



BUSHMILLS ETHANOL, INC. • 17025 HWY 12 NE • ATWATER, MN 56209 • PHONE: 320-974- 8050 • FAX: 320-974-0805

May 1, 2015

Re: Method 2A Application- Excluding Confidential Business Information

California Air Resources Board
Industrial Strategies Division
Transportation Fuels Branch
Fuels Evaluation Section
1001 I Street
Sacramento, CA 95812

To: The Executive Officer

Herewith, please find our application and supporting documents for two fuel lifecycle GHG emissions pathways using the Method 2A application process described in “Establishing New Fuel Pathways under the California Low Carbon Fuel Standard (LCFS) Procedures and Guidelines for Regulated Parties” report by ARB (California Air Resources Board) as updated on January 3, 2013, as well as the recently revised LCFS Regulations.

We seek four new pathways for our Bushmills Ethanol, Inc. (“Bushmills”) ethanol plant located near Atwater, Minnesota. At our facility, we produce ethanol from U.S. corn. Our facility uses natural gas for its process energy and electricity from the local grid. We co-produce modified distillers grains solubles (MDGS), dry distillers grains solubles (DDGS) and corn oil. No lime is used to treat the soil used to grow our corn feedstock because the soil conditions have a naturally high pH environment. No lime means that lime is applied on less than 2% of the fields where corn is grown for Bushmills ethanol plant 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 two new pathways are sub-pathways of the Corn Ethanol (Midwest; Dry Mill; Dry DGS, NG) Pathway because, except for the points of deviation summarized below, our pathways are identical to 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.¹

We have used the CA-GREET Model 1.8b to calculate the lifecycle greenhouse gas emissions from these sub-pathways. Based on the input changes to the model described in the attachments, the carbon intensity value of the new pathways are summarized in the following table:

Table 1: Summary of Bushmills New Pathways

Summary of Bushmills Ethanol, Inc. New Corn Ethanol Pathways			
Pathway #	DGS Co-Product	Ag Lime Use	CI, gCO2e/MJ
1	DDGS	No Lime Use	83.42
2	MDGS	No Lime Use	79.18

These CI intensity values 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 new pathways under Method 2A. Portions of the following information are considered confidential business information and each page with “Contains Confidential Information” in the page header should be considered to contain confidential business information. Pages that have been redacted to remove confidential business information have “Non-Confidential, Redacted Version” in the header. Where redaction has occurs in the text, it is marked with one or more “x” symbols. The number of “x” symbols has no meaning. Each electronic file that includes the word “CONFIDENTIAL” in the file name should be considered to contain confidential business information. If the electronic file does not contain any confidential business information, the file name includes the word “PUBLIC”.

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

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.

Contacts:

Affiliation:	Bushmills Ethanol, Inc.	Houston BioFuels Consultants LLC
Name:	Mr. Donovan Prah, CFO	Mr. Logan Caldwell, Consultant
Telephone number:	1-320-974-8050	1-281-360-8515
E-mail address:	Donovan.p@bushmillsethanol.com	lc@hbioc.net
Mailing Address	17025 Hwy 12 NE Atwater, MN 56209	5707 Ridge Vista Drive Kingwood, TX 77345

Sincerely,



Donovan M. Prah, CFO

Attachments

Section Number and Contents

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

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

Figure 1: WTW Components of the Bushmills Pathway are Identical to the Corn Ethanol (Midwest; Dry/Wet Mill; Dry DGS, NG) Pathway²

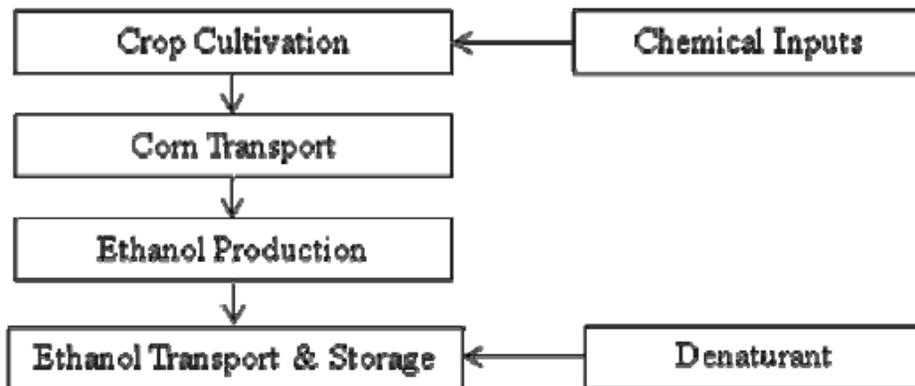


Figure 1. WTT Components for Ethanol Transported to California

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. Bushmills Plant Information

Bushmills Ethanol, Inc. Plant Information

1. EPA Facility ID Number - 70109
2. Plant Location – near Atwater, Minnesota
3. Plant History and Capacity Information – Bushmills Ethanol, Inc. is a 400 plus farmer owned cooperative which began operations in December of 2005 and currently is permitted to produce 65 million gallons of corn starch ethanol.
4. Technology – ICM Inc.
5. Feedstock Type – local corn. Farmer owners typically provide around half of the corn and Bushmills procures the remainder from other local farmers.
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 –

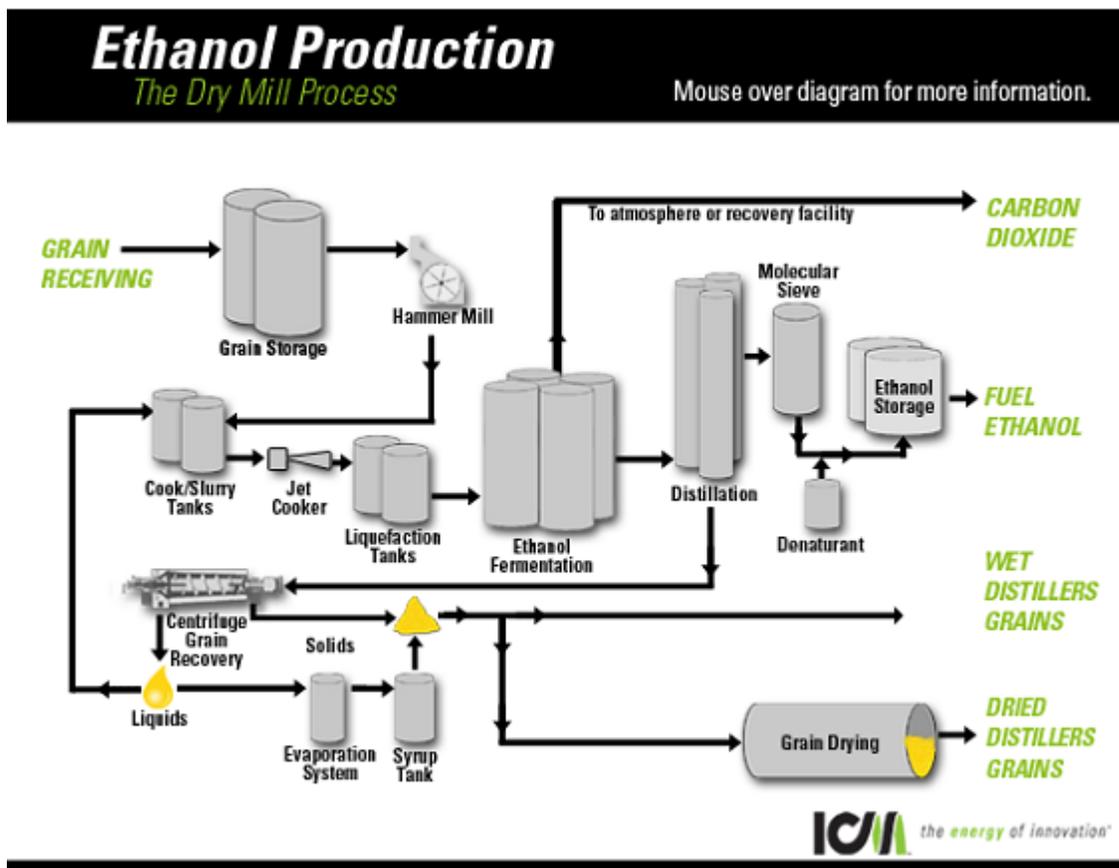
Corn may be received by either truck or railcar. The corn is stored until further processing. The corn is conveyed from storage to a scalper where the corn is screened to remove any unwanted debris. The corn is then ground into flour in a hammer mill. The flour is mixed with water, enzymes and yeast 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.

Source: ICM Inc.



12. Energy and Material Balance. For legibility, the energy and material balance for the Bushmills ethanol plant is contained in a separate pdf file accompanying the electronic version of this application and is a separate document in the printed, hard copy version of this application. The file name is: *Bushmills E&M Balance Diagram CONFIDENTIAL 20Sep13.pdf*.

13. In a separate document/electronic file accompanying this application due to its size, please find the latest version of the plant's air permit. This permit contains information about the equipment in the plant that generates emissions from the combustion of fuel. The file name of the permit is *Bushmills Current Air Permit PUBLIC 27Aug13.pdf*.

III. Table of CA-GREET Model Inputs for Bushmills Pathways

Table 2: CA-GREET Model Inputs for the Bushmills 100% DDGS Pathway

CA-GREET Model Sheet Name	Cell number	Default Pathway Value	Bushmills 100% DDGS Pathway Value	Units	Description	Comments and Table Reference
Regional LT	C2	U.S. Avg and Midwest	U.S. Avg and Midwest	n/a	Region for Analysis	No change. Shown for reference only
Fuel_Prod_TS	L277	36,000	Business Confidential	btu/gal (LHV)	Corn Ethanol Plant Energy Use, Dry Mill	Table 7, Total Energy use
Inputs	C247	10.19%	Business Confidential	%	Electricity % of total process energy	Table 7
Fuel_Prod_TS	D277	2.72	Business Confidential	gal/bu	Ethanol yield of Corn Ethanol Plant, Dry Mill	Table 7
Fuel_Prod_TS	T263	1,202	Business Confidential	grams/bu	CaCO3 Fertilizer for Corn	

Table 3: CA-GREET Model Inputs for the Bushmills Pathway 100% MDGS

CA-GREET Model Sheet Name	Cell number	Default Pathway Value	Bushmills 100% MDGS Pathway Value	Units	Description	Comments
Regional LT	C2	U.S. Avg and Midwest	U.S. Avg and Midwest	n/a	Region for Analysis	No change. Shown for reference only
Fuel_Prod_TS	L277	36,000	Business Confidential	btu/gal (LHV)	Corn Ethanol Plant Energy Use, Dry Mill	Table 8, Total Energy use
Inputs	C247	10.19%	Business Confidential	%	Electricity % of total process energy	Table8
Fuel_Prod_TS	D277	2.72	Business Confidential	gal/bu	Ethanol yield of Corn Ethanol Plant, Dry Mill	Table8
Fuel_Prod_TS	T263	1,202	Business Confidential	grams/bu	CaCO3 Fertilizer for Corn	

IV. Basis for the Input Values

The input values presented in this application are based on the 24-month period from February 2013 through January 2015, the “Production Period”. This period was selected based on the plants operating history and the most recent monthly data available at the start of the Method 2A application process.

No Lime Use for Corn Production

xxx

Distillers Corn Oil Considerations

The Bushmills ethanol plant produces distillers corn oil from the distillers grains co-product. Distillers corn oil production averaged xxx pounds of distiller's oil per gallon of ethanol produced and xxx pounds per bushel of corn feedstock. This production amount is consistent with other dry-mill ethanol plants extracting distiller's oil. By comparison, the default DGS production on a bone dry basis is xxx pounds of DGS per gallon of ethanol in the default corn dry-mill pathway. The DGS in the default pathway includes the distillers corn oil since there is no extraction of distillers corn oil in the default pathway process flow sequence. The distiller's oil extracted by Bushmills is approximately xxx of the DGS production before distillers corn oil extraction. Distillers corn oil from the Bushmills plant is used xxx. Given the relatively small amount of extracted distiller's oil to the total DGS production, and the relatively small fraction of the CI represented by co-product production, for the purpose of calculating the CI of the Bushmills new pathways, the distiller's oil has been assumed to be part of the DGS production.

Measuring Natural Gas Used for MDGS and DDGS Production

The Bushmills ethanol plant dries its distillers grains with xxx

Figure 2: Schematic of the Bushmills DGS Dryers

This figure is considered Confidential Business Information and is not included in this non-confidential, redacted version of the application.

Xxx



xxx.

Table 4: xxx

This table is considered Confidential Business Information and is not included in this non-confidential, redacted version of the application.

xxx

Table 5: xxx

This table is considered Confidential Business Information and is not included in this non-confidential, redacted version of the application.

xxx

Table 6: xxx

This table is considered Confidential Business Information and is not included in this non-confidential, redacted version of the application.

xxx

Table 7: Calculation of the Input Values for the Bushmills 100% DDGS Pathway

This table is considered Confidential Business Information and is not included in this non-confidential, redacted version of the application.

Table 8: Calculation of the Input Values for the Bushmills 100% MDGS Pathway

This table is considered Confidential Business Information and is not included in this non-confidential, redacted version of the application.

V. CA-GREET Model Output and Analysis of Results

The Bushmills 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 gCO₂e/MJ. The calculation of the CI of the reference pathway is shown below for reference only and is from the same model downloaded from the ARB web-site that was used to calculate the CI values of the Bushmills' pathways.

Table 9: CI of Existing Midwest Dry Mill, 100% DDGS, 100% Natural Gas Fuel Pathway

CARB Lookup Table Reference Pathway: Midwest Dry Mill Ethanol Plant, 100% DDGS, NG Fuel Pathway							
CA-GREET Model Output							
IPPC factors	Corn	Ethanol		Calculations to convert Output to g/CO ₂ e/MJ			
gCO ₂ e/g	Btu or Grams per mmbtu of Fuel Throughput					gCO ₂ e/mmbtu	gCO ₂ e/MJ
	US Avg Corn	100% DDGS	Corn w/loss	Total corn + EtOH			
Total energy	187,247	1,469,428	187,342	1,656,770			
VOC	16.768	55.519	17	72			
CO	151.276	31.385	151	183			
CH ₄	25	17.400	73.663	17	91	2,276.8	2.16
N ₂ O	298	41.743	0.400	42	42	12,564.9	11.91
CO ₂	1	15,064	41,354	15,071	56,426	56,425.9	53.48
Sub-total lifecycle CI before denaturant and lt. vehicle combustion						71,267.6	67.55
Denaturant and lt. vehicle combustion effects factor							0.80
Total Lifecycle CI before ILUC with denaturant and lt. vehicle combustion effects included							68.35
Indirect Land Use Change Factor (ILUC)							30
Total CI of Pathway including Indirect Land Use Change							98.35
Note: The calculated result of this pathway prior to making the input changes for the subpathway ethanol plant is 67.55 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 vehicle combustion factor of 0.8 gCO ₂ e/MJ is added.							

The carbon intensity values of the two new pathways Bushmills is applying for in this new pathway application are summarized in the following table. The details of the CI calculations are shown in the subsequent tables. The primary pathways are the no lime use pathways.

Table 10: Summary of Bushmills Ethanol, Inc. New Pathway CI Values

Summary of Bushmills Ethanol, Inc. New Corn Ethanol Pathways			
Pathway #	DGS Co-Product	Ag Lime Use	CI, gCO ₂ e/MJ
1	DDGS	No Lime Use	83.42
2	MDGS	No Lime Use	79.18

The CI calculations for the new Bushmills pathway with DDGS co-product are shown in the following table.

Table 11: CI Calculation of Bushmills Mixed 100% DDGS Pathway, No Lime Use

This table is considered Confidential Business Information and is not included in this non-confidential, redacted version of the application.

The CI calculations for the new Bushmills pathway with MDGS co-product is shown in the following table.

Table 12: CI Calculation of Bushmills Mixed 100% MDGS Pathway, No Lime Use

This table is considered Confidential Business Information and is not included in this non-confidential, redacted version of the application.

VI. Production Range of Bushmills Pathway

As stated in the Method 2A application form, the new pathways are applicable to the Bushmills facilities for at least 52 MGY to 65 MGY of ethanol production.

VII. Sustainability of Bushmills Pathway

The Bushmills 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

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

IX. Documentation of Annual Quantities of Feedstock, Utilities and Production

Table 15: Summary of Inputs and Outputs during “Production Period”

This table is considered Confidential Business Information and is not included in this non-confidential, redacted version of the application.

Contains Confidential Business Information

Documents authenticating the amounts shown in the table above are listed below. Utility Invoices are shown in separate pdf files. These are:

The natural gas invoices coincide with the calendar month and are documented in the following file.

- *Bushmills natural gas invoices CONFIDENTIAL 31Mar15.pdf*

The monthly electricity invoices are documented in the following file.

- *Bushmills electrical invoices CONFIDENTIAL 31Mar15.pdf*

The monthly electricity invoices do not coincide with the calendar months and have been pro-rated across the months each invoice covers to put the electricity consumption on a calendar month basis. The table calculating the calendar month basis of the electricity usage can be found in an Excel spreadsheet named: *Electricity Use Monthly Invoice Reconciliation CONFIDENTIAL 10Mar15.xlsx*

By separate file named *Bushmills Transmittal Attestation Letter PUBLIC 1May15.pdf*, please find a letter from Mr. Donovan Prah, Chief Financial Officer of Bushmills, attesting to the accuracy and authenticity of the data used in this new pathway application.