



# SHRUB WILLOW

FACT SHEET  
SERIES



## Renewable Energy & Environmental Benefits

### Commercial Willow Production for Biopower in Northern NY State

#### Shrub Willow

Shrub willow is a fast-growing, short-rotation woody crop that rapidly produces large amounts of hardwood biomass. One planting of a willow crop can be harvested up to seven times on a three- or four-year rotation cycle; with biomass yield of four to five dry tons per acre per year, or 25 to 30 wet tons per acre at each harvest. Research and development of shrub willow has been ongoing at SUNY-ESF since 1986 and is now being furthered by commercial production and innovations, as well as continued collaborations with numerous universities, companies and other stakeholders.



A three-year-old shrub willow crop at harvest

Willow can be grown on idle or marginal lands, stimulating rural economic development while also producing numerous environmental benefits. Willow is a carbon-neutral renewable energy source that does not contribute to climate change and has a high net-energy ratio between 15:1 and 45:1, meaning that for every unit of energy input into the system, 15 to 45 units of energy are produced depending on the feedstock transport distance and the efficiency of the end-use conversion technology. Willow can also reduce soil erosion, mitigate point source pollution, increase wildlife habitat and biodiversity, and be used for bioremediation applications such as vegetative landfill covers and treatment and utilization of agricultural and municipal waste streams such as manure and biosolids.



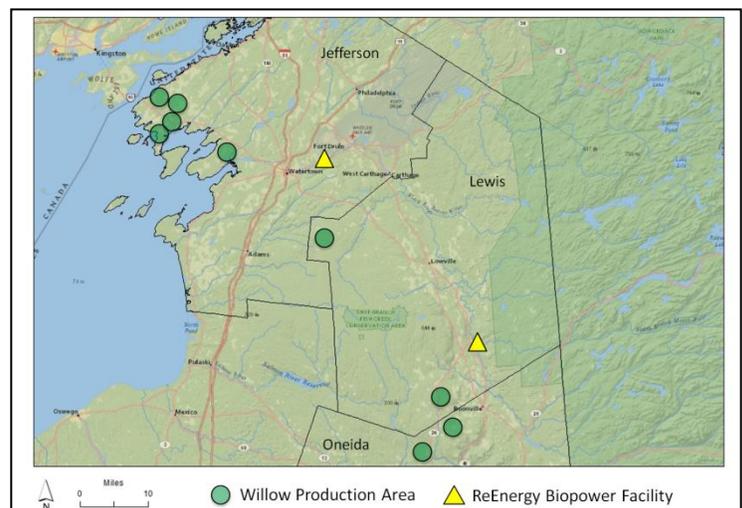
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#### USDA BCAP

Commercial production of willow crops in Northern New York State is now being catalyzed by the United States Department of Agriculture Biomass Crop Assistance Program (USDA BCAP), which is helping New York willow producers overcome the challenges of growing a new dedicated energy crop. The broad goals of BCAP are to improve domestic energy security, reduce atmospheric carbon pollution and spur rural economic development by providing assistance to landowners who establish and produce new biomass feedstocks such as shrub willow. The BCAP program directly assists willow producers by providing partial establishment grants to cover some of the costs of planting new willow, as well as annual acreage incentive payments based on soil conservation rates which can help balance the intermittent cash flows of the multi-year harvest cycle. The current enrollment period for BCAP funding to establish willow biomass crops in New York State has expired, but more funding opportunities may become available again in the near future. Increasing commercial production also spurs innovation, awareness and adoption of the new crop.

There are currently over 1100 acres of willow crops enrolled in the BCAP program in New York State; spread across Jefferson, Lewis, and Oneida counties and situated around two biopower facilities owned by ReEnergy Holdings LLC.



Locations of willow production areas and ReEnergy biopower facilities across three counties in Northern New York State



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#### Willow Harvesting and Biopower

The majority of new willow crops (about 70%) were established in 2013 and the remainder were established several years earlier, providing a range of crop ages on the landscape and the opportunity to harvest willow biomass every year in the future.



A field of one-year-old willow crops in Northern NY State

The BCAP program has created market certainty for willow producers by pairing them with an end-user in ReEnergy who has committed to purchasing all willow grown under the BCAP program for a period of 11 years and mixing the willow with other local sources of woody biomass such as forest residues from logging operations. Approximately 100 acres of mature BCAP willow crops were harvested in New York State in 2013. This produced over 2,500 tons of chips that were delivered to a local ReEnergy biopower facility and converted into about 1400 Mwh of renewable electricity.



Harvesting a mature willow crop in Northern NY State

Over two hundred acres of mature willow crops will also be harvested in 2014. Preliminary analysis of chip samples from these commercial harvests has shown the values and variability of moisture, ash and energy content of willow to be similar to forest residue chips and therefore suitable for mixing and integrating these two locally produced feedstocks for renewable power.



Willow biomass chips are mixed with forest residue chips at ReEnergy biopower facilities in Northern NY State

In support of BCAP willow production, SUNY-ESF, in partnership with the NEWBio project, is providing extension services to Northern NY willow growers in the form of technical and analytical services, outreach programs, meetings with stakeholders, educational materials, crop monitoring services, equipment access and more.

**For more information, please visit us online at:**

[www.esf.edu/willow](http://www.esf.edu/willow) and [www.newbio.psu.edu](http://www.newbio.psu.edu)

Or contact us by phone: (315) 470-6775 or email: [willow@esf.edu](mailto:willow@esf.edu)

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This work was supported by the New York State Energy Research and Development Agency (NYSERDA), the US Department of Energy (USDOE) and the US Department of Agriculture National Institute of Food and Agriculture (USDA NIFA) through the Northeast Woody/Warm Season Biomass Consortium (NEWBio). No funding agencies, SUNY, nor any of their employees, makes any warranty, express or implied, or assumes any legal responsibility for the completeness, accuracy, or usefulness of any information or process disclosed here.