

## Considerations for Diversifying the Farm Portfolio to Include Biofuels

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- **How do farmers respond to rising energy prices to maintain competitive?**

Increases in the cost of inputs such as fossil fuels can undermine the bottom line. In response to rising energy costs the first choice should be energy efficiency projects. However, rising energy costs present an opportunity for farmers to move into various kinds of energy production. Using abandoned or under-utilized farmland for energy production diversifies the farm economy (and increases management). As on-farm energy prices rise, a farm that produces its own energy will be more financially stable in response to a volatile fossil fuel market. If a farm decides to diversify its farm portfolio for the purpose of selling the product for off-farm demands, as energy prices increase, the price paid for biofuels made should also increase keeping production costs and consumption price compatible.

- **Is there a market for biofuels?**

This is a tough question. The best advice is to look around your region and get some business counseling advice. Farming for fuels is good logic. It not only adds money to the local economy, but it defers part of the \$-139.5 billion energy trade balance from fossil fuel imports. It also reduces our greenhouse gas emissions by burning renewable, carbon neutral fuels. Good logic and market dynamics don't always go hand in hand. A cautious start is to produce your own energy needs on farm first then expand production as demand for alternative fuels becomes more reliable.

There are some good indicators though. Consider that the Northeast is heated predominantly with #2 heating fuel. Realize also, seven New England States have signed onto a Regional Greenhouse Gas Initiative – a cap-and-trade program regulating electric power plant CO<sub>2</sub> emissions. One way for power companies to achieve reductions is to co-fire biomass with coal. Keep an eye out for the Renewable Portfolio Standards in your state.

Growing renewable carbon neutral fuels will help support the local economy, keep lands productive, reduce greenhouse gas emissions and secure our energy future.
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- **Land-use considerations**

In considering what to grow, using existing infrastructure will lower costs as well as improve efficiency of use. It is also important to recognize the time of year of use and time of production as this has storage space considerations and reliable delivery of product when the crop is not being produced. The long term planning strategies for the land or farm should also be considered. What is so lovely about forests is you have to manage them less frequently and they keep growing. But grassland can be converted to a completely different crop the next year without significant work such as removing tree stumps. To start, it is suggested that abandoned or underutilized land be the first to consider these biofuel options so as not to radically change the farm structure and explore different options.

- **What biomass energy options are there for land-owners?**

There are three basic useable energy forms besides food: heat, electricity and transportation fuel. Many options exist when farming for fuels (See also Alternative Energy Production, B. Burtis) To compare different fuel qualities, try <http://www.eere.energy.gov/afdc/altfuel/altfuels.html>

- 1) **Grass biomass** pelleted for heating homes in high-ash stoves: [www.grassbioenergy.org](http://www.grassbioenergy.org)
- 2) **Short Rotation Woody Crops** chipped/co-fired in large coal plants: [www.esf.edu/willow](http://www.esf.edu/willow)
- 3) **Waste Vegetable Oil (WVO)** can be collected from fryers, filtered, and used straight with slight modification of diesel engines for homeheating or transport: [greasecar.com](http://greasecar.com)
- 4) **Straight Vegetable Oil (SVO)** can be extruded from oilseeds such as rape, soy, or mustard seed and used straight or processed into biodiesel for homeheating or transport.
- 5) **Biodiesel** can be made from WVO/SVO: [journeytoforever.org/biodiesel\\_make.html](http://journeytoforever.org/biodiesel_make.html)
- 6) **Wind** maps in your region, see: [www.awstruewind.com/inner/windmaps/UnitedStates.htm](http://www.awstruewind.com/inner/windmaps/UnitedStates.htm)
- 7) **Forest** land managed as per the landowners preferred goals; management cullwood can be chipped for electric powerplants. Sustainable forests: [sfp.cas.psu.edu/about\\_us.htm](http://sfp.cas.psu.edu/about_us.htm)
- 8) **Ethanol** can processed from corn or other biomass in an ethanol plant to displace MTBE, a toxic oxygenate in gasoline: [www.eia.doe.gov/oiaf/analysispaper/biomass.html](http://www.eia.doe.gov/oiaf/analysispaper/biomass.html)
- 9) **Corn grain** can be burned straight in appropriate corn-stoves and furnaces, see: [energy.cas.psu.edu/burncorn/shellcorn.html](http://energy.cas.psu.edu/burncorn/shellcorn.html)
- 10) **Manure digesters** combined with regional food wastes can generate methane in anaerobic digesters that power a small electric generator: [www.manuremanagement.cornell.edu](http://www.manuremanagement.cornell.edu)

- **How much infrastructure is needed to process biofuels?**

This depends on the type of fuel you are considering processing. Custom made anaerobic digesters can cost \$1 million dollars. If you already have shelled corn at home, then you have a home heating source and can pick up a corn stove from \$1,500 to \$3,000. While you can make biodiesel in your shed, there are safety considerations. If you are interested in ethanol, chances are, you'll only make money by selling the raw materials to a larger processor. Financing the infrastructure for biofuels is likely to be expensive so financial counseling is advised.

- **How can I compare the price of home heating fuels?**

The standard price of home heating fuels is easiest to do by comparing price per million BTU's. This way you escape trying to compare a gallon of #2 fuel with a cord of wood. A good price comparison will include the moisture content of the biomass. It will also include the burn efficiency by the furnace or stove. Both moisture content and burn efficiency affect your delivered BTU heat. Two good fuel calculators: [energy.cas.psu.edu/costcomparator.html](http://energy.cas.psu.edu/costcomparator.html), [www.fpl.fs.fed.us/documnts/techline/fuel\\_value\\_calculator.pdf](http://www.fpl.fs.fed.us/documnts/techline/fuel_value_calculator.pdf)

- **Alternative Fuels: What is an Output:Input ratio?**

Often when speaking about alternative fuels, there is not a clear definition of what an alternative fuel means other than the fact that the fuel is not a fossil fuel derivative. An Output:Input ratio is a way to rate different alternative fuels. It is simply a ratio of alternative energy created (output) per fossil fuel energy used (input). Assessing the fossil energy inputs and alternative fuel outputs is essential in getting the most bang for your buck. The greater the Output:Input ratio, the greater the benefit for society, the less pressure on the ecosystem and the greater economic potential. In other words, 1 acre growing a crop with a 10:1 ratio does the same work as 5 acres growing a crop with a 2:1 ratio. This efficiency in conversion makes economical and environmental sense (See Energy Budgets for Biomass Fuels, J Duxbury).

**What is a renewable fuel?**

Imagine there is one unit of fossil fuel left.

With an output:input ratio of 2:1,  
one unit of non-renewable fuel is used to generate two units of a 'renewable' fuel.

Remember we need one unit of the renewable fuel to make the next generation of fuel.  
This leaves us with one unit of renewable fuel to be used for heating, electricity or transport.

The greater the output:input ratio, the greater the return on investment.

- **What option is best for you? Some questions.**

- What is your most expensive energy type: heat, electricity or transport fuels?
- What is the demand for each type of fuel on your farm, in your community?
- What infrastructure do you already have access to?
- Do you need a crop that can easily be reverted to more traditional row crops?
- What is your time/land commitment/availability (seasonally and over years)?
- What is the season of your crop relative to the season of energy demand?
- What is your storage capacity of the biomass as it waits processing or use?
- What are the new inputs required and how do they affect watershed, soil health, etc.?
- How far will you have to transport your material to the distribution network?
- What are your personal, financial and land-use objectives?

As the price for fossil fuel rises, the value of biofuel also rises with three positive effects.

- 1) As on-farm energy prices rise, a farm that reduces energy use, increases efficiency and produces its own energy will be more financially stable in a volatile fossil fuel market.
- 2) If a farm decides to sell the biofuels for off-farm demands, as fuel prices increases, the price paid for biofuels will also increase keeping production costs and consumption price compatible.
- 3) Farming for fuel recycles money in the local economy, it defers part of the \$-139.5 billion energy trade balance from fossil fuel imports and reduces our greenhouse gases by using renewable, carbon neutral fuels.

There is opportunity to develop clean, high output biofuels, support local economies, and encourage sustainable land-management activities for energy security.