Introduction to Rentech

• Established in 1981
• Employees: 250+
• Publicly-traded: NYSE AMEX: “RTK”
• Locations:
  o Los Angeles, CA (Headquarters)
  o Commerce City, CO (BECE location)
  o Natchez, MS
  o Honolulu, HI
  o East Dubuque, IL
• 30 years of technology operating experience
• 40 years of syngas production experience
• Nitrogen fertilizer facility: 600K tons/yr
• BioEnergy Center of Excellence “BECE”
  o $150 Million Fully Integrated Biomass Synthetic Fuels, Power and Chemicals Facility
  o Majority Owner of ClearFuels Technology Inc.
Introduction to Rentech

**Rentech Nitrogen Partners (RNF)**
- Publicly Traded (NYSE: RNF)
- Market capitalization: ~$1B
- Fertilizer facility produces +600,000 tons of fertilizer annually
- Employees: ~250
- Headquarters: Los Angeles, CA

**BioEnergy Center of Excellence (BECE)**
- Fully integrated biomass to synthetic drop-in fuels facility in North America
- Capable of producing 10 bbl/d biofuels
- Syngas production from variety of inputs (incl. natural gas and coal) for higher-value conversion

1 As of February 24, 2010
Source: Rentech, Yahoo Finance
# Introduction to Rentech
## Clean Energy Technologies

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Sugarcane bagasse, wood processing by-products, agricultural residues, lignin using steam reformation</td>
<td>Wood, agricultural residues, straw, switch grass, &amp; energy crops using dual circulating fluid bed gasification</td>
<td>Syngas from any carbon-bearing materials</td>
<td></td>
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<tr>
<td>Products:</td>
<td>Syngas, Steam, Hydrogen and/or Power, Optimized for fuels or power</td>
<td>Power; fuels &amp; power</td>
<td>Hydrocarbons for synthetic fuels; specialty chemicals</td>
</tr>
<tr>
<td>Readiness:</td>
<td>Proven at pilot scale; To be proven at demo scale first half 2012</td>
<td>Proven at commercial scale; Deployable today</td>
<td>Proven at demonstration scale; Deployable today using natural gas and SMR</td>
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**Clean Energy Solutions**

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4
Energy Products

Certified Fuels from Rentech’s FT Technology

Diesel: Audi 1000 Mile Drive
Certified Jet: United Airlines Flight
Lower tailpipe emissions

Low carbon footprint & cellulosic RINs

Other Cellulosic Fuels
- Cellulosic ethanol and other fuels from our biomass gasification technologies
- Fuels can qualify for cellulosic RINs

Renewable Hydrogen
- Produced from biomass by Rentech-ClearFuels gasifier

Renewable Power
- **Renewable baseload** power; no backup required
- **Close** to interconnection and transmission
BioEnergy Center of Excellence (BECE)
Rentech Energy Technology Center, LLC
BioEnergy Center of Excellence

- Integrated systems for Synthetic Fuels, BioFuel, Renewable Chemical, and Power Production; Steam-Methane Reformer, Biomass Gasification; Hydro-Processing; Catalyst Development and Testing Labs
  - Platform for development of BioEnergy technologies for commercial deployment
  - Designed to be highly flexible – “Plug and Play” for innovative new technologies
  - Produces ultra clean, certified aviation and diesel fuels, naphtha, power and chemicals
- Produced Ultra-clean diesel & aviation fuels and naphtha
  - Diesel fuel meets ASTM, D97566 and EN 590 specs
  - “Drop in” fuels
- Testing syngas and fuels from variety of feedstocks:
  - Wood Waste
  - Bagasse
  - Natural Gas
  - Switchgrass
  - Corn Stover
  - Sorghum
- $150 million technology and R&D center
- 70 scientists, engineers, technicians and operators
- 3 catalyst development and evaluation labs
- 1 analytical lab and 1 wax/catalyst separation technology lab
BECE – BioEnergy Center of Excellence

- With the addition of a Rentech-ClearFuels Biomass Gasifier, the BioEnergy Center of Excellence (BECE) will be a fully-integrated biomass-to-liquids (BTL) facility
  - $23 million DOE grant for the RTK/CF Gasifier with an additional $13 million invested by Rentech
  - Will allow flexibility of feedstock including wood chips, sugar cane bagasse, and corn stover in addition to the current feedstock of natural gas
  - The BECE has in place the necessary equipment to clean and remove any contaminants present in the various feedstock to the permitted levels
- First production expected in mid 2012

Rentech-ClearFuels’ Biomass Gasifier
BECE is developing a variety of technologies at pre-commercialization stage.

**Stage of development and technology readiness level (TRL)**

- System test, launch & operations
- System/subsystem development
- Technology demonstration
- Technology development
- Research to prove feasibility
- Basic technology research

**Advanced development stage (TRL 6-7)**
- Nat gas to fuels (GTL) Gen 1 – TRL 7
- Biomass to power (BTP) – TRL 7
- Biomass to fuels (BTL) Gen 1 – TRL 6+

**Next Gen technologies for improved yields, economics, or scale (TRL 2-6)**

**BECE value**
- BECE integrates Rentech’s proprietary gasification and processing technologies into a biorefinery capable of producing 10 bpd in drop-in fuels
- The Rentech Process can utilize Fischer-Tropsch chemistry, with improved catalyst composition, reactor design and design parameters of synthetic fuels and chemicals facilities
- BECE uses Rentech’s proprietary iron-based catalyst, which performs well with a wide range of syngas compositions from a variety of feedstocks
Rentech gasification technologies

### Rentech SilvaGas gasifier

- **Patented, commercially proven**, gasification technology with over $100 million invested in technology and assets
- **Capability to produce syngas from a wide variety of cellulosic feedstocks**, which can be used for renewable power or can be processed into drop-in, certified, renewable fuels
- The gasifier is **deployable today**, having successfully operated in Burlington, VT for 2+ years in partnership with the US Department of Energy, National Renewable Energy Laboratory (NREL) and Battelle Columbus Laboratory

### Rentech ClearFuels gasifier

- Produces **hydrogen and syngas** from finely-ground cellulosic feedstocks through a High Efficiency Hydrothermal Reformer (HEHTR).
- **Optimized for producing drop-in fuels** from syngas; can also produce renewable power
- Operated at pilot scale for >10,000 hours and multiple third parties, including Idaho National Laboratory and Hawaii Natural Energy Institute, have independently validated the results of the pilot scale data
- Currently **undergoing a demo-scale campaign** through a $23 million grant from the US Department of Energy
Rentech’s synthetic fuels (Fischer-Tropsch) technology

- Light Products
- Catalyst – Wax Separator
- Clarified Wax

- No moving parts
- Proprietary catalyst form produced by world-class catalyst manufacturer
- Catalyst–wax separation using magnetically enhanced dynamic settler
- Demonstrated over the last 3 years at 10 bpd capacity
- Low catalyst losses – good separation
- Stable catalyst activity

\[ \text{H}_2 + \text{CO} \quad \text{(SynGas)} \]
Product Upgrading – The Final Step

- The final step in the Rentech Process is Product Upgrading
- Light products and clear wax from Rentech reactor are hydroprocessed to products
- Uses proven UOP Technology via our Alliance Agreement
- Low cost and simple relative to petroleum refining
  - Simpler than hydrocracking and hydrotreating used in refineries today
- Capable of making multiple fuel and chemical products
  - High quality Diesel or Jet or specialty chemicals

\[ \text{H}_2 + \text{CO (SynGas)} \rightarrow \text{Light Products} \rightarrow \text{Waxy Products} \rightarrow \text{Clear Wax} \]
Process Overview
BECE offers flexibility in feedstock and output, underpinned by strong research and IP capability

<table>
<thead>
<tr>
<th>Conversion capability</th>
<th>Outputs</th>
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<tbody>
<tr>
<td>▪ Flexible feedstocks:</td>
<td>▪ Drop-in synthetic fuels – 10 bpd current capacity</td>
</tr>
<tr>
<td>▪ Biomass (wood waste, corn stover, bagasse, MSW/RDF)</td>
<td>▪ 7-8 bpd of diesel or jet fuel production</td>
</tr>
<tr>
<td>▪ Fossil fuels (Natural gas, coal¹)</td>
<td>▪ Hydrogen production from natural gas or biomass</td>
</tr>
<tr>
<td>▪ Up to 20 dry tons per day biomass feedstock</td>
<td>▪ Hydrocracking of C20+ materials and hydrotreating of C5-C20 materials</td>
</tr>
<tr>
<td>▪ Biomass gasification</td>
<td>▪ Renewable chemicals</td>
</tr>
<tr>
<td>▪ Syngas to syncrude conversion (Fisher-Tropsch)</td>
<td>▪ Power production</td>
</tr>
<tr>
<td>▪ Hydro-processing</td>
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<table>
<thead>
<tr>
<th>Research / testing capability</th>
<th>Intellectual property (IP)</th>
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<tbody>
<tr>
<td>▪ 70 scientists, engineers, technicians and operators</td>
<td>▪ Only Fisher-Tropsch technology of this scale available for licensing²</td>
</tr>
<tr>
<td>▪ Catalyst development and evaluation labs</td>
<td>▪ 40 US granted patents</td>
</tr>
<tr>
<td>▪ Analytical fuels testing lab</td>
<td>▪ Continuously developing new IP</td>
</tr>
<tr>
<td>▪ Fluidization/separation technology lab</td>
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¹ Through a 3rd-party gasification system
² Sasol and Shell operate large-scale commercial F-T facilities but do not typically license the technology
BioEnergy Center of Excellence (BECE) Status and Challenges
Rentech’s BioEnergy Center of Excellence

Oklahoma EPSCoR Conference – April 2012
Phil Weathers, Managing Director
BioEnergy Center of Excellence
Rentech Energy Technology Center, llc