Advanced Research Projects Agency • ENERGY

ELECTROFUELS PROJECT

OPX BIOTECHNOLOGIES

ENGINEERING BACTERIA FOR EFFICIENT FUEL PRODUCTION

PROJECT TITLE:	Novel Biological Conversion of Hydrogen and Carbon Dioxide Directly into Free Fatty Acids		
ORGANIZATION:	OPX Biotechnologies, Inc.	LOCATION:	Boulder, CO
PROGRAM:	Electrofuels	ARPA-E AWARD:	$5,997,490
TECH TOPIC:	Advanced Fuels	PROJECT TERM:	7/12/10 – 7/11/13
WEBSITE:	www.opxbio.com		

CRITICAL NEED

Domestic biofuels are an attractive alternative to petroleum-based transportation fuels. Biofuels are produced from plant matter, such as sugars, oils, and biomass. This plant matter is created by photosynthesis, a process that converts solar energy into stored chemical energy in plants. However, photosynthesis is an inefficient way to transfer energy from the sun to a plant and then to biofuel. Electrofuels—which bypass photosynthesis by using self-reliant microorganisms that can directly use the energy from electricity and chemical compounds to produce liquid fuels—are an innovative step forward.

PROJECT INNOVATION + ADVANTAGES

OPX Biotechnologies is engineering a microorganism currently used in industrial biotechnology to directly produce a liquid fuel from hydrogen and carbon dioxide (CO_2). The microorganism has the natural ability to use hydrogen and CO_2 for growth. OPX Biotechnologies is modifying the microorganism to divert energy and carbon away from growth and towards the production of liquid fuels in larger, commercially viable quantities. The microbial system will produce a fuel precursor that can be chemically upgraded to various hydrocarbon fuels.

IMPACT

If successful, OPX Biotechnologies would create a liquid transportation fuel that is cost competitive with traditional gasoline-based fuels and 10 times more efficient than existing biofuels.

- SECURITY: Cost-competitive Electrofuels would help reduce U.S. dependence on imported oil and increase the nation's energy security.
- ENVIRONMENT: Widespread use of Electrofuels would help limit greenhouse gas emissions and reduce demands for land, water, and fertilizer traditionally required to produce biofuels.
- ECONOMY: A domestic Electrofuels industry could contribute tens of billions of dollars to the nation's economy. Widespread use of Electrofuels could also help stabilize gasoline prices—saving drivers money at the pump.
- JOBS: Electrofuels could create jobs in fuel production, distribution, and sales.

CONTACTS

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