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Mr. Dean Simeroth
California Air Resources Board
PO Box 2815
Sacramento, CA 95812

Subject: Comments on the CA-GREET Model Lifecycle Analysis for Cellulosic Ethanol Production by BlueFire Ethanol's Arkenol Process

Dear Dean:

Thank you for participating in the meeting among representatives of BlueFire Ethanol, ARB and CEC staff on November 21, 2008 to discuss the Arkenol/BlueFire ethanol production process and how the GREET Model might be modified to accommodate the Greenhouse Gas (GHG) benefits of cellulosic ethanol in calculating a weighting for the Low Carbon Fuel Standard and CEC's AB118 process. As you are aware, BlueFire is in the final stages of permitting a 3.7 mmgal/yr ethanol facility in Lancaster and is developing another project in California with support from the U.S. Department of Energy. Biomass diverted from landfills will be used as feedstock for the process in both of these projects. Byproduct lignin will be used as boiler fuel. Additional biomass will be used to supplement the lignin as boiler fuel. We believe that ethanol from the Arkenol/BlueFire process will be shown to have a very low carbon footprint, to the benefit of the LCFS.

As you continue to make progress in developing a GHG lifecycle analysis for cellulosic ethanol, we urge you to account for the GHG benefits of waste conversion through a process such as ours, which apparently is not covered in the current version of GREET. That is, the avoidance of an alternate fate whereby the biomass feedstock and fuel would be left to decay in the landfill. In our process, the carbon in the biomass that would have otherwise decayed is converted to ethanol with the result that all of the carbon is eventually oxidized to CO_2, either as thermal energy for the ethanol plant or after combustion of the ethanol. The alternate fate, that of landfill decay, would result in a portion of the carbon being released as CH_4 as discussed below.

The gaseous products of decay in the landfill are primarily CO_2 and CH_4, occurring in approximately equal volumes in a typical landfill. Much of the landfill gas is captured and the CH_4 portion is oxidized to CO_2 via combustion, either by flare or IC engine. However, a portion of the LFG stream is released directly to the air, bypassing the LFG control system. Thus, a portion of the biomass carbon is released to the air in reduced form as CH_4 when left to decay in a landfill. When the biomass is diverted to the Arkenol/BlueFire process, where all carbon is oxidized either by combustion for boiler

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fuel or in the ethanol product, the overall CO2e emissions will be less than under the alternate landfill fate.

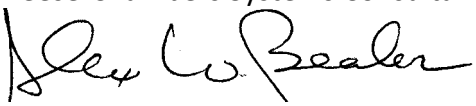
Since CH_4 has a global warming potential factor of 23, vs. a GWP factor of 1.0 for CO_2, the alternate fate scenario would lead to greater emissions of GHGs (as CO2e) compared to the Arkenol/BlueFire process. Since the biomass carbon was initially derived from the atmosphere, the Arkenol/BlueFire process is carbon neutral (notwithstanding some fossil fuel emissions from transportation and yard equipment). The Pacific Institute, with funding from the CEC and others, has recently studied the alternate fate of fuels for biopower projects[1]. For a controlled landfill, a net reduction of CO2e emissions of 16 tons/billion Btu (32 lb/MMBtu) was calculated for combusting the biomass in the power plant rather than allowing it to decay in the landfill. The Arkenol/BlueFire process is functionally equivalent to a biomass power plant in this regard because all biomass carbon is converted to CO_2 as opposed to the alternate fate of some portion being released as CH_4.

Modifying the GREET model by allowing for the consideration of avoided alternate fates would lead to a more accurate assessment of the effective carbon content of cellulosic ethanol as produced by the Arkenol/BlueFire process.

The ARB adopted a similar approach of avoiding a worse alternate fate in the 1980s when it developed "A Procedure Relating to the Determination of Agricultural/Forestry Waste Emission Offset Credits" (November, 1989) under AB 1223 and AB2158. The idea in that legislation was to burn agricultural waste in controlled biomass boilers, thereby avoiding the alternate fate of open-field burning with its significantly greater criteria pollutant emissions.

Thank you for the opportunity to provide comments. If you require additional information on our technology please do not hesitate to contact us. Please note that BlueFire's Peggy Gunawan has been in contact with CEC's McKinley Addy regarding the production aspects of the Arkenol/BlueFire process as they apply to CA-GREET.

Sincerely,
Reese-Chambers Systems Consultants, Inc.



Alex W. Bealer

Copy: Necy Sumait
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[1] Gregory Morris, PhD, 2008. "Bioenergy and Greenhouse Gases", Green Power Institute, The Renewable Energy Program of the Pacific Institute, Berkeley, California, May 2008.
www.pacinst.org/reports/Bioenergy_and_Greenhouse_Gases/