Producing Commercial Liquid Fuels
from Cellulosic Biomass

Advanced Leadership Biofuels Conference           April 4, 2012
# Ensyn’s Renewable Fuel from Cellulosic Biomass

<table>
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<tr>
<th>What we do</th>
<th>Produce a liquid petroleum replacement from cellulosic non-food biomass - Renewable Fuel Oil or “RFO”</th>
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<tr>
<td>Economics</td>
<td>Powerful unit economics - cash cost of $45 BOE &amp; capital light</td>
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<td>Technology</td>
<td>Commercially proven RTP technology with over 30M gallons of RFO produced - UOP/Honeywell performance guarantee</td>
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<td>Markets</td>
<td>Targeting large global petroleum markets – leverages existing fuel oil and refinery infrastructure</td>
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<td>Strategic Relationships</td>
<td>Strong Strategic Relationships – UOP Honeywell (Envergent), Chevron &amp; Biomass Owners</td>
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<td>Roll-out</td>
<td>Significant capacity expansion in progress</td>
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RTP™ History & Accomplishments

1. 1984: Foundation
1989: Commercial production, fuels and chemicals for food sector & $20+ MM Liquidity

2. 1990-1998: Scale-up, fuels and chemicals for food sector
1998-2005: Development & sale of petroleum application for US$100 MM

3. 2006-Present:
   - Focus on renewable fuels
   - Strategic partnerships
     - Project rollout
     - Chemicals upside
From Cellulosic Biomass to a Barrel of Oil

*Maximizes the conversion of carbon in solid biomass to liquid carbon (in less than a second)*

**Biomass Feedstock** → **RTP Process** → **Petroleum Replacement Fuel** → **Broad and Deep Addressable Markets**

- Non-catalytic process maximizes carbon conversion from solid biomass to liquid fuels – and generates high liquid yields
- Gas and Char co-products used as source of energy to run the facility

**Engine Fuel** (for power)

**Heating Oil** *RFS2 Approval in Process*

**Refinery Feedstock** (transportation fuel) *RFS2 Approved*

**Stand-Alone Upgrading** (transportation fuel) *RFS2 Approved*
Natural Progression to Transportation Fuels

Natural Evolution of the Market Applications for RFO

- Power generation
- Heating Oil
- Refinery Feedstock (transportation fuels)
- Standalone upgrading (transportation fuels)

A consequence of:

- Rapid RFO Technology Development
- RIN approval / EPA
- Strategic/Industry interest
- Massive market potential
- Strong RFO unit economics
RFO as Heating Oil – Enormous Project Opportunities

- 20+ years of combustion experience in Wisconsin – over 15 million gallons combusted for heat
- Multiple recent commercial RFO demonstrations in different boilers - Hosted at Ensyn’s partners & customers
- RFO can be co-fired or used alone in conventional commercial and industrial boilers
- RFO combustion emissions compare favorably with fossil fuel
  - SOx Reduction: > 99%
  - NOx Reduction: > 36%
  - CO Reduction: > 72%
Heating – Canadian Iron Ore Pelletizing Mill

- Iron Ore Mill - Boiler Ops
  - Ran up to 22 GJ/hr
  - Fired one burner exclusively on RFO replacing HFO
  - Application was ideal for RFO

RFO Flame

Iron Ore Pelletizing Furnace
RFO in Refineries: Drop-In Transportation Fuel

Utilizes existing refinery capital equipment and infrastructure

RFO
Refinery Processing
Transportation Fuel
(fully fungible hydrocarbon)

Minimum of 70 gallons per Ton of wood biomass in pilot plant trials (80 gallons per tonne)

More than 100 gallons per Ton demonstrated (110+ gallons per tonne)
Ensyn’s Standard RFO Production Facility

- Yield, availability, product quality consistent with historical production
- Scale of reference facility minimizes the delivered cost of biomass
- Standard 400 tpd design (maximizes economies of scale while minimizing biomass price risk)

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<th>Facility Profile</th>
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<tr>
<td><strong>Input</strong></td>
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<td><strong>Output</strong></td>
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<tr>
<td><strong>Capital Cost</strong></td>
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<td><strong>Cash Operating Cost</strong></td>
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<td><strong>Construction Period</strong></td>
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Modular, Repeatable Facility

- 400 tonnes per day of dry biomass
- ~850 barrels per day, BOE = 23 million gallons per year of RFO
- Capital costs of $60-$100 million, depending on existing infrastructure
Since 1996, Ensyn has returned 3x the amount it has raised in equity funding.
Implementation Plan – Strategic Partners

Ensyn’s Core Competency + Strategic Partners + Business Model

Fiber + Technology + Offtake

Build-Own-Operate

Market leadership with extraordinary long-term returns
Ensyn RFO: Best-in-Class Commercial Option for Liquid Fuels from Cellulosics

Projects with Strategic Partners

Massive Heating Oil Markets and RINs

Commercially Proven Tech

Transportation Fuels and RINs