

Biomass Program Mission



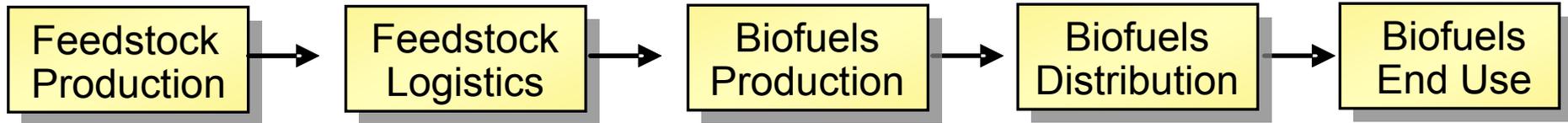
Develop and transform our renewable and abundant biomass resources into cost-competitive, high-performance biofuels, bioproducts, and biopower.

Focus on targeted research, development, and demonstration

- Support through public and private partnerships
- Deploy in integrated biorefineries



Strategic Focus: Biofuels



- **Cellulosic Ethanol:** Primary focus of the program.
- **Alternative Light-Duty and Diesel Replacement Fuels:** A scoping study is underway to help prioritize future work on additional alternate fuels that require governmental support and can significantly contribute to achieving the President's goal.

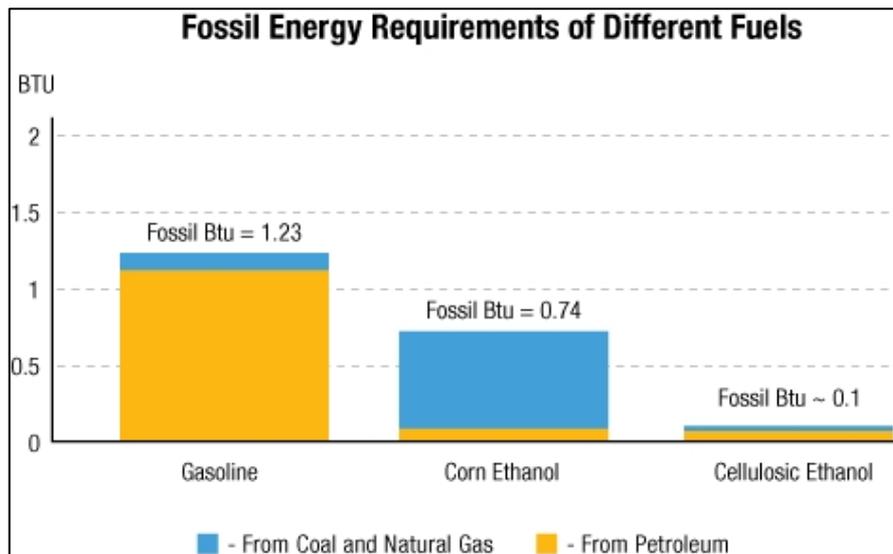
Moving to non-food feedstocks

Today

- Grains (corn, sorghum, wheat)
- Oilseeds and plants (soybeans)

Tomorrow

- Agricultural residues (stalks, stems, other crop wastes)
- Energy crops (switchgrass, miscanthus, poplar, willow)
- Forest resources (wood waste, forest thinnings, small-diameter trees)
- Oilseeds and oil crops (Algae, Jatropha)
- Green wastes (urban wood wastes, sorted municipal solid waste)

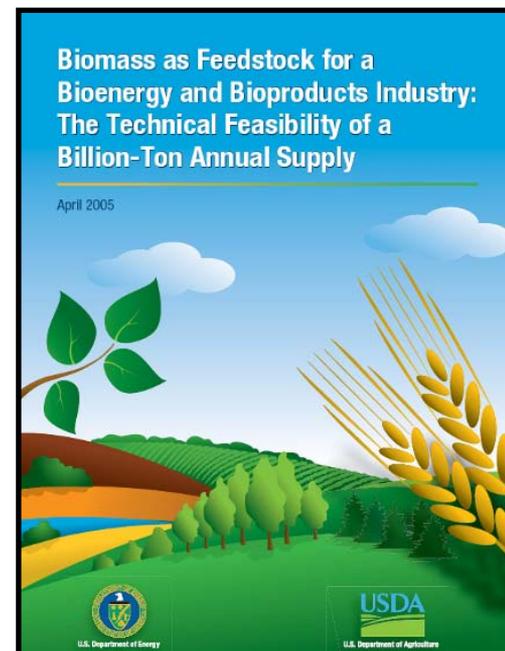
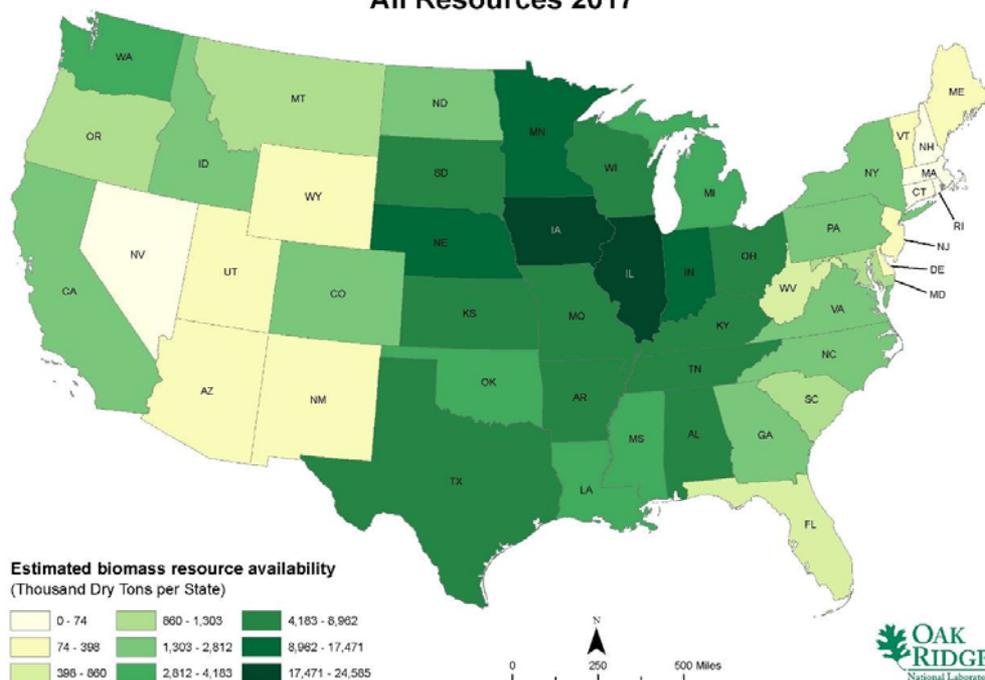


Biomass Resources Adequate to Meet RFS

Interim Update to the *Billion-Ton Vision Report*



All Resources 2017



By 2017, forest and cropland resources can yield 23-30 billion gallons of cellulosic biofuels

National Biofuels Targets



New Renewable Fuel Standard

- Expand use of renewable fuels to 36 billion gallons annually by 2022
- Cellulosic biofuels component
 - 0.5 billion gallons by **2012**
 - 3 billion gallons by **2015**
 - 16 billion gallons by **2022**
- Includes Significant Safeguards
 - Targets are within 2006 Billion-Ton study volumes
 - Ethanol production from corn is capped at 15 bgy
 - EPA authorized to waive targets annually
 - Requires GHG reductions, which include land use impact
 - Requires studies on environmental impacts

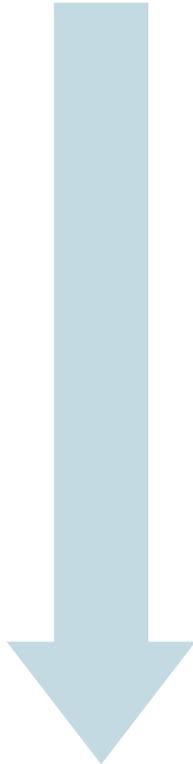


***Best short-term option to alleviate gasoline prices
and heating oil costs***

Biofuels Beyond Ethanol



Today



Ethanol – as a blending agent from either grain or cellulosic material from Ag and/or Forestry industry

Biodiesel – Transesterified vegetable oils blended with diesel

Green Diesel – fats, algal oils, waste oils, or virgin oils converted to low-sulfur diesel in petroleum refinery

Higher alcohols – examples include: butanol, mixed alcohols, higher carbon alcohols (C5- and greater)

Fischer-Tropsch Liquids – and other products from syn gas including methanol, dimethyl ether, etc

Pyrolysis Liquids – alternative feedstock to petroleum refinery or gasification facility

Methanol derived fuels – Methanol to gasoline technology, dimethyl ether and other products

Other fuels – Liquid transportation fuels from sugars/oils refinery not discussed or yet envisioned

Future

Our Commitment to Sustainability



EERE is committed to developing the resources, technologies, and systems needed for biofuels to grow in a way that enhances the health of our environment and protects our planet. To that end, we are working to...

- Develop diverse, non-food feedstocks (e.g., switchgrass, sorghum) that require little water or fertilizer
- Foster sustainable forestry practices (e.g., advanced harvesting techniques) to enhance forest health
- Selectively harvest biomass components while leaving adequate soil nutrients
- Assess life-cycle impacts of major scale-up in biofuels production, from feedstocks to vehicles, addressing:
 - land use and soil health
 - water use
 - air quality issues
 - impacts on greenhouse gas (GHG) emission



Efforts are anchored into senior-level Biomass R&D Board Sustainability Working Group