Ensyn’s Approach to Next Generation Bioproducts

- Production of renewable low carbon fuels and chemicals
- Anchored by Ensyn’s commercial RTP process
- Our existing chemicals, heating & cooling business offer steady growth
- The refinery feedstock market represents a global opportunity for the production of low carbon fuels
- We maintain world-class strategic relationships across the value chain
- Existing commercial production in Wisconsin and Ontario
- Capacity expansion underway in Canada, Brazil and the U.S.
Ensyn’s Business – Forest Biomass to High Value Products

Biomass Feedstock → RTP Process → Biocrude Conversion → Liquid Biocrude → Chemical Feedstock → Renewable Fuel Oil (RFO) → Refinery Feedstock

Food Ingredients & Renewable Chemicals

Heating & Cooling

Refinery Co-processing
Ensyn’s RTP® Technology

Maximum Conversion of Solid Carbon to Liquid

- Not “severe” – a non-catalytic, thermal process
- Similar to Fluid Catalytic Cracking (FCC)
- No need for catalysts, high pressure or hydrogen
- Gas and char used to run the facility and dry the biomass (energy self-sufficient)
- 35 patents issued, 97 pending
A 30+ Year Growth Story Backed by Commercial Operations

- **1984**: Commercial Deployment
- **1989**: Heavy Oil
- **1998-2005**: return to Bio-energy
- **2006**: Ontario Facility & Ongoing Bioenergy Expansion
Strategic Relationships Across the Value Chain

Feedstock

Conversion to RFO

Refinery Feedstocks

Heating & Cooling

Specialty Chemicals & Food Ingredients

Fibria

Honeywell UOP

Honeywell UOP

Sprague

Red Arrow

ARBEC

Envergent

Chevron Technology Ventures

CleaverBrooks

Kerry

Roseburg

A Forest Products Company

Tesoro

BR Petrobras
Specialty Chemicals – Food Ingredients

- One of Ensyn’s initial commercial market applications
- Over 25 years of commercial production
- Over 30 food products developed
- Five commercial RTP facilities currently in operation
- Strategic partner: Kerry Group (Red Arrow Products, Wisconsin)
- Kerry/Red Arrow is the global leader
Heating Fuels

- Ensyn’s second market application
- Over 25 years and 20 million gallons of combustion in industrial boilers
- Now operational in a wide range of applications
  - Heating & cooling markets
  - Large commercial and institutional users
  - District heating systems
  - Mining (indurating furnace)
Heating Sales & Contracts

- Memorial Hospital, New Hampshire
  - 100% fuel conversion for almost 2 years
  - Generating D-7 RINs under the U.S. RFS

- Youngstown, Ohio district heating
  - Commercial deliveries have begun

- Bates College

- Additional contracts under negotiation

- Strategic alliances with infrastructure & heating oil suppliers
Refinery Co-processing vs. Traditional Biofuels

Leveraging existing infrastructure:

- Lowers the refiners CAPEX & OPEX of compliance
- Facilitates implementation
- Up to 5% biocrude processed with conventional petroleum feedstocks
- Provides comparable yields on a volumetric basis
- Does not compete for market share with the refiner
- Allows refiner to control generation of their regulatory credits
Co-processing Commercialization

- More than 5 years of development
- Strategic alliance with Honeywell UOP expanded in 2014 to include Refinery Co-processing
- In negotiations with a motivated group of “Early Adopter” refiners
- Announced refiner strategic relationships include Chevron & Tesoro
- Additional refiner initiatives underway
- Biocrude supply for these contracts:
  - Initially from the Ontario facility
  - Additional deliveries from projects in development
Regulatory Framework Supports Deployment

- RFS – the following pathways are in place
  - RFO Heating (D7 RINs – Ensyn leading producer of D7 RINs)
  - Co-processing gasoline (D3 RINs)
  - Co-processing diesel (D7 RINs)

- LCFS – California pathway approved:
  - For Ensyn’s renewable gasoline and diesel
  - Carbon intensity determined to be approximately 20.25 g CO$_2$e/MJ

- RECs
  - Generation of REC- eligible heat since Aug 2015 in NH
  - Final stages of measurement protocols with the regulatory authorities
Production Facilities & Projects
Ontario Production Facility

- 3 million gallons per year
- Commissioned in 2006 as a merchant plant for chemicals and fuels production
- Enhanced in 2014 to 24 by 7 operation as Ensyn’s anchor fuels facility
- Facility is qualified by the U.S. EPA under the RFS program
- Sales to qualified users in the U.S. are generating D-7 RINs
Cote Nord Project, Quebec

- 10 million gallon per year facility being developed by Ensyn and Arbec Forest Products
- First of several projects contemplated by the partners under a joint development agreement
- Located at Arbec’s sawmill facility in Port Cartier, Quebec
- Feedstock for the project is local forest residues
- Product will be sold to heating/cooling and refining customers in the U.S. Northeast
- Project funded, civil work has begun and major equipment modules ordered
Aracruz Project - Brazil

- 20 million gallon per year facility being developed in partnership with Fibria Celulose
- Located at Fibria’s pulp mill in Aracruz, Espirito Santo
- Feedstock is eucalyptus forest residues
- Offtake targeted for U.S. refineries and heating/cooling clients
- Preliminary engineering substantially complete
Vienna Project, Georgia

- 20 million gallon per year facility being developed by Ensyn, Renova Capital Partners, and Roseburg Forest Products
- Location is a mothballed mill in Dooly County, Georgia
- Feedstock is forest residues and thinnings from local sources
- Product targeted for refineries and district heating clients
- Conditional commitment from the USDA for a $70 million loan guarantee with Citibank as the Lender of Record
- Preliminary engineering substantially complete
Ensyn’s Success is Supported by its Strong Investor Base

Credit Suisse

Fibria

investeco

Roseburg

IMPAX

Chevron Technology Ventures
Thank you