Supplying A Billion Tons of Biofuel Feedstocks:
Regional Biomass Processing Depots for Cellulosic Biofuels

Overview

A very large scale cellulosic biofuels industry requires that hundreds of millions of tons of feedstock be supplied each year for decades to hundreds of biofuel production facilities ("biorefineries") that process these feedstocks to biofuels. This is a truly formidable challenge. While a great deal of public and private investment has been made in developing biorefinery conversion technology, comparatively little attention has been paid to how these feedstocks will be supplied to the biorefineries. The feedstock supply difficulty is compounded by the low bulk density of biomass as well as its compositional variety and tendency to degrade over time.

We propose that the biomass supply problem be addressed by a network of Regional Biomass Processing Depots (RBPDs, see Figure 1). The RBPD systems manage the crop and regional diversity at the point of harvest and individual depots, allowing the subsequent supply system infrastructure to be similar for all biomass resources, providing a uniform bulk commodity that can be traded on the market to biorefineries and other markets, reducing feedstock supply costs and significantly reducing risks associated with regional feedstock supply shortages. A major objective of the RBPDs is to process low density and often unstable biomass into stable, dense intermediate products compatible with existing bulk commodity material handling, storage and transportation systems.

Advantages of Regional Biomass Processing Depots

A network of RBPDs supplying biorefineries would have the following advantages:

- RBPDs would contract for the biomass, thereby greatly reducing transaction costs for the biorefineries
- RBPDs would preprocess, store and supply biomass to the biorefineries, thereby reducing the storage and processing needed at the biorefinery
- Some RBPD products might be processed by existing domestic oil refineries, thereby leveraging the capital and expertise of our oil industry
- RBPDs could be owned in whole or in part by local interests, thereby helping ensure that more communities would capture part of the "value added"
- RBPDs would shift some of the higher paying processing jobs from the biorefineries toward rural communities
- The capital required for an economically scaled biorefinery would be reduced, a key consideration in a more capital risk averse investment climate
- Capital risk would also be reduced by the ability to provide dense processed commodities to more remote locations, for example during droughts
- RBPDs could certify the environmental performance of their commodities

How to Get There: Developing the Foundational RBPD Technologies

While the advantages of establishing a RBPD system are compelling, actually getting there will take a lot of focused, disciplined work. In short, we must develop economical, robust processing technologies that will actually allow RBPDs to succeed. We believe Iowa State University (ISU), Michigan State University (MSU), Penn State University,

and Idaho National Laboratory have the institutional and personnel resources, and established connections with industry, that are required to explore and develop the foundational technologies for RBPD systems. Our roadmap for the technology development of these RBPD systems is as follows:

- Optimize in-field harvest, storage, and logistical systems for lignocellulosic biomass
- Develop the fundamental technologies needed to process biomass into stable, dense intermediate products that can be traded as uniform commodities to biorefineries and other markets
- Thoroughly characterize the intermediates products
- Optimize supply chains to provide best intermediate product(s) for biorefineries (thermochemical, biochemical, and Combined Heat and power (CHP) processing systems)
- Develop model Regional Biomass Depots (RBDs) and terminals (BTs) that preprocess, store, and supply biomass to biorefineries and other markets
- Conduct life-cycle and techno-economic analyses for different feedstock, preprocessing, and processing paths to ensure environmental and economic sustainability

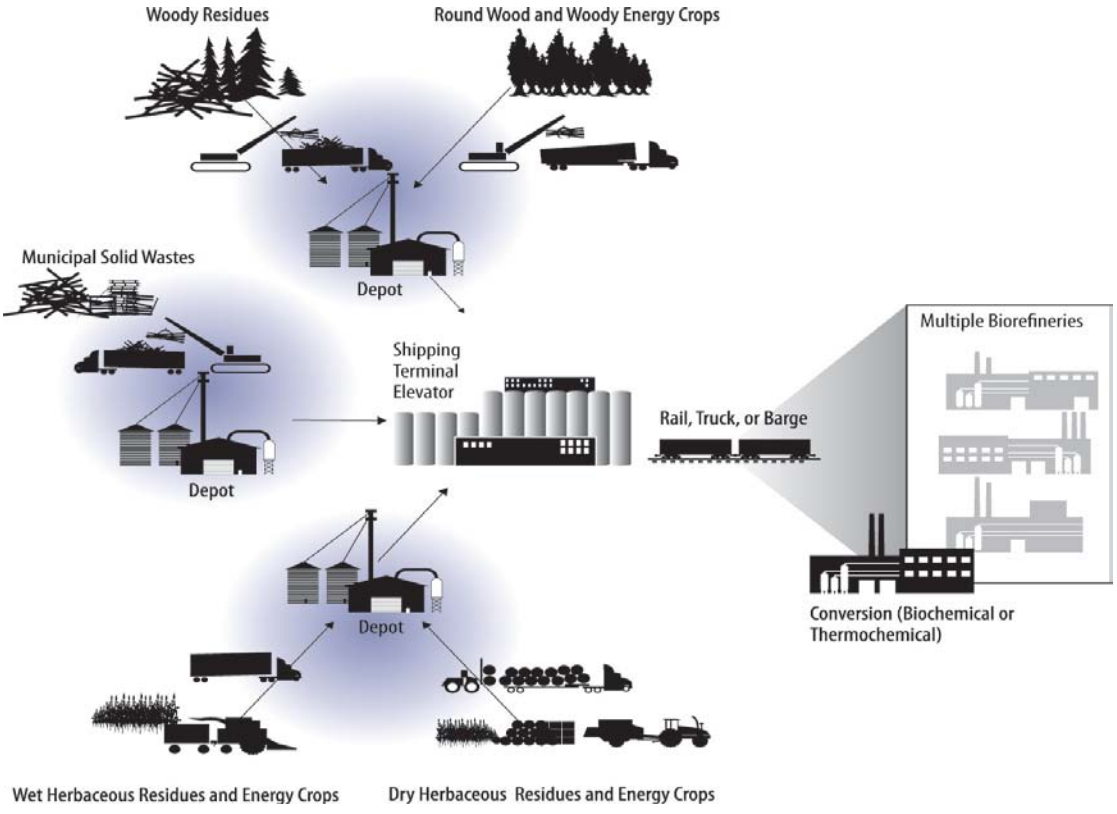

Figure 1. Conceptual Layout of Advanced Uniform-Format Solid Feedstock Supply Systems (Hess, et al)