



Energy for a Clean Environment

1822 43rd Street SW  
Mason City, IA 50401  
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Phone: 641-423-8525  
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May 17, 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 Golden Grain Energy, LLC located in Mason City, 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. Approximately 98% of our distillers grains co-product is dried distillers grains solubles (DDGS) and the remainder is modified distillers grains solubles (MDGS) with a nominal 50% by weight moisture content.

The CARB LCFS regulations stipulate that only pathways lower in carbon intensity value than main pathway that 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.<sup>1</sup>

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 **88.92** gCO<sub>2e</sub>/MJ. This CI intensity value and 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 is assisting us with the application and may be contacted if you have questions or comments about our application.

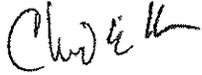
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<sup>1</sup> Detailed California-Modified GREET Pathway for Corn Ethanol Well-to-Wheel (WTW) lifecycle analysis, Version 2.1, published February 27, 2009.

*Contacts:*

Affiliation:	Golden Grain Energy, LLC	Houston BioFuels Consultants LLC
Name:	Chad Kuhlers, Plant Manager	Mr. Logan Caldwell, Consultant
Telephone number:	1-641-423-8525	1-281-360-8515
e-mail address	ckuhlers@etoh.us	lc@hbioc.net
Mailing Address	1822 43 <sup>rd</sup> Street S.W. Mason City, IA 50401	5707 Ridge Vista Drive Kingwood, TX 77345

Sincerely,  
GOLDEN GRAIN ENERGY, LLC



5/17/2011

Chad Kuhlers  
Plant Manager

Attachments

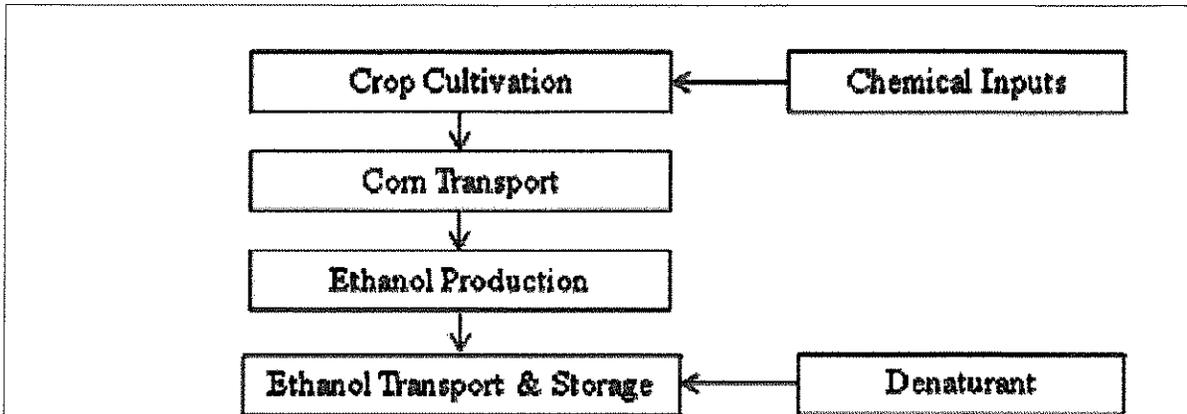
## **Attachments**

### Section Number and Contents

- I. WTW Diagram of Golden Grain Energy Sub-Pathway of the Corn Ethanol (Midwest; Dry Mill; Dry DGS, NG) Pathway
- II. Golden Grain Energy Plant Information
- III. Table of CA-GREET Model Inputs for Golden Grain Energy Pathway
- IV. Basis for the Input Values
- V. CA-GREET Model Output and Analysis of Results
- VI. Production Range of Golden Grain Energy Pathway
- VII. Sustainability of Golden Grain Energy Pathway
- VIII. Impact on Land Use
- IX. Documents supporting Annual Quantities of Corn, DGS, Ethanol, Natural Gas and Power

**I. WTW Diagram of Golden Grain Energy Sub-Pathway of the Midwest Corn Ethanol Pathway**

Figure 1: WTW Components of the Golden Grain Energy Pathway are Identical to the Corn Ethanol (Midwest; Dry/Wet Mill; Dry DGS, NG) Pathway<sup>2</sup>



*Figure 1. WTT Components for Ethanol Transported to California*

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

## II. Golden Grain Energy Plant Information

### Golden Grain Energy Plant Info

1. EPA Facility ID Number - 70691
2. Plant Location – 1822 43<sup>rd</sup> Street S.W., Mason City, IA 50401
3. Plant History and Capacity Information – Original construction 40 MMGPY plant in 2003, additional 40 MMGPY with an aggregate total to 80 MMGPY and maximum permitted volume of 150 MMGPY (4/19/06)
4. Technology – ICM Inc.
5. Feedstock Type - corn
6. Product – denatured ethanol
7. Co-Products – DDGS, MDGS, corn oil
8. Process fuel – natural gas
9. Power supply – local grid

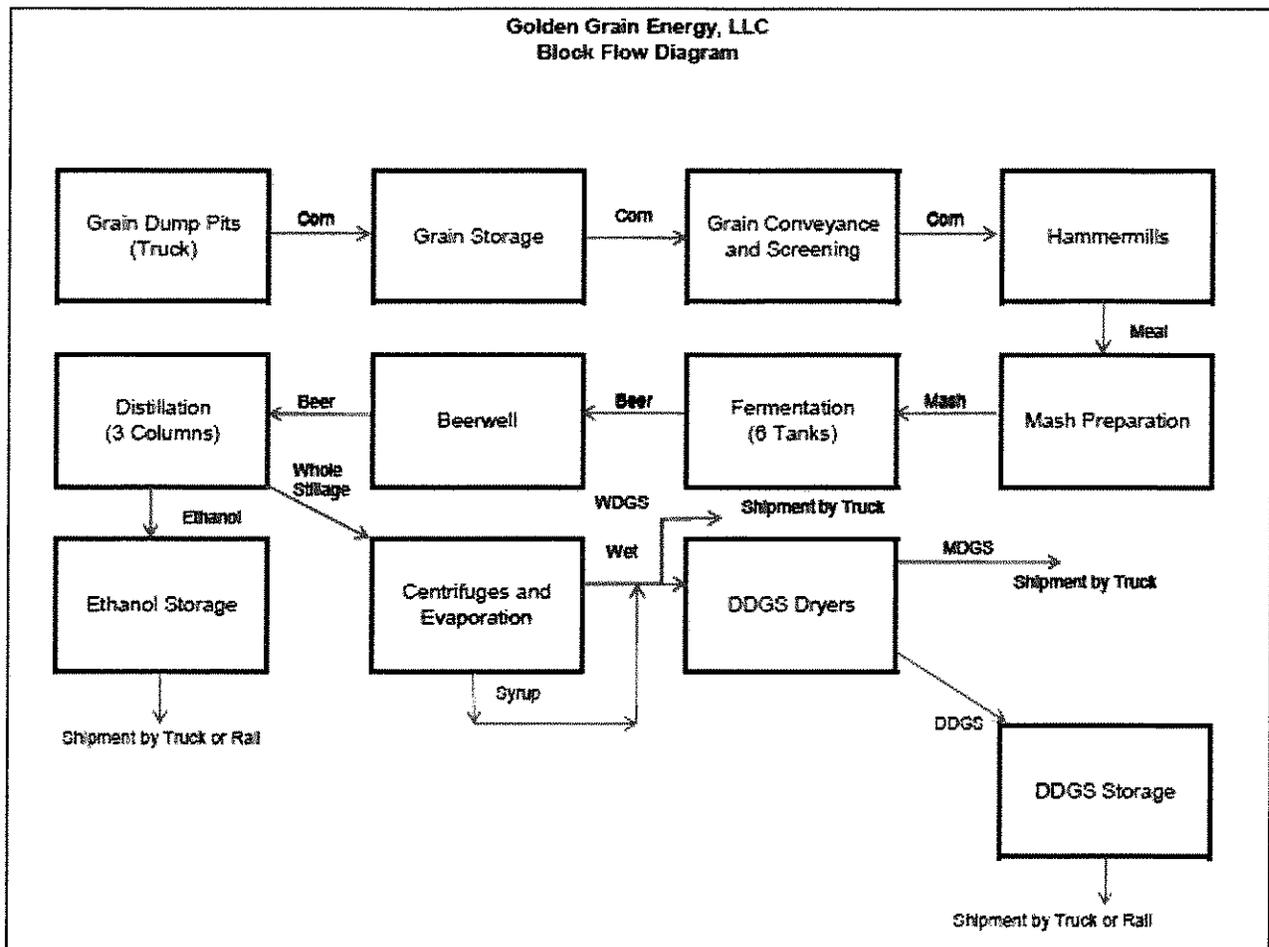
10. Process Flow Description – please refer to the block flow diagram on the next page –

Corn is received by truck and railcar. The corn is stored until further processing. The corn is conveyed from storage to a scalper where the corn is screened to remove any unwanted debris. The corn is then ground into flour in a hammer mill. The flour is mixed with water, enzymes and yeast and pumped to one of several fermentation tanks and allowed to ferment. The fermentation tanks operate in parallel as staggered batch processes. The carbon dioxide generated in the fermentation process is cleaned using a water scrubber. The resulting beer is pumped from the fermentation tanks, one at a time, to the beerwell.

The beer is pumped continuously from the beerwell to a three-column distillation process. The distillation process heats the beer and uses the differences in physical properties of the chemicals to separate the ethanol from the other beer constituents. The resulting hydrous ethanol (ethanol with 5 percent water by volume) is further refined using molecular sieves to remove the remaining water. The resulting 200-proof ethanol is stored in storage tanks and blended with denaturant prior to shipment. The bottoms from the first phase of the distillation process, known as whole stillage, is pumped into process storage tanks and then to centrifuges.

The whole stillage is separated at the centrifuges into thin stillage (liquid) and wet cake (solids). The thin stillage is then sent to the corn oil extraction process where the oil from the thin stillage is mechanically separated. The resulting corn oil is stored in tanks and shipped as a crude product. The remaining thin stillage is then sent to evaporators to remove water, resulting in syrup. The wet cake is sent to the dryers along with syrup to make either modified or dry distillers grains with solubles (MDGS or DDGS). The DDGS and MDGS are sold as animal feed.

## 11. Process Block Flow Diagram



## 12. Energy and Material Balance- Confidential Business Information

The material and energy balance for the Golden Grain Energy, LLC ethanol plant is shown on the following page. However, because it contains Confidential Business Information, it is not included in this non-confidential version of the application.

13. In a separate document/electronic file accompanying this application due to its size, please find the latest version of the plant's air permits (Title V permit). 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 Golden Grain Energy Pathway - Confidential Business Information**

Table 1: CA-GREET Model Inputs for the Golden Grain Energy Pathway

CA-GREET Model Sheet Name	Cell number	Default Pathway Value	Golden Grain Energy Pathway Value	Units	Description	Comments
Fuel_Prod_TS	L277	36,000	Confidential Business Information	btu/gal	Corn Ethanol Plant Energy Use, Dry Mill	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	10.19%	Confidential Business Information	%	Share of process energy for Electricity	With modern plant, lower power use
Inputs	C254	32,330	Confidential Business Information	btu/gal	Process fuel	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 April 2010 through March 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 Golden Grain Energy (GGE) pathway carbon intensity value is a sub-pathway of the Midwest, Dry-Mill, 100% DDGS Co-product, 100% natural gas fuel ethanol plant pathway. The carbon intensity value of the base pathway is 98.4 gCO<sub>2</sub>e/MJ. The carbon intensity value of the Golden Grain Energy ethanol plant ethanol is **88.92 gCO<sub>2</sub>e/MJ**.

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

CA-GREET Model Output							
IPPC factors	CA-GREET Model Output		Calculations to convert Output to g/CO <sub>2</sub> e/MJ				
	Corn	Ethanol	Btu or Grams per mmbtu of Fuel Throughput			gCO <sub>2</sub> e/mmbtu	gCO <sub>2</sub> e/MJ
gCO <sub>2</sub> 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 <sub>4</sub>	25	17.4	17	91	2,277.0	2.16	
N <sub>2</sub> O	298	41.7	42	42	12,571.0	11.92	
CO <sub>2</sub>	1	15,064	15,079	56,433	56,433.4	53.49	
<b>Sub-total lifecycle CI before denaturant and lt. vehicle combustion</b>						<b>71,281.4</b>	<b>67.57</b>
Denaturant and lt. vehicle combustion effects factor							0.80
<b>Total Lifecycle CI before ILUC with denaturant and lt. vehicle combustion effects included</b>							<b>68.37</b>
Indirect Land Use Change Factor (ILUC)							30
<b>Total CI of Pathway including Indirect Land Use Change</b>							<b>98.37</b>
Note: The calculated result of this pathway prior to making the input changes for the GGE ethanol plant is 67.57 gCO <sub>2</sub> e/MJ. This matches the Corn Ethanol WTW Analysis result of 67.6 gCO <sub>2</sub> e/MJ (Table B. GHG Emissions Summary for Dry and Wet Mill Corn Ethanol, page 5) before the denaturant and light vehicle combustion factor of 0.8 gCO <sub>2</sub> e/MJ is added.							

Table 4: GGE Mason City, Iowa Ethanol Plant CI Calculation based on the CA-GREET Model Output

GGE Ethanol Plant Sub-Pathway of the Midwest Dry Mill Ethanol Plant 98% DDGS/2% MDGS, NG Fuel Pathway							
IPPC factors	CA-GREET Model Output		Calculations to convert Output to g/CO <sub>2</sub> e/MJ				
	Corn	Ethanol	Btu or Grams per mmbtu of Fuel Throughput			gCO <sub>2</sub> e/mmbtu	gCO <sub>2</sub> e/MJ
gCO <sub>2</sub> e/g	US Avg Corn	98% DDGS/2% MDGS	Corn w/ loss	Total Corn + EtOH			
Total energy	187,023	1,332,177	187,117	1,519,294			
VOC	16.748	54.446	17	71			
CO	151.095	24.431	151	176			
CH <sub>4</sub>	25	17.379	17	75	1,878.8	1.78	
N <sub>2</sub> O	298	41.693	42	42	12,519.6	11.87	
CO <sub>2</sub>	1	15,046	15,053	46,915	46,915.1	44.47	
<b>Sub-total lifecycle CI before denaturant and lt. vehicle combustion</b>						<b>61,313.4</b>	<b>58.12</b>
Denaturant and lt. vehicle combustion effects factor							0.80
<b>Total Lifecycle CI before ILUC with denaturant and lt. vehicle combustion effects included</b>							<b>58.92</b>
Indirect Land Use Change Factor (ILUC)							30
<b>Total CI of Pathway including Indirect Land Use Change</b>							<b>88.92</b>

## VI. Production Range of Golden Grain Energy Pathway - Confidential Business Information

The new pathway should be applicable to the Golden Grain Energy facilities for at least 100% (80,000,000 gallons/year) to 150% (120,000,000 gallons/year) of Nameplate Capacity.

### Discussion

*This is the version of the letter that does not contain confidential business information. Another version containing confidential business information was submitted with the confidential version of this application support document.*



1822 43rd Street SW  
Mason City, IA 50401  
www.goldengrainenergy.com

May 12, 2011

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

**RE: Golden Grain Energy, LLC – Validity of Production Range**

To: The Executive Officer

This letter is to certify that the production range chosen for Golden Grain Energy's new pathway for the GGE Mason City, IA ethanol plant is true and accurate. Golden Grain's nameplate rate is 80 MMGal and its permitted rate is 150 MMGal. Golden Grain Energy has chosen the production range of 80 MMGal of denatured ethanol to 120 MMGal of denatured ethanol. This range is 100% to 150% of the nameplate rate. [REDACTED]

Sincerely,  
**GOLDEN GRAIN ENERGY, LLC**

  
5/12/2011

Chad Kuhlers  
Plant Manager

## **VII. Sustainability of Golden Grain Energy Pathway**

The Golden Grain Energy 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.<sup>3</sup>

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<sup>3</sup> 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, Natural Gas and Power –  
Confidential Business Information**

Table 5: Summary of Inputs and Outputs during “Production Period”

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

The monthly utility bills authenticating the amounts of natural gas and electricity shown in the table above are on the following pages. For the first month of the production period, the electricity consumed is based on the 3/31/11 – 4/29/11 invoice less one day’s pro-rata amount of the previous month’s bill to remove March 31. For the last month of the production period, the electricity consumed is based on 3/1/11 – 3/30/11 invoice plus two day’s pro-rata amount of the next month’s utility bill to add the electricity used on March 30 and March 31, 2011.

Table 6: Summary of Electrical Power Monthly Invoices

and the Pro-Rata Adjustment of the First and Last Month of the Production Period

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

Table 7: Summary of the Monthly Natural Gas Consumption Invoices, DecaTherms

Table 7 is considered Confidential Business Information and is not included in this non-confidential version of the application.

Copies of the monthly invoices summarized in the preceding two tables are shown on the following pages. Because the monthly invoices contain confidential business information, they are not shown in this non-confidential version of the application support document.

Also, on the following page, please see a letter from Mr. Chad Kuhlers, Plant Manager and Chief Operations Officer, Golden Grain Energy, LLC ethanol plant, attesting to the accuracy of the information used in the preparation of this application.



1822 43rd Street SW  
Mason City, IA 50401  
www.goldengrainenergy.com

May 11, 2011

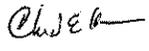
California Air Resources Board  
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1001 I Street  
P.O. BOX 2815  
Sacramento, CA 95812

To: The Executive Officer

RE: Golden Grain Energy, LLC Ethanol Plant – Accuracy of Data in New  
Pathway Application

This is to certify that the quantities of corn, undenatured ethanol, distillers grains solubles co-products and utilities summarized in the Golden Grain Energy, LLC application for a new pathway for the GGE Mason City, Iowa ethanol plant are true and accurate. These quantities represent the true and accurate production, feedstock use and utility consumption of our plant located at 1822 43rd Street SW, Mason City, Iowa and owned by Golden Grain Energy, LLC.

Respectfully,  
**GOLDEN GRAIN ENERGY, LLC**

 5/11/2011

Chad Kuhlers  
Plant Manager