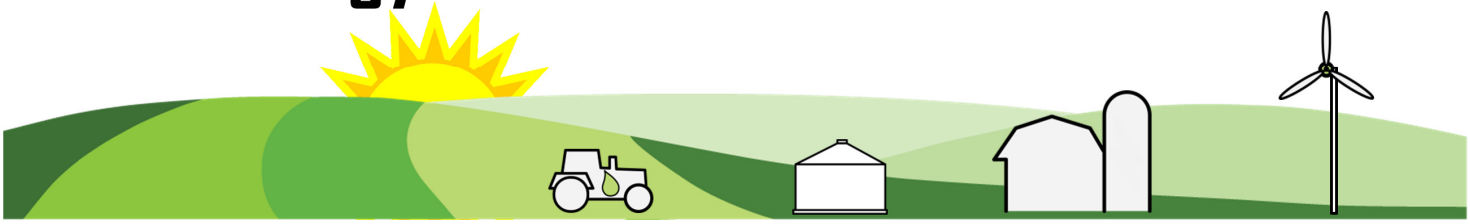
Farm Energy IQ



Pellet Module Alternate ASP Activity – Analyzing a Pelleting Operation

In this exercise, you will use a spreadsheet model to estimate the cost of running a farm pelleting operation.

EQUIPMENT AND SUPPLIES NEEDED

- Computer
- File "OnFarmPelletCosts.xlsx"

SCENARIO

Farmer Brown would like to go into the pellet-making business but he's not sure how much it will cost him. He can get 250 tons of switchgrass bales from his neighbor (Farmer Green) for $60 per ton and has tracked down the following prices for pelleting equipment:

- Bale grinder (1000 lb per hour, needs PTO drive) $4000 (used)
- Hammer mill (1000 lb per hour, diesel engine included) $3000 (new)
- Mixer for adding water (600 lb per hour, needs PTO drive) $1500 (used)
- Pelletizer (500 lb per hour, diesel engine included) $12000 (new)
- Cooling racks (manual operation, 500 lb per hour) $500 (assembled on site)
- Bagging system (manual operation, 500 lb per hour) $500 (assembled on site)

What is the total operating cost for Farmer Brown to produce one ton of pellets? What selling price must Farmer Brown get to pay back the initial investment in two years?

PROCEDURE

1. Familiarize yourself with the inputs needed in the spreadsheet cost estimator.
2. List the information you still need.
3. Use your best judgment to estimate the data needed to complete the spreadsheet inputs.
4. Read the results in the blue shaded cells toward the bottom of the sheet.

CALCULATION TOOL – PELLET OPERATION COST ESTIMATOR

This spreadsheet file (OnFarmPelletCosts.xls) will allow farmers to estimate the cost of producing pellets on the farm by inputting a few bits of information about their desired farming and pelleting operation.

INPUTS WILL INCLUDE:

FEEDSTOCK COST ($/TON): Enter the price you will pay to purchase feedstock from others or calculate the cost of growing your own feedstock. Two adjacent worksheets, adapted from the AFRI project are included with the file that calculate estimated production costs for 1)switchgrass and 2)Miscanthus.

FEEDSTOCK AMOUNT (TON/YR): Enter the total amount of feedstock available to make into pellets.

MOISTURE CONTENT (%, WET BASIS): Enter the percent moisture content of your feedstock. You can use a moisture sensor or a drying oven to determine how much moisture is in the material. Dried grasses are usually 10 to 15%, green wood chips are ~50%,

LABOR COST: Enter the cost, in dollars per hour, of the labor used to carry out the work on the pelletizer. If you are doing the work yourself, you can enter zero or else enter the price that you'd like to earn for work on the pelletizer.

DESIRED PAYBACK ON INVESTMENT: Enter the number of years that it should take to recoup the initial cost of purchasing the pelleting equipment.

MANAGEMENT COST (%): Enter the percent "profit" that the farmer desires to earn as owner and manager of the operation.

ELECTRICITY COST ($/KWH): This is the cost that you pay for electricity, in dollars per kilowatt-hour. If your operation is powered completely by diesel fuel, you can leave this cell blank.

DIESEL FUEL COST ($/LITRE): If you use diesel fuel to power any of your pelletizing equipment, enter the cost of fuel in dollars per U.S. Gallon. If your operation is all electric, you can leave this cell blank.

BALE GRINDER COST ($): Enter the purchase price of your bale grinder.

BALE GRINDER CAPACITY (LB/HR): Enter the processing speed of the bale grinder, in kg per hour (multiply kg per hour by 2.2).

LABOR, PERSONS TO RUN: Enter the number of people needed to run the bale grinder. For example, if it needs one person working full time, enter 1. If it needs one person working half of the time, enter 0.5, and so on.

BALE GRINDER ENERGY USE: We are assuming that the bale grinder is driven by a PTO shaft from a tractor. Enter the rate of fuel use by the tractor, in gallons of fuel per hour (divide liters per hour by 3.8).

HAMMER MILL COST ($): Enter the purchase price of your hammer mill.

HAMMER MILL CAPACITY (LBS/HR): Enter the processing speed of the hammer mill, in pounds per hour (multiply kg per hour by 2.2).

LABOR, PERSONS TO RUN: Enter the number of people needed to run the hammer mill. For example, if it needs one person working full time, enter 1. If it needs one person working half of the time, enter 0.5, and so on.

HAMMER MILL ENERGY USE: Enter the rate of energy use by the hammer mill, either in kW of electricity (the first cell) or gallons of fuel per hour (divide liters per hour by 3.8).

DRYER/CONDITIONER COST: Enter the purchase price of your dryer.

DRYER/CONDITIONER CAPACITY (LBS/HR): Enter the processing speed of the dryer, in lbs per hour (multiply kg per hour by 2.2).

LABOR, PERSONS TO RUN: Enter the number of people needed to run the dryer/conditioner. For example, if it needs one person working full time, enter 1. If it needs one person working half of the time, enter 0.5, and so on.

DRYER ENERGY USE: Enter the rate of energy use by the dryer/conditioner, either in kw of electricity (the first cell) or gallons of fuel per hour (divide litres per hour by 3.8).

PELLETIZER COST ($): Enter the purchase price of your pelletizer.

PELLETIZER CAPACITY (LBS/HR): Enter the processing speed of the pelletizer, in lbs per hr (multiply kg per hour by 2.2).

LABOR, PERSONS TO RUN: Enter the number of people needed to run the pelletizer. For example, if it needs one person working full time, enter 1. If it needs one person working half of the time, enter 0.5, and so on.

PELLETIZER ENERGY USE: Enter the rate of energy use by the pelletizer, either in kW of electricity (the first cell) or gallons of fuel per hour (divide liters per hour by 3.8).

DRYER/COOLER COST ($): Enter the purchase price of your pelletizer.

DRYER/COOLER CAPACITY (LBS/HR): Enter the processing speed of the pelletizer, in lbs per hour (multiply kg per hour by 2.2).

LABOR, PERSONS TO RUN: Enter the number of people needed to run the dryer/cooler. For example, if it needs one person working full time, enter 1. If it needs one person working half of the time, enter 0.5, and so on.

DRYER/COOLER ENERGY USE: Enter the rate of energy use by the pelletizer, either in kW of electricity (the first cell) or gallons of fuel per hour (divide liters per hour by 3.8).

BAGGER COST ($): Enter the purchase price of your bagger.

BAGGER CAPACITY (LBS/HR): Enter the processing speed of the bagger, in kg per hour (multiply kg per hour by 2.2).

BAGGER ENERGY USE: Enter the rate of energy use by the bagger, either in kW of electricity (the first cell) or gallons of fuel per hour (divide liters per hour by 3.8).

LABOR, PERSONS TO RUN: Enter the number of people needed to run the bagger. For example, if it needs one person working full time, enter 1. If it needs one person working half of the time, enter 0.5, and so on.

COST OF BAGS ($/TONNE): Enter the cost of bags that will be used to store and market the pellets.

OUTPUTS WILL INCLUDE:

ENERGY USE (KWH/TON, LITERS DIESEL/TON): These two cells display the amount of electricity and/or diesel fuel used to make each ton of pellets.

ENERGY RATIO (J IN FUEL PER J OF ENERGY USED): This calculation calculates how much energy is in the pellets that are produced, relative to the amount of energy used to manufacture them. This calculation is for the pelletizing operation only, and does not consider energy used to grow and harvest the feedstock.

LABOR REQUIREMENT (MAN-HOURS/TON): This cell is an estimate of the amount of labor required to produce each ton of pellets. Again, this is for the pelleting operation only, and does not take into consideration the growing and harvesting of the feedstock. The calculation is based on the assumption that each machine (grinder, hammer mill, pelletizer, dryer/cooler) requires a person to operate the device.

COST OF FEEDSTOCK ($/TON): This is the cost of feedstock, per ton of pellets produced. This number may be different than the cost of one tonne of feedstock, because one tone of feedstock generally results in less than one ton of pellets, due to material shrinkage and drying (removal of moisture).

COST OF ENERGY ($/TON): This is the cost of energy that is used to manufacture the pellets.

COST OF LABOR ($/TON): This is the cost of the labor that is used to manufacture the pellets.

COST OF BAGS ($/TON): This is the cost of bags in which the pellets are stored and sold.

MAINTENANCE COST ($/TON): This is the cost of keeping the equipment maintained, and is assumed to equal 15% of the purchase price, on an annual basis.

TOTAL COST ($/TON): This is the estimated total cost of producing pellets on the farm, including all of the above partial costs.

PRICE NEEDED TO ACHIEVE PAYBACK ($/TON): This is the selling price the farmer must charge in order to pay back the cost of the equipment in the desired time frame.

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