

Biofine Technology, LLC

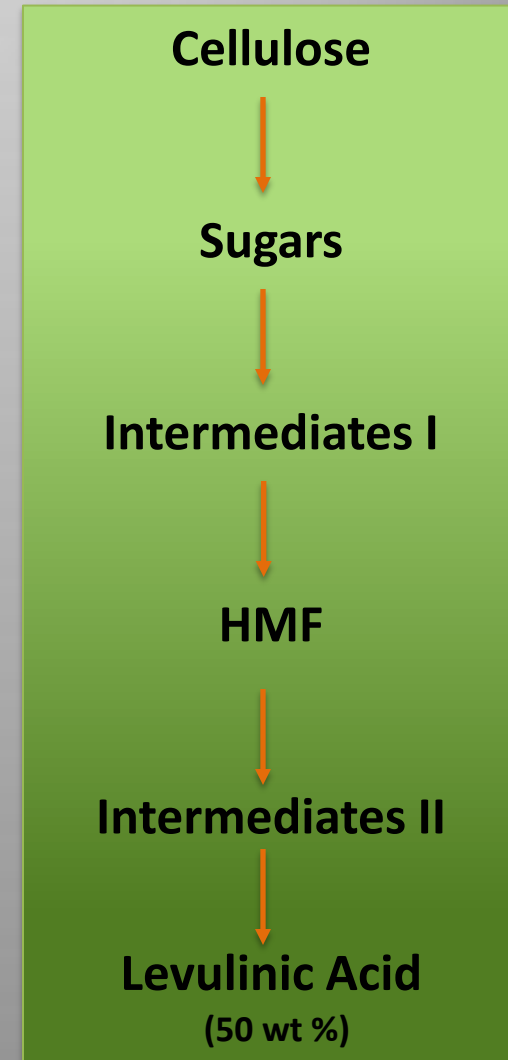
Newport, RI Conference - NORA



The Biofine Process

Biofine Technology has developed a proprietary, continuous chemical bio-refining process that enables the production of high value renewable chemicals and biofuels from cellulosic residues.

- The US DOE and NYSERDA funded initial proof of concept work
- Key partnerships for product development (biofuels, chemicals)
- Strong intellectual property portfolio (including several recent patents)
- 1 MT/day demonstration plant (Old Town, ME) – University of Maine partnership
- Focused development of key derivative **Ethyl Levulinate (EL) as a heating fuel.**



The Value Chain Partnerships



Cellulosic Feedstock

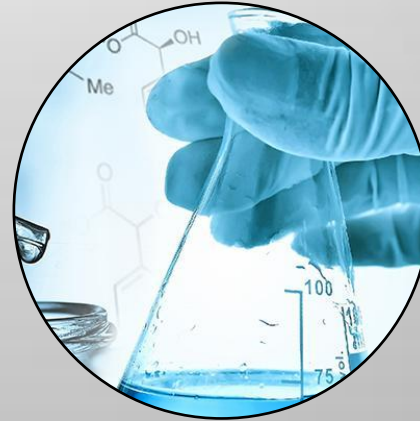
Wood

Cellulosic Sludge
Waste Paper/OCC
Crops
MSW



Biofine Process

Levulinic Acid
Formic Acid
Furfural
Ligneous Char



Downstream Conversion

3-HPA
Acrylic Acid
Succinic Acid
Ethyl Levulinate
Hydrocarbons
DALA
Diphenolic Acid
Valeric Acid
Formates



Drop-In Product Demand

Heating Fuels

Plastics/Plasticizers
Packaging
Agriculture
Cosmetics
Flavor & Fragrance
Resins & Coatings
Carbon Fiber

Technical Benefits Ethyl Levulinate (EL)

- INCREASES COMBUSTION EFFICIENCY OF FUEL: EL - 33% OXYGEN
- REDUCES COMBUSTION PARTICULATE (SOOT) AND CARBON OXIDES
- REDUCTION IN SULFUR EMISSIONS
- GIVES HEATING OIL A **LOWER GHG FOOTPRINT** THAN NATURAL GAS @ 5% BLEND
- BIGGER REDUCTION IN GHG FOOTPRINT THAN SOY BIO-DIESEL
- IMPROVES **LOW TEMPERATURE HANDLING** (GELL PT. CLOUD PT., CFPP)
- INCREASES **LUBRICITY** AND LOWERS **VISCOSITY** OF HEATING OIL
- **EASILY BLENDS** WITH BASE FUEL

Timeline

Test Market - Commercialization

- **2017/2018** – Field Test = 20 homes for full season
 - Location: Maine
 - Partners: Dead River Company, NORA, European Chemical Company – Production, Operations, Logistics, Monitoring, Evaluation
- **2018 – 2020** – Expanded Testing/Demonstration Market and Full Scale Plant Construction
- **2020** First Plant Operational
 - 8mm gallons/year +
 - Fuel priced at par with #2 heating fuel
 - Eligible for D7 RINS = \$2.91/gallon
- **2021** – Begin Construction on Larger Plant
 - Approximately 30mm gallons per year

Long-Term Development

Continue to work with industry partners to develop a 100% renewable, non-fossil, clean-burning, heating fuel formulation.





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