GRUPPO MOSSI & GHISOLFI

Crescentino:

a second generation biorefinery

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Our Group

1950 - 1979

Packaging Manufacturing Phase

M&G was founded in 1953 by Vittorio Ghisolfi in Tortona, Italy

M&G offered customers packaging from HDPE and PVC

GRUPPO MOSSI & GHISOLFI

Privately held company with deep roots in manufacturing (PET and Acetates)
2600 Employees worldwide
A commitment to R&D (3 Centers) and Process
USD 3 billion annual revenue
Operations in the USA, Italy, Mexico and Brazil

1979-2000

Chemical Specialty Manufacturing Phase

Group activities were integrated upstream in the development and production of special resin (PET) for food packaging applications

2000-2007

PET Expansion Phase

2000
Acquisition of Shell's PET business

2002
Acquisition of Brazilian controlled Rhodia-ster from Rhone Poulenc

2003
Start up of world's largest PET production unit at Altamira (Mexico)

2004
Acquisition of the world class engineering group Chemtex from Mitsubishi Corporation

2007
Start-up of highest capacity single line PET plant in Suape, Brazil
A Chemtex EPC Project

2007 & Beyond

Renewables

2007
Testing and development of technology on lab scale for cellulosic ethanol

2008
Agronomic testing of energy crops

2009
Construction and operation of a continuous pilot plant for **cellulosic ethanol**

2011
Construction of a 40ktpa Cellulosic Ethanol Demonstration Plant

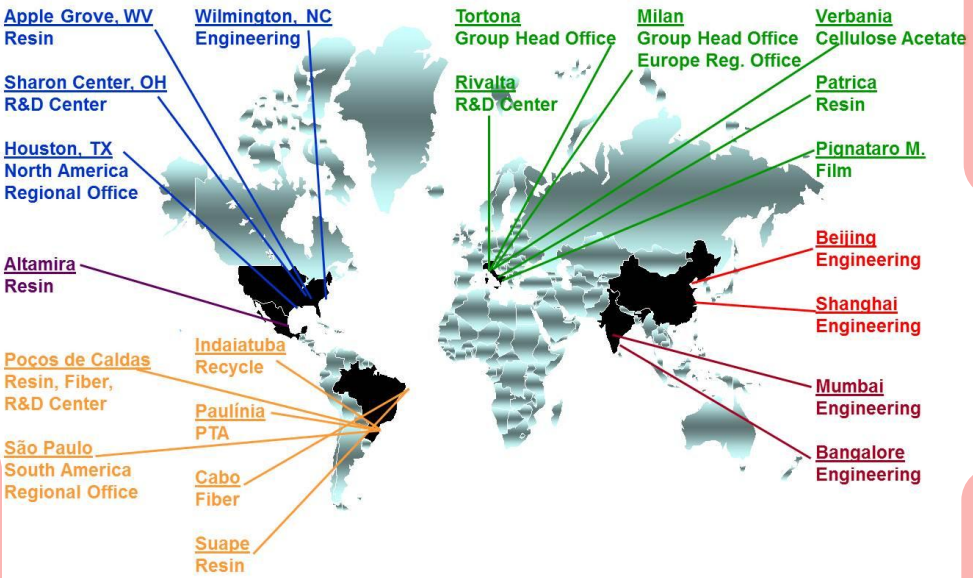
Collaboration with Amyris, Genomatica and Codexis for 2G Sustainable Chemicals

Launch of

The Engineering Company

Chemtex Italy

Tortona, Rivalta



Chemtex China

Shanghai, Beijing

Chemtex USA

Wilmington, NC

Chemtex India

Mumbai, Bangalore

PROESA™ in a Nutshell

✓ PROESA™ pillars:

- *Agronomy;*
- *Pretreatment;*
- *Hydrolysis + fermentation.*

✓ Over US$ 200M investment in R&D since 2007.

✓ Extensive agronomic studies and supply chain logistics to support downstream plant development.

✓ A continuous 1 t/d biomass pilot facility operational since 2009.

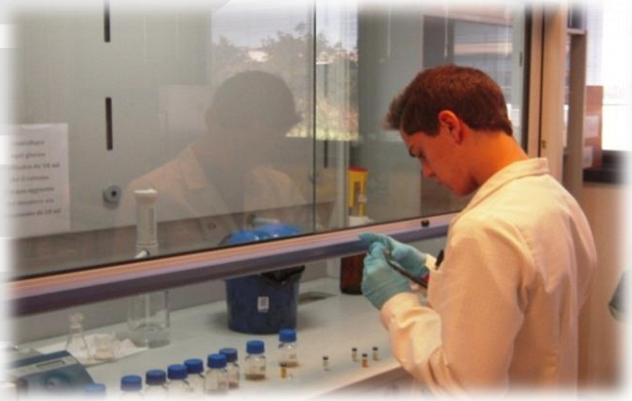
✓ A 40 kt/t demo plant under construction in Crescentino (VC) with start-up in Q4 2012.

in a Nutshell

- ✓ Intellectual property: 11 patent applications filed.
- ✓ 3 licenses already sold for plants between 65 and 100 ktpa of EtOH.
- ✓Commitment of M&G / Chemtex and partners to continuous improvement.

Release of high quality low cost sugars,
the new feedstock
for the production of ethanol and/or biobased chemicals.

PROESA™ Technology step by step



2006-2008

- Scouting of Technologies
- Generation of key inventions
- Proof of UNIT OPERATION in the labs

2009-2010

- Pilot plant construction & start up (June 2009)
- Pilot Plant operation and Data gathering
- Test of Plant flexibility using multiple biomasses

2011-2012

- Crescentino Unit
- Technology licensing

Crescentino 40ktpa Plant

- In April 2011, M&G and Chemtex broke ground for a 40 ktpa / 13.4 mmgpy nameplate cellulosic ethanol plant based on Arundo Donax & wheat straw.
- Crescentino will generate 13MW of “green” power from lignin to the grid and will sell ethanol to a major oil company.
- Design incorporates state-of-the-art wastewater treatment facility for maximum recycle of water.
- Start-up: Q4, 2012.

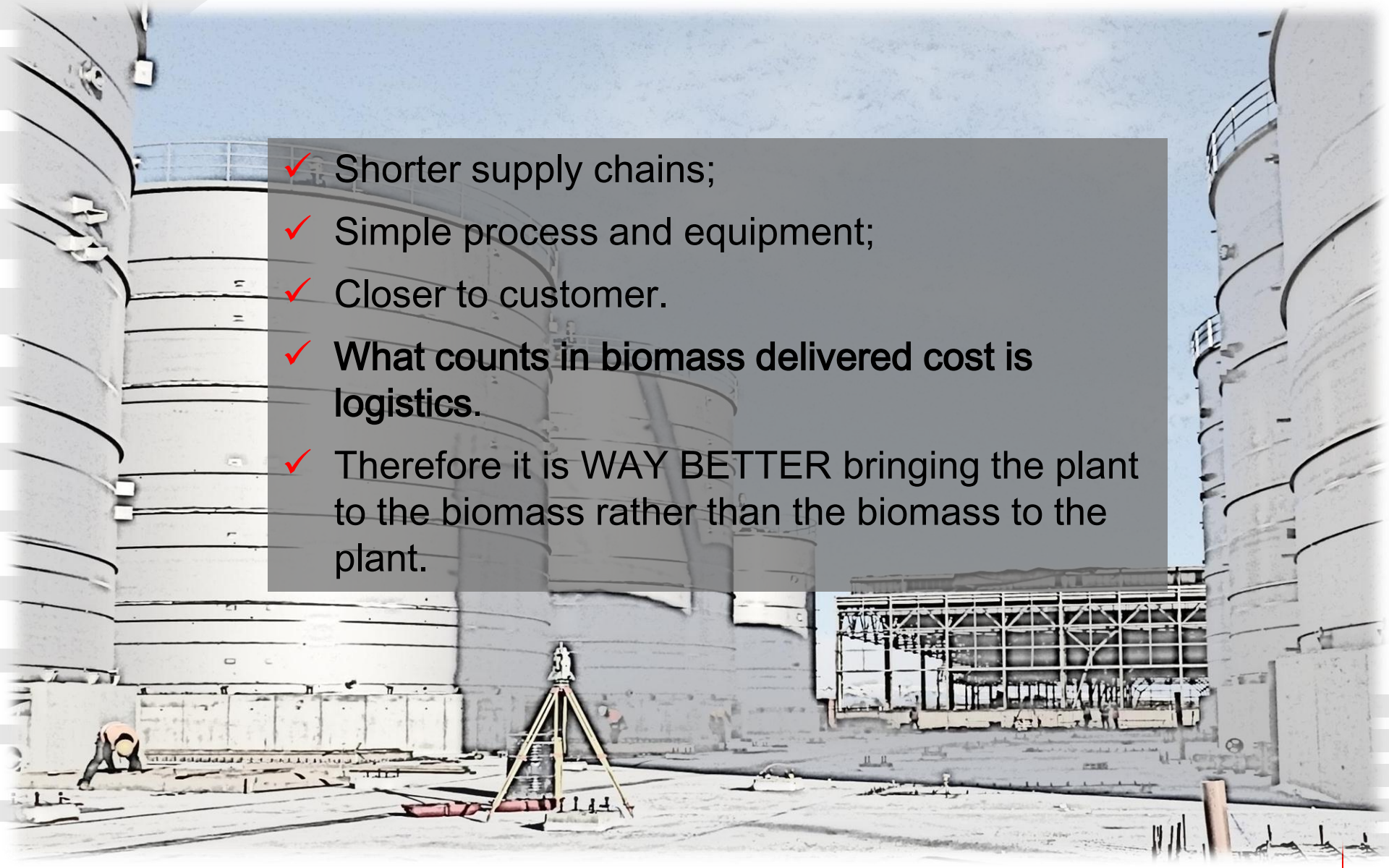
Crescentino 40ktpa Plant: Lignin Boiler

Crescentino, April 2012

Crescentino 40ktpa Plant: Today

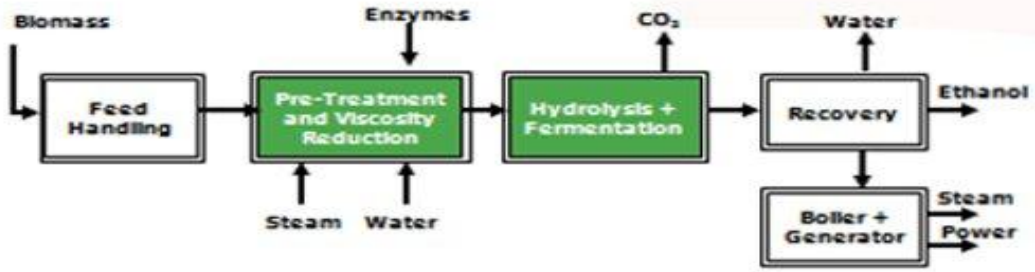
Crescentino, September 2012

Economics improve at smaller scale



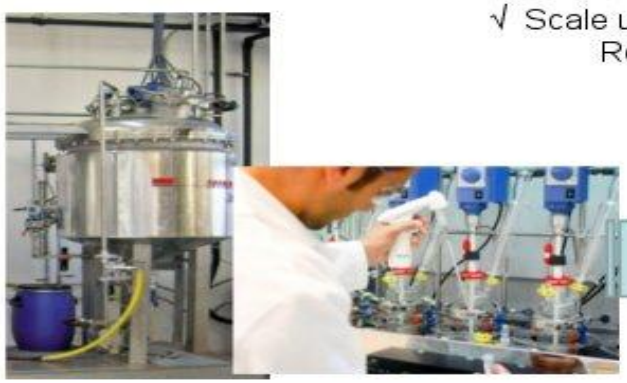
- ✓ Shorter supply chains;
- ✓ Simple process and equipment;
- ✓ Closer to customer.
- ✓ **What counts in biomass delivered cost is logistics.**
- ✓ Therefore it is WAY BETTER bringing the plant to the biomass rather than the biomass to the plant.

Successful European Projects E P7 BIOLY E



FP7 - DG TREN - BIOLYFE
Second generation BIOethanol process: demonstration scale for the step of Lignocellulosic hydrolysis and Fermentation

√ Starting date 01/2010 – 4y duration
√ 8,6 million € EC contribution on 15.6 million € budget
√ 7 Partners from I, DK, DE, SE
√ Scale up of unique and innovative Viscosity Reduction and SCCF technologies



VR, Hydrolisi and Fermentation

Successful European Projects E P7 BIOLY E

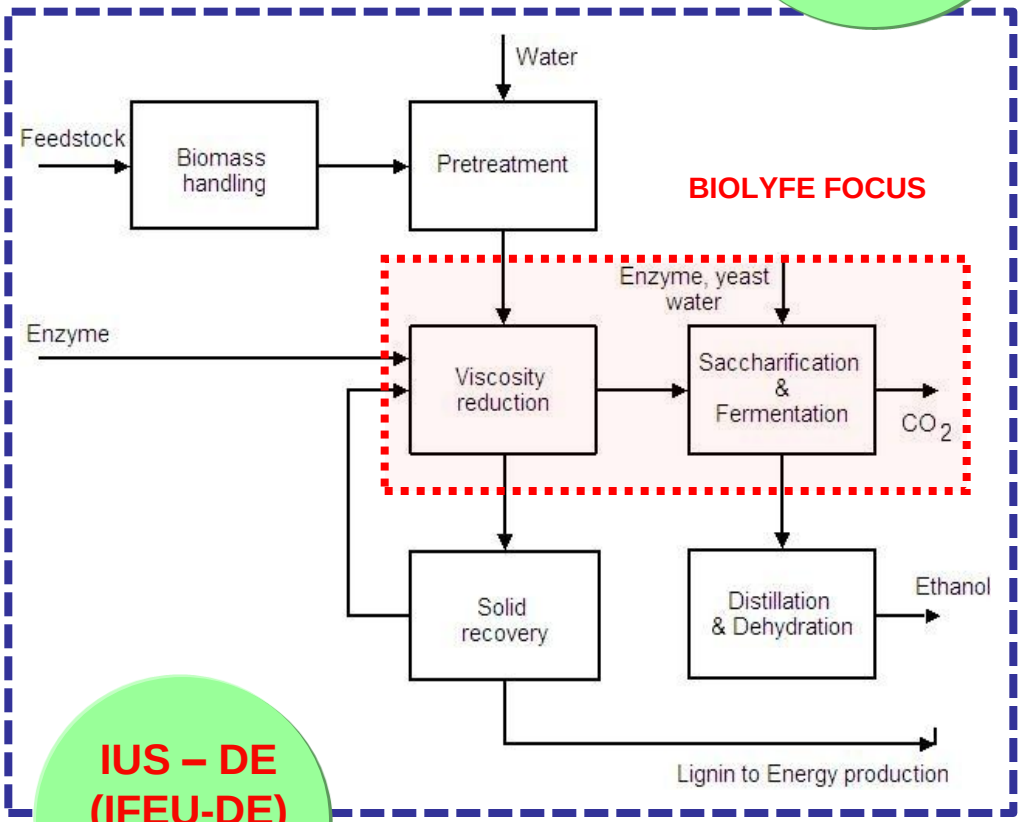
Second generation BIOethanol process: demonstration for the step of Lignocellulosic hydrolysis and Fermentation

Univ. Lund-SE (TAURUS-SE)
(Microorganism Fermentation);

ENEA - IT
(Pretreatment);

Agriconsulting IT
(biomass production);

WIP – DE (ETA-IT)
(Dissemination);



Novozymes DK
(Enzymes);

Chemtex - IT
(***Coordinator***, Second generation Bioethanol demo unit);

IUS – DE (IFEU-DE)
(Integrated assessment);

EC-FP7

Summary:key advantages of PROESA™

Financial:

- ✓ Lower capital due to less handling of biomass, simplified flows and no special 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; short supply chains.

Flexibility:

- ✓ Feedstock-independent: energy crops, agro wastes, woody biomass, bagasse;
- ✓ Deployable worldwide;
- ✓ Pure lignin by-product; provides power for plant;
- ✓ No long-term enzyme supply commitments.

Competitive and attractive economics without subsidies

THANK YOUR FOR YOU ATTENTION

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