



# INDUSTRIAL BIOTECHNOLOGY IN ITALY

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## **INDUSTRIAL BIOTECHNOLOGY IN ITALY**

### **INTRODUCTION**

In the last few years Italy has witnessed the birth of an industrial biotechnology sector, although later than other countries of similar economic size. Only a few Italian companies are involved in the production of the main white biotech products. According to a national survey prepared by SusChem Italy, the white biotech sector includes around 50 companies. Recognizing the growing importance of this sector, the Italian Government has allocated some funds to support industrial biotechnology research and development and has established an advisory committee with the objective of further developing this industry in Italy.

## I. RESEARCH AND INNOVATION

### A. Public research funding

The Italian IB Section of the Technology Platform for Sustainable Chemistry<sup>2</sup> (IT-SusChem) is a member of the European Network Area on Industrial Biotechnology<sup>3</sup> (ERA-net IB) as an observer.

Italy does not have a specific funded research program for Industrial Biotechnology. There was one programme in 2000 under the Research National Council coordination. A few new funding opportunities are available as part of the recently launched “Industria 2015” program funded by the Ministry for Economic Development (cf. below access to finance).

In 2006, a survey conducted by the scientific committee of the Industrial Biotechnology section of IT-SusChem found that about 130 large and interdisciplinary projects in the field of industrial biotechnology, mostly national but also some international projects were in progress.

Over 40 different Universities, several Institutes of the National Research Council<sup>4</sup> (CNR) and some centers of the National Agency for New Technologies, Energy and the Environment<sup>5</sup> (ENEA) along with private/public research centers, some spin offs and small private companies are involved in projects. Most of those projects have been supported through public funds provided on a competitive basis by the Ministry for the University and Research, the Ministry for Productive activities and the Ministry for the Environment and, to a minor extent, by some local institutions, small biotech or chemical companies, or the European Union<sup>6</sup>.

Most recently, researchers and industries involved in industrial biotech activities can obtain funds by participating in calls for proposals launched by the Ministry for Education<sup>7</sup> the Ministry for Industrial development (cf. below access to finance) and the Ministry of Agriculture<sup>8</sup>.

There are also some calls for proposals related to bioenergy production that have been opened or will open in different regions of the country (ex: Piemonte, Lombardia, Emilia Romagna, Liguria, Veneto). Generally, industrial biotechnology oriented calls represent around 10% of all calls.

### B. Pilot and demonstration plants

In Italy, very few pilot infrastructures to demonstrate the technologies and to test new feed-stock and pre-treatment processes exist. Furthermore, only large Italian companies (Novamont, ENI, Mossi&Ghisolfi) and some companies in the Federchimica cluster are able to develop their own infrastructures. The majority of these industrial pilot plants are private and restricted to own company uses.

#### i. pilot plants

<sup>2</sup>

<http://www.eng.unibo.it/PortaleEn/Research/Services%20for%20teachers%20and%20researchers/European%20funding/I-T-SusChem.htm>

<sup>3</sup> <http://www.era-ib.net/>

<sup>4</sup> [http://www.cnr.it/istituti/Istituti\\_eng.html](http://www.cnr.it/istituti/Istituti_eng.html)

<sup>5</sup> <http://www.enea.it/>

<sup>6</sup> <http://www.eng.unibo.it/NR/rdonlyres/60277CAF-E696-49B2-A73D-56B3D46DAFE3/70695/IndustrialBiotechnologyVisionDocument.pdf>

<sup>7</sup> i.e., the PRIN projects (Research Projects of National Relevance) launched by the end of 2007 with an overall budget of €95 million offered the opportunity to national interuniversity or University-CNR consortia to apply on subjects of their interest. Around 5 % of submissions concerns industrial biotech projects. <http://prin.miur.it/>

<sup>8</sup> at the end of 2007, a program on the use of crops and biomass for producing bioenergy and chemicals was launched with around €15 million budget.

There are only a few multipurpose pilot plants in Italy aimed at developing IB processes. These pilot plants were build up and are currently maintained mostly with private funds and partially through R&D funds coming from regional, national and EU RTD programs.

**a) Public agency (open to all)**

**Trisaia**

<b>R&amp;D Center of ENEA, Trisaia</b>	
General, products, feedstocks	Multidisciplinary centre equipped to perform research and development activities in a wide range of sectors: agro-biotechnology; laser applications; technology innovation for industry; renewable energy sources (biomass and solar energy); metrology; environmental monitoring; radioprotection; rare earths; waste treatment.
Services	
Financing	
Contact	Director: Dr. Donato Viggiano, <a href="mailto:donato.viggiano@trisaia.enea.it">donato.viggiano@trisaia.enea.it</a> <a href="http://www.enea.it/com/ingl/center/Trisaia_Research_Centre.pdf">http://www.enea.it/com/ingl/center/Trisaia_Research_Centre.pdf</a>

**b) Technological Park**

**Canavese**

<b>Bioindustry Park Canavese SpA, Canavese</b>	
General, products, feedstocks	Mission of the Park is to promote and develop biotechnological research hosting enterprises who want to set up research and pilot production in the chemical, pharmaceutical, diagnostic, veterinary, food, cosmetic, bioengineering and information science fields.
Services	
Financing	
Contact	<a href="http://www.bioindustryPark.eu/">http://www.bioindustryPark.eu/</a>

**Trieste**

<b>AREA Science Park, Trieste</b>	
General, products, feedstocks	The key science and technology sectors in AREA Science Park are life sciences (biotechnology, biochemistry, biomedical technologies) and physics (nanotechnologies, new materials), as well as electronics and informatics
Services	
Financing	
Contact	<a href="http://www.area.trieste.it/">http://www.area.trieste.it/</a>

**Lodi**

<b>Park Padano, Lodi</b>	
General, products, feedstocks	Specialised in agrifood biotech but with a small activity in the industrial biotech sector
Services	
Financing	
Contact	<a href="http://en.tecnoparco.org/">http://en.tecnoparco.org/</a>

### c) Private – small companies and consortium

#### Avezzano

<b>CRAB Consortium, Avezzano</b>	
General, products, feedstocks	Its activities are: biotechnological products and processes development and optimization, provision of chemical, biochemical and microbiological analysis in agro-industry, food-industry and environmental fields. Production of microorganisms, vitamins and proteins from natural sources.
Services	Processes Engineering Consisting of a Variable Configuration Multipurpose Pilot Plant that includes several Operative Units interconnected in several ways (bioreactors; filtration; chromatographic units; supercritical extraction plant; distillation plant; dehydration plants; centrifugation unit; full milk processing plant; homogenization units; 100 m2 clean-room class 100 SED STD). - Analytical qualitative and quantitative control Chemistry and biology laboratories include modern equipments for characterization of raw materials and bio-transformation products and for validation of food products.
Financing	Private
Contact	<a href="http://www.crab.abruzzo.it">http://www.crab.abruzzo.it</a>

#### Bertinoro

<b>BioSphere SpA, Bertinoro</b>	
General, products, feedstocks	Biosphere is a company in industrial biotechnology, whose core business is the development of new fermentation processes for the production of small molecules, intermediates, enzymes and ingredients. Biosphere offers to other companies, in the pharmaceutical, cosmetic and agro-food sectors a flexible and customized service for R&D and production. The company's modern and versatile equipment is designed to perform fermentations from lab to pilot and industrial scale, and for the recovery and purification of the products.
Services	The pilot plants and production facility are designed to work with microorganisms up to biosafety level 2 and genetically modified microorganisms belonging to Class 1, in accordance with EU Council Directive 98/81/EC. The fermentation facility includes fermenters of different size, from the laboratory scale (1 and 15 litres) to the pilot (150 litres) and pre-industrial scale (1.500 litres), equipped with temperature, pH, pO <sub>2</sub> , air, pressure, stirring controls and regulations. The downstream equipment includes centrifugals, microfilters, ultrafilters, reverse osmosis, filter-driers and bell filters. Chromatography and lyophilisation tests can be performed on a laboratory scale. The chemical and microbiological laboratories are equipped with HPLC, UV-VIS and FT-IR spectrophotometers for the analysis and identification of components, Atomic Absorption spectrophotometer for metal trace analysis, microscopes, static and orbital incubators.
Financing	
Contact	Operative Manager, Marco Pistocchi: <a href="mailto:info@biospherespa.com">info@biospherespa.com</a> <a href="http://www.biospherespa.com">http://www.biospherespa.com</a>

#### Trieste

<b>Spin, Trieste</b>	
General, products, feedstocks	Spin-off of the University of Trieste founded in 2007 by a group of scientists of the Department of Pharmaceutical Sciences, the University of Trieste and Resindion S.r.l.
Services	Services for Biocatalysed Process Development, Prediction of Thermodynamics of Biocatalysed Reaction Systems, Enzyme Selectivity, Enzyme Thermostability,

	Biocatalyst development Provides support to chemical, pharmaceutical and food industry in the implementation of sustainable processes.
Financing	
Contact	<a href="http://www.sprintechnologies.com">http://www.sprintechnologies.com</a>

#### **d) Private – large companies and consortium**

A few large companies (Novamont, Mossi&Ghisolfi, ENI) have developed pilot plants. These plants are closed.

##### **ii. demonstration plants**

Private investors develop demonstration plants as this is considered useful for small companies, academia and RTD Centres as they look to improve their market share. These demonstration plants are restricted.

## II. POLICY

### A. Policies and regulations

Until now, Italy has not developed specific legislation/regulations to support the development and/or market penetration of bio-based products.

The Italian Presidency of Council of Ministers established in 1998 a Committee for Biosafety, Biotechnology and Life Sciences<sup>9</sup>. The Committee, chaired by Prof. Leonardo Santi, set up in 2005 a Working Group on Industrial Biotechnology. This group worked during 2006 and developed several documents on industrial biotechnology and its potentials<sup>10</sup>. It studied the biotech applications used for industrial processes. The main focus was given to the new biotech applications for the traditional industry sectors, such as chemistry, textile and food.

The Working group has been re-established at the end of 2007. It is now chaired by Prof. Enrico Cernia. Several members of the scientific committee of the IB section of the Italian technology Platform SusChem join this working group.

With the main Italian industrial biotech and chemical industries, the Working group identifies short term RTD priorities in the area of integrated biorefinery on national biomasses; agro-food bio-products; environmental biotech for the remediation of contaminated sites.

The working group objective's is to promote priorities towards different Italian Ministries in order to have them mentioned in the coming Government funding programs. The Working group also aims to promote national policies and regulations that support the sector and the bio-based economy in general.

### B. Public procurement

There is no specific public procurement for bio-based products at the moment.

Italian decision makers are currently working on National Action Plan on Green Procurement. Biofuels produced from Biomass and organic wastes through biotech procedures should be included in the National Action Plan.

### C. Standardisation, labelling and certification

Currently, there is no recognised national labellisation, certification or standardisation scheme for bio-products in Italy.

Italian decision makers are also working on the standardization, labelling and certification of biobased products. The Committee for Biosafety, Biotechnology and Life Sciences of the Italian Presidency of Council of Ministers is involved in the discussion.

There are a few companies, such as Novamont, which developed a voluntary certification or labelling scheme on the biodegradability, the compostability and the biobased nature of their products.

### D. Access to finance

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<sup>9</sup> <http://www.governo.it/biotecnologie/>

<sup>10</sup> <http://www.governo.it/biotecnologie/documenti.html> (cf. 2006)

“Industria 2015”<sup>11</sup> funding programme has been launched at the end of 2007 with an overall budget of around €500 million. The programme funds 3 years R&D projects. Projects have to respond to given proposals. The program is for small and large companies, interested in scaling up promising processes in the area of biofuels production, fine chemical and biomaterial production, as well as agro-food byproducts and waste valorization. It plans to co-finance projects up to 50% (also up to 75% in the case of demonstration activities) of their costs. About 10% of the calls for proposal are in the industrial biotechnology area. The Ministry for economical development takes care of the calls for project management.

This programme is specifically addressed to support large initiatives (such as building of large scale demonstrators). Only large Italian Companies (Novamont, ENI, Mossi&Ghisolfi) and some companies of the Federchimica cluster are developing such initiatives.

### **E. Communication**

The national Technology Platform Suschem and the Committee for Biosafety, Biotechnology and Life Sciences of the Italian Presidency of Council of Ministers promote several events on IB priorities and potential in the Country.

These events (meetings, workshops, conferences) are usually held in fairs, congresses, and stakeholder meetings. They represent an occasion to highlight and stress the potential of current bio-products (biobased chemicals, materials and biofuels) in the main industrial sectors of Italy (chemistry, textile, Pharma, Cosmetics, Food, and energy).

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<sup>11</sup> <http://www.industria2015.ipi.it/>