

Bioindustry Creates Green Jobs

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

Rapid Growth Projected

The U.S. bioindustry is expanding rapidly in response to the need for a near-term alternative to 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. Meeting this EISA-mandated Renewable Fuel Standard (RFS) will require unprecedented growth in the U.S. bioindustry over the next decade. In 2008, the United States produced more than 9 billion gallons of ethanol¹ – only about one-quarter of the renewable fuels called for by 2022.

Successfully growing the U.S. bioindustry 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 biomass sources, such as switchgrass, fast-growing trees, crop residues, algae, and clean municipal wastes. Technologies will be needed to economically convert biomass into a range of advanced biofuels, and new or expanded infrastructure may be needed to deliver these fuels to consumers.

The U.S. Department of Energy’s Biomass Program is actively working with public and private partners to meet these needs and facilitate growth of a robust, domestic bioindustry. Through cost-shared research, development, and demonstration (RD&D), the Biomass Program is developing advanced technologies and real-world solutions. In the current economic environment, workforce expansion is an important ancillary benefit of these efforts.

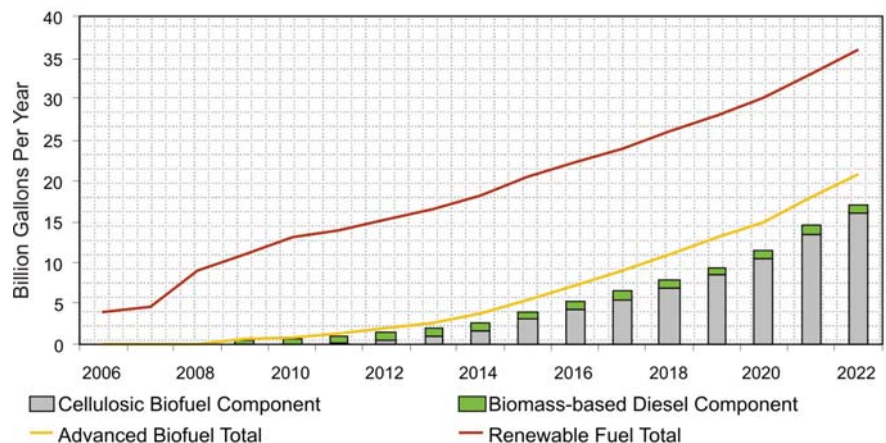


The growing U.S. bioindustry is creating opportunities for workers with a wide range of skills. (Photo courtesy of Verenium)

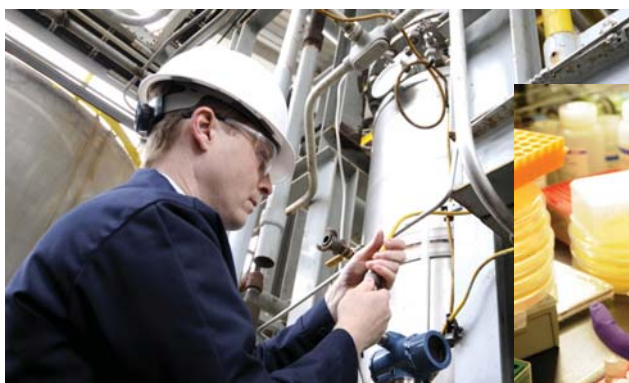
Stimulating Workforce Development and Jobs

The availability of skilled workers at all levels will be critical to successfully growing the U.S. bioindustry. Construction and operation of new U.S. ethanol plants, which have more than doubled in number since 2004, have already created many new jobs. Scientists and engineers are at work developing new feedstocks, conversion technologies, and advanced biofuels, while construction workers are building the infrastructure needed to transport, store, and deliver the biomass and biofuels.

RFS Calls for Dramatic Increase in Renewable Fuels



¹ Annual Energy Review 2008, EIA, June 2009.



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. Workers will be needed to design, build, and operate new biorefineries. In addition, more farmers and agricultural workers will be needed to expand the production of energy crops. Feedstock operations will also require workers to manufacture new harvesting and storage equipment and supply needed nutrients and chemicals. The need for specialists to conduct research 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 bioindustry. 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 biomass and biofuels professionals and production workers with real-world experience at the cutting edge of technology.

Economic Engine

A robust bioindustry will create high-paying jobs while helping the nation reduce its dependence on foreign oil. An industry report estimates that production, construction, and research in the ethanol industry supported the creation of 400,000 jobs in diverse sectors of the economy in 2009.¹ Combined spending for operations, transportation, research, and new plants in 2009 added \$53.3 billion to the nation's gross domestic product and put an additional \$16 billion into the pockets of American consumers.²

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 and biopower, additional jobs will be created. Studies estimate that, if current mandates are met, one to nearly two million new jobs could be added across the economy in the next 15 to 20 years.³

¹ *Outlook 2009*, Renewable Fuels Association, based on *Contribution of the Ethanol Industry to the Economy of the United States*, LECC, LLC, February 2010, 4.

² *Ibid.*

³ *Economic Impact of the Energy Independence and Security Act of 2007*, John M. Urbanchuk, Director, LECC, LLC, January 2008; *Green Jobs in the U.S. Metro Areas*, U.S. Metro Economies, October 2008; *U.S. Economic Impact of Advanced Biofuels Production: Perspectives to 2030*, BioEconomic Research Associates, February 2009.

Jobs in Biofuels

Feedstocks

Production and Harvesting:

- Farmers
- Seasonal workers
- Tree farm workers
- Mechanical engineers
- Harvesting equipment mechanics
- Equipment production workers
- Chemical engineers
- 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



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.biomass.energy.gov

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