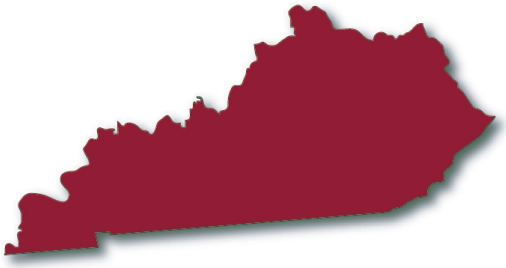
Kentucky's 25x'25 Energy Future

The Economic Impacts of a Renewable Electricity Standard

November 10, 2010



The Vision

By 2025, America's farms, forests and ranches will provide 25 percent of the total energy consumed in the United States, while continuing to produce safe, abundant and affordable food, feed and fiber.

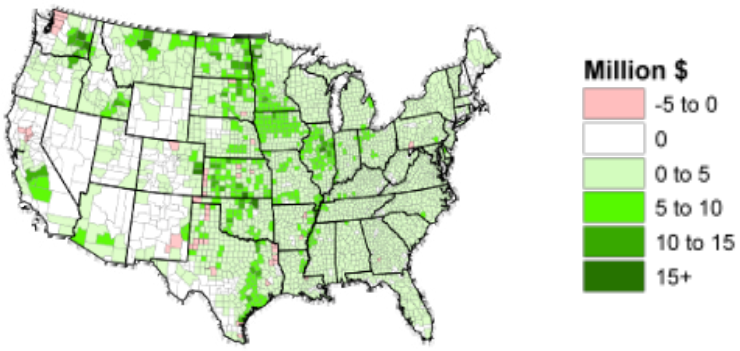
A National Study

An economic analysis conducted by researchers at the University of Tennessee on behalf of the 25x'25 Initiative outlines the impact of potential energy policy on America's farmers and foresters through the implementation of a national Renewable Electricity Standard (RES). The study provides information on land use change, feedstock production, feedstock prices, farm income, carbon costs, payments for producers, and resulting national economic impacts.

The study assumes that the agriculture and forestry community are already working to meet the needs of the 36 billion gallon national Renewable Fuels Standard (RFS2) by 2022, a component of the Energy Independence and Security Act (EISA) enacted by Congress in 2007. The study evaluates a 25 percent RES to be met by 2025; however, with exceptions for small power retailers, hydropower sales, municipal solid waste sales and energy efficiency credits, the effective RES is 17 percent by 2025.

Key Results from the National Study:

- Economic net returns to agriculture are projected to be positive in the EISA+RES Scenario compared with the baseline and widespread across the United States;
- Positive national economic impacts are projected to provide $215 billion of additional economic activity, the creation of over 700,000 jobs, and $84 billon added to the nation's GDP;
- Net carbon emissions are reduced under the EISA+RES Scenario, but the environmental performance with regard to carbon is slightly less effective than under EISA alone;
- There will not be major shifts in commodity cropland use or major changes in crop and livestock prices.



Under the EISA+RES Secnario, in 2025, positive agricultural net returns are scattered across the United States.

What Do These Mean?

Biofuel: Any liquid fuel produced from biomass. Biofuels sometimes are referred to as renewable fuels. However, renewable fuels also include biogas.

Biomass: Any biological matter that is available on a renewable or recurring basis, including agricultural crops and trees, wood and wood wastes and residues, plants (including aquatic plants), grasses, residues, fibers, and animal wastes, municipal wastes, and other waste materials.

Feedstock: Any crop grown to provide the raw material for producing biofuels, electricity, or other energy or biobased application or product.

RES: A renewable electricity standard—also referred to as a renewable portfolio standard (RPS)—requires certain electricity retailers to provide a minimum specified share of their total electricity sales from qualifying renewable power generation. RES policies can incorporate market-based mechanisms that enable obligated entities to buy or sell tradable renewable energy certificates (RECs) to demonstrate compliance.

Total Industry Output (TIO): the value of production across all industries in a region.

Woody biomass: Any material produced by trees, bushes and shrubs in any form of processing (chips, sawdust, leaves, needles, etc.).

A copy of this brochure, state data sheets and the complete report, "Implications of Energy and Carbon Policies for the Agriculture and Forestry Sectors," are available at: www.25x25.org.

Opportunities for Kentucky

This study estimates that by 2025, Kentucky's net farm income will increase $186.79 million more than with the RFS2 alone. In meeting the RES, the agriculture and renewable energy sectors will provide positive economic impacts to the state economy, including a total industry output (TIO) of $1.48 billion, and 779 new jobs in 2025. When multiplier effects are included TIO and jobs increase to $2.05 billion and 4,767, respectively.

By 2025, a properly constructed RES in Kentucky could result in:

- **$186.79 M increase in net farm income over an RFS2 alone**
- **$2.05 B increase in total economic impacts**
- **4,767 additional jobs**

Electricity Production

Under a properly constructed RES, by 2025, Kentucky could produce as much as 7.3 billion kWh of additional renewable electricity from biomass and wind. A breakdown of this production by biomass feedstock is shown in the figure to the right.

Electricity Production from Biomass (Million kWh) for Kentucky by Selected Year to Meet the 25x'25 Vision

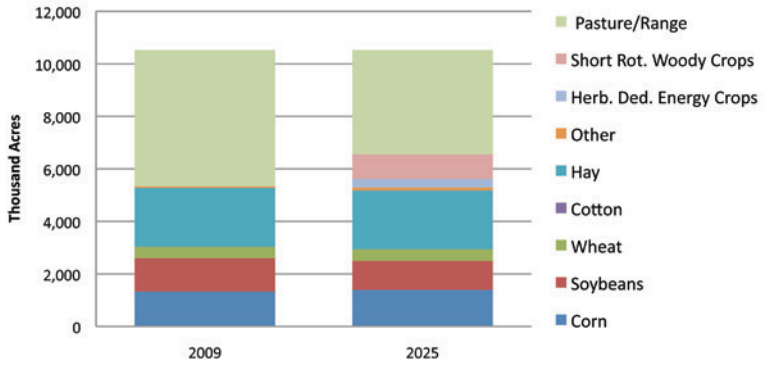
Feedstock	2015	2020	2025
Corn Stover	0.0	66.3	640.2
Wheat Straw	0.0	11.5	105.5
Livestock*	870.9	870.9	870.9
Woody Biomass	505.9	395.6	2986.8
Energy Crop	0.1	15.11	887.5
Byproduct Ethanol**	291.4	422.0	784.9
Total Biomass	**1668.3**	**1781.4**	**7275.8**

* Livestock consists of methane digesters plus any manure used for co-firing for electricity production.
** Byproduct ethanol values originate from the use of lignin to produce energy at the biorefinery.

Land Use Impacts

An increasing demand for biomass feedstocks for energy production in Kentucky will cause minor shifts in land use and the addition of new dedicated energy crops like switchgrass and fast growing trees like poplar. By 2025, an estimated 323,105 acres of dedicated energy crops are projected. For most states, the demand for bioenergy feedstocks will cause shifts to more intensely managed pasture land. Forest residues, thinnings and tree harvest will also play a significant role in meeting feedstock demands.

Land Use Comparison 2009 and 2025



State Data Sheet

The accompanying data sheet provides detailed results from the national study at the state level for Kentucky. The change in net farm income expresses the projected impacts of an RES in addition to the changes in farm income from the EISA baseline. These numbers may appear insignificant in the short term, but increase as demand for biomass increases. The figures on land use change show acres planted and the change in acres planted as compared to the number of acres planted in the baseline. The estimated economic impacts of the agriculture and renewable energy sectors on the state economy are presented. Agricultural economic impacts represent the land based impacts of renewable energy development, such as biomass feedstock production, wind lease payments, and electricity generation income from methane digesters. Renewable energy impacts represent the impacts of the development of a renewable energy industry, such as feedstock consumption, energy plants, and manufacturing.

Contact Information:

25x'25
1430 Front Ave., Lutherville, MD 21093
ph: 410-252-7079
info@25x25.org **www.25x25.org**

Department of Agricultural Economics
2621 Morgan Circle
The University of Tennessee, Knoxville, TN 37996-4518
ph: 865-974-3716

University of Tennessee Team:

Burton English/Daniel De La Torre Ugarte/Chad Hellwinckel/Kimberly Jensen/R. Jamey Menard/Tristram O. West/Christopher Clark

benglish@utk.edu/danieltu@utk.edu/chellwinckel@utk.edu/kjensen@utk.edu/jmenard@utk.edu/twest@utk.edu/cclark@utk.edu