

The background of the entire image is a detailed wireframe illustration of industrial machinery, including large cylindrical tanks, pipes, valves, and various mechanical components. The lines are thin and light gray, creating a technical and engineering atmosphere.

SPIRE

PROJECTS

Power to your know-how

2016

SPIRE 1 – 2016

Systematic approaches for resource-efficient water management systems in process industries

INSPIREWater

SPOTVIEW

ReWaCEM

SPIRE 2 – 2016

Plant-wide monitoring and control of data-intensive processes

CoPro

MONSOON

FUDIPO

COCOP

SPIRE 3 – 2016

Industrial technologies for the valorisation of European bio-resources into high added value process streams

Bio4Products

KARMA2020

REHAP

SPIRE 4 – 2016

Industrial furnace design addressing energy efficiency in new and existing furnaces

IMPROOF

VULKANO

DREAM

SPIRE 5 – 2016

Potential use of carbon dioxide / carbon monoxide and non-conventional fossil natural resources in Europe as feedstock for the process industry

CarbonNext

SPIRE 6 – 2016

Business models for flexible and delocalised approaches for intensified processing

INSPIRE

LCE-25 – 2016

Utilisation of captured CO₂ as feedstock for the process industry

FReSMe

EE-17 – 2016

Valorisation of waste heat in industrial systems

DRYficiency

Smartrec

SPIRE 1 - 2016

Systematic approaches for resource-efficient water
management systems in process industries



Innovative Solutions in the Process Industry for next generation Resource Efficient Water management

the AIM

INSPIREWATER will enable process industry companies to implement sustainable water treatment solutions as part of a corporate sustainability strategy. It will use new and established technologies, to reduce water consumption, energy, use of chemicals and to reduce waste. This will be underpinned by a holistic water management framework complementing existing management structures in companies. The project will enable Europe as a leader in green production and the industrial water treatment market, and create new highly skilled jobs in Europe.

the CONCEPT

The main approach to achieve the project's objectives is to integrate new solutions into existing company structures on two levels and to exploit new solutions.

The first level addresses the water management. The INSPIREWATER approach will demonstrate how a generic framework for process industries will be used and further developed to provide a holistic approach for water management, including life-cycle thinking and resource efficiency as key performance indicators. The approach includes facilitation of technology implementation. The framework is based on the CEN Workshop Agreement and will be further developed.

The second level addresses innovative technology solutions. New solutions for different treatment challenges are needed in order to reach new levels of resource efficiency. The INSPIREWATER approach will demonstrate and exploit new solutions for a number of typical treatment challenges in the steel and chemical industry enabling water saving and water reuse also for other sectors.



**This project has received funding from the European Union's Horizon 2020
Research and Innovation programme under Grant Agreement n° 723702**

www.spire2030.eu/inspirewater



the AIM

The objective of the SpotView project is to develop and demonstrate innovative, sustainable and efficient processes and technology components, in order to optimize the use of natural resources, especially water, in three industrial sectors (Dairy, Pulp and Paper and Steel).

the CONCEPT

Resource optimisation (including water, energy, raw materials and additives) is a key issue for competitiveness and sustainability. During the SpotView project, 14 existing and new technologies will be assessed for 9 new water management practices. Up to 7 selected technologies demonstrators are planned in real industrial environment. These technologies will be evaluated in terms of environmental impacts and benefits, generated by achieving the SpotView targets (20% to 90% reduction of water usage, wastewater emissions, chemicals and energy use).

The SpotView consortium covers the whole value chain, from technology development to industrial applications. Economic exploitation of the technologies is pursued through a robust business case scenario. Dissemination and training activities are planned to maximize the impact of the project.

Market opportunities for services and technology products beyond the SpotView project are expected to generate up to 2800 new facilities and 7000 new jobs in Europe!



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 723577

www.spotview.eu





Resource recovery from industrial waste water by cutting edge membrane technologies

the AIM

The ReWaCEM project aims at reducing water use, wastewater production, energy use and water footprint by between 30-90% as well as increasing valuable metal resource recovery in the metal plating, galvanizing and printed circuit board industry.

the CONCEPT

To achieve its objectives, ReWaCEM will adopt two cutting edge membrane technologies suitable for the requirements of closed material cycles approaches and recovery concepts in metal processing industry: Diffusion Dialysis (DD) and Membrane Distillation (MD) as an integrated hybrid process. This combination of existing technologies will be adapted to fit the requirements of 4 pilot demonstration sites in representative industrial applications of the metallurgical industry. After evaluations, a highly attractive technological solution for low energy wastewater treatment will be available to be introduced into the large and growing market of metal processing. This market will profit significantly from the technological outcome of this innovation action, with cost savings and environmental benefits as relevant rewards. In order to maximise impact, the project consortium gathers end users, scientific partners, associations, decision makers and SMEs with the intention for further mobilisation towards promoting innovative membrane solutions for industrial water and resources management, leading to the effective implementation of European directives and policies while creating market opportunities for European industry and SMEs.



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 723729

www.rewacem.eu



Improved energy and resource efficiency by better coordination of production in the process industries

the AIM

The project will develop and demonstrate methods and tools for process monitoring and optimal dynamic planning, scheduling and control of plants, industrial sites and clusters under dynamic market conditions. It will provide decision support to operators and managers and allow progress to automated closed-loop solutions to achieve an optimal energy & resource efficient production. It builds on results of the MORE and DYMASOS projects and goes forward to apply and extend them to plant-wide coordination and control, and to market-based coordination mechanisms for Industrial Parks.

the CONCEPT

CoPro will develop online data analytics and novel forms of information presentation leading to a symbiosis of operators and computer-based control & optimisation algorithms. The solutions will be integrated into the IT plants' infrastructure via a software platform that connects to different IT systems. CoPro will pay special attention to methods for the efficient development of plant models as basis for advanced control, scheduling and coordination.

CoPro will make significant contributions towards (1) efficiently operating existing plants by integrated plant-wide scheduling and control, (2) coordinating connected units in a site and within an industrial park and (3) buffering the effects of fluctuating renewable energy production and distribution by integrating demand side response with plant-wide scheduling and control.

CoPro will address use cases in (1) chemical production, (2) coupled production units in an industrial park, (3) cellulose fibre production, (4) production, formulation & packaging of consumer goods and (5) sterilisation & packaging of food. The technologies developed will be of generic nature, for application in multiple sectors.



**This project has received funding from the European Union's Horizon 2020
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www.spire2030.eu/copro



the AIM

MONSOON aims to develop a data-driven methodology and the related data platforms and ICT infrastructures to perform optimised predictive control in process industries. Its goal is to build a comprehensive system that (a) manages historical data collection and real-time data flows from industries; (b) performs focused data analyses through machine/deep learning techniques, with the final aim of defining new efficient predictive functions for different industrial use cases. The project is expected to provide economic and environmental improvements in the use and re-use of raw resources and energy.

the CONCEPT

MONSOON develops a predictive control methodology to improve the energy consumption and the re-use of waste material in industrial processes. The idea is to collect and analyse (through machine/deep learning techniques) information on industrial processes, with the final goal of developing new and more accurate predictive strategies.

Large amounts of data are acquired from industrial devices. Suitable transmission and storage systems are being designed to deal with such big data flows, including integration tasks to work with heterogeneous industrial technologies. A data lab is under construction, in which information will be stored and processed in a scalable way. The lab is conceived as cross-sectorial and multidisciplinary, i.e., it benefits of the collaboration among different industries and experts to work on the predictive strategies.

The methodology developed during the project is being tested in two industrial domains: an aluminium plant and a plastic factory.



**This project has received funding from the European Union's Horizon 2020
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www.spire2030.eu/monsoon





Future Directions of Production Planning and Optimized Energy and Process Industries

the AIM

FUDIPO will develop a system for the all-levels optimisation of a factory by building blocks integrating the different control levels, from the separate production units to mid-level or corporation level, and then implementing and validating the system in full-scale. The final output will be a toolbox development that will decrease the energy and resource consumption on-site by at least 10% directly and indirectly; this toolbox will include a handbook, methods for enhancing energy efficiency and a downloadable open-source software.

the CONCEPT

To build the blocks, the project will develop advanced dynamic physical models to be combined with machine learning methods for advanced diagnostic, decision support and optimization/multivariable model based control. These will be available for an easy drag-and-drop from a library when configuring a new automation system for the process system. Models will be updated with process measurements after analysis by adaptation algorithms developed in FUDIPO. Physical models will be complemented with soft sensors for prediction quality properties (Thermo Optical Measurement sensor, Radio Frequency analysis and Near Infrared reflectance spectroscopy).

The applications will contribute for both the improvement of existing processes as well as the development of totally new production system solutions, where experience from existing processes is gathered in the simulation models.

The system will be tested in five case studies: an oil refining plant, two heat and power plants, a biological waste-water treatment plant, and a pulp and paper manufacturer.



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 723523

www.fudipo.eu





Coordinating Optimisation of Complex Industrial Processes

the AIM

The European process industry faces a strong need to increase product quality and reduce operating costs and its environmental footprint. A complex industrial plant comprises continuous and/or batch unit processes where the complexity stems from its dynamic properties. The vision of COCOP is that, in order to achieve their competitiveness and sustainability goals, these process industry plants will be optimally run by operators with the guidance of a model-based, predictive, coordinating, real-time optimisation system integrated with the plant's local control.

the CONCEPT

COCOP will define, design and implement a concept that integrates existing control systems with efficient data management and optimisation methods and provides means to monitor and control large industrial production processes. The concept is based on the decomposition-coordination optimisation of the plant operations: the overall problem is decomposed into unit-level sub-problems, so that solutions of sub-problems are coordinated with a plant-wide optimal schedule using high-level coordination and enabling real-time optimisation of the plant. This will also enable operators to understand the functioning of the plant as a whole and take better decisions within their part of the process.

COCOP will also include a social innovation process of co-creation and co-development. This will improve effectiveness and impact of the innovations, their implementation process and the related organisational & personnel development.

While applicable to any large industrial production site, the project will demonstrate its concept in copper and steel manufacturing and analyse its transferability to chemical and water treatment processing.



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 723661

www.cocop-spire.eu





**BIO4
PRODUCTS**
Creating sustainable resources
for process industry

4x4, demonstrating a flexible value chain to utilize biomass functionalities in the processing industry

the AIM

Bio-based products – products wholly or partly derived from materials of biological origin – can make the economy more sustainable and lower its dependence on fossil fuels. Bio4Products will demonstrate an innovative conversion method to transform residual biomass into high added value chemicals. The overall objective is to create four products for which between 30% and 100% of the original fossil-based stream is substituted with sustainable resources, delivering a 75% reduction in greenhouse gas emissions.

the CONCEPT

Bio-resources such as straw, bark, forest residues and sunflower husks could hold the key to a more environmentally-friendly future for Europe's process industry. Bio4Products will demonstrate how these four bio-resources can be exploited, creating renewable alternatives to fossil-based processing streams such as bitumen, phenols and creosote.

A technique called fast pyrolysis will be employed, which transforms solid biomass into a flexible bio-oil in a matter of seconds. A fractionation demo-plant will be constructed to separate the oil into lignin and sugar fractions: bio-based intermediates which can be used in existing production processes.

Bio4Products will demonstrate the integration of these sustainable resources into four end products: roofing material, phenolic resins, sand moulding resins, and engineered wood and natural fibre reinforced products. With considerable potential to include its sustainable resources in other product ranges, Bio4Products can help lay the foundations for a more innovative and sustainable process industry in Europe.



**This project has received funding from the European Union's Horizon 2020
Research and Innovation programme under Grant Agreement n° 723070**

www.bio4products.eu





Industrial Feather Waste Valorisation for Sustainable KeRatin-based MAterials

the AIM

In Europe, every year the poultry industry generates 3 million tons of feather waste. At present, this waste is converted into low nutritional value animal food or is simply dumped or incinerated with a huge loss of source of keratin. KaRMA2020 aims at the industrial manufacture and exploitation of sustainable raw materials from feather waste to develop innovative green products for high impact cross-sectorial markets. Its technological breakthroughs will guarantee significant benefits from environmental and economic points of view.

the CONCEPT

The development of conversion methods and exploitation strategies for waste feathers will increase their value as raw material and reduce the environmental impact and health hazards associated to landfill. KaRMA2020 aims to the industrial manufacture and exploitation of this under-utilised waste to produce added value raw materials for the chemical sector: keratin, bioplastics, flame retardant coatings, non-woven and thermoset biobased resins. The project will reach its objectives through either: (1) innovative and sustainable approaches (already patented by some of KaRMA2020 partners), or (2) conventional and economic techniques. The obtained raw materials will be manufactured at industrial scale and further used for the production of novel bio-based products such as: slow release fertilizers, biodegradable food packaging plastics, flame retardant coated textiles and flame retardant thermoset biobased composites. The sustainability of the new raw materials and end-products will be evaluated through LCA. An integrated waste management plan will also be developed to minimize the environmental impacts.



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 723268

www.karma2020.eu





Systemic approach to reduce energy demand and CO₂ emissions of processes that transform agroforestry waste into high added value products

the AIM

Europe's production of biochemicals from biomass and by-products is limited to a few compounds, while their demand is among the largest worldwide. In addition, lignocellulosic waste constitutes one of the most abundant resources, without competing with the food chain. REHAP aims at revalorizing agricultural (wheat straw) and forestry (bark) waste by recovering and turning them into novel materials. The project will lead to reductions of 80-100% in fossil resources and of more than 30% in energy use and of CO₂ emissions.

the CONCEPT

The project will work in three areas: (1) isolation of tannins and carbohydrates from forestry waste to turn them into bio-phenolic resins for wooden panels and, respectively, isocyanate-free polyurethanes (PU) for insulating foams; (2) isolation of lignin and carbohydrates from agricultural waste to turn them into bio-phenolic resins for wooden panels and biosuperplasticizers for cement, and, respectively, estherpolyol PU for adhesives; (3) fire retardant lignin and sugar-based additives will be also developed. Developed processing technologies (chemo/thermo/enzymatic and fermentation) will be optimized at pilot scale for further exploitation and replication of results. All products will be integrated in a prototype to demonstrate industrial applicability into the Green Construction sector. Life Cycle and Cost Assessment, market analysis, business plan, waste management strategy and measures for future standardisation will be implemented using a systemic perspective approach.



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 723670

www.rehap.eu



SPIRE 4 - 2016

Industrial furnace design addressing energy efficiency
in new and existing furnaces



Integrated Module guided PROcess Optimization of steam cracking Furnaces

the AIM

IMPROOF targets a drastic but cost-effective improvement of the energy efficiency of steam cracking furnaces by at least 20%, while simultaneously reducing emissions of greenhouse gasses and NO_x per ton ethylene produced by at least 25%. Expected outcomes are (1) novel high emissivity coatings to improve heat transfer; (2) 3D profiled reactors out of novel high temperature alloys to reduce coking; (3) novel oxyfuel combustion furnace design and operation to increase combustion efficiency and decrease NO_x and CO emissions.

the CONCEPT

One way to reduce the energy input in steam cracking furnaces is to reduce coke formation on the reactor wall. The use of either advanced coil materials, combined with 3D reactor designs, improved process control, and more uniform heat transfer will increase run lengths, reducing simultaneously CO_2 emissions and the lifetime of the furnaces. Biogas and bio-oil will be used as alternative fuels due to their renewability characteristics, and hence, decrease net CO_2 production. Application of high emissivity coatings on the external surface of the radiant coils will further substantially improve the energy consumption. Less firing is required to reach the same process temperatures in the radiant coils. This will reduce fuel gas consumption and CO_2 emissions by 10 to 15%.

IMPROOF will demonstrate the advantage of combining all these technological innovations with an anticipated increase of the time on stream with a factor 3. All the technology will be implemented in real-plant conditions.



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 723706

<http://improof.cerfacs.fr>





Novel integrated refurbishment solution as a key path towards creating eco-efficient and competitive furnaces

the AIM

VULKANO will design, implement and validate an advanced retrofitting integrated solution to increase the energy and environmental efficiency in existing preheating and melting industrial furnaces currently fed with natural gas. It will contribute mainly to update the aged European furnaces and also create a path forward towards a successful design of new furnaces. The retrofitting solutions will be tested in two facilities in the Ceramic and Steel sectors, validating the replicability of the solutions in the Aluminium sector.

the CONCEPT

VULKANO will develop an advanced retrofitting integrated solution based on five innovations: high-temperature phase change materials (PCMs), new refractories, optimized co-firing, advanced monitoring and control systems and a holistic in-house predictive tool.

By means of their implementation, an increase of the furnaces' energy efficiency up to 20% is expected, as well as a reduction of the fuel consumption up to 40%, depending on the sector.

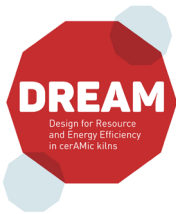
Furthermore, the holistic tool will also optimize the integration of the solutions with an upstream/downstream perspective, following a life cycle assessment and costing thinking. This will support plant operators and decision makers to select the most suitable retrofitting strategy, fostering overall efficiency, increase in competitiveness and circular economy and reducing the environmental impact of the product value chain.



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 723803

www.vulkano-h2020.eu





Design for Resource and Energy efficiency in cerAMic kilns

the AIM

The DREAM project aims to design, develop and demonstrate a radically improved architecture for ceramic industrial furnaces, characterised by optimised energy consumption, reduced emissions, and lower operating costs compared to currently available technological solutions. This will be obtained by substantially enhancing specific furnace parts and by adding new modules and sub-systems to the current furnace architecture.

the CONCEPT

DREAM will develop and demonstrate technologies enabling a significant advancement in the sustainability of ceramics processes, implementing 5 synergic lines of research and 3 industrial demonstrators, which will act as technological showcases for market deployment.

The project will work on (1) designing innovative hardware furnace components improving energy efficiency (cogeneration power unit, heat exchanger, emission abatement system); (2) introducing substantial improvements on current hardware-software kiln parts (kiln control tool, refractory materials); (3) testing the DREAM solutions in a variety of industrial settings (retrofitting and pilot kiln demonstrators); and (4) paving the way for taking full advantage of DREAM-related market opportunities (dissemination, exploitation within the ceramic sector and market replication).

DREAM will thus strongly contribute to both the sustainability and competitiveness of the European ceramics and process industries.



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 723641

www.spire2030.eu/dream



SPIRE 5 - 2016

Potential use of carbon dioxide / carbon monoxide and non-conventional fossil natural resources in Europe as feedstock for the process industry



The Next Generation of Carbon for the Process Industry

the AIM

The process industries and other crude oil consuming sectors are heavily dependent on fossil inputs for both carbon feedstock and energy, with the consequential CO₂ emission problems and import dependency as a result. To be prepared for the future, they are seeking alternative carbon sources to replace traditional fossil fuels. CarbonNext aims to evaluate the potential use of CO₂/CO and non-conventional fossil natural resources as feedstock for the process industry in Europe.

the CONCEPT

The work will examine the existing and expected sources of CO₂ and CO as well as non-conventional fossil natural resources such as shale gas, tar sands, coal bed methane, gas to liquid, and coal to liquid technologies.

Results of the project will include the identification of value chains within processes and where industrial symbiosis can be valuable (chemistry, cement, steel, etc.). The CarbonNext project will provide, as a basis for decision-making, an enhanced understanding of the impact and opportunities for new sources of carbon for the processing industry. CarbonNext will primarily focus on new sources of carbon as a feedstock and secondarily on the impact on energy availability, price and emissions.

CarbonNext will build on the project's team achievements in the FP7 project SCOT (Smart CO₂ Transformations), the BMBF-funded coordination project CO₂Net, the CO₂Chem network as well as many other climate and energy related projects.



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 723678

www.carbonnext.eu





Towards growth for business by flexible processing in customer-driven value chains

the AIM

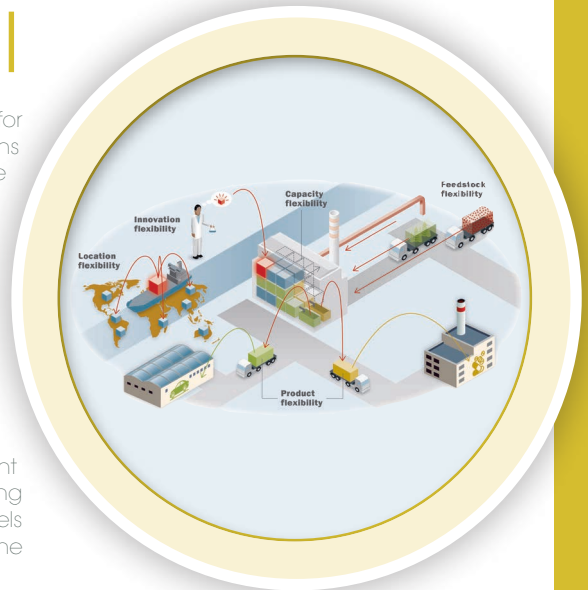
Efficient and sustainable production of high value-added goods is of crucial importance for the European manufacturers to stay in business in today's fierce competitive environment. Adapting towards more organized and interlinked supply chains to face the shortened life cycle of products is therefore essential. INSPIRE aims at informing on these potential adaptations leading to reduced production costs, increased product quality, minimized time to market and optimized strategies towards resource efficiency.

the CONCEPT

INSPIRE focuses on developing innovative business models for more flexible and sustainable manufacturing value chains through the use of intensified processing that would promote more local production in Europe.

INSPIRE takes a unique approach by bringing together the manufacturing and the process industry communities. It studies (1) further (vertical and horizontal) integration of these industries in the value chain leading to more flexible and demand driven business operation and (2) increased trends towards resource sharing and optimization across multiple process industries (e.g. through industrial symbiosis). Special attention is given to how this approach responds to the needs of SMEs as partners in value chains.

Expected outcomes would be the description of the current European landscape and link between intensified processing and flexibility, the development of innovative business models for different sectors, and providing a guideline to measure the performance of such novel models under different scenarios.



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 723748

www.inspire-eu-project.eu

Illustration: TNO



LCE-25 – 2016

Utilisation of captured CO₂ as feedstock
for the process industry



FReSMe

From residual steel gasses to methanol

the AIM

FReSMe aims to demonstrate the whole process that enables the valorization of CO_2 and H_2 captured from blast furnace gases from the steel industry by turning into a versatile chemical platform and renewable fuel such as Methanol that will be used as fuel in the ship transportation sector. The project will build on technologies developed in two previous EU-funded projects, STEPWISE and Mef CO_2 . It will contribute to the use of green methanol fuel and to achieving the European targets for renewable energy use.

the CONCEPT

FReSMe's green fuel will be produced from CO_2 , recovered from an industrial Blast Furnace Gases (BFG), and H_2 from both recovered BFG itself, as well as produced by electrolysis.

The two different sources of H_2 will enable (a) maximum use of the current residual energy content of BFG, while at the same time (b) demonstrating a forward technology path where low carbon or renewable H_2 become more ubiquitous. The project will use equipment from the two related projects, one for the efficient separation of H_2 and CO_2 from BFG, and one for the production of methanol from a CO_2 - H_2 syngas stream.

The production of methanol from CO_2 offers the unique combination of scale, efficiency and economic value necessary to achieve large scale carbon reduction targets. The pilot plant will run for a total of three months divided into three different runs with a nominal production rate of up to 50 kg/hr from an input of 800 m^3 /hr BFG. This size is commensurate with operation at TRL6, where all the essential steps in the process must be joined together in an industrial environment.



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 727504

www.fresme.eu

Photo: Bergslagsbild





Waste Heat Recovery in Industrial Drying Processes

the AIM

Drying takes 12-25% of the energy needed in industrial processes. DRYficiency demonstrates both open and closed loop, high-temperature industrial heat pumps for the recovery of waste heat with savings up to 80% of energy, reductions of CO₂ emissions of more than 50% and lower production costs of up to 20%. The generic design approach aims to make the technology widely replicable in a range of industries in both newly built and existing plants. A certified training programme will be established to make engineering know-how available and promote market uptake.

the CONCEPT

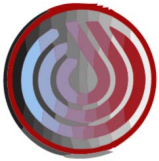
DRYficiency will elaborate technically and economically viable solutions to upgrade idle waste heat streams to process heat streams at higher temperature levels of up to 180°C. The key elements are two high temperature vapour compression heat pumps: a closed loop heat pump for air drying processes and an open loop heat pump for steam drying processes. The solutions will be demonstrated under real production conditions in operational industrial drying processes (TRL7) in three leading European manufacturing companies from the pet food, food and brick industries. The technology demonstrated aims to reduce the specific energy demand for drying and dehydration from 700-800 kWh down to 200 kWh per ton of evaporated water. The energy switch from fossil fuels towards heat pump technology reduces the environmental impact considerably and, at the same time, reduces energy consumption by 60-80%, consequently lowering specific product costs and contributing to significantly improved competitiveness.



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 723576

www.dry-f.eu





Smartrec

Developing a standard modularised solution for flexible and adaptive integration of heat recovery and thermal storage capable of recovery and management of waste heat

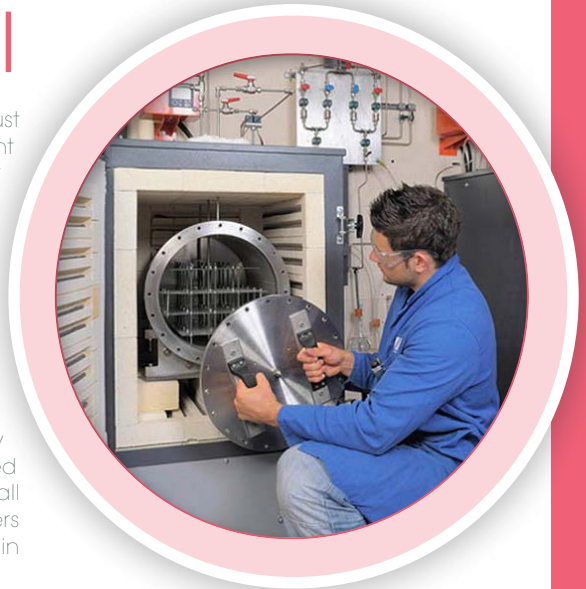
the AIM

Waste heat is a significantly underused resource in the process industries. Secondary aluminium recycling and ceramic processing were identified as key examples with economically recoverable waste heat. Smartrec meets the inherent challenges (e.g. batch-based processes with corrosive particulate-laden flue gas over a wide temperature range) by the development of a standard, modular solution for the integration of heat recovery with thermal storage that valorises medium to high grade waste heat, adaptable to different temperatures and industries.

the CONCEPT

Following an end-user analysis and characterisation of exhaust streams and waste products, a life cycle costing and assessment will be carried out with candidate molten salts selected for thermal storage and heat transfer fluid, validated by corrosion testing. A custom heat pipe heat exchanger will be modelled and designed around the requirements of heat transport capacity wick structure and capable of heat exchange with a molten salt pumping loop. This loop will include a dual media thermozone thermal storage system with cost/system modelling, validation and instrumentation incorporated.

A pilot will be built in a secondary aluminium recycler and/or ceramic processor valorising high grade heat for continuous salt-cake recycling. Smartrec will be validated by integration with existing systems including a fully developed instrumentation framework. A knowledge-based tool, with all relevant parameters to model the system fully, will allow users to determine their needs & benefits and integrate Smartrec in their own systems via an open access workshop.

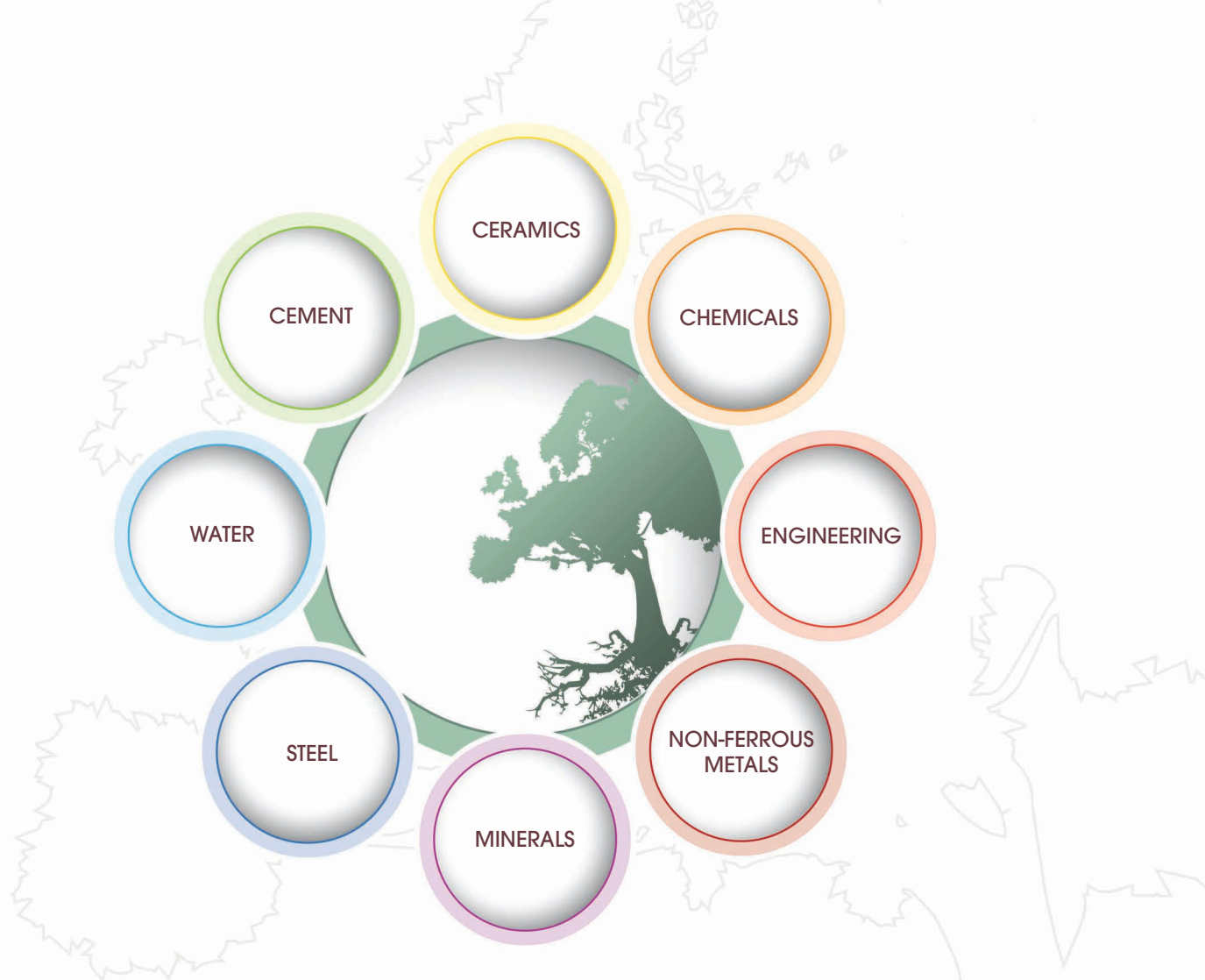


This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 723838

www.smartrec.eu



The Sustainable Process Industry through Resource and Energy Efficiency (SPIRE) is a contractual Public-Private Partnership (PPP) dedicated to innovation in resource and energy efficiency enabled by the process industries. The SPIRE Partnership is based on the Article 19 of the EU Research and Innovation Framework Programme, Horizon 2020, Regulation and has been established through a contractual arrangement between the European Commission and A.SPIRE aisbl. SPIRE will be implemented through competitive calls included in the Horizon 2020 work programmes. The objective of the SPIRE PPP is to develop the enabling technologies and value-chain solutions required to reach long-term sustainability for Europe in terms of global competitiveness, ecology and employment.



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