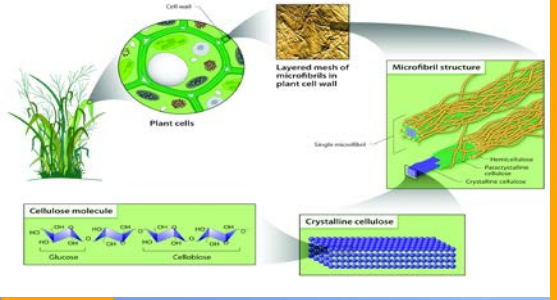
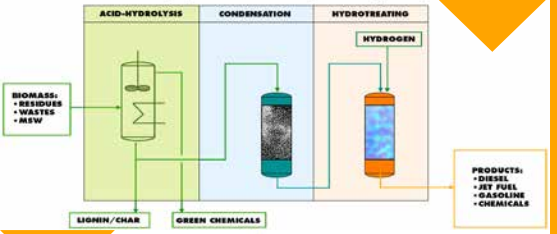


REnewable Acid-hydrolysis Condensation Hydrotreating (REACH) Technology



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Karl Seck

Why Are We Here?

Climate Change!
- **It's REAL!**
- **Biofuels are key for GHG mitigation.**
- **Drives value.**

Energy Security
- Shale gas and oil have changed this equation.
- US is still a net importer of oil that is used for transportation fuels.

Rural Redevelopment
- Agricultural areas.
- Paper and saw mill towns
- More jobs, less meth.

Reduced GHG = better world

+

More domestic energy = better country.

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Advanced Biofuels Categories

Biochemical Conversion:
- Fermentation to alcohols
- Very long residence time (days)
- Requires sugars as a feedstock

Thermochemical Conversion:
- Gasification and Pyrolysis
- Vapor phase process
- Large equipment to handle vapor volumes

Liquid Phase Catalytic (LPC) Conversion:
- **Low volumes with liquid phase**
- **Fast reactions and low residence times (hours)**
- **Converts raw biomass**
- **Low temperature / pressure**

Liquid phase = smaller equipment.

+

Catalytic = faster = smaller equipment.

=

Lower capital costs.

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REACH Technology

RE**newable**

Condensation

Acid-hydrolysis

Hydrotreating

A → CMF → C → 2-3x's → H

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.

MB
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Cost Structure (Corn Stover)

CapEx:

$ 3–5

/annual gal capacity

For example, a 15 mil gal plant at $4/annual gal capacity would cost $60 million

OpEx:

$ 1.06

/gal **excluding** capital charges

$ 1.62

/gal **including** capital charges

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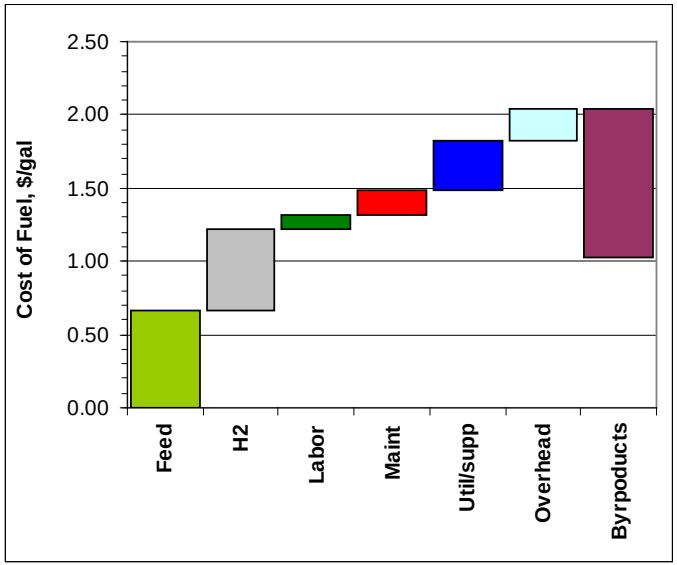
Cost Breakdown

Base Case

$ **50** /dry ton feed

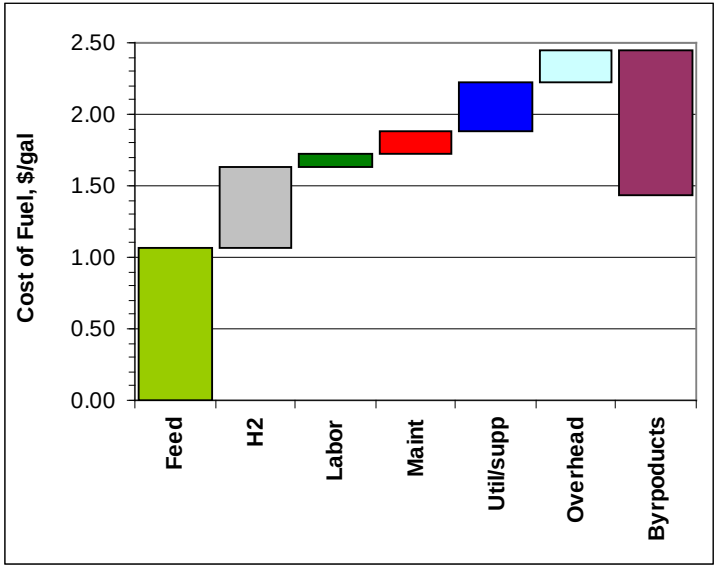
1.06 $/gal



Sensitivity

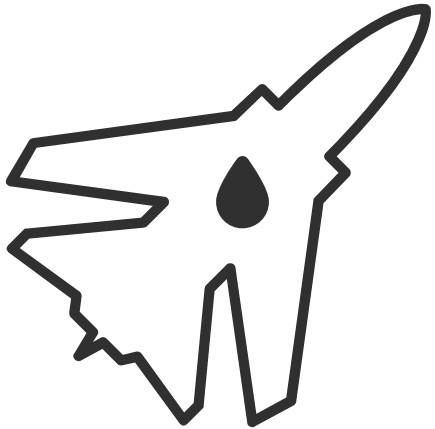
$ **80** /dry ton feed

1.46 $/gal



Fuel Products

Drop-in Hydrocarbon Jet Fuel



Drop-in Hydrocarbon Diesel Fuel

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Optional Chemicals & Byproducts

Levulinic Acid (LA) / Ethyl Levulinate (EL)

- Plasticizers
- Solvents
- Polymers

Furfural

- Solvent for extraction processes
- Resin manufacturing

Formic Acid / Ethyl Formate

- Food safe fumigant/ animal feed supplement
- Environmentally friendly de-icer
- Fuel cell feed

Char

- Solid Fuel
- Fertilizer / Soil Enhancer
- Potential On-site Hydrogen Production

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Future Products and Technologies

Fatty Acids

- Nutraceuticals
- Specialty chemicals

Cyclic Ethers

- High cetane diesel additive
- Specialty chemicals

Lignin Products

- Flavorings and perfume ingredients
- Aromatic fuels

Polymers

- 2,5-Furandicarboxylic acid (FDCA) for PEF
- Succinic acid (SA) for BDO to PBT and PBS

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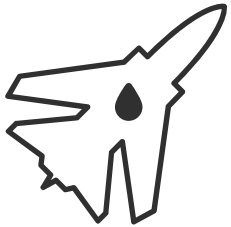
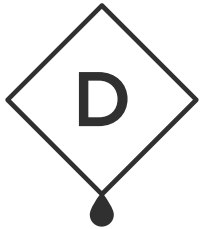
Market

U.S. liquid fuels sales in 2011 was estimated at

200+ Billion gallons



>22B
Jet Fuel



>45B
Diesel Fuel

Source: US Energy Information Association

RFS2 mandates advanced biofuels ramp up to a minimum of

21 Billion gallons annually by 2022 (at $4.00 per gallon)

or

$84 Billion market for 2nd generation biofuels

A

2%

Market Share

nearly

$2Billion

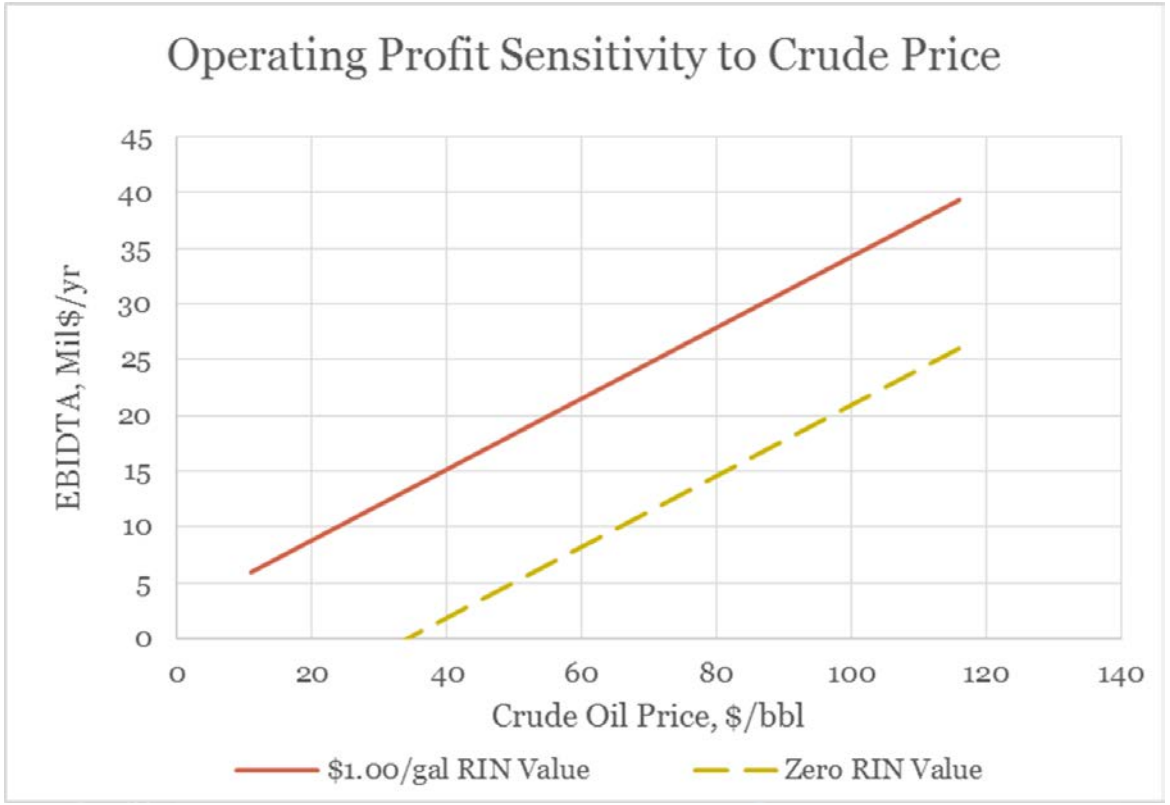
for Mercurius in 2022

with an

$84Billion

market assuming $4/gal

Economics Good at Lower Crude Prices



Customers

The US Navy **is committed to supply 50% of its fuel** needs with non-petroleum fuels by 2020

Many airlines, including Alaska, Delta, and United have committed to **using increasing amounts of biofuels**

Diesel vehicle fleets are potential **high volume customers**

Customers for optional chemicals and by-products include **agricultural and specialty chemical companies**

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Technology Development Advantages

- Hydrolysis similar to pulp & paper technologies
- Condensation Hydrotreating similar to petroleum refining
- Scalable, proven methodologies

- Quicker ramp-up to full capacity
- Independent of genetic research

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Value Proposition

- Low cost – Capex and Opex
- Feedstock flexibility:
  - Larger sizing
  - No inhibitor issues
  - High moisture ok
- Distributed model capable
- Fuel products with increasing demand
- 90% reduction in GHG
- High value co-products
- Co-processing options
- Patented process

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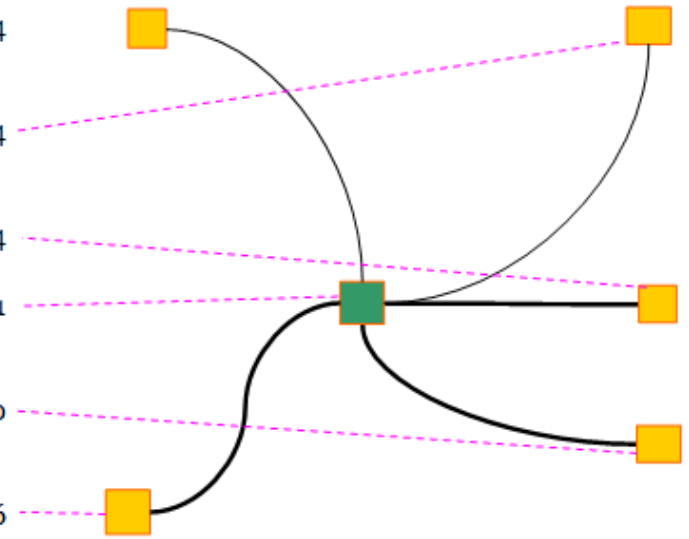
Distributed Model Example

	Feed	Feed TPD	Inter TPD	Fuel TPD	Fuel mil gpy	CapEx Mil$
1	Corn Stover	500	170.3	116.1	14.5	27.4
1	Corn Stover	500	170.3	116.1	14.5	27.4
5	Switchgrass	500	140.4	95.6	11.9	24.4
	Central Processing Facility (CPF)					130.1
8	Waste Paper	1000	525.8	370.5	44.9	54.0
3	Whole Poplar	500	151.5	104.4	12.9	25.6
	Totals	3000	1158.3	802.7	98.7	289.0



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DOE Pilot Plant Project

- Build and operate at University of Maine
- $4.6 million matching grant from the US DOE
- Hydrolysis/Condensation
- Hydrotreating - existing small scale facilities available

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Scale-up Strategy

REACH™

Commercial scale-up ~50:1

- 500 MTPD biomass feed
- US Department of Defense, DPA grant for military fuel
- Other grants and loan/bond guarantees available
- Target 2019 start-up
- Target 2020 full capacity
- Supply and off-take agreements

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Key Partners

CSIRO (Australia)
process optimization research

Purdue University
scientific/engineering/aviation expertise

UMaine
continuous flow optimization, engineering and pilot plant operation

UC Davis
Hydrolysis technology & IP

Pacific Northwest National Laboratory
past hydrotreating & catalyst development

Haldor Topsoe
catalyst / hydrotreating technology

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Management Team

Karl Seck

President & CEO

Karl has nearly 30 years experience as a process engineer in the petroleum industry. He has a Bachelor of Science in Chemical Engineering from the University of Kansas.

Michael Vevera

Chief Financial Officer

Michael has started-up and run successful companies in Japan and Australia. He has a degree in International Finance from Oregon State and a Masters in International Marketing from University of Technology, Sydney.

Knud Balslev

VP of Business Development

Knud has 25+ years of international business development experience. He has a BSC in Electronics from the Danish Technical University.

Advisors

Mark Mascal

Professor of Chemistry, University of California–Davis

Mark received his PhD from the University of London, Imperial College and was a Postdoctoral Fellow at the University of Strasbourg, France.

Pete Kitzman

Sr. Manager: Risk Management & Procurement, The Kellogg Company

Pete has over 30 years of experience in risk management, strategic project management, biofuel co-product dev. & agriculture production. He has a BS in Agriculture from Iowa State University

Clayton Wheeler

Assistant Professor of Chemical & Biological Engineering, University of Maine.

Clay received his BS, MS and PhD degrees from the University of Texas at Austin.

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Funding Needs

Series A
2016

Seeking $5 million

of equity funding to use as matching funds along side the DOE grant of $4.6 million to build the 10 MTPD Pilot Plant

Series B
2017

Seeking $35 million

of equity funding to use along with $35 million of debt to build the 500 MTPD Commercial Plant

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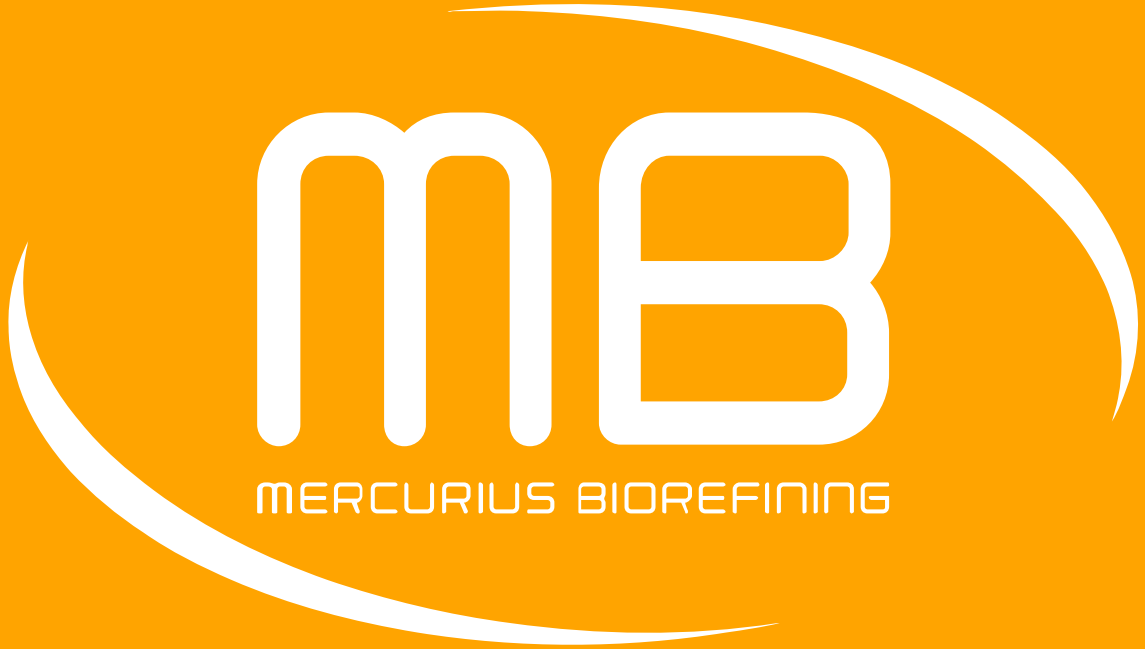

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