Sustainable Process Industry

Public-Private Partnership

SPIRE

Sustainable Process Industry through Resource and Energy Efficiency

> be more

Stronger
Smarter
Swifter

A strategic research and innovation agenda

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.

Vital

1

The European process industry represents the **economic roots of the European economy,** bringing economic and social value by transforming raw materials into intermediate and end-user products that society needs to address the current challenges in housing, transport, energy etc. Having a high dependence on resources (energy, raw materials and water) in production and striving for long-term sustainability, the process industry has a clear and urgent interest in improved efficiency and competitiveness.

Ambitious

2

A future sustainable European society has complex needs that will need to be satisfied using fewer resources and less energy. The process industry will be part of this future through the ambitions it has set and the strong unprecedented scale of industrial commitment and support. With envisaged overall effects along the value chains, **SPIRE aspires** to achieve reductions of up to 30% in fossil energy intensity, reductions of up to 20% in non-renewable and primary raw material intensity, and, as a consequence, a drastic overall efficiency improvement of up to 40% in CO_2-equivalent footprints.

SPIRE will achieve its goals by **inspiring innovations** that would **reduce** resources and energy used in processes but also industrial emissions and waste; would **reuse** resources and materials from end-of-life products as raw materials for new products; would **replace** current feedstock by integrating renewables or waste (for example, biomass and CO_2); and would **reinvent** processes, equipment and business models.

Unique

3

The magnitude of the challenges ahead makes it clear that industry cannot tackle these issues alone. This joint public-private endeavour will contribute to putting **the European manufacturing industry back on the innovation track.** It sets a long-term vision and a strategic research & innovation agenda for the process industry to ensure that it significantly contributes to the overall objectives of **sustainable growth and jobs.**

SPIRE is a unique cross-sectorial partnership which will promote **a systemic approach.**
It is innovation- and market-focused along the innovation chain:
from research to demonstrations.
It connects sectors within their value chains:
from raw materials to the end-user industries.
It proposes a complementary and Europe-focused approach in the industrial chain:
from the big to small and medium enterprises.
It represents an articulation of the various sectorial innovation priorities:
from individual initiatives to synergistic effects.

SPIRE takes **the best out of eight process industries** and aims at integrating, demonstrating and validating systems and technologies across the SPIRE sectors. This unique co-operation will enable massive leveraging of costs and faster implementation of technologies through closer connection and integration of innovations in industry and their value chains.

Impactful

4

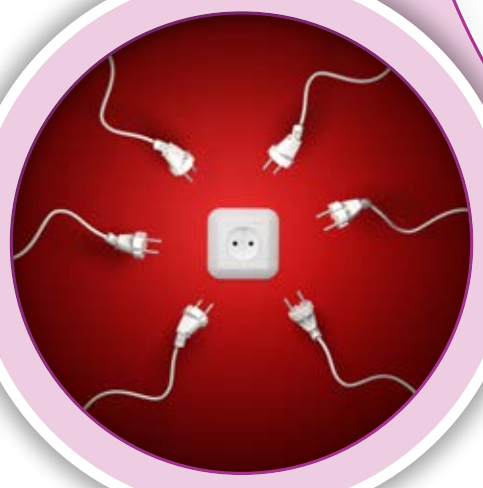
In the short- to medium-term SPIRE will radically improve the competitiveness and efficiency of the European process sectors themselves.
In the medium- to long-term **SPIRE can enable the development of a truly sustainable European economic system in which economic growth is permanently decoupled from environmental impact.**

SPIRE will base its **innovations on the three sustainability pillars:**
Environment: enabling the sustainable use of resources as well as renewable and novel feedstock; reducing emissions and waste;
Social: ensuring the creation of high quality, skilled jobs in modern manufacturing in Europe;
Economic: accelerating the transformation of fundamental research into market opportunities in order to provide Europe with the eco-efficient process technologies and materials it needs to retain global leadership and competitiveness.

Process

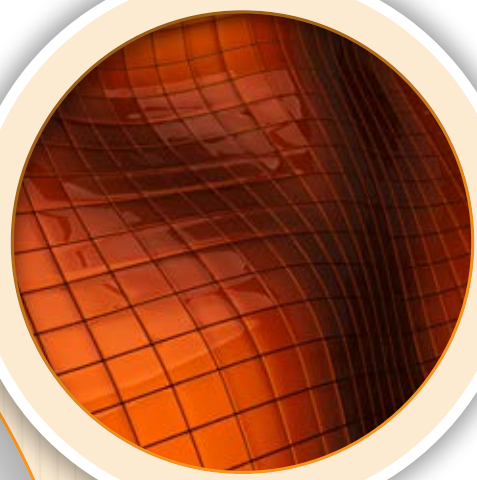
Solutions for more efficient processing and energy systems for the process industry, including industrial symbiosis

While production processes evolved, they can still be significantly or radically improved in terms of sustainability. Addressing the challenges faced by the process industry can only be done through a multiplicity of approaches. It requires (cross-)sectorial innovative advances towards appropriate technologies, processes and products and demands intelligent designs which can increase energy, resource and/or carbon-neutral efficiencies. SPIRE will deal with the important trend towards industrial symbiosis, to align and optimally manage resource streams within industrial parks, optimizing both input and re-use of raw materials, energy and water streams in a synergetic way. It will focus and demonstrate solutions on novel advanced energy technologies; energy harvesting, storage and reuse; process monitoring, control and optimization; more efficient systems and equipment; and new energy and resource management concepts.



Applications

New materials (and their respective processes) for market applications that boost energy and resource efficiency throughout the value chains



SPIRE will cover two fundamental cornerstones for energy and resource efficient applications both in the process industry itself as well as in other parts of the value chain. On the one hand, more sustainable processes will contribute to the development of advanced materials (with less CO_2 and energy footprint) that are needed to address complex societal challenges. On the other hand, new sustainable (advanced) materials will help the process industry itself to develop more energy and resource efficient processes (i.e. energy storage materials, materials for high temperature processes). To be successful in developing the materials and processes, SPIRE has the explicit intention to take a less "agenda-driven" and more of a "bottom-up" driven approach, leaving room for proposed market needs solutions that have a drastic impact on resource and energy efficiency down the value chain, and require contributions from the process industry.

Waste

Avoidance, valorisation and re-use of waste streams within and across sectors, including recycling of post-consumer waste streams and new business models with the ambition of closing the loop

SPIRE will develop and demonstrate solutions that will increase waste collection rates as well as the re-use and recycling rates; will reduce the generation of waste; will increase the yield and the quality of recycled materials, and will enable access to and use of wastes and low-yield materials through improved processes. The value proposition is therefore the transformation of waste into a resource towards a circular economy consisting of several steps such as the use of a systems approach in order to increase the understanding of the value within the waste streams; the separation and capture of valuable elements; the treatment of valuable elements to increase the reuse and recycle potential of the elements; and waste collection, reuse and recycle schemes and business models as a step towards increasing the eco-innovation potential and creating economically attractive business opportunities.

Feed

Increased energy and resource efficiency through optimal valorisation and smarter use and management of existing, alternative and renewable feedstock

The feed in industrial production processes deals with the material and utility streams required for the subsequent conversion/transformation operations. Breakthroughs to achieve a significantly lower or better consumption of these primary resources or feedstock require an integral approach which stimulates and enables the use of renewable resources such as biomass or CO_2; improves the utilisation and valorisation of secondary feedstock like recycled end-of-life materials of industrial and social origin, residue and waste streams; creates sustainable alternatives to enhance the availability and quality of essential primary resources. The primary target for the impact of the feed activities is a substantial reduction in the use of primary resources/feedstock intensity. Resource efficiency will consequentially be accompanied by energy efficiency and reductions in waste and emissions to soil, air and water.

A.SPIRE is the European Association which is committed to manage and implement the SPIRE Public-Private Partnership. It represents innovative process industries, 20% of the total European manufacturing sector in employment and turnover, and more than 90 industrial and research process stakeholders from over a dozen countries spread throughout Europe. SPIRE brings together cement, ceramics, chemicals, engineering, minerals and ores, non-ferrous metals, steel and water sectors, several being world-leading sectors operating from Europe.

The mission of **A.SPIRE** is to ensure the development of enabling technologies and best practices along all the stages of large scale existing value chain productions that will contribute to a resource efficient process industry.

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