Advanced Supply System Design Workshop:

Designing biomass supply chains to deliver a billion-ton annual supply

Mission Statement: The Bioenergy Technologies Office (BETO) has been researching the concept of an advanced, commodity-based feedstock supply system designed to supply a future bioeconomy with over 1 billion tons of biomass each year. There are a number of barriers to implementing an advanced supply system, and solutions that address these barriers require a number of assumptions that require additional research. BETO would like to have subject matter experts (SMEs) discuss the legitimacy, feasibility, and priority of the barriers being addressed, as well as assumptions made in addressing these barriers. This workshop will focus on presenting the advanced supply system concept and to provide a platform for SMEs to comment on the key assumptions behind the designs. The outcome of the workshop will provide BETO insight on how to direct R&D investments in feedstock supply and logistics going forward.

Barrier 1: Cost and Quantity

Assumption 1: Conventional supply systems cannot deliver a billion tons of biomass each year that meet cost targets.

Assumption 1.1: Transportation cost in the conventional supply system is too expensive.

- Stranded resources, on which the 1.3 billion is based, are so far from biorefineries that there is no profit in transporting over such large distances.
- Revenue forecasts are not great enough to substantiate cost over large distances.
- Current road infrastructure is not sufficient to transport 1.3 billion tons.

Assumption 1.2: Storage cost in the conventional supply system is too expensive.

- Storing raw biomass is cost prohibitive, in terms of land area, dry matter loss, rot, etc.
- Revenue forecasts are not great enough to substantiate high storage costs.

Assumption 1.3: In conventional supply, volume variation is too great to depend only on high producing areas; failure of a crop in a resource rich region means excess costs of importing from other regions.

- Depending only on resource-rich areas creates vulnerability in the system to unfavorable weather conditions; if drought, floods, wind, hail etc. damage the crops in a resource rich region, then there is even greater importance placed on stranded resource areas.

Barrier 2: Quality Constraints

Assumption 2: Biorefineries need feedstock of uniform quality to maximize conversion efficiency.

- Passive management for biomass quality will not work at large scale. Quality attributes must be controlled in order to maximize conversion efficiency.
- Uniform carbohydrate level maximizes conversion efficiency to biofuels.

- Ash content, dry matter loss, and moisture content reduce efficiency and increase costs.

Barrier 3: Operational Risk

Assumption 3: Biorefineries will be willing to pay more for feedstock that reduces their risk of disruption to operations or reduced conversion efficiency.

Assumption 3.1: Volume risk increases biorefinery total costs.

- Insufficient feedstock means procuring more at spot prices, and contracting too much biomass means paying for un-needed feedstock.
- Procuring feedstock from multiple, distinct regions reduce volume uncertainty and costs.

Assumption 3.2: Quality variation increases biorefinery costs.

- Conversion processes are designed around an often narrow range of feedstock parameters; moving outside this range can have significant impacts on product yield, quality, and system economics.

Barrier 4 & 5: Business Case and Financial Risk

Assumption 4: Biorefinery profitability is greater, and has less variability, in the advanced supply system than the conventional supply system.

Assumption 4.1: Reducing operational risk increases long-term profitability.

- Greater cost control results from reducing volume uncertainty and actively managing quality variation.
- Reduced profit variation lets biorefinery owners make decisions based on better understanding of costs.

Assumption 4.2: Greater expected profits with less uncertainty will attract investors and favorable borrowing rates.

- Less uncertainty in costs means that those interested in investing in biorefineries have a better idea of what costs to expect.
- Greater expected profits, with less variability, means better lending rates; lower loan rates on substantial amounts borrowed means lower long-term costs.

Assumption 5: Economies of scale exist with biorefinery capacity and depot capacity. Biorefinery (depot) sizing and siting depends on proximity of the depots (biorefinery).

Draft Agenda:

	Day 1	Day 2
8:00 9:00		Session 2: The Advanced Depot Design Concept
9:00 10:00		
		BREAK
10:15 11:15		Session 3: Unresolved Issues
11:15 12:00		
12:00 1:00	Opening Remarks & DOE Strategic Vision	WORKING LUNCH
1:00 2:15	Session 1: Barriers to delivering one billion tons annually	Panel Discussion
	BREAK	ADJOURN
2:30 3:45	Session 1: Barriers to delivering one billion tons annually	
3:45 5:00		