



# Pennsylvania's 25x'25 Energy Future

## The Economic Impacts and Land Use Changes of Increased Biomass Production

### 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 how America's vast natural resources can be utilized to produce 25 percent of the nation's energy supply from renewable sources by 2025.

The study assumes that of the 29.42 quads of total renewable energy needed, 1) 15.45 additional quads would come from biomass, 2) the continuation of current farm program features, 3) continued production technology improvement, and 4) that cellulosic conversion will be economic by 2012. The national study focuses on wind, solar, geothermal, hydro and biomass contributions\*, and provides one scenario among many to meeting the 25x'25 vision. The national study also includes estimates for energy production from livestock, and the impact on livestock and poultry.

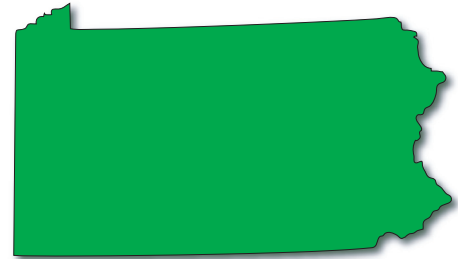
A 25x'25 future presents tremendous opportunities for each state as revealed by the study. With continued advancements in technology and significant shifts in cropping patterns, U.S. farmers, ranchers and foresters in each state can contribute to this energy goal while still providing abundant supplies of food, feed and fiber; improving soil, water and air resources; and enhancing wildlife habitat.

### Opportunities for Pennsylvania

The study estimates that by 2025, Pennsylvania's wind, solar and biomass resources will have the potential to produce 1.1 billion gallons of biofuels and 14.1 billion kilowatt hours of renewable electricity – a 250 percent increase from 2003 levels. As renewable energy production in the state increases, Pennsylvania's net farm and forest income will increase. By 2025, the projected increase in net farm income will be \$460 million. Economic impacts caused by changes in crop prices, shifts in crop acres, additions of dedicated energy crops and the decreases in government payments will result in \$2.2 billion in increased economic activity in the state. An additional \$3.9 billion in economic activity will occur in the conversion of feedstocks to energy. Total economic impacts are estimated at nearly \$6.1 billion and over 44,000 additional jobs will be created in Pennsylvania.

### Pennsylvania's Role in a 25x'25 Energy Future will Result in:

- **\$460M increase in net farm income**
- **\$6.1B increase in total economic impacts**
- **44,000 additional jobs**



### What Do These Mean?

**Quad:** a measure of energy equivalent to one quadrillion British Thermal Units (BTUs). About 4.4 million American households would consume a quad of energy through electricity and gasoline use in one year.

**BTU** (British Thermal Unit): A unit for measuring heat. A BTU is defined as the amount of heat required to raise the temperature of 1 pound of water by 1 degree Fahrenheit.

**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.

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

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

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

### More Information:

A copy of the national study, "25% Renewable Energy for the United States By 2025: Agricultural and Economic Impacts," is available at [www.25x25.org](http://www.25x25.org).

## Feedstock Quantities

By 2025, Pennsylvania's renewable energy production needs will create an increase in demand of over 9 million dry tons of dedicated energy crops and over 4 million dry tons of wood.

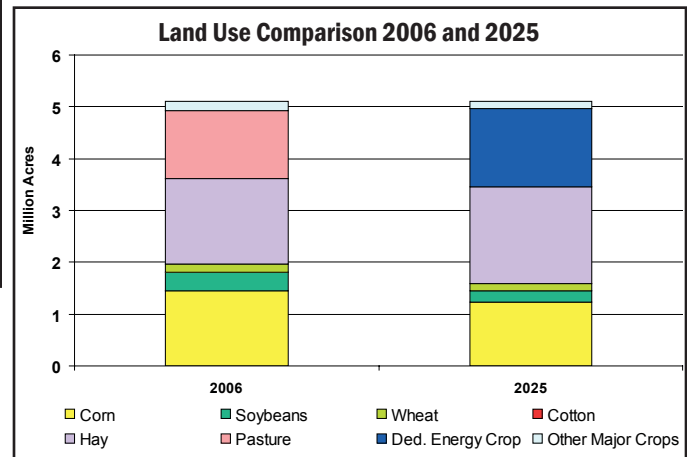
### Quantities of Feedstock Supplied for Pennsylvania by Selected Year to Meet the 25x'25 Vision

Feedstock	2010	2015	2020	2025
Million tons				
Corn	0.15	0.22	0.28	0.71
Soybeans	0.01	0.02	0.03	0.04
Million dry tons				
Wood	0.00	4.20	4.23	4.26
Dedicated Energy Crops	0.00	0.21	4.55	9.11
Corn Stover	0.00	0.12	1.36	1.74
Wheat Straw	0.00	0.15	0.25	0.29
Total Cellulose	0.00	4.68	10.39	15.40

*\*While the analysis includes forest waste from hazard-reduction programs and mill residue, it does not take into account woody biomass from standing timber, agricultural wastes (other than corn and wheat) and urban wood waste. Furthermore, while the analysis includes the production of dedicated energy crops, some varieties of feedstocks currently under research in laboratories and universities (energy cane, Miscanthus and hybrid willow, among others) may not be fully evaluated in this analysis.*

## Land Use Impacts

Pennsylvania's agricultural and forestry sectors will be strongly impacted by the development of a renewable energy future that relies on a significant amount of biomass. By 2025, hay acreage will increase as pasture is converted to hay production and dedicated energy crops. An estimated 1.5 million acres of dedicated energy crops are projected by 2025.



## Pennsylvania 25x'25 Alliance

### For more information, contact

Gibson C. Armstrong  
 Chairman  
 Pennsylvania 25x'25 Alliance  
 c/o American PowerNet  
 867 Berkshire Boulevard, Suite 101  
 Wyomissing, PA 19610  
 (610) 372-8500

[garmstrong@americanpowernet.com](mailto:garmstrong@americanpowernet.com)

Contact by email preferred.

### For More Information:

**25x'25**  
 P.O. Box 603, Brooklandville, MD 21022-0603  
 info@25x25.org      www.25x25.org

A copy of this brochure, the 86-page state-by-state analysis, and the national study, "25% Renewable Energy for the United States By 2025: Agricultural and Economic Impacts," are available at: [www.25x25.org](http://www.25x25.org).

### University of Tennessee Team:

Burton English/Daniel De La Torre Ugarte/Kimberly Jensen/Jamey Menard  
 benglish@utk.edu/danieltu@utk.edu/kjensen@utk.edu/jmenard@utk.edu

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