



PRESS RELEASE

The world's first plant for the production of second generation biofuels has been opened in Northern Italy

Operating at full capacity, the bio-refinery constructed by Beta Renewables (Mossi Ghisolfi Group) will produce 75 million litres a year of second generation bioethanol from non-food biomass such as agricultural residues.

Guido Ghisolfi: "We have paved the way for a green revolution in the chemical sector. Environmental sustainability and industrial innovation are essential factors for the Country's economic recovery."

Italian technology will be exported worldwide: agreements have been signed to construct similar plants in Latin America and in the United States.

*Crescentino (Vercelli), 9 October 2013 - **The world's first commercial-scale plant for the production of bioethanol from non-food biomass sources** was officially inaugurated today before the Minister for Economic Development Flavio Zanonato and the local Authorities (President of the Regional Administration Roberto Cota, Mayor of Crescentino Marinella Venegoni, President of the Provincial Administration Carlo Riva Vercellotti). The Crescentino (Vercelli) bio-refinery is owned by **Beta Renewables**, a joint venture between **Biochemtex**, a Mossi Ghisolfi Group engineering company, the American fund **TPG** (Texas Pacific Group), and the Danish company **Novozymes**, a world leader in bio-innovation.*

The Crescentino plant, a **150 million euro** capital investment, has won Italy a high-ranking position in the world for ground-breaking technological progress in the strategic industrial sector of green chemistry. The project was supported by the European Commission within the 7th Framework Programme for Research and Technological Development.

The bio-refinery, with a footprint of **15 hectares**, will have a positive economic impact in the region, employing directly a staff of approximately one hundred and creating more than 200 indirect jobs. Started up in January 2013, the facility has a production capacity of **75 million litres** a year of second generation bioethanol intended for the European market. The plant is entirely self-sufficient in terms of energy consumption (13 MW of electricity produced from lignin) and does not discharge any wastewater, ensuring 100% water recycling. Construction of the plant required 1,500 tons of steel, 1,400 tons of pipes and valves and 18 km of underground pipes. 370 machines were used in the process.

The "revolutionary" feature of the bio-refinery is the technology platform that is used to obtain bioethanol. In fact, the innovative **PROESA™** (*PROduzione di Etanolo da biomasSA* - Production of ethanol from biomass) technology combined with **Cellic®** enzymes produced by Novozymes makes use of sugars that are present in lignocellulosic (non-food) biomass to obtain alcohol, fuel and other chemical products with low emissions of greenhouses gases at competitive costs, compared to fossil fuels. Moreover, the PROESA technology produces biofuels that ensure a reduction in greenhouse gas emissions close to 90% of those generated by fossil fuels, substantially better than the reduction achieved by 1st generation biofuels.

"Investors interested in cellulosic ethanol often ask when the technology will be ready at commercial scale," said Guido Ghisolfi, CEO of Beta Renewables. "PROESA enables customers to produce advanced biofuel at a cost-competitive price relative to conventional

biofuels – at large-scale and today. Our complete offering makes cellulosic biofuel projects bankable and replicable. With the world's first commercial plant up and running here in northern Italy, I very much look forward to an exciting journey of establishing an entirely new, and very promising, industry."

"Policy makers now need to send clear signals to encourage the necessary investments in advanced biofuels," said Peder Holk Nielsen, CEO of Novozymes. "Stable and predictable blending mandates, incentives for the collection of agricultural residues, and investment support for the first large-scale plants will help move the world substantially in terms of reducing greenhouse gasses, stimulating economies, and providing energy security. Continued reliance on fossil fuels is not viable."

"Large scale production of low cost sugars from non-food biomass is a critical enabler to accelerate the growth of biochemicals and biofuels", said Geoffrey Duyk, MD, PhD, Managing Director and Partner at TPG. "We are very excited to see the technology deployed worldwide, leveraging the most cost effective source of biomass specific to each region, including dedicated crops and agriculture waste."

TPG and TPG Biotech are investors in Beta Renewables.

The Crescentino bio-refinery is situated in a territory whose strong agricultural vocation allows to exploit an extensive variety of biomasses that are available at a low cost within a 70 km range from the plant (principally rice straw, which is plentiful in the area). The company is also developing a dedicated production line fuelled by giant cane (*Arundo Donax*), which can be cultivated on marginal land, without affecting the agricultural food production.

The PROESA™ technology, which is the result of a 150 million euro investment and 5 years of research, was developed by Biochemtex, a Mossi Ghisolfi Group engineering company, at the Rivalta Scrivia Research Centre in Alessandria. The Research Centre, which is entirely dedicated to renewable sources, started up a pilot plant for biofuel production in 2009. The results obtained in the pilot plant have led the company to scale-up the technology to industrial scale with the construction of the Crescentino plant.

Beta Renewables has been exporting this entirely Italian leading-edge technology throughout the world over the past few years. Several agreements have already been signed with international companies on the use of PROESA™, namely with the American **Genomatica**, technological leader in the chemical industry, and the Brazilian **GranBio**. Based on this agreement, the latter will construct Brazil's first refinery of second generation bioethanol with a production capacity of 82 million litres per year. An agreement was recently signed with the Californian company **Canergy** for the construction of a 25 million gallon per year plant in the United States. Recently, Biochemtex and **Codexis**, a developer of engineered enzymes for pharmaceutical, biofuel and chemical production, announced the successful scale-up in the production of CodeXol® detergent alcohols using cellulosic sugars.

*"The second generation biofuel market has high economic and occupational potential, considering the know-how of our companies and the directives issued by the European Commission on the subject," said **Guido Ghisolfi**, CEO of Beta Renewables. "We shall continue to invest in research because we believe that sustainable chemistry is one of the key sectors for the Country's economic recovery. We are making a series of preliminary assessments in some areas in Italy that might prove to be strategic for the construction of new plants. We shall open a new Research Centre and a demonstration plant in Modugno, near Bari, to produce intermediate chemical products starting from lignin, a coproduct of ethanol production. At the same time we shall continue to export our technology in the world through commercial agreements, since the demand for new generation biofuels is steadily expanding."*

About Beta Renewables

Beta Renewables is a leader in the field of advanced biofuels and biochemical compounds at competitive costs. It was established at the end of 2011 as a joint venture between Biochemtex, a company of the Mossi Ghisolfi Group, and the U.S. fund TPG (Texas Pacific Group) with a total investment of 250 million Euro (350 million dollars). At the end of 2012, Novozymes – world leader in the enzymes industry – became a shareholder of Beta Renewables, with the acquisition of 10 percent of the shares, amounting to 90 million Euro. Beta Renewables owns the Proesa™ technology, applied to the field of biofuels and chemical intermediates. Beta Renewables manages the plant in Crescentino (VC), the first commercial facility in the world for the production of second-generation ethanol.

About Novozymes

Novozymes is the world leader in bioinnovation. Together with customers across a broad array of industries we create tomorrow's industrial biosolutions, improving our customers' business and the use of our planet's resources. With over 700 products used in 130 countries, Novozymes' bioinnovations improve industrial performance and safeguard the world's resources by offering superior and sustainable solutions for tomorrow's ever-changing marketplace.

About TPG and TPG Biotech

TPG is a leading global private investment firm founded in 1992 with \$55.3 billion of assets under management and offices in San Francisco, Fort Worth, Austin, Beijing, Chongqing, Hong Kong, London, Luxembourg, Melbourne, Moscow, Mumbai, New York, Paris, São Paulo, Shanghai, Singapore and Tokyo. TPG has extensive experience with global public and private investments executed through leveraged buyouts, recapitalizations, spinouts, growth investments, joint ventures and restructurings. TPG Biotech is part of the growth equity and venture investment platform of TPG. With more than \$1.3 billion under management, TPG Biotech targets investments in pharmaceutical discovery and development, medical technology, diagnostics, healthcare and pharmaceutical services, life sciences, as well as industrial applications of biotechnology.

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