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Biofuels Categories

Lower left quadrant:

Liquid phase = smaller equipment.

Catalytic = faster = smaller equipment.

= Lower capital costs.

Modified from Biofuels Digest, 4/18/2011
REACH Technology

Renewable Acid-hydrolysis Condensation Hydrotreating

• Acid-hydrolysis – breaks down biomass to non-sugar intermediates.

• Condensation – puts molecules together to customize carbon chain length.

• Hydrotreating – deoxygenates to drop-in hydrocarbon fuel.
Cost Structure

OpEx:
- $1.06 /gal excluding capital charges
- $1.62 /gal including capital charges

CapEx: $3-5 /annual gal capacity. For example, a 15 mil gal/yr plant at $4/annual gal capacity would cost $60 million
Fuel Products

- Drop-in Hydrocarbon Jet Fuel
- Drop-in Hydrocarbon Diesel Fuel

Estimated wt%

Freeze Point = -48.4°C
JP-8 (Mil.) spec < -47°C
Technology Development Advantages

- Scalable, proven methodologies
- Hydrolysis similar to pulp & paper technologies
- Condensation/Hydrotreating similar to petroleum refining
- Chemical products
- Independent of genetic research
DOE I-Pilot Plant Project

- Build and operate at Michigan State University Bioeconomy Institute (MSUBI)
- $4.6 million matching grant from the US DOE
- 10 Dry Metric Tons/day - Hydrolysis/Condensation
- Hydrotreating - existing small scale facilities available
- Initial feedstock – local corn stover
Key Partners

- CSIRO (Australia) – process optimization research
- Purdue University – scientific/engineering/aviation expertise
- MSUBI - Pilot plant facilities
- UC Davis – Hydrolysis technology and IP
- Pacific Northwest National Laboratory (PNNL) – past hydrotreating and catalyst development
- Haldor Topsoe - catalyst / hydrotreating technology
Purdue

- Agriculture and biomass preparation
- Life cycle analysis
- Science/engineering – micro pilot
- Aviation expertise
MSUBI

- Existing reactor systems
- Existing infrastructure
- Experienced workforce
Thanks!

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