



Seeding the job market. At the Bioproducts, Sciences, and Engineering Laboratory on the Washington State University Tri-Cities campus, PNNL and WSU researchers work with students to develop bio-based fuels and products that directly address industry needs. Graduates enter job markets armed with high-demand skills.

*Cost-competitive, bio-based systems
for America's energy future*

Biofuels and Bioproducts

PNNL is addressing the challenge by developing novel biomass conversion processes that are competitive with \$70 per barrel petroleum for production of

- ▶ Gasoline, diesel, and jet fuel that use existing infrastructure
- ▶ High-demand, high-value chemicals.

Key elements include:

- ▶ Using DOE's Environmental Molecular Sciences Laboratory and PNNL's Institute for Interfacial Catalysis to understand conversion chemistries for complex reactions and design novel catalysts and organisms for biomass conversion
- ▶ Predicting and avoiding unintended environmental consequences of biomass use.

Partners

Our partners include companies such as ADM, Boeing, UOP, Albemarle, W.R. Grace, refineries and biorefineries, and universities such as Washington State University.

PNNL'S SCIENCE AND TECHNOLOGY IMPACT

Pathways to Fuels

- ▶ Groundbreaking catalytic conversion processes that enable bio-oil to substitute directly for petroleum—the first-generation technology is moving into pilot plants under construction in Hawaii
- ▶ Combining catalytic and biological processes to make jet fuel designed to integrate into a demonstration-scale facility under construction in China

Pathways to Chemicals

- ▶ ADM is building two facilities to produce commodity chemicals based on processes PNNL identified; additional process development is under way with various partners
- ▶ Degradable by Design Deicer™—a suite of commercially available products based on PNNL developments—keeps ice off aircraft and roadways

TECHNOLOGY SPOTLIGHT

Jet fuel from biomass. PNNL partnered with UOP, Boeing, and others to produce the world's first jet fuel derived from biomass, demonstrated in a hydroplane at Seattle's Seafair race. Jet fuel represents 11% of the nation's total transportation fuel need.



Photos: Chris Donalov, www.nwspedshots.com; UOP, LLC, www.uop.com

ABOUT PNNL

The Pacific Northwest National Laboratory, located in southeastern Washington State, is a U.S. Department of Energy Office of Science laboratory that solves complex problems in energy, national security and the environment, and advances scientific frontiers in the chemical, biological, materials, environmental and computational sciences. The Laboratory employs more than 4,900 staff members, has a \$1.1 billion annual budget, and has been managed by Ohio-based Battelle since 1965.

For more information about PNNL's R&D related to Biofuels and Bioproducts, contact:

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