Processes4Planet

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

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Processes 4 Planet Ideation Event
Monday 8 February 2021

Basic assumptions for Hubs4Circularity

Potential for resource efficiency and reductions in waste, emissions, polution lies in synergies when connecting processes across company borders. The implementation needs:

- Technology development
- Overcoming non-technological barriers to implementation
- Engaging all stakeholders to get support and co-financing for infrastructure

Symbiosis Readiness Level (SRL)

Facilitation between companies and stakeholders in regions is key

H4C are 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.

HORIZON-CL4-2021-TWIN-TRANSITION-01-14
Deploying industrial-urban symbiosis solutions for the utilization of energy, water, industrial waste and by-products at regional scale (RIA)

TWIN-TRANSITION-01-14: Deploying industrial-urban symbiosis solutions for the utilization of energy, water, industrial waste and by-products at regional scale (RIA) - Expected outcomes

- Real-scale pilot for energy flows, industrial waste and water - 50 % improvement
- Sustainable new value chains and business models;
- Actions to overcome non-technological barriers for exploitation;
- Develop relevant indicators and metrics, with baseline values, should be stated clearly in the proposal
- Connect to European Community of Practice (ECoP);
  - Actions to exchange knowledge and human capital, develop learning resources;
  - Explore and demonstrate replication potential in other regions;
  - Implement a social innovation spin-off action involving local authorities, civil society, businesses, especially SMEs, and educational establishments.

TWIN-TRANSITION-01-14: Deploying industrial-urban symbiosis solutions for the utilization of energy, water, industrial waste and by-products at regional scale (RIA) - The scope

- A broad cross-sectorial symbiosis in regions Cross-cutting solutions - equipment, process re-design and adaptation
- Technologies:
  - Novel sensing technology, IoT and digital tools for design, flow optimization, controls;
  - Flexible and robust management of exchange streams in dynamic production
  - IT infrastructures and tools for the integrated management and the preservation of confidentiality of sensitive data;
- Use of outcomes from previous SPIRE projects on Industrial Symbiosis);
- Assessment methodologies and KPIs to measure the performance of symbiosis and common reporting methodologies for the assessment of industrial symbiosis;
- Study social aspects of the community (social innovation, underdevelopment, job quality gender and inclusiveness perspective) - cooperation with other regions

HORIZON-CL4-2022-TWIN-TRANSITION-01-10
Circular flows for solid waste in urban environment (IA)

HORIZON-CL4-2022-TWIN-TRANSITION-01-10: Circular flows for solid waste in urban environment (IA) - Expected outcomes

- Industrial-Urban Symbiosis - a real scale demonstrator for the flow of solid waste circular in process, manufacturing and/or construction industries;
- Reduce 80 % solid waste generated in comparison to current state-of-the art
- Implement a social innovation spin-off action involving local authorities, civil society, businesses, specially SMEs, and educational establishments.
- Connect to the EU Community of Practice (ECoP)
  - Actions to overcome non-technological barriers for exploitation;
  - Share knowledge: know-how, challenges and recommendations on technological and non-technological aspects with the EU Community of Practice (ECoP) and other relevant bodies;
  - Consider training, human capital exchange, optimisation of job profiles and sharing with the local educational establishments;
  - Explore and illustrate replication potential in other regions (e.g. by setting up a network amongst waste associations to optimise flow of secondary raw materials);

HORIZON-CL4-2022-TWIN-TRANSITION-01-10: Circular flows for solid waste in urban environment (IA) - The scope

- Management and processing of waste streams for the valorisation and use as feedstock for process industries; Availability and distribution of "waste" resources and logistics forthe new processes;
- New approach to end-of life materials removing the usual barriers of exploitation, enabling novel symbiotic interactions; unification of administration procedures, data sharing and preservation of data confidentiality;
- Technologies:
  - IoT and digital tools for classification and sorting of solid waste streams;
  - Recycling
- Define assessment methodologies and evaluate KPIs to measure the performance of symbiosis, including environmental, economic and social impacts; (including Symbiosis Readiness Level);
- Create societal awareness through a participative approach locally and more broadly, highlighting and communicating political and regulatory obstacle between regions/countries.
- Study social aspects of the community and its improvement through I-US where demonstration is located, whilst also considering a gender and inclusiveness perspective;

HORIZON-CL4-2021-TWIN-TRANSITION-01-16

Hub for European Circularity

Community of Practice (ECoP) platform (CSA)

HORIZON-CL4-2021-TWIN-TRANSITION-01-16: Hub for European Circularity Community of Practice (ECoP) platform (CSA) - Expected outcomes

- EU CoP to **connect Hubs4Circularity** and stakeholders;
- Support to H4C by collecting knowledge, tools, training materials and providing them to circular practitioners;
- Analyse available collaboration models, tools, technologies, solutions - from previously funded projects;
- Define a set of methodologies, KPIs and gaps for the quantification of circularity and symbiosis;
- Provide a state-of-art analysis of regions best suited for the first implementation of advanced H4C in Europe, study strengths and weaknesses, incl. Symbiosis Readiness Level (SRL) and scenarios implementation;
- Roadmap on how to achieve an effective implementation of first-of-a-kind pilot advanced H4Cs by 2025, supported by a solid blended funding strategy, targeting a significant level of circularity by 2030;
- Foster business-to-territory relationships in the area in which the H4C, or neighbouring H4C, are located (i.e. with authorities, SMEs, associations, educational organisations, civil society, etc.). Stimulate investments;
- Provide a solid plan for self-financing the ECoP in the long term from once funding has ended;

HORIZON-CL4-2021-TWIN-TRANSITION-01-16: Hub for European Circularity Community of Practice (ECoP) platform (CSA) - The scope

- Gather and synthesise knowledge; Characterise and evaluate systematically symbiosis and circularity-related solutions; optimise support based on feedback;
- Draw up criteria for best suited areas for lifting up and expanding existing Hubs;
- Identify high-potential areas, for the first demonstrator of H4C by 2026, to become lighthouse examples of win-win cooperation between industry, SMEs, public authorities, academia and civil society on circular economy beyond 2026;
- Involve scenarios and infrastructures that are already in place, as well as, potential public or private financial support; the SRL should be significant. Identify gaps.
- Connect H4C for knowledge and experience exchange; Provide support, advice, tutorials; Propose stakeholder events, also local; Promote the role of facilitators;
- Collaborate with other related networks.

Processes4Planet

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

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HORIZON-CL4-2021-TWIN-TRANSITION-01-17: Plastic waste as a circular carbon feedstock for industry (IA)

- Valorise a wide variety of unsorted polymer waste in large amounts, to avoid landfill;
  - Attempts to include sorted (plastic) waste and more directed, catalytic technologies not successful.
  - Waste sources mentioned include plastic, packaging, non-sorted polymers, textiles, PPE
  - Need to provide support for secure supply of targeted waste and feasible business case
- Produce material streams of high industrial interest, replacing the ones currently produced from fossil feedstocks
  - Olefins, hydrogen, syngas, etc.
  - Targeting electrified cracker technologies

Other relevant points

- Special attention is required to the potential variability of the input, and the presence/formation of contaminants and impurities in the process
- Proof that these secondary raw material streams can be used in downstream industries should be provided
  - Probably best shown via integration in existing value chains.
- Choice of benchmark important for both proof of improved environmental impact of products and processes and 60 % reduction in Greenhouse Gas emissions
  - Current sourcing of products important
  - Undefined use of "products" in LCA bullet point – presumably "products" in LCA sense are the raw material streams

HORIZON-CL4-2022-TWIN-TRANSITION-01-11: Valorisation of CO/CO_2 streams into added-value products of market interest (IA) – Expected outcome

Sustainable Process Industry through Resource and Energy Efficiency

➢ **Innovation Action**: TRL 5 -> TRL 7

➢ **Expected outcome**:

- **Utilise CO/CO_2 streams to produce added value products and/or intermediates of wide industrial interest** (e.g. polymers, resins, chemicals, food/feed ingredients, minerals, etc.). **Excluding fuels and/or energy carriers**;
- Enhance the market for CO/CO_2 based products providing **economically viable and sustainable alternatives** to existing products with strong market interest in **one or more applications** (e.g. consumer products, feed/food ingredients, automotive, construction, etc.);
- Develop **concepts enabling 100% utilisation of RES** (e.g. electrified processes, concentrated solar, etc.), **coping with potential fluctuations in the energy supply**;
- Achieve **at least 60% GHG emissions mitigation** in the overall lifecycle compared to existing processes for the same products (or relevant benchmark);
- Develop mature **technologies for separation/purification of CO/CO_2 containing** waste **streams** to allow the integration in the targeted industry sector/sectors.

HORIZON-CL4-2022-TWIN-TRANSITION-01-11: Valorisation of CO/CO_2 streams into added-value products of market interest (IA) – Scope

Sustainable Process Industry through Resource and Energy Efficiency

➢ **Scope**:

- **Process significant amounts CO/CO_2** containing waste streams **from energy intensive industries**;
- Consider clearly **industrial specifications** and **relevant market requirements;**
  Demonstrate that targeted products and/or intermediates **can fully replace existing counterparts**.
  The **prevention of upcycling of hazardous substances, including their separation and disposal** should be considered;
- Demonstrate the **improved environmental footprint** of the proposed products and processes, as well as other positive impacts using relevant methodologies;
- Demonstrate the proposed concepts in an **industrially relevant environment** and at an **appropriate scale**.
  The *integration of the proposed technology in existing value chains* and the *relevance to several European contexts*
  would be *an added value;*
- Provide elements related to the **replicability and scalability** of the technology, along with the potential for applicability in other energy intensive industry sectors;
- Consider the **co-design of learning resources** together with local and regional educational organisations for current and future generations of employees, incl. innovative learning-teaching methods and identification of new skills.

Processes4Planet

Integration of Renewables and Electrification in process industry

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HORIZON-CL4-2021-TWIN-TRANSITION-01-21: Design and optimisation of energy flexible industrial processes (IA)

Sustainable Process Industry through Resource and Energy Efficiency

Scope: Flexibility solutions are key to achieve the EU renewable energy target of at least 32% for 2030

Proposals should address the following aspects:

- In an existing process, identification of potential flexibility that allows an efficient and competitive operation;
- Redesign and modification of the process to enable more flexibility in operation (e.g. process that can run faster or slower depending on the needs of the grid) or the shift from batch processes to continuous processes, etc., including the removal or adaptation of process steps that limit the flexibility;
- Redesign and modification of the process to increase its flexibility response rate (e.g., faster ramp up or ramp down) towards a higher energy efficiency at subsystem level;
- Development or redesign of digital process control systems, including, e.g., digital twins with integrated multi-agent systems, etc., supported by smart sensors and integrated analytical tools, to realise the flexibility of the process and to create connections to grid integration platforms;
- Evaluation of the potential use of onsite energy storage and conversion (electricity, heat, or other energy vectors) for the proposed flexible solution and integration of such energy solutions whenever relevant and feasible;
- Optimisation of the new process design at pilot scale.

HORIZON-CL4-2021-TWIN-TRANSITION-01-21: Design and optimisation of energy flexible industrial processes (IA)

Sustainable Process Industry through Resource and Energy Efficiency

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.

HORIZON-CL4-2022-TWIN-TRANSITION-01-15: New electrochemical conversion routes for the production of chemicals and materials in process industries (RIA)

- Electrification of the industrial production process
  - While the Roadmap recommends transformation of electrical energy into a variety of vectors to drive chemical reactions – including microwave, ultrasound, plasma – this Topic is restricted to electrochemical or photoelectrochemical processes
  - This means processes limited to the control of electrons
- No apparent limit on the outputs of the process, except
  - CO_2 cannot be the input
  - H_2 cannot be the output (but H_2O can be an input)
- Production of valuable products from both the oxidation and reduction half-reactions is part of the Roadmap and is recommended.

Other relevant points

- Call opens up for all types of electrochemical processes
  - Low-temperature aqueous, high temperature molten salt, etc
- All aspects of the electrochemical process need to be addressed
  - New electrochemical conversion routes
  - Improved electrodes/electrocatalysts
  - Reactor design, optimization and control of mass and charge transfer for both performance and lifetime/cost
  - Separation of the products from the cell
- Energy savings, material savings, CO_2 emission savings compared to classical production routes must all be addressed

HORIZON-CL4-2022-TWIN-TRANSITION-01-17: Integration of hydrogen for replacing fossil fuels in industrial applications (IA)

- Specific conditions:
  - Expected EU contribution per project: EUR 15.00 and 25.00 million
  - Total indicative budget: EUR 40.00 million.
  - Type of action: Innovation Actions
  - Technology Readiness Level: Start TRL 5, achieve TRL 7 by the end of the project
- Expected Outcome:
  - Significant reduction of CO_2 emissions of industrial process, whilst keeping NO_x levels low
  - Improved energy efficiency of the industrial process
  - Significant reduction of hydrogen fuel needs of the developed process with regards to the current fossil fuel needs
  - Competitive costs of the developed technologies

HORIZON-CL4-2022-TWIN-TRANSITION-01-17: Integration of hydrogen for replacing fossil fuels in industrial applications (IA)

- Scope:
  - Utilisation of hydrogen as feedstock and energy carrier in energy-intensive industry sectors
  - Integration of hydrogen into new production routes
  - Replacement of fossil fuels by hydrogen to generate high temperature heat
- Relevant aspects:
  - Redesign of heating processes for hydrogen including combustion system (modification of heating equipment), (off-)gas systems, measures for NO_x-reduction
  - Development of oxygen(-enriched) combustion processes
  - Detection and regulation of fuel gas characteristics (measurement techniques)
  - Proven economic viability

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Novel paradigms to establish resilient and circular value chains

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Harald Peters *BFI*

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HORIZON-CL4-2021-RESILIENCE-01-01:

Ensuring circularity of composite materials (RIA)

SPIRE
Sustainable Process Industry through Resource and Energy Efficiency

- TRL 3 -> TRL 6 by the end of the project

SCOPE:

*'The European **composites** market size was worth €16 billion in 2018 and is estimated to register an annual growth rate of 7.5 % from 2020 to 2025, owing to increasing demand for lightweight materials in various energy intensive value chains such as wind energy or transport. However, composites are difficult to reuse or recycle as available technologies, such as high-temperature pyrolysis and grinding (filler material applications), are either not environment friendly or economically unattractive. In addition, the environmental legislation on recycling of end-of-life components and structures will mean that from 2025, for example, 80,000 tons of fibre-reinforced polymer composites will have to be recycled every year in Europe. In this context it is imperative that **technologies are found to reuse and recycle these materials in an effective and sustainable manner,** without a compromise to downcycling.'*

HORIZON-CL4-2021-RESILIENCE-01-01:

Ensuring circularity of composite materials (RIA)

Sustainable Process Industry through Resource and Energy Efficiency

Proposals:

- Innovative **dismantling and sorting systems** (functional recycling of complex composites);
- Integration of **novel solutions** for a **higher reuse** of **whole products and components**;
- **Safe, environmentally friendly and commercially attractive** solutions, for a **wide range of composites**;
- **Pilot level feasibility** of **reuse and/or recycling** solutions of composites and its secondary raw materials;
- **Tools** development to demonstrate **circularity and environmental benefits** of tested solutions;
- **Learning resources outcome** development with local and regional educational organisations;
- Consideration: Where relevant, solutions for the reduction of toxic elements or compounds in resulting materials -> include the management of the hazardous substances removed.

Expected outcomes:

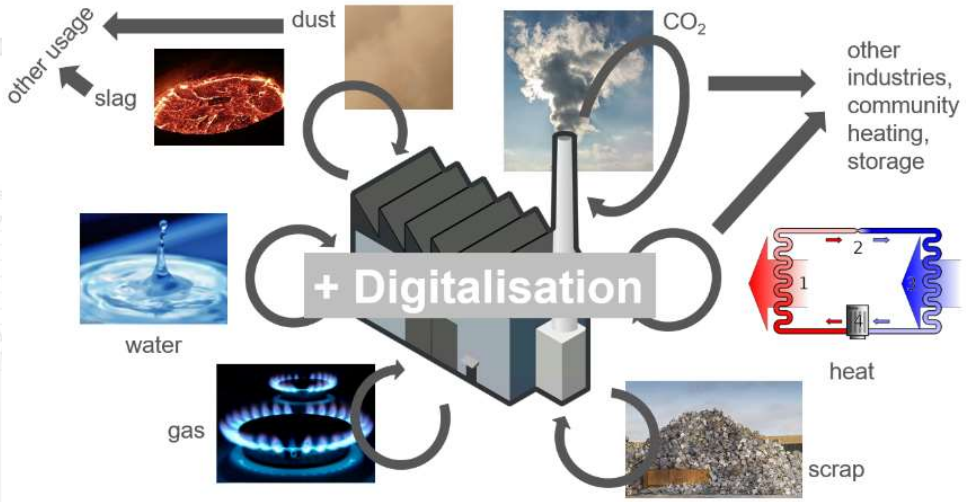
1. **Reuse** of **composite** and **recovery** of **secondary RMs** of **higher value** vs. currently available;
2. **Reduction** of **landfill waste** and **positive environmental impact**;
3. **New value streams**, **new business opportunities** and **revenue flows** for recycling companies, benefiting particularly **SMEs**;
4. **Increased uptake of novel composites in applications** that are **today limited,** due to cost and adherence to environmental legislation and the end-of-life directive.

HORIZON-CL4-2022-RESILIENCE-01-01:

Circular and low emission value chains through digitalisation (RIA => 100% funding rate)

Scope:

Circularity is an essential part of a wider transformation of industry towards **climate neutrality and long-term competitiveness**. It can deliver **substantial material savings** throughout value chains and production processes, generate extra value and unlock economic opportunities. While circularity is in simple terms addressed by **waste from one process becoming secondary materials for others**, an efficient use in the value chain in order to **close the loop** or reuse in other industries, can be ensured only through a transparent information system. There is thus a need for designing and piloting an **information system for raw materials and components in products throughout the whole value chain** of process industries



HORIZON-CL4-2022-RESILIENCE-01-01:

Circular and low emission value chains through digitalisation (RIA => 100% funding rate)

Sustainable Process Industry through Resource and Energy Efficiency

the technology itself is the basis

Integrated components:

- new solutions for improved **use of secondary raw materials**
- methodologies for **digital tracing and certification** of secondary raw materials
- **real-time access** to information on material compositions and material quality
- digital tools for **integration of product passport** and/or certification schemes
- "open source" software, open hardware design, and **easy access to data**
- means and tools to **indicate the composition and origin** of recycled materials (bar code etc.)
- if possible: contribution to **standardisation**

some of this has to be integrated

this is only optional

Expected outcomes:

1. Demonstrate an **increase in the waste reduction** by application of digital technologies
2. Demonstrate **optimisation of use of secondary raw materials** in the value chains.

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Buildings and Industrial Facilities in Energy Transition

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HORIZON-CL5-2021-D4-01-04:
Full demonstration of heat upgrade technologies with supply temperature in the range 90-160°C

Sustainable Process Industry through Resource and Energy Efficiency

- Budget ~ 8 M€
- Innovation action (IA)
- TRL 7-8 by the end of the project

Why?

- Cost-efficient way to improve energy efficiency and reduce the GHG emissions
- Upgrading lower temperature heat flows
  - Renewable heat sources, ambient heat or industrial excess (waste) heat

Project focus:

- Scaling up and improvement of heat upgrade systems which can supply various industrial processes with useful heat 90 – 150 °C.
  - Integration and adaption to existing/improved processes.
- Demonstration at industrial scale (0.5 – 10 MWth).
- Demonstration of business models and contractual agreements in the use of the upgraded heat within the industrial plant identifying also potential regulatory barriers
- Better awareness of the challenges and benefits of heat upgrade in the relevant industrial sectors.

HORIZON-CL5-2021-D4-01-04:

Full demonstration of heat upgrade technologies with supply temperature in the range 90-160°C

Sustainable Process Industry through Resource and Energy Efficiency

Demonstration at full scale (0.5 – 10 kWth) of industrial heat upgrade systems

- Scale up heat upgrade technologies with useful heat in the temperature range of 90 to 160°C and improve its technical performances in terms of:
  - sink output (90 to 160°C); temp increase between sink inlet and outlet; temp spread between source and sink temperatures; flexibility to source input temperature variations; higher sink thermal power; higher coefficient of performance; bigger size; lower CAPEX and operational costs.
- Integration and long-term full-scale demonstration of the system in an industrial environment application in at least one industrial sector
- Identify the potential barriers to the deployment of heat upgrade

Make a preliminary analysis of the technico-economic feasibility and impact of the proposed heat upgrade process .

Impact:

- Identify the target industrial processes
- Assess the potential impact in CO2 emissions reduction (MtonCO2/a) and energy savings (TWh/a) in EU27 and in the Associated States (extrapolate at global level)
- Assess the potential for transferring the technology to the building heating sector, including district heat networks.

HORIZON-CL5-2021-D4-01-05:
Industrial excess (waste) Heat-to-Power conversion based on organic Rankine cycles

Sustainable Process Industry through Resource and Energy Efficiency

- Substantial budget foreseen (10-14 M€)
- Innovation action
- TRL 6-7 at the end of the project

Why?

- Use of process excess/waste heat represents a significant source of energy savings for industries.
- Mitigate the increase of electricity consumption due to industrial electrification and reduce the load on the power grids

Project focus

- Improved ORC systems → The KPI's
  - higher power levels
  - higher cost effectiveness
  - wider input temperature ranges
  - reduced system size
- Better awareness of the challenges and benefits of systems based on Organic Rankin Cycles

HORIZON-CL5-2021-D4-01-05:
Industrial excess (waste) Heat-to-Power conversion based on organic Rankine cycles

Integrate an industrial excess heat-to-power conversion system based on Organic Rankine Cycle (ORC) and demonstrate the system operation in industrial environment

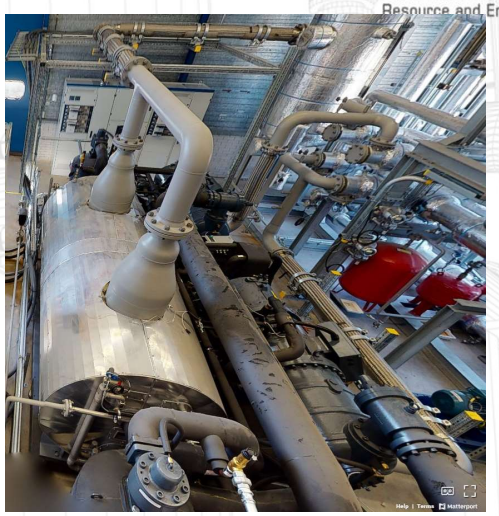
- At an output power level of at least **2 MW**
- With improved cost efficiency compared to existing solutions

- Optimisation of thermal cycles and mixtures of fluids or additives for different T levels in terms of efficiency and economics
- Development/improvement of design tools (components and system level).
- Materials and components: heat exchangers, turbomachinery (including advanced sealing technologies), waste heat recovery unit, power generator and electronics, etc.
- Technical, and economic LCA adapted for at least 4 energy intensive industrial sectors (economic viability, define business cases and exploitation strategy).
- Evaluation of the potential impacts in assuming full deployment in EU Member States and (if possible) Associated Countries, and at global level by extrapolation.

Considerations: (more than one) SME, roadmap, business cases for different sectors

HORIZON-CL5-2022-D4-01-05:
Development of high temperature thermal storage for industrial applications

Sustainable Process Industry through Resource and Energy Efficiency



- Budget 3-4 M€
- Research and Innovation action (RIA)
- TRL 4-5 at the end of the project

Why? Need for flexibility in matching heat demand and supply:

- Generate heat during off-peak times to provide energy demand flexibility.
- Decoupling the heat generation from the heat use in continuous or non-continuous industrial processes
- Allow for heat exchanges between different industrial processes and so enable industrial symbiosis

Project focus:

- Short term (intraday or a couple of days) thermal storage systems for industrial heat)
- Development of new materials:
  - economically affordable
  - dedicated to medium to high temperature industrial processes
  - including better basic understanding
- Better awareness of the challenges and benefits of heat storage in the relevant industrial sectors.

HORIZON-CL5-2022-D4-01-05:
Development of high temperature thermal storage for industrial applications

Integration and demonstration of the system at lab scale

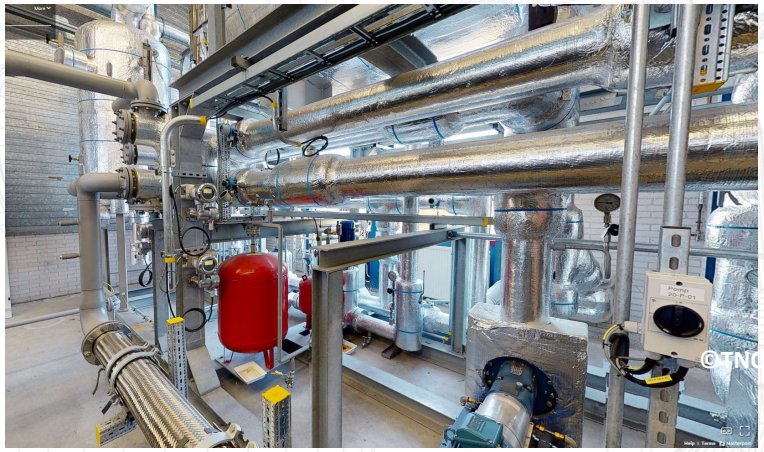
- New designs for high temperature storage of industrial heat
  - Cost effective with minimal footprint
  - Based on novel materials and designs which allow large capacity combination with long design lifetime
- Development of materials and components: thermal storage materials, container construction, insulation technology, heat exchangers with aid of computational fluid dynamics.
- Evaluate its economic potential: based on preliminary estimation of the future equipment cost for at least two industrial applications
- Impact analysis: potential industrial applications and related benefits of the proposed storage system in EU27 and (if possible) in the Associated States, at global level;
- Define an exploitation strategy.

Considerations: important to select materials for relevant temperature levels with economic perspective, already preliminary impact should be in proposal

HORIZON-CL5-2022-D4-01-04:
Development & pilot demonstration of heat upgrade technologies with supply temperature in the range 150-250°C

Sustainable Process Industry through Resource and Energy Efficiency

- Budget 3-5 M€
- Research and Innovation action (RIA)
- TRL 5 at the end of the project



Why?

- Cost-efficient way to improve energy efficiency and reduce the GHG emissions
- Upgrading lower temperature heat flows
  - Renewable heat sources, ambient heat or industrial excess (waste) heat
- Extend the application field by increasing supply temperature

Project focus:

- Validate feasibility of heat upgrade systems which can supplying different industrial processes 150 – 250 °C heat in from different sources.
- Development and demonstration at pilot scale (5 – 200 kWth).
- Better awareness of the challenges and benefits of heat upgrade in the relevant industrial sectors.

HORIZON-CL5-2022-D4-01-04:

Development & pilot demonstration of heat upgrade technologies with supply temperature in the range 150-250°C

Demonstration at pilot scale (5 – 200 kWth) in conditions similar to real industrial environment

- Develop one or more heat upgrade technologies to raise the output temperature to the range 150 to 250°C. Optimise its technical performances in terms of:
  - Delta T between source and sink temperatures, increase in sink temperature
  - Flexibility to source input temperature variations;
  - Thermal power potential
  - Coefficient of performance.

Make a preliminary estimation of the future equipment cost for at least two industrial applications, to evaluate its economic potential; define an exploitation strategy.

Impact:

- Identify the target industrial processes
- Make a preliminary assessment of the potential impacts of these industrial applications (GHG, energy, air pollutant emissions reductions) in the EU (and Associated States, if possible, extrapolate global level)
- Select most promising applications in the subsequent development step

Considerations: already ideas on impact in the proposal, think about SME's, standardisation

Processes for Planet

Social and Non-technological Innovation

Skills Alliance for Industrial Symbiosis
SPIRE-SAIS

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TU Dortmund University
06.02.2021

Co-funded by the Erasmus+ Programme of the European Union

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612429-EPP-1-2019-1-DE-EPPKA2-SSA-B

Triple Transition: Digital, Green and Social

Starting point:

A lot of technological innovation is not being used and implemented

- **Every technological or economical innovation is also a social innovation (process),** which is decisive for or at least co-determining efficiency and effectiveness, success and failure of an innovation.
- Technology as an **enabler** of innovation. "A New Nature of Innovation" (OECD 2010)

Solution:

Digital, Green and Social Transition

Combining technological innovation with a social innovation process
Stakeholder and user involvement in a co-creation process
Considering impact, organisational and personnel development right from the beginning

Processes for Planet: combining technological and social innovation

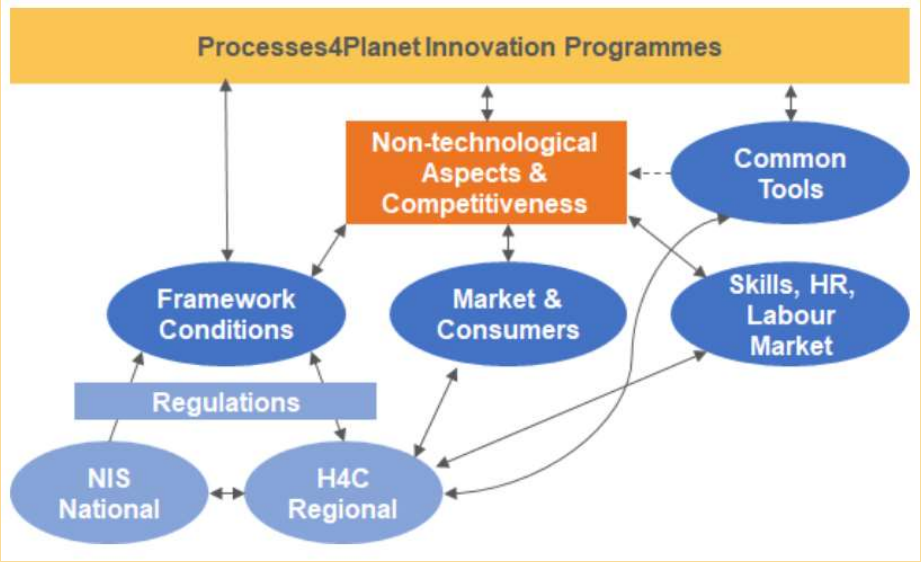
Modern mission-oriented innovation paradigm:

- Technological innovations supported by non-technological elements
- Open the innovation processes by co-creation, user and worker involvement, empowerment of citizens and cross-sector collaboration
- Considering economic, social, and environmental impacts as well as organisational and personnel development right from the beginning ("bringing technology into society")

Operationalisation Roadmap 2050:

- Integration of non-technological aspects as a cross-cutting issue in the innovation programs
- Specific human resources, skills, and labour market Innovation Program

TRANSVERSAL TASK FORCE
Social & non-tech innovations



Skills Alliance for Industrial Symbiosis (SAIS) A Cross-sectoral Blueprint for a Sustainable Process Industry (SPIRE)

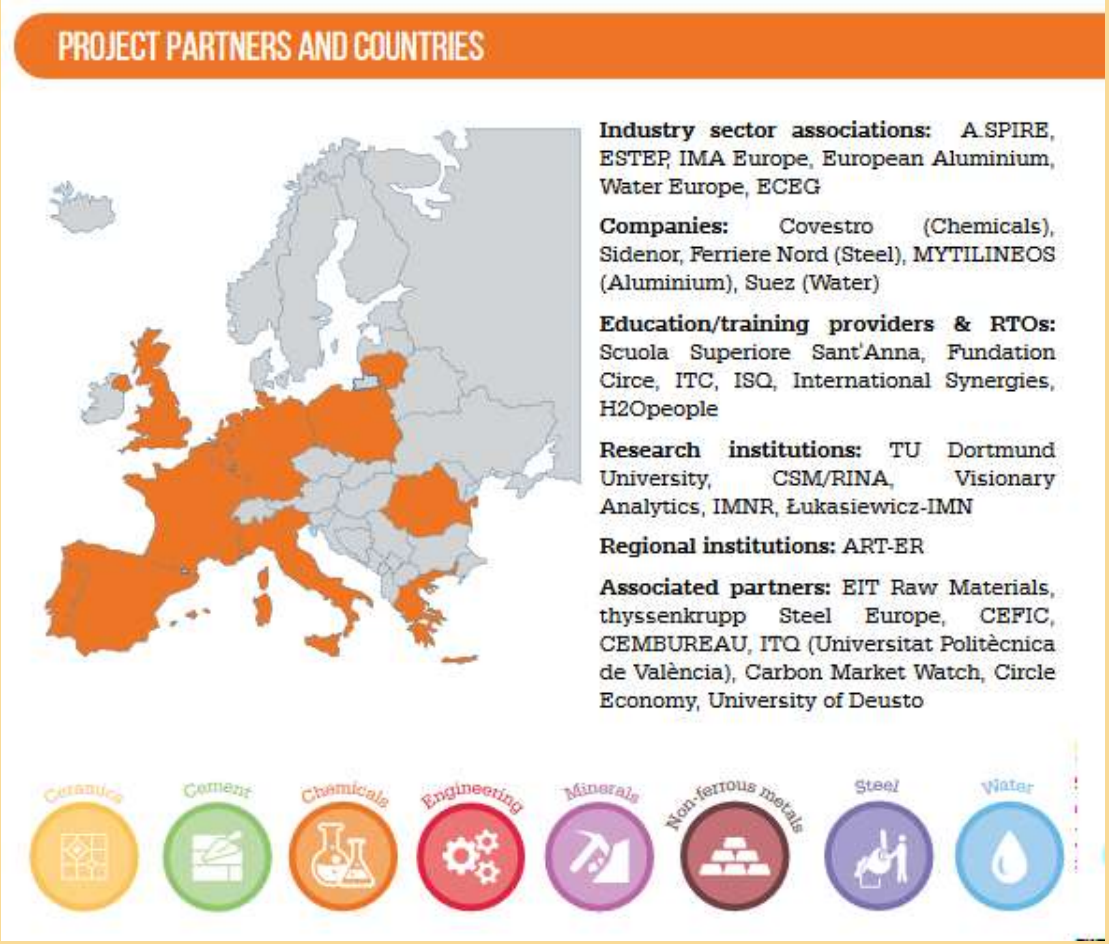
EU Programme: ERASMUS+ "New Skills Agenda"

- Duration: January 2020 – December 2023
- Funding: 4 Mio Euro
- 24 Partners + 11 associated partners
- Already 25 funded sectoral blueprints

Key components of SPIRE-SAIS:

- Build on existing SPIRE coordination, projects and activities
- Cross-sectoral approach, covering all the eight SPIRE energy intensive industry sectors
- Sector associations as central communication and dissemination intersection

Industry driven consortium



- 23 partners
- 11 associated partners
- 12 countries
- 8 industry sectors
  + 2 new sectors in consideration
- **New partner search (company or association):**
  from minerals, ceramics, cement sector
  or from the new sectors: pulp&paper, refinery

Integrating Relevant Industry Actors

- **Companies** (and their relevant departments) (steel making and processing)
- **Research, education and training institutions** (universities, vocational schools, training enterprises and associated partners e.g. sector agencies)
- **Social partners** on the EU (such as sector associations and industriALL) and national level
- **European** and **national** Vocational Education and Training (VET) institutions (such as ESCO, CEDEFOP)
- **SPIRE sector platforms** (A.SPIRE, ESTEP, IMA, European Aluminum, CEFIC, EIT RM, WE)
- **National funding institutions** (national VET programmes, ESF, EFRE …)
  (for a sustainable **national roll-out** of the blueprint)
- Technological, educational, training, human resources and economic **experts**
- Representatives of the **European Commission** (DG Employment, Research an Innovation, Grow, Connect, Education and Culture, …)

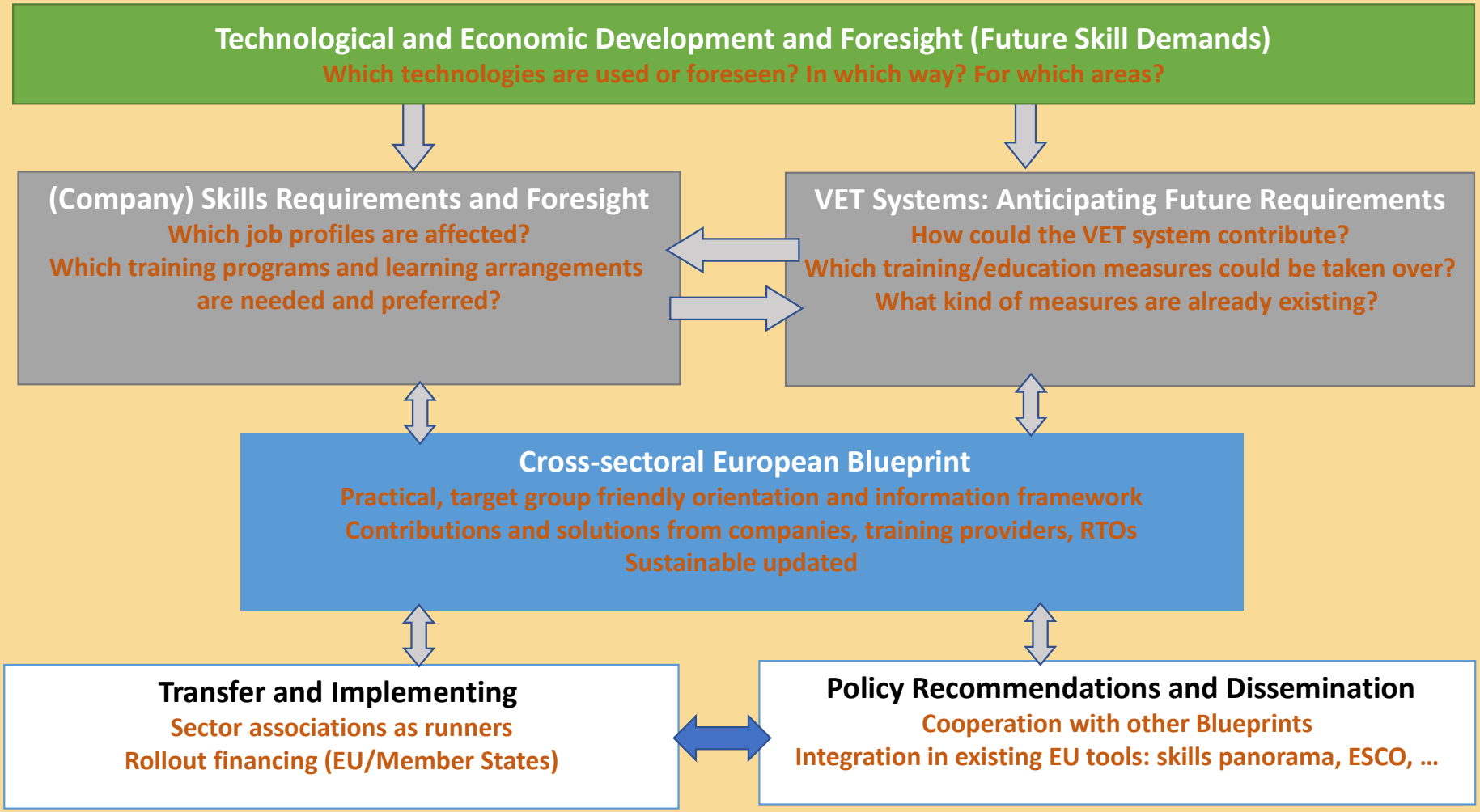
Blueprint for an cross-sectoral industry driven long-term skill strategy

Expected results:

- **Adjusting the workforce proactive**, to deploy and implement new technologies aiming at an optimisation of the production process
- **Monitoring and shorten the implementation of industry relevant qualifications and training**
- **Political support** measures by mobilising and integrating stakeholders and policy makers of the EU and national level;
- Successful sectoral **upskilling schemes** and efficient management of knowledge;
- More **attractiveness of the industries** and careers for talented people (**recruitment and retention**)

➢ **Our mission:**
Industry driven proactive adjustment of future skills for industrial symbiosis and energy efficiency across SPIRE sectors

Blueprint Development



Collaboration of Sectoral Blueprints

2018
- Automotive
- Maritime technology
- Space
- Textile
- Tourism

2019
- Additive manufacturing
- Construction
- Maritime technology
- Steel industry
- Space geography

2020
- Industrial Symbiosis
- Digitalisation of Energy
- Batteries
- Defence
- Bio-Economy
- MicroElectronics

2021
- Blockchain
- Cultural heritage
- Cybersecurity
- Rail supply and transport industries
- Work integration social enterprises
- Software services

#SPIRESAISBlueprint

New partner search
(company or association):
minerals
ceramics
cement
pulp & paper
refinery

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How to connect to sessions of P4Planet ideation event

To select the sessions you wnat to participate:

1. Log in B2MATCH platform https://p4planet-heu-brokerage.b2match.io/
2. Go into EVENT AGENDA
3. Choose Add or Remove depending on your interest in the topic or the pitch
4. Assure you participate in some parallel conversation room

To participate to the sessions:

1. Log in B2MATCH platform https://p4planet-heu-brokerage.b2match.io/
2. Go into MY AGENDA
3. Click on “JOIN ONLINE” to get access to the online room of the session you are registered
4. Please keep the browser with MY AGENDA opened to switch from the plenary sessions to the parallel session whenever is needed

Enjoy the event!

AGENDA Tuesday 9th

09h00	**Opening**
09h10	**13 PITCHES on Enabling circularity of resources in the process industries, including waste, water and CO2/CO (Plenary room)**
09h45	**6 Conversation rooms in parallel with 30 minutes for pitches: P1, P2, P5, P6, P8 and P9**
10h15	**7 Conversation rooms in parallel with 30 minutes for pitches: P3, P4, P7, P33, P10, P11 and P12**
10h45	*Virtual Coffee Break (15 minutes)*
11h00	**14 PITCHES on Integration of Renewables and Electrification in process industry (Plenary room)**
11h30	**7 Conversation rooms in parallel with 30 minutes for pitches: P13, P14, P17, P18, P21, P22 and P23**
12h00	**7 Conversation rooms in parallel with 30 minutes for pitches: P15, P16, P19, P20, P24, P25 and P26**
12h30	**7 PITCHES on Novel paradigms to establish resilient and circular value chains (Plenary room)**
13h00	**4 Conversation rooms in parallel with 30 minutes for pitches: P27, P28 and P32**
13h00	**3 Conversation rooms in parallel with 30 minutes for pitches: P29, P30, P31 and P34**
14h00	*End of the second day*

AGENDA Wednesday 10th

09h00	**Opening**
09h05	**10 PITCHES on Hubs for circularity (Plenary room)**
09h35	**Open discussion on Hubs 4 Circularity Community of Practise (EcoP) platform (CSA) (including the P41, P42, P43 and P44) (Plenary room)**
10h10	*Virtual Coffee Break (20 minutes)*
10h30	5 **Conversation rooms in parallel with 30 minutes for pitches: P35, P36&P37, P38, P39, P40**
11h00	**5 PITCHES on Buildings and Industrial Facilities in Energy Transition (cluster 5) (Plenary room)**
11h30	**3 Conversation rooms in parallel with 30 minutes for pitches: P45, P47 and P49**
12h00	**2 Conversation rooms in parallel with 30 minutes for pitches: P46 and P50**
12h35	*End of the second day*

THANK YOU FOR YOUR ATTENTION

Connected across borders and to citizens

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