

Biofuels Create Green Jobs: Growing Transportation Fuels and the Nation's Economy

Biofuels made from abundant, renewable, domestic feedstocks can reduce U.S. dependence on oil, lower impacts on climate, and stimulate economic growth.

Rapid Growth Projected

The U.S. biofuels industry grew rapidly in response to the need for alternative fuels that can directly substitute for liquid petroleum fuels. The Energy Independence and Security Act of 2007 (EISA) requires that renewable fuels collectively supply at least 36 billion gallons of U.S. motor fuels by 2022.

This new Renewable Fuel Standard (RFS) mandated by EISA calls for unprecedented growth in the U.S. biofuels industry over the next decade. Today, the United States produces nearly 9 billion gallons of ethanol¹ annually – only about a quarter of the renewable fuels called for by 2022.

Successfully growing the biofuels industry will require new systems and networks to efficiently produce, harvest, and transport large quantities of diverse feedstocks. Biofuels will need to be produced from new sources such as switchgrass, fast-growing trees, crop residues, and even municipal wastes. Advanced technologies will be needed to economically convert biomass into fuels in biorefineries. New fuels, such as green gasoline, diesel from algae, and others must be explored to expand our choices beyond ethanol. New or expanded infrastructure must also be developed to deliver these fuels to consumers throughout the nation.

The Biomass Program at the U.S. Department of Energy is actively working with public and private partners to meet these needs and support a larger, more robust biofuels industry. Through cost-shared research, development, and demonstration

(RD&D), the Biomass Program is developing advanced technologies and real-world solutions to spur industry growth. An important outgrowth of these efforts, particularly in the current economic environment, is workforce development.



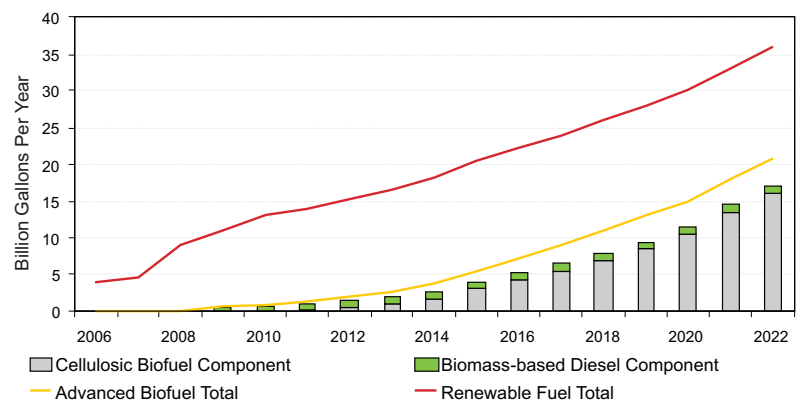
Stimulating workforce development and jobs

The availability of skilled workers at all levels will be critical to successfully growing the biofuels industry. Construction and operation of new U.S. ethanol production plants, which have doubled in number since 2004, have already created new jobs. Companies, national laboratories, and universities are putting scientists and engineers to work on developing new feedstocks, delivery infrastructure, conversion technologies, and advanced biofuels.



Continued growth will require an expanded workforce that is skilled in a range of disciplines, from chemical and biochemical engineering to agricultural science, microbiology, and genetics.

New RFS Calls for Dramatic Increase in Renewable Fuels



¹ Full 2008 production figures not yet available.

Workers will be needed to design, build, and operate new biorefineries. Feedstock operations will require workers to run farms, manufacture new harvesting and storage equipment, and supply needed nutrients and chemicals. The need for researchers knowledgeable in these fields is catalyzing the creation of new programs in school systems across the country.



The Department of Energy is helping support the development of a workforce capable of meeting the needs of an expanded and advanced biofuels industry. Biomass R&D funds support graduate research at colleges and universities and promote the development of curricula aimed at biofuels science and engineering. At DOE's National Renewable Energy Laboratory, education programs help prepare future workers through undergraduate and graduate internships, teacher training, and other programs. Through demonstration projects, DOE also helps to provide real-world experience at the cutting edge of technology for biomass and biofuels professionals and production workers.



Economic Engine

A robust biofuels industry will create high-paying jobs while helping the nation reduce its dependence on foreign oil. In 2007, production and construction in the ethanol industry supported the creation of about 240,000 jobs in all sectors of the economy. Combined spending for operations, transportation, and new plants in 2007 added \$47.6 billion to the nation's Gross Domestic Product and put an additional \$12.3 billion into the pockets of American consumers.¹

While projections of job creation vary, analysts agree that the sector could be a

powerful jobs stimulus. As the industry expands beyond ethanol to include a wide range of advanced biofuels, additional jobs will be created. A couple of studies estimate that more than a million jobs could be added to the economy within the next 15 to 20 years.^{2,3}

¹ *Outlook 2008*, Renewable Fuels Association, based on input developed by J. Urbanchuk, LECG LLC.

² *Economic Impact of the Energy Independence and Security Act of 2007*, John M. Urbanchuk, Director, LECG LLC, January 2008.

³ *Green Jobs in the U.S. Metro Areas*, U.S. Metro Economies, October 2008.

Jobs in Biofuels

Feedstocks

Harvesting:

- Farmers
- Seasonal workers
- Tree farm workers
- Mechanical engineers
- Harvesting equipment mechanics
- Equipment production workers
- Chemical engineers (agric. chemicals)
- Chemical application specialists
- Chemical production workers
- Biochemists
- Agricultural engineers
- Genetic engineers and scientists



Storage:

- Storage facility operators

Conversion

Biorefineries:

- Microbiologists
- Clean room technicians
- Industrial engineers
- Chemical & mechanical engineers



Blending Facilities:

- Plant operators

End Use

Delivery Infrastructure:

- Station workers
- Construction workers (to build infrastructure for distribution, storage, delivery, and dispensing of fuels, including end-use stations, pipelines, dispensing equipment, shipping terminals, blending facilities, ethanol or biodiesel production facilities, etc.)



Auxiliary Activities:

- Codes & standards developers
- Regulation compliance workers
- Consultants
- Chemists

Transport of Feedstocks & Biofuels:

- Truck drivers
- Truck filling station workers
- Pipeline operators
- Barge operators
- Railcar operators
- Train station operators



For additional information visit: www.biofuels.energy.gov



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