Ethanol 2015: Emerging Issues Forum - ICM Line of Sight

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Presentation Agenda

- ICM Background
- Industry Vision
- Purpose of Grind and Cook
- Updates for ICM Technologies
...sustain agriculture while advancing renewable energy.


> 102 Ethanol Plants, 18 Retrofits, Hungary, Argentina, Canada
Industry Vision – What is most available?

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Ingredient</th>
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<tbody>
<tr>
<td>310%</td>
<td>Cellulosic Ethanol</td>
</tr>
<tr>
<td>300%</td>
<td>Corn Oil</td>
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<tr>
<td>290%</td>
<td>Ethanol</td>
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<tr>
<td>280%</td>
<td>High Protein DDG</td>
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<tr>
<td>270%</td>
<td>DDGS</td>
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<tr>
<td>260%</td>
<td>CORN 100%</td>
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<tr>
<td>250%</td>
<td>Fiber + Syrup</td>
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<tr>
<td>240%</td>
<td>Liquid Syrup</td>
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<td>230%</td>
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<td>220%</td>
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<td>110%</td>
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Purpose of Grind and Cook

> Purpose to **physically, chemically, and biologically** prepare grain for fermentation

- Breaking/grinding of grain
- Wetting of grain
- Gelatinization, swelling of **starch** (water + heat)
- Mechanical shear bursts swollen granules allowing enzyme action
Selective Milling Technology™

- Patented
- Selective Sizing
- Potential for Ethanol +1-2%
- Potential for Oil +10%
- Operations cost saving opportunities
- Protects Fiber for Fiber Separation Technology™ (FST™)
Purpose of Grind and Cook with FST™

- Purpose to **physically, biologically, and chemically** prepare grain for fermentation
- **FST™** adds ability to **concentrate process flows**
Link to video available upon request to ICM
Fiber Separation Technology™

Potential for 1-2% + yield

Potential for 10% + throughput, or grind less

Potential for 20% + yield
Purpose of Grind and Cook with FST™ and Generation 1.5 Grain Fiber to Cellulosic Ethanol Technology™

- **Purpose to physically, biologically, and chemically prepare grain for fermentation.**

- **FST™ adds ability to concentrate process flows.**

- **Generation 1.5 Grain Fiber to Cellulosic Ethanol Technology™ (Gen 1.5) adds ability to physically, biologically, and chemically prepare corn kernel fiber for fermentation.**
Gen 1.5 from Fiber – Easiest Step into Cellulosic

- Fiber is Just-In-Time Feedstock
- Truly Integrated
- Reduced capital (≈$2.30/gal)
- < $0.30 op ex. No additional Water or Acids
- 3.08+ Gallons per bushel yield
- Patent Pending
Generation 1.5 Grain Fiber to Cellulosic Ethanol Technology™

Fiber Separation Technology™ (FST™)

Fiber

Generation 1.5™

Fermenter

High Protein DDG
45% Protein

Syrup

Syrup

Corn Oil

Ethanol

Cellulosic Ethanol

Potential for 8%+ yield

Potential for 20%+ yield

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Generation 2.0 Co-Located Cellulosic Ethanol

- Grind and Cook prepare lignocellulose for fermentation
- Shared infrastructure (Roads, Rail, Utilities)
- Operational synergies (Energy, Water, Nutrients)
- Co-product optimization
Selective Milling Technology™ Update

> 18 ICM systems running today
  • Over 1.05 BGPY production rate benefitting

> 20 ICM systems running by late 2015
  • + 9 strategic partner systems = 29 total

> Over 2.01 BGPY production rate total
> Continuous operation at ICM BioFuels since August 2013
  • Proven feedstock for Generation 1.5 Grain Fiber to Cellulosic Ethanol Technology™

> First/Early Adopters
  • Aylmer, ON
  • Redfield, SD
  • Adams, NE
  • Lyons, KS
Gen 1.5 and Gen 2.0 Updates

> Trial runs completed and processes proven
> Full Scale (150MMGPY) Gen 1.5 engineering and economic work complete
  - 3.1+ gallons per bushel yield
  - $2-$3 USD/installed gallon
> Trial schedules for 2015
  - Gen 2.0 switchgrass – Mar-Apr
  - Gen 2.0 energy sorghum – Jun-Jul
  - Gen 1.5 – Oct-Dec
  - “Live” tour opportunities available
Thank You!

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