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)
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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, intercropping
• Western U.S. – fragile ecosystems (not wastelands)
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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)
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