



Updates biorefineries in Italy

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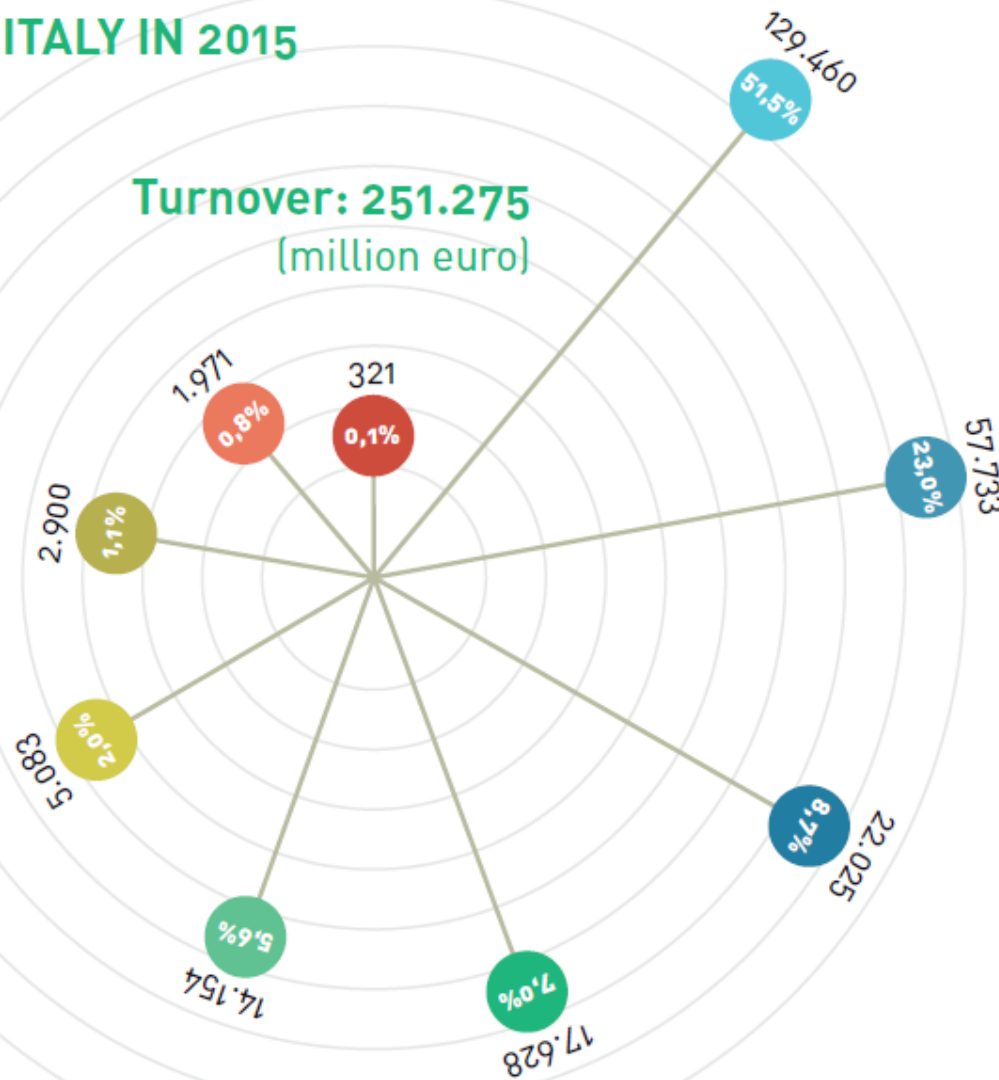
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Bioeconomy in Italy

1 BIOECONOMY IN ITALY IN 2015

- Food industries, beverages and tobacco
- Agriculture, forestry and fisheries
- Manufacture of paper and paper products
- Manufacture of textiles and wearing apparel
- Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
- Manufacture of biobased pharmaceutical products
- Manufacture of biobased chemicals and chemical products
- Bioenergy
- Biodiesel



Source:

SOURCE: Public consultation on the adoption of a bioeconomy Strategy for Italy (presented on 20 April 2017)

Overall Maps of industrial initiatives

4 Biorefining and related activities in the country

- PILOT PLANTS
- DEMO PLANTS
- INDUSTRIAL SITES
- FLAGSHIPS

Piemonte

PILOT PLANT Fatty Alcohol (Rivalta Scrivia – AL)

PILOT PLANT Biomonomers (Novara)

INDUSTRIAL PLANT Lignocellulosic Bioethanol (Crescentino – VC)

FLAGSHIP Succinic Acid (Cannaro Spinola – AL)

Lombardia

PILOT PLANT for Biobased Butadiene (Mantova)

Veneto

FLAGSHIP 1,4 BDO from RRM (Adria – RO)

Umbria

PILOT PLANT and DEMO PLANT Oleaginous crops and Biolubricants from local crops (Terni)

INDUSTRIAL PLANT Bioplastics based on Starch and Polyesters from vegetable oils (Terni)

Lazio

INDUSTRIAL PLANT Biodegradable Polyesters (Patrica – FR)

Campania

INDUSTRIAL PLANT Levulinic Acid (Caserta)

Puglia

PILOT PLANT and DEMO PLANT Aromatic Biochemicals from lignin (Modugno – BA)

FLAGSHIP Aviation Fuel (Modugno – BA)

Sardegna

1 FLAGSHIP basis for Biolubricants and Bioadditives for Rubber (Porto Torres – SS)

1 FLAGSHIP Azelaic Acid and Pterargonic Acid (Porto Torres – SS)

Location TBD

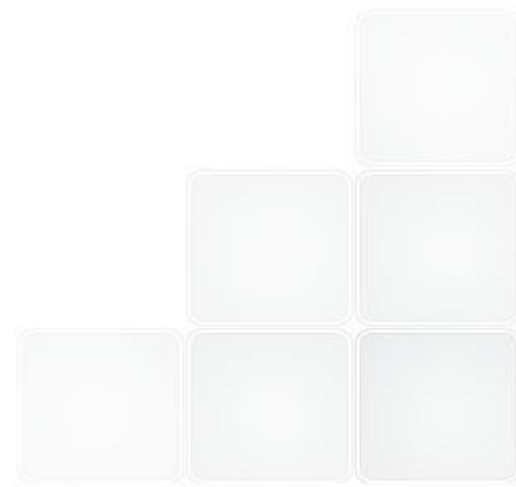
FLAGSHIP for the extraction of Natural Rubber and other valuable products (resins, etc.)

HIGHLIGHTS:

1. Five Flagship Biorefineries
2. MOST INDUSTRIAL INITIATIVES ARE BASED IN THE PIEMONTE REGION (Novamont, Biochemtex, Reverdia)

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SOME DETAILS ON INDUSTRIAL INITIATIVES



NOVAMONT's PROJECTS on biodegradable and compostable bioplastics

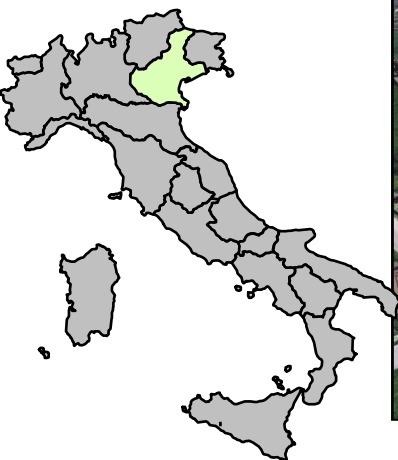


Biorefineries from vegetable oils

NEW NOVAMONT PLANT: Mater-Biotech

- ❑ New fermentation plant in the site of a previous plant (Adria) for the production of 1.4 butanediol from renewables
- ❑ Important partnership with Genomatica.
- ❑ Plant size: 30.000 ton/y

Plant start up in july 2016



Biorefinery in Porto Torres



polimeri europa

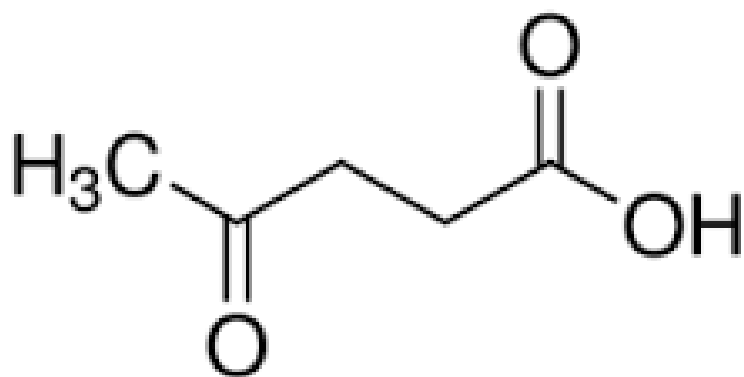


Matrica biorefinery
Joint venture for a biorefinery in Porto Torres (Sardinia)

7 plants with a total investment of 500 M€

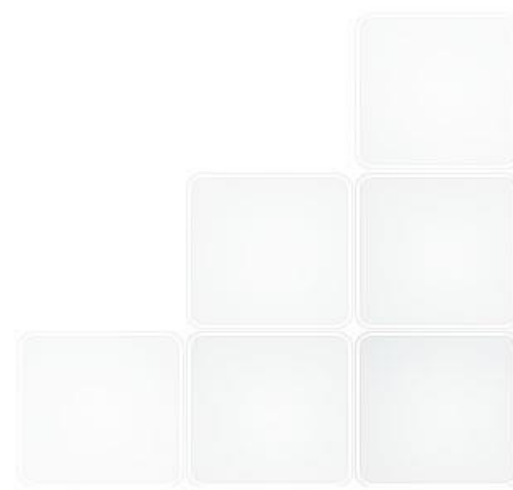
The biorefinery will produce monomers (40kton/y) and lubricants (30kt/y)

GF-BIOCHEMICALS: PRODUCTION OF LEVULINIC ACID



Biobased chemical company GF-Biochemicals has started in 2016 the commercial production at its 10,000 MT/a capacity levulinic acid plant in **Caserta**.

GFBiochemicals is the first company to produce levulinic acid at commercial scale directly from biomass.

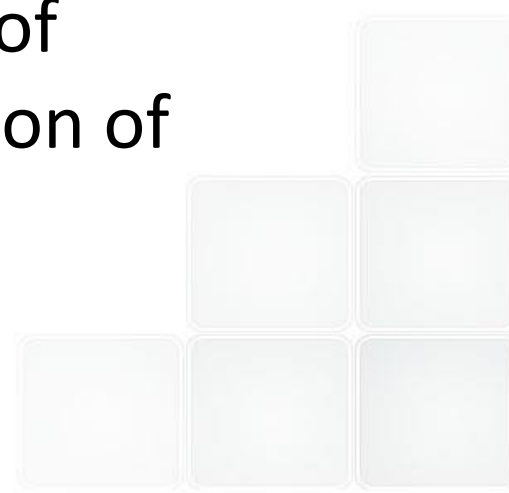


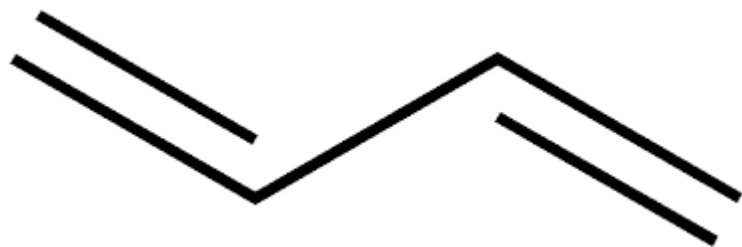
Piana di Monte Verna (Caserta)



Recent Novamont 's Reserch Centre derived from ex-Tecnogen.

The Centre is focused on the development of biotechnological processes for the production of biobased monomers for bioplastics.

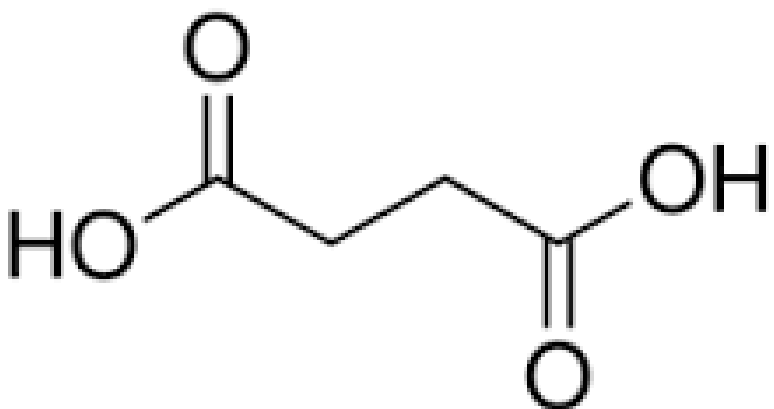




ENI-Versalis and Genomatica have advanced to pilot-scale the production of bio-butadiene (bio-BDE) from renewable feedstock to make bio-rubber, namely, bio-polybutadiene (bio-BR). “

The project started with the establishment of a technology joint venture between Versalis and Genomatica in early 2013.

Production of bio-succinic acid



Reverdia, the joint venture between DSM and Roquette Freres.

World's first bio-succinic acid plant (10 kton/y) through a yeast-based fermentation process in Cassano Spinola (Italy)

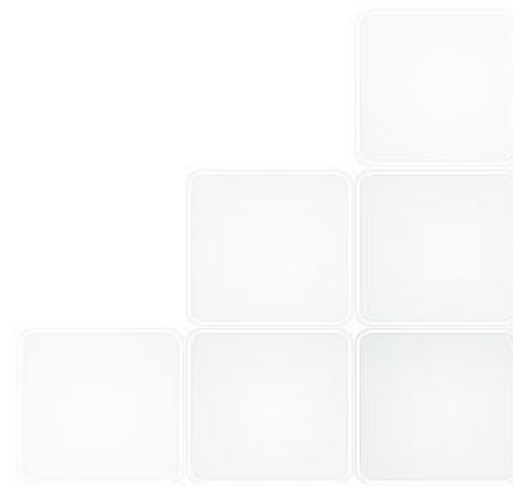
Beta Renewable



In India, Novozymes and Beta Renewables are working to establish a 75 million liter per year cellulosic ethanol plant using 3 million metric tons of paddy straw as feedstock.

- ✓ Beta renewables was funded in 2011
- ✓ In 2012 a partnership was created between Novozymes and Beta renewables .
- ✓ 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
- ✓ Parties are committed to ongoing improvements in enzymes and process
- ✓ Ensuring secure and most competitive enzyme supply to the customers

PUBLIC TO PRIVATE PARTNERSHIP (PPP)



PPP INITIATIVES ON THE GREEN CHEMISTRY



SPRING – Sustainable Processes and Resources for Innovation and National Growth

Biorefineries for the production of added value products (i.e. biochemicals and bioplastics)

Reconversion of industrial sites facing severe crisis

Use renewable raw materials including residues or dedicated sustainable crops

Establishment of public-private partnership in order to accelerate the industrialization of innovative technologies

4 initial R&D and demo projects, coordinated by the promoters companies

Industrial leaders: (Biochemtex (Tortona), Novamont (Novara) e Versalis (San Donato))

ENEA INVOLVMENT IN SPRING



Project ALBE

Leader Versalis:

- Sustainable technologies for the production of new **elastomeric materials** and lubricant oils



Project BIT3G

Leader Novamont

- "Third" generation biorefineries (OILS→**Bioplastics**, biolubricants, bioherbicides, etc)



Project REBIOCHEM

Leader Mater-Biotech:

- Chemicals from biomass (i.e. **BDO**, 5HMF)

The projects will be concluded in 2017.
New initiatives are expected soon

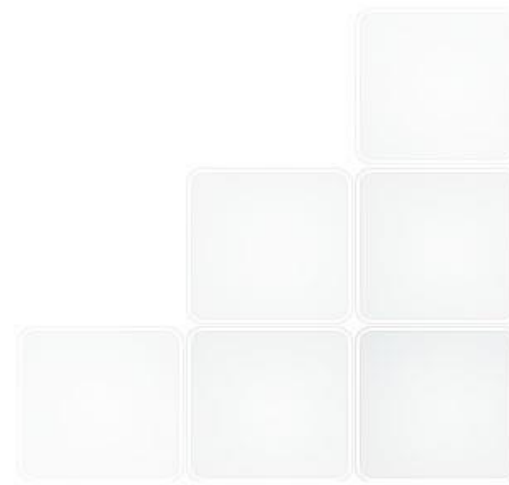
<http://www.clusterspring.it/home-en/>

http://www.novamont.com/page.php?id_page=41&id_first=12&id_second=14

Regional Clusters on bioeconomy



- **LOMBARDY** Green Chemistry Association LGCA (Consorzio Italbiotec Innovhub, Stazioni Sperimentali per l'industria SSI, Politecnico di Milano, Università degli studi di Milano)
- **BASILICATA (SOUTHERN ITALY)** signed a MOU between several local research organizations and the Basilicata Region for the creation of an operative thematic group (GTO) on Bio economy. The group will follow the indications in the Smart Specialisation Strategy S3 for the Basilicata Region and will create the regional cluster on bio economy based on the establishment of local PPP.



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