U.S. BILLION-TON UPDATE

Summary Findings*

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Summary

The *U.S. Billion-Ton Update: Biomass Supply for a Bioenergy and Bioproducts Industry (Billion-Ton Update)* identified sufficient biomass feedstock under baseline assumptions to meet near- and long-term bioenergy goals, such as displacing one-third of current transportation fuel demand. Under the high-yield scenario, more ambitious goals may be feasible. The updated report took into consideration environmental sustainability, and it identified likely costs to access these resources.

Under baseline assumptions, the current combined resources from forests and agricultural lands total about 473 million dry tons at a farm or forest roadside price of $60 per dry ton or less. About 45% is currently used and the remainder is potential additional biomass. By 2030, the estimated resource increases to nearly 1.1 billion dry tons. About 30% would be projected as already-used biomass and 70% as potentially additional.

The high-yield scenario increased the proportion of corn in reduced and no-till cultivation and nearly doubled the rate of increase in corn yield relative to the baseline. These assumptions greatly increase the potential supply of corn stover residue. For energy crops, the high-yield scenario increased the annual rate of crop productivity growth to 2%, 3%, and 4% annually. High-yield scenario results at a simulated farmgate feedstock price of $60 per dry ton and 2% to 4% annual growth in energy crop yields show a total resource ranging from nearly 1.4 to over 1.6 billion dry tons annually of which 80% is potentially additional biomass. No high-yield scenario was evaluated for forest resources, except for the woody crops.

Background

The report, *Biomass as Feedstock for a Bioenergy and Bioproducts Industry: The Technical Feasibility of a Billion-Ton Annual Supply* (generally referred to as the *Billion-Ton Study* or 2005 *BTS*), was an estimate of "potential" biomass within the

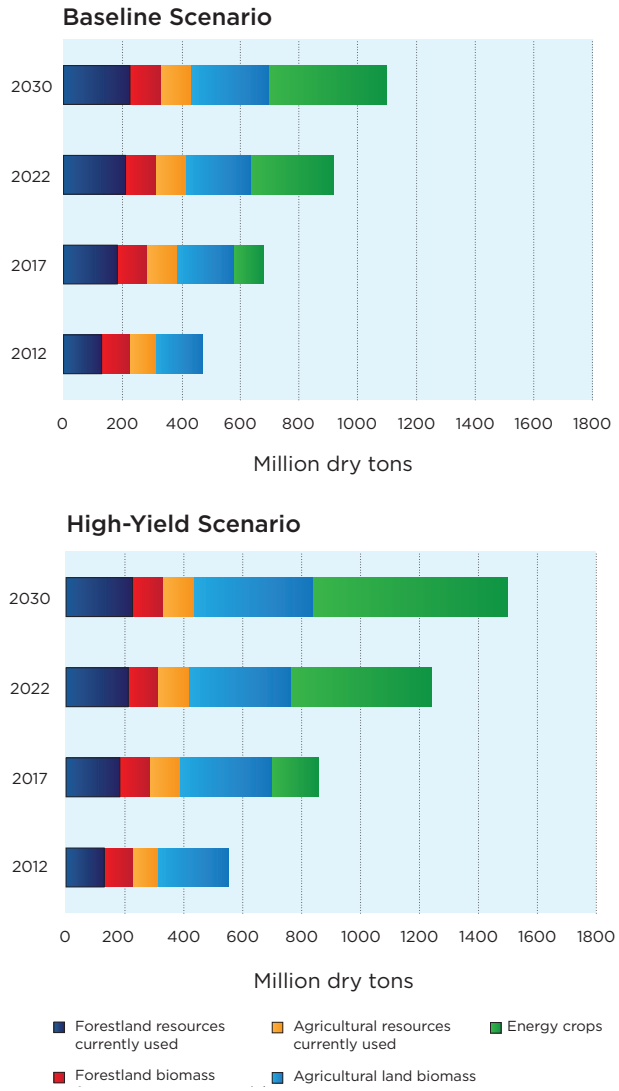

Illustration courtesy of BCS Inc.

*This fact sheet refers to the following document: U.S. Department of Energy. 2011. *U.S. Billion-Ton Update: Biomass Supply for a Bioenergy and Bioproducts Industry*. R.D. Perlack and B.J. Stokes (Leads), ORNL/TM-2011/224. Oak Ridge National Laboratory, Oak Ridge, TN. 227p. Download the full report at eere.energy.gov/biomass/pdfs/billion_ton_update.pdf. View the report, explore its data, and discover additional resources at bioenergykdf.net.

contiguous United States, based on numerous assumptions about current and future inventory production capacity, availability, and technology.

The 2005 *BTS* was a strategic analysis to determine if U.S. agriculture and forest resources have the capability to produce at least one billion dry tons of biomass annually in a sustainable manner, which is enough to produce biofuels to meet more than one-third of the current demand for transportation fuels. To ensure reasonable confidence in the study results, an effort was made to use relatively conservative assumptions. However, for both agriculture and forestry, the resource potential was not restricted by price. That is, all identified biomass was potentially available, even though some potential feedstock would more than likely be too expensive to be economically available.

In addition to updating the 2005 study, the *Billion-Ton Update* addresses a number of its shortcomings. Specifically, the updated report provides:

- A spatial, county-by-county inventory of primary feedstocks
- Price and available quantities (e.g., supply curves) for the individual feedstocks
- A more rigorous treatment and modeling of resource sustainability.

Additional Information

The *Billion-Ton Update* evaluates two scenarios—baseline and high-yield. The baseline scenario essentially assumes a continuation of the U.S. Department of Agriculture 10-year forecast for the major food and forage crops, and it extends an additional 10 years to 2030. The average annual corn yield increase is assumed to be slightly more than 1% over the 20-year simulation period. The baseline also assumes a continuation in trends toward no-till and reduced cultivation and an annual increase of 1% in energy crop yields. The 1% annual yield change in the baseline scenario reflects learning or experience in planting energy crops and limited gains that can be had through breeding and selection of better varieties. The high-yield scenario is more closely aligned to the assumptions in the 2005 *BTS*. In this scenario, higher corn yields and a much larger fraction of crop acres in reduced and no-till cultivation are assumed. Under high-yield, the projected increase in corn yield averages almost 2% annually over the 20-year simulation period. The energy crop productivity increases are modeled at three levels—2%, 3%, and 4% annually. These gains are due not only to experience in planting energy crops, but also to more aggressive implementation of breeding and selection programs.

The analysis and results for these scenarios are based on very limited data and, as such, require making numerous assumptions. However, an effort was made to be as transparent as possible with the data, methodology, and assumptions. The Bioenergy Knowledge Discovery Framework website, bioenergykdf.net, provides reference materials and additional data and explanations. The website also provides tools to help present the results in custom tabular, graphic, and spatial formats, as it is impossible to provide this in a reasonable length report.

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