



19 August 2009

Mr. John Curtis
Manager, Alternative Fuels Section
California Air Resources Board
P.O. Box 2815
Sacramento, CA 95812

**Re: Comments to Proposed Draft California-Modified GREET Pathways for
Brazilian Sugarcane Ethanol**

Dear John:

I am writing to provide comments to the document titled *Preliminary Draft Detailed California-Modified GREET Pathways for Brazilian Sugarcane Ethanol: Average Brazilian Ethanol, With Mechanized Harvesting and Electricity Co-product Credit, With Electricity Co-product Credit*, dated July 20, 2009.

Introduction

Amyris Biotechnologies, Inc. ('Amyris') based in Emeryville, CA, is applying a proprietary synthetic biology technology to create a portfolio of renewable fuels and chemicals that help reduce the world's carbon footprint. Amyris products are designed to be low cost, scale-able, and compatible with the existing infrastructure with performance attributes comparable to petroleum-based products. Amyris Renewable Diesel has been registered by the Environmental Protection Agency.

Amyris operates two subsidiary companies: Amyris Fuels, LLC and Amyris Brazil Pesquisa e Desenvolvimento, Ltda. 'Amyris Fuels' is building Amyris' U.S. based product distribution and marketing capabilities and is active with ethanol distribution in the US. 'Amyris Brazil' was established to oversee Amyris' final scale up, licensing, production and distribution in Brazil. Amyris Brazil includes development laboratories, a pilot plant and demonstration facility.

The demonstration facility, located in the midst of the sugarcane processing industry, secures the final development step before full commercial production of

Amyris' renewable hydrocarbon fuels. The Brazilian facility complements the research and development laboratories and pilot plant operations in Emeryville.

To achieve Amyris' targeted 2011 commercialization, a leading engineering, procurement and construction management firm has been engaged to oversee final design and construction of commercial production facilities. Amyris intends to leverage existing Brazilian sugarcane industry infrastructure.

Sugarcane Ethanol Pathways

Our assessment of the modified GREET pathways for Brazilian sugarcane pathways calculations is that it was carefully done, capturing many of the complexities of the agricultural and industrial processes. Our comments below suggest further changes that should be applied across sugarcane ethanol pathways.

The proposal analyzes two additional scenarios for sugarcane ethanol to account for improved harvesting practices and the export of electricity from sugarcane ethanol plants in Brazil using energy from bagasse. The first additional scenario recognizes mechanized harvesting of cane which is replacing the traditional practice of burning straw before harvesting cane. The second scenario includes export of electricity beyond that required for processing in the plant (co-product credit).

The new analysis allows Brazilian ethanol to receive a credit of more than 15 gCO₂e/MJ, due to the use of bioelectricity from sugarcane cogeneration (7 gCO₂e/MJ) and the mechanization of sugarcane harvest (8.2 gCO₂e/MJ). Amyris is supportive of these additional pathway scenarios and offers the following insights.

Co-generation:

Sugarcane mill operations of latest designs will yield greater cogeneration efficiencies and reduced process demands than as proposed. These advanced technology mills will utilize a greater mix of electricity resources specific for the region. It is requested that ARB pathway certification allow for higher documented cogeneration sales credit and resultant lower equivalent CO₂ values.

Transportation fuel composition values:

The transportation fuel composition occurring with the agricultural activities through Brazilian port delivery is largely diesel fuel, presently consisting of 2% biodiesel. The biodiesel blend ratio has been national mandated to 3% biodiesel commencing in 2010, and will be expanded to 5% commencing in 2012. The use of

biodiesel blends will substantially reduce the carbon intensity value of diesel fuel from 94.71 gCO₂e/MJ (petroleum diesel) to lower values as pure biodiesel is presently assigned a value of 26.9 gCO₂e/MJ. The ARB fuel composition value should be readily adjustable to recognize this higher biodiesel percentage.

Maritime transportation assumption:

ARB has assumed that maritime transport departing from a California port will be with no cargo. As no data substantiating this assumption has been located, it is requested that data justifying this assumption be provided.

Pathway applicability to sugarcane diesel:

It should be noted that the proposed sugarcane ethanol pathways can be easily adapted for diesel fuel produced from sugarcane fermentation. Sugarcane diesel fuel production will utilize unique chemical finishing processes relative to ethanol production. The higher energy density and lower production volume for diesel fuel in comparison to ethanol production will require additional energy inputs, and will reduce the overall energy usage attributed to fuel transport.

Pathway similarity with other domestic feedstocks:

CERES agronomy studies have demonstrated that sugarcane ethanol pathways can be readily adapted to well represent other feedstocks which are domestically grown such as sweet sorghum. Sweet sorghum is commonly grown the states of Texas, Louisiana, Florida, Alabama and in regions of California. Amyris urges that ARB finalize the proposed sugarcane ethanol pathways with the consideration of practical alternative feedstock adaptation.

Supplemental Comments Regarding ILUC

California ARB has publicly undertaken the responsibility to improve the carbon emissions values for all fuels, as well as emissions related to the controversial issue of ILUC. It is believed that the science of ILUC as it has evolved today justifies addressing the impact of biofuels on global land management practices.

It is essential that verifiable data and updated research are taken into account with regards to ILUC assessment, so that it may accurately reflect current day agriculture practices. We are certain that an analysis based on available and reliable data will support an indirect impact on land use by sugarcane in Brazil much lower than the 46 gCO₂e/MJ value presently assumed by ARB.

While Amyris supports that indirect effects should be considered or managed, mechanisms must be developed to promote best practices. Rewarding the efficient use of land for dedicated biofuels production (e.g. 'energy cane') will accelerate the positive trends in land use efficiency across US and global agriculture, thus minimizing direct and indirect effects.

Amyris urge that ARB seek alternate policy mechanisms to address these concerns. Strategic elements of such policy should include the following.

- A defined process for dialog between ARB and the producer in which initial values for each feedstock be fully reviewed with the impacted bio-fuel producers
- A program structure allowing rapid inclusion and *updating* of ILUC values to represent latest science
- Identify mechanisms which reward best practices as reductions in agronomy inputs, reduced energy inputs and increased product yields are possible in the near future

Conclusion

Amyris fully support California ARB's efforts to update the sugarcane ethanol pathway values. The new proposal better recognizes the existing science and provides reasonable GHG credits to the mechanization of the sugarcane harvest, as well as the generation of bioelectricity with the combustion of sugarcane bagasse.

I look forward to further explain the suggestions described herein with ARB staff and members of the upcoming Experts Workgroup.

Respectfully,



Fernando J. Garcia
Senior Director