Bioindustry Creates Green Jobs

Energy from abundant, renewable, domestic biomass can reduce U.S. dependence on oil, lower impacts on climate, and stimulate jobs and 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 2011, the United States exceeded the revised RFS annual production target for traditional biofuels (12.6 billion gallons) yet fell far short of the mandated target for advanced (non-starch-based) biofuels.[1]

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 municipal wastes. Technologies will be needed to economically convert biomass into a range of advanced biofuels, and new or expanded infrastructure may be needed.

The Energy Department's Bioenergy Technologies Office (BETO) 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), BETO is developing advanced technologies and real-world solutions. In the current economic environment, workforce expansion is an important ancillary benefit of these efforts.

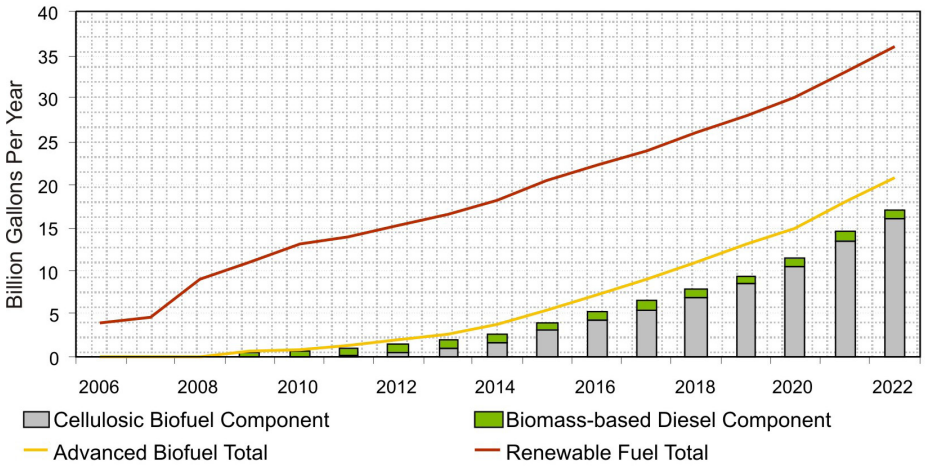
[1] DOE, EIA, *Biofuels Issues and Trends*, Oct. 2012

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. biofuel refineries, which have nearly tripled in number since 2004,[2] 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



[2] Statistics page, Renewable Fuels Association website. Accessed 31 Jan. 2013

Switchgrass being harvested for biofuels. *Photo courtesy of Idaho National Laboratory*

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, agricultural workers, and aquaculture specialists 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 or recycle 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 Energy Department is helping support the development of a workforce capable of meeting the needs of an expanded and advanced bioindustry. Bioenergy Technologies R&D funds support graduate research at colleges and universities and promote the development of curricula aimed at biofuels science and engineering. At the National Renewable Energy Laboratory, education programs help prepare future workers through undergraduate and graduate internships, teacher training, and other programs. Through consortia and demonstration projects, the Energy Department 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 reduce U.S. dependence on foreign oil. One industry report estimates that production, construction, and research in the ethanol industry supported the creation of more than 401,000 jobs (about 90,000 each, direct and indirect; remainder induced) across the economy in 2011.[3] Combined spending for operations, research, and agriculture in 2011 added $42.4 billion to the nation's gross domestic product and put an additional $30 billion into the pockets of American consumers.[4]

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. For example, Environmental Entrepreneurs (E2) estimates that 27 advanced biofuel facilities now scheduled for construction could create up to 47,000 direct and indirect jobs by 2016.[5] If current production mandates are met, studies suggest that one to nearly two million new jobs could be added across the economy in the next 12 to 18 years.[6]

[3] John A. Urbanchuck, Contribution of the Ethanol Industry to the Economy of the United States, Renewable Fuel Association, 2 Feb 2012.

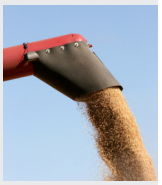
[4] Ibid.

[5] Mary Solecki et al, Advanced Biofuel Market Report 2012, Environmental Entrepreneurs

[6] Economic Impact of the Energy Independence and Security Act of 2007, John M. Urbanchuk, LECG, 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, Feb. 2009.

Jobs in Biofuels

Feedstocks



- 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 facility operators

Conversion

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

End Use

- Station workers
- Construction workers
- 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

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