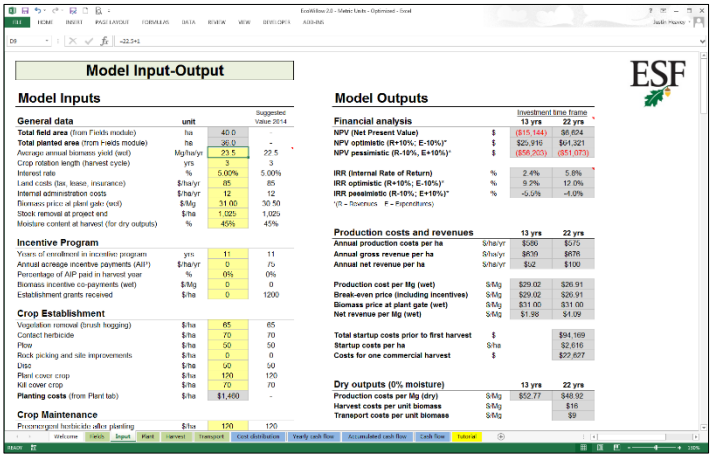
EcoWillow 2.0 – Economic Analysis of Willow Bioenergy Crops

EcoWillow 2.0

Shrub willow is a bioenergy crop being developed as a sustainable commercial enterprise. Willow crops provide a biomass feedstock in the form of hardwood chips that can be converted to renewable heat and power, biofuels and bioproducts. EcoWillow 2.0 is a financial analysis tool for willow that encompasses all stages of the crop's lifecycle over multiple harvest rotations. Data from research trials and commercial operations has been incorporated into EcoWillow 2.0, along with several new features and a more user-friendly design.



The main Input-Output module of EcoWillow 2.0

EcoWillow 2.0 is a versatile analytical tool for landowners, investors, extension professionals and others working with willow bioenergy crops. A default base case scenario is provided with the tool, but users can adjust variables and customize the model scenario to fit their own operating conditions and assumptions. EcoWillow 2.0 allows users to easily model how crop yield, management choices, best practice targets, incentive payments and other factors impact the costs and revenues of growing willow bioenergy crops. The tool is flexible enough to apply to the wide range of sites where willow can be grown. EcoWillow 2.0 is provided as an Excel file containing several linked spreadsheets that correspond to the different stages of the crop lifecycle. The EcoWillow tool, supporting documentation and an instructional video can be downloaded free of charge from our website (www.esf.edu/willow). This fact sheet summarizes each module within EcoWillow 2.0.

Fields Module

The Fields module is a new addition to EcoWillow 2.0 which allows users to combine multiple fields and/or sites into one project analysis. This module also facilitates more precise calculations of transport distances and planted/unplanted areas, important factors in estimating biomass production, costs and revenues.

Input-Output Module

The primary worksheet of EcoWillow 2.0, inputs of this module include biomass yield, price received for the biomass feedstock, incentive payments, and crop maintenance costs. Cost totals from other modules (Fields, Plant, Harvest, Transport) feed into this module to calculate outputs including the financial metrics of net present value (NPV), internal rate of return (IRR), break-even price, and costs/revenues on both a wet and dry weight basis.

Planting Module

The Planting module of EcoWillow 2.0 is based on data from commercial willow operations in New York State. Inputs on this worksheet include the cost of labor, equipment and supplies. An option for refrigerated truck rental is included to account for proper storage of planting stock, as willow cuttings should be kept cool until just prior to planting. Outputs of the planting module include categorized cost totals, total planting costs, and planting costs per unit land area.

Planting a willow crop in New York State

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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 woody crops cutting header. Total harvest time, fuel use, labor, equipment and other variables impacting 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 the harvest module include categorized cost totals, total harvest cost, cost per unit land area, and cost per unit biomass.

Harvesting willow with a New Holland cut-and-chip system

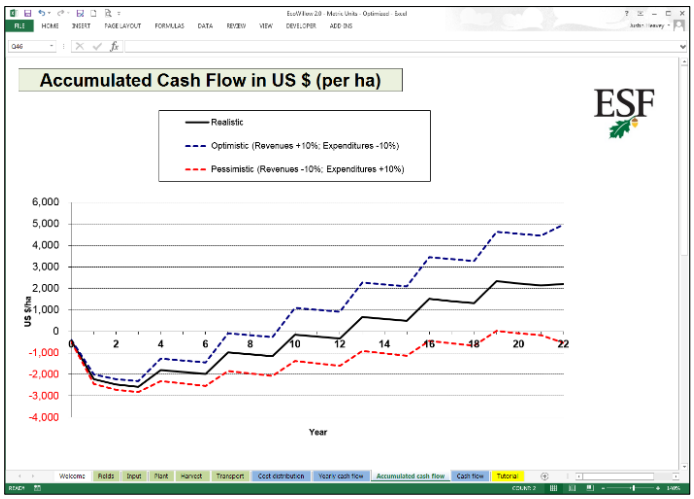
Transport Module

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 the method of transferring chips (blower, loader or direct) from collection to transport vehicles.

Willow chips are transferred from a collection wagon to a truck for transport

Graphical Outputs

EcoWillow 2.0 provides a series of graphical outputs which display the project cost distribution, the annual cash flow and accumulated cash flow over the project life cycle of 22 years, or seven harvest rotations.



Accumulated Cash Flow Graph in EcoWillow 2.0

Crop Production Scenarios

Four willow crop production scenarios have been developed and tested using EcoWillow 2.0. These include the conservative base case pre-entered into the model upon downloading it, and three alternative scenarios that add potential system improvements and incentive payments to the base case. Outputs and more information on these scenarios is provided in a fact sheet available for download at the address below.

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The Northeast Woody/Warm-Season Biomass Consortium
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