Biofuel Outlook at HC&S Co.

Island Challenges and Opportunities for Military and Aviation Biofuels Panel

Lee Jakeway
Director, Energy Development

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Hawaiian Commercial & Sugar Co.

- Subsidiary of A&B, Inc.
- Cultivate 36,000 acres in central valley of Maui
- Last remaining sugarcane grower
- 800 employees including other Maui divisions
- Revenue generating products:
  - 200,000 tons raw sugar equiv.
  - 65,000 tons final molasses
  - 200,000 MWh electricity generated
    - Mostly from renewable biomass and hydro
    - 55-80,000 MWh export to MECO
    - 5-6% of Maui Island's electricity

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Bagasse Production

- Co-product of raw sugar manufacturing
- Biofuel used as boiler fuel
  - Produce 400 to 500,000 tons per year
  - Most used to support operation
- Equivalent fuel values
  - 1 ton bagasse ~ 1 bbl oil
  - 1 ton bagasse ~ 0.3 tons coal

Federal Bioenergy Research Funding

- Department of Energy
  - "Development of High Yield Tropical Feedstocks and Biomass Conversion"
  - $6 million, UH College of Tropical Agriculture main recipient
    - $2 million to HC&S as sub-recipient for feedstock demonstration and conversion technology investigation
- Office of Naval Research/USDA
  - $10 million research funding from ONR to USDA
  - In third year of 5 year funded program
  - HC&S is host site for ONR funded USDA research
- USDA-NIFA Biomass Research & Development Initiative
  - Energy grass crop and field-scale harvest demonstration

Bioenergy Grant Research Activities

- HC&S sub-recipient activities
  - Energy cane variety development
  - Field trials using energy grasses
  - Mechanical harvesting trials
  - Advanced biofuel conversion trials with development partners

Challenges for Advanced Biofuel Production

- Affordable biomass feedstock/fermentable sugars
- Biorefinery size and location critical
  - Oahu location close to petroleum refinery, hydrogen, and market
  - Biorefinery on neighbor islands co-located with feedstock
    - Need appropriate scale and hydrogen source
    - Transport intermediate biofuel product to Oahu?
      - Ethanol feasibility studies estimated transport costs at $0.10/gal
- Advanced biofuel technology comes with risks
  - Two advanced biofuel technology partners no longer pursuing Hawaii ventures

Biofuel Opportunities for Hawaii

- Large volumes required in military and airline sectors
  - “Drop-in” renewable jet or diesel required
  - Military is nation’s single largest consumer of fuels
  - Airline sector has no choice but to use liquid fuels
  - Existing demand in ground transportation and electric utilities
- More biofuel pathways being developed
  - EPA approved cellulosic biomass feedstocks such as energy cane, napier grass, and giant reed
- Hawaii ethanol production facility tax credit still exists
  - Limited to facilities producing up to 15 MGPY

Summary

1. HC&S has infrastructure to produce biomass feedstock and energy products on a large scale
2. Federal grant funding provides a unique opportunity to explore cellulosic biomass feedstocks and advanced biofuel conversion technologies
3. Biorefinery scale and inter-island transport challenges exist for biofuel production in Hawaii
4. There is market demand for “drop-in” renewable jet and diesel in the military and aviation sectors; existing demand in ground transportation and electric utilities