



# PROESA<sup>®</sup> TECHNOLOGY

Advanced Bio-Fuels and Renewable  
Chemicals from Cellulosic Biomass

BIO, Montreal Canada  
June 17<sup>th</sup> 2013



# Proesa<sup>®</sup>: We Are Ready



**Commercial  
Scale**

**Solid Economics  
= Profitable**

**Performance  
Guarantees**



# Topics

1

Group Overview: focus on  
Chemtex and Beta Renewables

2

The Proesa<sup>®</sup> Technology

3

CRESCENTINO: World's 1st  
Commercial Cellulosic Ethanol Plant

4

Our Business Model and Partners



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# MG Polymers

One of the top 3 producers worldwide



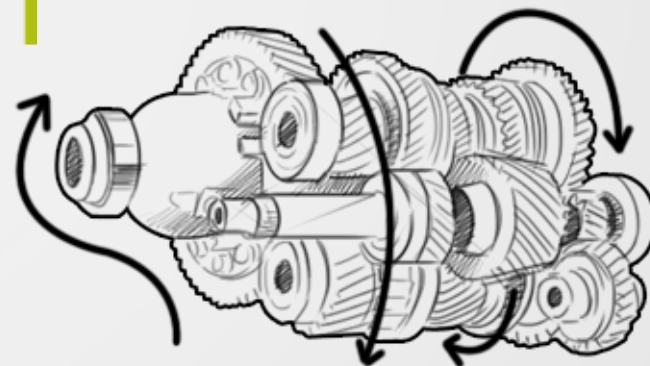
# Engineering and R&D

60 years of excellence in process development and commercialization of plants



# Sustainable Chemistry

Proesa<sup>®</sup>: technology leader in biofuels and chemical intermediates from non-food biomass



# Our R&D Centers

## Rivalta, Italy

4500 m<sup>2</sup> dedicated to renewable resources **biochemistry** and **technology**



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

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

# Beta Renewables: Sustainable Chemistry

Beta Renewables is a joint venture, created in October 2011, between Chemtex 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 2GE biofuels plant in Crescentino (Italy)





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# Technology: A Snapshot

More than USD **200M** investment  
into R&D since 2006

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**Extensive agronomic studies**  
and supply chain logistics  
investigation

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## Intellectual Property

14 patent family applications filed,  
4 are public

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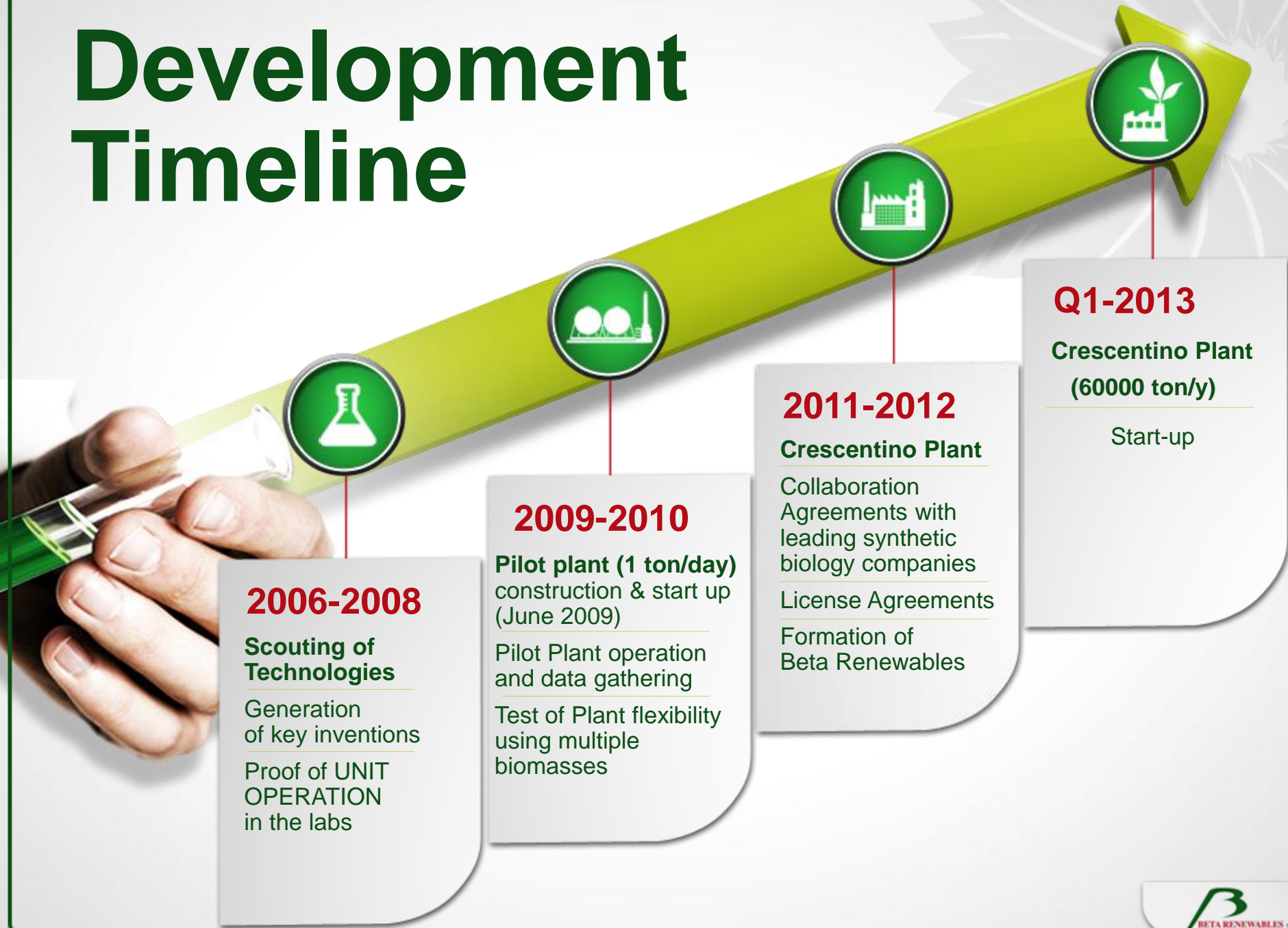
1<sup>st</sup> Focus: **bioethanol**

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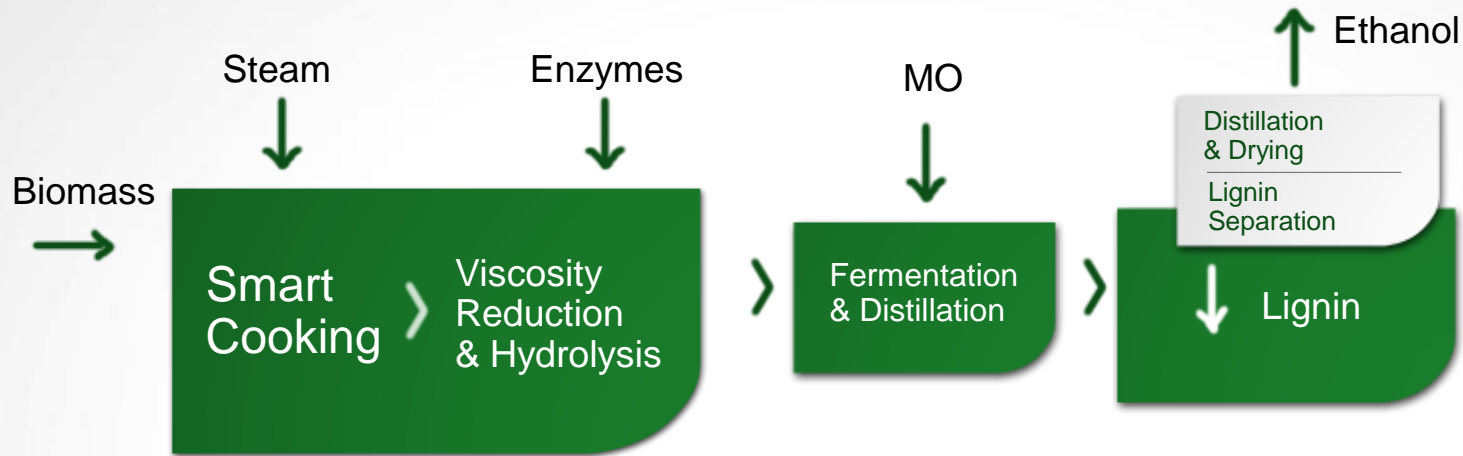
Then: **bio-based chemicals**



# Development Timeline



# 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

# Our Approach to a Local Biomass Supply Chain



The flexibility of the Proesa® Pretreatment enables a **locally sourced and flexible supply chain**, based on a mix of available **agricultural wastes and energy crops**



**Chemtex Agro** was established to develop the supply chain for Crescentino



Through Beta Renewables Chemtex Agro supports the **analysis and development** of supply chain for Proesa® licensees



This approach guarantees year-round **security of supply**

# A Platform for Sustainability

## PROESA® Cellulosic Sugar Technology



Pre-Treatment Section

Enzymatic Hydrolysis Section

### BIOFUELS

Ethanol  
Bio-Jet  
Butanol 

### BIOCHEMICALS

Fatty Alcohols   
1,4 Butanediol   
Farnasene  
Acrylic Acid  
Succinic Acid  
Others

### LIGNIN CHEMICALS

Phenols  
Xylene  
Terephthalic Acid



# Proesa<sup>®</sup>: Key Advantages



## Financial

**Lower capital:** simpler process and equipment

Cash **cost of fermentable** sugars at ~10¢/lb

Cash **cost of ethanol** of <\$1.50/USG (\$0.40/L)

**Cost-effective** at modest scale

Lignin provides **power for plant**



## Flexibility

**Feedstock-independent:** energy crops, agricultural wastes, woody biomass, bagasse

**Deployable worldwide**

**Competitive and attractive  
economics without subsidies**



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# Crescentino Commercial Plant



**Ribbon Cutting – April 2011**

**Energy block commissioned – October 2012**

**Biofuel production commissioned – January 2013**



# Crescentino Commercial Plant

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# Our Business Model



Owns the Proesa<sup>®</sup> 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

# Novozymes and Beta Renewables A Strategic Partnership

Partnership of two industry leaders  
boosts confidence in the  
technology

Guarantees on enzyme  
performance and cost incidence  
de-risks the technology

Ensuring secure and most  
competitive enzyme supply to our  
customers



To Jointly  
Market  
PROESA®  
and CTEC®

# Our Joint Value Proposition

The goal of this agreement is to further de-risk the technology, enabling profitable deployment and bankable projects

## Cellulosic Ethanol Licensee

Proesa<sup>®</sup>  
Licensee



■ Process guarantees

Basic Engineering  
& Key Equipment



■ Mechanical Guarantees

Enzyme  
Supply



■ Enzyme Specifications

Results in a BR / NZ Joint Hydrolysis Cost Guarantee  
= a guarantee on the  
\$ enzyme purchases / gal (or ton) of EtOH produced

# Supporting your 2G Project from Idea to Realization



## Enable

## Deploy

## Empower

Development

Engineering

Construction

Start-up

Operations

**Project feasibility study**  
and investment estimates

Qualify feedstock in **pilot plant**

Optimize **process parameters**  
and enzymes for **feedstock**

Support in the **development of**  
**a biomass** supply chain

Support in **financing**

Basic **engineering package**

**Qualify EPC** contractor

Permitting **support** and **procurement**  
of critical equipment

Support in the **construction of the**  
**plant** and deployment

Start-up and **training**

Support in **finding product**  
off-takers

Ensure **joint performance**  
guarantees hold

Provide **ongoing customer** support

Supply of **enzymes** and **yeast**

# We Are Gaining Momentum



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## Canergy selects Chemtex and Beta Renewables for its Cellulosic Ethanol Project in California

USI

Brawley, CA & Wilmington, NC, USA and Tortona, Italy – April 30, 2013

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Canergy, LLC, an advanced biofuels company based in California that is focused on the production of ultra-low carbon intensity ethanol from sustainable non-food energy crops, is pleased to announce that it has selected Chemtex, a leader in chemical engineering and renewable processes, and Beta Renewables, a global leader in cellulosic bio-fuels, for the development of their 25 million gallon a year cellulosic biofuels facility to be located in the Imperial Valley of California. Construction of the new facility is targeted to begin in Q1, 2014 pending successful completion of permitting and financial activities. The facility is expected to be operational in 2016.

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Tim Brummels, Canergy's CEO, said, "We are excited to be moving this project forward. California is the country's largest retail gasoline market and this first project's biofuel will facilitate obligated parties compliance with California policy directives to reduce their carbon footprint through 2020. We have completed extensive research and have concluded that PROESA® Technology is both ready now and is the most advanced and competitive cellulosic platform in the marketplace today. We are also excited to have CHS Inc., a leading global energy, grains and foods company, working with us as a development partner in the project."

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today

will help create more than 300 jobs in North Carolina and is a perfect example of how producing home-grown energy is good for the economy and good for our energy future."

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**BETA RENEWABLES** S.p.A.

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