EcoWillow 2.0

Shrub willow is a short rotation woody crop (SRWC) that is being developed as a sustainable commercial enterprise. Shrub willow crops provide biomass in the form of hardwood chips that can be used to produce renewable heat and power, biofuels and bioproducts. EcoWillow 2.0 is a comprehensive financial analysis tool for willow that encompasses crop establishment, harvesting and transport to an end-user. Willow crops have been studied since 1986 at the State University of New York College of Environmental Science and Forestry (SUNY-ESF), and this research is now being applied and furthered by commercial willow operations in the Northeastern United States.

EcoWillow allows users to easily model how yield, management options and a variety of cost factors influence the cash flow and internal rate of return for willow crops. The model is flexible enough to be applied to a range of sites where willow crops can be grown across the Northern U.S. and Southern Canada. EcoWillow 2.0 is a Microsoft Excel workbook consisting of several linked worksheets containing input modules, graphical displays and a tutorial. There are five input modules in EcoWillow 2.0: Fields, Input-Output, Plant, Harvest and Transport.

Fields Module
The Fields module is a new addition to EcoWillow 2.0 which allows users to combine multiple fields in various locations into one project. This module provides user input options for up to 20 individual fields to be modeled as one financial analysis. The Fields module also facilitates improved calculations of headlands/unplanted area and transport distance for each field and the project as a whole - important factors in estimating biomass output and costs.

Input-Output Module
The Input-Output module is the primary worksheet of EcoWillow 2.0. Inputs on this page include general model parameters, field data, incentive program payments, crop establishment and maintenance costs. Totals from all other modules (Fields, Plant, Harvest, Transport) also feed into this module. The model outputs include net present value (NPV), internal rate of return (IRR), and production costs/earnings per ton of biomass in both wet and dry weights. Model outputs are presented on the right side of this worksheet.

Information from these research and commercial ventures has been incorporated into EcoWillow 2.0 including the most recent data, logistics, best practices and possible incentive payments. EcoWillow 2.0 includes several key updates and a more user-friendly design. A series of suggested default values are pre-entered into the model, representing a conservative base case production scenario, with other possible scenarios summarized at the end of this fact sheet. Most of these parameters can be modified by the user to represent their conditions and costs. EcoWillow 2.0 and all supporting material can be downloaded at no cost from:

www.esf.edu/willow

Model Structure
EcoWillow 2.0 is a versatile analytical tool designed to be useful for farmers, land owners, investors, project developers, extension personnel, resource managers and others.
Planting Module
The Planting module of EcoWillow 2.0 is based on data from commercial willow plantings recently conducted in New York State. Inputs cells on this page include the labor, equipment and supplies required to plant a willow crop. An option for refrigerated truck rental is included in this module to account for proper storage of planting stock, as cuttings should be kept cool until just prior to planting. Outputs of this module include categorized cost totals, total planting costs, and planting costs per unit land area.

Harvest Module
The Harvest module of EcoWillow 2.0 is based on commercial-scale harvesting of willow crops using a New Holland 9000 series forage harvester and 130FB short rotation woody crop cutting header. Total harvest time, fuel use, labor, equipment and other variables affecting harvest costs are calculated as a function of standing biomass in the field and the rate of harvest, which can be adjusted by the user. Outputs of this module include categorized cost totals, total harvest cost, cost per unit land area, and cost per unit biomass.

Transport Module
The Transport module of EcoWillow 2.0 is based on logistics and cost estimates from commercial willow operations recently conducted in New York State, with user options for the size of transport vehicles, loading times, and method of chip transfer from collection to transport vehicles. Outputs include total transport cost, cost per unit land area, and cost per unit biomass.

Graphical Outputs and Cash Flow
EcoWillow 2.0 provides a series of graphical outputs which display the project cost distribution, the annual and accumulated cash flows.

Crop Production Scenarios
Four generalized willow crop production scenarios using EcoWillow 2.0 have been developed and tested by SUNY-ESF. These scenarios include the conservative base case pre-entered into the model upon downloading if for the first time, and three potential alternative scenarios that add system optimizations and possible incentive payments to the base case. For outputs and more information on these scenarios, please refer to the corresponding fact sheet “Willow Crop Production Scenarios” available for download at the address below.

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