THE EU RESEARCH & INNOVATION PROGRAMME
2021 – 2027

Other Funding Opportunities
Cluster 4 (Cluster 5 Info Days)

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European Commission
DGs R&I, CONNECT
CLUSTER 4 – Digital, Industry and Space

● Advancing key enabling, digital and space technologies
● Underpinning the transformation of our economy and society
● Supporting the digitisation and transformation of European industry
● Contributing to securing global industrial leadership and autonomy in terms of technologies and resources

A number of topics are complementary to, and should be of interest to stakeholders of, Cluster 5
Call - TWIN GREEN AND DIGITAL TRANSITION 2021

Call - A DIGITISED, RESOURCE-EFFICIENT AND RESILIENT INDUSTRY 2021

A new way to build, accelerating disruptive change in construction

- HORIZON-CL4-2021-TWIN TRANSITION-01-10: Digital permits and compliance checks for buildings and infrastructure (IA)
- HORIZON-CL4-2021-TWIN TRANSITION-01-11: Automated tools for the valorisation of construction waste (RIA)
- HORIZON-CL4-2021-TWIN TRANSITION-01-12: Breakthrough technologies supporting technological sovereignty in construction (RIA)
HORIZON-CL4-2021-TWIN-TRANSITION-01-10: Digital permits and compliance checks for buildings and infrastructure (IA)

**Expected Outcomes:**
- Efficiency and productivity gains in design and construction processes;
- Fewer errors in planning, design and construction processes;
- Automated, faster, more accurate and more efficient compliance for construction works (e.g. regulatory, health and safety, performance);
- Improved build quality and resource efficiency in construction, in line with the aims of the New European Bauhaus initiative.

**Indicative budget:** EUR 15.00 million
**EU contribution per project:** around EUR 5.00 million
**Type of Action:** Innovation Actions (70% funding)
**TRL:** Start at 5 and achieve 7
HORIZON-CL4-2021-TWIN-TRANSITION-01-11: Automated tools for the valorisation of construction waste (RIA)

Expected Outcomes:
• Increase significantly the construction and demolition waste (CDW) utilisation (at least 80% weight in line with the current waste Directive 2008/98/EC as amended by Directive 2018/851) by cascade approach including re-use, recycle and transformation of waste into secondary products in full cooperation between construction and waste management companies.
• Provide new value chain and sustainable business models for construction waste reduction mobilising cross sectorial actors;
• Implement appropriate tracing of material and/or component along the new value chain.
• Increase by 50% the reusability of construction products post demolition and reduce the down cycling of construction waste by facilitating modular dismantling of complex construction products;
• Plan a list of actions for overcoming relevant barriers (e.g. end of waste criteria, lack of trust in secondary products, awareness of circular potential);
• Develop holistic and replicable solutions for more circular and climate neutral construction materials and activities involving upstream and down-stream actors.

Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.

Indicative budget: EUR 21.00 million
EU contribution per project: EUR 6.00 – 10.00 million
Type of Action: Research and Innovation Actions
TRL: Start at 4 and achieve 6
**Expected Outcomes:**

- Integrate breakthrough technologies derived from other industries: examples include additive manufacturing; human robot collaboration; autonomous vehicles in construction activities; autonomous maintenance, diagnostics and monitoring;
- Demonstrate the impact of the use of these new breakthrough technologies on the efficiency of resources (raw materials, water etc.), the reduction of waste and embodied CO\textsubscript{2} emissions;
- Demonstrate the safety of these breakthrough technologies on a construction environment in cooperation with workers;
- Demonstrate a reduction of dependency for importing breakthrough technologies related to additive manufacturing, human robot collaboration or autonomous vehicles;
- Increase the wellbeing of the construction workforce concerned.

**EU contribution per project:** EUR 8.00 – 10.00 million

**Indicative budget:** EUR 24.00 million

**Type of Action:** Research and Innovation Actions

**TRL:** Start at 4 and achieve 6
Call - TWIN GREEN AND DIGITAL TRANSITION 2021

Call - A DIGITISED, RESOURCE-EFFICIENT AND RESILIENT INDUSTRY 2021

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

- HORIZON-CL4-2021-TWIN-TRANSITION-01-18: Carbon Direct Avoidance in steel: Electricity and hydrogen-based metallurgy (Clean Steel Partnership) (IA)
- HORIZON-CL4-2021-TWIN-TRANSITION-01-19: Improvement of the yield of the iron and steel making (Clean Steel Partnership) (IA)

Integration of Renewables and Electrification in process industry

- HORIZON-CL4-2021-TWIN-TRANSITION-01-21: Design and optimisation of energy flexible industrial processes (IA)
- HORIZON-CL4-2021-TWIN-TRANSITION-01-22: Adjustment of Steel process production to prepare for the transition towards climate neutrality (IA)
Expected Outcomes:
Projects outcomes will enable achieving the expected impacts of the destination by improving energy efficiency in raw materials value chains.
Projects are expected to contribute to the following outcomes:
• Demonstration of technologies in the steel sector leading to a reduction of CO₂ emissions by 2050 by at least 80 to 95% compared to 1990 levels;
• Improve energy and resource efficiency (considering also intermittency and the possibility to offer demand-response flexibility) and increase utilisation of renewable energy sources in metallurgical processes to substitute fossil fuels;
• Enabling steel production through carbon direct avoidance (CDA) technologies at a demonstration scale.
Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.

EU contribution per project: EUR 6.00 – 8.00 million
Indicative budget: EUR 28.00 million
Type of Action: Innovation Actions (60% funding)
TRL: Start at 5 and achieve 8
HORIZON-CL4-2021-TWIN-TRANSITION-01-19: Improvement of the yield of the iron and steel making (Clean Steel Partnership) (IA)

Expected Outcomes:

- Validate at industrial test scale technologies for impurity removal from scrap or the recovery of metal fractions contained in steel making process residues (that are today mainly landfilled) reaching high recycling rate of residues originated at the demo site up to 40% achieving a metal recovery efficiency up to 90% and a mineral recovery efficiency up to 80%;
- Progressively increasing the uptake of low-quality scrap grades into high quality steel grades;
- Progressively replacing the use of pre-consumer scrap grades with high quality clean scrap grades;
- Progressively replacing the use of solid pig iron produced by traditional BF process with post-consumer grades;
- Reducing the environmental impact by minimizing CO$_2$ emission up to 20% both, directly (and locally) by internal recycling of the metal fraction derived from residues, or indirectly by increasing the use of scrap as raw material in steelmaking production processes including:
  - the reduction of pig iron use the in the steelmaking process;
  - the use of alternative reducing agents as coal substitution, such as biomass, polymers, hydrogen;
  - the reduction of CO$_2$ emission derived by extraction and transportation of natural resources as well as transportation and landfill of industrial waste;
  - the generation of CO$_2$ neutral energy vector from chemical and sensible heat from pyro-metallurgical residue treatment processes allowing at least 5% reduction of specific energy consumption for a dedicated process.
- Develop novel technologies for onsite characterization (chemical and physical) of ferrous materials to help standardization of charge managing practice;
- Confirming the replicability of the demonstration plant in most of EU steel shops.

Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.

EU contribution per project: EUR 4.00 – 5.00 million
Indicative budget: EUR 14.00 million
Type of Action: Innovation Actions (60% funding)
TRL: Start at 6 and achieve 8
Expected Outcomes:

- Significant increase of the process flexibility and demand response towards the integration of variable energy sources, i.e., renewable energy sources, including possible onsite energy storage and conversion;
- Overall increased energy efficiency of the industrial process within the energy system;
- New digital tools that account for the energy availability to realise the additional flexibility of the process and that create connections to energy grid platforms for a more efficient energy management system;
- Cost reduction of the overall process through valorisation of excess streams into the energy system.

Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.

EU contribution per project: EUR 12.00 – 18.00 million
Indicative budget: EUR 39.00 million
Type of Action: Innovation Actions (60% funding)
TRL: Start at 5 and achieve 7
HORIZON-CL4-2021-TWIN-TRANSITION-01-22: Adjustment of Steel process production to prepare for the transition towards climate neutrality (Clean Steel Partnership) (IA)

Expected Outcomes:
• Adaptation of the energy and materials flow in the existing steel installations to allow for a technically and economically feasible transition to reduce the use of fossil carbon as reducing agent;
• Reduction of carbon footprint by incrementally adapting to hydrogen and biomass as reducing agents;
• Showcase new technologies to reduce steelworks energy consumption by implementing improvements in the materials and energy flows whilst reducing fossil carbon related emissions;
• Develop technological pathways to increase the reutilization of internal process metallurgical gases by deploying advanced gas treatment solutions.

EU contribution per project: EUR 4.00 – 5.00 million
Indicative budget: EUR 14.00 million
Type of Action: Innovation Actions (60% funding)
TRL: Start at 6 and achieve 8
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<thead>
<tr>
<th><strong>HORIZON-CL4-2021-DIGITAL-EMERGING-01-09</strong></th>
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<td><strong>AI, DATA AND ROBOTICS FOR THE GREEN DEAL</strong></td>
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<th>TYPE: Innovation Action (IA)</th>
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<td><strong>BUDGET</strong>: 27M€ (3~5M€/project)</td>
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<td>➔ May provide FSTP*</td>
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<td>TRL start: 3-5 ➔ TRL end: 6-7</td>
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* FSTP: Financial Support to Third Parties
AI, DATA AND ROBOTICS FOR THE GREEN DEAL
EXPECTED OUTCOMES:

1. Resource optimisation and minimisation of waste, energy, or greenhouse gas emissions
2. Environmental and waste management in the circular economy
3. Robotics solutions in harsh environments serving the Green Deal

(Awarding will ensure balanced portfolio coverage)
SCOPE: INTEGRATE AND OPTIMISE AI, DATA AND ROBOTICS SOLUTIONS TO DEMONSTRATE HOW THEY CAN CONTRIBUTE TO THE GREEN DEAL

- Driven by use-cases
- Demonstrate technology performance + added value to the application field
- Environmental impact
- Deep involvement of stakeholders
THREE TYPES OF DEMONSTRATORS:

- **ROBOTICS ONLY**: e.g. robotics in harsh environments
- **MIX OF ROBOTICS AND NON-ROBOTICS**: e.g. applications in waste management
- **ONLY AI AND DATA**: e.g. energy optimisation
TWO TYPES OF PROPOSALS:

~3M€:
• user industry
• technology providers

~5M€
Must include FSTP:
• >40% of the budget
• up to 200K€/TP
TOMORROW’S DEPLOYABLE ROBOTS: EFFICIENT, ROBUST, SAFE, ADAPTIVE AND TRUSTED

HORIZON-CL4-2021-DIGITAL-EMERGING-01-11

PUSHING THE LIMIT OF ROBOTICS COGNITION

TYPE: Research and Innovation Action (RIA)

BUDGET: ~5M€/project

TRL start: 2-3 ➔ TRL end: 4-5
Pushing the Limit of Robotics Cognition
Expected outcome

Next Generation of AI-Powered Robotics

Improved Perception & Understanding
Increased Autonomy
Less Supervision

New Generation of Interactive Robots
ADDITIONAL EXPECTED OUTCOME DEPENDING ON THE FOCUS OF THE PROPOSAL

Smarter robots:
- capabilities/functionalities
- complex functionalities
- increased autonomy

Smooth and trustworthy human-robot collaboration:
- safe & reliable
- Advanced reactivity
- Mutual understanding
- Human-centric adaptation
All proposals expected to demonstrate improvements in robotics cognition in 3 real-world scenarios and measurements of functional performance.
European Innovation leadership in electronics and photonics

2021
- Ultra-low-power, secure processors for edge computing (RIA)
- Open Source Hardware for ultra-low-power, secure processors (CSA)
- Functional electronics for green and circular economy (RIA)
- Advanced optical communication components (IA)
- Advanced Photonic Integrated Circuits (RIA)

2022
- Advanced multi-sensing systems (RIA)
Technology context: “Integrated in Diversity”

**Photonics**
(Sources, waveguides, detectors, Si)

**Micro- Nanoelectronics**
(CMOS & post-Moore)

**Micromechanics**
(MEMS/NEMS sensing and actuating)

**Microfluidics**
(pumps & channels)

**Control / Processing Software**
(Embedded)

**Communication**
(Optical / RF / THz)

**Storage**

**Energy**
(batteries, harvesting)

**Bio-photonics Bio-sensing**

**Flexible & Printed substrates**

**Integrated Digital components**

**Co-Design**

**Miniaturisation**

**Packaging**

**Co-design + Eco-design**

**HEU Infodays – 30 June 2021 - Rajbenbach**
A holistic approach

Functional Electronics?

Advanced Nanoelectronics

Electronic Smart Systems

Flexible & Wearable Electronics

Call coverage

Source: the 5E project - www.5e-project.eu
HORIZON-CL4-2021-DIGITAL-EMERGING-01-31:
Functional electronics for green and circular economy

BUDGET
- 35 million Euro
- Call opening 22-June-2021
- Submission: 21-Oct-2021

PROJECTS
- RIA
- EU contribution: 3-5 M€

TRL (TECHNOLOGY READINESS LEVEL)
- From 2-3 to 4-5 by the end of the project
Expected Outcomes:

- European leadership in the area of **flexible, printed and organic electronics**
- New concepts, designs and technologies in electronics for **circular economy and sustainability**.
- Next generation components and systems that will deliver **climate-neutral digital solutions**.

Scope:

- **Technological breakthroughs** in functional electronics technologies
- Addressing challenges & opportunities of **green and digital transformations**.
- **Eco-design principles**
  - reduction of energy and resource consumption.
  - low-cost / light-weight / less energy intensive approach
Focus:

- Use of different types of substrates e.g. flexible, stretchable and conformable
- **Integration** in textiles, plastics, glass, paper and metal.
- Improvement of system characteristics - **performance, robustness, reliability**
- High throughput and low-cost **manufacturing processes**

- Application domains:
  - wearables, mobility, health/well-being, agriculture and environment, energy and smart logistics

- **Eco-design principles**:
  - Recovery and recycling solutions
  - Optimisation of the use of resources
  - e.g. energy efficiency at system and manufacturing level, material consumption
How much eco is eco?

The principles of eco-design were published in 2002 (ISO/TR14062) [https://www.iso.org/standard/33020.html](https://www.iso.org/standard/33020.html).

**Eco-design** considers **environmental** aspects at all stages of the product development process, striving for products which make the lowest possible **environmental** impact throughout the product life cycle. (Source: EEA Glossary)

| Successive stages | • Raw material extraction and supply  
|                   | • Manufacturing  
|                   | • Product distribution  
|                   | • Consumer use  
|                   | • End of life (recovery and recycling) |
| Main criteria taken into account | • Consumption of raw materials  
|                                   | • Energy consumption  
|                                   | • Releases in the natural environment and other pollutions  
|                                   | • Climatic impacts  
|                                   | • Impacts on biodiversity |
| Some goals and principles are specifically about | • Using fewer materials and resources for manufacturing products  
|                                                      | • Using materials and resources obtained with a minimum environmental impact  
|                                                      | • Producing the least waste and pollution possible  
|                                                      | • Reducing the ecological impacts of distribution  
|                                                      | • Making reusing/recycling easier by intelligent design that makes disassembly easy |