Processes4Planet 2050
A roadmap for transformation
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Executive Director
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Match-making webinar
A holistic approach to circular manufacturing: Exploring collaboration between European PPP initiatives and Portuguese stakeholders
An integrated and digital European Process Industry, fostering a "well-below 2 degrees" scenario and a fully circular future for our planet and society.
The climate neutrality and circularity targets can only be reached jointly through the common and cross-sectoral R&I strategy.

- Similar innovation challenges
- Shared learning
- Faster deployment at scale
- Efficiency in resources
- Shared costs on benefit of circularity
- Strengthen connection with others initiatives
Process Industries

From primary & secondary resources to materials with required properties and functionalities

- Circular Bio-based EU
- Clean Steel
- Chemicals Risk Assessment

Resources

- Clean H2
- Water4All

Enablers

- EIT Raw materials KIC
- EIT Inno Energy KIC
- EIT Digital KIC AI, Data & Robotics Key Digital Technologies
- EIT Climate KIC
- EIT Manufacturing KIC

Manufacturing industries and contractors

Manufacturing of consumption goods or capital goods enhancing quality of life of citizens

- Made in Europe
- Batteries
- Built4People

Society

- Waste management, regions and cities
- Driving Urban Transition for a Sustainable Future

Processes4Planet

Minimized input of primary resources
Processes4Planet Roadmap: Routes to Transformation

4 Transformation Levers

16 Innovation Areas

36 Innovation Programs

Industrial-Urban Symbiosis
Process Innovation
Digitalisation
Non-technological levers

Specifying what innovation is needed to meet the SPIRE ambitions

Specifying how SPIRE aims to achieve the required innovations

2050 Process Industries

✓ Climate neutrality
✓ Near-zero landfilling & water discharge
✓ Competitive process industries

10 Circularity of materials
10c Upgrading secondary resources
10d Wastewater valorisation

11 Industrial-Urban symbiosis
11a Demonstration of Industrial-Urban Symbiosis

12 Circular regions
12a European Community of Practice
12b Development of Hubs for Circularity
We need to start now, the way is long

<table>
<thead>
<tr>
<th>Innovation area</th>
<th>Progress up until milestone year¹</th>
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<tr>
<td></td>
<td>2024</td>
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<td>Renewable energy integration</td>
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<td>Heat reuse</td>
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<td>Electrification of thermal processes</td>
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<td>Electrically-driven processes</td>
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<td>Hydrogen integration</td>
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<td>CO₂ capture for utilisation</td>
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<td>CO₂ utilisation in minerals</td>
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<td>CO₂ &amp; CO utilisation in chemicals and fuels</td>
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<td>Energy and resource efficiency</td>
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<td>Circularity of materials</td>
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<td>Industrial-Urban symbiosis</td>
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<td>Circular regions</td>
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<td>Digitalisation</td>
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<td>Non-technological aspects</td>
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¹ Progress is depicted here as % of total TRL9 projects programmed in each area, and for circular regions, digitalisation, and non-technological aspects % of total investment needs until 2050
The process industry is in a position to decarbonise many value chains and reconnect resources into a circular economy.

A large number of innovations are needed to fasten a competitive process industry transformation.
Regional community

Sustainable business models

Disruptive innovation

P4PLANET

Use of geographical advantage
- New value chains
- Co-investments
- Economic solutions

- Recycling technologies
- Alternative resources
- Material design
- Digitalisation
- Logistics

H4Cs CONCEPT

Self-sustaining economic industrial ecosystems for full-scale Industrial-Urban Symbiosis and Circular Economy, closing energy, resource and data loops and bringing together all relevant stakeholders, technologies, infrastructures, tools and instruments necessary for their incubation, implementation, evolution and management.

→ Territorial systemic solutions (regional approach)
→ Processes4Planet inside!
→ Facilitation necessary to overcome non-technological barriers to symbiosis
Knowledge management through Community of Practice

Platform for non-competitive exchange of knowledge and best practices
- Practical toolbox: technologies and tools
- Innovation programmes for finding the missing pieces in the puzzle of symbiosis
- Modelling circular concepts and plants of the future
- Enhancing replicability
- Communication and transfer of technologies and solutions
- Education and training
- Sustainability of the network

Section 3 + Appendixes
### SPIRE Projects related to Circular Economy

<table>
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<tr>
<th>Title</th>
<th>Goal</th>
<th>P4Planet’s Roadmap link</th>
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<tr>
<td><strong>SCALER:</strong> Scaling European resources with industrial symbiosis</td>
<td>• Increase the uptake of industrial symbiosis in Europe by producing a set of best practices, guidelines and business systems.</td>
<td>IA 11a IS and 12 Circular regions Valorization of 100 promising synergies at EU level.</td>
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| **MULTICYCLE:** Advanced & sustainable recycling processes and value chains for plastic-based multi-materials | • Develop a solvent-based and unique recycling technology for fossil- and bio-based thermoplastic multilayer packaging and fibre reinforced composites at TRL7  
• Potential to continue to TRL9 by 2025.  
• It can be clustered with PLASTICRICLE and POLYCE. | IA 10c Upgrading secondary resources Circular economy (recycling of multilayer packaging and fibre) Process is able to recover all target polymers and fibres from different post-consumer and post-industrial packaging and composite waste streams. |
| **INCUBIS** An Industrial Symbiosis Incubator for Maximizing Waste Heat/Cold Efficiency in Industrial Parks and Districts | • Unlocking the market potential of ENERGY SYMBIOSIS to decarbonise EU industry by 2050  
• Developing and deploying five (5) Energy Symbiosis Incubators across Europe, + a digital Cloud Incubator, | IP11a Demo of Ind Urban Symbiosis  
12a European Community of Practice  
12b Development of Hubs for Circularity  
I-US, first H4C pilots example and example of ECOP with 5 incubators + virtual incubator platform |
Connected across borders and to citizens

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