Method 2A Application: Life Cycle Analysis Report

This document ("**Life Cycle Analysis Report 24FEB2012.doc"**) and the accompanying spreadsheet (**"Life Cycle Analysis Report 24FEB2012.xls"**) encompass the "Life Cycle Analysis Report" as specified in Section IV of the POET's Method 2A Application. These two files are meant to be reviewed concurrently, and this document describes the contents of the spreadsheet analysis.

The Life Cycle Analysis (LCA) Report documents the analysis of the POET facility data for dry mill ethanol production (with natural gas as the primary process fuel) and corresponding calculation of carbon intensity (CI) values following CARB methods. The calculation of CI was completed in conjunction with the CARB version of the GREET1.8b model (in spreadsheet format). The interaction and use of GREET1.8b in this analysis is summarized as follows.

(A) The key modeling parameters used as input by GREET1.8b were calculated as shown in this report.
(B) The sub-pathway modeling parameters were input into GREET1.8b, and the values of CI as estimated by GREET1.8b are then copied back into this report.
(C) This report compares the final sub-pathway CI value estimated against the nearest, existing CARB pathway estimate for CI. The CARB application process requires that the difference in CI values (sub-pathway versus existing CARB pathway) be at least 5 g CO2e/MJ. This criterion for difference in CI is met for all cases evaluated.

The analysis generally utilizes GREET1.8b default assumptions, with the exception that most recent year's historical POET facility data are used to establish the value of key modeling parameters related to the ethanol production process. Specific modeling parameters based on POET-specific plant data were ethanol yield, total energy consumption, energy consumption by fuel type and DGS yield. Plant operations data represent the historical period from July 1, 2010 to June 30, 2011.

The remainder of this document describes the contents of the LCA Report and is organized by the individual worksheets contained in the accompanying spreadsheet.

Facility Matrix

This worksheet lists the 4 POET fuel production facilities represented by the proposed sub-pathway.

The sub-pathway number is a numeric designation meant to distinguish this sub-pathway (Sub-Pathway 7) from other POET sub-pathways defined by previous Method 2A applications.

SubPath7-DDGS

This worksheet contains the facility specific estimates for ethanol yield, total energy consumption, energy consumption by fuel type and DGS yield – **for the case assuming 100% dry DGS (or DDGS) co-product**. These facility specific inputs were incorporated into GREET1.8b and the resulting CI values out of the model were extracted and are reported here (units = gCO2e/MJ). Copies of the GREET1.8b model evaluations for each facility accompany this Application.

The GREET1.8b estimated CI value is then combined with the CARB-derived denaturant impact of 0.8 gCO2e/MJ. The combined CI value (facility plus denaturant) for each facility is reported here.

In the Application, the CI value assigned to this sub-pathway is the maximum value estimated for the 4 individual facilities.

SubPath7-WDGS

This worksheet contains the facility specific estimates for ethanol yield, total energy consumption, energy consumption by fuel type and DGS yield – **for the case assuming 100% wet DGS (or WDGS) co-product**. These facility specific inputs were incorporated into GREET1.8b and the resulting CI values out of the model were extracted and are reported here (units = gCO2e/MJ). Copies of the GREET1.8b model evaluations for each facility accompany this Application.

The GREET1.8b estimated CI value is then combined with the CARB-derived denaturant impact of 0.8 gCO2e/MJ. The combined CI value (facility plus denaturant) for each facility is reported here.

In the Application, the CI value assigned to this sub-pathway is the maximum value estimated for the 4 individual facilities.

CI Reduction Demonstration

This worksheet presents the demonstration that the proposed sub-pathway CI values (for DDGS and WDGS separately) meet the required 5 gCO2e/MJ reduction requirement of a Method 2A Application. The reduction is estimated relative to the closest CARB Reference pathway for "Mid-West Dry Mill, 100% NG." Values reported include the denaturant impact on CI.

In the Application, the CI value assigned to this sub-pathway is the maximum value estimated for the 4 individual facilities.

Drying Energy

The energy requirements for drying DGS are summarized in this worksheet.

The results in dekatherms (Dths) per ton equaled 4.3. These are the underlying CA-GREET1.8b-based values, and were carried forward into the energy estimates supporting the CI analysis. Utilizing the GREET-based values here would also mean these sub-pathway results and the differences between dry and wet DGS would be fully consistent with the existing CARB corn pathway estimates.

These values remain unchanged from those used the February 2011 Method 2A application submitted by POET, which was subsequently approved by CARB.

POET Original

This worksheet contains the facility operations data supplied by POET (unmodified).

POET Modified

This worksheet contains the facility operations data modified for consistency with GREET-required modeling. Energy consumption is converted from a HHV-basis to a LHV basis (GREET requirement). DGS yield is adjusted to 0 percent moisture (GREET requirement). Energy requirements for the two 100% DDGS and 100% WDGS cases are calculated.