

## Amyris Integrated Biorefinery: Conversion of sweet sorghum biomass to hydrocarbon diesel and chemicals

Scale-up and Mobilization of Renewable Diesel and Chemical Production from Common Intermediate using US-based Fermentable Sugar Feedstocks

The primary product of the Amyris IBR is Amyris Renewable Diesel, an advanced biofuel registered for use by the US EPA and covered by an issued US patent. Secondary products will include lubricants, polymers and other petro-chemical substitutes. These secondary products are derived from the same C15 fermentation intermediate as Amyris Renewable Diesel, providing opportunities to de-risk commercial production.

### Project Description

Amyris' integrated production process uses low-risk, industrially-proven yeast-based fermentation of traditional or lignocellulosic-derived sugar feedstocks. The Amyris fermentation intermediate is readily recovered as water-immiscible oil. 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.

### Potential Impacts

This project will directly support the employment of over 50 full-time equivalents at Amyris and its sub-



*Amyris Biotechnologies' Pilot Scale Fermentation Suite in Emeryville, CA*

awardees. It will allow for the commercial development of Amyris' breakthrough technology in the U.S. leading to the creation of additional "green" jobs. Additionally, commercial development will enhance America's energy independence and energy security while providing significant reductions in criteria pollutants. Life-cycle analysis of Amyris Diesel production from sweet sorghum indicates Greenhouse Gas (GHG) emission reductions of greater than 80%.

Commercial US production of Amyris Diesel from sweet sorghum – a DOE high-impact feedstock with domestic potential in excess of 100 million dry tons per year – is targeted for 2013 with potential partners in Hawaii, California, Alabama or Florida.

Providing feedstock versatility and product diversity, Amyris will leverage its growing fuels distribution business and network of customers to rapidly enable product acceptance. In this manner, Amyris will help meet 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., lignocellulosic pretreatment will be in collaboration with DOE's National Renewable Energy Laboratory, and anaerobic digestion will be in collaboration with ICM, Inc.

Prime	Amyris Biotechnologies, Inc.
Location	Emeryville, California
Feedstock (s)	Sweet sorghum
Size	1.8 tons per day
Primary Products	No Compromise® Amyris Diesel and chemical products
Capacity	1370 gal/year
Award Date	November 30, 2009
GHG Reduction	Over 80% reduction versus petroleum diesel
Anticipated Job Creation	Funding will support over 50 FTEs during the funding period, enabling many more green jobs upon commercial deployment post-2012
Company Point of Contact	Todd Pray, Ph.D., Assoc. Director, Project Management Tel: +1.510.450.0761, email: <a href="mailto:pray@amyris.com">pray@amyris.com</a>