NOVAMONT: A CIRCULAR APPROACH TO BIOECONOMY

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NOVAMONT ROOTS (1989)

MONTEDISON

MONTECATINI CHEMICAL TECHNOLOGIES

ERIDANIA-BEGHIN SAY AGRICULTURAL RAW MATERIALS

FERTEC
FERRUZZI RESEARCH AND TECHNOLOGIES

INTEGRATION OF CHEMISTRY, AGRICOLTURE AND ENVIRONMENT

Living Chemistry for Quality of Life.

R&D Projects with focus on materials, cobuilders for cleaning, biofuels, pulp additives, chemical intermediates from hydrocracking, etc.

NOVAMONT S.P.A.

Focus on materials (complexed starch)
Invention of Mater-Bi

THE PILLARS OF OUR DEVELOPMENT MODEL

BIOECONOMY AS TERRITORIAL REGENERATION

NOVAMONT is the international leader in the **bioplastics** sector and in the development of **biochemicals** and **bioproducts** obtained from the integration of chemistry, agriculture and the environment.
It promotes a **model of the bioeconomy** as a factor of **territorial regeneration**, based on three pillars:

REGENERATION OF DEINDUSTRIALISED SITES

Reindustrialisation of no longer competitive sites thanks to **proprietary technologies first in the world** in order to create "**bioeconomy infrastructures**", integrated with the territory and interconnected

INTEGRATED AGRICULTURAL VALUE CHAIN

Development of **low impact value chains** through the valorisation of marginal land not in competition with food production, integrated in local areas and connected with the bioeconomy infrastructures

PRODUCTS CONCEIVED AS SOLUTIONS

Products and value chains are conceived and designed to provide **unique** and **sustainable solutions** for specific environmental and social problems.
Elements of a system with broader impacts than the single product

OUR DNA

NOVAMONT: A GROUP WITH A TRIPLE VOCATION

INDUSTRIAL STRUCTURE

- Turnover: 170 mln/€
- >600 people
- 4 production plants
- 7 compounding lines
- 4 discontinuous and 1 continuous polymerization lines

RESEARCH & DEVELOPMENT

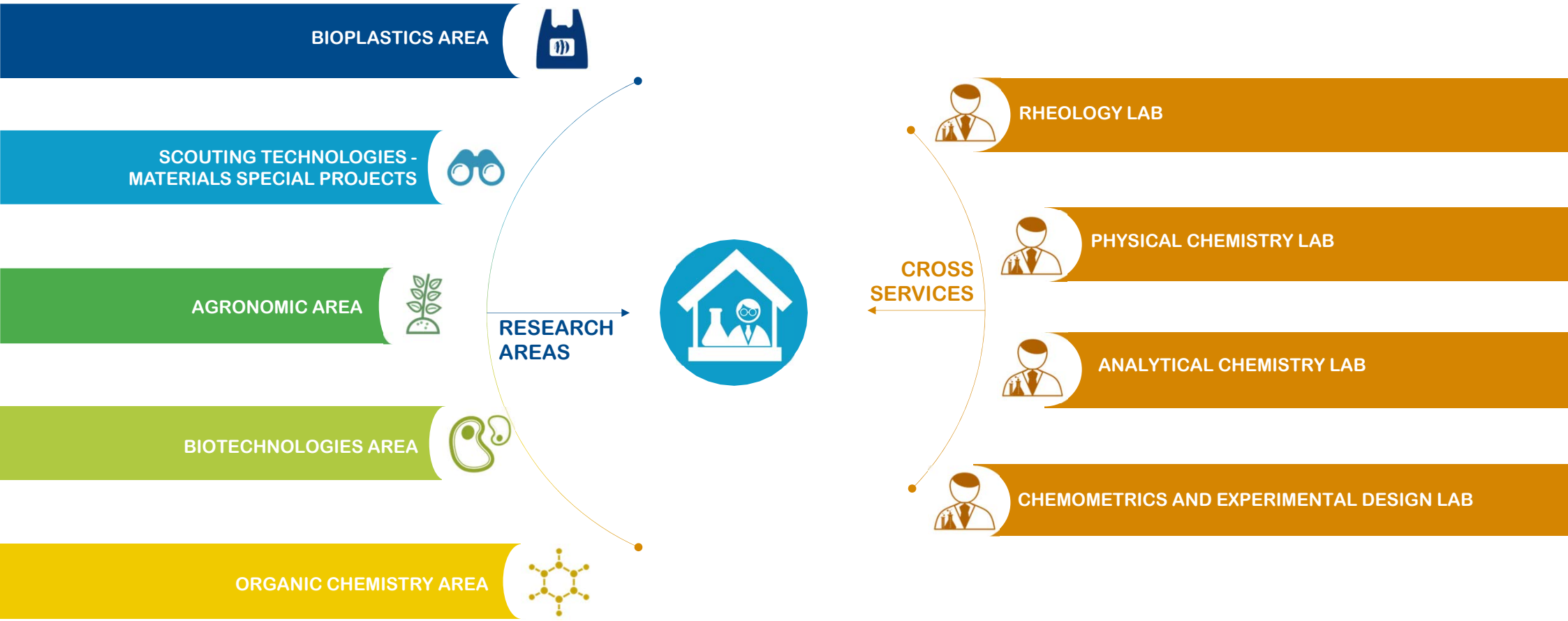
- 7,4% of investments compared to turnover
- 20% of people dedicated to research, development and innovation activities
- 4 world-first technologies
- ~ 1.000 patents

TRAINING CENTER

- 350 training activities since 1996 for young researchers and experts
- multidisciplinary training paths activated on complex projects

Data to 31/12/2016

RESEARCH AS DRIVER OF OUR INDUSTRIAL DEVELOPMENT



A COMPANY WITH ROOTS IN THE TERRITORY

THE NOVAMONT GROUP IN ITALY

HEADQUARTER AND RESEARCH CENTRE
Novara - Piedmont

MATER-BIOTECH BIOBDO PRODUCTION
Adria (RO) - Veneto

MATER-BI PRODUCTION AND RESEARCH ON INTERMEDIATES FROM RENEWABLE RESOURCES
Terni - Umbria

MATER-BIOPOLYMER ORIGO-BI PRODUCTION BIOPOLYESTERS
Patrica (FR) - Lazio

BIOTECHNOLOGY RESEARCH CENTRE
Piana di Monte Verna (CE) - Campania

MATRÌCA PRODUCTION OF CHEMICAL INTERMEDIATES FROM RENEWABLE RESOURCES
Porto Torres (SS) Sardinia

HEADQUARTERS

PRODUCTION SITES

R&D CENTRES

EXPERIMENTAL FIELDS

NOVAMONT'S SITES

SUBSIDIARY COMPANIES

JV NOVAMONT/VERSALIS

FROM NOVAMONT RESEARCH IT BECOMES MATER-BI

THE CONTROLLED, INNOVATIVE, GUARANTEED BIOPLASTIC

RENEWABILITY

Use of **renewable raw materials** (dedicated crops, scraps)

BIODEGRADABILITY AND COMPOSTABILITY

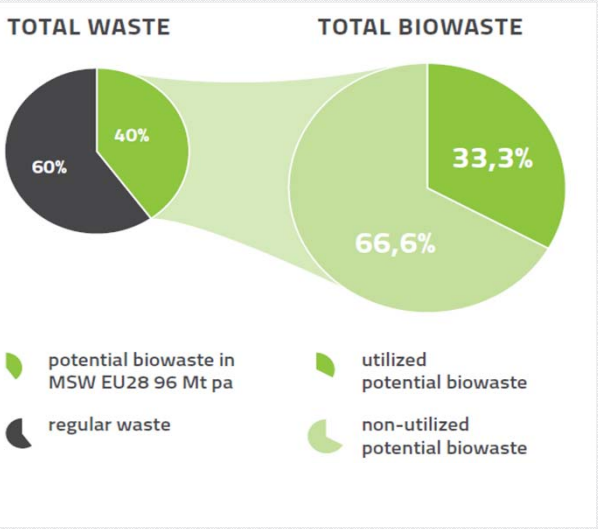
Biodegradable with the possibility of the organic recycling (composting and anaerobic digestion)

- Solution for specific environmental problems
- Added value both in use and in the end-of-life
- Biodegradation in composting, soil and marine environment
- Accredited and certified by international bodies as conforming to European standard EN 13432
- Controlled bioplastic as a result of a constant innovation towards attaining the highest and most stringent quality standards

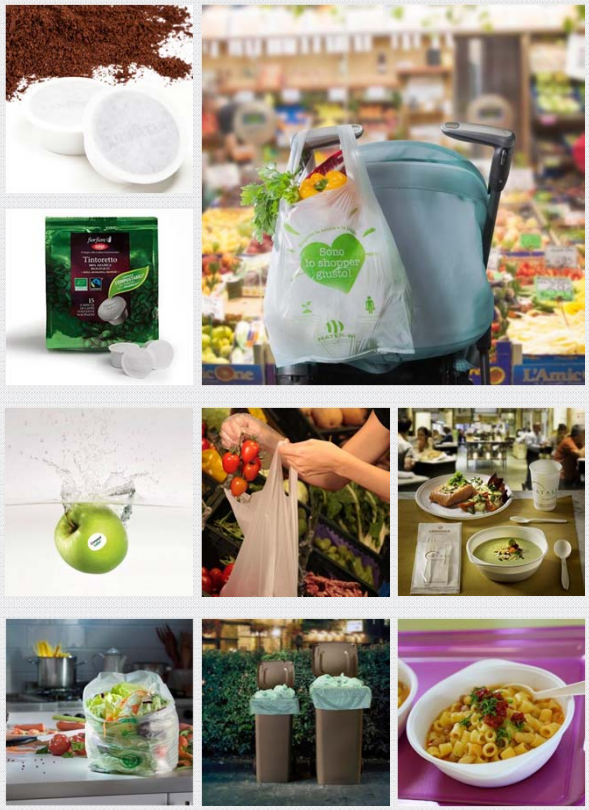
TURNING A PROBLEM INTO AN OPPORTUNITY

SOURCES: EUROPEAN COMPOST NETWORK, BUDIMAN MINASNY ET AL. (2017)

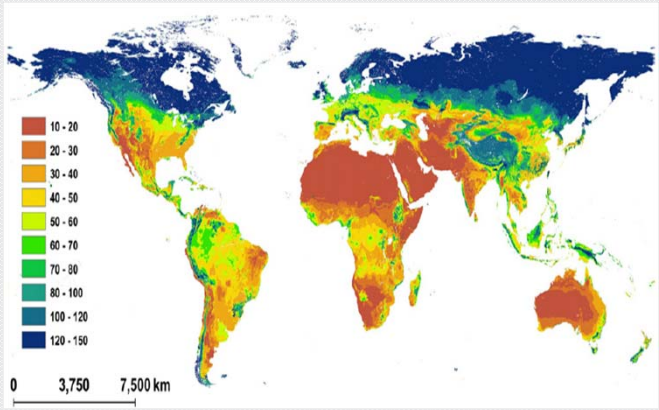
ORGANIC WASTE IN LANDFILL



ORGANIC WASTE SEPARATE COLLECTION INFRASTRUCTURES AND BIODEGRADABLE BIOPLASTICS IN LIMITED AND SPECIFIC APPLICATIONS



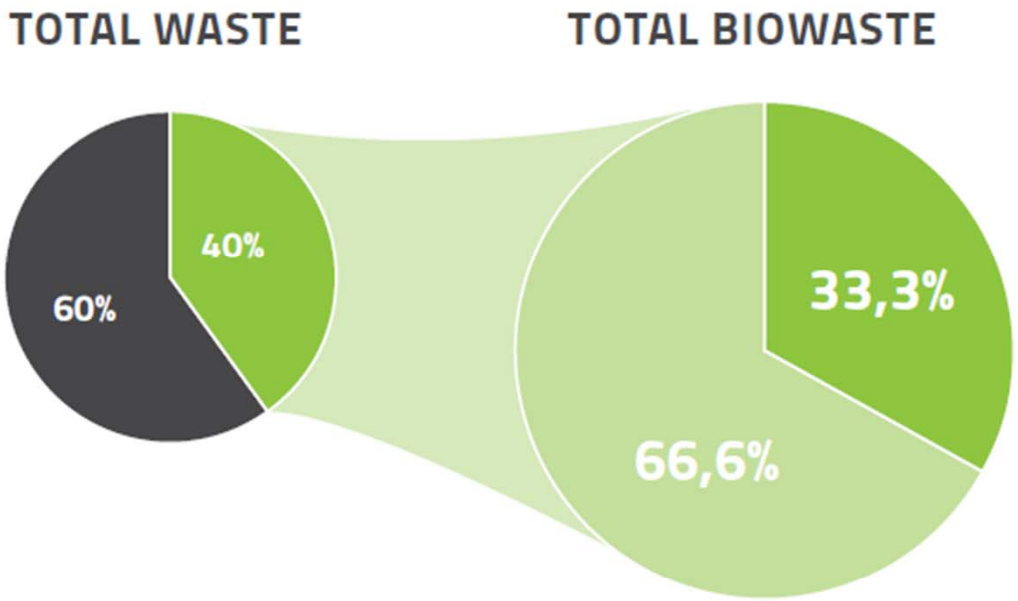
COMPOST AS DRIVER FOR SOILS FERTILITY



BIOWASTE AS AN ECONOMIC GROWTH DRIVER

ECN (EUROPEAN COMPOST NETWORK) FACTSHEET

BIOWASTE IN EUROPE



POTENTIAL DIRECT JOBS IN THE BIOWASTE SECTOR

RURAL AREAS
1 JOB / 1380t biowaste

URBAN AREAS
1 JOB / 4500t biowaste

APPLICATION SECTORS OF MATER-BI

FOODSERVICE

RETAIL

AGRICULTURE

SEPARATE COLLECTION

PACKAGING

MATER-BI IN RETAIL

BIODEGRADABLE AND COMPOSTABLE SOLUTIONS

MATER-BI IN FOODSERVICE

BIODEGRADABLE AND COMPOSTABLE SOLUTIONS

MATER-BI IN AGRICULTURE

INNOVATIVE SOLUTIONS BIODEGRADABLE IN SOIL





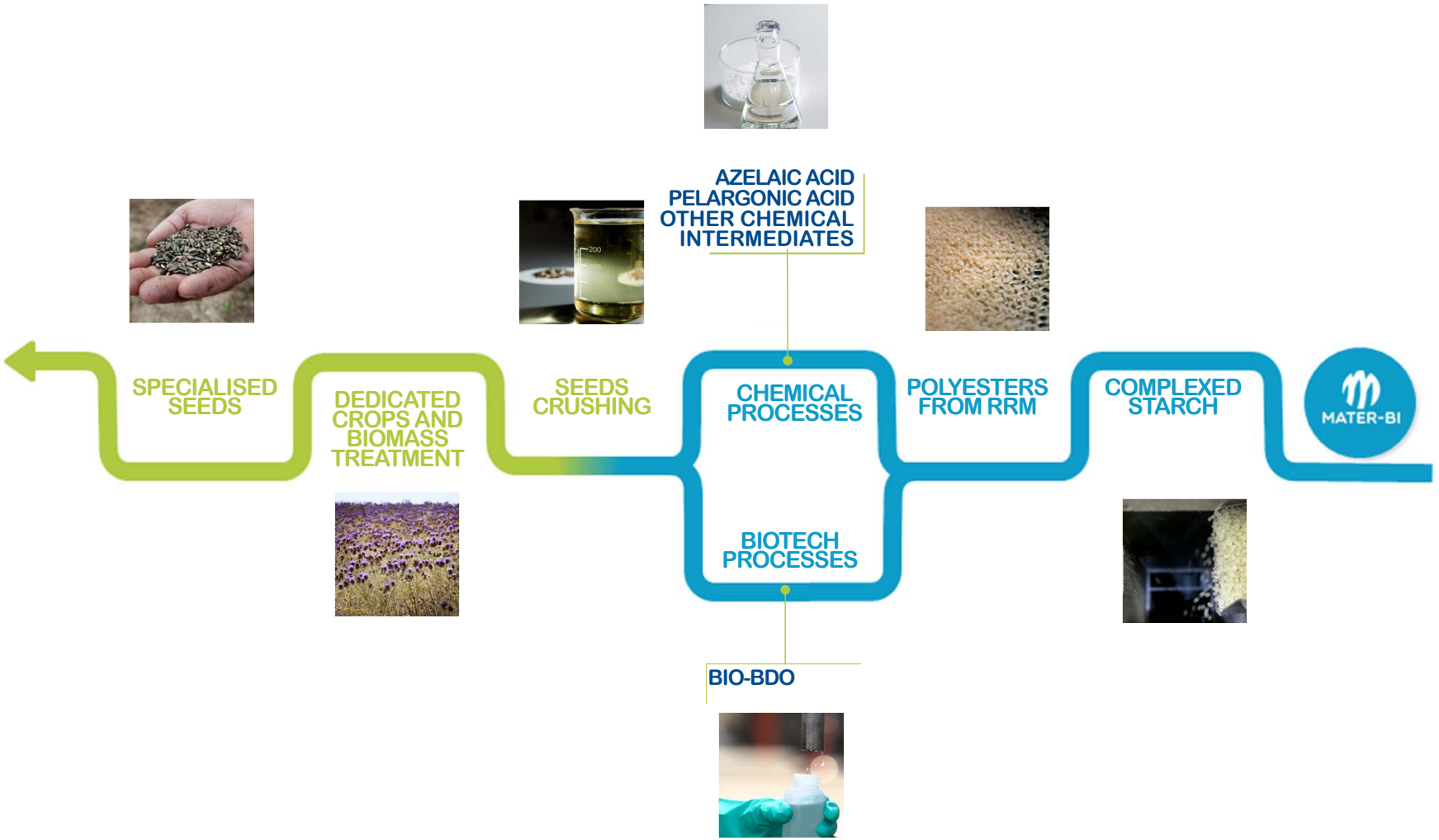






NOVAMONT PROPRIETARY TECHNOLOGIES

UPSTREAM INTEGRATION 1996-2017



MAKING OUR OWN POLYESTERS: ORIGO-BI FROM MATER-BIOPOLYMER

FACTS & NUMBERS

- ORIGO-BI production, range of biopolyesters from vegetable oils used to improve the technical and environmental characteristics of MATER-BI
- Production capacity 50Kton/year to be doubled starting from March 2018
- Development of new biopolymers
- Extension: 70.000 m^2
- 87 people

Data to 31/12/2016

MAKING OUR OWN MONOMERS: BIOBUTANEDIOL FROM MATER BIOTECH

First dedicated industrial plant at world level for the **production of butanediol** (1,4 BDO) directly **from sugars**

Regeneration of the former BioItalia/Ajinomoto site in Adria, after the shut-down of the fermentation plant in 2006

Integration of Novamont's know-how and competences in the development of **low-impact production processes** through an innovative technology developed by Genomatica, leader in the industrial biotechnologies

Investment > **100 million euro**

300 people and **100 companies** engaged in the reconversion of the plant (2014-2016)

MAKING OUR OWN MONOMERS : AZELAIC ACID FROM MATRICA

Joint venture 50:50 **NOVAMONT/Versalis** (Eni)

Biorefinery integrated in the local area born from the partial conversion of a no more competitive industrial site

NOVAMONT proprietary technologies first in the world for the production of high added value bioproducts

Bioproducts for many different market segments: bioplastics, biolubricants, personal care products, plant protection products and additives for the rubber and plastics industry

Development of an **agro-industrial value chain** in the territory together with local farmers

Partnerships with universities, research institutes, schools and local institutions

NEW BIOPRODUCTS FOR NEW MARKETS

NOT ONLY MATER-BI: CUSTOMIZED SOLUTIONS IN SENSITIVE SECTORS: THE ENVIRONMENT AND HEALTHCARE

MATROL-BI

- Biolubricants and greases rapidly biodegradable from renewable resources
- Optimal solution for environmental and sensitive areas such as agricultural, forest, marine or urban areas

CELUS-BI

- Innovative and sustainable products for cosmetic sector and for personal care
- Made through low impact production processes and with raw materials from European value-chains

BIOHERBICIDES

- Solutions for the management of weed control that combine productivity, safety and respect for the environment
- Based on pelargonic acid from vegetable origin for the non-selective control of vegetation

THE CARDOON AND THE AGRICULTURAL VALUE CHAIN

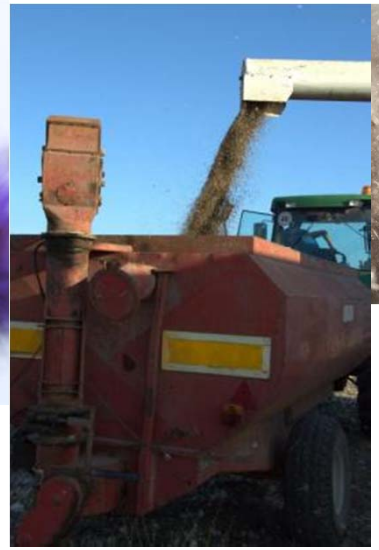
2015: **NOVAMONT**, **Coldiretti** and **Consorzi Agrari d'Italia** (CAI) agreement, for the creation of innovative agro-industrial value chain of bioplastics and bio-based products

New model of **cooperation between** an innovative industry and the **local farmers** for the territorial regeneration

>5 years of experimental activities on dry crops: agronomic protocols, mechanization, logistics, genetic improvements, etc.

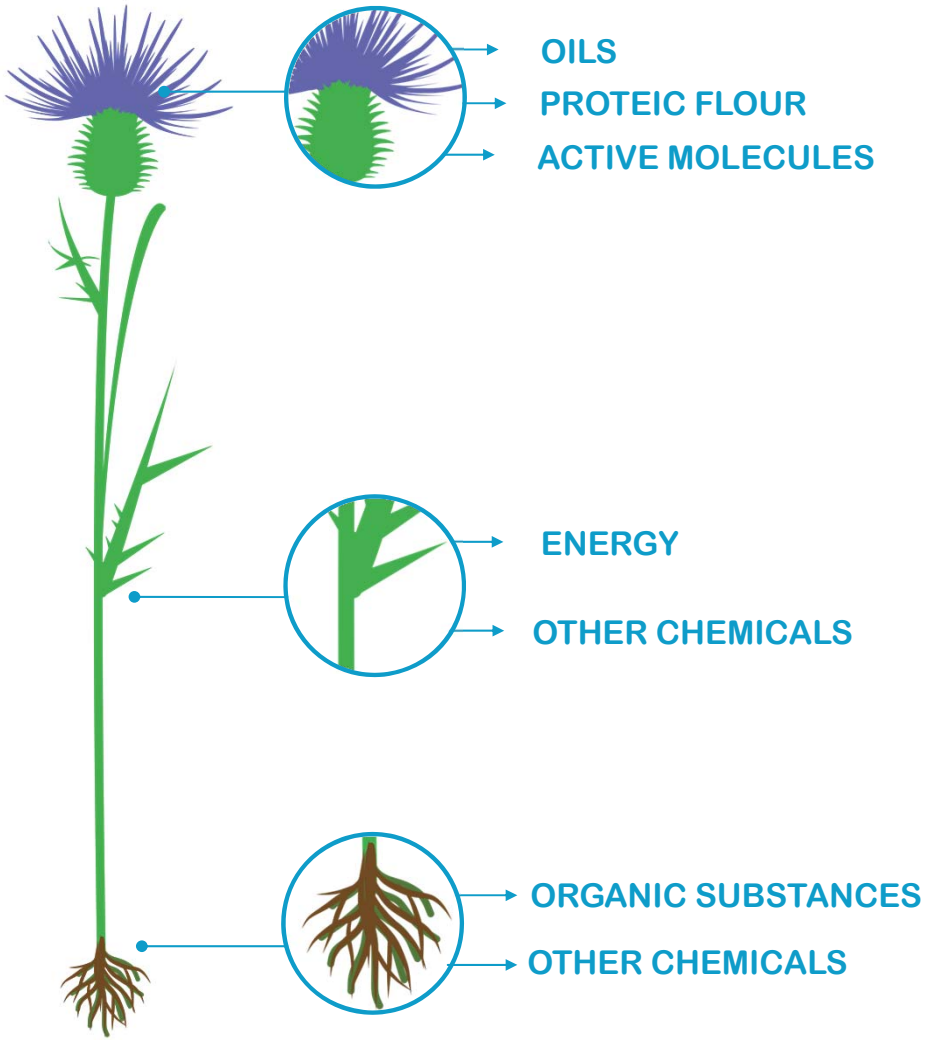
Cardoon (Cynara cardunculus L. var. Altilis): **pluriennal low-input crop** suitable to the Mediterranean climate, requires no irrigation and **grows on arid land** inappropriate for traditional crops

Added value for the players in the sector, **cascading use of resources** and development of new innovative products



THE DIFFERENT USES OF CARDOON

CASCADING USE OF RESOURCES



OPPORTUNITIES FOR FARMERS, SHEPHERDS AND OPERATORS THANKS TO THE CARDOON VALUE CHAIN ...

- Exploitation of marginal areas (just in Sassari province 70,000 ha of harable land lost from 1982 to 2010)
- Local production for protein for animal feed
- Efficiency and energy independence
- Supplementary income for farmers

.... AND TO THE BIOPLASTICS AND BIOCHEMICALS VALUE CHAIN

- Reduction of environmental impact for soil, water and air though the use of:
  - biodegradable mulch films
  - pelargonic acid for weed control
  - biolubricants

CONCLUSIONS

INFRASTRUCTURES IN THE LOCAL AREAS AS A KEY ELEMENT FOR THE BIOECONOMY

THE CONTRIBUTION OF NOVAMONT

HEADQUARTER AND RESEARCH CENTRE

Novara - Piemonte

MATER-BIOPOLYMER (78% NOVAMONT)

PRODUCTION OF POLYESTERS FROM VEGETABLE OILS

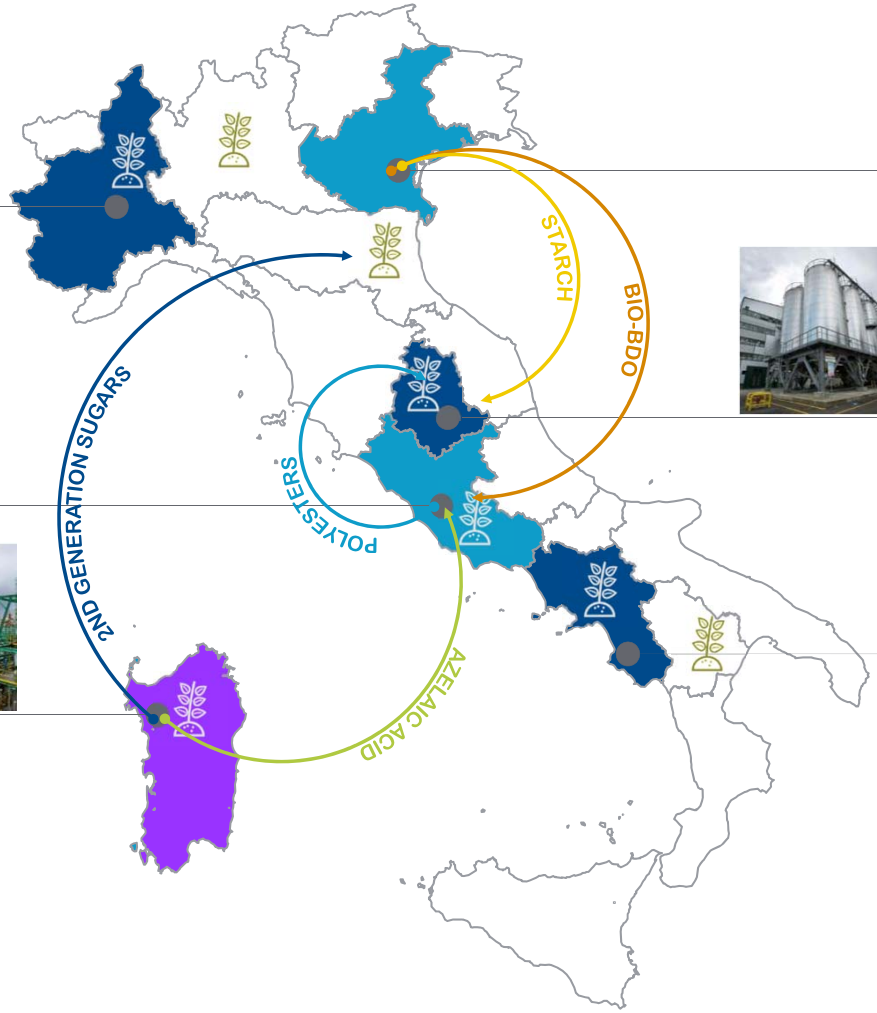
Patrica (FR) - Lazio

MATRÌCA 50:50 JV NOVAMONT-VERSALIS

FLAGHIP FOR AZELAIC AND PELARGONIC ACIDS, THEIR ESTERS, PLASTICISERS, BIOHERBICIDES, BASIS FOR BIOLUBRICANTS

INTEGRATED AGRICULTURAL VALUE CHAIN

Porto Torres (SS) - Sardegna



MATER-BIOTECH (100% NOVAMONT)

FLAGSHIP FOR 1,4 BDO PRODUCTION THROUGH FERMENTATION PROCESSES

Adria (RO) - Veneto

MATER-BI PRODUCTION AND R&D ON ON INTERMEDIATES FROM RRM

Terni - Umbria

BIOTECHNOLOGY RESEARCH CENTRE

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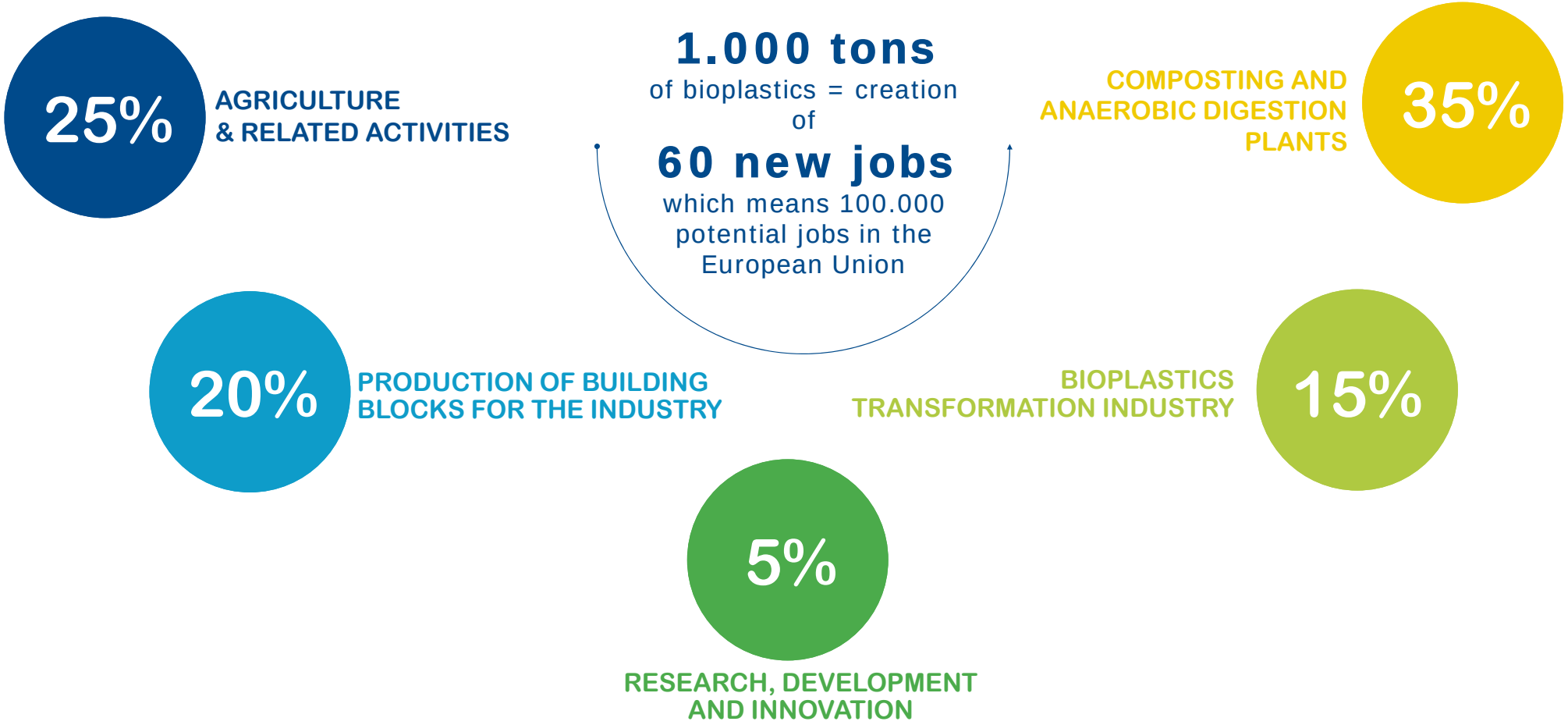
JOBS CREATION ALONG THE VALUE CHAIN



NOVAMONT'S INTEGRATED VALUE CHAIN

A REFERENCE CASE FOR THE BIOECONOMY STRATEGY AND CIRCULAR ECONOMY IN ITALY AND EUROPE

READY FOR EXPLOITATION IN CONNECTION WITH THE OPPORTUNITIES OF BIOECONOMY, CIRCULAR ECONOMY, DECARBONIZATION PROGRAMS IN EUROPE, MEDITERRANEAN REGIONS, USA, CANADA AND SOUTH AMERICA

EU Inventor of the Year 2007 for the invention of bioplastics and their industrial development

Winner of the **First EU flaship project** launched by Horizon 2020 EU Innovation Program

Member of first and second **Bioeconomy Panel** of the European Commission

Member of the **High Level Group** of Commissioner Moedas **for the Decarbonization of the EU**

Cofounder and President of the **Italian Green Chemistry Cluster**. The Cluster is official member of the interministerial table which produced the Italian Bioeconomy Strategy

Novamont investment plan is part of the **Junker Program** and validated by the **European Bank of Investment**

Novamont has been among the 3 companies selected by Italy to represent the Italian Industry in the **2017 G7 Environment meeting**. Novamont has also been the coordinator of the **G7 Industry side event.**

“The challenge of our millennium is in the balance between the technical means that humanity possesses and the wisdom in how we will make use of them”

UMBERTO COLOMBO

LUIGI CAPUZZI

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THANK YOU FOR YOUR ATTENTION

www.novamont.com