



# **Circular Economy**

***The role of science and  
research***

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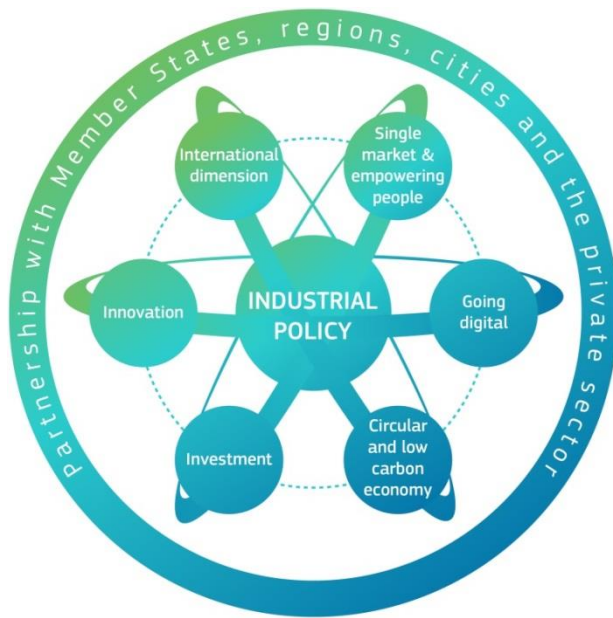
# OVERVIEW

- *2015 EU Action Plan for the Circular Economy and Horizon 2020*
- *Sustainable Industries (SPIRE)*
- *Horizon Europe proposal*
- *Conclusions*

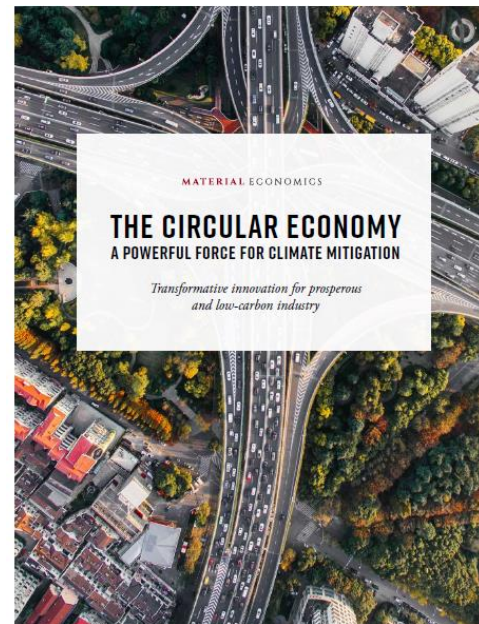
# Action Plan and Horizon 2020

- *Circular Economy a "Focus Area" under Work Programme 2018 – 2020 / Horizon 2020*
- *Focus Area: "Connecting economic and environmental gains – the Circular Economy (CE)"*
- *EUR 964 Million for CE in total for topics under WP 2018/2019. Still open for WP 2020*
- *EUR 370 Million for CE under LEIT – NMBP (Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing)*
- *Links with other focus areas: Low-carbon, Climate resilient future (LC) and Digitising Industries (DT)*

# Circular Economy + Low Carbon Economy



**Commission  
Communication „A  
renewed European  
industrial policy strategy“  
- 13/09/2017**



**<http://materialeconomics.com/latest-updates/the-circular-economy>**

**Circular economy can lead to cut of 3.6 Billion tonnes CO<sub>2</sub> gradually by 2050**

# Deliverables under Horizon 2020

- *Catalysis to eliminate pollutants and to convert carbon dioxide*
- *Industrial biotechnology*
- *Sustainable process industry (SPIRE Public-Private Partnership)*
- *Waste and resource management*
- *Closed-loop manufacturing*
- *Water*
- *Bioeconomy*

[https://ec.europa.eu/programmes/horizon2020/sites/horizon2020/files/ce\\_booklet.pdf](https://ec.europa.eu/programmes/horizon2020/sites/horizon2020/files/ce_booklet.pdf)



# **SPIRE: Sustainable Process Industry through Resource and Energy Efficiency**

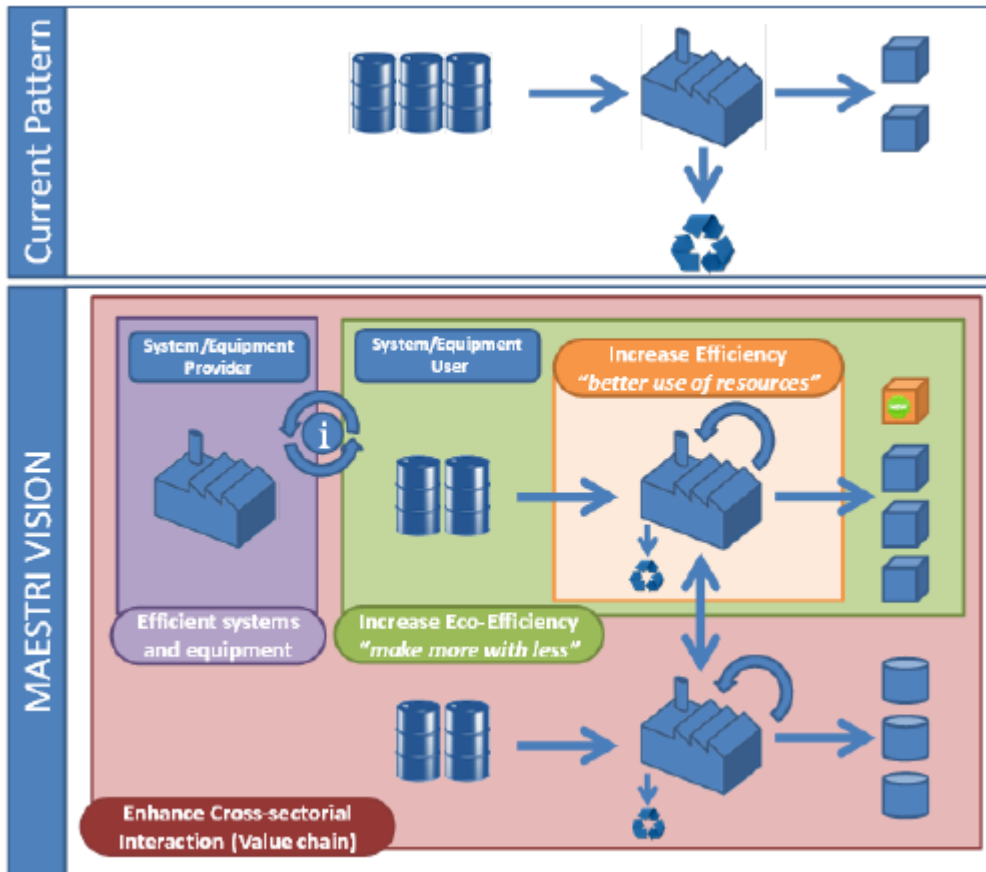
- Contractual Public-Private Partnership under H2020, with a foreseen EU contribution of EUR 900 Million for the period 2014-2020. It covers 8 EU industrial sectors, representing around 6.8 million jobs in 450,000 enterprises.
- Main objectives:
  - A reduction in fossil energy intensity of up to 30% by 2020
  - Efficiency improvement of CO<sub>2</sub>-equivalent footprints of up to 40%
  - Major integration of industrial processes through Industrial Symbiosis
  - A reduction in non-renewable, primary raw material intensity of up to 20%
- All SPIRE funded projects: <https://www.spire2030.eu/projects/our-spire-projects>

# Industrial symbiosis

- **MAESTRI**: Energy and resource management systems for improved efficiency in the process industries.  
09/2015 – 08/2019; €7M
- **SHAREBOX**: Secure Management Platform for Shared Process Resources.  
09/2015-08/2019; €6M
- **EPOS**: Enhanced energy and resource Efficiency and Performance in process industry Operations via onsite and cross-sectorial Symbiosis.  
10/2015 – 09/2019; €5M
- **SCALER** (CSA): Study for the development of collaboration and cooperation opportunities for industrial symbiosis. 11/2017 – 04/2020; €1M

# MAESTRI

## The Total Efficiency Framework

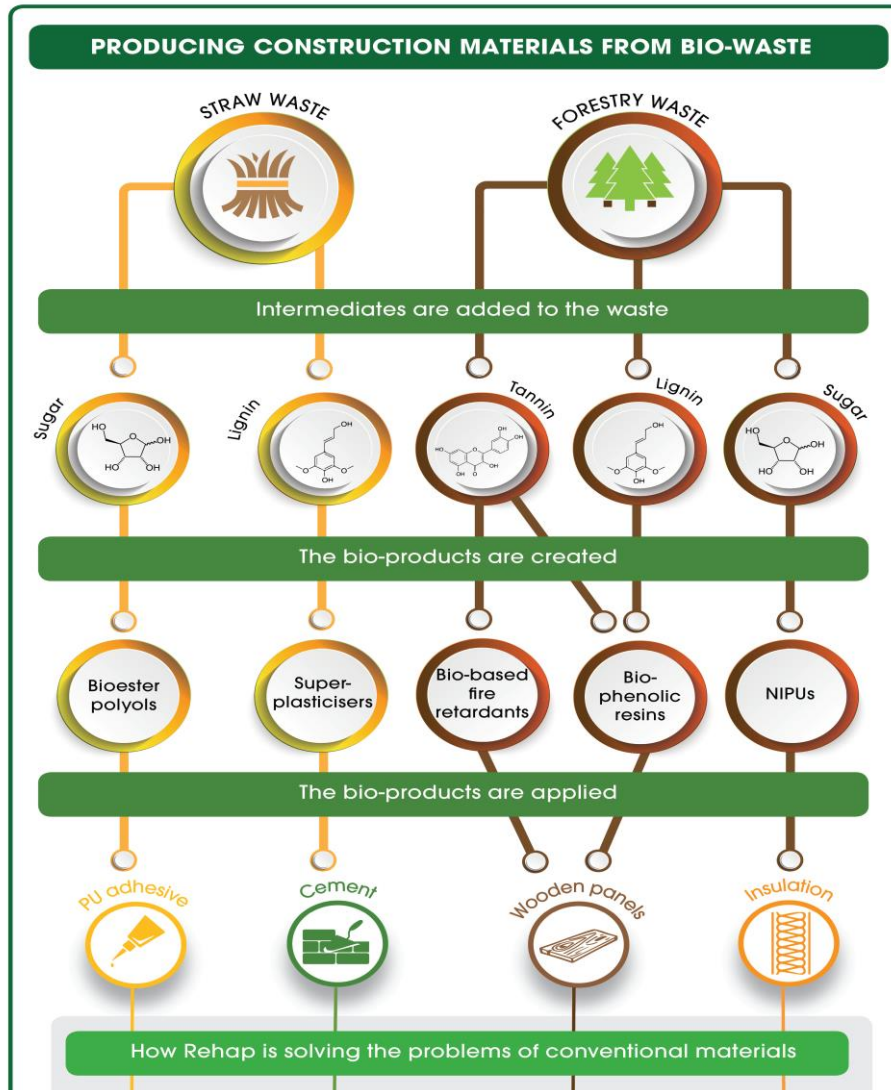


- Development of a management system in the form of a flexible and scalable platform across plants and sectors assisting in:
  - Decision-making
  - Identifying improvement potentials
  - Monitoring

# Plastics and Bio-based

- **DEMETO**: Modular, scalable and high-performance depolymerization by microwave technology.  
09/2017 – 08/2020; €10M
- **SYMBIOPTIMA**: Human-mimetic approach to integrated monitoring & optimization of symbiotic production unit clusters.  
09/2015 – 08/2018 CLOSED; €6M
- **iCAREPLAST**: Integrated Catalytic Recycling of Plastic Residues Into Added-Value Chemicals.  
10/2018 – 10/2020 JUST STARTED; €8M
- **STEAMBIO**: Flexible steam torrefaction and grinding of indigenous biomass to produce feedstocks for chemical and energy applications.  
02/2017-07/2018 (CLOSED); €7M
- **REHAP**: Transforming agroforestry waste into high added value products. 10/2016 – 09/2020; €8M

# REHAP: European Bio-resources valorisation into value added construction products



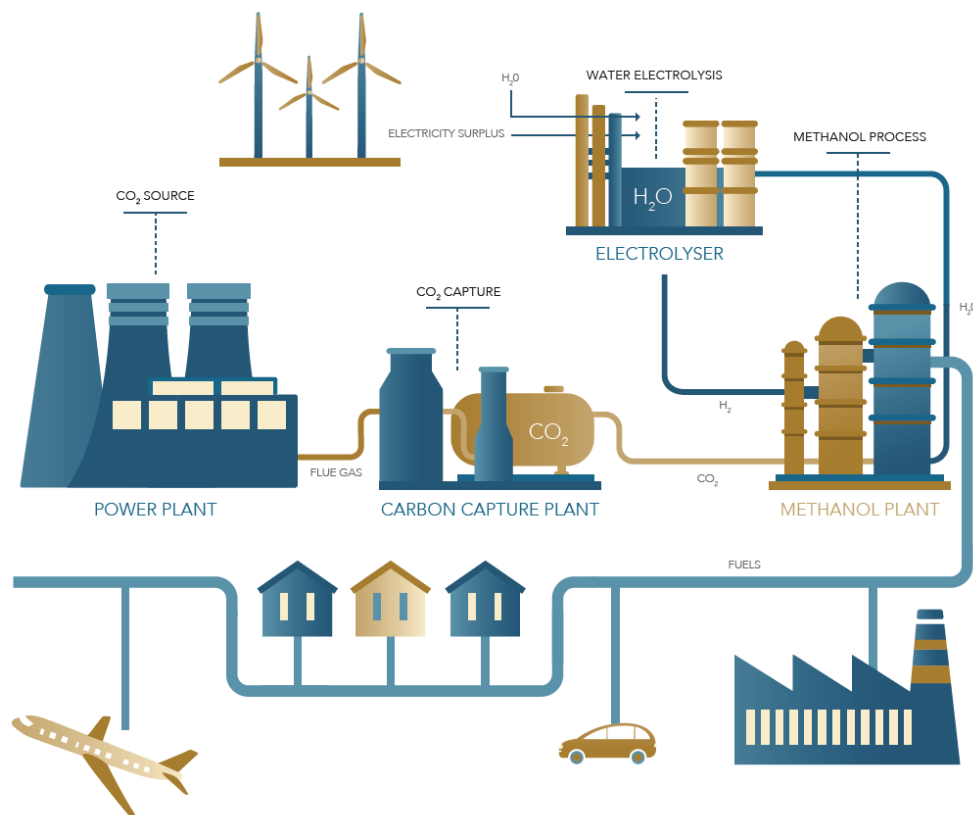
- The project aims to develop the next generation of sustainable bio-based construction products from the European bio-resources.
- To help greening-up the European construction sector, the industry as well as the European economy.

# CO2 Utilization

- **MefCO2**: Methanol production from CO2 waste streams  
12/2014 – 03/2019; €11M
- **RECODE**: Waste CO2 to produce cement and cement additives  
08/2017- 07/2021; €8M
- **Carbon4PUR**: Polyuretaness production from waste CO2  
10/2017-09/20; €8M
- **ICO2CHEM**: Hydrocarbons production from waste CO2  
10/2017 – 09/2021; €6M
- **OCEAN**: Electrochemical conversion of CO2 to oxalixc acid  
10/2017 – 09/2021; €5.5M
- **CarbonNext**: CSA study on viable alternative industrial carbon feedstocks. 09/2016-08/2018; €0.5M
- **CO2EXIDE**: CO2-based electrosynthesis of ethylene oxide  
01/2018 – 12/2020; €5.5M
- **STEELANOL** : Production of advanced bioethanol gasfermentation process using exhaust gases emitted in the STEEL industry  
05/2015 – 10/2018; €14.5M (funded under SC3)

# MefCO2

→ Synthesis of methanol from captured CO<sub>2</sub> using surplus electricity



→ Demonstrate the economic feasibility of valorizing CO<sub>2</sub>

→ Modular intermediate scale design allowing adaptation to varying plant sizes and gas composition

## Overview of activities



<https://www.spire2030.eu/>

# Horizon Europe



is the Commission proposal for a € 100 billion research and innovation funding programme for seven years (2021-2027)



**To strengthen the EU's scientific and technological bases**



**To boost Europe's innovation capacity, competitiveness and jobs**



**To deliver on citizens' priorities and sustain our socio-economic model and values**

Additional **€ 4.1 billion** are proposed to be allocated for defence research, in a separate proposal for a European Defence Fund

# Horizon Europe:

# investing in R&I to shape our future

- The vision
  - **"a Europe that protects,  
a Europe that empowers,  
a Europe that defends"**  
*Jean-Claude Juncker*
- Tackling **climate change**  
(35% budgetary target)
- Helping to achieve **Sustainable Development Goals**
- Boosting the Union's **competitiveness and growth**



# Lessons Learned

from Horizon 2020 Interim Evaluation



**Support breakthrough innovation**



European Innovation Council



**Create more impact through mission-orientation and citizens' involvement**



R&I Missions



**Strengthen international cooperation**



Extended association possibilities



**Reinforce openness**



Open science policy



**Rationalise the funding landscape**



New approach to Partnerships

# Horizon Europe



## **Pillar 1** Open Science

European Research Council

Marie Skłodowska-Curie Actions

Infrastructures



## **Pillar 2** Global Challenges and Industrial Competitiveness

Clusters

- Health
- Inclusive and Secure Society
- Digital and Industry
- Climate, Energy and Mobility
- Food and natural resources

Joint Research Centre



## **Pillar 3** Open Innovation

European Innovation Council

European innovation ecosystems

European Institute  
of Innovation and Technology

## Strengthening the European Research Area

Sharing excellence

Reforming and Enhancing the European R&I system

# Global Challenges & Industrial Competitiveness:

Boosting key technologies and solutions underpinning EU policies & Sustainable Development Goals

Clusters Implemented through usual calls, missions & partnerships	Budget (€ billion)
Health	7.7
Inclusive and Secure Society	2.8
Digital and Industry	15
Climate, Energy and Mobility	15
Food and Natural Resources	10
Joint Research Centre supports European policies with independent scientific evidence & technical support throughout the policy cycle	2.2

# CONCLUSIONS

- *Circular economy major priority for Horizon 2020 and Horizon Europe*
- *Circular and low carbon economy go more and more together*
- *Many research results as of 2020 onwards. Challenge is market uptake and deployment by the industries*
- *European Partnerships with industry perhaps a tool for better market uptake and deployment*

# Further information

**Horizon 2020:** [http://ec.europa.eu/research/horizon2020/index\\_en.cfm](http://ec.europa.eu/research/horizon2020/index_en.cfm)

**Key Enabling Technologies, R&I website :**

[http://ec.europa.eu/research/industrial\\_technologies/index\\_en.cfm](http://ec.europa.eu/research/industrial_technologies/index_en.cfm)

**Participant Portal** - Funding Opportunities and support services :

<http://ec.europa.eu/research/participants/portal/desktop/en/home.html>

**National Contact Points in your country (NMP)**

[http://ec.europa.eu/research/participants/portal/desktop/en/support/national\\_contact\\_points.html#c,contact=country/sbg//1/1/0&+person.last\\_name/desc](http://ec.europa.eu/research/participants/portal/desktop/en/support/national_contact_points.html#c,contact=country/sbg//1/1/0&+person.last_name/desc)

**Research Enquiry Service:** <http://ec.europa.eu/research/index.cfm?pg=enquiries>

**CORDIS database with EU funded research projects :**

[http://cordis.europa.eu/projects/home\\_en.html](http://cordis.europa.eu/projects/home_en.html)

**European Institute of Innovation & technology:**

[www.eit.europa.eu](http://www.eit.europa.eu)

**“Projects for Policy” report: Capitalising on the 4<sup>th</sup> Industrial Revolution**

[https://ec.europa.eu/info/research-and-innovation/strategy/policy-support/p4p\\_en#what-is-projects-for-policy-p4p](https://ec.europa.eu/info/research-and-innovation/strategy/policy-support/p4p_en#what-is-projects-for-policy-p4p)

**Blueprint for sectorial cooperation:**

<http://ec.europa.eu/social/main.jsp?catId=1415&langId=en>