

Michigan

Michigan can leverage its existing, abundant biomass resources to increase biofuels production for transportation use. The Bioenergy Technologies Office (BETO) enables the development of novel technologies that can be used to establish Michigan as a leader in the bioeconomy.

In 2012, Michigan consumed more than 21 times more petroleum than it produced.

Biofuels offer a sustainable strategy to narrow the gap between energy consumption and production.



Economy

Michigan spent about **\$20 billion** on petroleum fuels for transportation in 2013. Investments in Michigan **biofuels help keep those dollars within the state** to stimulate economic development and add to the state's **82,600+ jobs** in green goods and services.



Energy

In 2012, the energy content of **Michigan-produced biofuels** exceeded that of the 3.9 million barrels of jet fuel consumed in the state. **Drop-in biofuels** can help meet the state's energy needs, and **bio-based jet fuel** produced in Michigan could advance the use of sustainable aviation fuels in the Midwest.



Environment

In 2011, petroleum use by Michigan's transportation sector released **44.7 million metric tonnes of carbon dioxide**. On a life-cycle basis, advanced biofuels can **reduce greenhouse gas (GHG) emissions by $\geq 50\%$** compared to petroleum—helping to reduce environmental impacts.



Feedstocks

Michigan has abundant **biomass resources** that can be **sustainably utilized** to produce advanced biofuels and high-value products. The state's **agricultural wastes, sorted municipal solid waste, algae, and wood wastes** can all contribute to the production of advanced biofuels.

Strategic policies and investments help **bridge the gap** between promising research and large-scale production of advanced biofuels.

Biofuels support the four key focus areas of Michigan energy policy: adaptability, reliability, affordability, and environmental protection.

The U.S. Department of Energy (DOE) has awarded more than **\$32 million** to university and industrial partners in Michigan to research, develop, and deploy sustainable bio-based fuels and products since 2005.

In 2011, the **Michigan Biotechnology institute in Lansing, Michigan**, was selected to receive up to **\$4.3 million** to improve biomass pretreatment processes to enable regional biomass processing depots. The project completed in February 2015 with successful operation of the pilot plant.

Michigan Technological University is working to develop life-cycle assessments of hybrid catalytic routes to fuels from biomass syngas.

Michigan's Pilot-Scale Integrated Biorefinery *

Operated by	—————	American Process Inc.
Location	—————	Alpena, Michigan
Jobs	—————	31 created, 200 retained
Primary products	—————	Ethanol and potassium acetate
Environmental benefit	—————	60% GHG reduction vs. gasoline
Feedstock	—————	Woodchip waste
Capacity	—————	800,000 gallons per year

* Developed with the support of approximately \$22 million from DOE to engineer, build, and operate the facility

Why Michigan?



Michigan's forests and robust pulp and paper industry could provide 3.6 million metric tonnes of woody feedstocks annually for biofuel production. 

Existing non-cellulosic ethanol facilities can be upgraded to utilize non-food-based feedstocks and contribute to advanced biofuels production. * 

Biomass resources could supply aviation in Michigan with sustainable alternatives to petroleum. 

Favorable geographic location facilitates distribution of products to new markets. 

* Michigan ranks 11th (274 million gallons/year) among 25 ethanol producing states in the U.S.

For more information on Michigan's energy portfolio and the economic benefits of biofuels, visit: eia.gov/state/analysis.cfm?sid=MI
energy.gov/eere/bioenergy/about-bioenergy-technologies-office-growing-americas-energy-future-replacing-whole-acre.org/files/pdfs/states/Michigan.pdf (based on 2011 survey by the Bureau of Labor Statistics)
For more information on Michigan's biomass resources and environmental impacts, visit: epa.gov/otaq/fuels/renewablefuels/documents/420f12078.pdf
eia.gov/environment/emissions/state/state_emissions.cfm
eere.energy.gov/bioenergy/pdfs/billion_ton_update.pdf, maps.nrel.gov/biofuels-atlas

For more information on Michigan clean energy initiatives and DOE partnerships, visit: michigan.gov/energy, energy.gov/eere/bioenergy/financial-opportunities
energy.gov/articles/department-energy-announces-36-million-support-development-drop-biofuels-and-bioproducts
energy.gov/eere/bioenergy/alpena-biorefinery
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U.S. ethanol production: eia.gov/state/seds/sep_prod/pdf/P4.pdf, eia.gov/petroleum/ethanolcapacity/