

OPPORTUNITY FOR HEMP HURD AS FUEL

Minnesota has been at the forefront of renewable energy for years. Programs supporting ethanol and bio-diesel production in Minnesota illustrate the commitment this state has made to promote renewable energy.

The opportunity Minnesota has to offer biomass crops and renewable energy is evident through various programs supporting the use of renewable fuels along with industries within the state that already utilize solid biomass fuel. This analysis focused on renewable energy opportunities that may exist for hemp products.

Hemp coproducts such as the hurd, extracted flower and cake all have high heating values. Hemp seed oil can also serve as a feedstock to make biodiesel, with the end product competing with the properties of soy-based biodiesel. Utilizing hemp coproducts as fuel sources are a potential opportunity, however the materials will likely have higher values in other areas and there are a few hurdles to overcome, including meeting pellet fuel standards as well as its price competitiveness with other leading fuel sources.

Table 1.
Value of hemp hurd to be competitive with other fuel commodities on the market based on dollar per million BTUs.

Natural Gas \$8/therm ¹	Propane \$1.60/gal ²	Wood \$180/ton ³	Shell Corn \$3.50/bushel ⁴
\$101	\$227	\$139	\$80

Hemp hurd per ton comparative value

The values calculated in the table above are derived from accounting for the fuel value of each commodity and combustion efficiency variations to compare fuel sources on an equivalent cost per energy unit.

If you can source any of the hemp ingredients for less than the comparative value column shown in Table 1, hemp hurd may offer a competitive alternative to use as a fuel source. Note: The capital cost of biomass heating systems and potential pelleting cost of around \$90 per ton is not considered in the projections. Hemp oil may also be competitive with soybean oil for biodiesel production, providing another opportunity in the state for biodiesel plants.

Hemp flower and hemp cake both have high energy content which could serve as a good fuel source. However high protein and energy feed values show that these commodities will likely capture a greater value as livestock and poultry feed.

ADDITIONAL INFORMATION

pelletheat.org | auri.org/hemp | fpl.fs.fed.us/documnts/techline/fuel-value-calculator.pdf

Sources for Commodities Prices

¹ Natural Gas Price - eia.gov/dnav/ng/hist/n3010mn3m.htm

² Propane Price - eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=W_EPLLP_A_PRS_SMN_DPG&f=W

³ Wood Price - bankrate.com/mortgages/how-much-does-a-cord-of-wood-cost/

⁴ Corn Price - markets.businessinsider.com/commodities/corn-price

Hurdles

While the energy value of many hemp plant components is substantially high, in order to contend as a pellet fuel some challenges need resolving for hemp to play a role as a marketable fuel. For example, blending the hurd with shelled corn or wood to reduce chlorine levels in the final products could be a great opportunity to make a blended hemp fuel product. Chlorine levels will be more important to focus on when considering home pellet fuel burners. However, larger industrial scale systems should be able to handle higher chlorine contents. However, as the chlorine levels begin to reach the thousands of parts per million (PPM) levels, one should expect equipment degradation. **AURI recommends learning and following your biomass stove manufacturer fuel recommendations and guidelines.

Product Opportunities

- Hemp hurd pellet fuel blends with other natural fuel commodities such as wood or corn for use in residential or industrial pellet burner systems
- Hemp cake or hemp flower fuel pellets
- Biodiesel

Existing Infrastructure

Existing Minnesota Infrastructure and products that could utilize hemp products as fuel:

- Biodiesel plants to utilize hemp oil in their process
- Biomass boiler companies with systems capable of combusting hemp hurd



FUEL

Forecasted Market Potential

Estimated fuel values for hemp coproducts will continue to be based on commodity price fluctuations.

Citing the Minnesota Department of Agriculture's (MDA) 2017 biodiesel study Economic Impact of the Minnesota Biodiesel Industry: Minnesota currently ranks 10th among the US states in biodiesel production.

In 2016 the total economic impact of Minnesota's biodiesel production, including direct, indirect and induced impacts, was about \$1.7 billion.

AURI Involvement

- Coproducts facility in Waseca is a unique value-added facility in the Midwest.
- Coproducts lab is uniquely positioned to aid in product development involving hemp byproducts utilized for pellet fuel blends.
- AURI has worked on numerous pellet fuel development projects in the past.
- AURI's Marshall facility also has the capability to make small batches of biodiesel from hemp oil.
- Capabilities include but are not limited to: pellet mill, hammer, mill aspiration, mechanical and thermal dewatering, cold oil pressing and filtration, blending/mixing ingredients
- Reach out to Harold Stanislawski, Al Doering or Riley Gordon at AURI to learn more about how AURI can help move your hemp fuel idea forward!