PROESA™ TECHNOLOGY

Break-through Technology for Producing Advanced Bio-Fuels and Renewable Chemicals from Cellulosic Biomass

Pacific Rim Summit on Industrial Biotechnology and Bioenergy
San Diego, December 2013

Kevin Gray, Vice President Bio-based Chemicals, Beta Renewables

Polymers

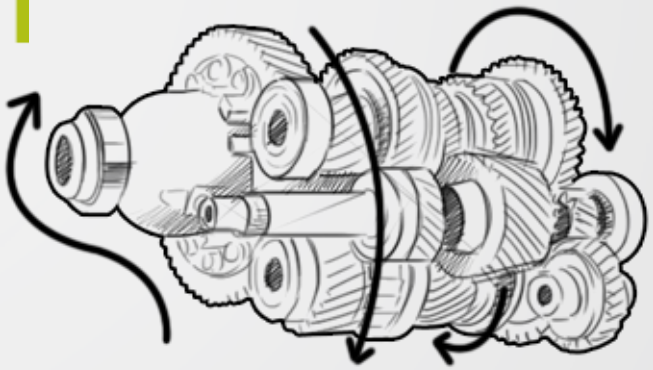
One of the top 3 producers of PET resins worldwide

Engineering and R&D

60 years of excellence in process development and commercialization of plants

Sustainable Chemistry

Proesa™: technology leader in biofuels and chemical intermediates from non-food biomass



Beta Renewables: Sustainable Chemistry

Beta Renewables is a joint venture, created in October 2011, between BioChemtex and the investment firm TPG (Texas Pacific Group)

Novozymes, Denmark-based world-class biotech company acquired 10% share of Beta Renewables in October 2012

Beta Renewables owns and licenses the Proesa™ technology

1st commercial-scale lignocellulosic biofuels plant in Crescentino (Italy)

Our Partners:

GranBio
novozymes Rethink Tomorrow
gevo
MYBIOMASS
CODEXIS
genomatica
Canergy

The M&G Group:
Industrial Growth and Innovation

1953 – 1979
Packaging production

1953 - Tortona - Italy

Mossi Ghisolfi Group founded HDPE and PVC packaging production

1979 – 2000
Special chemical production

Development and production of **PET resins** for food packaging

2000 – Today
Acquisition and PET expansion

Acquisition of PET **Shell** activities and Rhodia from Rhone Poulenc

Acquisition of **Chemtex** from Mitsubishi Corporation

Construction of the **world's largest plants** for PET production in Altamira (Mexico) and Suape (Brasil)

Plans announced for a new plant in Corpus Christi (Texas, USA)

2005 – Today
Renewables

2008 - New **Research Centre** fully dedicated to renewables

2009 - First pilot plant for **2nd generation biofuels production**

2011 - Beta Renewables is founded, (Biochemtex+TPG) dedicated to sustainable chemistry

2012 - Partnership between Beta Renewables and **Novozymes**

Start up of the world's **1st commercial-scale plant** that produces **biofuels** from **non-food biomass** (60.000 ton/year)

Our R&D Centers

Rivalta, Italy

4500 m² dedicated to renewable resources **biochemistry** and **technology**

Biochemtex also operates R&D centers focused on cellulosic sugar chemistry and engineering research

- **Sharon Center (Ohio)**
- **Bari (Italy)**

PROESA™ Development Timeline

2006-2008

Scouting of Technologies

Generation of key inventions

Proof of UNIT OPERATION in the labs

2009-2010

Pilot plant (1 ton/day) construction & start up (June 2009)

Pilot Plant operation and data gathering

Test of Plant flexibility using multiple biomasses

2011-2012

Crescentino Plant

Collaboration Agreements with leading synthetic biology companies

License Agreements

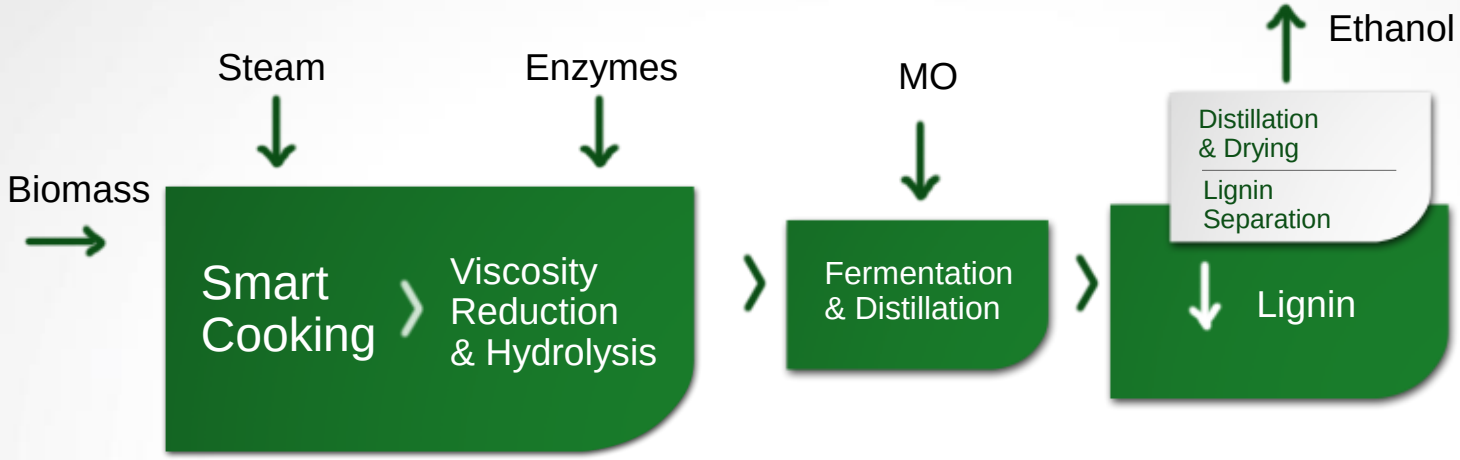
Formation of Beta Renewables

Q1-2013

Crescentino Plant (60000 ton/y)

Start-up

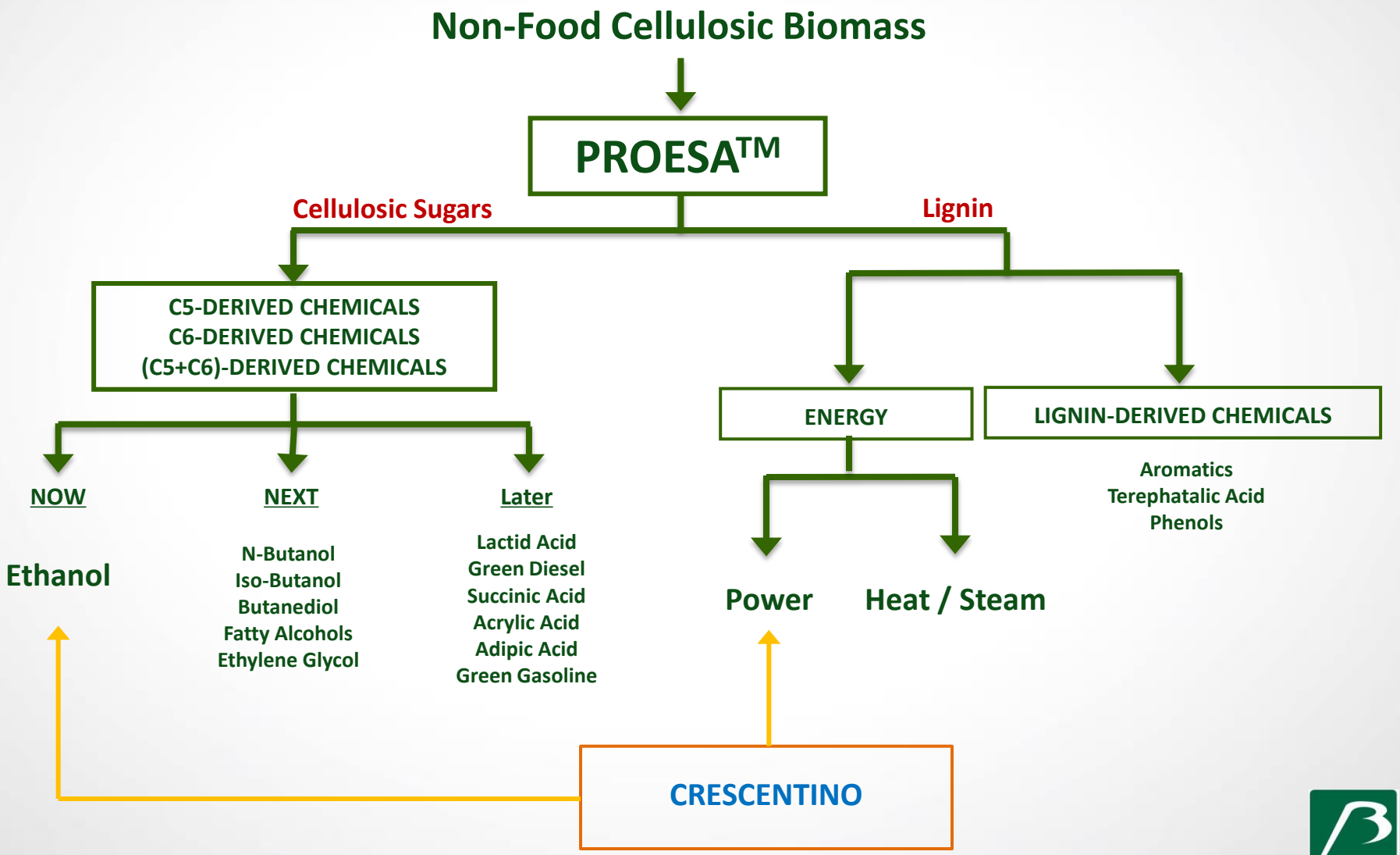
The PROESA™ Process



PROESA™ Technology benefits:

- Feedstock flexibility
- Fully integrated process design using continuous equipment to enable large scale plants
- Continuous process, no chemical addition, optimal sugar extraction and low enzyme dosage
- Best in class technology with lowest capex and opex backed with performance guarantees

PROESA™: A Technology Platform



Crescentino Commercial Plant

Commercial-scale

20MMgpy cellulosic ethanol plant in Crescentino (Italy), operational in 2013

Competitive without subsidies

Benchmark: Oil @ $70/bbl

Cellulosic Costs Less

Estimated cash costs:

Ethanol: <$1.50/USG

Sugars: 10¢/lb

Our Business Model

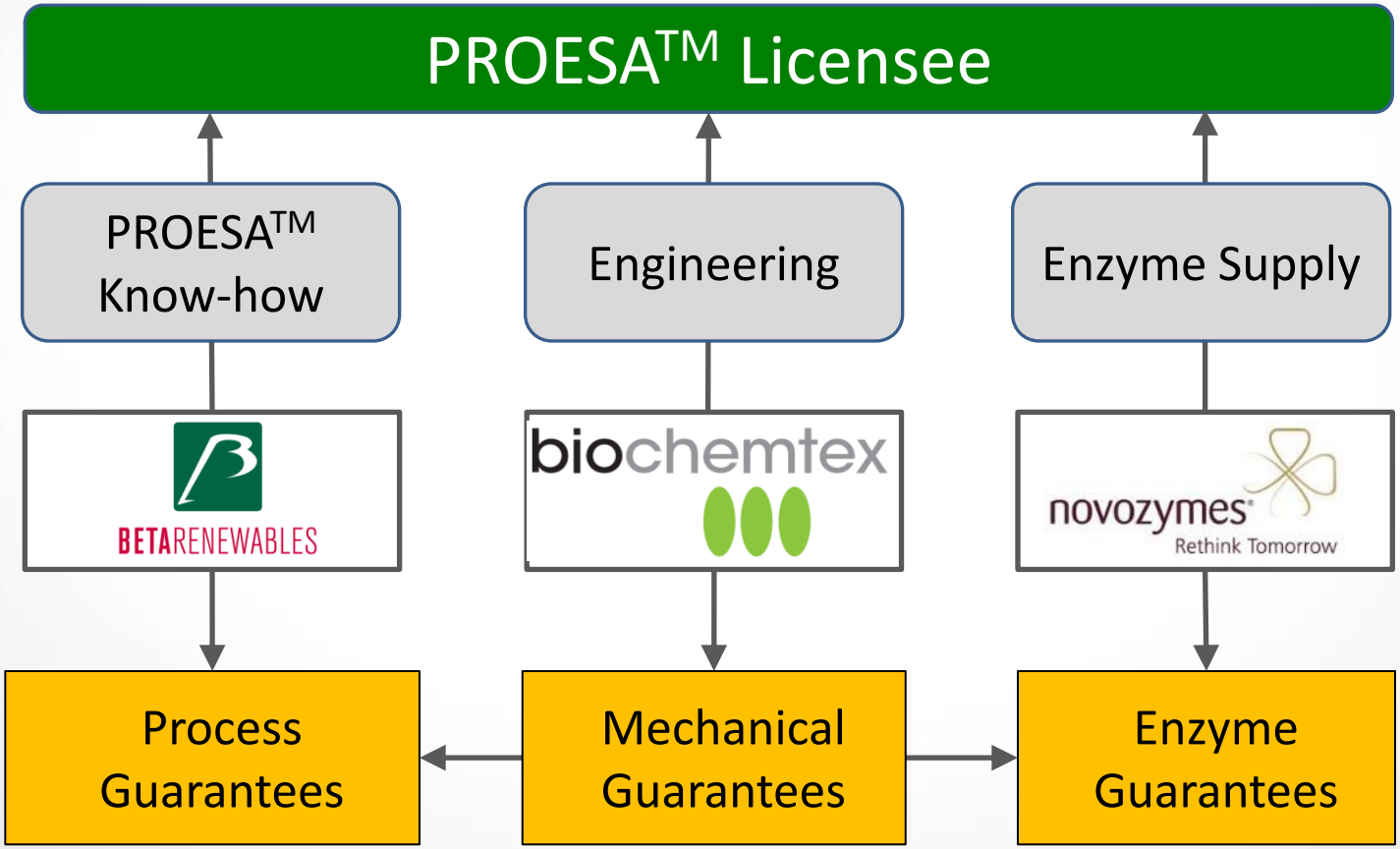
BETARENEWABLES

- Owns the Proesa™ technology
- Licenses the technology worldwide
- Provides performance guarantees
- Supports licensees on biomass supply chain, off-take, financing

- Exclusive engineering partner
- Supplies, at a minimum, a basic engineering and key equipment package
- Provides mechanical guarantees
- Qualifies EPC contractors

Our Value Proposition

To de-risk the technology, enabling profitable deployment and bankable projects




Più VERDE della VERDE
MAZZARIOL

Recent Events

- 65,000 tpa plant in Brazil (GranBio) scheduled to be mechanically complete Q1 2014
- Construction of 65,000 tpa plant in NC scheduled to begin construction H1 2014 (USDA loan guarantee, BCAP)
- Canergy selected PROESA™ for energy cane process in CA
- M&G announced 1 MM ton/yr (feedstock) biorefinery in China

BETARENEWABLES

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