

Fuel Pathway Summary for Golden Grain Energy

Mason City, Iowa Plant Summary

Golden Grain Energy (GGE) produces ethanol from corn at a dry mill plant in Mason City, Iowa. The plant is primarily powered by natural gas, but also consumes electrical energy. GGE produces both distillers' grains with solubles (DGS) and corn oil as co-products. According to the applicant, 98 percent of the DGS produced is dried while the balance is partially dried. The partially dried product—known as modified distillers' grains (MDGS)—contains about 50 percent moisture by weight. Dry DGS contains about 10 percent moisture. All three co-products (dry DGS, modified DGS, and corn oil) are sold as livestock feed, though some corn oil is occasionally sold to biodiesel producers. GGE has not included a corn oil co-product credit in its carbon intensity calculations. Because no corn oil credit is claimed, and because much of the extracted corn oil remains in the livestock feed market, GGE's carbon intensity includes the default DGS co-product credit.

Under the terms of its air pollution control permit, the GGE plant may operate at a maximum capacity of 150 million gallons per year (mgy). The Low Carbon Fuel Standard (LCFS) pathways for which GGE is seeking approval, however, would only apply to production occurring in the 80 to 120 mgy range.

Carbon Intensity of Ethanol Produced—GGE (Mason City, IA)

Golden Grain Energy is seeking ARB approval for an LCFS Method 2A pathway. Although the Mason City plant produces DGS at two distinct moisture levels, it is applying for a single carbon intensity. The DDGS and MDGS are produced simultaneously; there is no practical way to collect data on the emissions associated with 100 percent DDGS and 100 percent MDGS. The LCFS reference pathway applicable to the GGE application is the Midwest; Dry Mill; Dry DGS, NG pathway, which has a carbon intensity of 98.4 gCO_{2e}/MJ. Under the Method 2A process, dry DGS pathways serve as reference pathways for proposed pathways yielding either dry or modified DGS. As shown in Table 1, the carbon intensity of the proposed GGE pathway, as calculated by the applicant, is 91.33 gCO_{2e}/MJ. Because this carbon intensity is more than 5 gCO_{2e}/MJ lower than the reference carbon intensity, the proposed GGE pathway meets the Method 2A substantiality requirement that new pathways have carbon intensities that are no less than 5 gCO_{2e}/MJ lower than the carbon intensities of their reference pathways.

Table 1: Proposed Lookup Table Entries

Fuel/Feedstock	Proposed Lookup Table Pathway Description	Carbon Intensity in gCO ₂ e/MJ (Including Indirect Effects)	Do Special Conditions Apply? (Y/N) ¹
Ethanol/corn	Midwest; Dry Mill; Dry DGS, NG	91.33	Y

¹ The special conditions to which this column refers are discussed in the “Carbon Intensity of the Fuel Produced” section of this summary

The Mason City plant achieves a lower carbon intensity value relative to the reference pathway through two principal means. First, the plant incorporates modern plant design developed by ICM that results in less energy use in the plant. Energy use at the Mason City plant is below the 36,000 BTU per gallon energy use value that forms the basis of the carbon intensity for the reference dry DGS pathway. Second, electricity use at the Mason City plant is below the 1.08 kW-hr per gallon that is assumed for the reference pathway.¹

Operational Conditions – GGE (Mason City, IA)

The following will become operating conditions upon approval by the Executive Officer for the GGE pathway:

- Thermal and electrical energy usage rates per gallon of ethanol produced shall not exceed the current values that are classified by the applicant as confidential business information
- Modified DGS shall constitute a minimum of 2 percent of GGE’s total DGS production on an annual basis.
- The moisture content of modified distillers’ grains (MDGS) shall be no less than 47 percent by weight on an annual average basis.

Staff Analysis and Recommendation

ARB staff has reviewed the *Golden Grain Energy (GGE, Mason City, IA)* plant’s application and finds the following:

- GGE provided documentation for the plant’s energy usage.
- Staff agrees that the energy consumption values in the application accurately represent the *GGE* plant’s actual energy use values.
- Staff has replicated, using the CA-GREET model, the carbon intensity value calculated by the applicant.

¹ Actual plant energy use values are classified as confidential business information and not reported herein

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On the basis of these findings, staff recommends that the *GGE* Plant's application for the Method 2A Ethanol pathway be approved.