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Sustainable Process Industries in Horizon 2020
Work Programme 2014

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Sustainable Process Industries
Call Objectives

- Develop more flexible technologies, which are scalable and adaptable to different sectors of the process industry

- Develop novel technologies to reduce the footprint of industrial processes:
  - Reduce the utilisation of Energy & Resources
  - Allow the increased utilisation of renewable feedstocks in the process industry
  - Improve the recovery and re-processing of waste streams (less waste)

- R&I to integrate & demonstrate innovative process technologies in:
  - New technologies that can be integrated in the existing plants, assuring prompt industrial deployment
  - Improved industrial downstream processing operations
  - New paradigms for the utilisation of biomasses in the process industry

- Promoting cross-sectorial cooperation accross existing value chains and establishing new ones
Sustainable Process Industries Call Objectives

- The SPIRE call will also contribute to the development of tools for the assessment of sustainability in the process industry in terms of resource and energy efficiency of industrial processes.

- SPIRE with its strategic objectives and unique blend of industrial domains, is strongly relevant for several initiatives in H2020. The SPIRE objectives are fully aligned with those of several Societal challenges, such as:
  
  - Societal challenge 3: Secure, clean and efficient energy
    Energy Efficiency Call - Section Industry and products - To deliver innovative, affordable and applicable technologies for energy efficiency in the process and manufacturing industry
    Competitive Low-Carbon Energy Call – innovative renewables and fuels, smart grids, energy storage, CCS, unconventional fossil fuels, flexible power plants
  
  - Societal challenge 5: Climate action, resource efficiency and raw materials
    Waste CALL- A smart economy must minimise the production of waste and reuse waste as a resource while striving to move towards a near-zero waste society.
Application of the Technology Readiness Levels

Where a topic description refers to a TRL, the following definitions apply, unless otherwise specified:

- TRL 1 – basic principles observed
- TRL 2 – technology concept formulated
- TRL 3 – experimental proof of concept
- TRL 4 – technology validated in lab
- TRL 5 – technology validated in relevant environment (industrially relevant environment in the case of key enabling technologies)
- TRL 6 – technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies)
- TRL 7 – system prototype demonstration in operational environment
- TRL 8 – system complete and qualified
- TRL 9 – actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies; or in space)
## Types of action
(see the general annex for further information)

| Research and Innovation Actions (RIA) | • Activities aiming to **establish new knowledge and/or to explore the feasibility of a new or improved technology, product, process, service or solution**.  
• They may include **basic and applied research, technology development and integration, testing and validation on a small-scale prototype in a laboratory or simulated environment**.  
• Projects may contain closely connected but **limited demonstration or pilot activities** aiming to show technical feasibility in a near to operational environment.  
• Funding rate: **100%** |
| --- | --- |
| Innovation Actions (IA) | • Activities directly aiming at **producing plans and arrangements or designs for new, altered or improved products, processes or services**. They may include **prototyping, testing, demonstrating, piloting, large-scale product validation and market replication**.  
• Funding rate: **70%** (except for non-profit legal entities, where a rate of 100% applies) |
| Coordination and support actions (CSA) | • Actions consisting primarily of **accompanying measures** such as standardisation, dissemination, awareness-raising and communication, networking, coordination or support services, policy dialogues and mutual learning exercises and studies, including design studies for new infrastructure and may also include complementary activities of strategic planning, networking and coordination between programmes in different countries.  
• Funding rate: **100%** |
SPIRE PPP in Work Programme 2014-15

SPIRE 1: Integrated Process Control

SPIRE 2: Adaptable industrial processes allowing the use of renewables as flexible feedstock for chemical and energy applications

SPIRE 3: Improved downstream processing of mixtures in process industries

SPIRE 4: Methodologies, tools and indicators for cross-sectorial sustainability assessment of energy and resource efficient solutions in the process industry

SPIRE 5: New adaptable catalytic reactor methodologies for Process Intensification


SPIRE 7: Recovery Technologies for Metals and other Minerals

SPIRE 8: Solids Handling for Intensified Process Technology
SPIRE PPP in Work Programme 2014-15

**SPIRE 1: Integrated Process Control**

**SPIRE 2:** Adaptable industrial processes allowing the use of renewables as flexible feedstock for chemical and energy applications

**SPIRE 3:** Improved downstream processing of mixtures in process industries

**SPIRE 4:** Methodologies, tools and indicators for cross-sectorial sustainability assessment of energy and resource efficient solutions in the process industry
SPIRE PPP in SC3 Work Programme 2014-15: Secure, clean and efficient energy

CALL – ENERGY EFFICIENCY
C - Industry and products
EE 18 2014/2015: 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

CALL – COMPETITIVE LOW-CARBON ENERGY
LCE 2 – 2014/2015: Developing the next generation technologies of renewable electricity and heating/cooling
Subtopic g. Renewable Heating and Cooling:
• Solar cooling systems
• Solar heating for industrial processes
SPIRE PPP in SC 5 Work Programme 2014-15: Climate action, environment, resource efficiency and raw materials

Call- Waste: A Resource to Recycle, Reuse and Recover Raw Materials

WASTE-1-2014: Moving towards a circular economy through industrial symbiosis
SPIRE 1: Integrated Process Control

Specific Objective:

Fast in-line data collection and data treatment techniques for improved "near real-time" closed-loop control concepts allowing an integrated economic, ecological and safety optimisation of the processes.

Scope (see call text):

Novelties in:

- **Sensor technologies** (fast in-line, dynamic information, spatially resolved information, sensors for intensified processes, ...)
- **Process data treatment** (dynamic info, spatially resolved info, data management for optimisation, ...)
- **Process data mining and process knowledge extraction** (optimisation, ...)

Research and Innovation
SPIRE 1: Integrated Process Control

**Scope (see call text):**

R&D to address:

- Miniaturised and cross sectorial application of PAT & PPMT
- Methodologies for extensive integration of control systems
- New (soft-)sensors and sensing concepts, swarm sensors, disposable sensors,...
- Control strategies using integrated and validated PAT data
- Life cycle management

**Expected Impact (see call text):**

- Improvement of real-time measurement of properties of process streams, and of European PAT and Control technologies
- Improved process operation (efficiency, sustainability, reliability, safety, monitoring, resource and energy efficiency, GHG)
SPIRE 2: Adaptable industrial processes allowing the use of renewables as flexible feedstock for chemical and energy applications

Specific Objective:
Develop technologies able to support a significant increase in the utilisation of biomasses and/or re-processing of residues and waste gases in the Process Industry

Scope I:
- Development of integrated systems for biomass, residues and waste gas conversion, including downstream equipment.
- Provide significant increase in the utilisation of renewables in industry and re-processing of residues and of waste gas
- Lead to new streams suitable for further industrial processing for production of chemicals and/or fuels
SPIRE 2: Adaptable industrial processes allowing the use of renewables as flexible feedstock for chemical and energy applications

Scope II: R&D to address:

- Mobile, Flexible and Scalable technologies, allowing (pre-)processing of biomass, residues, waste gases
- Solution should be able to cope with the fluctuating nature (in availability and quality) of renewables
- Business feasibility of the technologies
- LCA and LCC analysis
- The technologies proposed should allow the processing of significant amount of biomass, residues and waste gases
- Substantial demonstration activities are expected
- Desirable: Multi sectorial approach and replicable methodology
SPIRE 2: Adaptable industrial processes allowing the use of renewables as flexible feedstock for chemical and energy applications

Expected Impact (see call text):

- The technologies proposed should allow a 30% decrease in fossil resources utilisation compared to current practices
- Provide opportunity for increased utilisation of renewables as feedstock for chemicals and fuels production
- Contribute to lowering industrial GHG emissions
- The technologies proposed should provide opportunity for integration in the current industrial landscape
- The concepts should provide direct or indirect impact on rural areas

Significant SME participation is encouraged
SPIRE 3  Improved downstream processing of mixtures in process industries

Specific Challenge:

The aim is to provide innovative solutions for downstream processing, advance in the integration of different separation techniques into complex hybrid units and provide tools for the design of such units.

Scope (I):

Important aspects that should be taken into considerations are:

• Compatibility with continuous processes and support for the transition from batch processes to more efficient and reliable continuous operations (where relevant).
SPIRE 3  Improved downstream processing of mixtures in process industries

Scope (II):

- Reduction of production costs and time to market by providing tools for process and separation unit design and optimisation.
- Significant improvements in energy and resource efficiency.
- Significant reduction in greenhouse gas emissions.
- Improvement in safety of the work environment.
SPIRE 3  Improved downstream processing of mixtures in process industries

*Expected Impact:*

- Novel and cost effective separation and fractionation technologies applicable to the process industry.
- Increasing the resource and energy efficiency for the process industries by at least 20% while leading to a significant decrease in greenhouse gas emission.
- Strengthening the competitiveness of the European industry developing both engineering know-how as well as economically sustainable industrial processes leading to shorter time to process/market, and higher production capacity.
**SPIRE 4:** Methodologies, tools and indicators for cross-sectorial sustainability assessment of energy and resource efficient solutions in the process industry

*Specific Objective:*

Increase the European knowledge base related to applied sustainability assessment tools, methodologies, indicators and to overcome the bottlenecks for cross-sectorial take-up and further development in the process industry.

*Scope (I):*

The support action should involve a study across multiple sectors in the process industries considering all aspects of sustainability assessment along the whole product life cycles with regard to resource and energy efficiency.

The study should include:

- A comparative overview of currently used methodologies, tools, indicators and practices in different sectors
- A selection of the most appropriate solutions, based on their demonstrated robustness
SPIRE 4: Methodologies, tools and indicators for cross-sectorial sustainability assessment of energy and resource efficient solutions in the process industry

Scope (II):

The study should include:

• An overview of the related opportunities as well as the bottlenecks towards further development and cross-sectorial replication/transfer
• Definitions of the required steps to accelerate further uptake of resource efficiency indicators over the value chains
• Recommendations on the most suitable tools for management and decision making
• Recommendations for further research and development projects in the field of sustainability assessment
• Collaboration with standardisation

Expected Impact:

• Identification of best practices for cross-sectorial environmental, social and economic sustainability indicators
• Identification of research needs within the process industry
• Identification of cross-sectorial tools for management and decision making within the process industry
SPIRE 2014 call details:

**Deadline Date (single stage):**

✓ 20-03-2014 @ 17:00:00 (Brussels)

**Total Budget for the 2014 call: €60,3 million**

**Type of action:** Research and Innovation actions

**Recommended EU contribution/project:** €3-6 million

**Type of action:** Innovation actions

**Recommended EU contribution/project:** €6-10 million

**Type of action:** CSA

**Recommended EU contribution/project:** €250,000-500,000
EE 18: 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

Specific Objective:

Explore heat recovery potential for reducing energy use in industrial processes and in heating and cooling by increasing the cost-effectiveness of waste heat recovery and developing practical integration solutions.

Scope (see call text):

Research and demonstration on the integration of innovative technologies, technical and operational approaches to recover waste heat from:

- Several industrial processes and sectors,
- Material flows originated in industrial processes (e.g. waste streams, by-products, intermediates),
- Plant perimeters and to transform it into useful energy forms.
EE 18: 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

**Scope (see call text):**

R&D to address:

- Development of technical, organisational and operational solutions addressing heat recovery.
- Integration and optimization of the heat chain.
- Evaluating waste heat recovery potentials internally and externally;
- Adaptable heat recovery modules for various processes, sources, equipment, sites and operation.
- Advanced control and operation techniques, automation and safety measures and protocols.
- Advanced co-generation and trigeneration, energy cascading;
- Validation in real production conditions in demo sites where pilot systems are tested in industrial facilities.

**RIA 100%**

**TRL 4-7**
EE 18: 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

*Expected Impact (see call text):*

- **Adaptable** technical, organisational and operational modules leading to internal and external heat recovery.
- Demonstration of *economically viable solutions* that recover at least 15% of process heat.
- **Easy integration** with current industrial landscape.
- **Turn-key solutions** with a pay-back time appropriate for industrial applications.
- **Reduce perceived technical and business risks** and promote widespread uptake of technical solutions with a high impact in several industrial sectors - *Large replication potential.*
EE 18: 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

Deadline Dates (single stage):

✓ 20-03-2014 @ 17:00:00 (Brussels)
✓ 09-12-2014 @17:00:00 (Brussels)

Type of action: Research and Innovation actions

Budget: €8,000,000 per call

Recommended EU contribution/project: €3-4 million
LCE 2: Developing the next generation technologies of renewable electricity and heating/cooling

Subtopic g. Renewable Heating and Cooling

LCE 2 – 2014

*Topic under Renewable Heating and Cooling:*

Solar cooling systems

LCE 2 – 2015

*Topic under Renewable Heating and Cooling:*

Solar heating for industrial processes

The subtopics are linked to SPIRE with a footnote: Projects selected under this heading might be considered contributing to the objectives of the SPIRE PPP depending on the centre of their activities.
LCE 2: Developing the next generation technologies of renewable electricity and heating/cooling
Subtopic g. Renewable Heating and Cooling

Specific Challenge:
Enhance performance and reliability of solar cooling systems, reduce complexity, contribute to cost reduction.

Scope (see call text):
LCE 2 – 2014: Solar cooling systems

Solar cooling systems reliability remains uncertain causing high installation and operation costs and hampering acceptance. Innovative solutions are needed to reduce the complexity of the installation, to improve components performance and reliability, and to ensure cost reductions.

Technical issues, synergies between technologies, regional approaches, socio-economic and environmental aspects from a life-cycle perspective need to be appropriately addressed where relevant.
LCE 2: Developing the next generation technologies of renewable electricity and heating/cooling
Subtopic g. Renewable Heating and Cooling

Specific Challenge:
Develop innovative concepts, processes and technologies for solar heating applications in industrial plants.

Scope (see call text):
LCE 2 – 2015: Solar heating for industrial processes

The potential benefit of using solar heat above 200°C in industrial processes has been already acknowledged. Innovative concepts, processes and technologies for these applications are needed which can be easily integrated into existing industrial plants and processes.

Technical issues, synergies between technologies, regional approaches, socio-economic and environmental aspects from a life-cycle perspective need to be appropriately addressed where relevant.
LCE 2: Developing the next generation technologies of renewable electricity and heating/cooling
Subtopic g. Renewable Heating and Cooling

**Expected Impact:**

- Significantly increased technology performance.
- Reducing life-cycle environmental impact.
- Increasing the attractiveness of renewable heating and cooling technologies by improving cost-competitiveness, reducing complexity and increasing reliability.
- Strengthening the European industrial technology base, thereby creating growth and jobs in Europe.
- and others (see call text).
LCE 2: Developing the next generation technologies of renewable electricity and heating/cooling

Subtopic g. Renewable Heating and Cooling

Budget for LCE 2 + LCE 11: € 60 million (2014) and € 59 million (2015), of which max. 25% may be dedicated to the renewable heating and cooling technology area.

The areas under LCE2 and LCE 11 are: 1) photovoltaics, 2) concentrated solar power, 3) wind energy, 4) ocean energy, 5) hydropower, 6) deep geothermal energy, 7) renewable heating and cooling, 8) biofuels, 9) alternative fuels.

→ Budget for LCE 2, Subtopic g. Renewable Heating and Cooling:

- 2014: up to € 15 million
- 2015: up to € 14,75 million

Projects will be selected based on merit. Thus, it is possible that no proposals are funded under some sub-topics.

Recommended EU contribution/project: € 3-6 million
LCE 15: Enabling the decarbonisation of the fossil fuel-based power sector and energy intensive industry through CCS

Specific Challenge:
The application of CCS (including Bio-CCS) to industrial sectors other than power (e.g. steel, cement, lime, chemical industry, refining) is expected to deliver half of the global emission reduction from CCS by 2050.

Scope (see call text):
Proposals should aim at integrating CCS in the best possible way so as to optimise the use of energy in the capture process, minimise process efficiency losses, achieve a suitable CO2 purity for transport and storage, and maintain the quality of the industrial end product. Piloting under realistic conditions is required to significantly lower the energy penalty and capture costs.

Collaboration with industrial end users is essential. Knowledge sharing as well as early and sustained engagement of the local community is essential.
LCE 15: Enabling the decarbonisation of the fossil fuel-based power sector and energy intensive industry through CCS

Expected Impact:

- Expand the available options for CCS and provide a stepping stone to its wider deployment
- Contribute to accelerating the development and deployment of CCS through enhanced cooperation between stakeholders and Member States

Ring-fenced budget for LCE 15, 16 and 17

- 2014: 33M€
- 2015: 35 M€

Recommended EU contribution per project: 4-9 M€
LCE 2 & 15:

Publication date: 11-12-2013

Deadline dates (two stage):

2014

✓ Stage 1: 01-04-2014
✓ Stage 2: 23-09-2014

2015

✓ Stage 1: 03-09-2014
✓ Stage 2: [03-03-2015]*

*The deadlines provided in brackets are indicative and subject to a separate financing decision for 2015.

Type of action: Research and Innovation Actions
WASTE-1-2014: Moving towards a circular economy through industrial symbiosis

Challenge/scope

- Demonstrating large-scale systemic innovations with the aim of turning waste from one industry into useful feedstock for another one
- Developing reliable and harmonised data for the estimation of composition, patterns of supply and quantity of wastes generated
- Demonstrating innovative processes and services, that increase product life-spans, enable product and material reuse, recycling, recovery, and reduce generation of waste along product chains
- Coordination between a variety of stakeholders and an increased awareness of producer responsibility
WASTE-1-2014: Moving towards a circular economy through industrial symbiosis

Expected Impact (see call text):

- Reduction of waste generation and resource use
- Gains in productivity, in material and energy efficiency, with reduction of greenhouse gas and other pollutants emissions
- Contribution to standards and best available and emerging techniques
- More sustainable consumption behaviour and lifestyle
- Support to the implementation of SPIRE PPP roadmap

IA 70%
WASTE-1-2014: Moving towards a circular economy through industrial symbiosis

Publication date: 2013-12-11

Deadline Dates:
Stage 1 08-04-2014 @ 17:00:00 (Brussels)
Stage 2 16-09-2014 @17:00:00 (Brussels)

Type of action: Innovation actions
Budget: €44,000,000
Recommended EU contribution/project: €8-10 million
For further Information ...

- **FP7 Research Themes and Call:**
  [ec.europa.eu/research/participants/portal](http://ec.europa.eu/research/participants/portal)

- **Horizon 2020 documents:**

- **Information on the Research PPPs:**
  [ec.europa.eu/research/industrial_technologies](http://ec.europa.eu/research/industrial_technologies)
More info:

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