Hereford Plant Summary

White Energy produces ethanol at a dry mill plant in Hereford, Texas. While Midwest corn is the primary feedstock processed at this plant, between 7 and 24 percent of the feedstock has consisted of sorghum over the last two years. The long-term sorghum use rate has ranged from 5 to 30 percent. All sorghum used in the plant is obtained from local producers. The plant, which is powered by natural gas and electricity, produces wet distillers' grains with solubles (DGS) consisting of 65 percent moisture by weight, but has the capability to produce modified DGS (50 percent moisture), as well as dry DGS (12 percent moisture). The DGS produced is a co-product which is used as livestock feed. Much of the ethanol produced by the Hereford plant is shipped by rail to California.

The air pollution control permit issued to the Hereford plant by the Texas Commission on Environmental Quality establishes the plant's maximum production capacity at 100 million gallons of ethanol annually.

Carbon Intensity of Ethanol Produced— Hereford Plant

White Energy is seeking ARB approval of twelve pathways for its Hereford plant. The pathways vary based on both the moisture content of distillers' grains and the proportion of sorghum in the feedstock mixture. Table 1, below, summarizes the proposed Hereford pathways. Also shown in the table are the conditions under which each pathway carbon intensity value could be applied to ethanol sold in California under the LCFS.

The land use change (LUC) impacts of sorghum ethanol have not yet been estimated. Since corn is the predominant feedstock for the plant, LUC impacts will be dominated by the current corn ethanol value of 30 gCO_2e/MJ. Accordingly, 30 gCO_2e/MJ will be used on an interim basis, pending Board approval of an LUC value for sorghum used as a fuel feedstock.

Table 1: Proposed Lookup Table Entries

Fuel/ Feedstock	Proposed Lookup Table Pathway Description	Carbon Intensity in gCO_2e/MJ (Including Indirect Effects)[1]	Special Conditions
Ethanol/ Sorghum, Corn	Midwest dry mill; 1% Sorghum, 99% Corn, Wet DGS	84.79	1) Plant energy use not to exceed a value the applicant classifies as confidential; 2) Percent sorghum fraction not to exceed 1%. 3) Moisture content of distillers' grains to be maintained as specified by the applicant at 65%.
Ethanol/ Sorghum, Corn	Midwest dry mill; 1% Sorghum, 99% Corn, Partially Dry DGS	87.09	1) Plant energy use not to exceed a value the applicant classifies as confidential; 2) Percent sorghum fraction not to exceed 1%. 3) Moisture content of distillers' grains to be maintained as specified by the applicant at 50%.
Ethanol/ Sorghum, Corn	Midwest dry mill; 1% Sorghum, 99% Corn, Dry DGS	93.09	1) Plant energy use not to exceed a value the applicant classifies as confidential; 2) Percent sorghum fraction not to exceed 1%. 3) Moisture content of distillers' grains to be maintained as specified by the applicant at 12%.
Ethanol/ Sorghum, Corn	Midwest dry mill; 10% Sorghum, 90% Corn, Wet DGS	85.46	1) Plant energy use not to exceed a value the applicant classifies as confidential; 2) Percent sorghum fraction not to exceed 10%. 3) Moisture content of distillers' grains to be maintained as specified by the applicant at 65%.
Ethanol/ Sorghum, Corn	Midwest dry mill; 10% Sorghum, 90% Corn, Partially Dry DGS	87.76	1) Plant energy use not to exceed a value the applicant classifies as confidential; 2) Percent sorghum fraction not to exceed 10%. 3) Moisture content of distillers' grains to be maintained as specified by the applicant at 50%.
Ethanol/ Sorghum, Corn	Midwest dry mill; 10% Sorghum, 90% Corn, Dry DGS	93.76	1) Plant energy use not to exceed a value the applicant classifies as confidential; 2) Percent sorghum fraction not to exceed 10%. 3) Moisture content of distillers' grains to be maintained as specified by the applicant at 12%.
Ethanol/ Sorghum, Corn	Midwest dry mill; 20% Sorghum, 80% Corn, Wet DGS	86.19	1) Plant energy use not to exceed a value the applicant classifies as confidential; 2) Percent sorghum fraction not to exceed 20%. 3) Moisture content of distillers' grains to be maintained as specified by the applicant at 65%.

Fuel/ Feedstock	Proposed Lookup Table Pathway Description	Carbon Intensity in gCO_2e/MJ (Including Indirect Effects)[1]	Special Conditions
Ethanol/ Sorghum, Corn	Midwest dry mill; 20% Sorghum, 80% Corn, Partially Dry DGS	88.49	1) Plant energy use not to exceed a value the applicant classifies as confidential; 2) Percent sorghum fraction not to exceed 20%. 3) Moisture content of distillers' grains to be maintained as specified by the applicant at 50%.
Ethanol/ Sorghum, Corn	Midwest dry mill; 20% Sorghum, 80% Corn, Dry DGS	94.49	1) Plant energy use not to exceed a value the applicant classifies as confidential; 2) Percent sorghum fraction not to exceed 20%. 3) Moisture content of distillers' grains to be maintained as specified by the applicant at 12%.
Ethanol/ Sorghum, Corn	Midwest dry mill; 30% Sorghum, 70% Corn, Wet DGS	86.93	1) Plant energy use not to exceed a value the applicant classifies as confidential; 2) Percent sorghum fraction not to exceed 30%. 3) Moisture content of distillers' grains to be maintained as specified by the applicant at 65%.
Ethanol/ Sorghum, Corn	Midwest dry mill; 30% Sorghum, 70% Corn, Partially Dry DGS	89.23	1) Plant energy use not to exceed a value the applicant classifies as confidential; 2) Percent sorghum fraction not to exceed 30%. 3) Moisture content of distillers' grains to be maintained as specified by the applicant at 50%.
Ethanol/ Sorghum, Corn	Midwest dry mill; 30% Sorghum, 70% Corn, Dry DGS	95.23	1) Plant energy use not to exceed a value the applicant classifies as confidential; 2) Percent sorghum fraction not to exceed 30%. 3) Moisture content of distillers' grains to be maintained as specified by the applicant at 12%.

[1] The carbon intensity values reported in this table include a land use change value of 30 gCO2e/MJ. This is an interim value which will be used until the Board approves a new regulatory value.

The Hereford plant achieves carbon intensity values that are generally lower than those associated with the Midwestern corn ethanol pathways currently in the LCFS Lookup Table. It achieves these lower values through two principal means: First, due to a higher overall plant efficiency, the Hereford plant realizes a lower carbon intensity for ethanol production (23.12 gCO2e/MJ as opposed to 38.3 gCO2e/MJ for the existing LCFS Midwest dry mill, dry DGS, natural gas corn ethanol pathway). Second, by producing DGS at three rather than two moisture content levels, Hereford has reduced the overall drying energy required to produce DGS. In effect, the plant has replaced a portion of its dry DGS production with modified DGS, which consumes less dryer

energy. White Energy has estimated the carbon intensity of modified DGS by interpolating between the ARB values for wet (60.1 gCO_2e/MJ) and dry (68.4 gCO_2e/MJ) DGS. According to White Energy, the result is a value of 62.4 gCO_2e/MJ for modified DGS.

Because the current, approved, LCFS Lookup Table contains no ethanol pathways for plants using multiple feedstocks, no reference pathway for the Hereford plant currently exists. White is, therefore, applying for the pathways shown in Table 1 under the Method 2B process. As such, the Hereford application is not subject to the substantiality requirements with which Method 2A applications must comply (a minimum improvement of five gCO_2e/MJ, and a minimum production volume of ten million gallons per year).

The following will become operating conditions upon approval by the Executive Officer of White Energy's proposed Hereford plant pathways:

- Total energy and electricity use
- Corn-sorghum ratios in the plant's feed stock
- DGS moisture content

Actual plant performance in each of these areas shall remain within the bounds established in White's application. The plant's energy and electricity use values are classified by the applicant as confidential business information. .

<u>Staff Analysis and Recommendation— Hereford Plant</u>

Staff has reviewed the White Hereford Plant application, and finds the following:

- Staff has replicated, using the CA-GREET spreadsheet, the carbon intensity values calculated by White Energy for each of the twelve sub-pathways;
- White Energy has provided documentation for its plant's energy use, feedstock use and ethanol production levels; and
- Staff agrees that the energy values in the application accurately represent the Hereford plant's actual energy use values.

On the basis of these findings, the staff recommends that White Energy's application for twelve Method 2B mixed feedstock (corn/sorghum) ethanol sub-pathways be approved.