KDF

U.S. DEPARTMENT OF ENERGY

The Bioenergy KDF helps the American public learn about ongoing efforts in Bioenergy technologies. *Photo: iStock/5990146.*

Bioenergy Knowledge Discovery Framework

Mapping the future of bioenergy with GIS and other cutting-edge data and tools.

Vision for Bioenergy

Making biofuels and bioproducts from domestic, non-food, and waste sources will help to provide benefits that are of strategic importance to the United States, including economic growth, energy security, environmental quality, and technology leadership. A key challenge to achieving these goals is synchronizing all of the steps in the biomass-to-biofuels supply chain—from biomass production and logistics to bioenergy production, distribution, delivery, and end use. Each current and proposed production system will be subject to economic, environmental, and infrastructure challenges unique to its region. While energy demand and end use may be concentrated in highly populated areas, bioenergy production may be dispersed throughout the United States. Determining the optimal sustainable solutions, therefore, requires considering a variety of regional factors, including climate, soils, vehicle fleets, and transportation routes.

Achieving the Vision

Developing a sustainable bioenergy industry requires thorough knowledge integration and decision support. The Bioenergy Knowledge Discovery Framework (KDF*) facilitates informed decision making by providing a means to synthesize, analyze, and visualize vast amounts of information in a spatially integrated manner. This geographic information system (GIS)-based framework allows users to comprehensively analyze the economic and environmental impacts of various development options for biomass feedstocks, biorefineries, and infrastructure. Analysis and visualization of socioeconomic and industrial factors integrated with spatial data can be used for planning, development, and management decisions, ensuring reliable and sustainable bioenergy production.

What Is a Geographic Information System?

A GIS is a collection of data where every data point has an explicit spatial location. Essentially, a GIS can be thought of as a digital model of the physical world where every data point corresponds to a place. A modern GIS is a suite of hardware, software, and electronic databases built from a variety of data sources that can range from remotely sensed measurements to waypoints collected in the field with handheld devices. Geographic information science is an advanced field that utilizes GISs to enable researchers to analyze, visualize, and synthesize vast amounts of information, which helps them understand real-world interactions and supports decision-making processes.
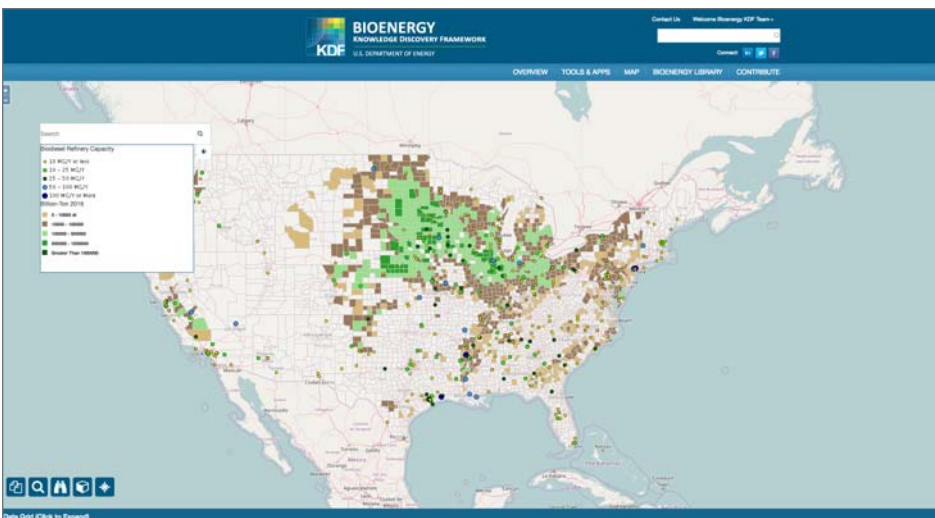
The online Bioenergy KDF interface offers users news and research highlights, search functions, data access, mapping tools, and more.

* bioenergykdf.net
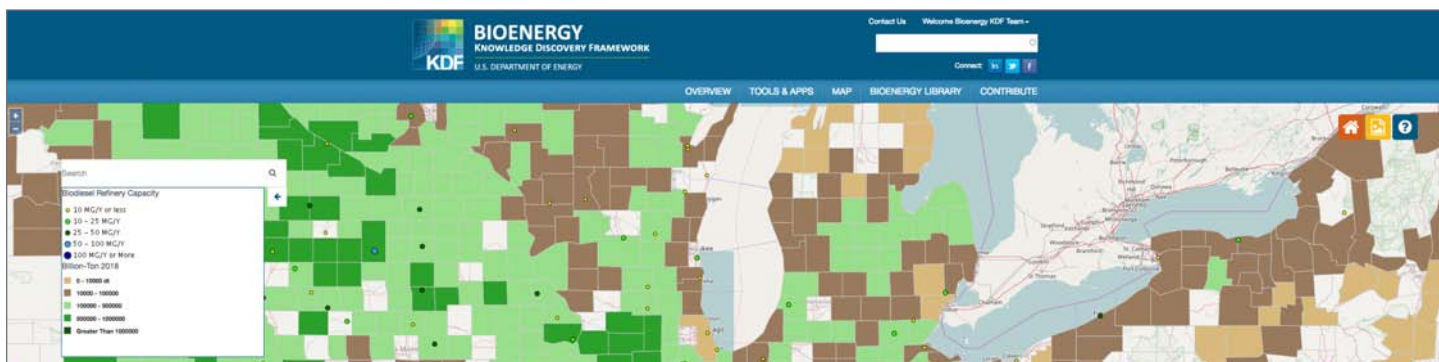
A view of the Bioenergy KDF showing biorefinery locations and potential biomass resource availability. Data from many Bioenergy Technologies Office projects can be combined with data from external sources and shared for analysis and visualization through the Bioenergy KDF (bioenergykdf.net).

Employing a GIS is a critical component in planning and deploying renewable energy technologies, including biomass production capabilities.

Bioenergy KDF Data Framework

- Robust geospatial technology framework for data collection, integration, and management to ensure quality analysis and visualization and provide access to the latest bioenergy research.

- Dynamic, distributed architecture that integrates data, models, and tools developed by the U.S. Department of Energy with those from other federal partners, industry, and academia.

- Standards-based technology framework that allows integration of data, models, and tools from distributed sources and allows users to contribute files and data sets, customize information online, and exchange knowledge with others.

- Searchable Bioenergy Library that contains hundreds of data sets, publications, and models related to bioenergy production, distribution, delivery, and end use.

Integrating the Bioenergy Technologies Office's Research Portfolio

The Bioenergy KDF is the portal for bioenergy data from many GIS projects that the Bioenergy Technologies Office supports, including efforts to analyze biomass resource potential and assess potential policy impacts, water resource use, and impacts on jobs and the economy.

Biomass Resource Potential

The Bioenergy KDF features interactive versions of the *2016 Billion-Ton Report, Volume 1: Economic Availability of Feedstocks* and the *2016 Billion-Ton Report, Volume 2: Environmental Sustainability Effects of Select Scenarios from Volume 1*, complete with data and interactive visualizations for every chapter of the reports.

Biomass Scenario Model Tool

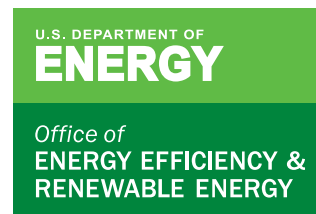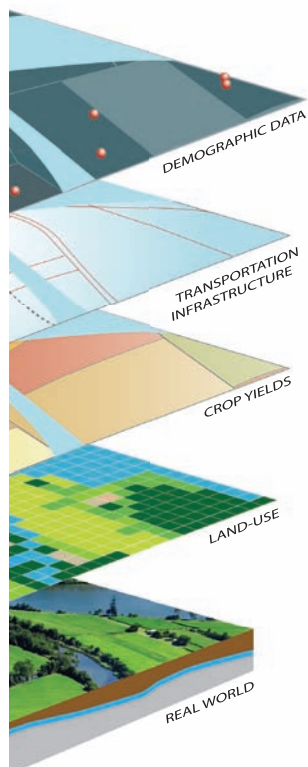This tool provides public access to exciting capabilities of the National

Renewable Energy Laboratory's Biomass Scenario Model (BSM). Use the BSM tool to model the potential impacts of policy scenarios in the United States.

WATER (Water Analysis Tool for Energy Resources)

WATER is a spatial-explicit online tool that assesses water resource use and water quality across the fuel production stages by quantifying the water footprint of fuels from feedstock production to the conversion process. It is an interactive and visual tool that provides analysis of water consumption and its impact on water quality at county, state, and regional resolutions.

Jobs and Economic Development Impact (JEDI) Biofuels and Petroleum Models

The JEDI models are user-friendly screening tools that estimate the economic impacts of constructing and operating power plants, fuel production facilities, and other projects at the local (usually state) level. ◼