Seeking Energy Solutions with Biomass Working Group

Millions of tons of biomass are left after America's crops are harvested but few commercially viable uses have been developed. At a time when the country is seeking alternatives to traditional energy sources, could this untapped supply be the answer?

Biomass Working Group, LLC, was organized as a multistate effort to find biofuel and other commercial uses for residues from corn, wheat, soybeans, and other major crops. Morrison & Company was engaged to research potential uses, determine markets for related products, research the availability and readiness of technologies to produce possible products, and determine the financial viability of producing such products.

Completed in December 2011, the project explored technologies and markets for biomass feedstocks (e.g., pellets), cellulosic ethanol, syngas, coal substitutes, biopower, and activated carbon. We also assessed crop residue availability and sustainability (e.g., how much crop residue can be removed without interfering with good agricultural practices), storage and transportation issues, regulatory drivers, and available government programs.

Brent Morrison with bio-oil made from wheat straw

Biomass Working Groups' founding members operate in South Dakota, Kansas, Indiana, Nebraska, and Illinois; significant participation and funding was provided by National Farmers Organization and the South Dakota Farmers Union. To assist with the technical aspects of the project, Morrison & Company engaged and managed the assistance of private technology companies and researchers, universities, and the US Department of Energy's Idaho National Laboratory, our major partner for technology assessment.

While much progress has been made in alternative energy technologies, significant challenges remain. It is possible to make bio-oil, ethanol,

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syngas, biodiesel, coal substitutes and other products from crop residues: the trick is to do so economically and in sufficient quantities to justify the cost of needed technologies and infrastructure.

Aside from the technological issues, the collection, harvest, storage, and transportation of both biomass feedstock and finished products is a major challenge. Crop residues are typically left in the field rather than brought to a central location as the result of processing as with rice hulls, nut shells, fruit pits, and other byproducts of processing. Suitable and economically viable methods of gathering, storing and handling are critical to any effort to use crop residues in large volumes.

Silica content, moisture, minerals used in crop production, and other factors pose problems for many applications. For example, a major Midwest power company we consulted has tried several coal substitute products made from crop residues and is working to overcome issues with ash, the chemical composition of the residues, regulatory issues, dust, water absorption, flowability, energy output, and other factors that currently make such products less efficient than coal.

There are also bright spots. For example, we had wheat straw and prairie hay tested with technologies to make bio-oil and torrefied fuel pellets developed by Mississippi State University. While not yet economically viable without government support, the bio-oil can be further processed into syngas, ethanol, and other products as technologies advance.

Ultimately our findings indicated a workable business model with the potential to provide both badly needed alternative energy sources and additional income for growers. We look forward to future collaboration with Biomass Working Group to help make this a reality.