



# Fostering Sustainability through Innovation in the Chemical Industry



The Chemical Innovation Conference/ ISRACHEM  
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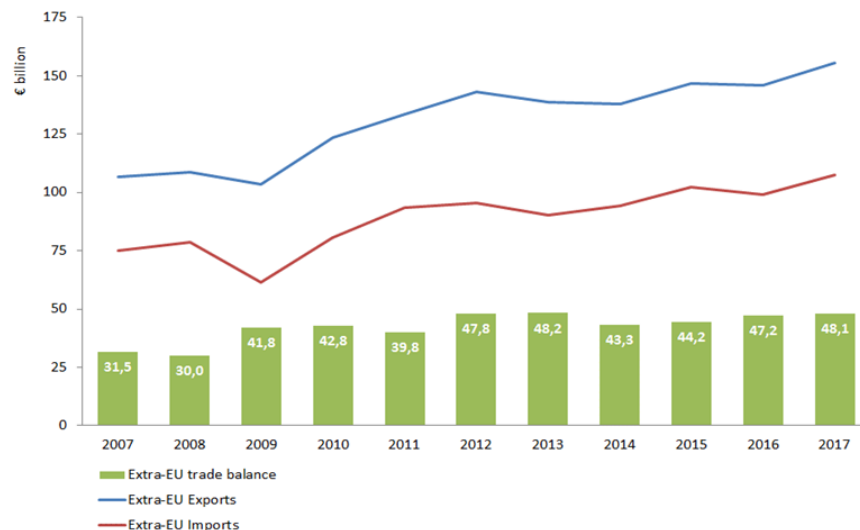
# At the Heart of European Industry

## Providing the essentials



- **29 000** companies
- **1,2 million** jobs
- **97%** of European chemical companies are **SMEs** (2015)
- Network of more than **5,000** chemical industry **experts**
- **€ 542** billion in sales in 2017
- EU chemical trade surplus of **€ 48,1** billion in 2017
- The third largest investor in EU manufacturing (**€21,6** bn 2017)

*Extra-EU Chemicals Trade  
Flows (€ billion)*



# At the Heart of European Industry

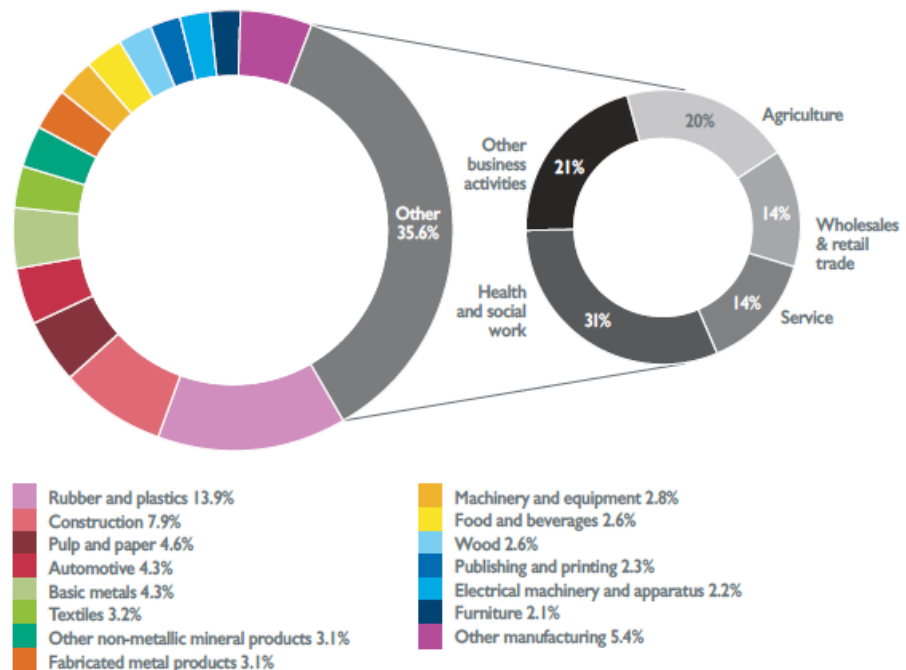
## Providing the essentials



- ❖ The European chemical industry is of major importance for economic **development** and wealth,
- ❖ Providing modern products and materials and **enabling solutions** in virtually all sectors.
- ❖ It is a wealth generating sector of the economy, and a **valuable part** of Europe's economic infrastructure.
- ❖ It aims to provide solutions for the achievement of a competitive, **low carbon and circular economy** in Europe and beyond.
- ❖ The European chemical industry is **highly successful**.
- ❖ Traditionally, it has been a **world leader** in chemicals production

## Contribution of the chemical industry to the EU economy

Customer sectors of the EU chemical industry



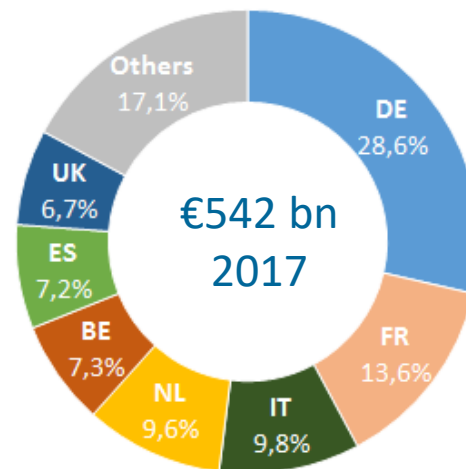


# Where are we today?

## The EU chemical industry ranks second

- ❖ Having ridden out the recession, the European chemical industry is continuing its recovery.
- ❖ Today, with nearly 16% market share, the EU chemical industry ranks second, along with the United States (13%).
- ❖ China continues to dominate chemicals world ranking in 2017, and contributed to 37% of global chemicals sales.
- ❖ Europe's share of global sales over the same period has declined from 31% in 1997 to 16% in 2017.
- ❖ This decrease is primarily due to declining competitiveness, as opposed to slow-growing destination markets.

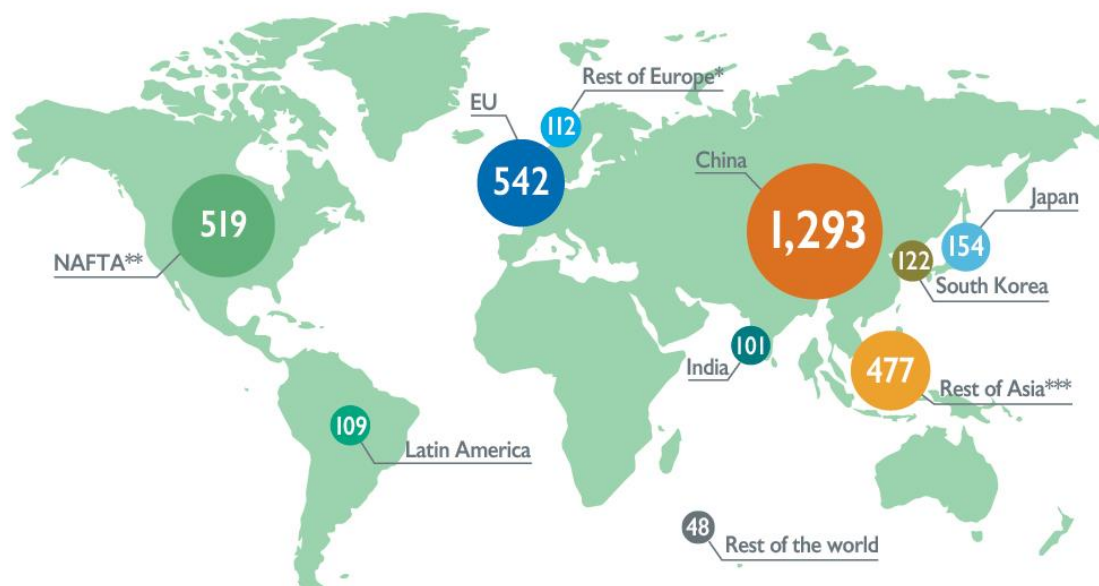
EU chemical industry sales by geographic breakdown



# Europe is the second largest chemicals producer in the world



World chemical sales (€3,475 billion)



Source: Cefic Chemdata International 2018

\* Rest of Europe covers Switzerland, Norway, Turkey, Russia and Ukraine

\*\* North American Free Trade Agreement

\*\*\* Asia excluding China, India, Japan and South Korea

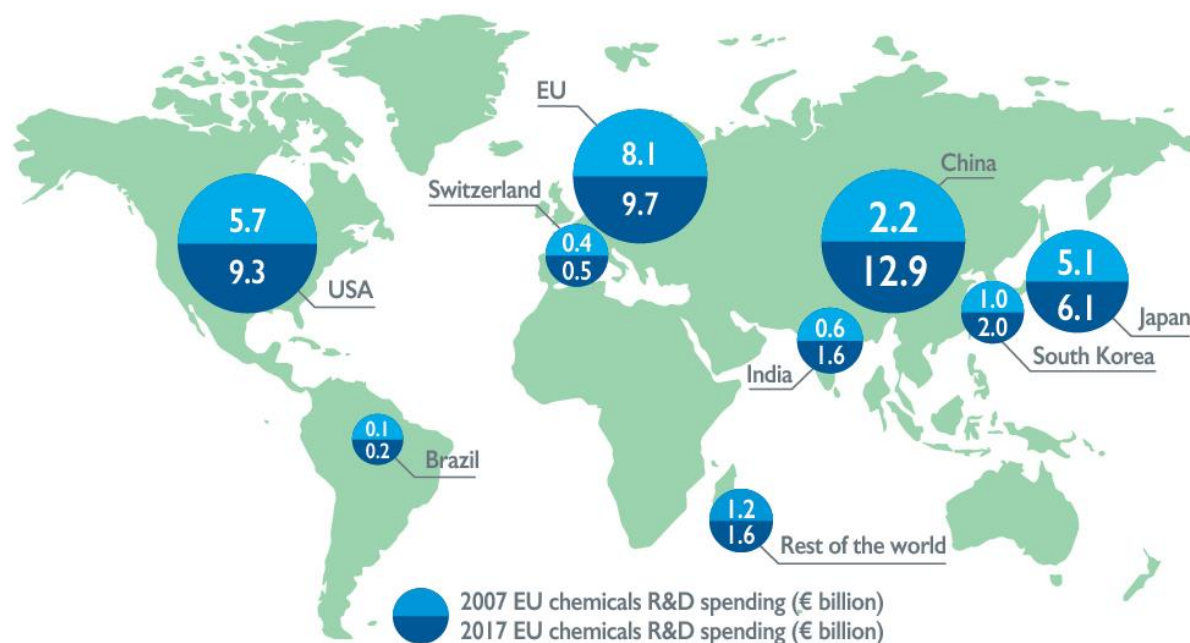
Unless specified, chemical industry excludes pharmaceuticals

Unless specified, EU refers to EU 28

# China outspends industrial and emerging countries in chemicals R&I



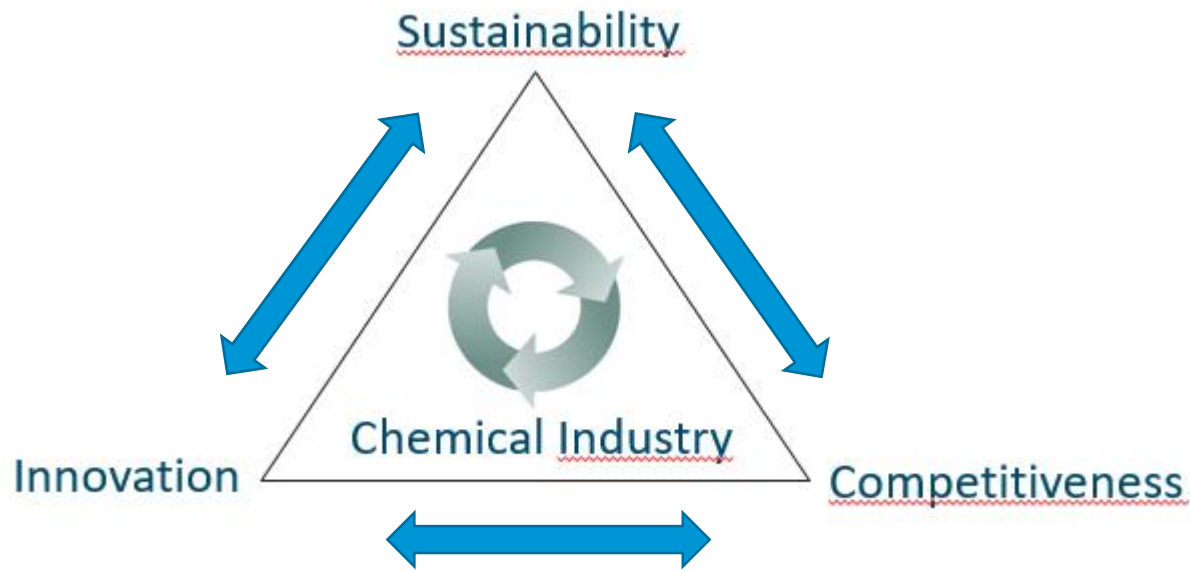
R&D spending by region



Source: Cefic Chemdata International 2018

Unless specified, chemical industry excludes pharmaceuticals  
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# The interlink between competitiveness, innovation and sustainability



Challenges offer tremendous innovation and business opportunities



# The world is changing fast



## THE GLOBAL GOALS For Sustainable Development





# Recommended reading



The Chemical Sector SDG Roadmap (Roadmap) is an initiative led by a selection of leading chemical companies and industry associations, convened by the World Business Council for Sustainable Development (WBCSD), to explore, articulate and help realize the potential of the chemical sector to leverage its influence and innovation to contribute to the SDG agenda.

The Roadmap offers a unique and collective vision for the sector on what the key impact opportunities to contribute to its most material SDGs and specific SDG targets are — from product innovation to process improvement through to innovative public-private partnerships. It also outlines tangible actions that the chemical sector may take to accelerate impact in the short-, medium- and long term in the run up to 2030.

Finally, the Roadmap also communicates the sector's willingness to engage with relevant stakeholder groups to promote sustainability throughout the value chain in support of the SDGs.

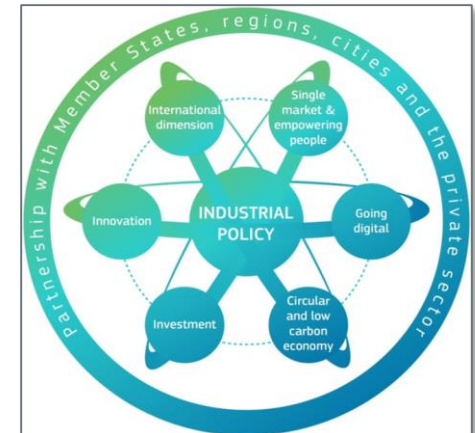
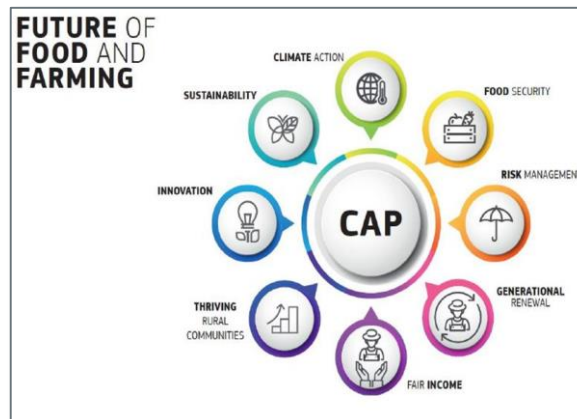
[View interactive site](#)

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<https://www.wbcscd.org/Programs/People/Sustainable-Development-Goals/Resources/Chemical-Sector-SDG-Roadmap>

# Mainstreaming in EU policy



# Chemical Industry under the 4th Industrial Revolution (sustainable, digital, social)



## Development from Chemistry 3.0 to Chemistry 4.0

	Chemistry 3.0 Globalization & Specialization	Chemistry 4.0 Digitalization & Circular Economy
<b>Drivers for transformation</b>	Globalization, the European internal market, growing competition from gas-based chemistry, the influence of financial markets on corporate strategies, commodification	Digital revolution, sustainability, climate protection, closing material cycles
<b>Raw materials</b>	Increasing use of renewable raw materials and natural gas	Intensive use of data, recycling of carbon-containing waste, H <sub>2</sub> from renewable energies in combination with CO <sub>2</sub> used to produce base chemicals
<b>Technology</b>	New synthesis and production processes through biotechnology and gene technology, enlargement of individual processes	Digitalization of manufacturing processes
<b>Research</b>	Close cooperation between basic research in universities and application-oriented research in companies	Decentralization of R&D in customer markets, utilization of Big Data, joint development with customers
<b>Corporate structure</b>	Internationalization of trade and on-site production abroad, specialization and growth in SMEs, consolidation through M&A, creation of chemical parks	More flexible cooperation as part of economic networks, digital business models, and consolidation
<b>Products</b>	Expanding product range, specialty chemicals oriented to specific customer requirements, new drugs, replacement of traditional materials with chemical products	Expanding the spectrum of value creation: chemical sector becomes a supplier of extensive and sustainable solutions for customers and the environment
<b>Environment, Health and Safety</b>	Environmental protection integrated into production, increasing product safety through expanded review of material properties, Responsible Care	With Chemie <sup>3</sup> (ecology, economy, and social affairs), sustainability becomes a comprehensive model and future concept for the industry

# Chemical Innovation in the 21st century



- Advanced materials
  - Batteries (energy storage, e-mobility)
  - Lightweight (automotive, aeronautics)
  - Renewable energy (wind, PV, ...)
- Advanced processes
  - Use of alternative feedstock (biomass, waste, CO/CO<sub>2</sub> ...)
  - Use of alternative energy sources
  - Cross-sectorial collaboration (Industrial symbiosis)
  - The journey to circularity
- Digital technologies

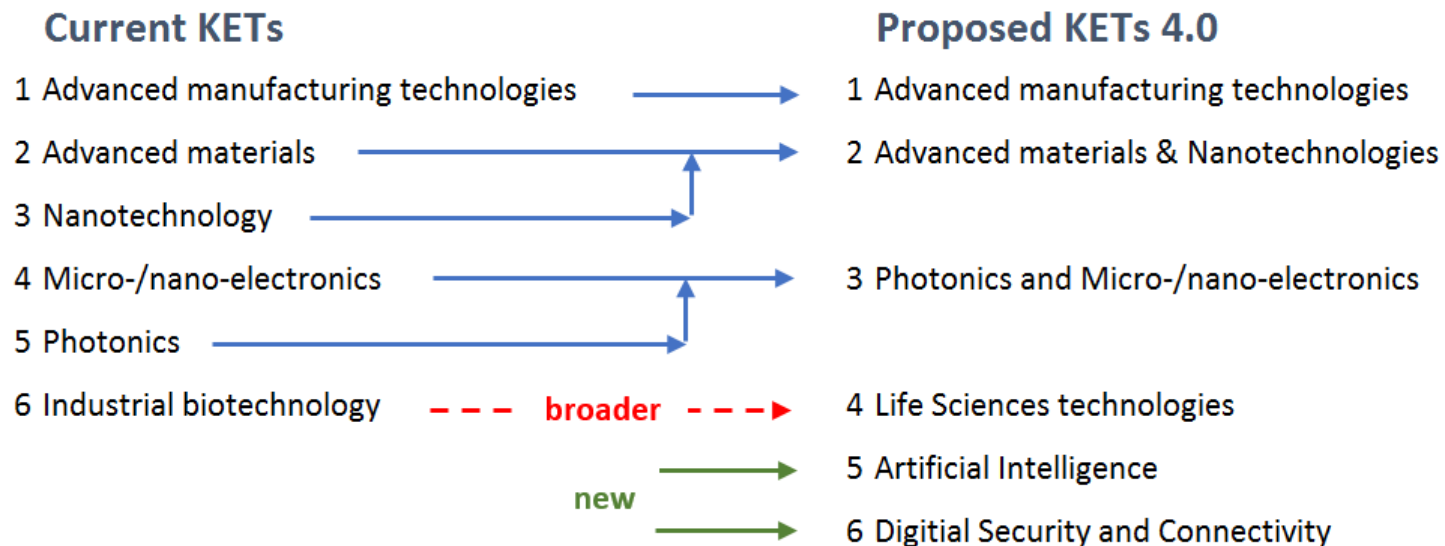


# Key Enabling Technologies KETs (from High Level Group)



KETs is a key concept in EU R&I policy.

*“Key Enabling Technologies (KETs) provide the basis for innovation in a range of products across all industrial sectors. They underpin the shift to a greener economy, are instrumental in modernising Europe’s industrial base, and drive the development of entirely new industries. Their importance makes them a key element of European industrial policy”. (European Commission)*



2014

2018

# Disruption in the way we innovate



## Talents for the European chemical industry:

- ❑ STEM skills & Digital skills
- ❑ Value chains approach
- ❑ **Blurring of boundaries across scientific disciplines**
- ❑ **Blurring of boundaries between different industrial sectors**
- ❑ Connection to “adjacent” disciplines (IPR, Regulatory, Toxicology/Ecotoxicology ...)
  - Lifelong learning ever more important
  - Challenge : attract, train and retain
  - Sense of purpose



# SusChem European Technology Platform (ETP)



**Climate Action, Environment,  
Resource Efficiency and Raw  
Materials**



**A Sustainable and Inclusive  
Bioeconomy**



**Secure, Clean and Efficient Energy**



**Smart, Green and Integrated  
Transport**

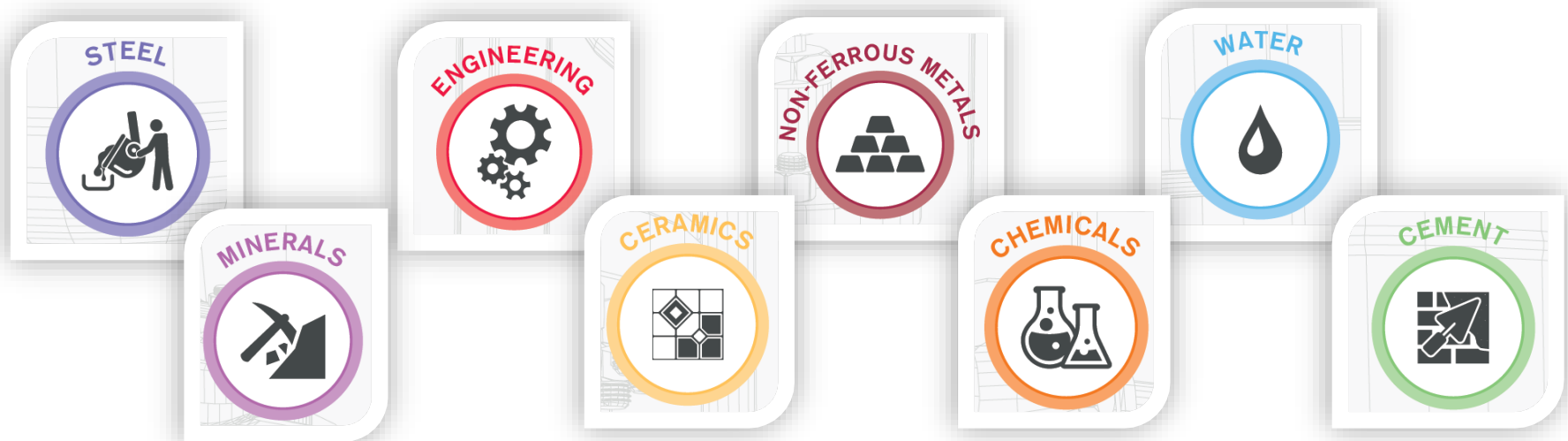


**Health, Demographic Change and  
Well-being**

# SPIRE Public Private Partnership



EU process industries sit at the core of most industrial value chains and are highly dependent on resources (energy, materials and water)



8 sectors representing together 6.8 million jobs in 450,000 enterprises and turnover of over €1,600 billion/year

They are struggling with competitiveness at global level and striving for long-term sustainability. High risks and long-term investments. There is a need for co-operation amongst them and along their value chains.

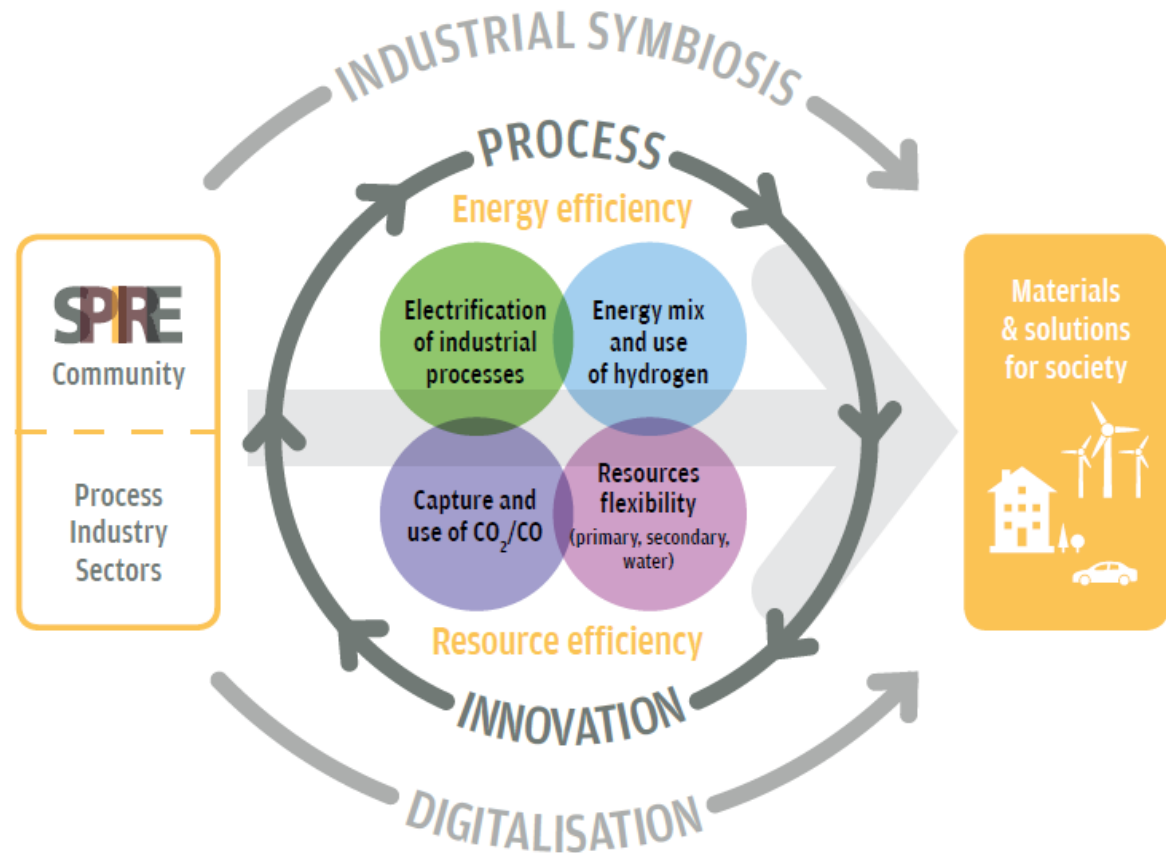
# SPIRE 2050 Vision

Mitigating climate change and enabling circularity



**“An integrated and digital  
European process industry  
fostering a “well-below 2°C”  
and a fully circular future  
for our planet and society”**

*SPIRE 2050  
Our Value Proposition*

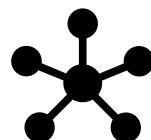


# Our ambitions



## Closing the climate technological gap

Development of the required solutions to fully contribute to the EU Climate Policy targets



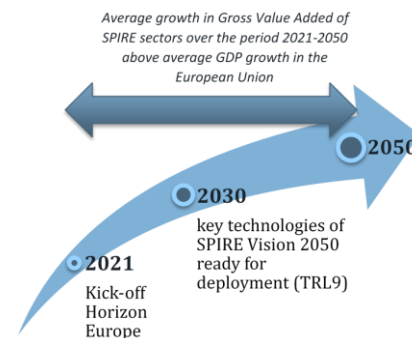
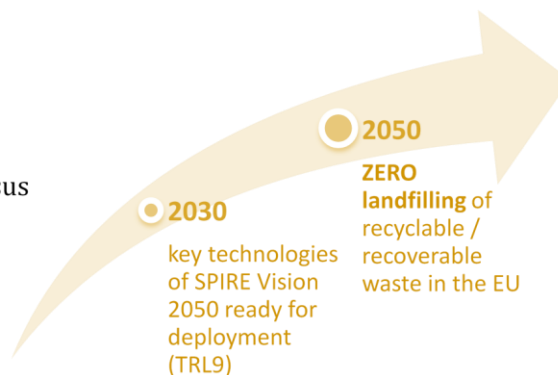
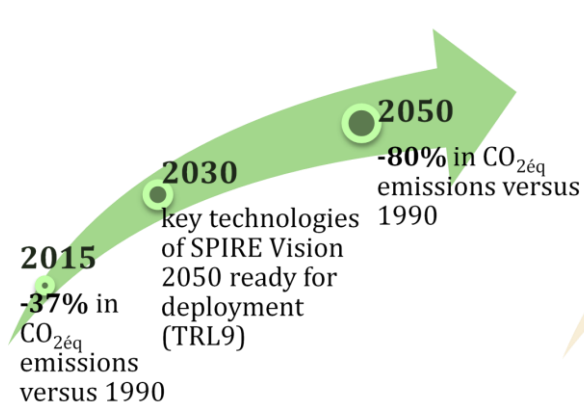
## Process industries as Hubs for circularity

Development of required solutions to move towards zero-waste-to-landfill and create Hubs for circularity across Europe



## Global competitiveness

Development of technologies which create new investment opportunities for globally competitive EU Process Industries



# Bio-based Industries (BBI PP Partnership)



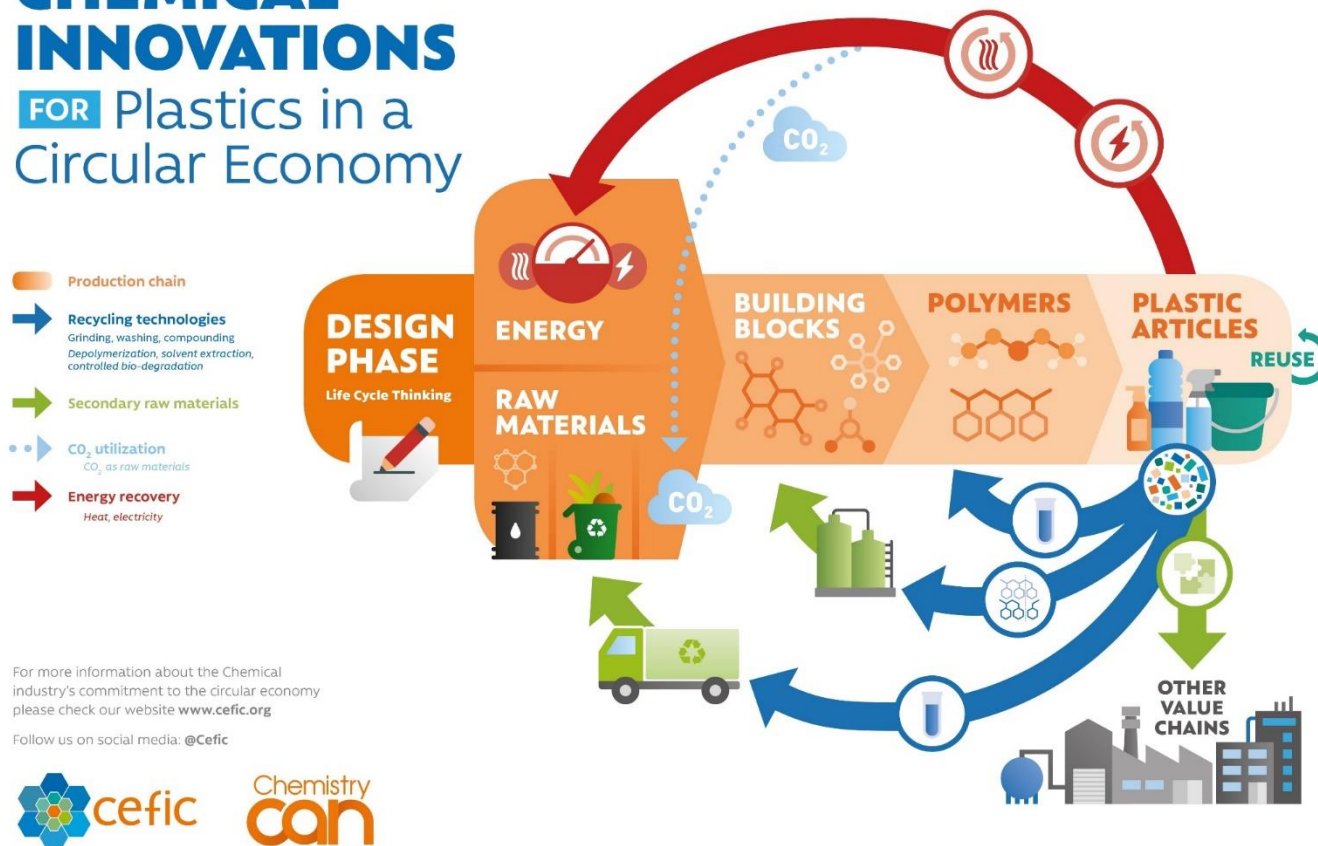
## Building a Circular Bioeconomy

Bio-Based Industries support the Sustainable Development Goals

# Plastics circularity with chemical recycling



## CHEMICAL INNOVATIONS FOR Plastics in a Circular Economy



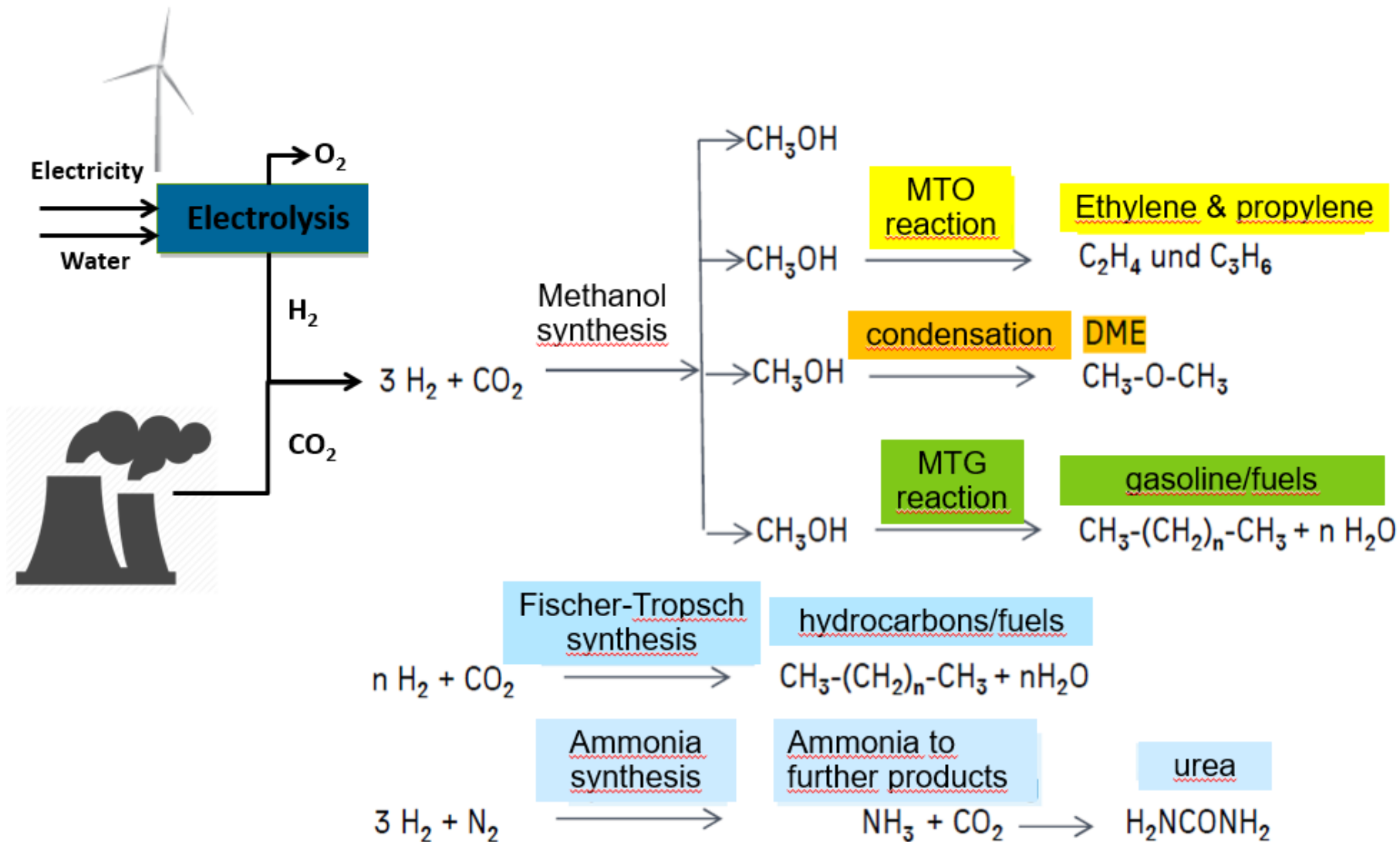
For more information about the Chemical industry's commitment to the circular economy please check our website [www.cefic.org](http://www.cefic.org)

Follow us on social media: @Cefic

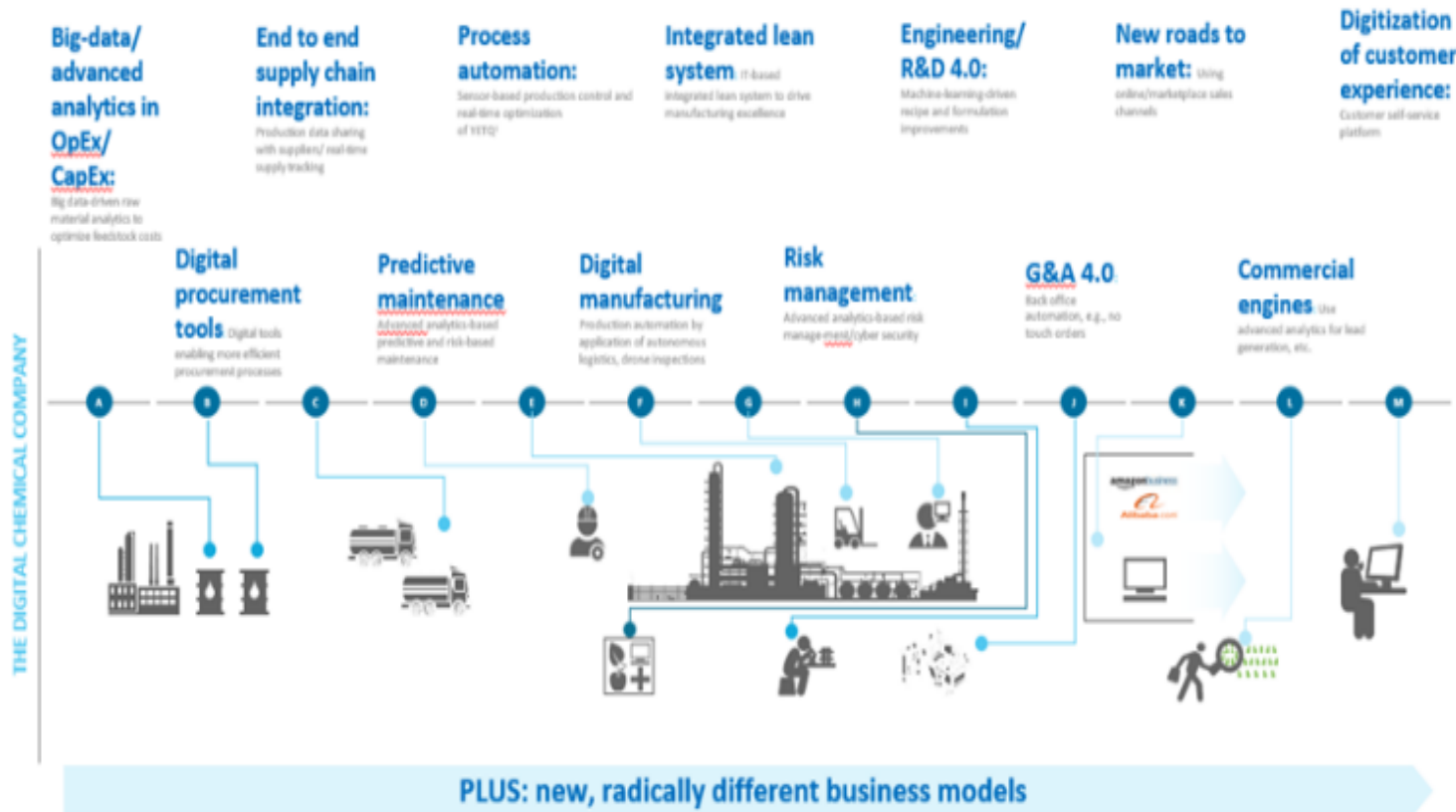




# CO<sub>2</sub> valorization with H<sub>2</sub>



# Impact of digitization



Source: Deloitte study for VCI

# Cefic Horizon Europe (FP9) Priorities



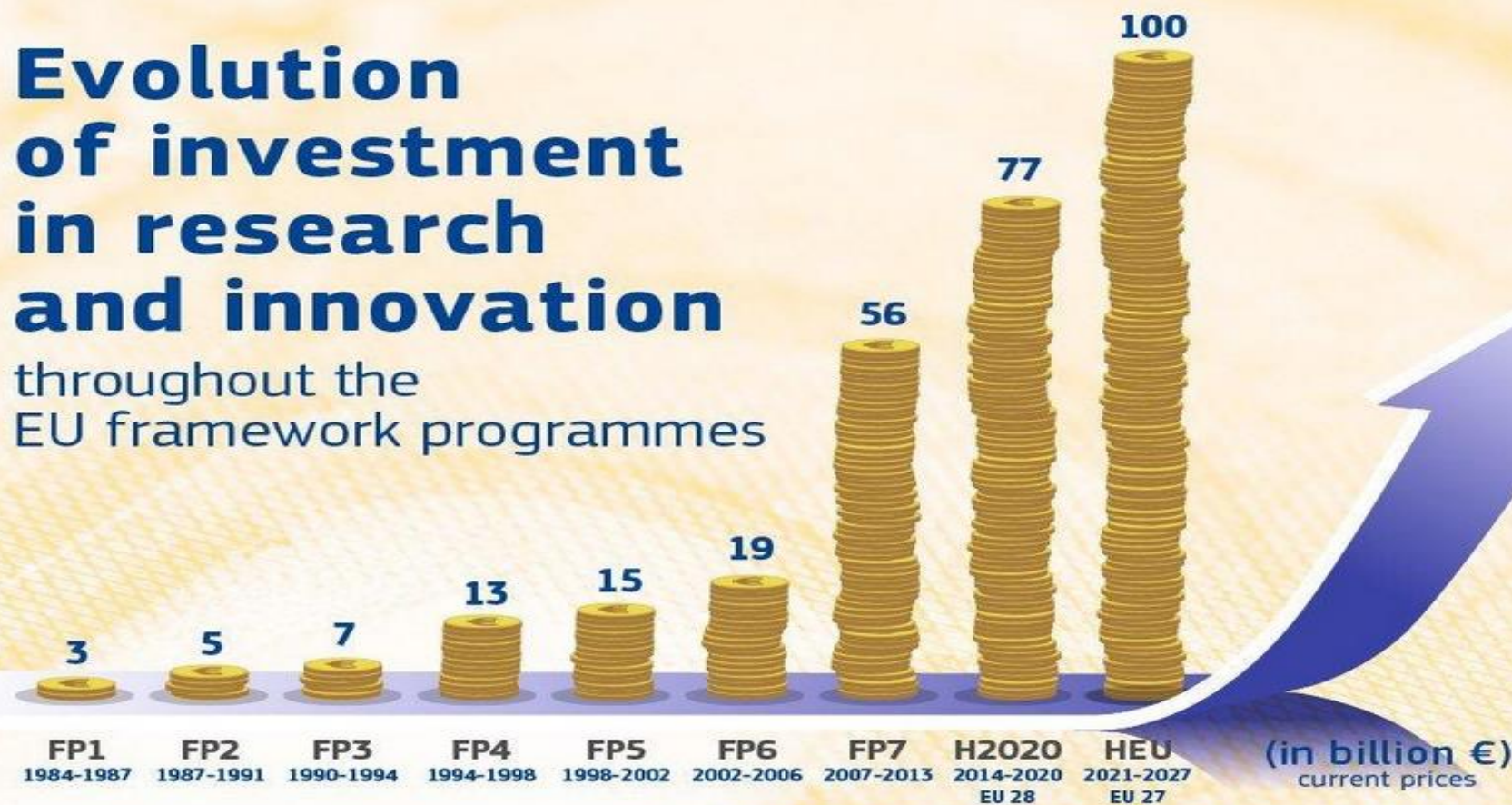
- ❑ **Open Innovation and Industry Participation**
  - through collaborative projects along the value chain and between EU Member States and Regions taking innovation faster to the market for the benefit of our society. *Public Private Partnerships, such as SPIRE, demonstrate effectiveness to drive economic growth by removing barriers to innovation in a cross-sectorial setting*
- ❑ **Key Enabling Technologies**
  - that address global challenges (*resource efficiency, circular economy, and low carbon economy*), drive breakthrough innovations and support the development of high added-value products and processes
- ❑ **Industrial Process Technologies**
  - that are crucial for achieving a low carbon and circular economy (*through valorisation of alternative feedstock including waste, secondary materials, CO<sub>2</sub>, biomass, chemical recycling*), and the energy transition (better utilization of alternative energy sources in the chemical industry and technologies for renewable energy storage)
- ❑ **Digital Technologies**
  - that are fully integrated with processes technologies, materials development, and new business model creation and have a direct impact in the whole industrial environment (*artificial intelligence and modelling tools*)
- ❑ **Biotechnologies**
  - that enable the production of alternative fuels, chemicals and polymers from new versatile feedstock's (*biocatalyst engineering*)
- ❑ **Advanced Materials**
  - that enable breakthrough application development down the value-chain (*building insulation, innovative packaging, renewable electricity production and storage (incl. batteries), and mobility*)



# Horizon Europe

## Evolution of investment in research and innovation

throughout the EU framework programmes



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#HorizonEU #InvestEUresearch #EUBudget



European  
Commission

# Cefic LRI Programme



## The Cefic Long-Range Research Initiative: A responsible approach to assessing the long-term impact of chemicals



Inform effective, science-based decision making

### 250+ research projects:

- Advance chemical assessment approaches
- Improve understanding of potential health & environmental risks

20+ quality-assured, easy-to-use and freely available chemical risk assessment databases and tools

A network of 200+ experts from industry, regulatory institutions and academia

A **stepping stone** for future scientific leaders  
(100 000 € Cefic LRI Innovative Science Award)

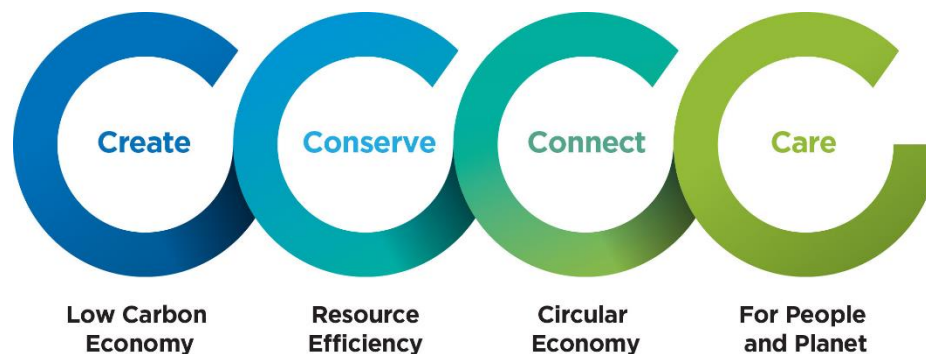


# The Cefic Sustainability Charter



<https://chemistrycan.com/>

- Enabling role of the European chemical industry for a sustainable society
- Supporting role for Cefic
- Roadmap to progress in Sustainable Development:







Thank you