

Firenze

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Industrial

# Biotechnologies

➤ supporting Green Chemistry Transition

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# The European framework

## The Chemical Industry

### KEY POINTS

- **Primary Market:** Manufacturing (31%)
- **Key Sectors:** Pharma, Automotive, Agri-food
- **The Trend:** Declining global competitiveness
- **The Rise:** Circular Bioeconomy



- Maintaining competitiveness requires a 20x increase in European biomanufacturing capacity by 2040
- Industrial biotechnology is classified by the EU as a Key Enabling Technology (KET) to support sustainable growth, reduce carbon footprints, and replace fossil sources

# A Paradigm Shift

- **From** mere replacement of **traditional production** to **Sustainability by Design**  
Industrial biotech as a core element of initial process design

## STRATEGIES & REGULATIONS

- Biotech Act
- Bioeconomy Strategy

## INTERNATIONAL NETWORKS

- SusChem
- EuropaBio
- Cefic
- Bio-based Industries Consortium

## NATIONAL NETWORKS

- Chimica Verde Bionet
- Federchimica
- Assobiotec
- Cluster Spring



# Trend & employment

Industrial biotech is the most rapidly growing branch of the biotechnology sector in Europe

**> 5 %**

**CAGR**

**7.5 X**

**Direct jobs**

compared to the  
UE average

**3.4 X**

**Indirect jobs**

for each direct  
job

**30 %**

**Italian**

biotech companies  
operate in the industrial  
biotechnology sector

# Market access =

## FEEDSTOCK & BIOMASS

- Supply chain variability
- Seasonality
- Competition with the food supply chain
- Soil degradation

## ECONOMIC SUSTAINABILITY

- Cost Gap: High energy intensity limits price competitiveness.
- Supply Chain: Resource instability affects scalability

## TECHNOLOGY

- EU Biotech Hub: Essential yet inadequate for full-scale industrialization
- Biotech-computing integration demands state-of-the-art infrastructure

A long way to go



## THE FUNDING GAP

- High capital requirements
- Specialized pilot platforms for scale-up needs
- Insufficient public and private investment

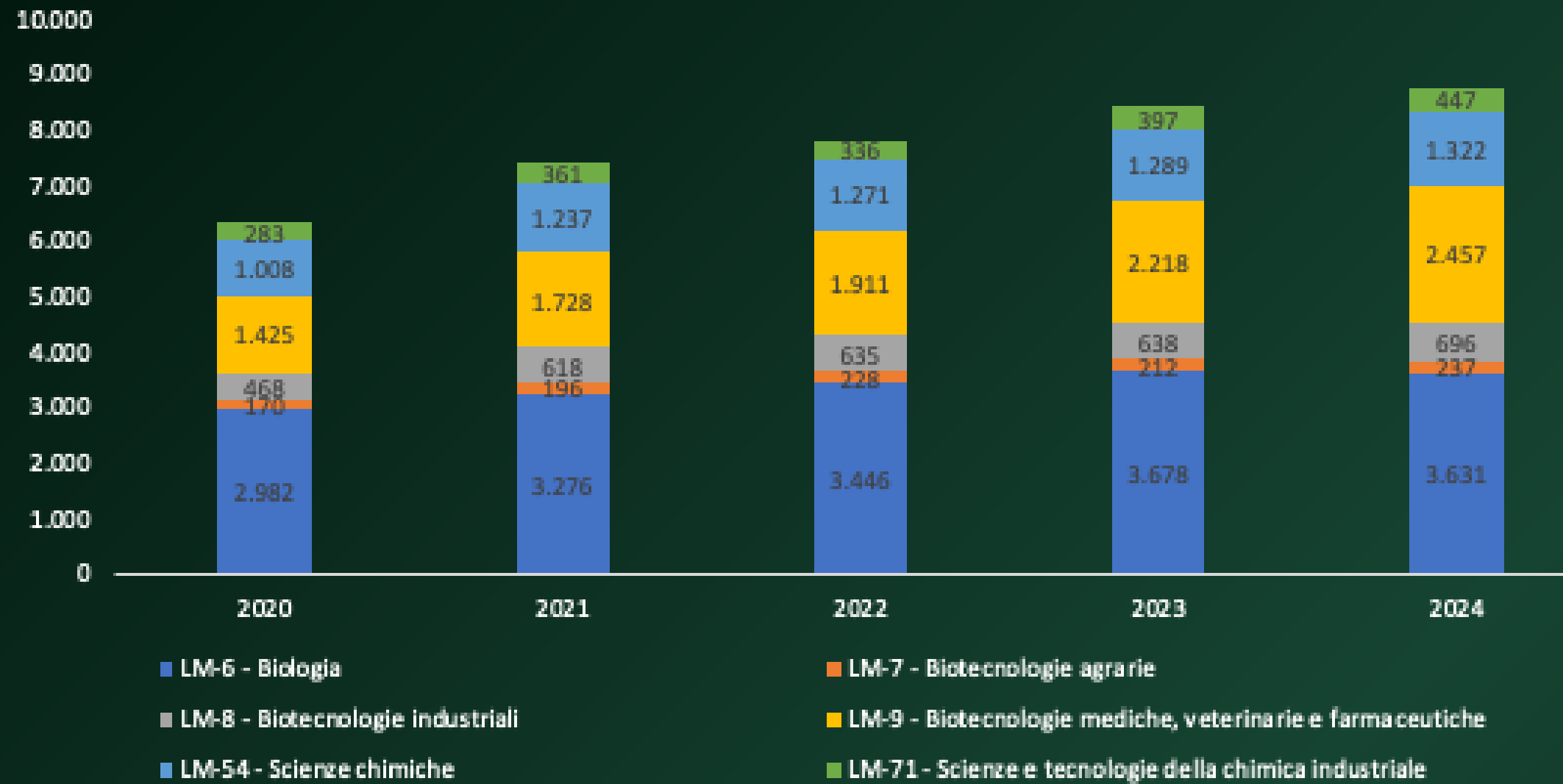
## AWARENESS GAP

- General Public: Low visibility of real-world impacts.
- Education: knowledge gaps among academia and industrial needs
- Industry: up-skilling and re-skilling of professionals

## REGULATION GAP

- Lengthy authorization procedures for renewable energy products
- GMO and End-of-Waste regulatory frameworks inconsistent with technological progress

## Laureati a.s.



STEM

### ITALY FORECAST 2025-2029

**Average Annual Workforce Needs**  
13,000 units  
(Chem-Pharma & Biotech)

### MEDICAL SCHOOL

**Admission Reform from 2025**  
Consequences for Life Science  
Education

# Training and skills needs

Unioncamere – Ministero del Lavoro e delle Politiche Sociali, Sistema Informativo Excelsior, Rapporto di Unioncamere dedicato alle Competenze green (2023); MIUR



# Conclusions

Green Chemistry & Biotechnology

01

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## ENGINES OF CHANGE

Industrial biocatalysis, bioconversions, precision fermentation, AI & Machine Learning

02

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## ENABLING FACTORS

Updated frameworks, funding, scale-up and high-performance computing infrastructure

03

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## HUMAN CAPITAL

Multidisciplinary skills, re-skilling, up-skilling, and a sustainability and entrepreneurial culture

04

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## PUBLIC ENGAGEMENT

Social acceptance as a key to unlocking biotech potential

