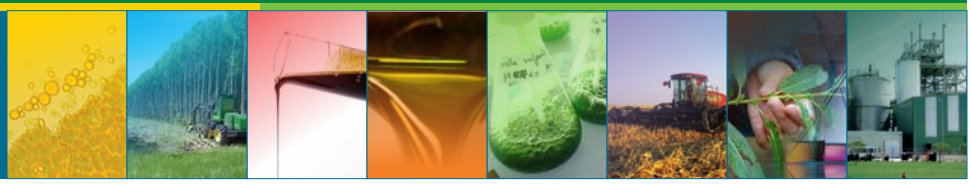
Bioenergy Technologies Office Conversion Pathways



The DOE Bioenergy Technologies Office pursues a pathway approach for advancing research and development (R&D) of converting biomass into renewable fuels and products. Following the Office's successful demonstration of cost-competitive cellulosic ethanol production technologies, R&D efforts now focus on the conversion of biomass into hydrocarbon fuels and intermediates that lead to "drop-in" replacements for gasoline, diesel, jet fuel, and other petroleum-based products. The Office has recently selected several priority pathways—covering thermochemical, biochemical, and algal conversion technologies—that will guide its R&D strategy in the near term.

Pathway Selection Process

In March 2012, the Office identified 18 potential routes to convert biomass into hydrocarbon fuels. Of the proposed pathways, 13 were selected for initial analyses. Working with scientists at the National Renewable Energy Laboratory, Pacific Northwest National Laboratory, and other national laboratories, the Office completed initial techno-economic analyses on each of the pathways. The Office then selected eight priority pathways based on the following criteria:

- Feasibility of achieving cost goal of $3.00 per gallon
- Near/Mid/Long-term techno-economic potential
- Potential national impact
- Feedstock availability/flexibility
- Data availability across the full pathway
- Co-product economics
- Potential volumetric impact in 2030
- Environmental sustainability.

Pathway Overview

The Office's eight priority R&D pathways are identified below. More information about each pathway can be found in the individual pathway fact sheets.

1. Biological Conversion of Sugars to Hydrocarbons
2. Catalytic Upgrading of Sugars to Hydrocarbons
3. Fast Pyrolysis and Hydroprocessing
4. Ex-situ Catalytic Pyrolysis
5. In-situ Catalytic Pyrolysis
6. Whole Algae Hydrothermal Liquefaction
7. Algal Lipid Upgrading
8. Syngas Upgrading to Hydrocarbon Fuels

Next Steps

The next steps in the Office's R&D strategy will be to identify cost goals and technical targets for each of the conversion pathways and determine priority areas of research. Throughout the next few years, the Office intends to publish design case reports for each pathway. These reports will be used to guide the Office's overall R&D strategy, inform funding opportunity announcements, and support shifts in focus for core laboratory R&D. In the future, as new data and information become available, design cases will be developed for additional pathways that show promise for near term commercial success. All of these efforts are designed to accelerate the development of new conversion technologies, hasten the construction of advanced biofuel facilities, and help the United States achieve national goals for reduced oil imports, technology innovation, and environmental sustainability.

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