Amyris Integrated Biorefinery

Demonstrating the conversion of sweet sorgum biomass to hydrocarbon fuel and chemicals.

Amyris industrial synthetic biology platform modifies microorganisms and uses them as living factories to convert plant-sourced sugars into target renewable molecules. Following the successful development of a precursor for an anti-malarial drug, Amyris has focused its development and production on Biofene,® Amyris's brand of renewable farnesene, manufactured using specially designed microbes in fermentation of plant-sugar feedstock. Using farnesene as a building block, Amyris is developing a wide range of renewable specialty chemicals and fuel products.

The purpose of the Amyris Integrated Biorefinery (IBR) project is to develop the feasibility of converting sweet sorghum, a U.S. Department of Energy (DOE) target high-impact feedstock, into renewable hydrocarbons; these can be used to produce renewable diesel and other chemical products such as industrial lubricants and polymers.

Project Description

Amyris' integrated production process uses industrially proven yeast-based fermentation of traditional or lignocellulosic-derived sugar feedstocks. The Amyris fermentation intermediate is readily recovered as a water-immiscible long-chain liquid hydrocarbon (trans-ß-farnesene). Fermentation waste is treated by anaerobic digestion to reduce effluent and utilize residual sugars for biogas production. Biogas is then converted to hydrogen via steam-methane reformation for use in finishing reactions for a variety of products.

Amyris's pilot-plant-scale fermentation tanks in Emeryville, California

Potential Impacts

The Amyris IBR project demonstrates conceptual design and economics for domestic production of renewable hydrocarbons in the United States from high-impact feedstock such as sweet sorghum. Future commercial development of renewable hydrocarbons from domestic feedstock can enhance America's energy independence and energy security while providing significant reductions in criteria pollutants. Initial life-cycle analysis of Amyris Diesel production from sweet sorghum indicates greenhouse gas (GHG) emission reduction of more than 80% when compared with fossil fuels. This project will directly support the employment of more than 35 full-time employee equivalents at Amyris and its sub-awardees, and support DOE's goals of short-term job creation, energy security, and environmental benefits through GHG reduction.

Other Participants

Feedstock development will be in collaboration with Ceres, Inc., an agricultural biotechnology company that develops seeds for energy crops such as sweet sorghum; DOE's National Renewable Energy Laboratory, which provides the lignocellulosic pretreatment; ICM, which supports the project with its anaerobic digestion technology; and Praxair, which provides its hydrogen production expertise.

Prime	Amyris, Inc.
Location	Emeryville, California
Feedstock (s)	Sweet sorghum
Size	1.8 dry tons per day
Primary Products	Renewable diesel produced from farnesene, a renewable hydrocarbon precursor to fuels and specialty chemical products
Award Date	November 30, 2009
GHG Reduction	More than 80% reduction versus petroleum diesel
Anticipated Job Creation	Funding will support more than 35 full-time equivalents during the funding period, enabling many more green jobs upon commercial deployment
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