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Systemic, eco-innovative approaches for the circular economy

CIRC-PACK
Ecobulk
FiberEUae
PlastiCircle
PolyCE
ZERO BRINE
TOWARDS CIRCULAR ECONOMY IN THE PLASTIC PACKAGING VALUE CHAIN

AIM

CIRC-PACK aims at more sustainable, efficient, competitive, less fossil fuel dependence, integrated and interconnected plastic packaging value chain. To this end, three case studies will work in developing, testing and validating better system-wide economic and environmental outcomes: decoupling the chain from fossil feedstock, reducing the negative environmental impact of plastic packaging; and creating an effective after-use plastics economy.

CONCEPT

Non-technological and advanced methodological analysis (including circular economy and industrial symbiosis principles) will trigger a broadly deployment of CIRC-PACK tested solutions. CIRC-PACK will provide breakthrough biodegradable plastics using alternative biobased raw materials, which will have an instrumental role to play in the subsequence steps of the plastic value chain. Eco-design for improving end-of-life multilayer and multicomponent packaging will be technologically advanced and adapted also to the new materials produced. Thus these developments will also contribute with a great impact in the packaging footprint, and increasing the biobased content and using compostable materials. Lastly, a multi-sectorial cascaded approach along plastic packaging value chain will be applied with critical impacts in other value chains. The overall outcome of the project will facilitate the transition from the current linear plastic packaging value chain to circular economy principles.

WWW.CIRCPACK.EU

The research project CIRC-PACK receives funding from the European Community Framework Programme for research and innovation under the Horizon 2020 (2014-2020) grant agreement No. 730423.
CIRCULAR APPROACH FOR ECO-COMPOSITE BULKY PRODUCT

AIM
ECOBULK aims at demonstrating and implementing a new Circular Economy model for composite products in automotive, furniture and building component industrial sectors, with high potential of cross-sectorial replicability and transferability to other industrial sectors, to promote greater re-use, upgrade, refurbishment and recycle of these products.

CONCEPT
ECOBULK will implement a new economy model for composite products in automotive, furniture and building component industrial sectors by developing:

- design strategies and procedures for the creation of circular designed composite products;
- redesigned value and supply chains for the select sectors to foster upgrade, reuse and recycling of products and parts and material recovery for (re-)manufacturing;
- new services and business models for the new value chain including collection, maintenance, reuse, tracking and labelling systems and an integrated Database platform which will share the value chain data between all the stakeholder including the designers, manufacturers, retailers, waste companies and end-users; and,
- demonstration of the circular design solutions by a large-scale demonstration program covering technological components at relevant industrial scale as well as other not-technological but key components at representative demo sites engaging end-users.

The research project EcoBulk receives funding from the European Community Framework Programme for research and innovation under the Horizon 2020 (2014-2020) grant agreement No. 730456.

WWW.ECOBULK.EU
AIM

Glass and carbon fiber reinforced polymer composites (GFRP and CFRP) are increasingly used as structural materials in many sectors, like transport and energy, due to their better lightweight and corrosion resistance compared to metals. However, composite recycling is still a challenge since no real added value in composite reuse is proved. FiberEUse aims at demonstrating a new cross-sectorial, value-chain oriented approach for enhancing the profitability of composite recycling and reuse into new value-added products.

CONCEPT

The project is based on the realization of three macro use-cases, further detailed in eight demonstrators. Within these use-cases, the cross-sectorial approach is enhanced where the waste from high-tech, high-volume applications, such as wind turbine blades and aerospace components, is transformed into input materials for other sectors. Examples include mechanical recycling of short GFRP to produce components for furniture, sport and creative products. Another use-case looks at the thermal recycling of long fibers to enable re-use in high-resistance applications. Inspection, repair and remanufacturing of CFRP parts is adopted to enable a totally new circular business model in automotive applications. A new concept of modular car design is implemented to facilitate component disassembly and unlock the innovative circular business case.

Through new cloud-based ICT solutions for value-chain integration, end-customer involvement through co-design, scouting of new markets, and optimization of different reverse logistic options, FiberEUse supports industry in the transition to a new circular economy model for composites.

The research project FiberEUse receives funding from the European Community Framework Programme for research and innovation under the Horizon 2020 (2014-2020) grant agreement No. 730323.
PlastiCircle aims to promote a transition towards a circular economy, contributing to 2030 EU waste management and recycling targets. By rethinking the different phases involved in transforming waste into valuable products, the partners will reinvent the plastic packaging treatment process to: obtain higher recycling rates, better quality and cheaper secondary raw materials, and; recovery and valorisation within the same value chain.

Twenty pan-European partners, led by the Packaging and Logistics Research and Innovation Center (ITENE), are working to reinvent the plastic packaging treatment process, making recycling more accessible, cost-effective and profitable for both citizens and professionals in the field. The project, funded by the European Union’s Horizon 2020 research and innovation programme, will rethink the different phases involved in transforming waste into valuable products. In particular, the consortium will focus on the development of smart containers for separate waste collection, on the improvement of transport routes, and of sorting and reprocessing technologies, eventually converting packaging waste into value-added products such as foam boards, automotive parts, roofing membranes, garbage bags, asphalt and urban furniture. Eventually, PlastiCircle will define business plans and promote replication of the proposed solutions through training and awareness raising activities for citizens, institutions and private companies.

The research project PlastiCircle receives funding from the European Community Framework Programme for research and innovation under the Horizon 2020 (2014-2020) grant agreement No. 730292.
AIM

PolyCE will demonstrate on large-scale, how a Circular Economy will look like for complex, sophisticated high-tech plastics from the electronics sector, covering the full recovery chain from sourcing of post-consumer plastics to recycling processes, remarketing of recycled tech-plastics and reuse in redesigned products of the electronics sector.

CONCEPT

To achieve a long-lasting impact beyond the project, PolyCE activities adopt a holistic approach to build strategic partnerships across the value chain; enhance the market uptake of PCR plastics, e.g. by expanding an existing online market platform; innovate collection, reverse logistics, pre-treatment and recycling of WEEE plastics; develop uniform and standardized technical requirements and grades for PCR plastics as well as testing procedures ensuring the quality of the recycled plastics; develop innovative plastic materials and additives, which are able to sustain their quality over multiple use and recycling cycles; identify business potentials and limitations for required changes of each actor in the value chain to move toward a circular economy and apply circular business models, e.g. the dematerialisation concept, i.e. the purchase of the services instead of the product itself; build awareness amongst the public, electronics designers and manufacturers; integrate lifecycle thinking into higher education.

The research project PolyCE receives funding from the European Community Framework Programme for research and innovation under the Horizon 2020 (2014-2020) grant agreement No. 730308.
RE-DESIGNING THE VALUE & SUPPLY CHAIN OF WATER & MINERALS: A CIRCULAR ECONOMY APPROACH FOR THE RECOVERY OF RESOURCES FROM BRINE GENERATED BY PROCESS INDUSTRIES

AIM

The objective of ZERO BRINE is to prove that minerals, such as magnesium, and clean water can be recuperated from industrial wastewater for reuse in other industries. The project aims to develop technological solutions and business models for wastewater/brine resource recovery, thus facilitating the implementation of the Circular Economy package and the SPIRE Roadmap.

CONCEPT

Coordinated by TU Delft, ZERO BRINE advances circular economy business model solutions by re-designing the value chains of industrial wastewater. The ZERO BRINE concept reduces industrial saline wastewater streams by recovering and reusing the minerals and water from the brine (saline impaired effluents) in other industries, thus ‘closing the loop’ and improving the environmental impacts of production. The project integrates innovative technologies to recover water and minerals of sufficient purity and quality for good market value.

ZERO BRINE includes 22 partners from research institutes, SMEs, process industries, and end-users from 10 countries. Over 4 years, ZERO BRINE is developing pilot plants in 4 process industries such as a demonstration water plant in the Netherlands, a coal mine in Poland, a silica factory in Spain, and a textile factory in Turkey. These provide massive potential to replicate and deploy circular economy solutions in the field of industrial wastewater treatment.
SPIRE 7

Process optimization

ENSUREAL
SUPREME
MORSE
ENSURING ZERO WASTE PRODUCTION OF ALUMINA IN EUROPE

AIM
The aim of ENSUREAL is to develop an alumina process that will be able to process a wider range of Bauxite, including qualities condemned to tailings with current mining practices. It will ensure zero-waste, resulting in a 100% yield in bauxite ore exploitation, and avoiding bauxite residue disposal problem altogether.

CONCEPT
In EU, around 96% of the total bauxite ore processed is imported and then treated to produce aluminium on European soil. Significant resources of lower grade bauxite do exist in Europe but are not currently exploited, due to technology and cost reasons. An eventual economical utilization of those resources would significantly decrease the need for bauxite imports.

Over 95% of the alumina being produced around the world is through the application of the commercial Bayer process in which bauxite is hydrometallurgically processed to produce alumina. The production of alumina through the Bayer process encompass a large amount waste (Red mud) and a subsequent loss of Fe- and Al-oxides. The present red mud production level in the EU is 5.1 Mtpa (million tons per year).

The concept of the ENSUREAL project is to prevent the generation of waste (at the highest level in the waste hierarchy), both tailings and red mud, during the production of alumina, by developing an alternative process for alumina production, first patented in 1920s by Harald Pedersen from Norway.

WWW.ENSUREAL.COM
The research project ENSUREAL receives funding from the European Community Framework Programme for research and innovation under the Horizon 2020 (2014-2020) grant agreement No. 767533.
SUSTAINABLE AND FLEXIBLE POWDER METALLURGY PROCESSES OPTIMIZATION BY A HOLISTIC REDUCTION OF RAW MATERIAL RESOURCES AND ENERGY CONSUMPTION

AIM

SUPREME aims at optimizing powder metallurgy processes throughout the supply chain. It will focus on a combination of fast-growing industrial production routes and advanced ferrous and non-ferrous metals. By offering more integrated, flexible and sustainable processes for powders manufacturing and metallic parts fabrication, SUPREME enables a reduction of the raw material losses while improving energy efficiency and thus carbon dioxide emissions, into sustainable processes and towards a circular economy.

CONCEPT

A cross-sectorial integration and optimization has been designed between several powder metallurgy processes: gas and water atomization as well as ball milling for metal powder production, laser-based additive manufacturing and near-net shape technologies for end-parts fabrication. Some quality and process control will be developed to monitor KPIs, to demonstrate the optimization of material and energy use. 4 demonstrators will be proposed at each step of the value chain: real industrial setting and business exploitation at MRL 7: mineral concentration, metal powder manufacturing, metal part manufacturing and end-product will validate a global optimization of >25% material efficiency, >10% energy efficiency, >10% in yield efficiency and >30% of CO2 emissions. SUPREME has an outstanding consortium of 17 partners, represented by 11 companies including 6 SMEs ensuring a successful implementation towards market applications. 5 application sectors are targeted: automotive, aeronautics, cutting tools, molding tools and medical. The process key differentiation advantages will bring modularity, flexibility and sustainability and will reduce the total cost breakdown of these technologies.

WWW.SUPREME-PROJECT.COM

The research project SUPREME receives funding from the European Community Framework Programme for research and innovation under the Horizon 2020 (2014-2020) grant agreement No. 768612.
MODEL-BASED OPTIMISATION FOR EFFICIENT USE OF RESOURCES AND ENERGY

AIM

Morse project is developing model-based, predictive raw material and energy optimisation tools for steel industry. With the enhanced Morse tools companies are able to optimise the use of raw materials and energy and control resource input and product quality along the entire process route from raw material and energy intake to customer delivery. Tools will be demonstrated in steel industry, to increase yield and product quality in production of high-strength carbon steels, stainless steels and cast steels.

CONCEPT

The overall concept of Morse project lies in the comprehensive integration of control and monitoring tools for the different sub-processes. The process route coordination will be composed by optimisation and scheduling tools allowing the mapping of the material and energy flows among the process units and deciding the optimal process target parameters. Coordinating layer will be dedicated on optimally managing the couplings, interactions and bottlenecks among the single process units within the entire production route. The developed model-predictive controls for selected unit processes will provide detailed real-time information and prediction of the evolution of process state variables, as well as energy and resource consumption for optimisation purposes.

The Morse project is enhancing and integrating software models and tools provided by partners to make them more mature, robust and useful for industrial deployment. The developed software solutions will be based on technologies that are interoperable with existing industrial IT infrastructures forming a comprehensive toolkit for process optimisation purposes for different process environment.

WWW.SPIRE2030.EU/MORSE

The research project MORSE receives funding from the European Community Framework Programme for research and innovation under the Horizon 2020 (2014-2020) grant agreement No. 768652.
CO2 utilisation

ICO2CHEM
RECODE
Carbon4PUR
ICO2CHEM aims at developing a new production concept for converting waste CO2 to value-added chemicals. The focus is on the production of white oils and high molecular weight aliphatic waxes. The technological core of the project consists in the combination of a Reverse Water Gas Shift (RWGS) reactor coupled with an innovative modular Fischer-Tropsch (FT) reactor.

WWW.SPIRE2030.EU/ICO2CHEM

The research project ICO2CHEM receives funding from the European Community Framework Programme for research and innovation under the Horizon 2020 (2014-2020) grant agreement No. 768543.
RECYCLING CARBON DIOXIDE IN THE CEMENT INDUSTRY TO PRODUCE ADDED-VALUE ADDITIVES: A STEP TOWARDS A CO₂ CIRCULAR ECONOMY

AIM

RECODE target: 20% reduction of CO₂ emissions in the long term. This impact will be achieved by:
• CO₂ capture, purification and conversion exploiting primarily REE recovered from the waste heat.
• The substitution of additives entailing strong carbon dioxide generation in their current manufacturing routes;
• The generation of nano-fillers (CaCO₃) whose CO₂ footprint is neutral or even carbon negative, as opposed to the current 0.21 tCO₂/tCaCO₃ footprint.
• Electrocatalytic reduction of CO₂ to added-value products.

CONCEPT

The RECODE project aims to enable a circular-economy approach for carbon capture and reuse within the cement industry, in a sustainable and synergistic manner. RECODE will reveal additional potential for Carbon Capture & Utilisation by exploiting an energy-efficient technology to recover CO₂ from cement-production flue gases with the use of ionic liquids, converted into added-value chemicals through (electro) catalytic process. RECODE aims to provide the means to utilise a significant portion of the produced chemicals within the cement industry, with the goal of enhancing cement qualities and reducing the energy intensity associated with its manufacturing. Distinctive features of the RECODE approach are the high process intensification and scale-up-ability; the use of low-grade heat sources; the meaningful reduction of CO₂ emissions (>20% accounting for direct and indirect means) and the good market potential of their products at a mass production scale.

WWW.RECODEH2020.EU/PROJECT

The research project RECODE receives funding from the European Community Framework Programme for research and innovation under the Horizon 2020 (2014-2020) grant agreement No. 768583.
TURNING INDUSTRIAL WASTE GASES INTO INTERMEDIATES FOR POLYURETHANE PLASTICS FOR RIGID FOAMS/BUILDING INSULATION AND COATINGS

AIM
Carbon4PUR will develop and demonstrate a new flexible technology for the valorization of steel gas to produce high value polymers for sustainable industrial applications. The process, based on direct chemical conversion without cleaning or separation of the gas components, will allow for a reduction of the CO2 footprint of polyurethane production by 20-60% and a substitution of at least 15% of oil-based reactants by waste gas based carbon.

CONCEPT
The concept is to transform the entire carbon from the flue gas stream containing both CO and CO2 into high value chemicals, which will be used for sustainable polyurethane applications - rigid foams and coatings. The novel technology will be adjustable to product and market requirements. The development and process operation will take into account all relevant variables at the same time; those technical, such as flue gas characteristics, material and process parameters, and those market oriented. It will flexibly involve the whole value chain. As this chemo-catalytic process will deal directly with the gas mixture, it will make any resource-intense physical separation obsolete.

The industrially driven multidisciplinary consortium is built along the full value chain. It goes from the conditioning of steel industrial emissions and its provision to a chemical company, where it is transformed into chemical building blocks and polymer intermediates to finally flow into the targeted implementations.

WWW.CARBON4PUR.EU

The research project Carbon4PUR receives funding from the European Community Framework Programme for research and innovation under the Horizon 2020 (2014-2020) grant agreement No. 768919.
Down-scaled high performance processing

DEMETO

NOVUM

ECCO

PORTABLECRAC
MODULAR, SCALABLE AND HIGH-PERFORMANCE DE-POLYMERIZATION BY MICROWAVE TECHNOLOGY

AIM
Reinventing PET-recycling for a circular economy

CONCEPT
Polyethylene Terephthalate (PET) is one of the most widely used materials in our economy. Yet, until now much of the plastics waste cannot be recycled and is burned or disposed into landfill. Nowadays, PET-based waste streams are mainly processed mechanically creating plastic solid waste for re-use. This process is aimed at single-polymer plastics only and excludes all the more complex and contaminated waste. Thus, PET production remains highly unsustainable and dependent on natural resources.

DEMETO provides a way to recycle PET which is both sustainable and feasible for industrial application. The project’s industrial-grade pilot plant uses an intensifying approach based on microwave radiations to return PET to its composing elements (Ethylene Glycol, EG, and Terephthalic Acid, TPA). This innovative technology allows a chemical treatment of PET without degrading the material. Plastic producers and waste recyclers are thus in a position to close the PET life cycle creating a circular economy for plastics.

The research project DEMETO receives funding from the European Community Framework Programme for research and innovation under the Horizon 2020 (2014-2020) grant agreement No.768573.
AIM

NOVUM aims to develop a ground-breaking manufacturing concept for electrical insulation components, building a basis for a radical renewal of the manufacturing industry. This can revolutionize the way in which power transformers are designed and produced, and lead to the transition from the current manual production to automated production lines with increased flexibility, resource and energy efficiency while lowering capital and operation costs.

CONCEPT

The new streamlined manufacturing concept developed in NOVUM intends to create a leap in the industrial process of electrical insulation components. The NOVUM Project Consortium is assembling a wealth of expertise to exploit the full design potential of form generation through innovative fabrication processes applied to cellulose-based electrical insulation components. The concept will be based on multiplicable technologies, permitting the transition and wide adoption for cellulose-based materials across the process industry and for applications in other industrial areas.

The approach is a three-stage development of the novel pilot line concept for production of cellulose-based electrical insulation components, driven by the end-product and process intensification specifications. Processing technologies include: 3D printing of cellulose-based materials having thermoplastic features, foam forming of cellulose fibres, and thermoforming of cellulose fibres.

The research project NOVUM receives funding from the European Community Framework Programme for research and innovation under the Horizon 2020 (2014-2020) grant agreement No. 768604.
ENEFICIENT COIL COATING PROCESS (ECCO)

AIM

The ECCO project proposes a novel solution for the curing oven operation, which can not only drastically increase the compactness and energetic efficiency of the system, but also provides an increased production flexibility due to a fuel-flexible, modular and potentially energetically self-sustainable process. By recovering and reusing the organic solvents, even an energy surplus is possible.

CONCEPT

The main idea is to heat the metal strip by IR-radiation and operate the curing oven well above the Upper Explosive Limit (UEL), thus, performing the drying and curing process in an atmosphere mainly consisting of the solvent vapours, which are recirculated in order to provide also a minor supporting convective flux within the oven. The heat source for the drying/curing process is high intensity IR-radiation provided by fuel-flexible IR radiant burners operating with solvent vapour or mixtures of solvent vapour and natural gas. As a result, heat fluxes to the coated metal strip are increased compared to conventional convective ovens. This approach leads also to significantly reduced energy demand, since the huge amount of hot air flow needed for the conventional operation below the Low Explosive Limit (LEL) is avoided and at the same time, the concentrated solvent vapour can be directly used as fuel in a burner without the need for a big size external incinerator. The proposed concept thus potentiates the system compactness and modularity.

WWW.SPIRE2030.EU/ECCO

The research project ECCO receives funding from the European Community Framework Programme for research and innovation under the Horizon 2020 (2014-2020) grant agreement No.768692.
PORTABLE SOLUTION FOR THE ELECTROCHEMICAL REGENERATION OF ACTIVATED CARBON

AIM

PORTABLECRAC has the purpose of developing an environmentally friendly and economically beneficial technology to regenerate the activated carbon used in small and large industry for water filtration. It will bring a sustainable and long term solution creating a direct and indirect employment in the EU “service-sector”. Its key value proposition is providing a solution with 86% reduction in cost per kg/AC and 4 times reduction in CO₂ emissions.

CONCEPT

PORTABLECRAC is a flexible solution tackling different niches that will allow an in-site regeneration of exhausted activated carbon (AC) by compact/portable prototypes able to adapt to client’s needs with economic and environmental impacts, determined through LCA and LCC analysis.

Within PORTABLECRAC approach, a strong effort on adaptation of electrochemical technology from batch to continuous operational mode will be faced which constitute an important innovation compared with the existing thermal regeneration. Furthermore, additional efforts will be focused on the scaling up of portable prototypes to industrial in order to meet client needs.

Portable nature of PORTABLECRAC solutions will allow the supply of in-site regeneration service to industrial end-user with AC regeneration needs. It is important to highlight the lack of portable solutions that may cover exhausted AC regeneration field. Although PORTABLECRAC will process spent AC from industries in Spain and Portugal, these results can be replicated to the rest of Europe with similar AC regeneration needs.

The research project PORTABLECRAC receives funding from the European Community Framework Programme for research and innovation under the Horizon 2020 (2014-2020) grant agreement No. 768905.

WWW.SPIRE2030.EU/PORTABLECRAC
New electrochemical solutions

CO2EXIDE
OCEAN
SIDERWIN

SPIRE 10
CO2-BASED ELECTROSYNTHESIS OF ETHYLENE OXIDE

AIM

The CO2EXIDE project aims at the development of a technology for the conversion of bio-based carbon dioxide into industrially relevant chemicals. In line with the energy turnaround, the underlying electrochemical process uses renewable energy from renewable sources. Operating at low temperatures and pressures, the reactions will forecast significant improvements in energy and resource efficiency combined with an enormous reduction of GHG emissions.

CONCEPT

The CO2EXIDE technology combines a modular nature for the feasibility of a decentralised application, high energy and material efficiency and the substitution of fossil-based production of ethylene oxide. Initially, the electrochemical step pursues the simultaneous conversion of CO2 to ethylene at the cathode and water oxidation to hydrogen peroxide at the anode. A subsequent chemical conversion of both intermediates to ethylene oxide will deliver polyethylene and further derivatives, which are basic materials for many industrial processes such as the manufacture of plastic products. All improvements will be quantified using life cycle assessment.

The CO2EXIDE approach will link the chemical and energy sector, climate protection to industrial processing: physicists, chemists, engineers, economists and communication experts from universities and research institutions, SMEs and industries, innovatively joining their key technologies to develop and exploit an unprecedented process based on CO2, renewable energy and water. The CO2EXIDE project thus tackles important societal challenges by fostering sustainable supply chains for the creation of factories of the future.

The research project CO2EXIDE receives funding from the European Community framework Programme for research and innovation under the Horizon 2020 (2014-2020) grant agreement No. 768789.

WWW.CO2EXIDE.EU
OXALIC ACID FROM CO2 USING ELECTROCHEMISTRY AT DEMONSTRATION SCALE

AIM

The overall objectives of the OCEAN project are to:

1. Provide a proof of the economic and industrial feasibility of the electrochemical technology to convert carbon dioxide
2. Develop and demonstrate innovative electrochemical technologies to overcome current challenges in electrochemistry
3. Integration of the electrochemical technologies into industrial operations

CONCEPT

The project concept and structure is based on the following main elements:

1. Demonstration of the industrial feasibility: a demonstration reactor, the Demo Cell, to prove the industrial feasibility of the electrochemical conversion of carbon dioxide to formate
2. New electrochemical methodologies: the reduction of CO2 will be coupled to an anodic reaction: glucose to glucaric acid.
3. New electrochemical methodologies: The conversion of carboxylates to carboxylic acids will be advanced.
4. Integration into existing industrial operations: create a C2 value chain from CO2 reduction.
5. Proof the economic feasibility: develop a strong business case for the C2 value chain from CO2 electroreduction.
6. Proof the impact on the environment: a Life Cycle Analysis to investigate the reduction in energy use and greenhouse gas emissions and the resource efficiency.

The research project OCEAN receives funding from the European Community framework Programme for research and innovation under the Horizon 2020 (2014–2020) grant agreement No. 767798.
DEVELOPMENT OF NEW METHODOLOGIES FOR INDUSTRIAL CO2-FREE STEEL PRODUCTION BY ELECTROWINNING

AIM

The SIDERWIN project aims at developing an innovative electrochemical process to transform iron oxide into steel metal plates. Based on the ULCOWIN technology developed since 2004, it produces steel by electrolysis without direct CO2 emissions. Electrical energy and iron oxide are converted into chemical energy consisting of separating iron metal from oxygen gas. This disruptive innovation entirely shifts the way steel is presently produced.

CONCEPT

The consortium has set five main objectives: (1) To develop, build and demonstrate the production of iron metal from its oxide without direct involvement of carbon or fossil fuels and according to the simplest stoichiometry of the reaction of iron oxide decomposition; (2) To produce iron by electrowinning with a prototype cell equipped with the key components of the final version; (3) To interface the electrowinning prototype cell with a communication system to operate it according to electric grid priorities in real time; (4) To produce iron metal from iron oxide coming from low-grade iron ore incompatible with the conventional process and from residues of non-ferrous metallurgies; (5) To propose a profitable model that should facilitate the financial support of the next development steps of the ULCOWIN process. Thus, bridging the “valley of death” between TRL 6 and 8 whose investment is too high for research programs and too risky for industrial participation.

The research project SIDERWIN receives funding from the European Community framework Programme for research and innovation under the Horizon 2020 (2014-2020) grant agreement No. 768788.

WWW.SIDERWIN-SPIRE.EU
Enhancement of the Spire impact
SETTING THE FRAMEWORK FOR THE ENHANCED IMPACT OF SPIRE PROJECTS

AIM

Project SPRING’s objective is to increase progress towards the SPIRE goals and enhance return on investment in projects by addressing the needs of those who make the decision to adopt process innovations in industry and barriers to their adoption.

CONCEPT

Project SPRING will work with all SPIRE projects to provide guidance to project participants, decision makers in industry and broader SPIRE stakeholders, enabling them collectively to:

• Improve the articulation of the value of project exploitable outputs
• Improve the articulation of industry needs and barriers-to-uptake of exploitable outputs
• Identify policy gaps and recommendations to improve project impact

The SPRING consortium of six partners represent seven SPIRE projects, which will be used as case studies: ProPAT, Sharebox, IbD, EPOS, COPRO, STYLE and DREAM.

The research project SPRING receives funding from the European Community framework Programme for research and innovation under the Horizon 2020 (2014-2020) under grant agreement No. 767412.

WWW.SPIRE2030.EU/SPRING
HARMONIZED ASSESSMENT OF REGULATORY BOTTLENECKS AND STANDARDISATION NEEDS FOR THE PROCESS INDUSTRY

AIM
HARMONI aims at bringing together all the relevant stakeholders of the process industry to jointly identify, analyse and propose solutions to the regulatory bottlenecks and standardisation needs that hamper their innovation processes and the market uptake of their results, necessary to move towards a more sustainable and competitive European process industry.

CONCEPT
To achieve HARMONI’s overarching goal, the consortium will develop and apply a methodology for ensuring an effective collaboration of the 8 sectors involved in SPIRE PPP to elaborate the solutions to the common challenges they face due to non-technological barriers, such as regulatory issues or the lack of European Standards when trying to improve their resource efficiency.

In addition, HARMONI will analyse, compare and propose recommendations to trigger the transferability of technical solutions among and beyond the SPIRE sectors.

The project activities will result in an optimized EU regulatory and standardisation framework that facilitates and supports innovation in the process industry; a better participation of the SPIRE community in the EU regulatory and procedures, thus providing the most adequate input to the regulatory authorities; an earlier and more active involvement of the SPIRE community in the EU standardisation process; and an overall better environment to maximize transferability rates of technologies across SPIRE sectors.
SCALER aims to increase the uptake of industrial symbiosis across Europe. Under the European Union’s Horizon2020 initiative, the project will develop a set of best practices, tools and guidelines, helping businesses and industrial sites work together to ensure sustainable resource use.

SCALER provides the mechanisms to accelerate the journey towards efficient and quick implementation of industrial symbiosis across the European process industry. We do this by developing action plans and adapted solutions to industrial stakeholders and communities.

We work closely with a wide range of stakeholders including industrial networks, consultancies, researchers and policy makers at various geographic and politic levels, to deliver practical tools and guidelines for industry actors engaging in resource efficiency, reuse and sharing.

By achieving industrial symbiosis, European industrial companies will become more resource efficient and therefore more competitive. Territories will be revitalised with industrial links. Communities will be involved in the transformation of the European industrial system.

The research project SCALER receives funding from the European Community framework Programme for research and innovation under the Horizon 2020 (2014-2020) grant agreement No. 768748.
Valorisation of waste heat

ETEKINA
Demonstrate cost-effective waste heat recovery in industrial applications.

Raise awareness of innovative heat recovery technologies that will be applied where the thermal energy is wasted.

Facilitate market penetration of new heat exchanger technology applications into non-ferrous, steel and ceramic sectors.

Project’s key goal is to improve the energy performance of industrial processes by supporting the development of heat recovery market in industry. ETEKINA aims to recover more than 40% of the waste heat streams with the help of heat pipe heat exchangers (HPHE) in the non-ferrous, steel and ceramic industries.

The project will demonstrate the cost effectiveness and reliability of such heat pipe based solutions for the valorization of furnace fumes. As part of the project, three HPHE prototypes will be built and tested at Fagor Ederlan (Spain), Metal Ravne (Slovenia) and Atlas Concorde (Italy).

Thus, different stream temperatures and flow rates combined with different heat sink needs will be addressed for the development of each individual heat pipe. In addition, specific designs will also be considered depending on the fumes’ properties (deposit, corrosion, etc.) in order to ensure efficient heat recovery. Once solutions have been developed, we will look into how they operate in practice and will assess them for economic and energy performance.

The research project ETEKINA receives funding from the European Community framework Programme for research and innovation under the Horizon 2020 (2014-2020) grant agreement No. 768772.