In April 2011 Chemtex broke ground for a 60 ktpa (20 MMgpy) nameplate cellulosic ethanol plant based on wheat & rice straw, and on the energy crop Arundo donax.
**ETHANOL PRODUCTION** READY TO GO!

|-----------|----------|----------|-----------|-----------|----------|

*Low Cost Sugar → Ethanol*
BETA RENEWABLES PROFILE

A JV between Chemtex, Texas Pacific Group and Novozymes
- Set-up as a €250 million joint venture between M&G and TPG in October 2011
- In October 2012, Novozymes acquired a 10% share in Beta Renewables, paying $115 million for equity, marketing fees and milestone payments

- Beta Renewables has developed the PROESA® Technology for the conversion of non-food lignocellulosic biomass to biofuels and biochemicals.

- The company is currently commissioning the world’s first commercial-scale cellulosic ethanol facility in Crescentino, Italy.

Our Partners:
OUR BUSINESS MODEL

- Owns the PROESA® technology
- Conducts the R&D for continuous process improvement
- Licenses the technology worldwide
- Provides performance guarantees
- Supports licensees on biomass supply chain, off-take, financing
- Operates the commercial site in Crescentino, Italy

Exclusive engineering partner
- Supplies, at a minimum, a basic engineering and key equipment package
- Provides mechanical guarantees
- Qualifies EPC contractors
- Support in commissioning, start-up and training
NOVOZYMES AND BETA RENEWABLES
A STRATEGIC PARTNERSHIP

✓ Long-standing collaboration has led to substantial reduction in cost of enzymes per unit of cellulosic ethanol
✓ Partnership of two industry leaders boosts confidence in the technology
✓ Guarantees on enzyme performance and cost incidence de-risks the technology
✓ Parties are committed to ongoing improvements in enzymes and process
✓ Ensuring secure and most competitive enzyme supply to our customers
THE BIOREFINERY CONCEPT

ONLY IF I SUCCEED IN CONVERTING THE WHOLE BARREL OF BIOMASS IN A DEDICATED BIOREFINERY I’LL BE SUCCESSFULL AND COMPETITIVE.
NOT A DREAM BUT A REALITY THANKS TO A LARGE COMMITTMENT

2006-2012 EXTENSIVE R&D AND TECHNOLOGY WORK

LEVERAGE IN HOUSE TECHNICAL COMPETENCIES

- Production
- Engineering
- Technology development
- Industrialization
- Innovation

2 MAJOR R&D FACILITIES
> 10,000 m² dedicated

150 people in Green R&D
200 Process Engineers
The use of PROESA technology will enable the production of cheap and clean sugars.

Thanks to a unique commitment, biorefinery will shortly become an industrial reality.
GREG PROJECT CONCEPT

Raw Biomass → Pre-Treatment $\rightarrow$ PROESA $\rightarrow$ Ethanol
$\rightarrow$ GREG $\rightarrow$ EG, PG

GREG process products

- Ethylene Glycol (EG) to M&G PET production
- 1,2-Propylene Glycol (PG) to cosmetic, pharmaceutical and resin industries
Greg Project capabilities

- Laboratory (litres per day)
- Pilot plant (hundred kg per day)
- Industrial plant (kton per year)
MOGHI Process

Lignin conversion to Bio-hydrocarbons
MOGHI - LIGNIN CONVERSION PROCESS TO CHEMTEX BIO-REFORMATE

CHEMTEX PROPRIETARY TECHNOLOGY

Lignin

Chemtex Bio-Reformate rich in BTX

MOGHI
MOGHI - LIGNIN CONVERSION PROCESS TO CHEMTEX BIO-REFORMATE

Chemtex Bio-Reformate
From Lignin

Available Petrochemical Technology

Aromatic chemicals, nylon intermediates, resins and many others
LIGNIN CONVERSION PROCESS: SHARON CENTER (OH)

Lignin Pilot Plant
<table>
<thead>
<tr>
<th>Sharon Center</th>
<th>Bio-Lab</th>
<th>Lignin Pilot Plant</th>
<th>Puglia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2009</strong></td>
<td>Batch reactors: 50 cc, 8 L, 12 L</td>
<td>Lignin to Bio-Reformate Pilot Plant 2,5 kg/h Lignin Capacity</td>
<td>Demo Plant 1000 ton/y Bio-Reformate</td>
</tr>
<tr>
<td><strong>2011</strong></td>
<td>Continuous Reactors: 500 cc</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2014</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
BIOREFINERIES ARE POSSIBLE TODAY!