



Circular Economy SPIRE Opportunities for 2018-2019

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The contractual PPP approach

- **What is the same as in normal Horizon 2020:**
 - The financial rules are those of Horizon 2020
 - Final responsibility for the Work Programme stays with the European Commission
 - Implementation remains with the Commission: selection of proposals, grant preparation, review of progress and payments
 - Calls are open to non-members (~ 75% of funded participants are non-members)
- **What is different from normal Horizon 2020:**
 - Long-term commitment by Commission to support the field
 - Long-term commitment by industry to invest, with a need to demonstrate its fulfilment (monitoring & KPIs)
 - Roadmap-based strategy. Close interaction in the Partnership Board to prepare the content of the calls.

The SPIRE Research Roadmap

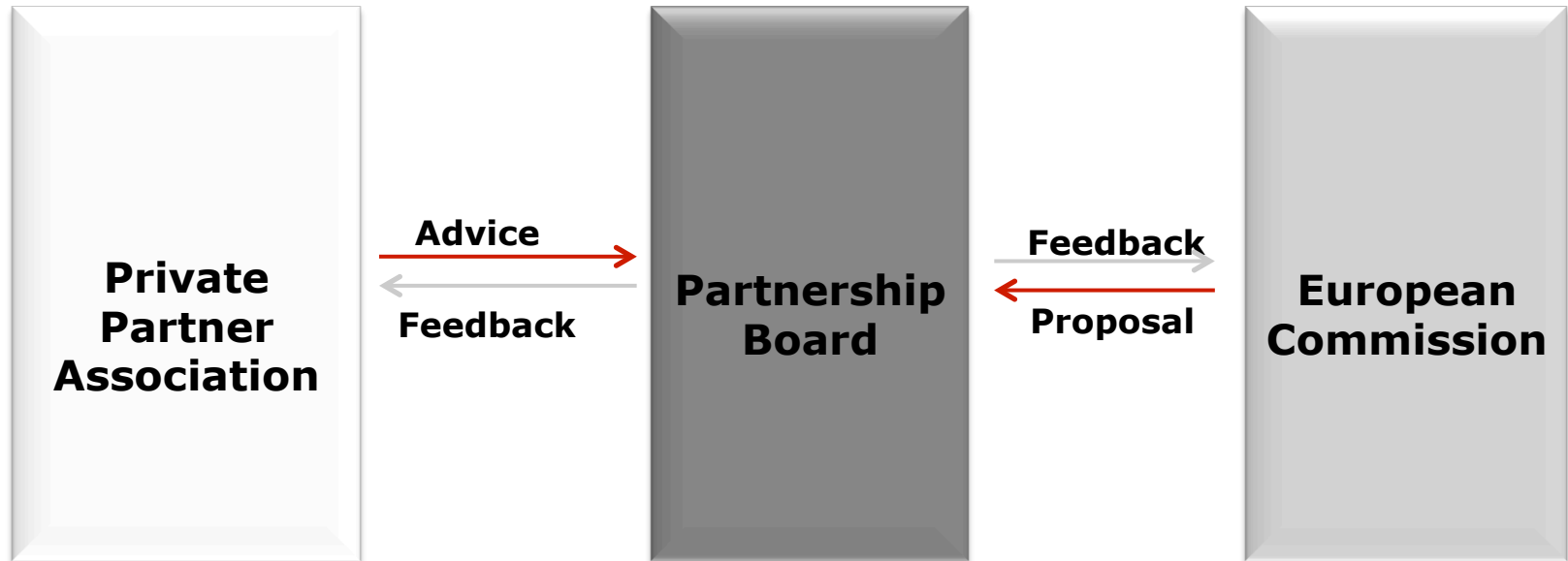


Structured around 6 Key Components, comprising Key Actions (KA):

- **FEED (4)**
Optimal valorisation of feedstock
- **PROCESSES (5)**
More efficient processing solutions
- **APPLICATIONS (2)**
New processes to produce materials for market applications
- **WASTE2RESOURCES (4)**
Management of waste streams
- **HORIZONTAL (4)**
Skills, tools, knowledge-sharing, best practices
- **OUTREACH (2)**
Reach out activities



The cPPPs Governance



- Discuss priorities
- Form consortia
- Apply to calls

- Discuss priorities & call topics
- Assess progress

- Develop work programme
- Publish open calls



Sustainable Process Industry through Resources and Energy Efficiency (SPIRE) cPPP





Rationale of the SPIRE cPPP

- Eight world-leading sectors (cement, ceramics, chemicals, engineering, minerals and ores, non-ferrous metals, steel and water)
- At the core of most industrial value chains
- Highly dependent on resources, interested in improved efficiency
- 20% of European industry (employment and turnover)
- Key part of the manufacturing base in Europe,
> 450000 enterprises, 6.8 million employees


Specific Objectives of SPIRE



R+I to integrate and demonstrate at least 40 innovative systems and technologies:

- 7 in Adaptable processes able to use different feedstocks
- 6 in Reduction and re-use of waste with ambition to close the loop
- 9 in Innovative processes leading to CO₂ reduction
- 8 in Green technologies to develop novel materials for new and existing markets
- 6 in Industrial processes reducing water use
- 4 using Technology uptake within/between sectors to enable industrial symbiosis

... and capable of achieving across process industry (by 2030):

- **A reduction in fossil energy intensity of up to 30%**
 - **A reduction in non-renewable, primary raw material intensity of up to 20%**
 - Increase in renewables, reduction and re-use of waste (even cross-sectorial) with ambition to achieve a close loop
 - Reduction of the water footprint of industrial processes
 - **Efficiency improvement of CO₂-equivalent footprints of up to 40%**
 - **10 new types of high-skilled jobs**
- 

Sustainable Process Industries through Resource and Energy Efficiency (SPIRE cPPP)

- Central objectives: optimise industrial processing, reduce energy and resource consumption and minimise waste **through cross sectorial approaches** → Significant contributions to the Circular Economy and to fighting climate change.
- SPIRE cPPP topics in Horizon 2020 (WP 2018-2019):
 - LEIT-NMBP (6 topics)
 - SC3 Secure, clean and efficient energy (3 topics, 1 with 2 subtopics)
 - SC5 Climate action, environment, resource efficiency and raw materials (2 topics)

SPIRE in Horizon 2020 WP 2018-2019

Overview of topics



SPIRE Topics		Type	TRL	
CE-SPIRE-02-2018	Processing of material feedstock using non-conventional energy sources	IA	4-6	NMBP
CE-SPIRE-03-2018	Energy and resource flexibility in highly energy intensive industries	IA (50%)	5-7	
CE-SPIRE-10-2018	Efficient recycling processes for plastic containing materials	IA	5-7	
CE-SPIRE-04-2019	Efficient integrated downstream processes	IA	5-7	
CE-SPIRE-05-2019	Adaptation to variable feedstock through retrofitting	IA (50%)	5-7	
DT-SPIRE-06-2019	Digital technologies for improved performance in cognitive production plants	IA	5-7	
CE-SC3-NZE-02-2018	Conversion of captured CO2	RIA	3 or 4 - 5 or 6	SC3
LC-SC3-RES-07-2019	Solar Energy in Industrial Processes	RIA	4-5	
LC-SC3-EE-06-2018	Business cases for industrial waste heat/cold recovery (cost/benefit models for industrial waste heat/cold recovery)	IA	4-8	
LC-SC3-EE-06-2019	Business cases for industrial waste heat/cold recovery (symbiosis in industrial parks and clusters-non-technological barriers)	CSA	-	
CE-SC5-01-2018	Methods to remove hazardous substances and contaminants from secondary raw materials	RIA	5-6	SC5
CE-SC5-04-2019	Building a water-smart economy and society a) Symbiosis between industry and water utilities	IA	5-7	



SPIRE Topics 2018-2019 in NMBP

- ***CE-SPIRE-02-2018***: *Processing of material feedstock using non-conventional energy sources*
- ***CE-SPIRE-03-2018***: *Energy and resource flexibility in highly energy intensive industries*
- ***CE-SPIRE-04-2019***: *Efficient integrated downstream processes*
- ***CE-SPIRE-05-2019***: *Adaptation to variable feedstock through retrofitting*
- ***DT-SPIRE-06-2019***: *Digital technologies for improved performance in cognitive production plants*
- ***CE-SPIRE-10-2018***: *Efficient recycling processes for plastic containing materials*

SPIRE in NMBP WP 2018-20

Call – INDUSTRIAL SUSTAINABILITY

- **Goal**

- *To further strengthen the global leadership of Europe's industry in environmental sustainability.*
- *EU Climate and Energy targets by 2030:
GHG reduction by 40% ; renewables share 27% ; energy efficiency 30%*
- *Contributes to the Sustainable Development Goals.*

- **Covers**

- ***SPIRE** and catalysing the Circular Economy*
- *Clean energy through innovative materials*
- *Cultural Heritage*
- *Energy-Efficient Buildings*

CE-SPIRE-02-2018: Processing of material feedstock using non-conventional energy sources

- *Challenge: Develop efficient processes utilising non-conventional energy sources, which are compatible with a renewable energy grid.*
- *Scope:*
 - Develop more Energy and Resource efficient **process intensification technologies**, which utilise **non-conventional energy sources**
 - **Flexible** technologies able to cope with **fluctuating energy fluxes**
 - Focus on **continuous processes**, possibility to **enable batch to continuous process transition**
 - **Containerisation** might be considered
 - **Scalability** and **replicability** should be considered, **LCA**
- *Impact:*
 - Energy and resource efficiency improvement of **30%**
 - CO₂ emissions decrease of **40%** (without considering the electricity generation and at steady state)
 - Decreased OPEX and CAPEX by **15%**
 - Allowing for a **-30% to +30%** energy input within RES fluctuations timeframes, without significant losses in specific energy efficiency

*EUR from 6 to 10
millions*

CE-SPIRE-03-2018: Energy and resource flexibility in highly energy intensive industries

- *Challenge: Adapt highly energy intensive industries operations to fluctuating energy supply, optimising energy streams, heat recovery and raw materials flows. Regional dimension.*
- *Scope:*
 - Technologies allowing **flexibility for raw materials**. Consider quality of the main products and by-products for valorisation
 - **Reduction, valorisation, re-use and recycling of by-products and waste streams** (solid, liquids and gaseous)
 - System, process modelling and **integration (up and down-stream)** improving energy and raw materials efficiency and flexibility, and minimising the impact on the environment
- *Impact:*
 - Cost reduction of the process of at least 10%
 - Improved process efficiency by at least 15% (re-utilisation of energy and/or material process streams)
 - CO2 emissions reduction by at least 5% and reduction of the environmental impact by at least 15% in terms of the main key performance indicators

CE-SPIRE-10-2018: Efficient recycling processes for plastic containing materials

- *Challenge:* The wide use of plastics generates a huge amount of plastic waste. Advanced recycling processes are essential to use this huge amount of heterogeneous material for the production of added value products and process streams.
- *Scope:*
 - Processes for the **production of recyclable materials containing plastics**
 - Integration with the relevant **value chains**. Meaning securing the supply of raw material streams and the involvement of the relevant actors
 - Flexibility in the **utilisation of heterogeneous plastic waste**, potentially use of bio-based materials and best valorisation of all components (e.g. fillers or fibres from composites)
- *Impact:*
 - Processing technologies utilising plastic waste as starting material for the production of added value products and chemicals (excluding fuels)
 - Decreased utilisation of primary fossil resources of at least 30% and CO₂ emission of 20%
 - The concept should utilise at least 70% of waste material including at least 40% of plastic waste

**EUR from 6 to 8
millions**

CE-SPIRE-04-2019: Efficient integrated downstream processes

- *Challenge: The development of novel technologies for upstream and downstream unit operations, as well as their better integration, to minimise inefficiencies and lead to resource and energy efficiency gains*
- *Scope:*
 - Intensified process technologies presenting **multistep upstream processes**, as well as **process analytical techniques (PAT)**
 - **Complex downstream operations, integrating different separation techniques and purification steps**
 - **Modularity and flexibility** of the solutions, as well as, potential for transition from batch to continuous operations
 - Increased productivity, purity and quality of products
 - Integration, replicability in different sectors, safety
- *Impact:*
 - **20% decrease in greenhouse gas emission**
 - **Increased in resource and energy efficiency by at least 20%**
 - **Novel modular and scalable integrated (upstream-downstream) pilot line technologies with 10% decrease in CAPEX and OPEX**

*EUR from 10 to 14
millions*

CE-SPIRE-05-2019: Adaptation to variable feedstock through retrofitting

- *Challenge: Keep long lifetime industrial facilities and equipment up to date from a technological and regulatory point of view.*
- *Scope:*
 - **Simulation models and decision support tools** for the production chain, including the detection of inefficiencies, to allow flexibility in terms of feedstock of variable composition
 - **Tools and methodologies** to streamline and support **retrofitting**
 - **Optimal operating input conditions**, indicators for their modification and replication
 - **Adapt the equipment** towards a larger number and more diverse feedstock
- *Impact:*
 - Increase resource and energy efficiency by at least 20%
 - Decrease GHG emissions by at least 30%
 - Decreased utilisation of fossil resources of at least 20%
 - Reduced OPEX by 30% and increased productivity by 20%
 - Effective dissemination through the development, by education/training experts, of learning resources with flexible usability

*EUR from 8 to 12
millions*

DT-SPIRE-06-2019: Digital technologies for improved performance in cognitive production plants

- *Challenge: Digitising the process industry to enable the autonomous operation of the system based on embedded cognitive reasoning*
- *Scope:*
 - **Online monitoring and innovative control technologies** (process performance, flexibility, maintenance needs, product quality)
 - **Digital retrofitting of existing assets**, holistic optimisation of operations, data-analytics, real-time capability, use role-specific representation of
 - **Other concepts: apply low-cost sensors** for on-line assessment of product quality and integration into process control; **robust optimisation methods** to distributed targeted process monitoring; simulation methods for the analysis, characterisation and study of systems for enhanced operations and decision-making combination of various forms of data with cognitive insight to optimise and enhance resources
- *Impact:*
 - Reduce CO₂ emissions (state-of-the-art)
 - Increase production performance by 20%

Deadlines 2018– 2019 /Indicative Budgets

Topic	Budget 2018 (M€)	Budget 2019 (M€)	Deadlines
CE-SPIRE-02-2018 CE-SPIRE-03-2018 CE-SPIRE-10-2018	Total: 97.5		31 Oct.17- 22 Feb. 2018
CE-SPIRE-04-2019 CE-SPIRE-05-2019		Total: 65.8	16 Oct.18- 21 Feb. 2019
DT-SPIRE-06-2019		32.9	16 Oct.18- 21 Feb. 2019

SPIRE NMBP topics are evaluated in single stage (full proposals to be submitted)

SPIRE Topics in SC3 & SC5, 2018-2019

- *CE-SC3-NZE-02-2018: Conversion of captured CO₂*
- *LC-SC3-RES-07-2019: Solar Energy in Industrial Processes*
- *LC-SC3-EE-06-2018: Business cases for industrial waste heat/cold recovery (Cost-benefit models for industrial waste heat/cold recovery)*
- *LC-SC3-EE-06-2019: Business cases for industrial waste heat/cold recovery (Symbiosis in industrial parks and clusters – non-technological barriers)*
- *CF-SC5-01-2018: Methods to remove hazardous substances and contaminants from secondary raw materials*
- *CE-SC5-04-2019: Building a water-smart economy and society*
 - a) Symbiosis between industry and water utilities*

LC-SC3-EE-6-2018: Business cases for industrial waste heat/cold recovery

TRL
from
4 to 8

Cost-benefit models for industrial waste heat/cold recovery

Challenge: Build business case for waste heat/ cold as a valuable resource for other industries and buildings/ District Heating and Cooling operators

Scope:

- Integrated cost-benefit simulation tools for financially viable solutions at recovering energy (waste heat or renewable surplus) in industrial sites/parks
- Flexible tools for different types of sites
- Characterization of processes and waste streams, barriers and opportunities (on the DHC side) and other variables (e.g., technology, infrastructure, administrative and legal costs, energy prices, demand)

IA
70%

Expected impacts:

- Holistic modelling of industrial waste heat/cold and/or surplus renewable energy from industrial or other sources
- Impact of various factors/variables on the cost-benefits
- Number of industrial sectors/sites/parks, public authorities, large private facilities and DHC operators with increased capacity
- Primary energy savings (GWh/year), investments in sustainable energy (million Euro) triggered, reduction of the emissions of CO₂ (tCO₂eq/year) and/or air pollutants (kg/year)

EUR from
3 to 4 millions

LC-SC3-EE-6-2019: Business cases for industrial waste heat/cold recovery

TRL
from
4 to 8

Symbiosis in industrial parks and clusters – non-technological barriers

Challenge: Improve energy efficiency of industrial parks districts and clusters by unlocking market potential and supporting demand and offer of high-quality energy services

Scope:

- Address legal issues in order to adapt regulatory and legal frameworks
- Take into account sustainability in time of the proposed symbiosis
- Ensure applicability of solutions to other industrial parks/business sectors

CSA
70%

Expected impact:

- Primary energy savings triggered (GWh/year)
- Investments in sustainable energy triggered (million Euro)
- Number of plant sites (within one industrial park) and number of industrial parks committed to energy cooperation
- Number of relevant stakeholders aware of and/or interested in implementing joint energy services
- Number of policies and legal frameworks created and/or adapted to facilitate energy cooperation

EUR from
1 to 2 millions

Deadlines 2018– 2019 / Indicative Budgets

Topic	Budget 2018 (M€)	Budget 2019 (M€)	Deadlines
CE-SC3-NZE-2-2018	12.0		15 May - 06 Sept 2018
LC-SC3-RES-7-2019		10.0	07 May -27 Aug 2019
LC-SC3-EE-6-2018	9.0		25 Jan - 04 Sept 2018
LC-SC3-EE-6-2019		10.0	24 Jan - 03 Sept 2019
CE-SC5-01-2018*	34.0		1 st stage 27 Feb 2018 2 nd stage 04 Sept 2018
CE-SC5-04-2019**		72.0	1 st stage 19 Feb 2019 2 nd stage 04 Sept 2019

* Call opens: 7 Nov 2017

** Call opens: 14 Nov 2017



HORIZON 2020

Thank you for your attention

Pre-published Work programme:

https://ec.europa.eu/programmes/horizon2020/sites/horizon2020/files/h2020-leit-nmbp-2018-2020_pre-publ.pdf

HORIZON 2020:

<http://ec.europa.eu/research/participants/portal/desktop/en/home.html>

Industrial technologies Research and Innovation:

http://ec.europa.eu/research/industrial_technologies/index_en.cfm