# Sustainable Production and Distribution of Bioenergy for the Central USA

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Global demand for energy continues to increase as the planet's population grows past 7 billion and incomes rise, especially in developing countries. The increasing demand for energy has spurred many countries to explore alternative energy platforms. Over 50 countries throughout the world have active bioenergy programs. The U.S. has moved to the front of this activity as we have grown to become the largest producer of biofuels and as we alternate between the world's largest importer and exporter of ethanol. In 2007, the federal government provided a blueprint for biofuel development over the next decade with the Renewable Fuels Standard (RFS). Figure 1 shows the RFS and details targets for various types of renewable fuels. Looking forward over the next decade, the government is seeking significant expansion of cellulosic biofuels. The target for cellulosic biofuels expands from 250 million gallons in 2011 to 16 billion gallons in 2022.

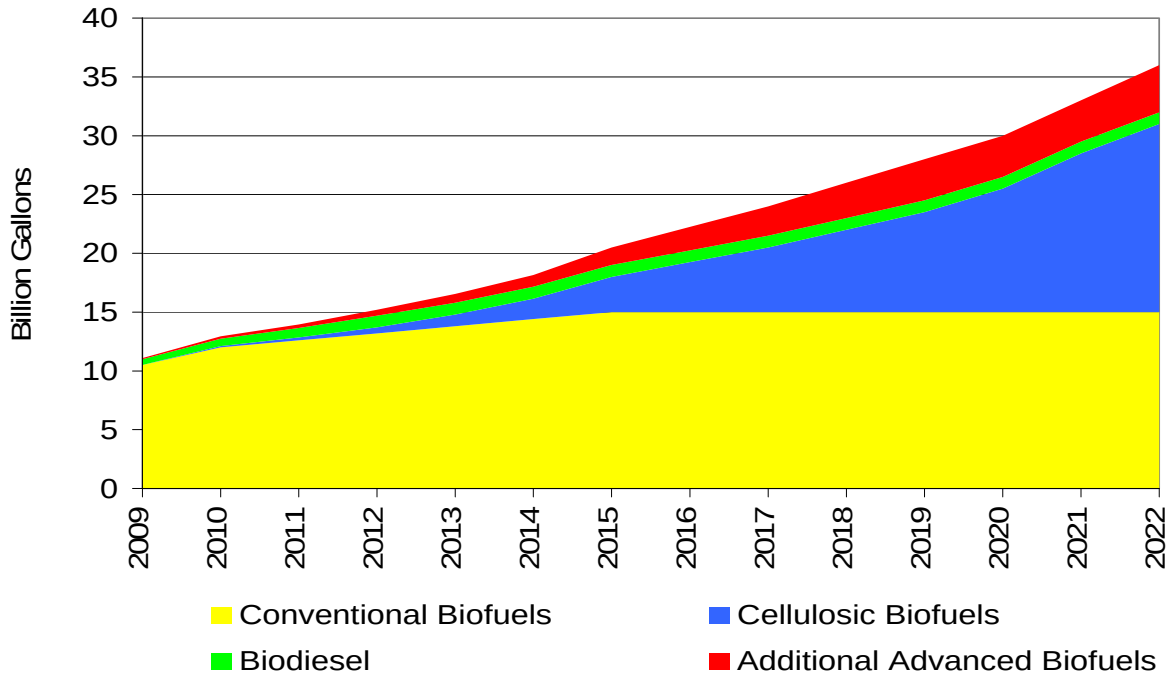


**Figure 1. Renewable Fuels Standard**

As part of the government's efforts to meet the RFS targets, USDA recently called for proposals to investigate the development of sustainable bioenergy platforms. Iowa State University and collaborators from several other states have been awarded funds for a project that will:

1) explore the feasibility of producing advanced transportation fuels derived from perennial grasses grown on land that is unsuitable or marginal for row crop production and
2) improve the sustainability of existing corn/soybean systems by reducing agricultural runoff of nutrients and soil and increasing carbon sequestration.

The project, known as CenUSA, is a multi-state and multi-disciplinary effort being led by Iowa State University Agronomy professor Ken Moore. Project activities will take place in Iowa, Indiana, Wisconsin, Minnesota, Nebraska, Illinois, Vermont and Idaho by researchers from Iowa State University, Purdue University, University of Illinois, University of Minnesota, University of Nebraska, University of Wisconsin, University of Vermont, Idaho National Laboratory and from USDA Agricultural Research Service offices in Wisconsin, Nebraska, Illinois, Pennsylvania, and Iowa.

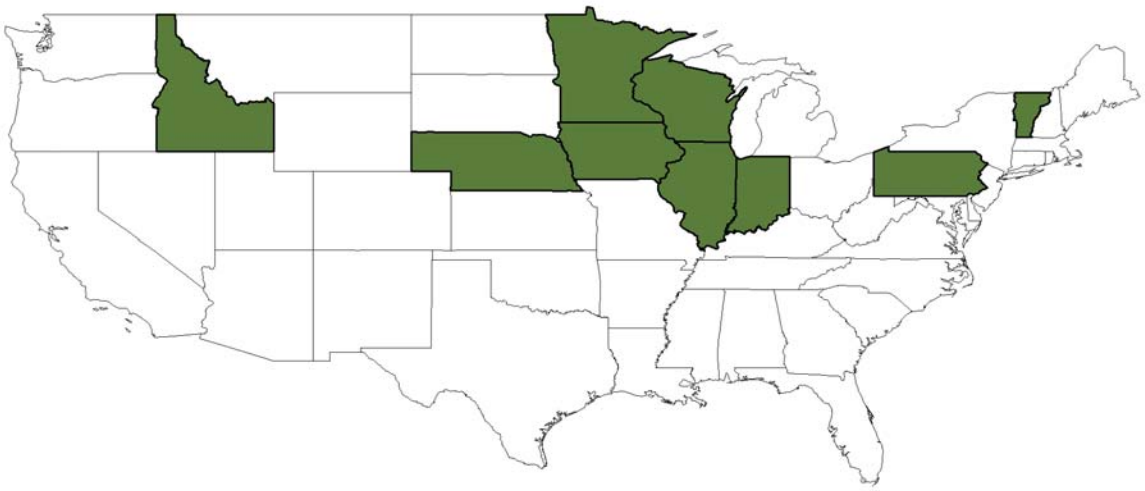

**Figure 2. CenUSA Team**

CenUSA has 9 broad platforms within the project:

1) Feedstock Development,
2) Sustainable Production Systems,
3) Feedstock Logistics,
4) System Performance,
5) Feedstock Conversion,
6) Markets and Distribution,
7) Health and Safety,
8) Education, and
9) Extension and Outreach.

Each platform has specific goals. For feedstock development, the goal is to develop improved perennial grass cultivars and hybrids that can be used on marginal cropland in the Central U.S. for the production of biomass for bioenergy. Sustainable production systems are set to conduct comparative analyses of the productivity potential and the environmental impacts of promising

bioenergy crops and management systems using a network of fields strategically located across the Central U.S. For feedstock logistics, the goal is to develop systems and strategies to enable sustainable and economic harvest, transportation, and storage of biomass feedstocks to meet the needs of the energy industry.

The goal within system performance is to provide detailed analyses of feedstock production options to help policymakers, farmers, and the bioenergy industry make informed decisions about biomass production (amounts and locations); environmental impacts; and the interaction among biomass production, climate change, or other environmental shifts. In feedstock conversion, the goal is to perform a detailed economic analysis on the biorefinery performance using pyrolytic processing of biomass into liquid fuels and to provide biochar to researchers on the project. The markets and distributions platform will examine farm level adoption decisions, exploring the effectiveness of policy, market and contract mechanisms that facilitate broad scale voluntary adoption by farmers; and evaluate impacts of expanded advanced biofuel system on regional and global food, feed, energy and fiber markets.

The health and safety platform will conduct a detailed analysis of all tasks associated with biomass production for hazard targets of personnel, equipment, environment, downtime, and product and will determine potentially hazardous respiratory exposure limits associated with the production of biomass. The education platform will provide rich interdisciplinary training and engagement opportunities for undergraduate and graduate students in all areas of the bioenergy value chain to meet the workforce challenges of the bioeconomy. The extension and outreach platform will deliver science-based informational and educational programs for agricultural producers, general public, and youth audiences regarding perennial grass and biochar agriculture and biofuels production.

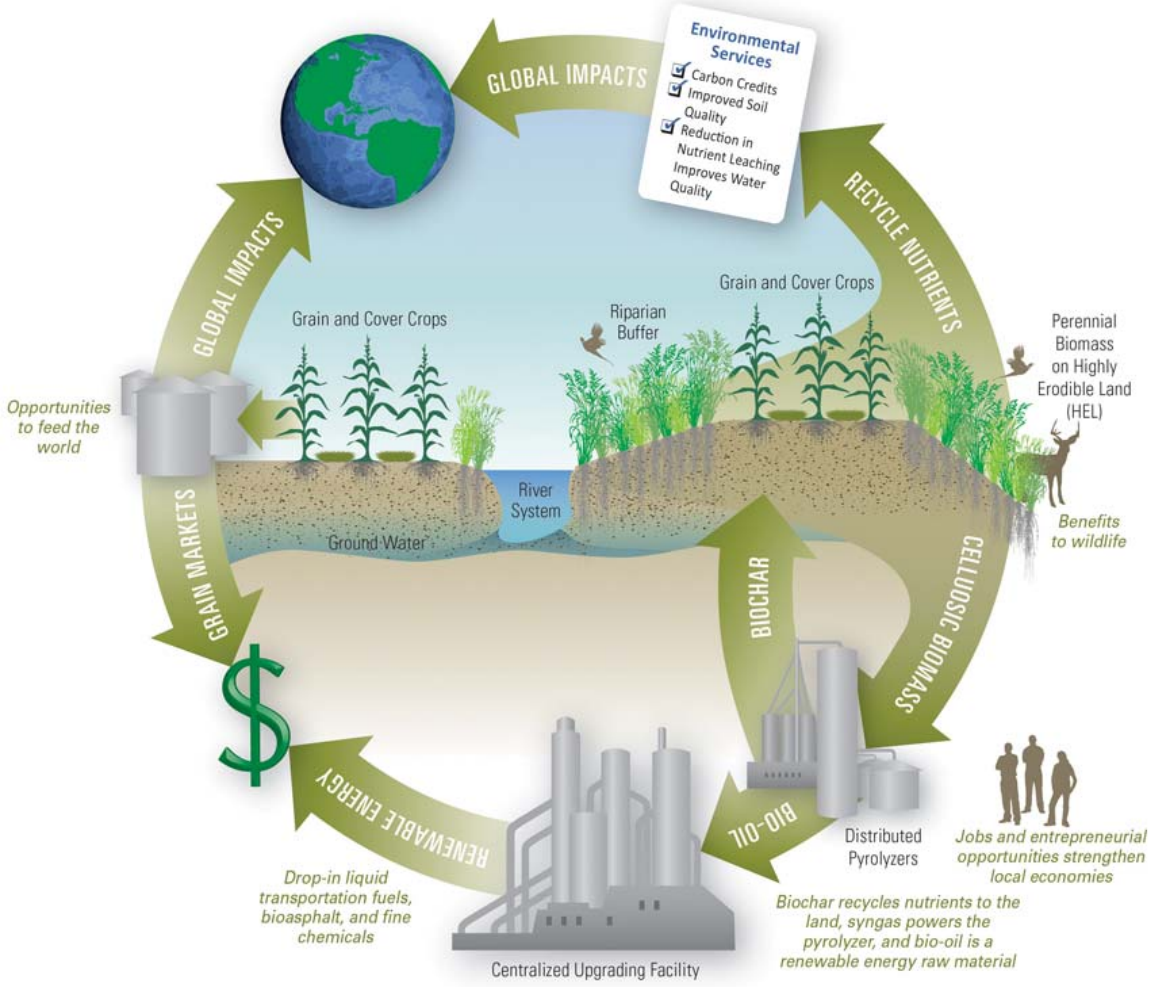


**Figure 3. CenUSA Grand Vision**