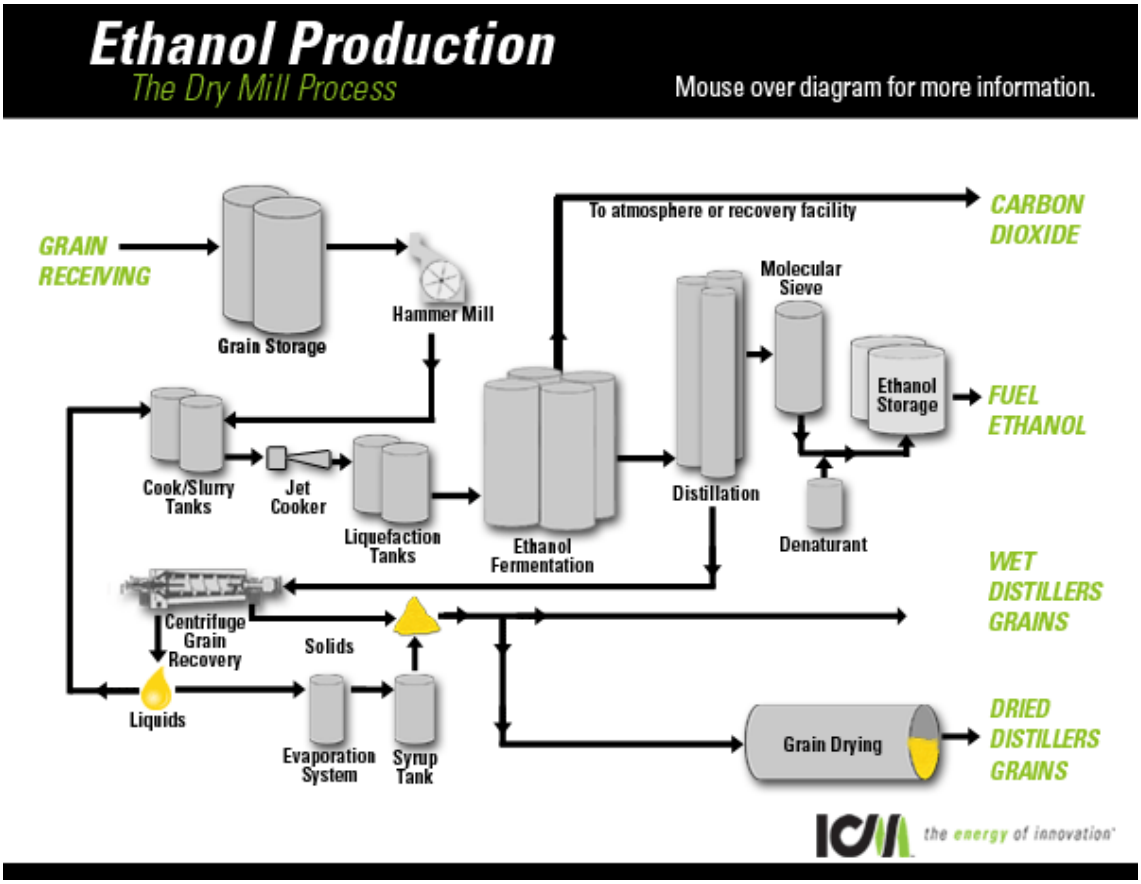
The 190-proof ethanol still contains about 5% water. It's passed through a molecular sieve to physically separate the remaining water from the ethanol based on the different sizes of the

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.

12. Process Block Flow Diagram

Source: ICM Inc.



13. Energy and Material Balance - **Confidential Business Information**

For legibility, the energy and material balance for the SELC ethanol plant is contained in a separate pdf file accompanying the electronic version of this application and is a separated document in the printed, hard copy version of this application. **However, because the energy and material balance contains Confidential Business Information, it is not included in this non-confidential version of the application.**

14. Air Permits - In a separate document/electronic file accompanying this application due to its size, please find the latest version of the plant's air permits. These permits contain information about the equipment in the plant that generates emissions from the combustion of fuel.

III. Table of CA-GREET Model Inputs for SELC Pathway - Confidential Business Information

Table 1: CA-GREET Model Inputs for the SELC Pathway

CA-GREET Model Sheet Name	Cell number	Default Pathway Value	Siouxland Pathway Value	Units	Description	Comments
Fuel_Prod_TS	L277	26,100	Confidential Business Information	btu/gal	Corn Ethanol Plant Energy Use, Dry Mill, 100% WDGS	With modern plant, lower power use
Fuel_Prod_TS	D277	2.72	Confidential Business Information	gal/bu	Ethanol yield of Corn Ethanol Plant, Dry Mill	With modern plant, optimized yield
Inputs	C247	14.06%	Confidential Business Information	%	Share of process energy for Electricity	With modern plant, lower power use
Inputs	C254	22,430	Confidential Business Information	btu/gal	Process fuel, 100% WDGS Co-Product	Shown here for reference only. This cell is calculated based on cell L277 in Fuel_Prod_TS and Inputs C247
Inputs	C258	1.08	Confidential Business Information	kwh/gal	Electricity used for ethanol production	Shown here for reference only. This cell is calculated based on cell L277 in Fuel_Prod_TS and Inputs C247

IV. Basis for the Input Values - Confidential Business Information

The input values presented in this application are based on the period from July 2010 through June 2011, the "Production Period".

Table 2: Calculation of the Input Values

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

V. CA-GREET Model Output and Analysis of Results

The SELC pathway carbon intensity value is a sub-pathway of the Midwest, Dry-Mill, 100% WDGS Co-product, 100% natural gas fuel ethanol plant pathway. The carbon intensity value of the base pathway is 90.1 gCO2e/MJ. The carbon intensity value of the SELC ethanol plant ethanol is 82.34 gCO2e/MJ.

Table 3: CI of Existing Midwest Dry Mill, 100% WDGS, 100% Natural Gas Fuel Pathway

CARB Lookup Table Reference Pathway: Midwest Dry Mill Ethanol Plant, 100% WDGS, NG Fuel Pathway							
		CA-GREET Model Output					
	IPPC factors	Corn	Ethanol	Calculations to convert Output to g/CO2e/MJ			
	gCO2e/g	*Btu or Grams per mmbtu of Fuel Throughput*				gCO2e/mmbtu	**gCO2e/MJ**
		US Avg Corn	100% WDGS	Corn w/loss	Total corn + EtOH		
Total energy		187,247	1,330,569	187,342	1,517,911		
VOC		16.8	54.446	17	71		
CO		151.3	26.943	151	178		
CH4	25	17.4	56.801	17	74	1,855.2	1.76
N2O	298	41.7	0.350	42	42	12,550.1	11.90
CO2	1	15,064	33,114	15,071	48,185	48,185.2	45.67
Sub-total lifecycle CI before denaturant and lt. vehicle combustion						62,590.5	59.33
Denaturant and lt. vehicle combustion effects factor							0.80
Total Lifecycle CI before ILUC with denaturant and lt. vehicle combustion effects included							60.13
Indirect Land Use Change Factor (ILUC)							30
Total CI of Pathway including Indirect Land Use Change							90.13
Note: The calculated result of this pathway prior to making the input changes for the Siouxland ethanol plant is 90.13 gCO2e/MJ. This matches the Corn Ethanol Midwest Dry Mill, 100% NG, 100% WDGS Look up Table value of 90.10 gCO2e/MJ							

Table 4: SELC, Sioux Center, Iowa Ethanol Plant CI Calculation based on the CA-GREET Model Output

Siouxland Ethanol Plant Sub-Pathway of the Midwest Dry Mill Ethanol Plant, 100% WDGS, NG Fuel Pathway							
		CA-GREET Model Output					
	IPPC factors	Corn	Ethanol	Calculations to convert Output to g/CO2e/MJ			
	gCO2e/g	*Btu or Grams per mmbtu of Fuel Throughput*				gCO2e/mmbtu	**gCO2e/MJ**
		US Avg Corn	100% WDGS	Corn w/ loss	Total Corn + EtOH		
Total energy		186,616	1,222,922	186,711	1,409,633		
VOC		16.711	53.601	17	70		
CO		150.767	20.845	151	172		
CH4	25	17.341	44.524	17	62	1,546.8	1.47
N2O	298	41.603	0.257	42	42	12,480.3	11.83
CO2	1	15,013	25,330	15,021	40,351	40,350.8	38.25
Sub-total lifecycle CI before denaturant and lt. vehicle combustion						54,378.0	51.54
Denaturant and lt. vehicle combustion effects factor							0.80
Total Lifecycle CI before ILUC with denaturant and lt. vehicle combustion effects included							52.34
Indirect Land Use Change Factor (ILUC)							30
Total CI of Pathway including Indirect Land Use Change							82.34

VI. Production Range of SELC Pathway - Confidential Business Information

The new pathway should be applicable to the SELC facilities for at least 66.67% (40 million gallons) to 108.33% (60 million gallons) of Nameplate Capacity.

Discussion

SELC

September 9, 2011

California Air Resource Board

Stationary Source Division
Criteria Pollutants Branch – 6th Floor
1001 I Street
P.O. Box 2815
Sacramento, CA 95812

RE: Validity of Production Range

To: The Executive Officer

This letter is to certify and attest that the annual production range for the Siouxland Energy and Livestock Cooperative's (SELC) Sioux Center, IA ethanol plant new pathway is from 40 million gallons of denatured ethanol to 65 million gallons of denatured ethanol. Within this range, the energy consumption per gallon is less than or equal to, and ethanol yield per bushel is greater than or equal to, the values used in our new pathway application. For reference, our plant's annual nameplate production rate is 60 million gallons and its annual permitted rate is 65 million gallons of denatured ethanol.

Sincerely,

Siouxland Energy and Livestock Cooperative

9-9-11

Jeff Altena

Director of Operations

3890 Garfield Ave. • Sioux Center, IA 51250 • 712-722-4904

VII. Sustainability of SELC Pathway

The SELC facility was designed and constructed using well-established modern designs and equipment and is managed by professional staff well-qualified to assure that over time the energy efficiency of and emissions from the facility 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.

VIII. Impact on Land Use

There is negligible difference between the land use of this sub-pathway and that of the Corn Ethanol (Midwest; Dry Mill; Dry DGS, NG) Pathway described in the Detailed California-Modified GREET Pathway for Corn Ethanol Well-to-Wheel (WTW) lifecycle analysis.[3].

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[3] Detailed California-Modified GREET Pathway for Corn Ethanol Well-to-Wheel (WTW) lifecycle analysis, Version 2.1, published February 27, 2009.

IX. Documents Supporting Annual Quantities of Ethanol, Corn, Distillers Grains, Corn Oil, Natural Gas and Power –Confidential Business Information

Table 5: Summary of Inputs and Outputs during Production Period
and the 12 months prior to the Production Period

Table 5 is considered Confidential Business Information and is not included in this non-confidential version of the application.

Table 6: Summary of the Monthly Electricity Invoices

Table 6 is considered Confidential Business Information and is not included in this non-confidential version of the application.

The following letter from Mr. Jeff Altena, SELC Director of Operations, attests to the accuracy and authenticity of the quantities shown in Tables 5 and 6. In addition, accompanying this application in separate pdf files due to the large file sizes, are copies of the natural gas and electricity invoices for the Production Period and the 12 months prior to the production period. **Because the invoices contain confidential business information, they are not shown in this non-confidential version of the application support document.**

SELC

STORYLAND ENERGY & LIVESTOCK COOPERATIVE

Date: August 30, 2011

Re: SELC Ethanol Plant Method 2A New Pathway Application – Accuracy of Data in New Pathway Application

This is to certify that the quantities of corn, undenatured ethanol, wet distillers grains solubles, corn oil and utilities summarized in the SELC ethanol plant application for a new pathway are true and accurate. These quantities represent the true and accurate production, feedstock use and utility consumption of our plant located at Sioux Center, IA and owned by SELC.

3890 Garfield Ave. • Sioux Center, IA 51250 • 712-722-4904