From Non-Food Feedstock to Fuel: “Here and Now”
Kerry Nixon, Manager, Central Minnesota Ethanol Coop
Fueling the Future:
The Role of Woody Biomass for Energy Workshop
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Ponsford

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Central Minnesota Cellulosic Ethanol Partners

From Non-Food Feedstock to Fuel

“Here and Now”
Disclaimer

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Central MN Cellulosic Ethanol Partners (CMCEP)

CMCEP include:

- **SunOpta Bioprocess, Inc.** – Experienced cellulosic ethanol company with leading pre-treatment technology

- **Central MN Ethanol Co-op (CMEC)** – 21.5 million gallons per year corn ethanol plant located in Little Falls, MN. CMEC is also part owner of Renewable Products Marketing Group, a pooled ethanol and DDGS marketing company

- **Bell Independent Power Corporation** – Experienced independent power producer with a well regarded track record in renewable and clean energy production
CMCEP Little Falls, MN Project

- SunOpta Bioprocess proprietary end-to-end cellulosic ethanol solution
- Sustainable feedstock supply from locally sourced hardwoods: poplar, aspen, birch, and other woodchips. All feedstocks will be non-food based
- Co-located with Central Minnesota Co-op ethanol plant in order to create synergies between the corn ethanol plant and the cellulosic ethanol plant
- 475 dry tons per day, but process uses wet woodchips and therefore is “water positive”
- 10 MM gallons per year initial nameplate capacity
- 100% sustainable energy using a biomass boiler
SunOpta, Inc. is a rapidly growing, vertically integrated company with extensive global expertise in sourcing, processing, packaging and distribution of natural, organic and specialty foods.

- Located: Toronto, Ontario
- ~90% of operations in US
- Publically-held: NASDAQ: STKL; TSX: SOY
- 2008 Revenue: $US1.05 billion (projected)
SunOpta Business Units

SunOpta Food Group
~90% of Revenue

Opta Minerals, Inc.
TSX: OPM (66.3% ownership)
~9% of Revenue

SunOpta BioProcess Inc.
(88% ownership)
~1% of Revenue
SBI Overview

- In June 2007, SunOpta BioProcess was spun-out as a stand-alone entity.
- Raised $30 million private placement
- $20+ million cash reserve on-hand
SBI Capabilities

- Key SBI technologies and know-how
  - Proven biomass preparation and pretreatment (from 25 to 300 tons per day)
  - Feedstock preparation and pretreatment designs for over 1,000 tons per day
  - Experienced with processing a wide variety of feedstocks
    - Cereal straws
    - Corn stover
    - Hardwoods
    - Oat hulls
    - Energy crops
  - 14 issued patents and 10 patent applications
SBI Cellulosic Ethanol Production Process

1. Biomass Preparation
   - Wood Chips
   - Corn Stover
   - Wheat Straw

2. Biomass Pretreatment
   - SBI Auto Hydrolysis

3. Enzymatic Hydrolysis
   - Steam Explosion
   - Steam exploded biomass (e.g., corn stover) into cellulose and hemicellulose

4. Fermentation
   - Cellulosic Ethanol
   - Enzyme Production
   - Lignin

5. Distillation
   - C5 and C6 Sugars
   - Power Generation
   - Electricity to Grid

Renewable biofuels
SBI Project History

- 1973  Biomass to Cattle Feed
- 1976  Entry to CE R&D
- 1978  Commercial Cattle Feed from Bagasse, Florida
- 1983  Xylitol from Oat Hulls and Birch Fines, Finland
- 1985  Cellulosic Butanol Straw/Wood Waste for Road Fuel, France
- 1987  CE R&D P&P Waste Streams, Canada
- 1990  Hydro Mulch from Orchard Wood Trimmings, California
- 1991  Published Hallmark Paper: *Fractionation of Populus Tremuloides – Cellulosic Ethanol*
- 1992  Cellulose, Hemicellulose, Lignin Fractionation, Italy
- 1993  Ammonia Pretreatment of Cellulose, Canada
- 1995  Rye Grass Straw to Liner Board, Oregon
- 1999  Dietary Fiber for Human Consumption from Oat Hulls, U.S.
- 2003  Wheat Straw to CE, Canada
- 2006  Corn Stover to CE (operational), PR of China
- 2008  Sugarcane Bagasse to Ethanol (operational), Louisiana
- 2009  Wheat Straw to CE, Spain
Typical Industrial-Scale Projects
Autohydrolysis Vessel
Integrated Plant

renewable biofuels

SunOpta BioProcess Inc.
COFCO Plant, China
CMCEP Project – Key Attributes

- SunOpta proprietary end-to-end solution
- Co-located with Central Minnesota Co-op ethanol plant
- Bell IPC is an experienced renewable energy developer providing expertise in boiler development and operations
- Sustainable non-food feedstock supply from local sources
- Rapid development will help meet RFS targets for advanced biofuels and cellulosic ethanol

Difficult to find financing for demonstration plants

renewable biofuels
Takeaway

- Near-term, cellulosic feedstocks must come from existing crops. Non-food wood chips are an excellent source.
- Project economics are very dependent on the technology used to convert non-food feedstocks to ethanol.
- Cellulosic ethanol can be price competitive with petroleum gasoline if the right technology is used.
- We believe that SunOpta BioProcess and the CMCEP Partners have proven technology to get the job done.

The CMCEP Little Falls, MN project needs government assistance to build the plant.
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