Feedstock Logistics
GHG, Land-Use

- Minimize energy waste (and GHG emissions)…
  - maximize truck tons/load (wood, densification/liquifaction in every operation)
  - utilize satellite/depot storage/staging sites (min. truck miles, justify rail, avoid QC rejects)
  - minimize material losses in feedstock supply chain
- Feedstock logistics for perennial grasses – relatively low volume of GHG emissions (but 25-30% of GHG emissions in value-chain)
  - relative cost, cropping (profit) alternatives (not GHG) dominate
    - ✓ competing with subsidized commodity crops
    - ✓ learn from high-volume, low-margin industries (cotton, container shipping, mining, forest products)

Feedstock Logistics

Sustainability

- Includes being economically sustainable and acceptable to community/society
- Biomass – positive or negative impacts on natural resource base (soil, water) and eco-system services (wildlife)
  - harvest-retention tradeoff (nutrients, carbon)
  - woody feedstocks better understood
  - herbaceous – harvest timing, crop rotation, cover crops, inter-cropping
- Western U.S. – fragile ecosystems (not wastelands)

Feedstock Logistics

Food vs. Fuel

- Logistics – minimal impact on food vs. fuel
  - environmental impacts more likely
- Water vs. fuel; Nitrogen vs. fuel
  - avoid irrigation for bioenergy crops
  - jatropha, camelina survive with little water or nitrogen, but yield little seed
  - close-to-farm partitioning/fractionating operations – recycle nitrogen

Other Points

- Feedstock logistics are important (distributed resource, herbaceous – narrow harvest window), but…
- Initial plants will be small (<50MM gal/yr) due to investment risk
  - feedstock logistics still challenging, but less important at this scale
- Logistics systems must be simple if farmers are to use them
- Existing logistics systems for oilseed and woody feedstocks mature enough
- Logistics systems for herbaceous cellulosics need development
  - larger volumes (scale)
  - modify existing harvesters (feedstock-flexible, moisture-insensitive)
- Woody resources more suitable for thermochemical processing
- Integrate bio-jetfuel biorefining with other industrial operations
  - 20-25% of FT output
  - flugas – algae – oil – fuel
- Site biorefinery near petroleum refinery (source of hydrogen)
  - Corpus Cristi (TX)
  - Beaumont (TX)
  - Vicksburg (MS)

Other Points (cont.)

- Marginal lands are called marginal for a reason! (no panacea)
  - greater environmental impacts from biomass capture
  - higher risk of production shortage
- Ideal biorefineries – feedstock-flexible and accept wide QC specs for feedstocks (lots of variability)
- Farming infrastructure, feedstocks vary by region – different logistics solutions
  - new business models (e.g., 3rd party collection/transport/storage/preprocessing)
- Requirements re. indirect land use impacts in RFS add substantial costs to soy-based fuels
  - Winter crops (e.g., pennycress, coriander, canola) could avoid ILUI
- USAF – provide market pull, motivate capital investment
- Long-term (10 year) contracts key
- This workshop – good start for DOD cooperation with USDA & DOE
  - Feedstock Logistics IWG (BRD Board) report
  - join BRD Board
- Logistics can adapt!
  - especially for $200/ton