European Commission

Horizon Europe

THE NEXT EU RESEARCH & INNOVATION PROGRAMME (2021 – 2027)

#HorizonEU

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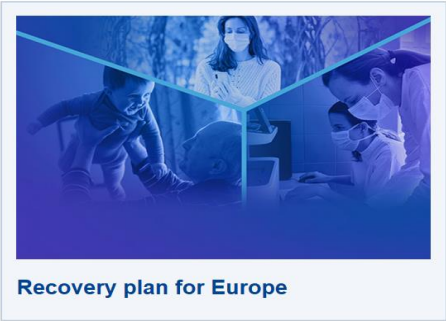
Research and Innovation

Cluster 4 – Political Priorities



[European Space Strategy]

[Action Plan on critical raw materials]

Cluster 4 – Vision

Competitive technologies respecting the boundaries of our planet, and reflecting human needs

Twin Green and Digital transitions

Climate-neutral, circular and clean industry

Industrial and digital transformation

- mastering technologies
- deploying technologies – technology infrastructures
- securing autonomy in strategic value chains

Major contribution to Inclusiveness and Resilience

- engagement with users, workers, citizens
- development of skills
- development of regions

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KEY STRATEGIC ORIENTATION	EXPECTED IMPACT
Making Europe the first digitally enabled, circular, climate-neutral and sustainable economy (C)	**Global leadership in clean and climate-neutral industrial value chains, circular economy and climate-neutral digital systems and infrastructures (networks, data centres)**, through innovative production and manufacturing processes and their digitisation, new business models, sustainable-by-design advanced materials and technologies enabling the switch to decarbonisation in all major emitting industrial sectors, including green digital technologies.
Promoting an open strategic autonomy by leading the development of key digital, and enabling and emerging technologies, sectors and value chains (A)	**Industrial leadership and increased autonomy in key strategic value chains with security of supply in raw materials,** achieved through breakthrough technologies in areas of industrial alliances, dynamic industrial innovation ecosystems and advanced solutions for substitution, resource and energy efficiency, effective reuse and recycling and clean primary production of raw materials, including critical raw materials and leadership in circular economy.
	Globally attractive, secure and dynamic data-agile economy by developing and enabling the uptake of the next-generation computing and data technologies and infrastructures (including space infrastructure and data), enabling the European single market for data with the corresponding data spaces and a trustworthy artificial intelligence ecosystem.
	Open strategic autonomy in digital technologies and in future emerging enabling technologies by strengthening European capacities in key parts of digital and future supply chains, allowing agile responses to urgent needs, and by investing in early discovery and industrial uptake of new technologies.
	Open strategic autonomy in developing, deploying and using global space-based infrastructures, services, applications and data, including by reinforcing the EU's independent capacity to access space, securing the autonomy of supply for critical technologies and equipment and fostering the EU's space sector competitiveness.
Creating a more resilient, inclusive and democratic European society (D)	**A human-centred and ethical development of digital and industrial technologies**, through a two-way engagement in the development of technologies, empowering end-users and workers, and supporting social innovation.

Cluster 4 Digital, Industry and Space – Destinations in Work Programme 2021-22

KEY STRATEGIC ORIENTATION	DESTINATION
Making Europe the first digitally led circular, climate-neutral and sustainable economy	**Climate neutral, Circular and Digitised Production – TWIN-TRANSITION**
Promoting an open strategic autonomy by leading the development of key digital, and enabling and emerging technologies, sectors and value chains	**A Digitised, Resource-efficient and Resilient Industry – RESILIENCE**
	World-leading Data and Computing Technologies – DATA
	Digital and Emerging Technologies for competitiveness, fit for the Green Deal – DIGITAL-EMERGING
	Open Strategic Autonomy in developing, deploying and using global Space-based Infrastructures, Services, Applications and Data – SPACE
Creating a more resilient, inclusive and democratic European society	**A Human-centred and Ethical development of Digital and Industrial technologies – HUMAN**

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Partnerships in Cluster 4

- Processes4Planet – Transforming the European Process Industry for a sustainable society
- Clean Steel – Low-carbon Steelmaking
- Made in Europe
- EuroHPC, High-Performance Computing (JU, 900M€)
- KDT, Key Digital Technologies (JU, 1,800M€)
- SNS, Smart Networks and Services (JU, 900M€)
- Artificial Intelligence, Data and Robotics
- Photonics
- Globally competitive Space Systems (proposed)
- Metrology (350M€, 100M€ from Cluster 4)

Indicative Budget of Cluster 4

Co-legislators have agreed on a **budget of 15.348 bn€ for Cluster 4** (including NGEU)

For the WP 2021-2022, the **programmable budget is ~3.5 bn€**, distributed *approximately* as follows (all figures in this presentation are to the nearest 5M€):

DESTINATION	BUDGET 2021-2022
Destination 'Climate neutral, circular and digitised production'	**740 M€**
Destination 'Increased autonomy in key strategic value chains for resilient industry'	**780 M€**
Destination 'World leading data and computing technologies'	**345 M€**
Destination 'Digital and emerging technologies for competitiveness and fit for the green deal'	**750 M€**
Destination 'Open Strategic autonomy in developing, deploying and using global space-based infrastructures, services, applications and data' (incl. Other Actions)	**525 M€**
Destination 'A Human-centred and ethical development of digital and industrial technologies'	**325 M€**
Other Actions (other than Space-related)	**35 M€**

Climate neutral, circular, and digitised production

SECTIONS	NUMBER OF TOPICS	ESTIMATED BUDGET (M€)
Green, flexible and advanced manufacturing	8	190
Advanced digital technologies for manufacturing	4	100
A new way to build, accelerating disruptive change in construction	4	70
Hubs for circularity, a stepping stone towards climate neutrality and circularity in industry	3 (including 1 CSA)	70
Enabling circularity of resources in the process industries, including waste, water and CO2/CO	6	175
Integration of Renewables and Electrification in process industry	5	135
TOTAL estimated budget WP 2021-2022	30	740

DRAFT Work Programme 2021-2022 “Destination – Climate Neutral, Circular and Digitised Production”

Call - Twin green and digital transition 2021

Green, flexible and advanced manufacturing

- AI enhanced robotics systems for smart manufacturing (IA)
- Zero-defect manufacturing towards zero-waste (IA)
- Laser-based technologies for green manufacturing (RIA)
- Manufacturing technologies for bio-based materials (RIA)

Advanced digital technologies for manufacturing

- Artificial Intelligence for sustainable, agile manufacturing (IA)
- Data-driven Distributed Industrial Environments (IA)

A new way to build, accelerating disruptive change in construction

- Digital permits and compliance checks for buildings and infrastructure (IA)
- Automated tools for the valorisation of construction waste (RIA)
- Breakthrough technologies supporting technological sovereignty in construction (RIA)

Hubs for circularity, a stepping stone towards climate neutrality and circularity in industry

- Deploying industrial-urban symbiosis solutions for the utilization of energy, water, industrial waste and by-products at regional scale (RIA)
- Hubs for Circularity European Community of Practice (ECoP) platform (CSA)

Enabling circularity of resources in the process industries, including waste and CO2/CO

- Plastic waste as a circular carbon feedstock for industry (IA)
- Carbon Direct Avoidance in steel: Electricity and hydrogen-based metallurgy (IA)
- Improvement of the yield of the iron and steel making (IA)
- Reducing environmental footprint, improving circularity in extractive and processing value chains (IA)

Integration of Renewables and Electrification in process industry

- Design and optimisation of energy flexible industrial processes (IA)
- Adjustment of Steel process production to prepare for the transition towards climate neutrality (IA)

Autonomy in Key Strategic Value Chains for Resilient Industry

SECTIONS	NUMBER OF TOPICS	ESTIMATED BUDGET (M€)
Novel paradigms to establish resilient and circular value chains	2	50
Raw materials for EU strategic autonomy and successful transition to a climate-neutral and circular economy	12 (incl. 2 CSA)	260
Green and Sustainable Materials	8 (incl. 1 CSA)	160
Materials for the benefit of society and the environment and materials for decarbonising Industry	9 (incl. 1 CSA)	190
Materials and data cross-cutting actions	5 (incl. 1 CSA)	80
Improving the resilience and preparedness of EU businesses, especially SMEs and Startups	7 (incl. 4 CSA)	40
TOTAL estimated budget WP 2021-2022	43	780

DRAFT Work Programme 2021-2022 “Destination – Increased Autonomy in key Strategic Value Chains for Resilient Industry”
Call - A digitised, resource-efficient and resilient industry 2021

Novel paradigms to establish resilient and circular value chains

- Ensuring circularity of composite materials (RIA)
- Raw materials for EU strategic autonomy and successful transition to a climate-neutral and circular economy
- Identifying future availability of secondary raw materials (RIA)
- Developing climate-neutral and circular raw materials (IA)
- Building EU-Africa partnerships on sustainable raw materials value chains (CSA)
- Innovation for responsible EU sourcing of primary raw materials, the foundation of the Green Deal (RIA)
- Building innovative value chains from raw materials to sustainable products (IA)

Green and Sustainable Materials

- Establishing EU led international community on safe- and sustainable-by-design materials to support embedding sustainability criteria over the life cycle of products and processes (CSA)
- Promote Europe's availability, affordability, sustainability and security of supply of essential chemicals and materials (IA)
- Paving the way to an increased share of recycled plastics in added value products (RIA)
- Safe- and sustainable-by-design polymeric materials (RIA)
- Safe- and sustainable-by-design metallic coatings and engineered surfaces (RIA)

Materials for the benefit of society and the environment and materials for climate-neutral Industry

- Development of more energy efficient electrically heated catalytic reactors (IA)
- Creation of an innovation community for solar fuels and chemicals (CSA)
- Advanced materials for hydrogen storage (RIA)
- Antimicrobial, Antiviral, and Antifungal Nanocoatings (RIA)

Materials and data cross-cutting actions

- Biomaterials database for Health Applications (CSA)
- Sustainable Industry Commons (RIA)

Improving the resilience and preparedness of EU businesses, especially SMEs and Startups

- Innovation Radar, Tech Due Diligence and Venture Building for strategic digital technologies (CSA)
- Re-opening industrial sites preparatory action – Promoting a sustainable strategy for Europe’s industrial future (CSA)
- 'Innovate to transform' support for SME's sustainability transition (CSA)
- European Technological and Social Innovation Factory (RIA)µ
- Social and affordable housing district demonstrator (IA)

Thank you!

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http://ec.europa.eu/horizon-europe