

Thermal Gasification of Biomass United States Update

IEA Bioenergy Task 33

Second Semiannual Task Meeting 2016

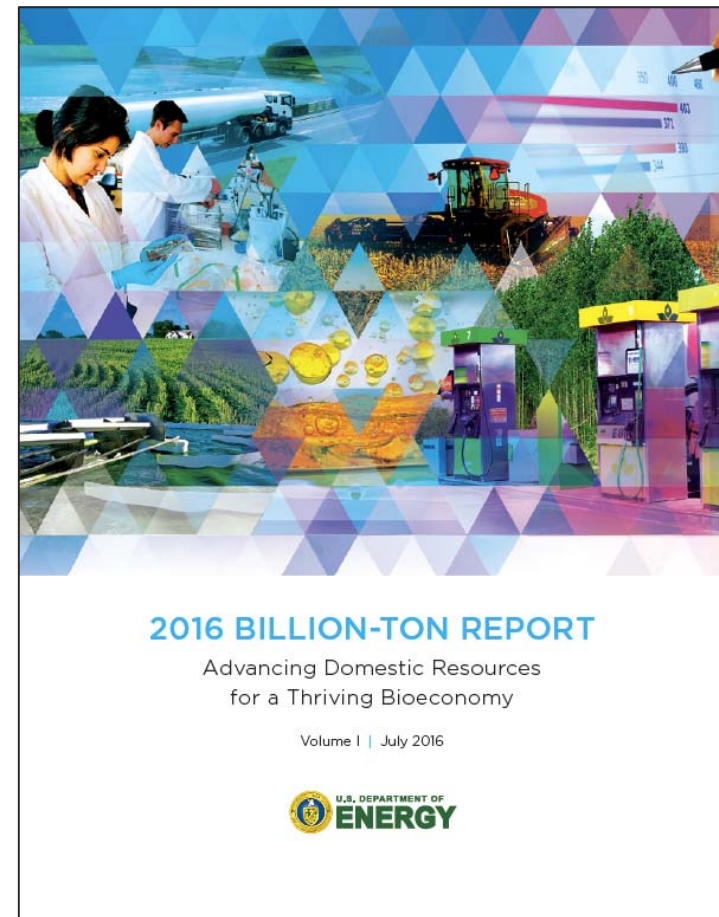
Lucerne, Switzerland

25 October 2016

Kevin Whitty

New 2016 Billion Ton Report

- New update of report
 - Original in 2005
 - Update in 2011
- Considers broader range of feedstocks
- Updates economic information
- Two volumes
 - Biomass resource assessment
 - Analysis of environmental sustainability of select cases
- Interactive version online at bioenergykdf.net/billionton2016/



Interactive Version

The screenshot shows a web browser window with the URL <https://bioenergykdf.net/billionton2016/>. The page header includes the Bioenergy KDF logo, the text "BIOENERGY KNOWLEDGE DISCOVERY FRAMEWORK U.S. DEPARTMENT OF ENERGY", and navigation links for "Register", "Sign-in", and "Contact Us". A search bar and social media icons for LinkedIn, Twitter, and Facebook are also present. A secondary navigation bar contains "OVERVIEW", "TOOLS & APPS", "MAP", and "BIOENERGY LIBRARY".

The main content area features a large blue banner with the text "2016 BILLION-TON REPORT INTERACTIVE VERSION". Below this, a paragraph explains that the report is the third in a series of national biomass resource assessments commissioned by the U.S. Department of Energy. It states that the report aims to inform national bioenergy policies and research, development, and deployment strategies. It is the first volume in a two-volume set. Volume 2 (forthcoming) evaluates the potential environmental sustainability effects of a subset of production scenarios described in Volume 1.

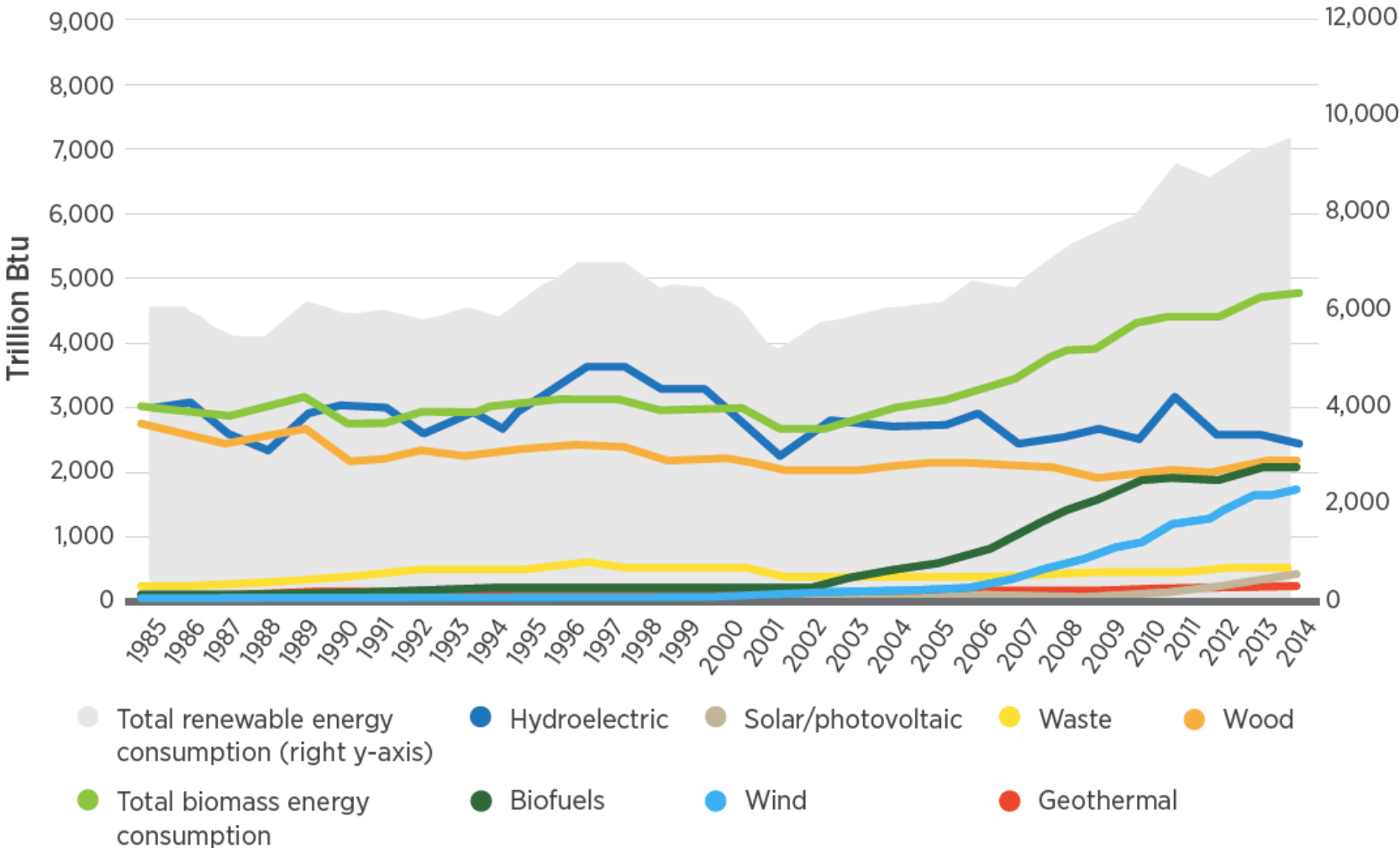
A second paragraph describes the interactive component, designed for the Bioenergy KDF, which offers detailed data visualization for potential cellulosic and algal biomass availability in the United States. It lists data sets including potential energy crop production, agricultural residue availability, and forestry production, as well as the potential economic availability of biomass resources delivered to biorefineries. Users are instructed to find key data sets by report chapter below, visualize these data sets on the KDF Map with [Data Explorer](#), and use [Data Download](#) for further analysis.

At the bottom of the main content area, there is a horizontal navigation bar with four buttons: "Access Report" (document icon), "Data Explorer" (location pin icon), "Data Download Tool" (download icon), and "Report Information" (information icon).

The footer of the page features a purple and blue geometric pattern with the number "01" centered in white.

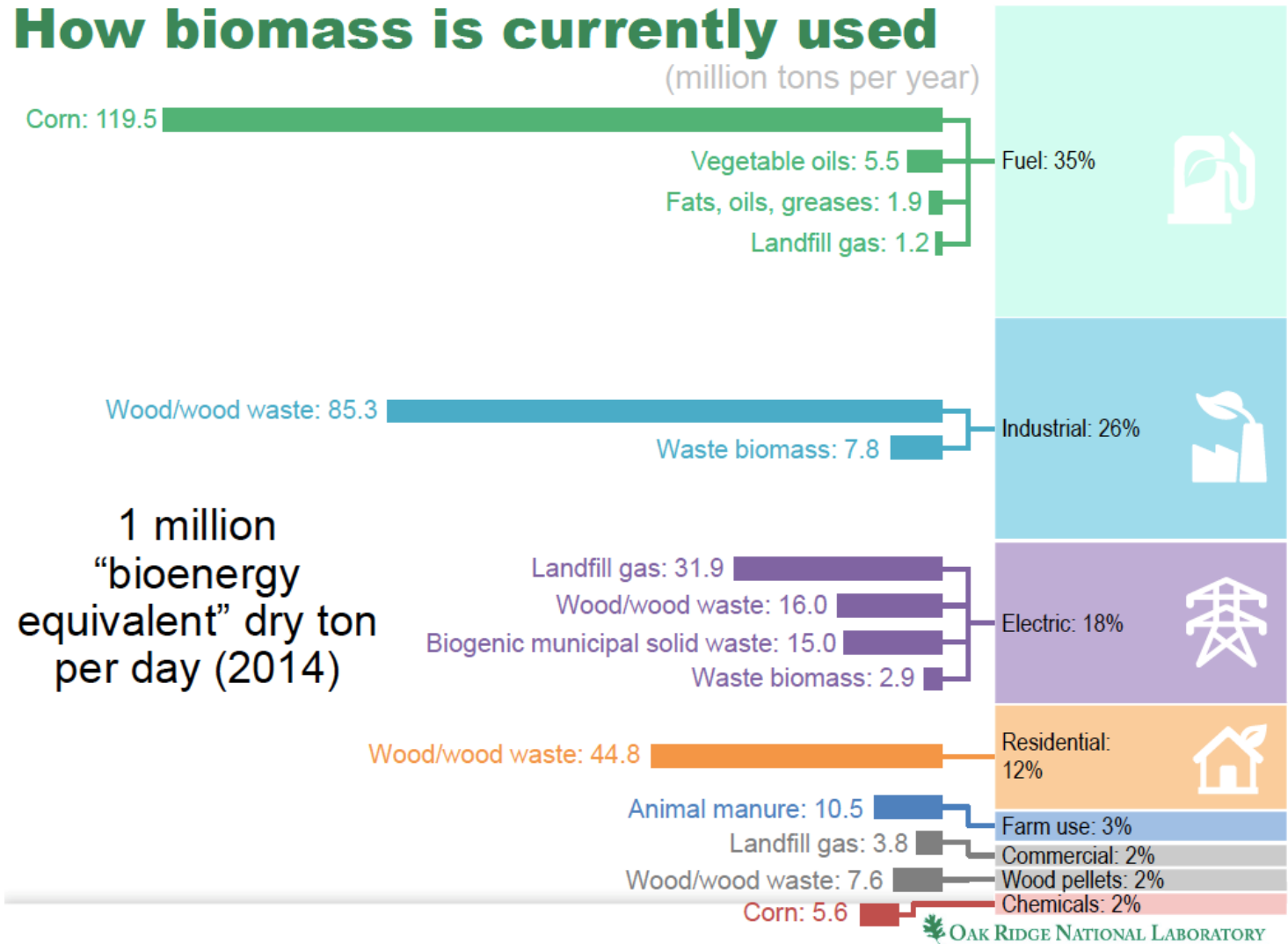
Renewable Energy Consumption in U.S.

Figure 2.2 | Primary renewable energy consumption by source and total consumption (1985–2014)



Source: Data from EIA (2015d).

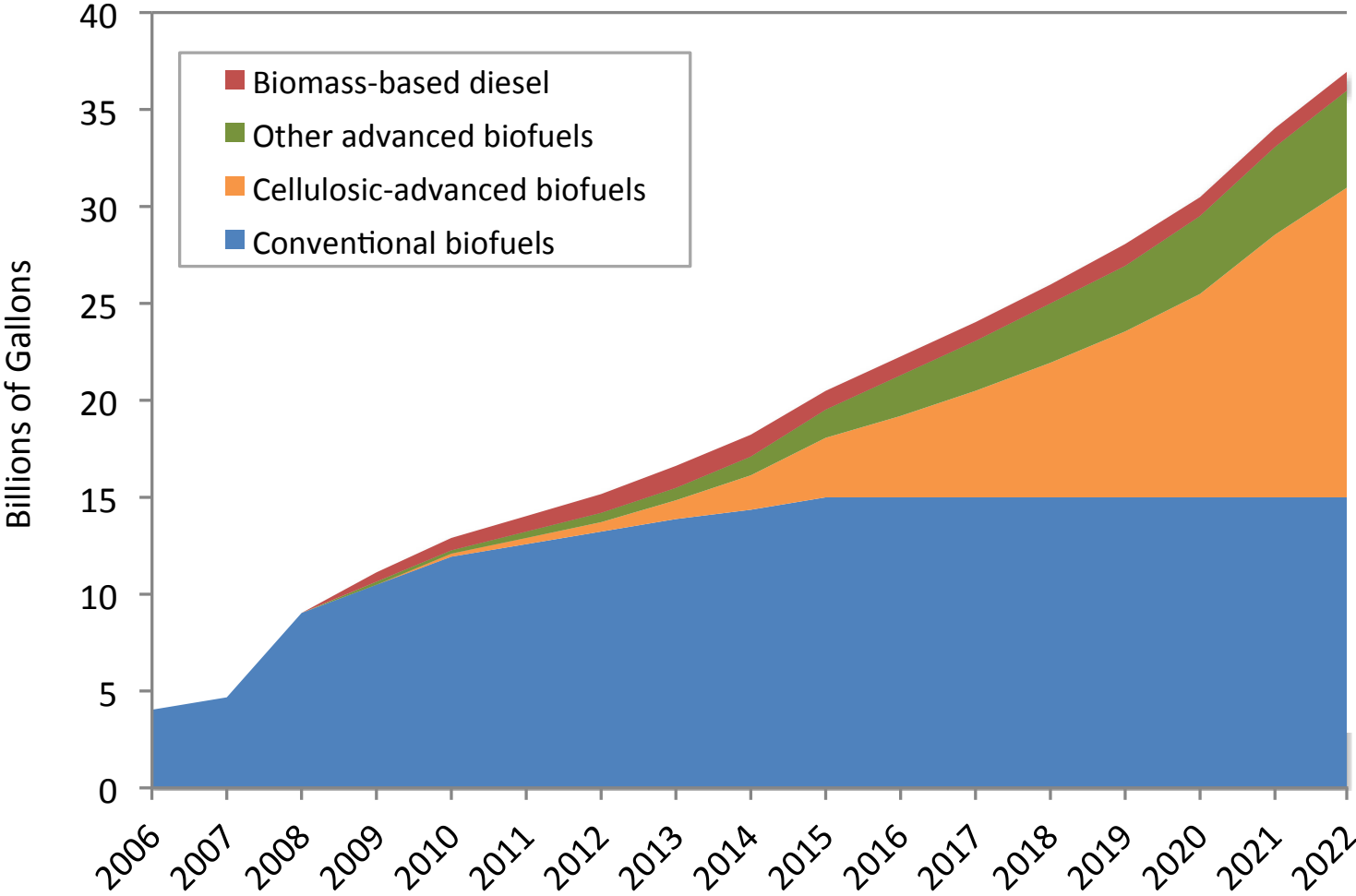
Biomass Consumption



U.S. Federal Policy and Incentives for Biomass Technologies

- Renewable Fuel Standard (EPA)
 - Establishes goals for biofuel usage in the US (36 billion gal of biofuel by 2022)
- Repowering Assistance Biorefinery Program (USDA)
 - Reimburses up to 50% of cost as incentive to convert fossil fuel refineries into biorefineries
- The Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance Program (USDA)
 - Assists in the development, construction, and retrofitting of new and emerging technologies for the development of Advanced Biofuels, Renewable Chemicals, and Biobased Product Manufacturing by providing loan guarantees for up to \$250 million.
- Biomass Crop Assistance Program (USDA)
 - Advanced Biofuel Feedstock Incentives: annual and matching payments for producers of advanced feedstocks.
- U.S. DOE Bioenergy Technologies Office (BETO)
 - Subset of US Department of energy. RDD&D Program.

Renewable Fuel Standard



Focus on Aviation Biofuels

- DOE Alternative Aviation Biofuels workshop Sept 2016
- Many projects under development focus on aviation fuels

Airline offtake agreements ... and more in process



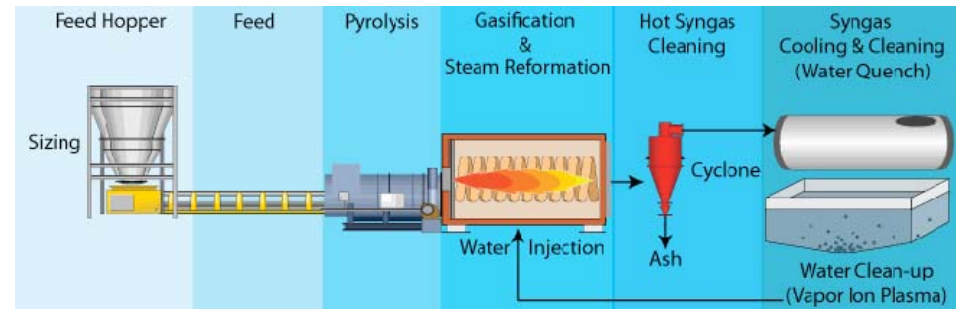
Fulcrum Bioenergy Sierra Biofuels Plant

- Waste to FT fuels
- 200,000 t/y MSW
- Designed for 10 million gallons syncrude
- TRI gasifier
- Agreement with United Airlines
- Collaboration with Tesoro
- Startup expected 2018
- Development activity continuing



Red Rock Biofuels

- Biomass to FT fuels
- Lakeview, Oregon
- TCG Global gasifier
- Veolocys for FT
- Targeting jet fuel
- Partnership with FedEx
- Est. \$180-200 million
- Final investment decision expected soon



INEOS Indian River Bioenergy Center

INEOS Bio, Vero Beach, Florida

- Feedstock: Vegetable and yard waste, MSW
- Products: Ethanol and power
- Scale: 300 tons feed/day
- Gasification technology: Proprietary oxygen-blown
- Cost: More than \$130 million
- Stopped in early 2015 to address technical issues. Has not been restarted.
- Sept 2016: Ineos has now put facility up for sale and is exiting ethanol business.
- Relatively little ethanol was actually produced during the facility's lifetime



North Fork Community Power

- 2 MW biomass gasification plant
 - Phased installation of 1+1 MW
- Feedstock: forest waste
- Lead: Phoenix Energy
- Gasification System: GE
 - Jenbacher engine
- Electricity sold to PG&E
- Target startup summer 2017

