

The background of the entire page is a detailed, light gray technical line drawing of industrial machinery. It features various components such as large cylindrical vessels, pipes with flanges, valves, and smaller mechanical parts, all rendered in a precise, engineering-style perspective.

**SPIRE**

PROJECTS

Power to your know-how

**2014**



## SPIRE 1 – 2014

Integrated Process Control

CONSENS

DISIRE

iCspec

ProPAT

RECOBA

## SPIRE 2 – 2014

Adaptable industrial processes allowing the use of renewables as flexible feedstock for chemical and energy applications

MefCO<sub>2</sub>

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SteamBIO

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Moving towards a circular economy through industrial symbiosis

BAMB

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RESYNTEX

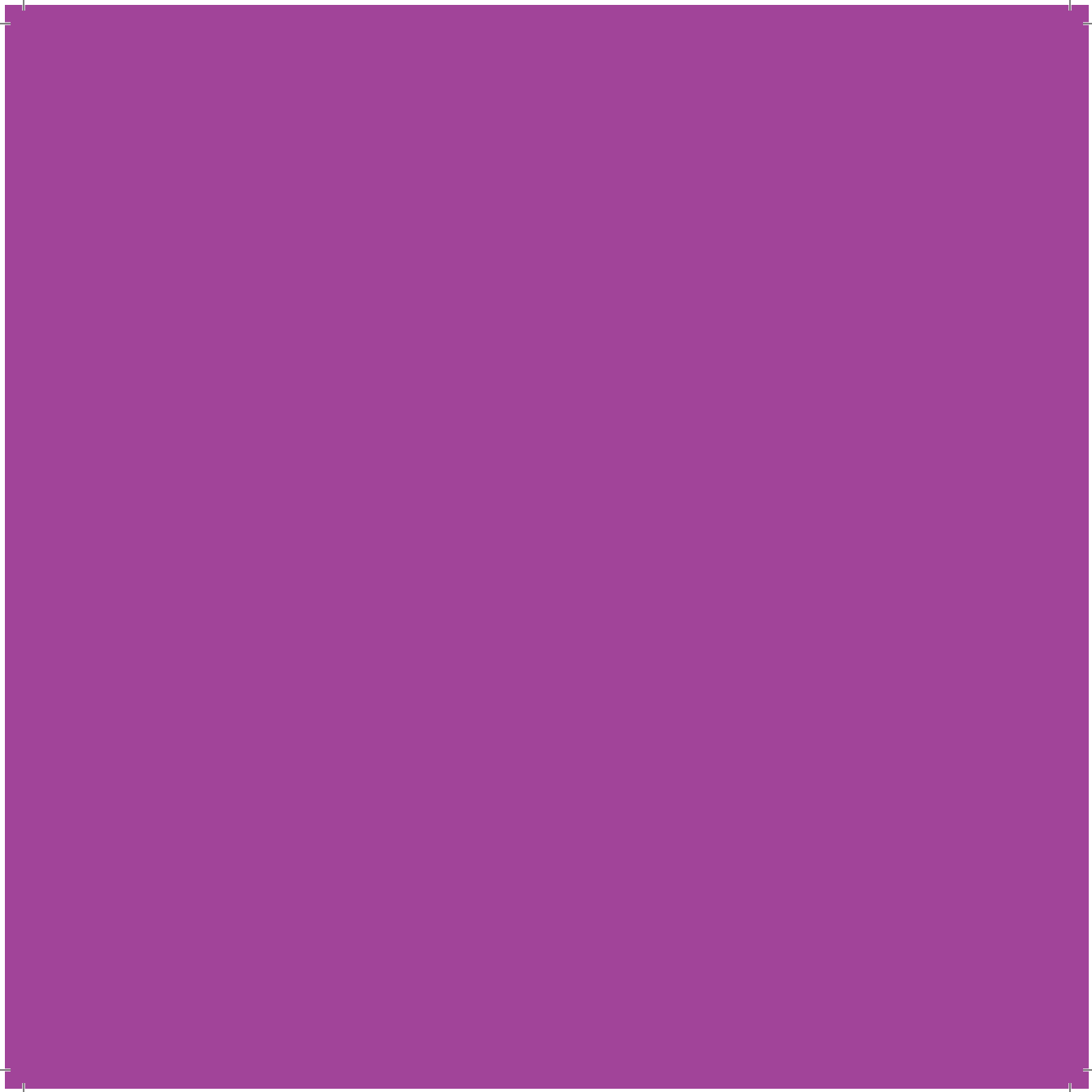


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## **SPIRE 1 - 2014**

Integrated Process Control

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# Integrated Control and Sensing for Sustainable Operation of Flexible Intensified Processes

## the AIM

The goal of the CONSENS project is to advance the continuous production of high-value products that meet high quality demands in flexible intensified continuous plants by introducing novel online sensing equipment and closed-loop control of the key product parameters. CONSENS focuses on flexible continuous plants in the chemical sector, but its results in the areas of sensing, control, monitoring, and design will be transferable to a wide range of large-scale processes in other sectors.

## the CONCEPT

The project activities are driven by industrial case studies from three different and important areas of chemical production: complex organic synthesis, speciality polymers, and consumer products. CONSENS is developing novel sensing technology for composition, rheological properties, and the formation of fouling layers. It is also developing self-adapting control schemes to cope with variations of input materials, degradation of equipment, and changing product specifications. In addition, software tools are being developed for sensor failure detection, performance monitoring, and design evaluation.

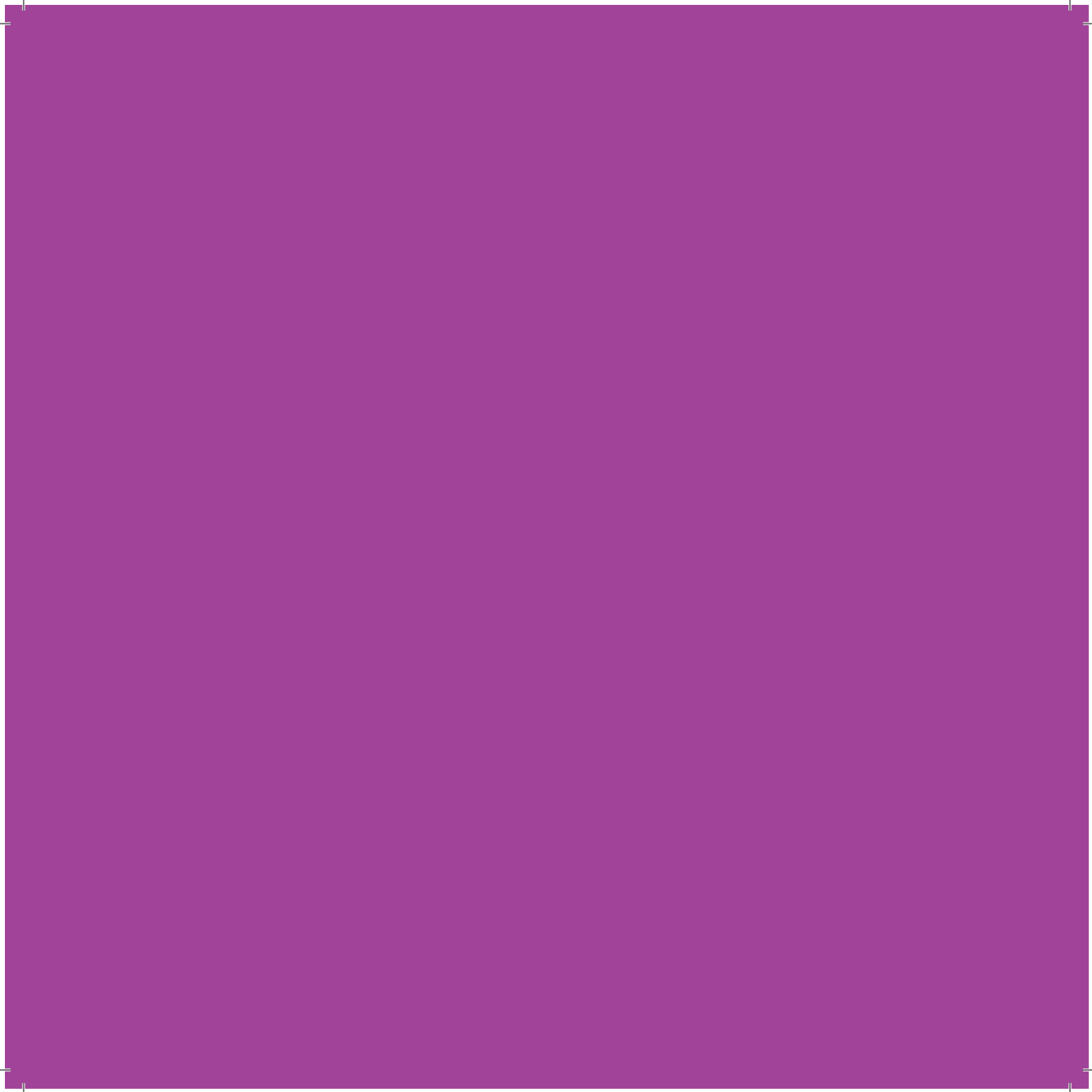
The project results will be validated in industrial pilot plants for all three types of processes. The exploitation of the new technologies will be facilitated by a tool for technology evaluation and economic impact assessment developed by CONSENS. A Cross-sectorial Advisory Board supports the transfer of Process Analyser Technologies and adaptive control systems to relevant sectors in the European process industry.



**This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 636942**

[www.consens-spire.eu](http://www.consens-spire.eu)









# Integrated Process Control based on Distributed In-Situ Sensors into Raw Material and Energy Feedstock

## the AIM

DISIRE will optimise existing industrial processes by improving their overall Resource and Energy efficiency. This objective will be achieved by fusing novel research and technological contributions in the fields of novel concepts of sensors for inline measurements, online Process Analyser Technologies (PAT) analysis, the use of 'big data' analytics for modelling and control of processes, real time integrated process control reconfiguration schemes, and real life experimentation and demonstration activities.

## the CONCEPT

With the DISIRE project, the properties of the raw materials or product flows will be fully integrated in a unique inline measuring system. This will extend the level of knowledge and awareness of the internal dynamics of the processes taking place during the transformation or integration of raw materials and enable more precise process control in subsequent production steps.

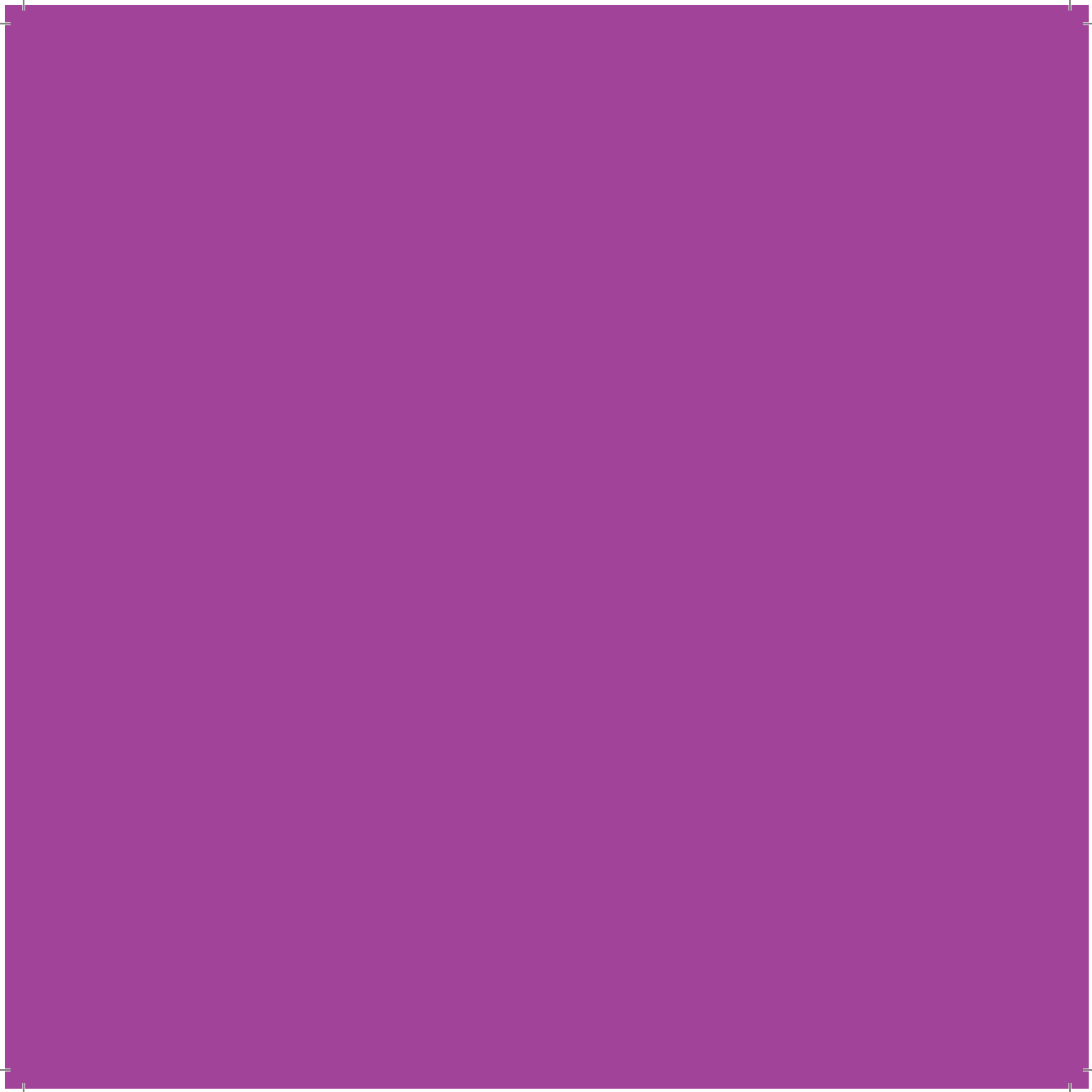
For the first time in the process industry, specific DISIRE PAT will be able to define quality and performance requirements that can be directly applied to the physical properties of the developed products and enable the overall online and product specific adaptation of the control system. In this way, the whole production process can be fully integrated in a holistic approach from the raw materials to the end product. This will allow multiple process reconfiguration and an optimised operation based on the final product's desired properties that can be generalised across the whole production cycle and is applicable to multiple cross-sectorial processes.



**This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 636834**

**[www.spire2030.eu/disire](http://www.spire2030.eu/disire)**







## in-line Cascade laser spectrometer for process control

### the AIM

The iCspec project contributes to improving product quality through enhanced in-line process control of technically relevant gases such as hydrocarbons (HC). The main purpose of the project is to develop 'beyond the state-of-the-art' gas analysers for fast in-line multi-component monitoring of gas compositions in a process stream. This development can replace currently employed analysers such as gas chromatographs (GCs) or Fourier-Transform-Infrared spectrometers (FTIRs).

### the CONCEPT

The development extends the established laser-based in-line gas sensing technology to the mid-infrared "chemical finger print" spectral range for multi-species detection. Specifically the project is developing wide wavelength range Mid-infrared (MIR) laser gas analysers for fast inline multi-component monitoring of gas compositions in a process stream.

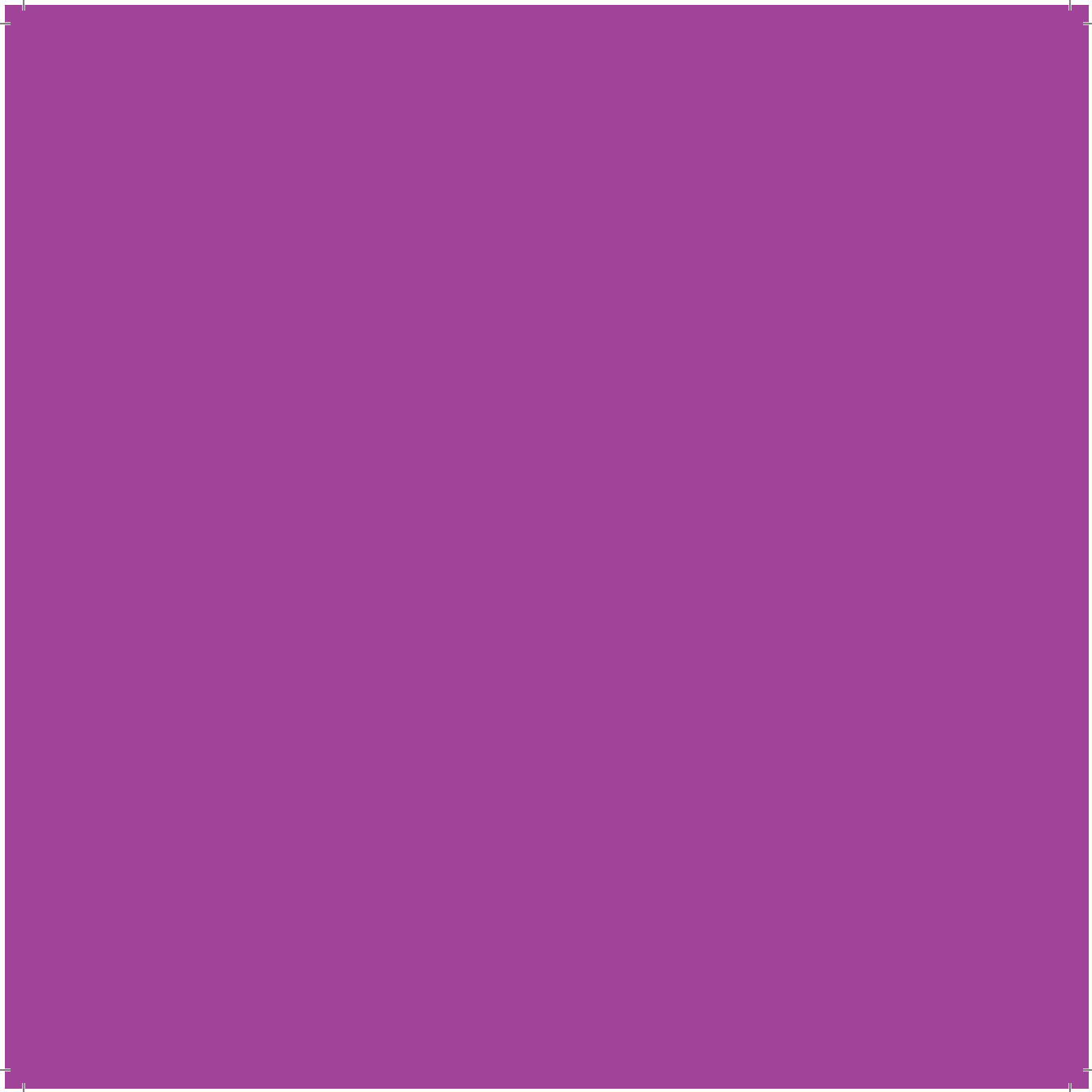
The developments are based upon two key technologies: the integration of MIR laser sources and the advancement of spectroscopic and chemometric data evaluation. For this, novel semiconductor laser sources for MIR spectroscopy are being developed and made available for the first time. These laser sources will be integrated into in-line gas analyzing measurement schemes and three demonstrator sensors based on two different techniques will be built. The separation of liquefied petroleum gas from crude oil distillation is the principle target application, though the developed analysers can be extended to other applications.



**This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 636930**

[www.icspec.eu](http://www.icspec.eu)







# Robust and affordable process control technologies for improving standards and optimising industrial operations

## the AIM

ProPAT aims to develop novel sensors and analysers to provide measurements on composition, particle size and local bulk properties, as well as more traditional, but smart, sensors for measuring other process parameters, such as temperature, flowrate, and pressure, etc. These measurements will be integrated into a versatile global control platform for data acquisition, processing and data mining in order to measure properties of process streams and products, accurately and in real-time, in a process friendly manner.

## the CONCEPT

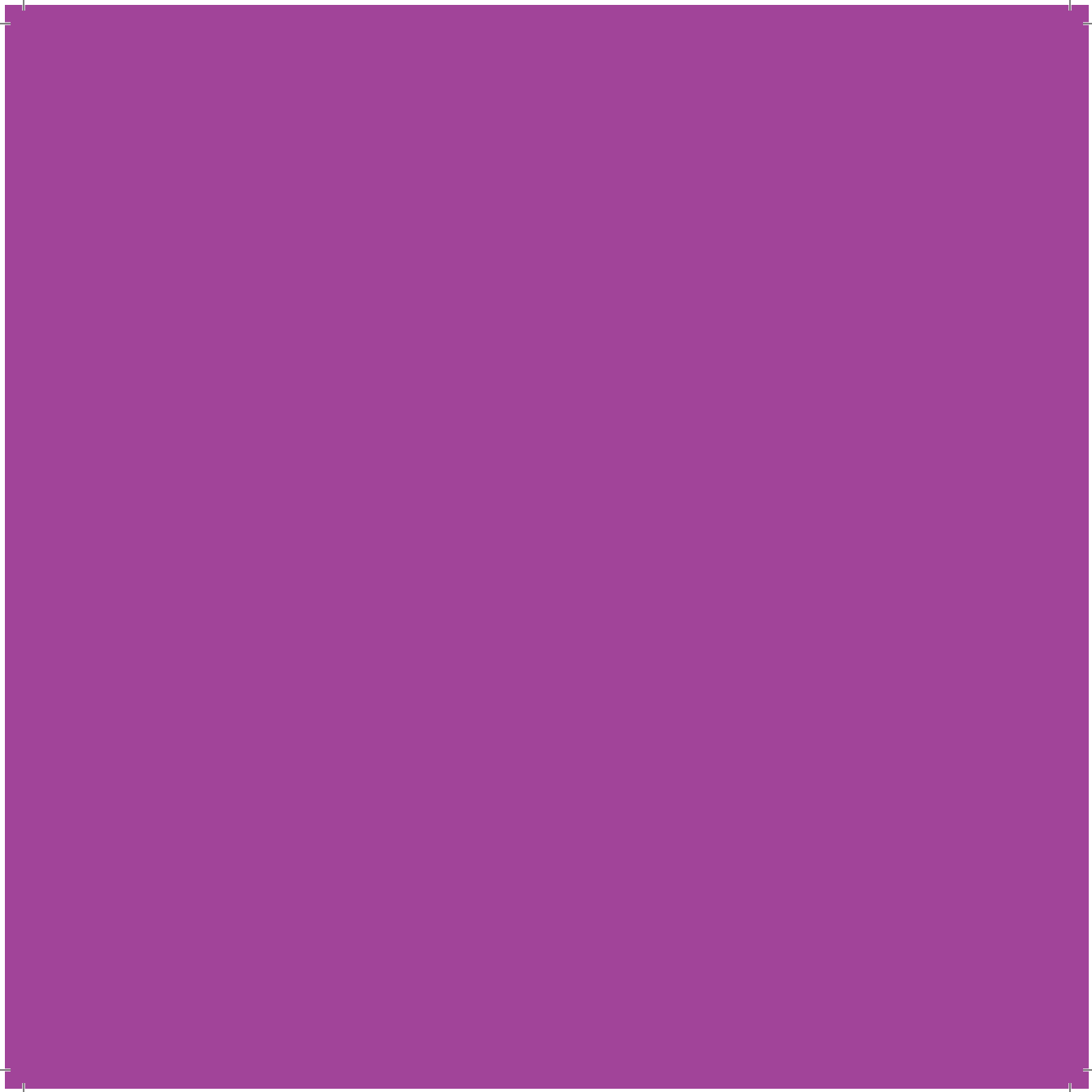
The PAT (Process Analyser technology) initiative focuses on building quality into both the product and processes, as well as enabling continuous process improvement. Essentially, integrating on-line measurement and/or modelling of critical quality attributes with automated feedback control of the process parameters impacting these attributes can ensure more efficient control of processes. This will reduce product variability, which will subsequently reduce the risk of releasing off-specification product into downstream discrete manufacturing, and increase customer satisfaction, thereby preventing products being rejected (and discarded) further down the supply chain. Through the adoption of ProPAT by the process industry, operators will be empowered to monitor progress and halt. The developed platform will also provide self-learning and predictive capabilities that can dramatically reducing increased costs that result from even slight deviations from the optimum process.



**This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 637232**

**[www.pro-pat.eu](http://www.pro-pat.eu)**







Cross-sectorial real-time sensing, advanced control and optimisation of batch processes saving energy and raw materials

## the AIM

All European process industry faces the same challenges: on the one hand, product quality must be improved and production costs decreased to ensure competitiveness in world markets. On the other hand, the resource and energy efficiency of products and processes must be improved to lower their environmental impact. The most promising medium term solution to address these challenges is through improved and integrated process control solutions. RECOPA's objective is to develop a new paradigm for the design and implementation of batch processes.

## the CONCEPT

Ten cooperation partners will make use of an online, model predictive control of complex batch processes for the production of emulsion polymers, steel, and silicon through the application of new sensor technologies, process models and automation tools. The consortium will focus on three different material systems to demonstrate the cross-sectorial applicability of developed sensors, optimization and control methods, with the goal of optimizing product quality, energy consumption, raw materials utilization and production costs of the considered processes.

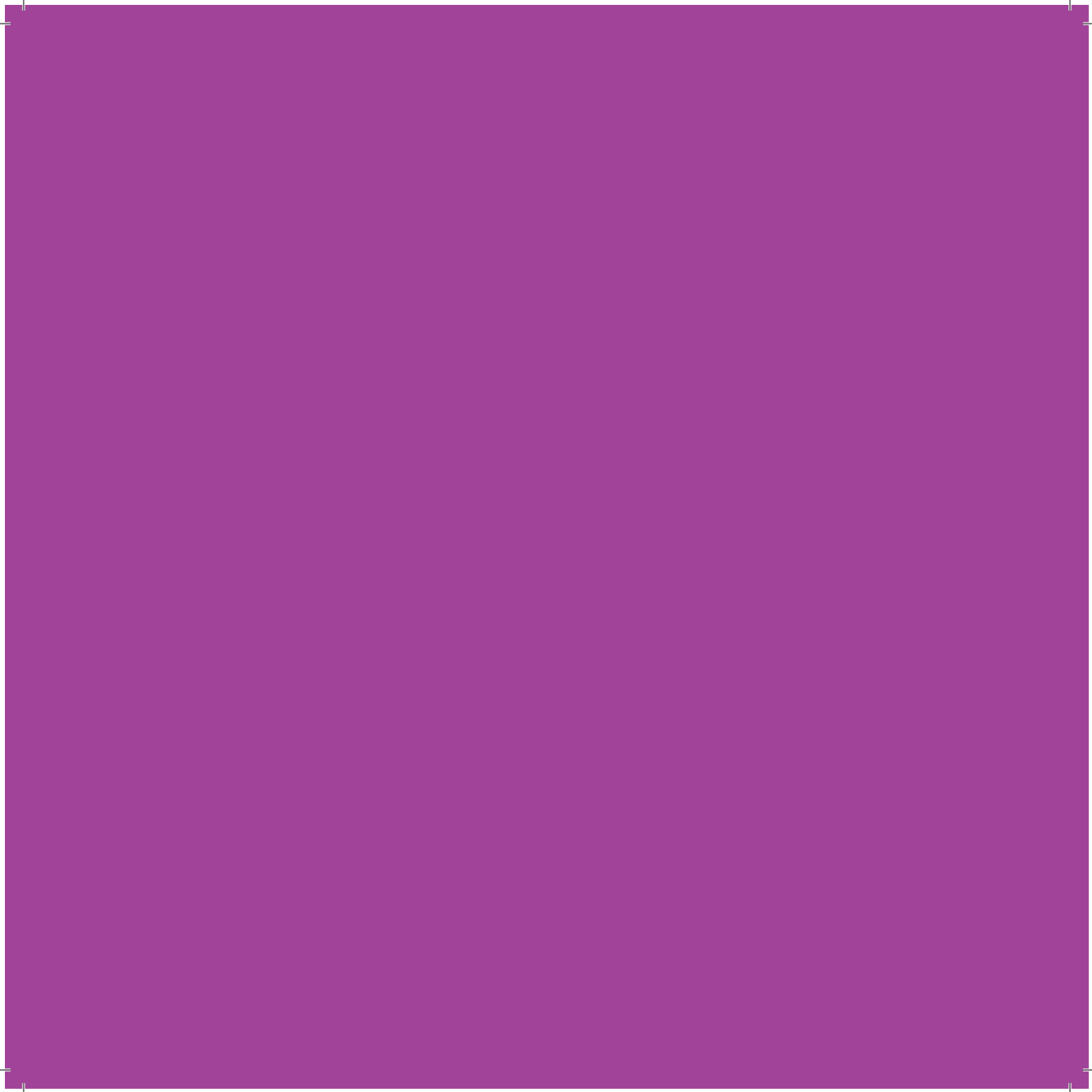
Key deliverables will be: new & innovative solutions for measuring different types of quality aspects; new models to realise integrated process control of batch processes; suitable online parameter adaptation technologies to keep these models valid; control modules to realise concepts for real-time, model based & closed loop process control, which are easily adaptable to existing batch processes in various industrial sectors; business models to approach relevant industrial sectors for a future market entry.



**This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 636820**

**[www.spire2030.eu/recoba](http://www.spire2030.eu/recoba)**







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## **SPIRE 2 - 2014**

Adaptable industrial processes allowing the use  
of renewables as flexible feedstock for chemical and  
energy applications

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# Methanol fuel from CO<sub>2</sub> - Synthesis of methanol from captured carbon dioxide using surplus electricity

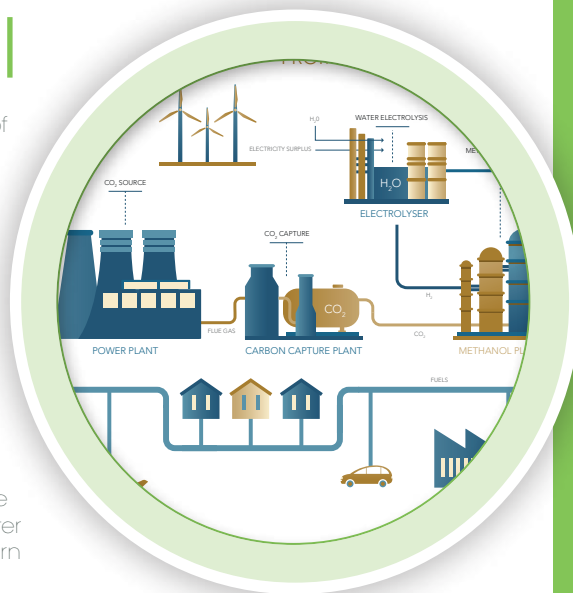
## the AIM

MefCO<sub>2</sub>'s objective is to develop an innovative green chemical production technology that uses CO<sub>2</sub> from industrial flue gas streams to produce a liquid fuel: methanol. The process can contribute significantly to the European objectives of decreasing CO<sub>2</sub> emissions while increasing renewable energy usage and improving competitiveness. The technology used is being designed in a modular intermediate scale with the aim of being able to adapt it to varying plant sizes and gas composition to maximize its potential for wide implementation.

## the CONCEPT

The overall concept underpinning the project is the use of the greenhouse gas carbon dioxide, which is emitted from many industrial processes, and hydrogen, produced from redundant electrical energy into a widely-useable platform chemical, methanol. The methanol synthesis process operates in a stable, high-throughput manner and demands a low carbon dioxide/carbon monoxide ratio in its input feed.

The project will encompass flexible (in both operation and feedstock) methanol synthesis with high carbon dioxide concentration-streams as an input, the latter originating from thermal power stations using fossil fuels. The technology can also be applied with existing biomass combustion and gasification system streams, operating for the production of electric/thermal energy, as opposed to chemical synthesis. The other synthesis reactant, hydrogen, will be produced from water hydrolysis using surplus energy, which could be difficult to return to the transmission grid.



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 637016

[www.spire2030.eu/mefco2](http://www.spire2030.eu/mefco2)







# Mobile and Flexible Industrial Processing of Biomass

## the AIM

Europe needs novel solutions to be developed for sustainable process industries that use renewable resources in a sustainable manner. Forestry, agricultural and industrial wastes are potential future resources, but their supply is typically fragmented and only seasonally available. MOBILE FLIP aims to develop and demonstrate mobile processes for the treatment of underexploited agricultural and forest based biomass resources to produce valuable products and intermediates.

## the CONCEPT

Process concepts have been designed around the key technologies pelletising, torrefaction, slow pyrolysis, hydrothermal pre-treatment and carbonisation. The eventual target products vary depending on the process concept, being typically fuels or components for co-combustion (pellets, torrefied pellets, biocoals), biochars for soil remediation, biodegradable pesticides for agricultural or forestry use or chemicals for the wood panel industry and sugars and hydrolysable cellulose as intermediates for the sugar platform. Some of the products are directly marketable, while some others are intermediates that will require further valorisation by integrated large industries. In the latter case, the mobile unit will pre-extract the most valuable components or densify the biomass to reduce the cost of transportation. Over-the-fence integration with large industries will be one means to ensure the availability of utilities for the process, such as steam and electricity, while in some mobile process concepts the utilities can be produced on site for internal or external uses.



**This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 637020**

[www.mobileflip.eu](http://www.mobileflip.eu)







# Flexible Superheated Steam Torrefaction and Grinding of Indigenous Biomass from Remote Rural Sources to Produce Stable Densified Feedstocks for Chemical & Energy Applications

## the AIM

SteamBio will demonstrate in fields and forests an innovative mobile superheated steam process. This process will convert agro-forestry residues into stable feedstock for biochemical and bioenergy uses. SteamBio involves the development of decentralised business models to enable widespread flexible deployment in rural areas across Europe. The successful project will create local jobs and generate local wealth. It will also contribute significantly to the sustainability of supply chains for energy and chemicals.

## the CONCEPT

The overall SteamBio concept is to create a commercially viable platform that can stabilise lingo-cellulosic biomass materials close to their source for subsequent biochemical and bioenergy uses. The platform will be scalable enabling both mobile deployment according to seasonal demands and use in a fixed location for high volume throughputs. The core enabling technology is Superheated Steam Processing. Superheated Steam is an efficient heat transfer medium implemented at industrial scales in drying applications. It has been proven at pilot scales to torrefy assorted biomass materials into hydrophobic and grindable solids with value-added volatile compounds as a side stream. The platform has been proven technically at industrial scales with temperatures up to and in excess of 300°C. The project will overcome many of the limitations of existing torrefaction approaches with all outputs being clean and uncontaminated by flue gases enabling maximum value recovery and minimal environmental impact.



**This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 636865**

**[www.steambio.eu](http://www.steambio.eu)**







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## **SPIRE 3 - 2014**

Improved downstream processing of  
mixtures in process industries

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## the AIM

A significant challenge faced by the process industry today, to enable the introduction of renewable raw materials into the value chains, is the development of cost- and energy-efficient water removal and product-recovery techniques. In order to unlock the potential of the renewable-based product market for the European process industry, PRODIAAS aims at a re-thinking of downstream process development and the development of suitable methodologies for fast-track development of tailored downstream processes as well as the optimisation of appropriate separation technologies.

## the CONCEPT

PRODIAAS develops and implements a toolbox of highly innovative and cost-effective separation and purification technologies tailored for renewable resources in white biotechnology production processes. Its focus is to adapt separation techniques to the need of white biotechnology products and to design novel hybrid systems combining individual advantages, for example, selectivity and energy efficiency. The bioreactions (fermentations) and biocatalysis by which the valuable products are produced are subject to alteration and optimization, to enable more efficient and resource-saving downstream processing. Novel, optimized apparatus and machinery are being developed to enable and host the technologies, in combination with an integrated design approach for the fast-track selection of appropriate technologies in order to facilitate a competitive use of renewable feedstocks in the process industry.



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 637077

[www.spire2030.eu/prodias](http://www.spire2030.eu/prodias)





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## **SPIRE 4 - 2014**

Methodologies, tools and indicators for cross-sectorial sustainability assessment of energy and resource efficient solutions in the process industry

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# Metrics for Sustainability Assessment in European Process Industries

## the AIM

MEASURE aims to provide a roadmap highlighting life cycle based evaluation approaches, which support sustainable supply chain management including cooperation between manufacturers and cross-sectorial co-products, and recycling and reuse options in practical applications. The project brings leading European process industries (chemistry, consumer goods, steel, automotive, and waste) together with academic experts on sustainability assessment, regulators and standardisation bodies.

## the CONCEPT

The project focusses on (1) critical 'crunch' points in current practice due to interfaces between sectors and/or along the supply chain; (2) moving from single sector to cross-sectorial supply chain (data) management by implementing full Life Cycle Sustainability assessment (LCSA) with the examples of the industrial sectors chemistry and consumer goods, steel and automotive as well as waste treatment; and (3) examining the innovation process from research & development to full scale production using the appropriate tools.

The outcome of the MEASURE project is a roadmap comprising recommendations for standards as well as best practice methods and tools for life cycle based evaluation approaches in process industries and sustainable process design for use in SPIRE projects.



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 637016

[www.spire2030.eu/measure](http://www.spire2030.eu/measure)









# Sustainability assessment methods and tools to support decision-making in the process industries

## the AIM

SAMT is a coordination and support action that promotes cross-sectorial learning and uptake of the most promising sustainability assessment methods and tools, focusing especially on energy and resource efficiency. A central outcome of the project will be a strategy for implementing harmonized best practices to assess sustainability across different sectors of the process industry.

## the CONCEPT

The SAMT project will respond to the need for cross-sectorial sustainability assessment methods by: (1) bringing together representatives of several process industry sectors: cement, metal, oil, water, waste and the chemical industry; (2) collecting and evaluating the current best practices from each industrial sector; and (3) reviewing the latest research know-how related to sustainability assessment methods and recent activities in standardisation relevant to the field.

By working together in common workshops and case studies during the project, industrial actors, stakeholders and researchers will create common understanding about the current bottlenecks in the applicability of existing sustainability assessment methods and tools, the development needs required to apply the recognised best practices in each sector and the possibilities to build cross-sectorial assessment tools.



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 636727

[www.spire2030.eu/samt](http://www.spire2030.eu/samt)





## the AIM

For many years, European process industries have recognised that assessment of sustainability is an essential component of their business management. Many indicators, tools and methodologies already exist. However, these vary widely in applicability, maturity and usability. STYLE seeks to specify a practical 'toolkit' to be used by future EU projects and industry sectors to assess the value (in sustainability terms) of new technologies and process modifications aimed at boosting resource and energy efficiency.

## the CONCEPT

Specifically, STYLE is targeting scenarios where: "A project team is evaluating options for a resource or energy improvement for their process or product and they need a pragmatic tool to check the broader sustainability implications of each technological solution." To address this, STYLE works on: (1) identifying best practice in sustainability evaluation, across multiple sectors in the process industries and through value chains, via inventory and classification of established approaches; (2) testing and delivering a practical 'toolkit' for sustainability evaluation of processes and products, spanning multiple sectors that is easily usable by non-practitioners; and (3) determining gaps and identifying future research needs to improve the 'toolkit' and ensure broad applicability across sectors.

STYLE is working in close collaboration with the SAMT and MEASURE projects to deliver a harmonised Roadmap covering all three projects' recommendations.



**This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 636771**

**[www.spire2030.eu/style](http://www.spire2030.eu/style)**



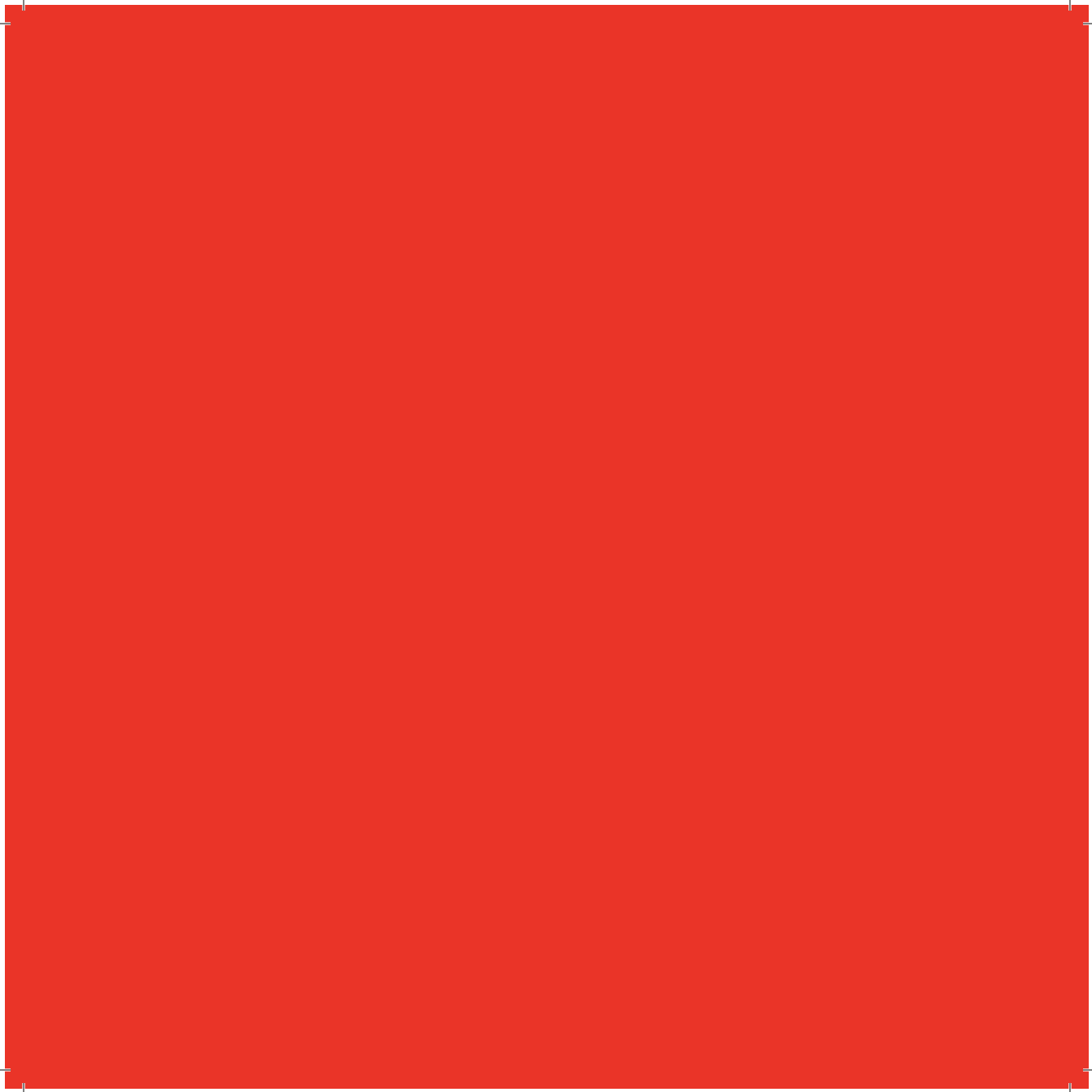


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## **EE 18 - 2014**

New technologies for utilization of heat recovery in large industrial systems, considering the whole energy cycle from heat production to transformation, delivery and end use

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# Waste Heat Recovery for Power Valorisation with Organic Rankine Cycle Technology in Energy Intensive Industries

## the AIM

The main objective of the TASIO project is to increase energy efficiency by developing solutions to recover the waste heat produced in energy-intensive processes in industrial sectors such as cement, glass, steelmaking and petrochemicals and transform it into useful energy. Appropriate solutions will be designed after evaluation of the energetic situations in these four industry sectors and will feature the development of Waste Heat Recovery Systems (WHRS) based on the Organic Rankine Cycle (ORC) technology.

## the CONCEPT

The TASIO project will design and develop a direct heat exchanger, applicable across sectors, to transfer heat directly from process flue gases to the organic fluid of an ORC system. This will transform the waste thermal energy into electric power for internal or external use and into mechanical energy for internal use in process equipment such as compressors. It will also develop new substrate/coating material solutions with higher anticorrosive and anti-abrasive resistance to be used in components for the heat exchanger that are in contact with the flue gases. These aspects will be completed by the design and modelling of a new integrated monitoring and control system for the targeted applications.

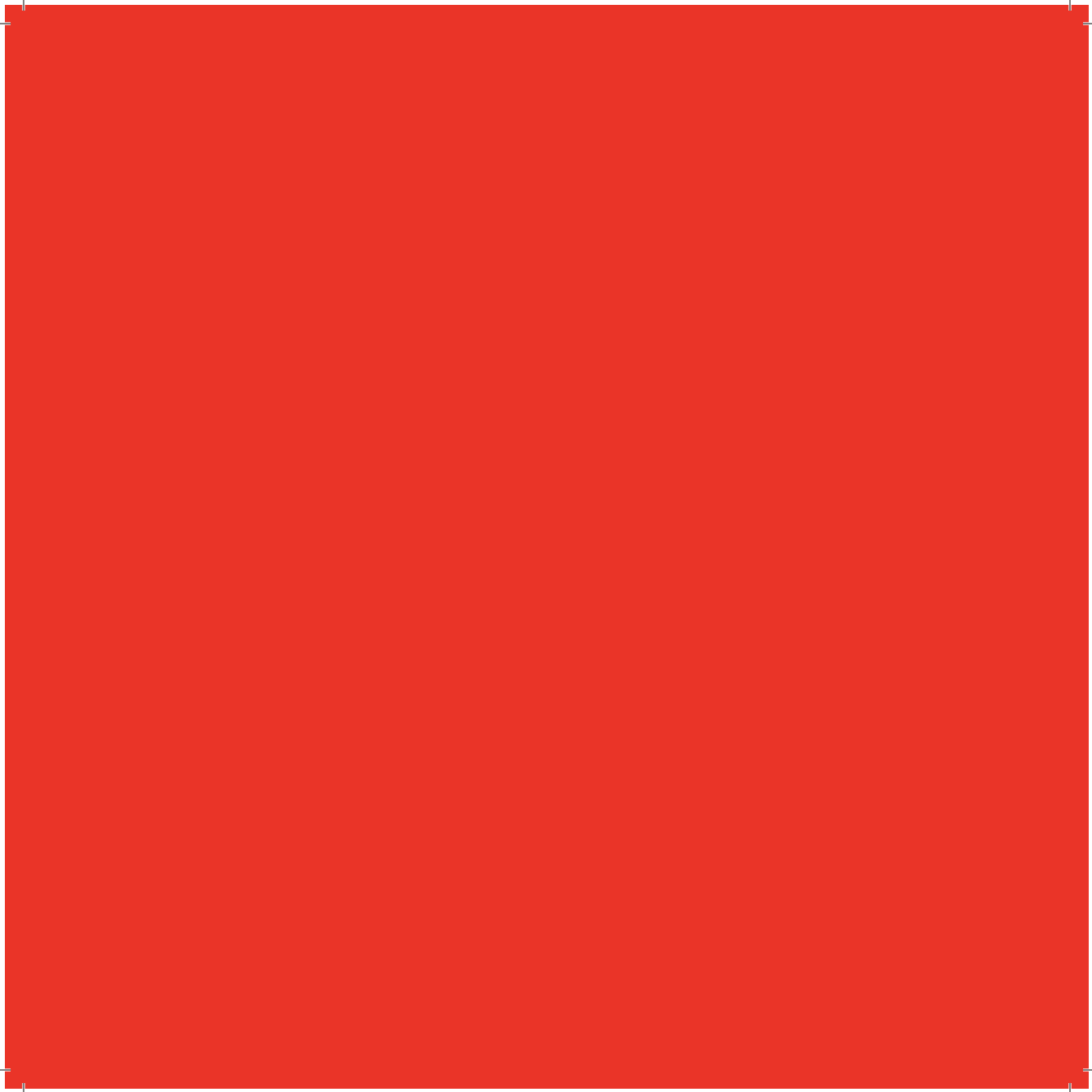
The project foresees the implementation of a full scale industrial demonstrator of the Waste Heat Recovery System for electrical energy generation in one of the industrial partners and a partial validation of the system for air compressors at pilot scale.



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 637189

[www.tasio-h2020.eu](http://www.tasio-h2020.eu)







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## **Waste 1 - 2014**

Moving towards a circular economy  
through industrial symbiosis

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# Buildings as Material Banks: Integrating Materials Passports with Reversible Building Design to Optimise Circular Industrial Value Chains

## the AIM

BAMB's mission is to enable a systemic shift in the building sector. Dynamically and flexibly designed buildings can be incorporated into a viable circular economy. Through design and circular value chains, materials in buildings sustain their value – in a sector producing less waste and using less virgin resources. Instead of being to-be waste, buildings will function as banks of valuable materials, slowing down the usage of resources to a rate that meets the capacity of the planet.

## the CONCEPT

The BAMB project implements the principles of the waste hierarchy: the prevention of waste, its reuse and recycling. The key is to maintain the value of materials used in buildings for recovery. This is achieved by developing and integrating two complementary technological innovations: (1) materials passports and (2) reversible building design, supported by new business models, policy propositions and management and decision-making models. These innovations will be able to change conventional (cradle-to-grave) building design, so that buildings can be transformed for new functions (extending their life span) or disassembled into building components or material feedstock that can be reused or upcycled (using materials passports). Increased value leads to less waste, and that is what BAMB is creating - ways to increase the value of building materials.



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 642384

[www.bamb2020.eu](http://www.bamb2020.eu)







**CABRISS**

# Implementation of a Circular economy Based on Recycled, reused and recovered Indium, Silicon and Silver materials for photovoltaic and other applications

## the AIM

CABRISS aims to develop a circular economy model mainly for the photovoltaic (PV) sector, but also relevant to the electronic and glass industries. It will implement: (1) recycling technologies to recover indium, silver and silicon for sustainable PV technology and other applications; (2) a solar cell processing roadmap, using silicon waste for the high throughput, cost-effective manufacturing of hybrid silicon-based solar cells, and demonstrating the possibility for re-use and recycling for key PV materials at the end of their normal life.

## the CONCEPT

The originality of the project relates to its cross-sectorial approach associating different sectors, such as the Powder Metallurgy (fabrication of silicon powder based low cost substrate), the photovoltaic industry (innovative PV Cells) and the recycling industry (hydrometallurgy and pyrometallurgy), with a common aim: to make use of recycled waste materials (silicon, indium and silver).

The silicon solar cells will have a low environmental impact through the implementation of low carbon footprint technologies and, as a consequence, the technology will present a low energy payback (about 1 year). CABRISS focuses mainly on the photovoltaic production value chain, thus demonstrating cross-sectorial industrial symbiosis with closed-loop processes.



This project has received funding from the European Union's Horizon 2020 (2014-2020) Research and Innovation programme under Grant Agreement n° 641972

[www.spire2030.eu/cabriiss](http://www.spire2030.eu/cabriiss)







# Fostering industrial symbiosis for a sustainable resource intensive industry across the extended construction value chain

## the AIM

The overall objective of FISSAC is to develop and demonstrate a new paradigm built on an innovative industrial symbiosis model for a zero-waste approach in the resource intensive industries in the construction value chain. The model will lead to material closed-loop processes in construction and facilitate the move to a circular economy. The ambition is that the model that is created can be replicated in other regions and along other value chain scenarios.

## the CONCEPT

A methodology and a software platform will be developed in order to implement the innovative industrial symbiosis model in a realistic scenario of industrial symbiosis synergies between industries (the steel, aluminium, natural stone, chemical and demolition and construction sectors) and stakeholders in the extended construction value chain. It will guide stakeholders in how to overcome relevant technical barriers and non-technical barriers, as well as addressing standardisation concerns, to implement and replicate industrial symbiosis in a local or regional dimension.

FISSAC will demonstrate closed loop recycling processes that transform waste streams into valuable secondary raw materials; demonstrate the eco-design of eco-innovative construction products (including real-world scale); implement a software platform; and assess the replicability of the model through a living laboratory concept. The model will be applied based on the three sustainability pillars.



**This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 642154**

[www.fissacproject.eu](http://www.fissacproject.eu)









**REslag**  
Turning waste into value

# Turning waste from steel industry into a valuable low cost feedstock for energy intensive industry

## the AIM

RESLAG aims to demonstrate that the 2.9 million tonnes per year of slag produced by the European steel that is currently placed in landfill or stored can be effectively used by other industrial sectors, if properly supported by the right technologies. In the course of demonstrating this, the project will also prove that there are other very important environmental benefits from an "active" use of the slag including CO2 saving and elimination of negative impacts associated with mining such as the recovery of valuable metals and the production of ceramic materials.

## the CONCEPT

To achieve the project's ambitious goal, four large-scale demonstrations to recycle steel slag are considered: extraction of non-ferrous high added value metals; thermal energy storage (TES) for industrial waste heat recovery applications; TES to increase the efficiency and availability of Concentrated Solar Power (CSP) plant electricity production and generation of innovative refractory ceramic compounds.

Overall, the RESLAG project aims at an innovative organizational steel by-products management model able to reach high levels of resource and energy efficiency, which considers a cascade of upgrading processes and a life cycle perspective as part of a future circular economy.



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 642067

[www.reslag.eu](http://www.reslag.eu)







# A new circular economy concept: from textile waste towards chemical and textile industries feedstock

## the AIM

Today, relatively little unwearable textile waste is collected and recycled. RESYNTEX's new reprocessing technology will increase resource efficiency by transforming textile waste into a useful industrial feedstock. Through an innovative recycling approach and a synthesis of expertise, textile waste will be transformed into secondary raw materials creating circularity and reducing environmental impact.

## the CONCEPT

The project models a complete value chain from textile waste collection through to the generation of new marketable feedstock for the chemical and textile industries. It will focus on the reprocessing of blends and pure components of unwearable textile waste. Moreover, it will improve collection approaches, while increasing public awareness of the issue of textile waste and boosting social involvement with it.

RESYNTEX will enable traceability of waste processing using data aggregation and evaluate the performance of the new value chains by means of life cycle assessment (LCA) and life cycle costing (LCC). It will develop innovative business models for the chemical and textile industries, and demonstrate a complete reprocessing production line for basic textile components, including liquid and solid waste treatment.



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement n° 641942

[www.resyntex.eu](http://www.resyntex.eu)





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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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**A.SPIRE aisbl**

Av. E. van Nieuwenhuyse, 4 - B-1160 Brussels

Email: [info@spire2030.eu](mailto:info@spire2030.eu) - Tel: +32 (0)2 676 72 31 - Fax: +32 (0)2 676 73 47

**[www.spire2030.eu](http://www.spire2030.eu)**

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**SPiRE** Sustainable Process Industry through  
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