European

Information Day of the cPPPs

Brussels 16th October 2015

SPIRE in Horizon 2020
Calls 2016 in the Work Programme 2016-17

A joint presentation by
Project Officers of DG RTD, ENER & EASME

HORIZON 2020

Goals of the Call and SPIRE

The long term goals are:

- A reduction in fossil energy intensity of up to 30% from current levels by 2030.
- A reduction of up to 20% in non-renewable, primary raw material intensity compared to current levels by 2030.
- A reduction of greenhouse gas emissions by 20% below 1999 levels by 2020, with further reductions up to 40% by 2030.

Hence: more efficient use of resources (raw materials, water, etc.) and energy (including renewables), high-tech and eco-efficient production facilities and materials, and minimising and re-using waste.

The integration of relevant training/learning as well as appropriate business models is key to ensure subsequent market implementation and identify and remove potential barriers for cross sectorial technology transfer is expected.

SPIRE-01-2016: Systematic approaches for resource efficient water management systems in process industries

***Specific Objective:* Challenge the industrial water use paradigm**

- 12% of water supplies are devoted to industrial use in the EU;
- Significant amount of energy is consumed for industrial water treatments;
- Competitive- and high value added products cannot exist without efficient water management technologies;
- Progressive efficiency is fundamental for all actors concerned;
- Efficient water use closely linked to efficient use and re-use of resources i.e. energy, chemicals, raw materials and soils;
- As water is a multi-dimensional and scare element it has to be considered respectively.

SPIRE-01-2016: Systematic approaches for resource efficient water management systems in process industries

Scope:

TRL 5-7

- **Priority engagement**: *Optimisation* of industrial water uses
- *Combining* existing technologies (e.g. advanced- materials, processing and nano-technology) for enhanced sustainability in water treatment processes;
- Selective separation processes for specific industrial fluxes, and for recovery of valuable substances;
- *Adaptation of current- processes* and/or equipment to use alternative sources;
- Elaboration of alternative methods for cooling and/or heating
- Low energy water treatment by using renewable energy.

IA 100%

SPIRE-01-2016: Systematic approaches for resource efficient water management systems in process industries

Expected impact:

- 20% reduction of water use compared to 2015`s levels;
- 30% reduction of waste-water production compared to 2015`sproductions;
- min. 15% reduction of energy use compared to the sectorial habits in 2015;
- Application of less water intensive or zero water technologies and/or increasing of recycling (smaller Water Footprints);
- Novell sustainable solutions in water treatment technologies and their wide application in process industries;
- Decouple industrial production from fresh water use.

EUR 5-7 million

SMEs

SPIRE-02-2016

Plant-wide monitoring and control of data-intensive processes

Specific Objective:

- *All current plants in process industries have control systems managing their production processes. […] However, there is still a lack of **integration of local control systems** dedicated to unit processes into an **overarching real-time optimisation and scheduling system** controlling and monitoring the operations of the whole plant.*
- *This […] is especially challenging for production processes where monitoring involves the collection and evaluation of **large amounts of data**.*
- *Future plant monitoring and control systems will have to integrate **lower scale model based control frameworks into plant scale scheduling**, or even geographic and logistic optimisation tools.*
- *The generalisation of model based predictive control techniques to plant-wide and possibly site-wide monitoring and control should be developed using overall plant models, and optimised solutions should be demonstrated.*

SPIRE-02-2016

Plant-wide monitoring and control of data-intensive processes

Scope:

- ✓ **Extension of the model based control techniques** to the level of plant or site-wide control ;
- ✓ Integration of local control systems into an **overarching real-time** plant and/or site **optimisation and scheduling system**;
- ✓ Cross-sectorial transfer of the technologies developed;
- ✓ Model Based Predictive Control frameworks taking into account the **Operators Training Systems** in their design;
- ✓ Plant level LC management tools (integrated or possibly as a plug-in to the control system) and robustness of the real-time optimisation tools.
- ✓ Solutions should consider the **"data-intensive"** nature of the process chains ;
- ✓ Proof of concept in terms of at least one demonstrator should be delivered before the end of the project
- ✓ The project can make use of pre-existing commercially available plant optimisation and scheduling solutions.

RIA 100%

TRL 4-6

SPIRE-02-2016

Plant-wide monitoring and control of data-intensive processes

Scope:

- Expected impact:

  Compared to the current practice in the sector, projects should :

  1) decrease:

  - **On-site material handling time by 10%**
  - **Resource consumption by 10%**
  - **Global use of energy on-site by 10%**
  - **Green House Gases emissions by 10%**

  2) Strengthen the global position of European process industry through plant-wide and/or, if possible, site-wide process control.

  3) Contribute to standardisation activities.

EUR 4-6 million

SPIRE-03-2016 :

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

Specific Objective:

- Valorise biobased streams from various sources (e.g. lignocellulosic biomass, bio-waste streams) into high added value products, through the development of technologies for their efficient isolation, fractionation, purification and processing.

SPIRE-03-2016 :

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

Scope:

- Develop processing technologies for the recovery and/or primary or secondary processing of bioresources, yielding high added value streams and/or products.
- Wide pallette of potentially suitable technologies (e.g. chemo/thermo/ bio-catalytic).
- Demonstration of the proposed concepts in an industrially relevant environment (potentially already existing industrial scenario), showing their potential for integration in existing processes.
- Improved sustainability (based on LCA)
- Techno-economic analysis, showing viability of the concept.

IA
70%

TRL
5-7

SPIRE-03-2016 :

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

EUR 5-7 million

Expected Impacts:

- Lead to at least 30% reduction in utilisation of fossil resources
- Lead to at least 30% improvement in energy efficiency
- Lead to a decrease in CO_2 emissions of at least 30%

Benchmark for all: similar or commercially available processes

- The economic viability of the concepts should be demonstrated, as well as the contribution to the long term sustainability of the industrial sectors targeted.
- The proposal should provide a clear business case for the deployment of the solutions in industry.

SPIRE-04-2016

Industrial furnace design addressing energy efficiency in new and existing furnaces

Specific Objective:

- *Industrial furnaces with **higher performances, optimised resource and energy efficiencies and less pollutant emissions** are a major goal for combustion researchers, furnace producers and the process industries[…].*
- *[…]Another challenge in the coming years will be the use of **alternative energy sources** or hybrid heating systems for such applications. **Novel designs** based on new technical concepts, materials and different combustion routes and processes are key for new advanced furnaces and the retrofitting of existing ones.*
- *The development of a clear understanding of the process function, the reliability of the process information and **how the furnace interacts with the rest of the manufacturing process** will be paramount for the new generation of technologies for new and retrofitted industrial furnaces.*
- *To develop and to scale up new systems and equipment based **on new high temperature materials and advance protective coatings** is a real challenge and could contribute to great savings in energy.*

SPIRE-04-2016

Industrial furnace design addressing energy efficiency in new and existing furnaces

Scope:

- ✓ […] All aspects for the **construction of new furnaces or the retrofitting** of existing furnaces with more efficient and effective technologies. […] Effects on upstream and downstream processes linked to […] the heating systems.
- ✓ The **design methods** and compatible with legislation, compliance with codes and standards and all the related economic aspects[…]

All of the following areas:

- ✓ Use of **at least two different energy sources**[…]. Design has to take into consideration the type of feed and an optimised fuel consumption.
- ✓ **Prediction tools and computer simulation** development applied to the design process and performance prediction.
- ✓ **Interaction of the furnace with the rest of the manufacturing** process, including the effect on upstream and downstream processes. […]
- ✓ Use of **new and improved** high temperature/corrosion/wear resistance **materials** […] for high temperature applications.
- ✓ **Monitoring and control systems for** the SOx, NOx and CO **emission** of industrial furnaces

The proposals must include at least one **demonstrator** in an industry-relevant environment, for either new or existing furnaces.

RIA
100%

TRL
4-6

SPIRE-04-2016

Industrial furnace design addressing energy efficiency in new and existing furnaces

Expected impact:

Compared to the current practice in the sector:

- ***Reduce the energy consumption by at least 15%.***
- ***Reduce the operating costs by at least 15%.***
- ***Reduce NOx, SOx and CO emission by at least 25%.***
- ***Reduce Capex and Opex costs of the furnaces by at least 15%.***
- ***Clear business cases for the deployment of the solutions in industry.***

EUR 5-7 million

European Commission

SPIRE-05-2016

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

Specific Challenge:

- **Europe is in serious CO2 dichotomy:** large **emission of CO2-containing gases vs. need for additional carbon-based resources (linear carbon flows vs. cyclic flow management)** ;
- Green House Gas emissions make process industry **needs increasing for non-conventional natural resources and other alternatives** e.g. organic solid waste's carbon gas sources;
- **The challenge** is **to understand how to turn the different carbon sources into chemicals while keep the process economically feasible depending on the different energy price scenarios.**
- **Prices of CO_2 emissions are dropping significantly** (i.e. ETS) **while fossils from both renewable feedstock are highly volatile on world markets**. Subsequently, **there is an urgent need to forecast possible scenarios** for a sustainable use of carbon resources.

SPIRE-05-2016

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

Scope:

- There is a **strong interest to evaluate the novel technologies and solutions for the use of CO2/CO containing process gas & non-conventional fossil natural resources at production site level together with the economic feasibility.**
- It is also **required to compile information on and create awareness on the relative maturity and adaptability of technologies to the local situations**, with the aim to accelerate market adoption and replication of these solutions.

SMEs

CSA
100%

SPIRE-05-2016

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

Scope:

- Some of the targeted chemicals offer dual use as an intermediate and energy carrier. Therefore, **the proposed technology not only links CO_2-producing and intensive carbon sectors but addresses various high-volume applications and significant markets**.
- The **focus of the forecast study** should be **on the use of CO_2/CO containing process gases to produce high value added products** (e.g. fine chemicals and polymers).

EUR 0,25 – 0,5 million

European Commission

SPIRE-05-2016

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

Expected Impact:

- **New scenarios** for increased use of CO_2/CO containing process gases and non-conventional fossil natural resources as new feedstock depending on future fossil fuel and energy prices.
- **Strategies** to facilitate the use of primary fossil feedstock displacement (downstream consuming industry).
- **Future scenarios that enable new business models** improving competitiveness of participating industries based on the use of CO**2**/CO containing process gases and non-conventional natural resources as feedstock for the process industry.
- **Synergies by linking production sites** of emitting and downstream consuming industries.
- **New areas for SME**

SPIRE-06-2016

Business models for flexible and delocalised approaches for intensified processing

Specific Challenge:

- Match technological innovation with new business models which may support industry and cross-sector clusters as well as industrial parks, while allowing flexible and delocalised operations
- Address the barriers which prevent regionally or locally adapted solutions, with an emphasis on technical but also non-technological barriers, such as legal, regulatory or cultural ones.
- Allow positive interactions between actors
- Consider the influence of consumer trends on energy and resource systems to achieve sustainable paths

SPIRE-06-2016

Business models for flexible and delocalised approaches for intensified processing

Scope:

All of the following (if applicable):

CSA
100%

- Spatial and resource flexibility parameters to optimise activities interdependence and yearly fluxes between companies
- Integrated business model solutions for customer-driven supply chain management based on intensified processing.
- Design constraints for new decentralised locations
- Pinpoint the routes towards reduction of carbon footprint
- Design solutions linking designers and manufacturers to the supply-chain, promoting social inclusion and deploying local skills available
- Scenarios for local sourcing and supply for raw materials and energy sources

SPIRE-06-2016

Business models for flexible and delocalised approaches for intensified processing

EUR 250,000 -500,000

Scope:

- Evaluation of best use and practical cases for intensified processing,
- Research needs to achieve rapid deployment of the novel business solutions in particular consumer-targeted domains (+roadmap)
- All relevant supply-chain stakeholders to be considered
- SMEs playing an important role in the deployment and application
- The needs of SMEs as part of the supply-chain should be addressed.

Estimated EU contribution between EUR 250000 and 500000. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

SPIRE-06-2016

Business models for flexible and delocalised approaches for intensified processing

Expected Impact:

- Return of at least 5% of the total manufacturing capacity, within 5 years after the end of the study.

- In medium term:
  - **-10 % carbon footprint through less stock, less waste and less transportation**
  - -15% raw material via creation of networks
  - **Scenarios for proper locations considering legal and social hampering factors**
  - **> business opportunities on local scale**
  - **> customers/users involvement in the business models solutions**

CIRC-01-2016-2017 Systemic, eco-innovative approaches for the circular economy: large-scale demonstration projects

Specific Challenge (2016–17):

- **increasing resources constraints**
- gains in **resource efficiency** by replacing current **linear** models with **circular models** of **production and consumption**
- adopting a **systemic** approach to **eco-innovation** encompassing the **whole value and supply chains** and engaging **all actors involved** in such chains

CIRC-01-2016 a)

Design for circular value and supply chains

IA
70%

Scope:

- **Large scale demonstration projects** testing and showcasing **circular economy solutions** based on **re-design of value and supply chains**
- At appropriate scale going **beyond a single production plant**
- Should entail the recovery, recycling and/or re-use of resources and energy flows, including by cross-sectorial symbiosis
- to contribute to the **SPIRE PPP Roadmap**

TRL
5-7

CIRC-01-2016 a) Design for circular value and supply chains

Expected impact (2016):

To make measurable impact in the **medium term** to:

- improving the **efficient use of resources**, the **optimisation of production**, and **reducing the generation of residual waste**
- the creation of **business opportunities**, **exploiting EU eco-innovative solutions**, and demonstrating their economic, social, and environmental **sustainability**
- **evidence-based knowledge** for enabling framework conditions that facilitate a transition to the circular economy in the EU.

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CIRC-01-2016 a) Design for circular value and supply chains

Deadlines

Stage 1 *08-03-2016 @ 17:00:00 (Brussels)*

Stage 2 *06-09-2016 @ 17:00:00 (Brussels)*

Type of action: *Innovation actions*

IA
70%

Indicative budget: *60 M€*

Appropriate EU contribution/action: 7-10 M€

Research and Innovation

SC3- WP 2016-2017- Energy efficiency

*1. responds to **policy** challenges & priorities :*

- *Energy Efficiency, a key dimension of the Energy Union:*
  - *existing **legislation implementation** and **review** e.g. **Energy Efficiency Directive***
  - *EU Strategy for **Heating and Cooling***

*2. widely addresses efficiency in **heating and cooling***

- *Comprehensive approach to **waste heat** recovery and reuse*

SPIRE PPP EE17-2016-2017

Valorisation of waste heat in industrial systems

Objective:

- Improve energy efficiency of large industrial systems, responding to process industry needs as identified in SPIRE Roadmap

SPIRE PPP EE17-2016-2017

Valorisation of waste heat in industrial systems

Scope:

- Two different actions:
  - Innovative technologies for efficient recovery of waste heat in large industrial systems, designing, building, testing and demonstrating new processes/components

OR

  - Innovative solutions for energy symbiosis between industries or plants inside large industrial parks for valorisation of waste heat
- Specific issues to be addressed for each of them
- Solutions to be adaptable to various types of industrial processes and to be validated by full scale demonstration in real production conditions in industrial facilities

IA
70%

TRL
5-7

SPIRE PPP EE17-2016-2017

Valorisation of waste heat in industrial systems

Impact:

Common impacts for the two different actions:

- Recovery of at least 40% heat
- Measurable substantial primary energy savings, clearly quantified and substantiated and consequent reduction of CO2 emissions

IA
70%

Specific impacts:

- For actions proposing innovative technologies for waste heat recovery: Reduction of energy cost expected to lead to a demonstrated advancement in competitiveness, expanding portfolio of energy sources and technologies
- For actions proposing innovative solutions of energy symbiosis: Cost-saving optimisations of energy and resources supply and demand

TRL
5-7

LCE 25 Utilisation of captured CO2 as feedstock for the process industry

Specific Objective:

- Demonstration, in the relevant environment and scale, of the technical and economic feasibility of novel and environmentally friendly processes for CO2 conversion to high-volume added-value products such as chemicals and/or fuels.

LCE 25 Utilisation of captured CO2 as feedstock for the process industry

Scope:

- CO2 from flue gas of fossil fuel power plants and/or from energy intensive industries e.g., cement, steel…
- Address innovative processes to produce high-volume added value products from CO2
- Consider the energy balance, the CO2 abatement potential (in terms of time-scale and volume)
- Consider process sensitivity to flexible (intermittent) operation
- Include Life-Cycle-Assessment, appropriate business model and measures to support market up-take

RIA
100%

TRL
4-7

LCE 25 Utilisation of captured CO2 as feedstock for the process industry

Expected impact:

- Reduction of the emissions of greenhouse gases on full LCA basis
- Significant decrease of the cost of CCU vs. CCS
- Improved energy and resource intensity with respect to conventional manufacturing of the same product.

RIA
100%

TRL
4-7

European Commission

Differences between LCE 25 and SPIRE 08

LCE 25	SPIRE 08
CO2 emitted by the power or process industry	CO2 only from process industry
Only CO2	CO2 and CO
High volume value added products such as chemicals and fuels	Lower volumes; fuels excluded
Consider energy balance and CO2 abatement potential	-
Consider flexible intermittent operation	-
TRL from 5-6 to 6-7	TRL 4-6

Budgets and Deadlines: Summary

Call	Budget	Deadline date
SPIRE-01-2016 SPIRE-02-2016 SPIRE-03-2016 SPIRE-04-2016 SPIRE-05-2016 SPIRE-06-2016	74 M€	21-01-2016 @ 17:00:00 (Brussels)
CIRC-01-2016	60 M€	1st stage: 08 March 2016 @ 17:00:00 (Brussels) 2nd stage: 06 September 2016 @ 17:00:00 (Brussels)

Budgets and Deadlines: Summary

Call	Budget	Deadline Date
LCE-25-2016	10 M€	16-03-2016 @ 17:00:00 (Brussels)
EE-17-2016 together with EE-10-2016	16 M€	21-01-2016 @ 17:00:00 (Brussels)