Industry and the Green Deal
Massive opportunities for innovators

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"Industrial Transformation"

European Commission, DG Research & Innovation

Overview

- Green Deal in the EU and role of research and innovation
- Horizon Europe
- Energy intensive industries – EU and international dimension
- Hubs for Circularity H4C

Context

- Ukraine war and fossil fuel scarcity
- Drought, climate change pressure
- Political changes / instability

In 2020, EU industry made up about 26% of the bloc's final energy consumption.

As much of industrial energy demand is fed by fossil fuels, tackling industrial energy appetites has been a longtime policy goal in the shift away from pollutants. With energy prices sky-high and dependence on Russia on everyone's mind, energy efficiency measures are receiving renewed attention.

Until now, energy costs usually only accounted for 1-2% of turnover, which is why they were often ignored. With energy prices exploding, this has now changed and the issue has reached the boardroom. So action is now expected.

Associations dealing in industrial energy efficiency have noticed similarly the changes in the tides. (EURACTIV)

The decarbonisation of EII's is a key driving force for reaching EU climate targets.

Policy push

The Green Deal

European Commission

Designing a set of deeply transformative policies

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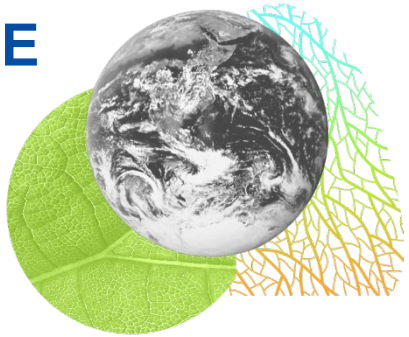
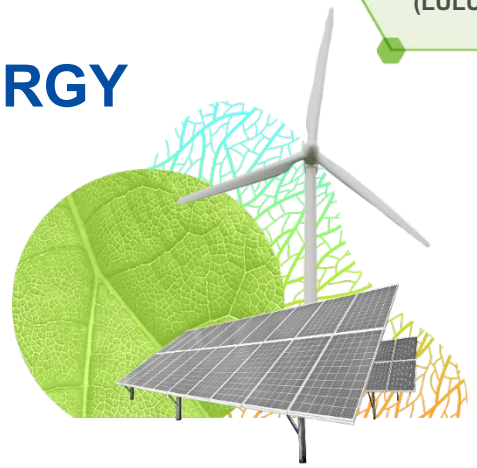
DELIVERING ON THE ‘FIT FOR 55’ COMMITMENT

CLIMATE



TRANSPORT

ENERGY



TAXATION AND TRADE

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How to reach 2050 Green Deal objectives

- Boosting research and innovation
- Save energy and other resources
- Set-up circular economy
- Deploying industrial twin transition

Horizon Europe 2021-2027

Budget : € 95 513

35% to be devoted to climate

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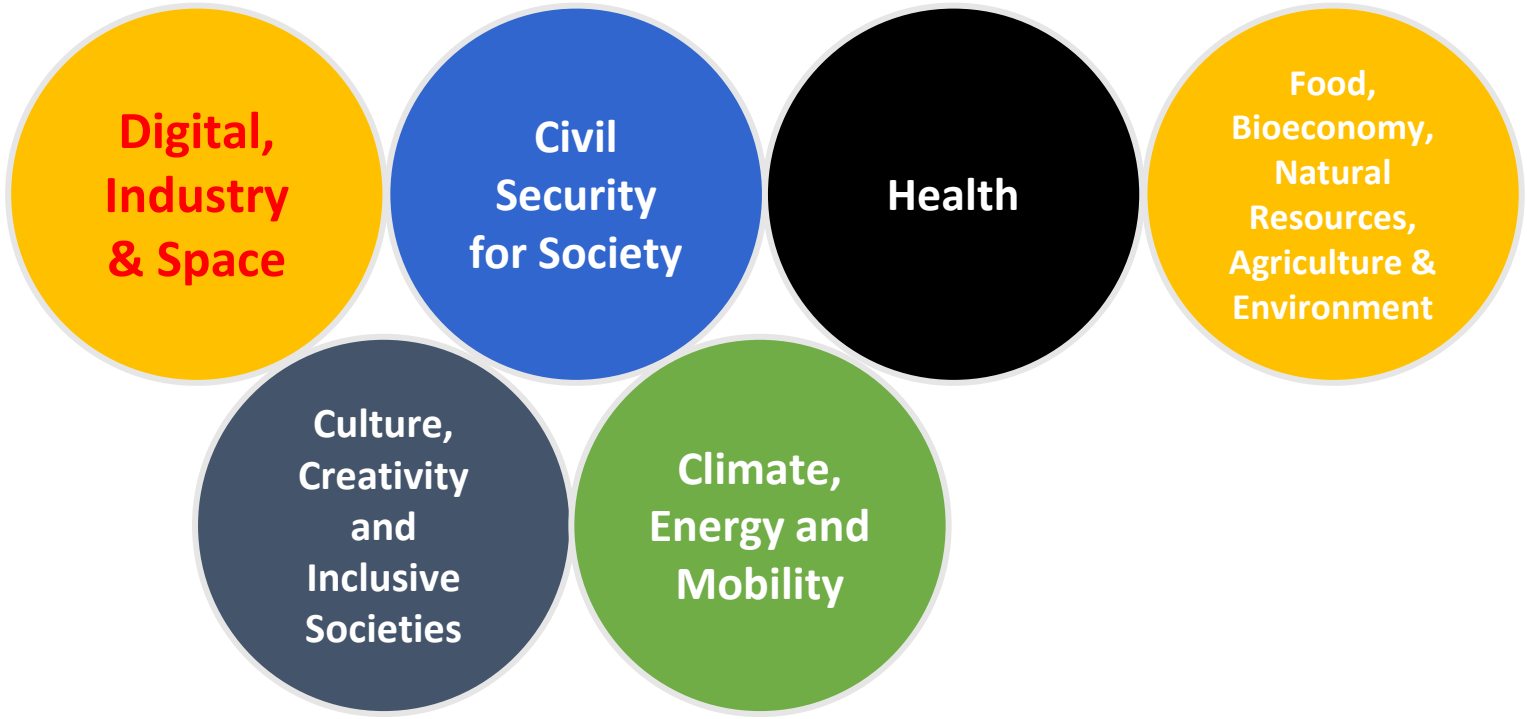
Horizon Europe – Pillar 2



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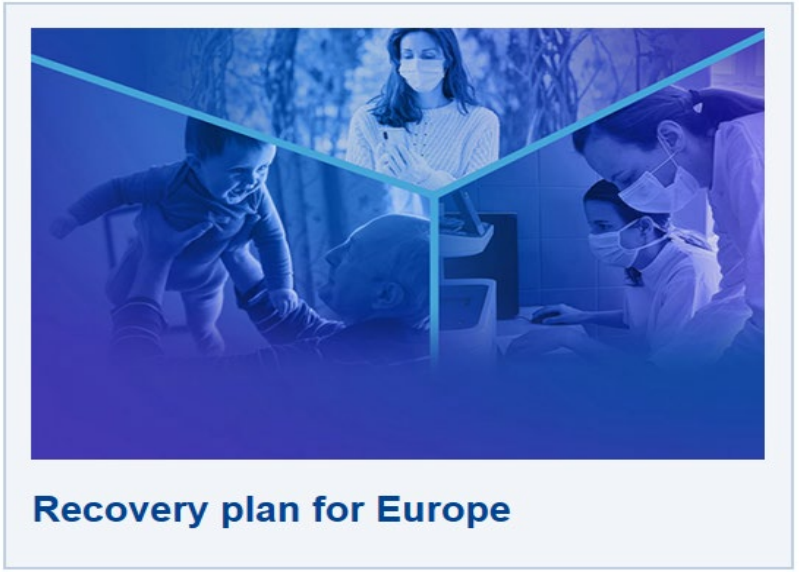
Cluster 4 ‘Digital, Industry and Space’ – **Policies**



European Green Deal **Energy- and Resource-efficient Industries (Manufacturing, Process, Digital Industries)**

A Europe Fit for the Digital Age **Digital Transformation for Industry and People**

Recovery Plan for Europe: R&I for fair green and digital transitions, 1.35 bn € from NextGenerationEU in Cluster 4 2021-27

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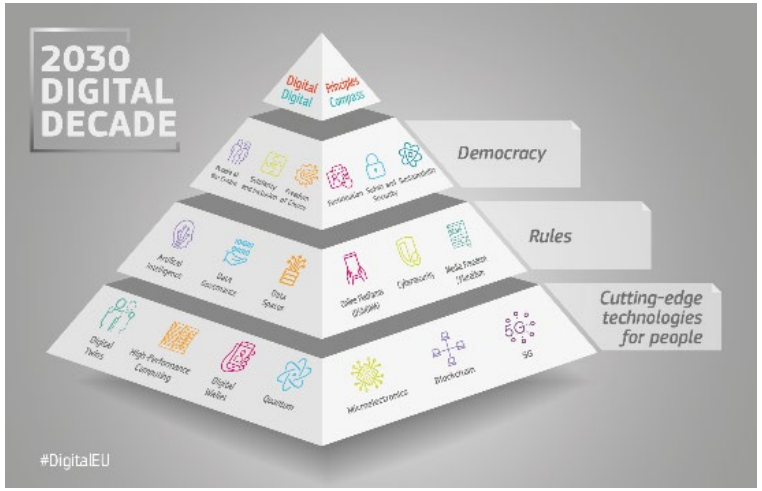
Cluster 4 ‘Digital, Industry and Space’ – **Strategies**

EU Chemicals Strategy: boosting innovation for safe and sustainable chemicals by design

Updated European Industrial Strategy

European Industrial Strategy Update: more sustainable, digital, resilient and competitive industry



2030 Digital Decade: human-centric digital technologies and digital transformation of businesses

Space Strategy for Europe: R&I for
Competitive space industry
New services and infrastructure

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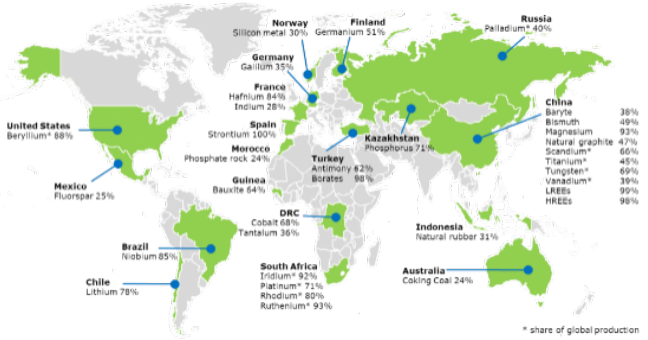
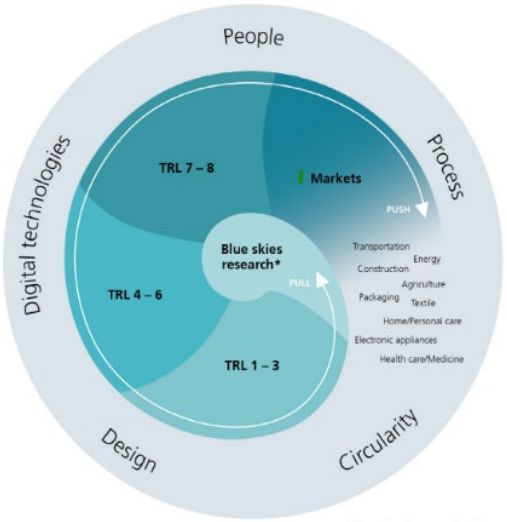
Cluster 4 ‘Digital, Industry and Space’ – **Action Plans**

Zero Pollution:
R&I for zero pollution from industry and chemicals for air, water and soil



Raw Materials Action Plan:
R&I for resilient value chains; less dependency on primary critical raw materials



Materials 2030 Manifesto:
new opportunities for advanced materials in 9 strategic markets

Circular Economy Action Plan:
R&I for circular industries; sustainable products; and no waste

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- Mission Innovation is a global initiative to catalyze action and investment in research, development and demonstration to make clean energy affordable, attractive and accessible to all this decade. This will accelerate progress towards the Paris Agreement goals and pathways to net zero.
- Mission Innovation is the main intergovernmental platform addressing clean energy innovation through action-oriented cooperation.

Missions include:

- ZERO-EMISSION SHIPPING
- CLEAN HYDROGEN
- GREEN POWERED FUTURE
- CARBON DIOXIDE REMOVAL
- URBAN TRANSITIONS
- NET-ZERO INDUSTRIES
- INTEGRATED BIOREFINERIES

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NET-ZERO INDUSTRIES MISSION

- Energy intensive industries stand for around 25% of global greenhouse gas emissions. RD&D over the next decade critical to develop and validate innovative industrial processes and technologies that enable radical emissions reductions at lowest costs. There is a need to accelerate the development of key technologies to become commercially available no later than 2030, to ensure that they can be taken up in the market in time for the next 25 year refurbishment cycle.

- **Mission Goal** : to catalyse the development and demonstration of cost competitive solutions for the efficient decarbonization of energy intensive industries worldwide by 2030.

Co-leads**:** Austria and Australia

Members: Canada, China, European Commission, Finland, Germany, Republic of Korea, United Kingdom

The Mission is founded on the principles of strengthen cooperation among member nations to accelerate and enable the industry adoption of decarbonization technologies.

- Agreed and launched in Pittsburgh, US at the Global Clean Energy Action Forum (21 – 23/9) - a joint convening of the 13th Clean Energy Ministerial and 7th Mission Innovation ministerial

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European Partnership Processes4Planet

*"Transforming the European **energy intensive process industries** to make them **circular** and achieve overall **climate neutrality** at EU level by 2050, while enhancing their competitiveness."*

Roadmap

***10 industry sectors**: cement, steel, ceramics, chemicals, engineering, minerals and ores, non-ferrous metals, water, refineries, pulp/paper.*

Budget of 2.6 BEUR (1.3 BEUR from Horizon Europe)

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Process industry ambition in line with the Green Deal

Processes4Planet: a vibrant community with a common strategic Vision

A.SPIRE – European cross-sectorial association

DG R&I
DG Grow

COMMISSION EUROPÉENNE

PROCESSES4PLANET

2050 Process Industries

- ✓ Develop & deploy climate-neutral solutions
- ✓ Closing the energy and feedstock loops
- ✓ Achieve global leadership of the Process Industry
- ✓ Accelerate innovation & unlock public-private investments

OPEN APPROACH: inclusive of different stakeholders and welcoming Newcomers

- Industries, incl. SMEs
- Industrial Associations & Clusters
- Consultancies

- RTOs
- Higher Education Institutions
- NGOs

- Public institutions
- Innovation Agencies
- MS and Regional representatives

- Partnerships & EITs
- Financial parties
- New sectors

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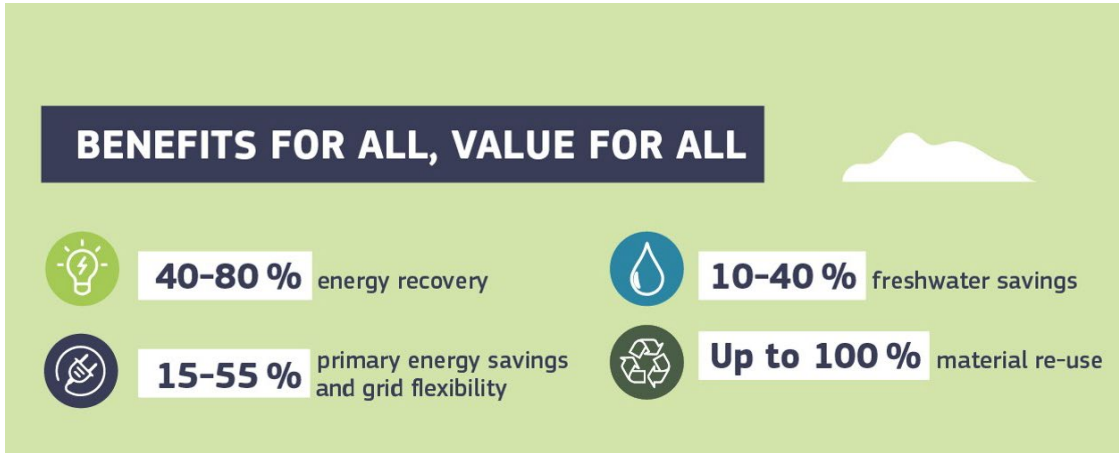
Processes for Planet (P4P) partnership

Roadmap 2050 :

- Need to go for Industrial symbiosis
- Process industries get inspired by Kalundborg example
- Hubs 4 Circularity (H4C)

Why industrial symbiosis

Industrial symbiosis engage “traditionally separate industries” in a collective approach to competitive advantage involving physical exchange of materials, energy, water, and by-products



- The keys to industrial symbiosis are collaboration and the synergistic possibilities offered by geographic proximity : economy of resources and investments
- From 1990 many attempt to plan “eco-industrial parks” are described in the scientific literature proving I-US high potential
- EU H2020 : 28 industrial symbiosis projects, involving 14 different industrial sectors were funded by the Prosperity Directorate for EUR 168 million
- Project showed : the utilization of resources (waste, energy, water, materials…) across organizations, sectors and value chains enable breakthrough efficiency and competitiveness improvements at systemic level
- Hence a great tool to reach Green Deal objectives for industry together with civil society
- But industrial symbiosis is only applied in an isolated manner in Europe. Industry does not see sufficiently the actual benefits and do not engage sufficiently yet in that direction.

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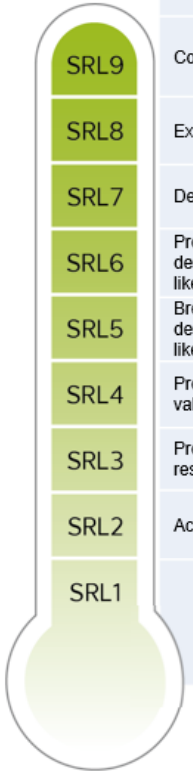
From industrial symbiosis to hubs for circularity

- **From supply-driven business model** towards **demand-based by-design approach.**
- Start within an **existing group of companies in local proximity**, be it an industrial park or a more loosely arranged cluster.
- Industrial Symbiosis approach **can be applied broadly to many different industrial sectors.**

Use of symbiosis readiness levels SRLs



	Technology	Business	Ecology	Management
SRL9	Commercialization	Business case continuously controlled, reported and shared	Sustainability benefits proven	Resilient partnership
SRL8	Extended operation	Finalize legal framework	Benefits routinely monitored and reported	Practical operation and management starts
SRL7	Demonstration	Partners committed	Monitoring and reporting begins	Senior management is involved and supports Ind Symb case
SRL6	Prototype demonstration "looks like"	Business case with all details	Permits applied for	Concept for joint management is developed
SRL5	Breadboard demonstration "acts like"	Evaluate competitiveness	Sustainability assessment finalized	Partners start joint evaluation of Ind. Symb. potential
SRL4	Proof of concept validation	Check resources and criteria	Sustainability assessment in execution	Partners indicate interest
SRL3	Proof of concept research (bench scale)	Check fit with strategies of partners	Thorough data collection	First contact with partners
SRL2	Academic research	Develop concept	Rough estimate	Potential partners identified
SRL1	Initial ideas			

* Study and portfolio review of the projects on industrial symbiosis in DG Research and Innovation - https://op.europa.eu/en/publication-detail/-/publication/f26dfd11-6288-11ea-b735-01aa75ed71a1

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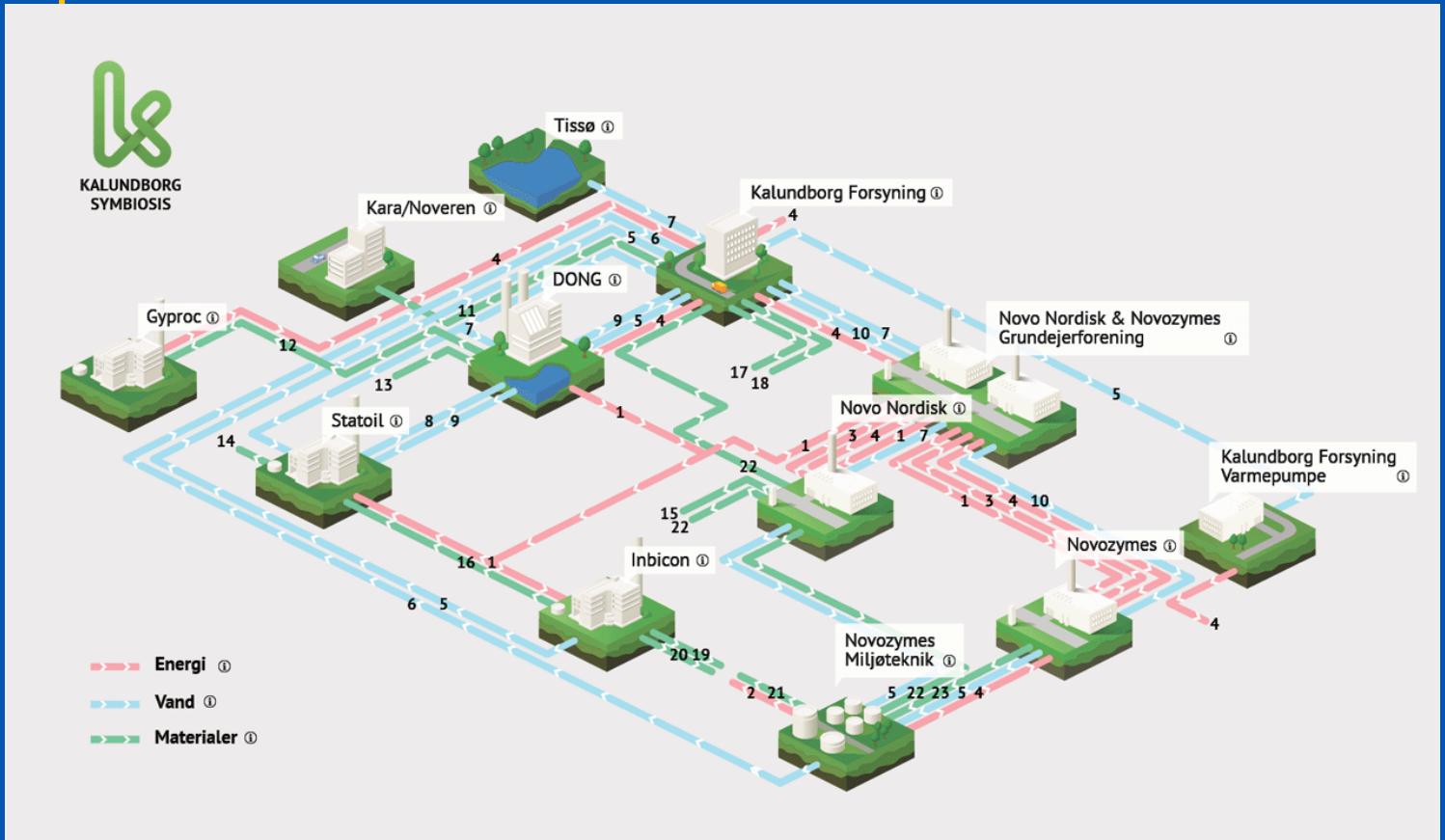
HUBS FOR CIRCULARITY

THE CONCEPT – P4P roadmap

*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 with integration of interregional recycling value chains
- → **Processes4Planet inside!**
- → Facilitation necessary to overcome non-technological barriers to symbiosis

Kalundborg in Denmark



Connection of **geographically close units** to keep resources in the loop as long as possible

*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.*

Kalundborg, Source of image: http://www.energycrossroads.org/industrial-symbiosis-circular-economy

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Destination 1 – Climate-neutral, circular and digitised production

- Manufacturing Industry - **Made in Europe** Partnership
  - Advanced manufacturing as a key enabling technology
  - From smart factories to regenerative factories, incl. bio-intelligent manufacturing
  - Systemic approach: from smart factories to smart value loops – e.g. support to digital product passport
  - Data-driven technologies, Manufacturing-As-A-Service
- Construction
  - Digitisation and circularity for buildings - synergies with Bauhaus, Built4People
- Energy-efficient and Climate-neutral Industries - **Processes 4 Planet** and **Clean Steel** Partnerships
  - Energy Efficiency and Climate Neutrality - **REPowerEU**
  - Circularity / Zero-pollution (air, soil and water)
  - Hubs for Circularity – place-based innovation between industry, regions and cities
  - Synergies with: Mission Innovation 2.0 / ETS Innovation Fund / Coal and Steel Fund

Destination 2 – Increased autonomy in key strategic value chains for resilient industry

- Raw Materials
  - Sustainable / responsible exploration, extraction, processing, refining + *recycling*
  - European Raw Materials Alliance – focusing on Critical Raw Materials, e.g. rare earths
- Safe and Sustainable by Design (SSbD)
  - Implementing SSbD and Strategic Research and Innovation Plan for Chemicals and Materials (Chemicals Strategy) - framework and criteria for assessing safety and sustainability of chemicals and materials)
  - Toolboxes for Safe and Sustainable by Design Policy
- Strategic Innovation Markets driven by Advanced Materials
  - Implementing Materials 2030 Manifesto – covering nine innovation markets

Hubs for Circularity (H4C) – The plan

First-of-a-kind, lighthouse demonstrator plants of commercial size

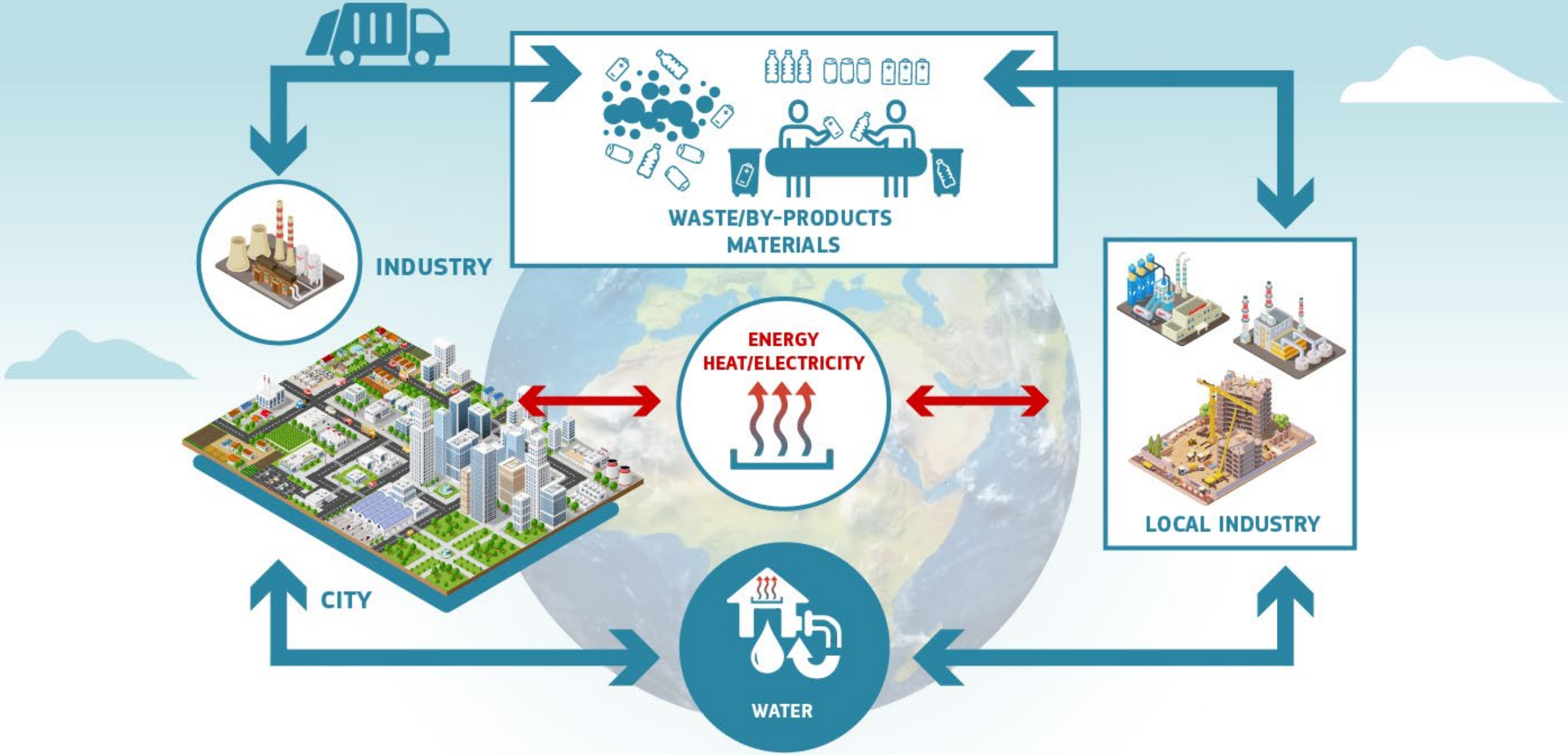
- industrial symbiosis and/or urban industrial symbiosis
- achieving a step change in circular utilization of resources and GHG emission reductions
- within a given representative geographical area
- strong technological focus and industrial dimension

Specific implementation:

- funding strategies
- participation of all stakeholders (Industry, SMEs, local authorities, educational institutions and civil society)

Common target :

- collectively achieve and demonstrate at scale a leap towards circularity and carbon neutrality in the use of resources (feedstock, energy and water) in a profitable way.
- accelerate in this way green industrial transition



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H4C Topics in Horizon Europe

What we are looking for?

- **Accelerate Green industrial transition** through implementation of IS, IUS and circularity in large scale demonstrators.
- Innovative approach that **brings together companies from different business sectors** with the **aim of improving cross industry resource efficiency** through the commercial trading of materials, energy and water and sharing assets, logistics and expertise.
- Clustering industries / stakeholders / citizens around common green targets.
- Initiate **a systemic change in prosperity** for region and cities rethinking completely interactions within a business to territory view to create win- win interactions with the existing social ecosystem.
- Seed 50 light-house H4Cs by 2030

WP 2020-21 & WP 2023-24

Overview of HE 2021-22 H4C and Circularity related projects

FIELD	PROJECT ACRONYM	TOTAL GRANTED BUDGET	PROJECTS FUNDED
Industrial symbiosis (RIA)	WaterProof Symsites AshCycle	M€ 31,9	3
Urban industrial symbiosis (IA)	MobiCon Terys HighPCR	M€ 36,2	3
H4C European community of practice (CSA)	H4C ECoP H4C EUROPE	M€ 4,0	2

WP 2023-24 will include 2 H4C topics:

- Hubs for circularity for near zero emissions regions applying industrial symbiosis and cooperative approach to heavy industrialized clusters and surrounding ecosystems (IA) in 2023
- Hubs for circularity for industrialised urban peripheral areas (IA) in 2024

Spread significantly the H4C concept across the EU

Deploy at least 15 H4Cs effectively running by 2030

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H4C Community of Practice – ECoP platform

ECoP innovation activities

- Build the European Community of Practice that connects H4C on the level of knowledge management and services
- Synthesise findings into generic learning/frameworks and keep knowledge about state-of-the-art solutions updated
- Enable evaluation of I-US projects
- Facilitate education & training

Regional level

- Knowledge on local availability of material and heat flows and resulting opportunities and requirements
- Provide a state-of-play analysis of regions/areas best suited for the first implementation of advanced H4C in Europe
- Study of their strengths and weaknesses, including their symbiosis readiness level and several specific scenarios for H4C implementations
- Analyse collaboration models, non-technological barriers, tools, technologies and existing solutions for I-US and circularity

European level

- Development of the technologies, knowledge, tools and best-practice exchange to accelerate roll-out of Urban-Industrial Symbiosis.
- Bringing together the regional H4C in one network of networks.
- Collaboration with other initiatives (EIT KICs, The H2 Valleys, the Digital Innovation Hubs or other pan-European initiatives).
- Stimulate public and private investments in I-US and circular economy projects

The platform is expected to be launched by the end of 2022 !

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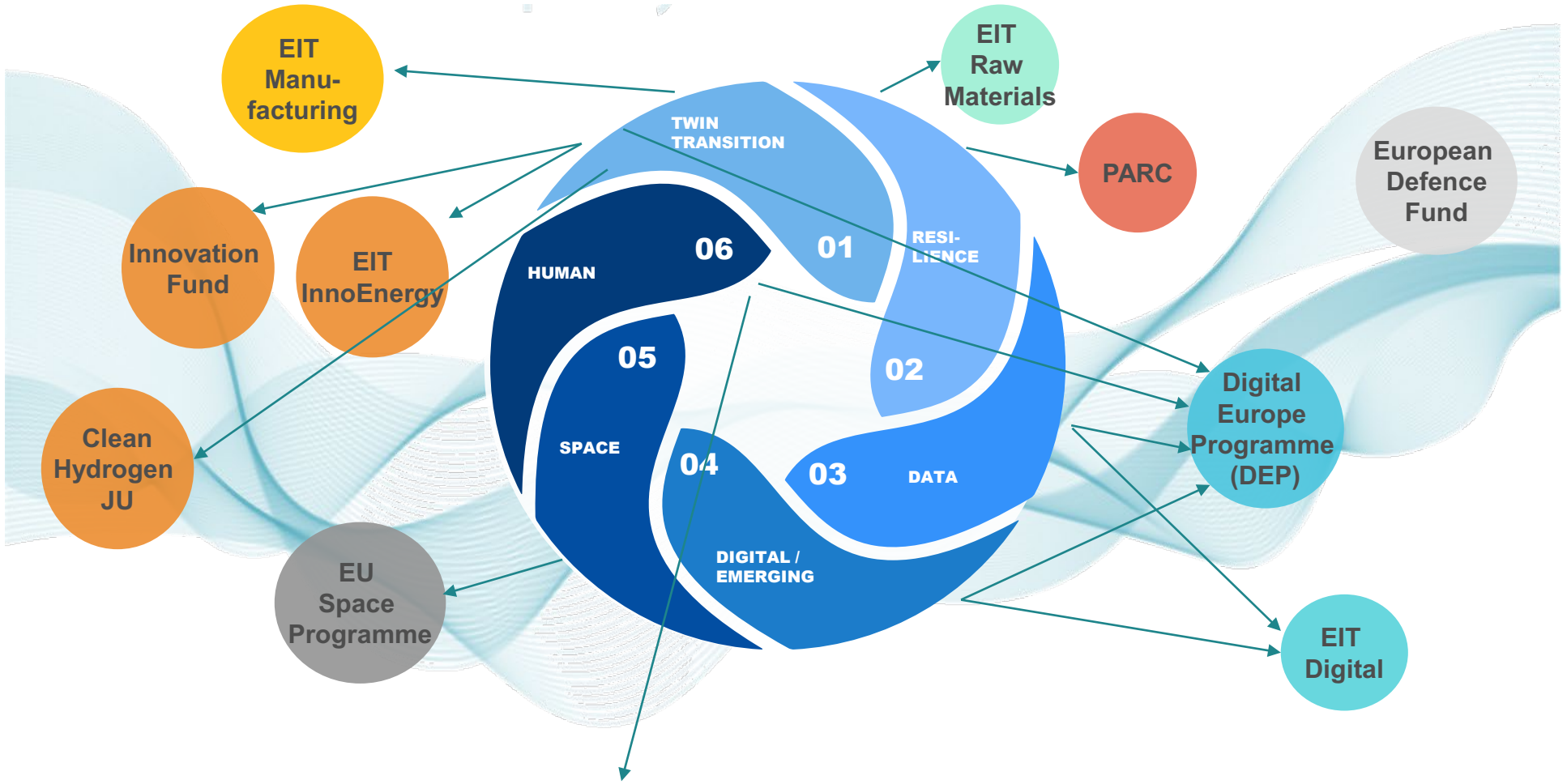
Cluster 4 Synergies - Overview



Keep in touch

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Processes 4 Planet
Advanced Materials and Chemicals Advanced Manufacturing
Metrology

https://research-and-innovation.ec.europa.eu/research-area/industry/sustainable-production-processes_en

Contact H4C Community of Practice : info@h4c-community.eu

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Thank you

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