

# ECONOMICS OF WILLOW BIOMASS PRODUCTION AND POLICY TO ENHANCE MARKET PENETRATION

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Woody biomass has significant potential as a sustainable energy source to provide society with fuel, thermal energy, and electrical power. Short-rotation coppice (SRC) willow crops are a promising source of biomass for the production of sustainable energy and bioproducts. However, current markets for biomass are thinly traded, the economics of willow plantations is little understood, and there are potential market barriers to the adoption of willow as a biomass energy crop. We analyze how financial incentives influence profitability of SRC willow plantations in upstate New York and identify barriers to further expansion. We introduce SRC willow plantation economics under different parameters that can impact market penetration, such as biomass productivity, land rent, biomass price, fuel costs, and labor costs. We then examine the impact of various incentives on profitability of SRC willow plantations. Financial incentives used include low-cost loans, annual subsidy payments, and establishment grants. We also examine the influence of nonfinancial factors, such as imperfect information, status quo bias, and land-ownership patterns, on the adoption of willow as a biomass energy crop.

Recent studies suggest that a 20-acre SRC willow plantation is economically viable only with a biomass productivity above 3 oven-dried-tons (odt)/acre/year and a biomass price of above \$50/odt. Dependence on start-up loans can obliterate a plantation's profitability.

We introduce various incentive scenarios using a mix of the three financial tools. Establishment grants are one of the most promising financial tools; a grant for 50 percent of establishment costs, or \$549/acre, would nearly double the internal rate of return in the case study. Results indicate that incentives focusing on the early stages of plantation establishment are the most promising ones. We also develop policy recommendations to address the nonfinancial market—structural and ownership parameters that may impact SRC willow acreage expansion.

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KEY WORDS: short-rotation coppice, willow crops, economic analysis, policy, incentive, market barriers

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