

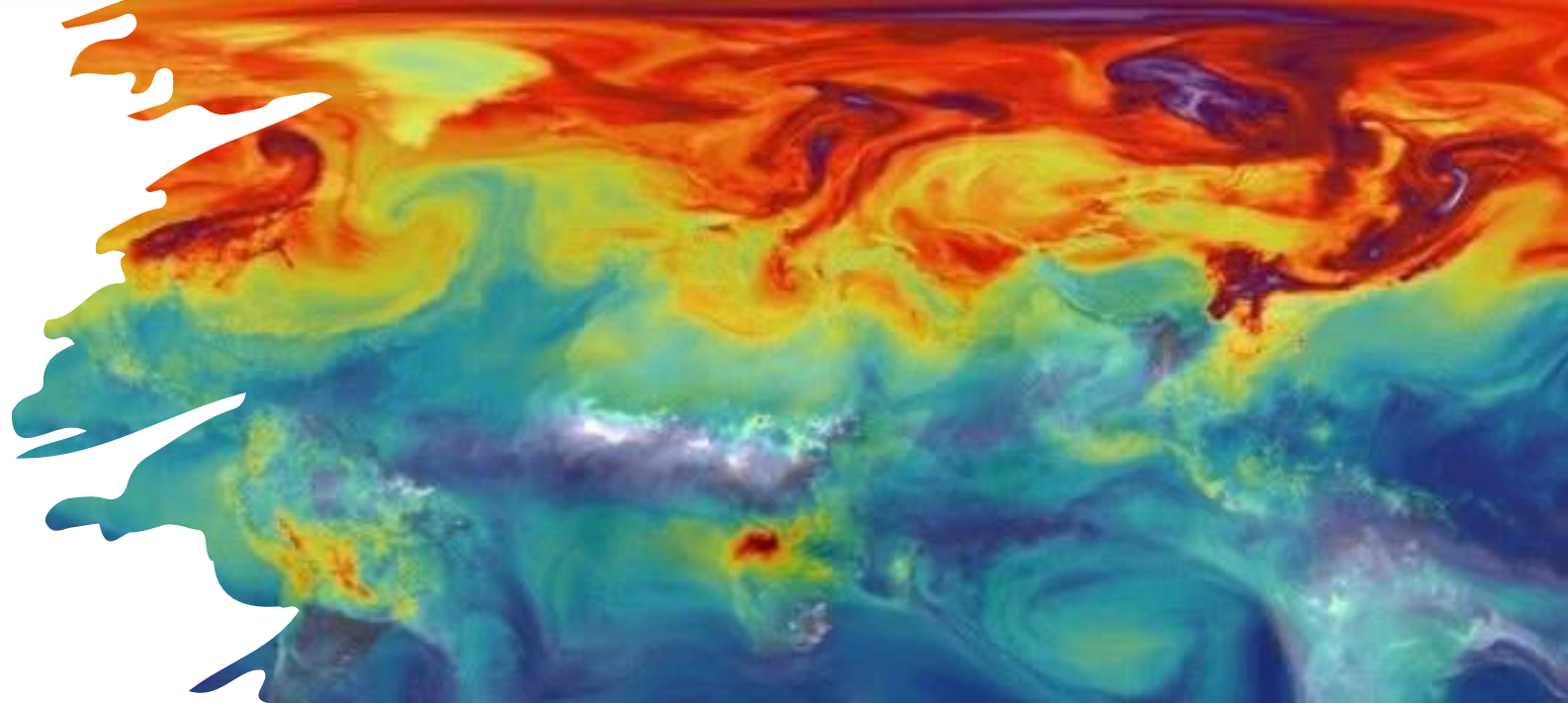
The circular bioeconomy: growth, jobs, resilience and wellbeing

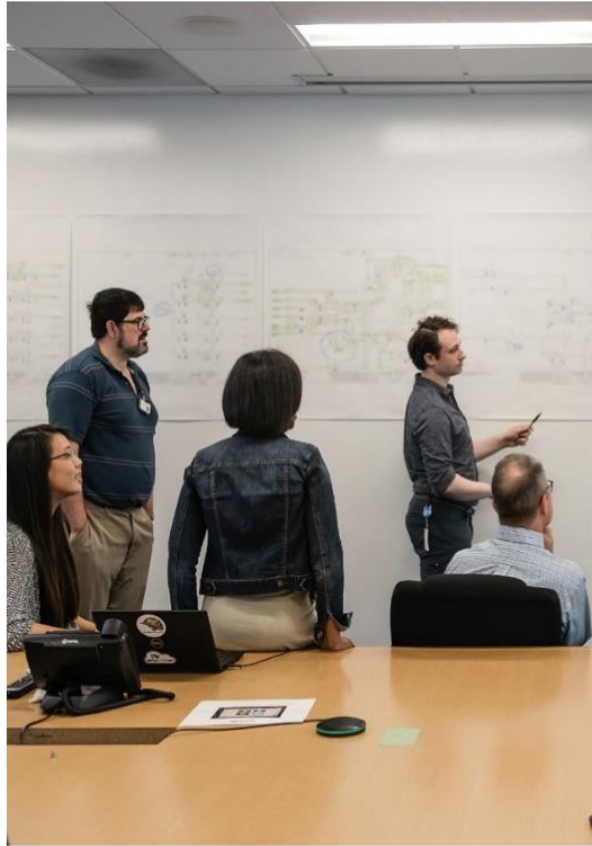
Mario Bonaccorso
Director





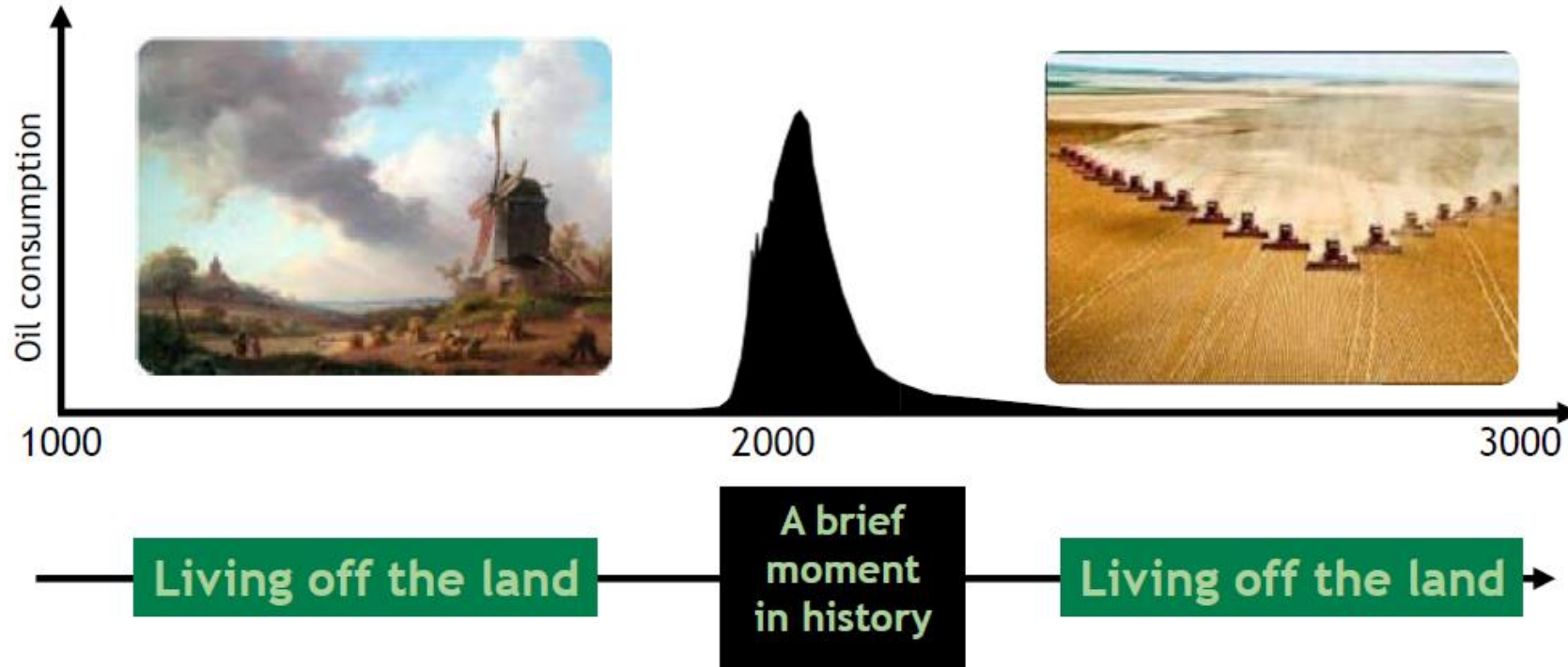
**Limitless
Potential**





By Integrating Engineering with Biology and AI

The Industrial Revolution of Third Millennium



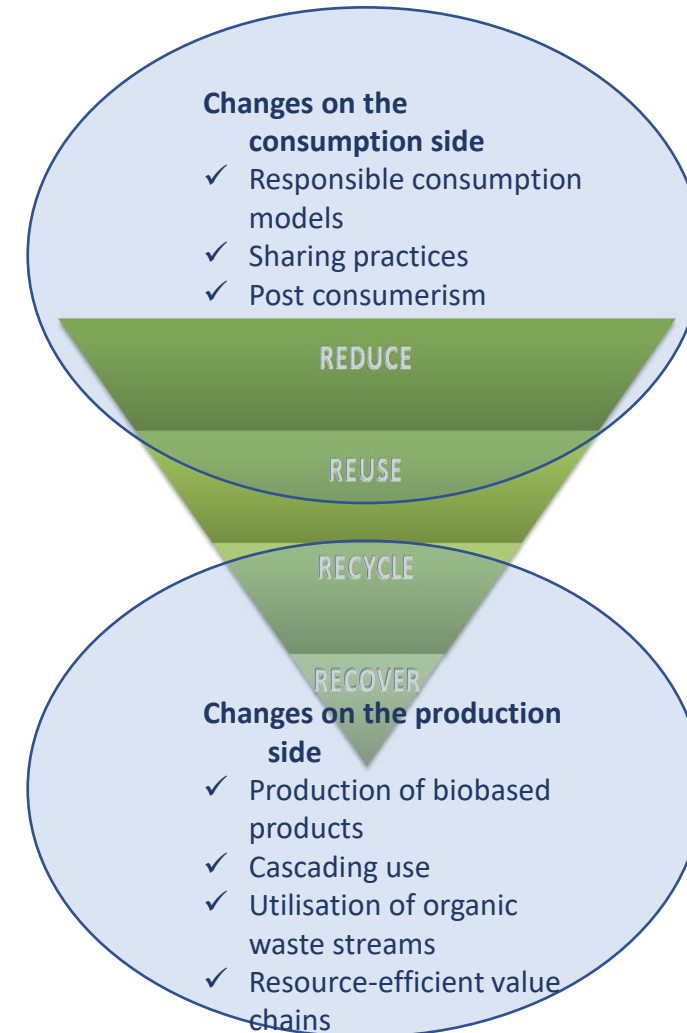
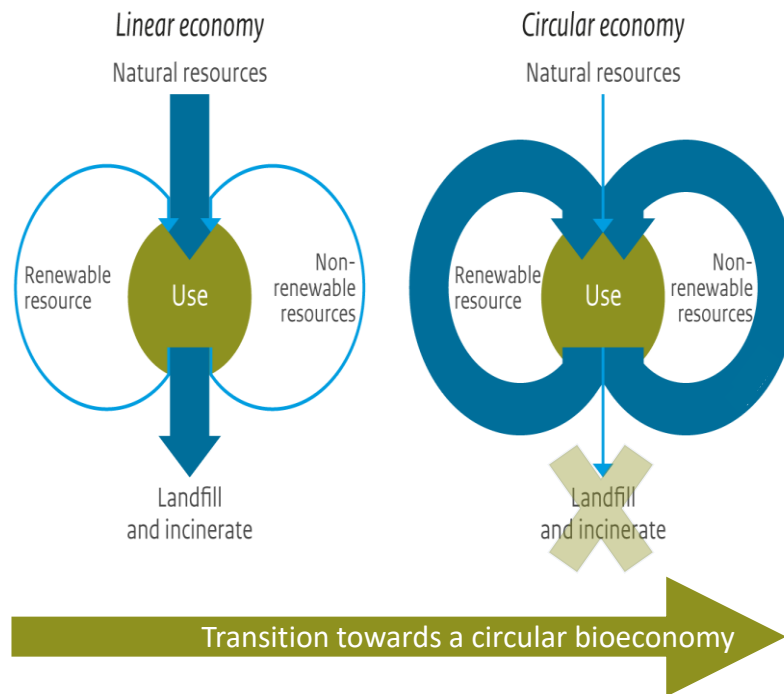
The Oil age will end long before we run out of oil
And while running out, it will become much more expensive

How to revert these trends?

The transition towards circular biobased economy

Framing the problem

From a linear to a circular bioeconomy



The three pillars

The European Strategy focuses on three key aspects:

- **developing new technologies and processes for the bioeconomy;**
- **developing markets and competitiveness in bioeconomy sectors;**
- **pushing policymakers and stakeholders to work more closely together.**

The Updated Bioeconomy Strategy: WHAT does the initiative aim to achieve?

Deliver	Deliver SUSTAINABILITY and CIRCULARITY in the EU Bioeconomy policy and practice
Link	Link the BALANCED USE of biological resources for food/feed/bio-based production with the PROTECTION and RESTORATION of biodiversity, ecosystems and natural capital on land and water.
Boost	Boost EU COMPETITIVENESS, JOBS and GROWTH, by renewed industrial base and modernised primary production, with strengthened BIO-BASED sectors
Focus on	Focus on IMPACT by FEW ACTIONS to embed in agriculture, marine, energy, environment, industrial, regional, education and R&I policies
Deploy	Deploy EU REGIONAL / LOCAL bioeconomies in rural, coastal, urban areas, across the entire EU





Drivers: check policy directions match the objectives

Present/frequent

- Climate change and climate obligations (nearly all)
- Lowering/ending oil dependence (especially Japan, Sweden)
- Rural development/regeneration
- Brownfield redevelopment/revitalising chemical industry (especially Canada and Italy)
- Resource efficiency (all countries)
- Waste valorisation (most case studies, especially China)

Demand for more sustainable chemicals and polymers is growing

Stakeholders driving the demand for more sustainable polymers



Public/consumer awareness

- increases with high media attention and campaigns



Regulatory pressure

- EU ban on single-use plastic products
- European Green Deal – roadmap for becoming climate-neutral by 2050



Brand owners' commitment

- continues to build up through sustainability pledges of industry players

Examples of brand owners' commitment

Ikea:

“People and Planet Positive to end our dependence on virgin fossil materials and fuels”

Henkel:

100% **recyclable**, reusable or compostable packaging by 2025

Cofresco:

100% **renewable** or recycled plastics in the long-term



Bio-based products in our daily life

Industrial Sectors

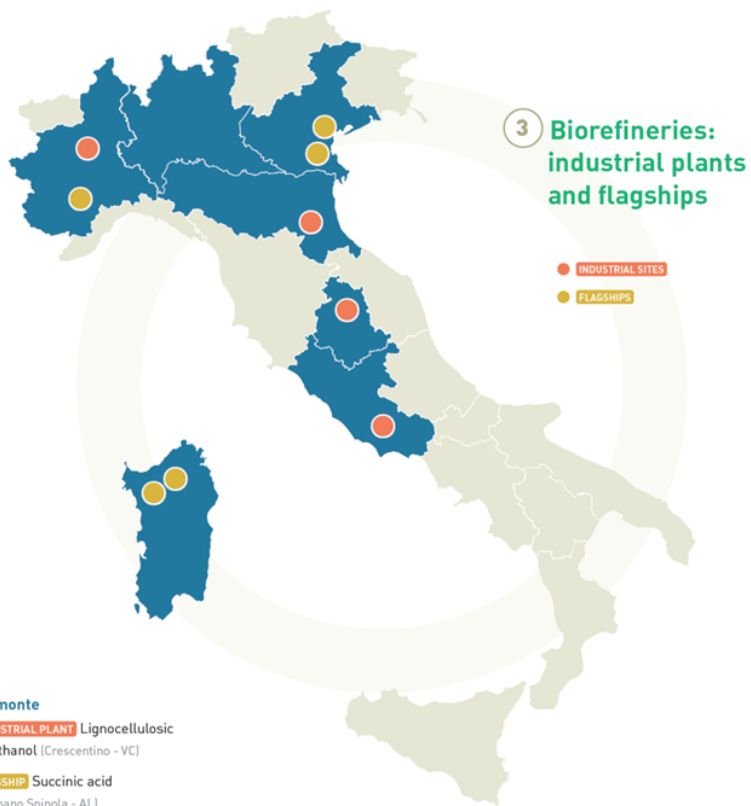
- Automotive
- Fashion and Textile
- Construction
- Food and Packaging
- Aviation and maritime
- Electronics
- Shoes and sports



Is Italy doing well in the Bioeconomy?

Bioeconomy in Italy

- **Relevant bioeconomy stakeholders**
- **Clusters development (SPRING)**
- **Research and development facilities to provide support**
- **Industry partners available as collaboration partners**
- **Educated workforce**
- **Several biorefineries with private investments which are more than 1.0 billion € and 1600 people employed**



3 Biorefineries: industrial plants and flagships

Piemonte

INDUSTRIAL PLANT Lignocellulosic bioethanol [Crescentino - VC]

FLAGSHIP Succinic acid [Cannano Spinola - AL]

Emilia Romagna

INDUSTRIAL PLANT based on vinification scraps and byproducts [Faenza - RA]

Veneto

FLAGSHIP 1.4 BD0 from renewable raw materials [Adria - RO]

FLAGSHIP for the production of biofuels from vegetable oils biomass [Porto Marghera - VE]

Umbria

INDUSTRIAL PLANT Bioplastics based on starch and polyesters from vegetable oils [Terni]

Lazio

INDUSTRIAL PLANT Biodegradable polyesters [Patrica - FR]

Sardegna

FLAGSHIP Bases for biolubricants and bioadditives for rubber [Porto Torres - SS]

FLAGSHIP Azelaic acid and pelargonic acid [Porto Torres - SS]

Piemonte

R&D CENTER Bioplastics and biochemicals from renewable raw materials [Novara]

R&D CENTER Chemistry from renewables [Novara]

R&D CENTER Biochemicals and biofuels from renewables [Rivalta Scrivia - AL]

PILOT PLANT Fatty alcohols [Rivalta Scrivia - AL]

PILOT PLANT Biomonomers [Novara]

EXPERIMENTAL FIELDS

Lombardia

R&D CENTER Biolubricants [San Donato Milanese - MI]

R&D CENTER Green chemistry, process engineering and biolubricants [Mantova]

PILOT PLANT for biobased butadiene [Mantova]

PILOT PLANT for biobased coatings [Cernusco sul Naviglio - MI]

PILOT PLANT for biomaterials from mycelia and scraps [Varese]

EXPERIMENTAL FIELDS

Veneto

R&D CENTER for new technologies development in the biotech-sector [Adria - RO]

Emilia Romagna

R&D CENTER Bioelastomers [Ravenna]

PILOT PLANT for PHA [Bologna]

EXPERIMENTAL FIELDS

Toscana

R&D CENTER and **PILOT PLANT** for biolubricants and biopesticides [Sesto Fiorentino - FI]

R&D CENTER, **PILOT PLANT** and **DEMO PLANT** on bioenergy, biofuels and bioproducts [Scarperia e San Piero - FI]



4 Biobased R&D centres, pilot plants, demo plants and experimental fields

Umbria

R&D CENTER, **PILOT PLANT** and **DEMO PLANT** Oleaginous crops and biolubricants from local crops [Terni]

EXPERIMENTAL FIELDS

Lazio

EXPERIMENTAL FIELDS

Campania

R&D CENTER on biotechnologies [Piana di Monte Verna - CE]

EXPERIMENTAL FIELDS

Puglia

R&D CENTER to characterize biomass and biomaterials, organic waste and sludge, residues and agro-food byproducts [Foggia]

PILOT PLANT Anaerobic digester plant, pyrolysis/gasification plant, photobioreactors plant [Foggia]

Basilicata

R&D CENTER for green biotechnologies [Matera]

PILOT PLANT for conversion of non-food cellulosic biomass into cellulosic glucose [Rotondella - MT]

2 PILOT PLANTS for steam gasification of biomass [Rotondella - MT]

EXPERIMENTAL FIELDS

Sardegna

R&D CENTER for biochemicals from vegetable oils [Porto Torres - SS]

EXPERIMENTAL FIELDS

Sicilia

PILOT PLANT for cellulose extraction from citrus for textiles [Caltagirone - CA]

EXPERIMENTAL FIELDS

Bioeconomy: A Compelling Sector to Drive Italy's Growth

Economic activities based on processes using biological sources to generate sustainable economic, social and environmental development

The Vision

Italy's bioeconomy to be a significant contributor to the nation's economy by 2030 and beyond

Bioeconomy has the potential to:

- Make the country more competitive internationally
- Creation of value added jobs
- Enhance food security and healthcare
- Create greener economy as the country shifts towards a low-carbon economy
- Increase Nation's income by exploiting our bio-resources to high value products using biotechnology

THANKS FOR YOUR ATTENTION

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Italian Circular Bioeconomy Cluster