Panel topic: Food vs. Fuels Issues

Panelist: Stephen W. Searcy, Texas A&M University

Questions:

How does feedstock logistics relate to location of production issues?

Logistics systems will directly affect the feedstock sources and locations where they are economically feasible to capture. An acceptable cost of delivered cellulosic biomass will be proportional to the cost of alternative energy sources, particularly crude oil. That economically feasible feedstock cost will determine those regions where biofuel production is possible. Crop residues have no cost of production (assuming all costs are allocated to grain production), but have low yields on a per area basis. This results in higher collection costs (more area covered to collect a given quantity) and longer haul distances to the conversion plant. Collecting residues following or as a part of a grain harvest operation will limit the time period available for the logistics system to operate, resulting in higher fixed costs. For dedicated biomass energy crops, higher yields are possible, but production costs will require that the logistics costs are a smaller portion of the delivered cost. For either feedstock source, the logistics systems must be based on some common principles.

- Dry matter capture is maximized – (The desired capture rate must be balanced with sustainability requirements, but losses that do not maintain soil quality must be minimized.)
- Biomass packaging must facilitate storage or transportation, minimize the number of packages to be handled, provide maximum legal truckloads and be compatible with rapid mechanized handling – (The industrial model most applicable is sea/truck/rail container shipping, rather than current hay or silage operations.)
- Harvest, packaging, storage and transport must be moisture insensitive to allow operation whenever field conditions allow – (The industrial scale required will have such high capital cost that machines cannot be idle while waiting for material to reach a desired moisture content. However, this will result in the need to dry the delivered material if the conversion process requires a moisture level that can not be achieved by blending available feedstocks of different qualities.)
- Logistics systems should be insensitive to feedstock type and regional weather conditions – (Development of unique systems for regions or feedstock types will fragment the market for equipment manufacturers, resulting in lower sales quantities and higher machine costs.)

Production locations will affect logistics operations, particularly transport machines. Roadway limitations are likely to limit access to certain fields. A particular concern is load-limited bridges on many rural roads. Narrow roads may also prevent machine access in some regions. The roadway infrastructure may prevent certain areas from being considered for energy feedstocks production, or may increase costs due to small load sizes.

What is the role of feedstock logistics in the food/fuel debate?

The same points made above regarding production locations also affect the food vs. fuel conflict. While cellulosic feedstocks may eliminate the direct conflict over the choice of using material for food or energy production, indirect effects will still occur. Adding energy biomass to the mix of uses for agricultural lands will result in some portion of the land no longer contributing to food production efforts.

One means by which the logistics systems can minimize the land use changes that might occur is by maximizing the capture of dry matter. Every percent increase in the delivery efficiency (ratio of tons dry matter delivered at a plant to tons of dry matter in the field) will reduce the land area that must be dedicated to energy feedstocks.

A second means is by minimizing the costs of machinery and storage required in providing a twelve-month supply of cellulosic material. This will be accomplished by maximizing the harvest period for collection, minimizing the amount of material that must be stored, minimizing losses during storage, and reducing the costs for all logistics operations.

How can the Air Force contribute to developments in technology, organization and policy that would accelerate the biofuels industry?

Development of a viable aviation biofuels industry will require several changes in status.

- Identification of a "suitable" biomass conversion technique that can provide biofuels with the characteristics desired for aviation fuels (may be regionally specific)
- Establishment of feedstock physical and chemical specifications required by the identified conversion technique
- Development of logistics systems that will reliably meet the feedstock specifications
- Establishment of contracting methods that mitigate economic and supply risks for both feedstock producers and the conversion facility

A primary Air Force role should be to accelerate establishment of a biofuels industry through the setting standards and providing a reliable market for aviation biofuels. The development of technologies and organizations to enhance the biofuels industry should be coordinated with DOE and USDA research programs. The Air Force should establish contracts for delivery of aviation biofuels at prices and quantities attractive to potential suppliers in 2012 and gradually increasing quantities while decreasing price toward 2017. This would provide sufficient incentive to jump-start the biofuels industry. Specifically considering logistics, the first generation biofuel facilities could utilize hay or silage logistics systems. As the fuel quantities increase and price decreases, second-generation logistics systems will be required to reduce costs and improve efficiencies. The establishment of feedstock property specifications and the requirement to meet those specs over a 12-month period is needed to focus the logistics development efforts.