



Sustainable Process Industry through
Resource and Energy Efficiency

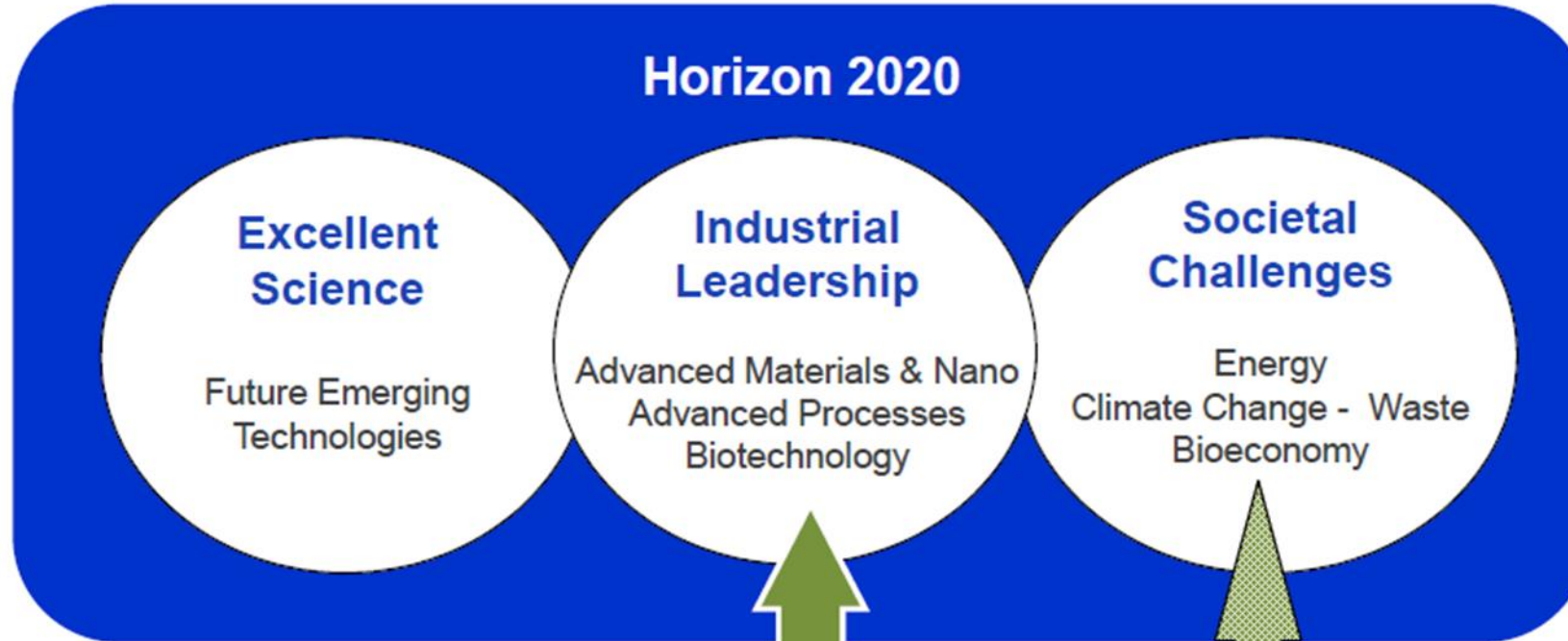


BBI & SPIRE Infoday
Lisbon, 24 May 2018

SPIRE
**Other support measures for
bio-based industries**

Àngels Orduña Cao
A.SPIRE Executive Director

SPIRE cPPP in Horizon 2020



1st cPPP for Process Industry

Unique cross-sectorial approach

900M€ of H2020 Budget

The value chain

Raw Materials



Process Industry:

Physical transformation and formulation of raw materials using continuous and batch processes into materials with new properties and functionalities

Discrete Manufacturing:



Strengths

- 6.3 million direct jobs
- 19 million indirect jobs
- 450,000 enterprises
- €1,8 trillion/y turnover
- 4.7% OF EU28 GDP

Challenges

Resources & energy
Competitiveness
High-risks/long-term investments

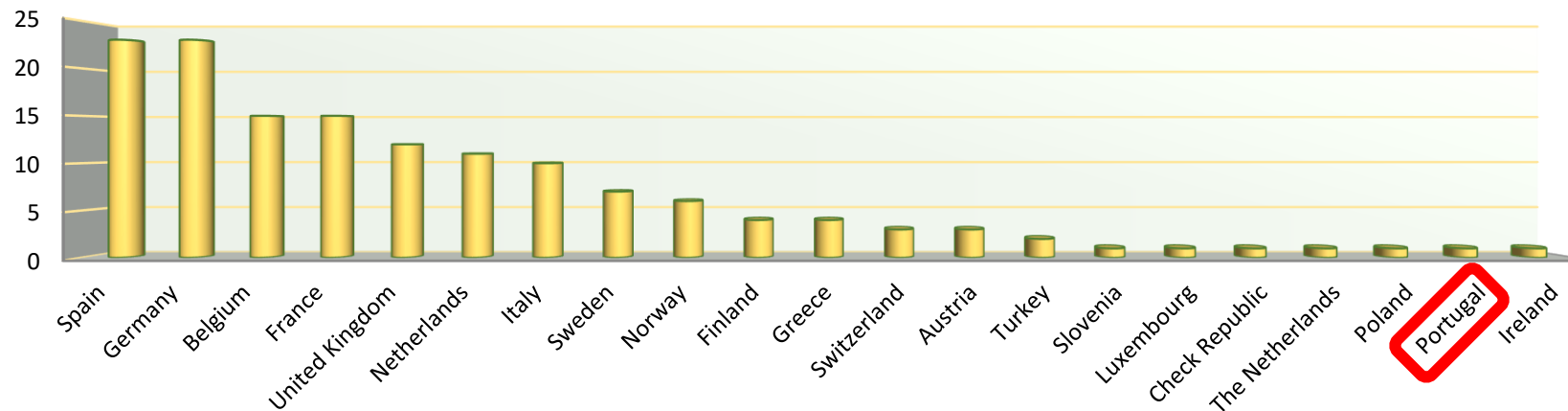
SPRE

Membership



Membership type	
Associate member	11
Associations	15
Industry member (intermediate)	2
Industry member (large)	29
Industry member (medium)	3
Industry member (small)	13
Research member (large)	41
Research member (small)	33
Total	147

A.SPIRE membership by countries

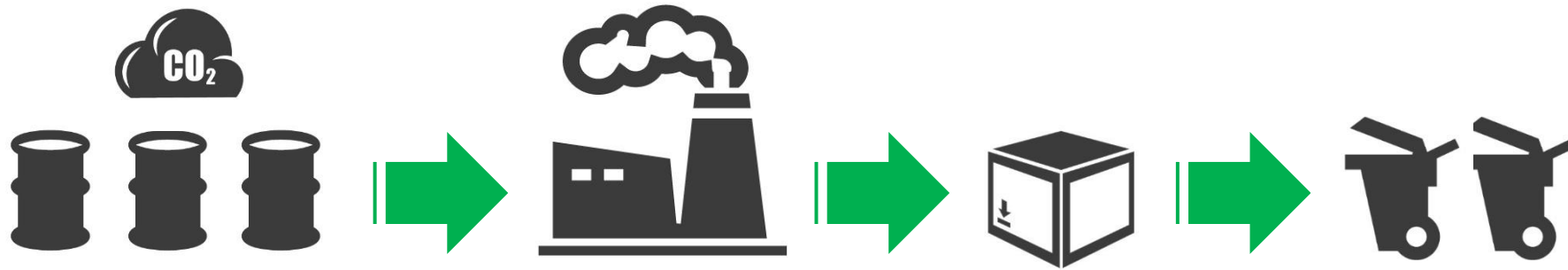


Membership



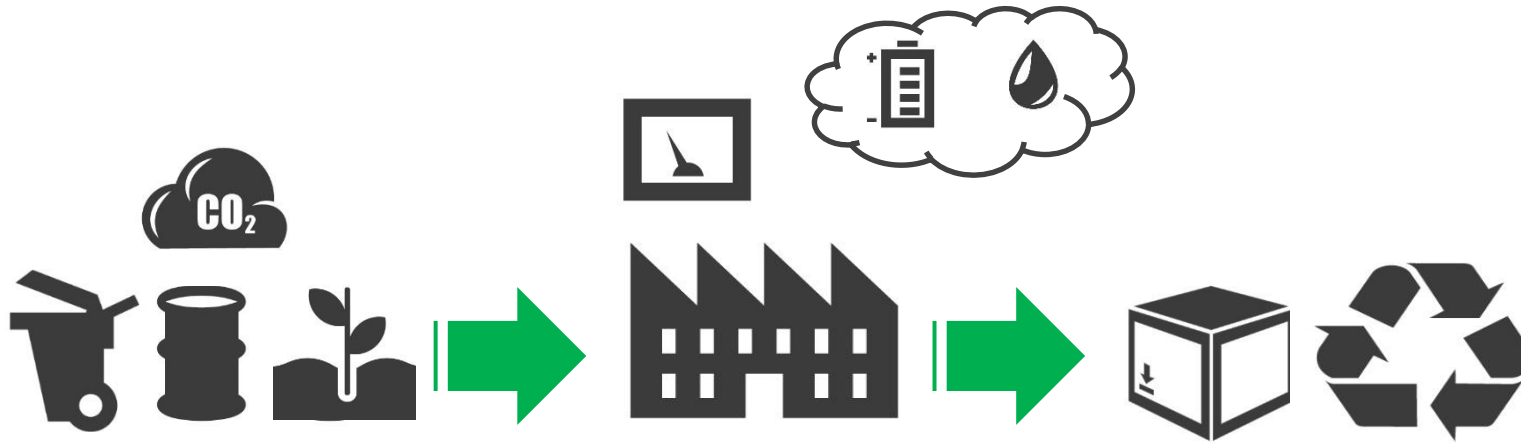
SPIRE 2030 roadmap

FROM TODAY'S SCENARIO:



SPIRE 2030 roadmap

TO TOMORROW's SCENARIO:



- **(Re)invent** feedstock (waste, bio, CO₂)
- **Reduce** emissions; **(re)invent** energy & resource management concepts, incl. industrial symbiosis
- **Introduce** digital devices for better monitoring and control
- **(Re)invent** materials for optimised processes
- **(Re)invent** processes & materials with a significantly increased impact on resource & energy efficiency down the value chain: transport, housing
- **Reduce** waste & **(re)invent** technologies for valorisation of waste streams within and across sectors



SPIRE EXPECTED IMPACTS

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):

- **Up to 30% less fossil energy intensity**
- **Up to 20% reduction in non-renewable, primary raw material intensity**
- **Up to 40% less CO₂-equivalent footprints**
- **10 new types of high-skilled jobs**

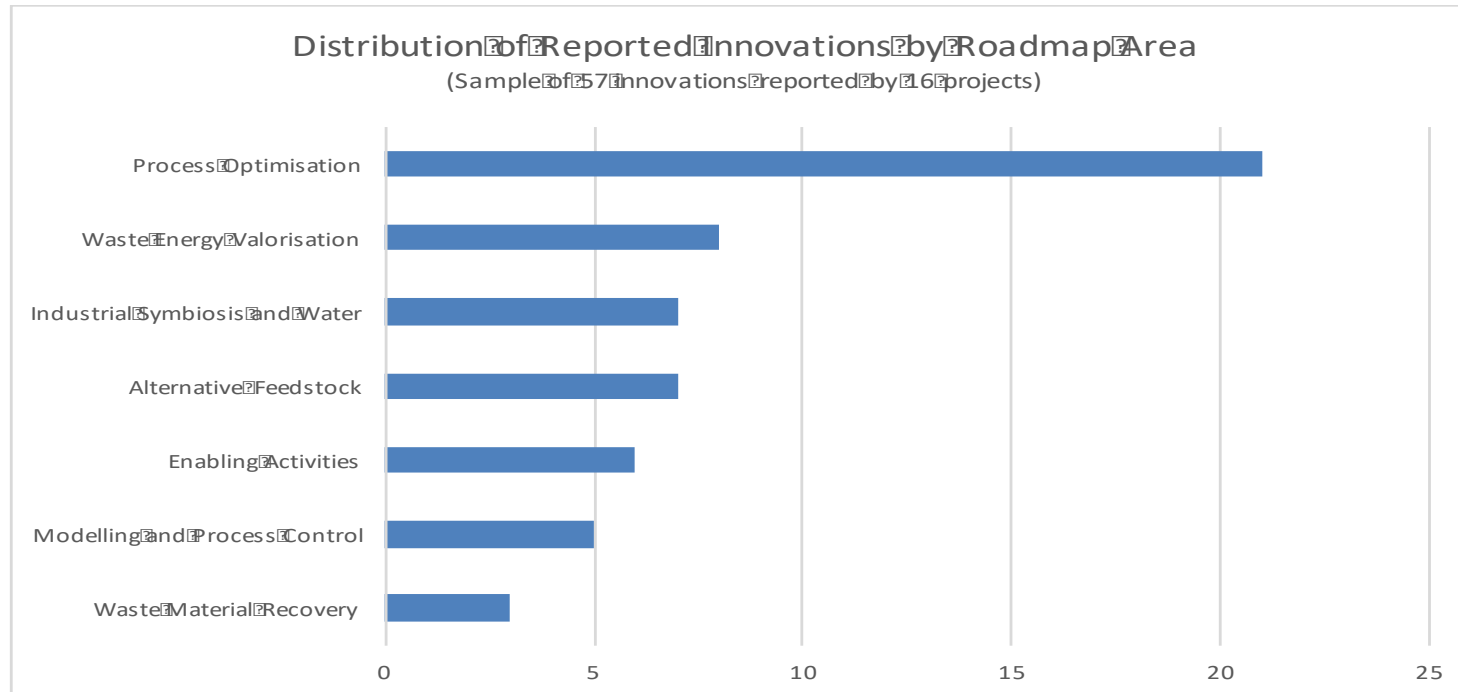


UPDATE ON PROGRESS MONITORING REPORT 2018

PRELIMINARY CONCLUSIONS ON COMMON KPIS

KPI 1: significant innovations

- Estimated: 211-327 innovative systems and technologies under development
(1st draft; Survey ongoing)

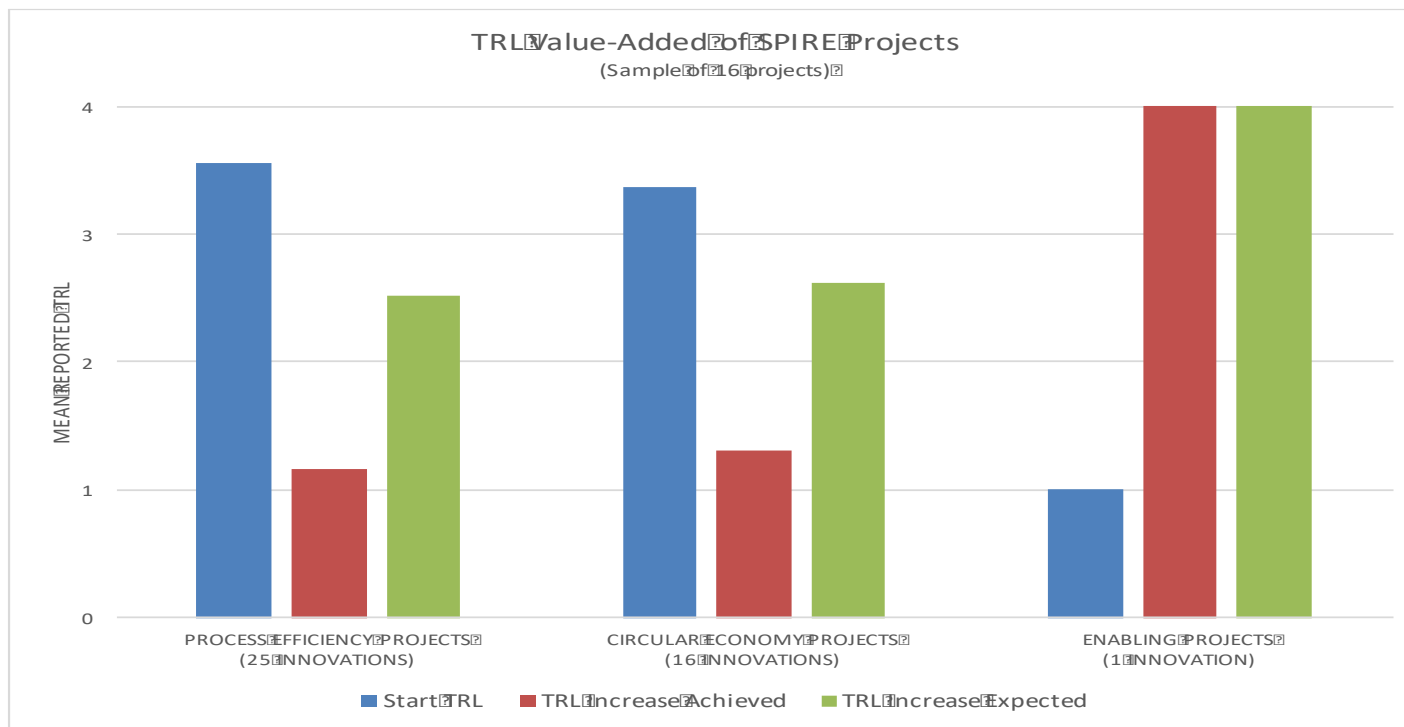


UPDATE ON PROGRESS MONITORING REPORT 2018

PRELIMINARY CONCLUSIONS ON COMMON KPIS

KPI 1: significant innovations

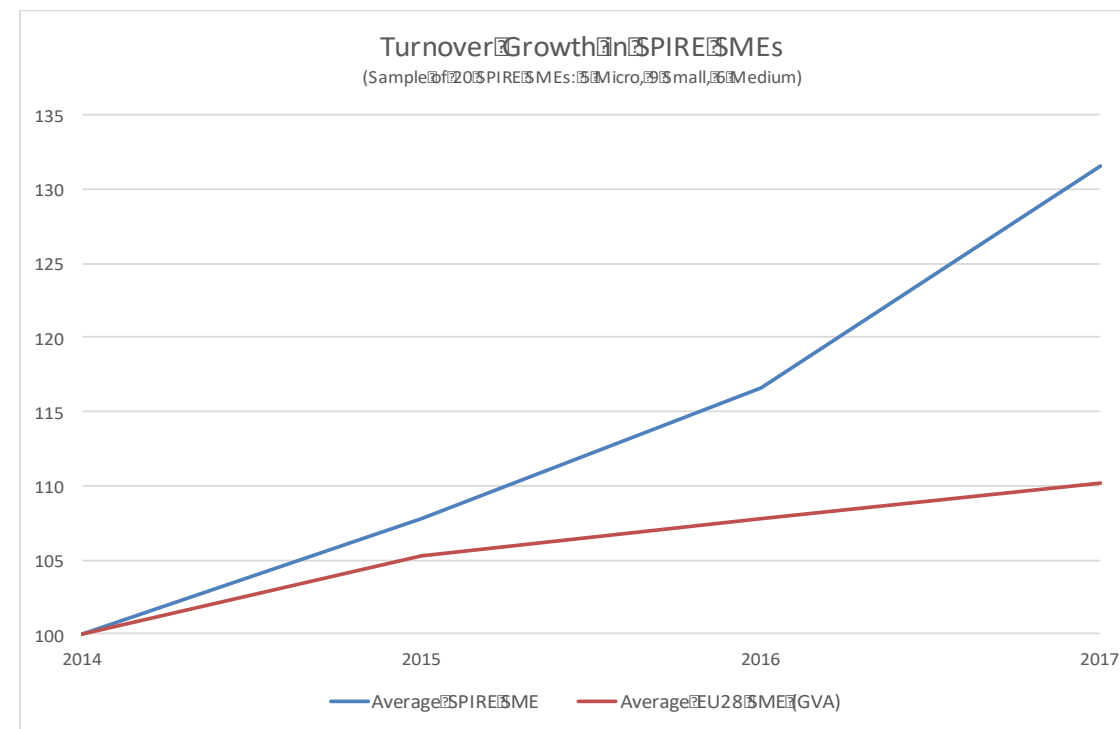
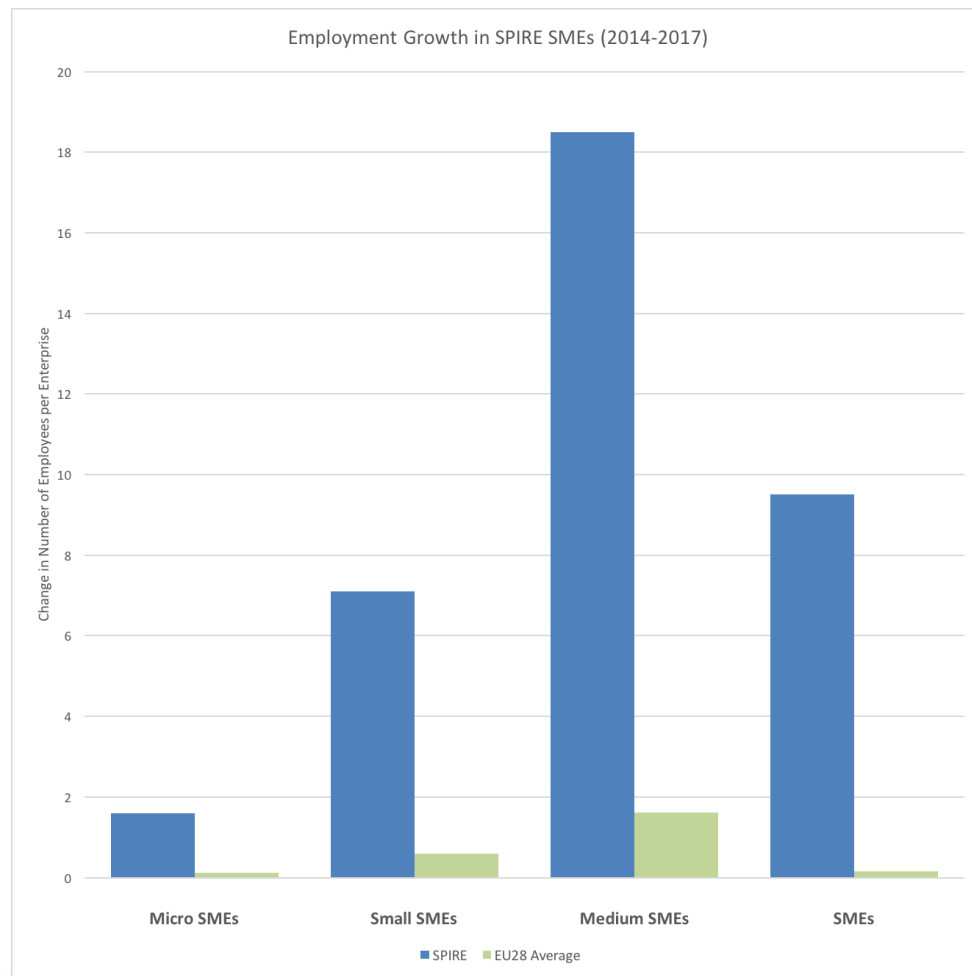
62% of Project partners plan to take the innovations to higher TRLs after the end of the Project.



UPDATE ON PROGRESS MONITORING REPORT 2018

PRELIMINARY CONCLUSIONS ON COMMON KPIS

KPI2 Impact of the cPPP on SMEs



UPDATE ON PROGRESS MONITORING REPORT 2018

PRELIMINARY CONCLUSIONS ON COMMON KPIs



KPI 6: Number of new skills and job profiles

- 14 Jobs created by 16 SPIRE projects; 310 Jobs created by 32 companies in relation to SPIRE roadmap
- Influence on a minimum of 4,000 to 6,000 new or existing Jobs



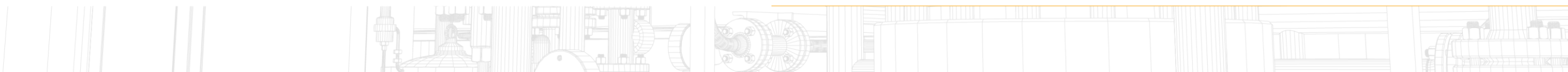
UPDATE ON PROGRESS MONITORING REPORT 2018

PRELIMINARY CONCLUSIONS ON COMMON KPIs

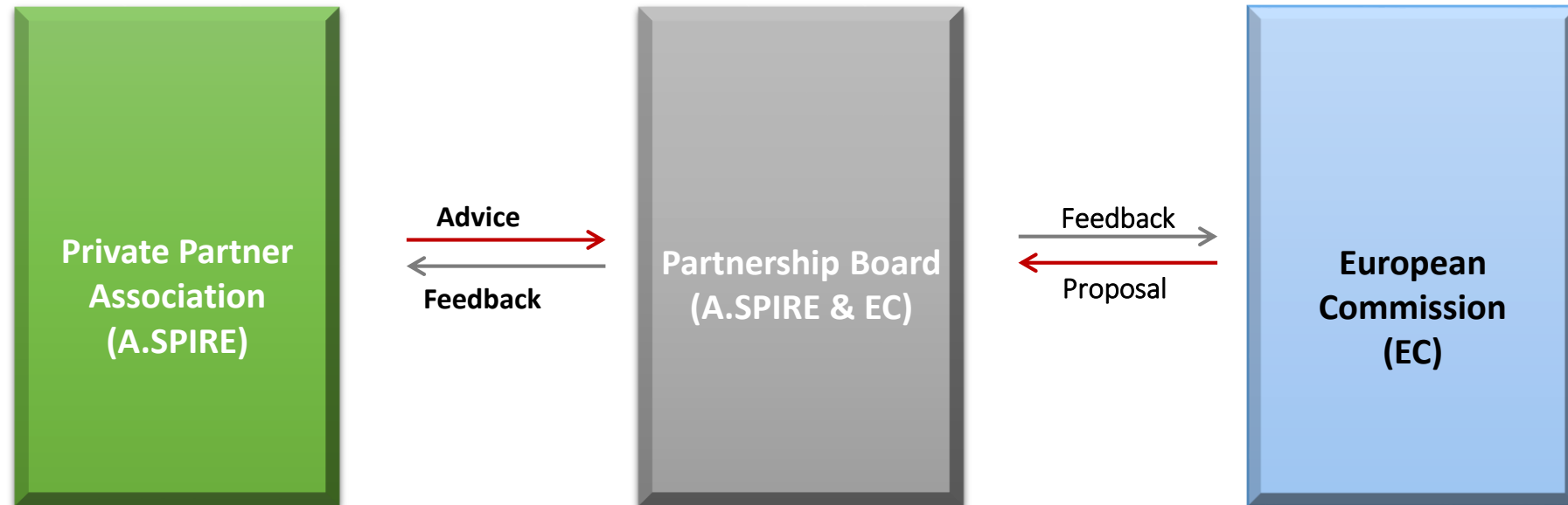
KPI 7: Mobilised private investments

EU contribution to SPIRE projects	€439 million
Budgeted private co-financing in projects	€56 million
Estimated actual private contribution to projects	€74–82 million
Estimated total private investment on Roadmap	€2405–3049 million
Leverage factor	5.5–6.9

- **€1 M** investment on average reported by **SMEs**



The Governance of SPIRE cPPP

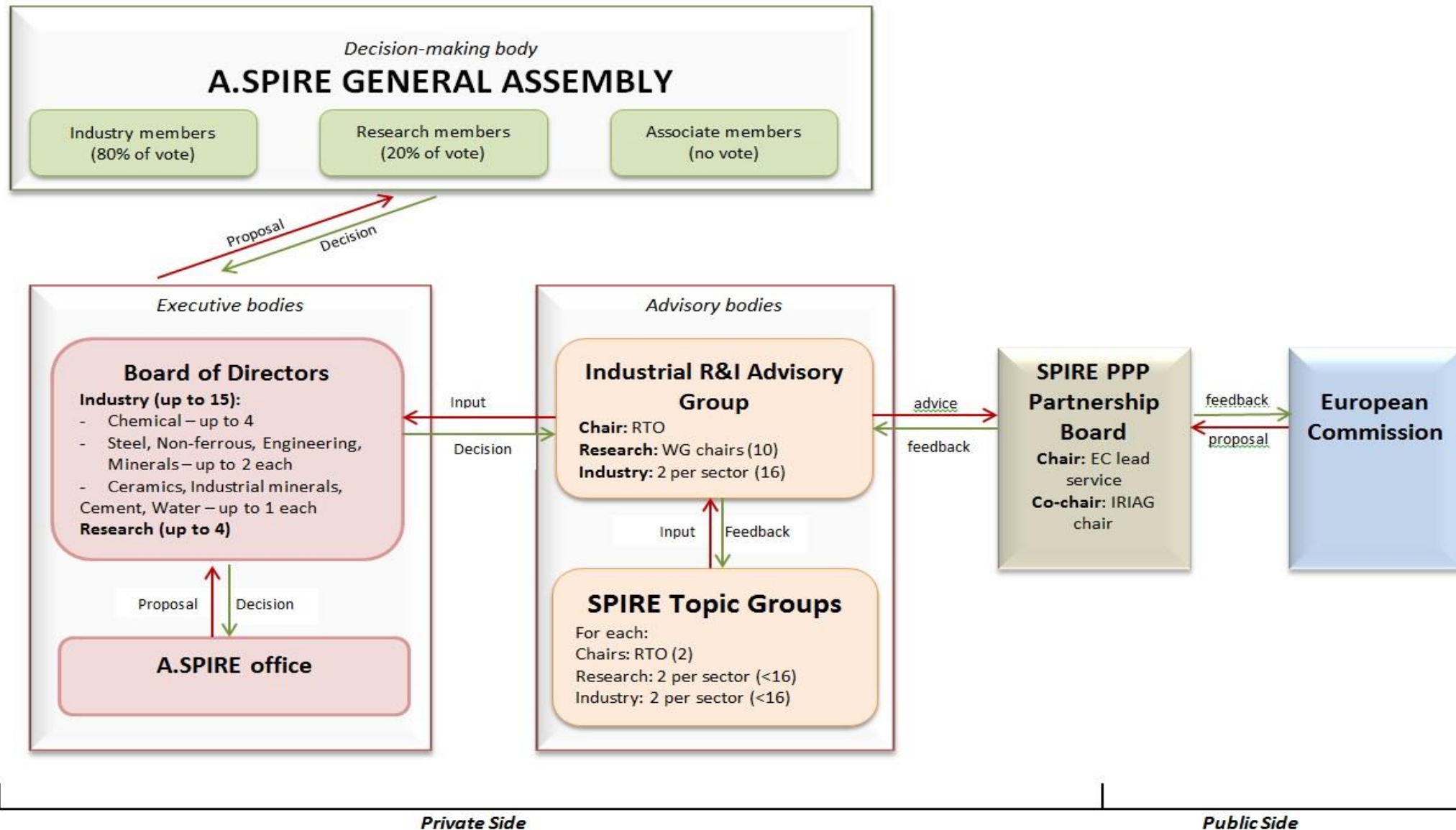


- Discuss priorities
- Propose call topics
- Form consortia
- Apply to calls

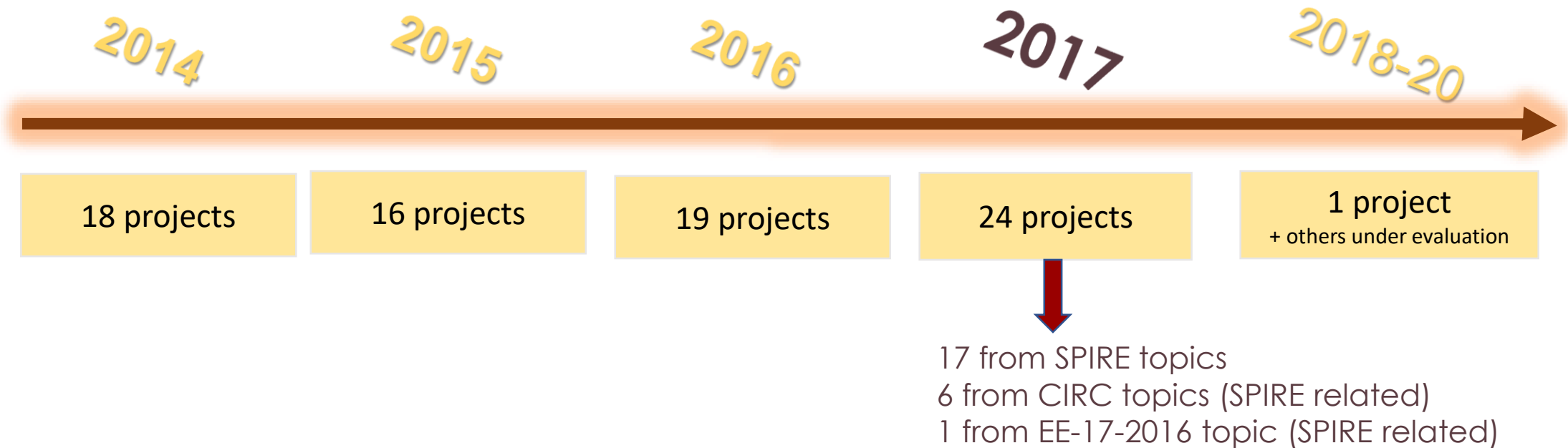
- Discuss priorities & call topics
- Assess progress

- Develop work programme
- Publish open calls

The Governance (2)

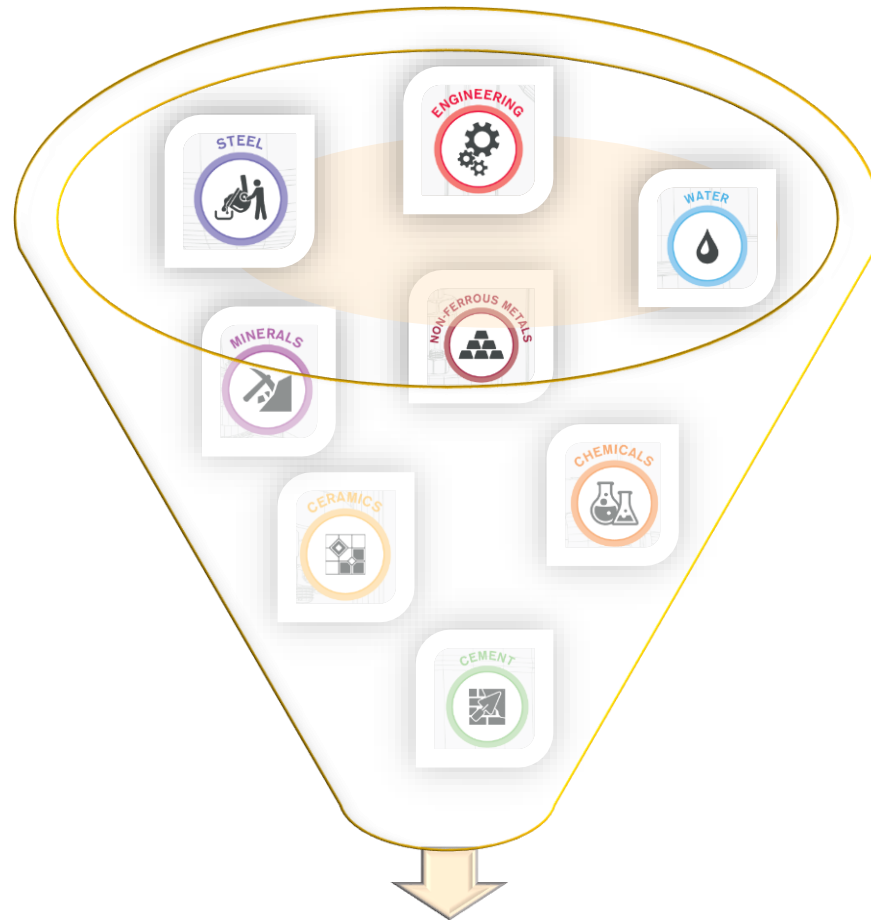


SPIRE Projects overview



70 ongoing projects + 7 finished = 77 SPIRE Projects
34 RIAs / 35 IAs / 8 CSAs

Cross-sectorial approach



SPIRE PROJECTS

Cross-sectorial collaboration is cornerstone for SPIRE projects:

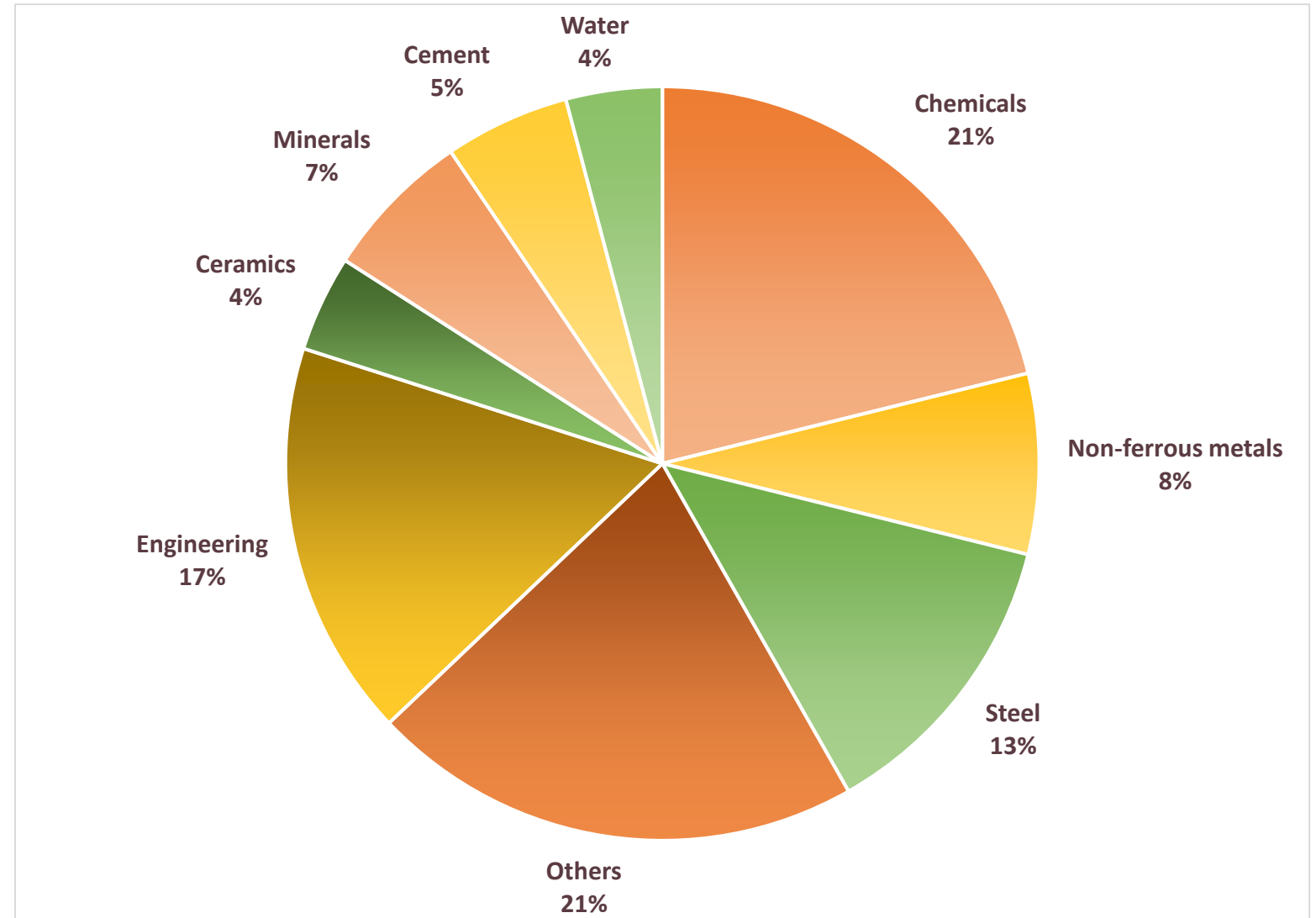
- **Minimum: 2 sectors/project**
- **7 or 8 sectors together are collaborating in various projects**
- **Average: 2.67 sectors/per project**



Cross-sectorial approach

Global sectors
participation in
SPiRE projects:

All sectors benefit



SPIRE PROJECTS – PORTUGUESE PARTNERS

WASTE-1-2014	IA	BAMB	Buildings as Material Banks: Integrating Materials Passports with Reversible Building Design to Optimise Circular Industrial Value Chains
CIRC-01-2016-2017	IA	ECOBULK	Circular Process for Eco-Designed Bulky Products and Internal Car Parts
SPIRE-06-2015	RIA	MAESTRI	Energy and resource management systems for improved efficiency in the process industries.
SPIRE-06-2015	RIA	MAESTRI	Energy and resource management systems for improved efficiency in the process industries.
SPIRE-06-2015	RIA	MAESTRI	Energy and resource management systems for improved efficiency in the process industries.
SPIRE-06-2015	RIA	MAESTRI	Energy and resource management systems for improved efficiency in the process industries.
SPIRE-06-2015	RIA	MAESTRI	Energy and resource management systems for improved efficiency in the process industries.
SPIRE-13-2017	CSA	SCALER	Scaling European Resources with Industrial Symbiosis
SPIRE-10-2017	RIA	SIDERWIN	Development of new methodologies for industrial CO2-free steel production by electrowinning

NMBP – SPIRE calls for 2018-2020

- **+196 M€ in calls from NMBP** to provide major momentum to Research & Innovation across the process industry sectors
- Build on the positive results achieved so far, aiming at **large scale demos to enable prompt industrial deployment**
- Target breakthrough gains in **resource and energy efficiency** across the process industry, through **Industrial Symbiosis** and **cross-sectorial integration, recycling and recovery technologies**
- Support the development of **smart retrofitting** concepts to improve performance of existing large scale installations
- Enable the shift to **renewable electricity**
- **International cooperation** may be particularly appropriate in some areas of the Sustainable Process Industry, in particular with Eastern Partnership countries (Ukraine, Moldova, Georgia, Armenia, Azerbaijan and Belarus)

❖ **CE-SPIRE-04-2019: Efficient integrated downstream processes (IA)**

CHALLENGE: Better integration of downstream and upstream processing to provide significant energy efficiency gains

❖ **CE-SPIRE-05-2019: Adaptation to variable feedstock through retrofitting (IA 50%)**

Keeping industrial facilities up to date from a technological and regulatory point of view (e.g zero waste).
Technological breakthroughs needed either for 10 years or 30 years equipment (furnaces, reactors, raw materials handling and storage systems)

❖ **DT-SPIRE-06-2019: Digital technologies for improved performance in cognitive production plants (IA)**

Endow the production system with capabilities for analysis to enable autonomous operation based on embedded cognitive reasoning and relying on high-level supervisory control.

IN ALL TOPICS: Dissemination, next generation of employees, development of learning processes, including life long learning



CE-SPIRE-04-2019: Efficient integrated downstream processes (IA)

Scope:

Proposals submitted under this topic are expected to provide novel solutions for a deeper integration of upstream and downstream processing operations. Proposals should consider:

- Intensified process technologies presenting multistep upstream processes, potentially exploiting hybrid chemo and bio catalytic technologies as well as process analytical techniques (PAT), in order to maximise production efficiency, selectivity and mitigation of downstream processing;
- 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;
- The technologies proposed should enable increased productivity, purity and quality of products, while lowering the process environmental footprint and increasing resource and energy efficiency;
- The potential for integration in the current industrial scenario, and the replicability of the concept in different sectors of the process industry;
- Increased safety of the work environment.

Proposals should provide proof of economic and industrial feasibility of the technologies involved; and should consider the potential integration in existing installations, as well as their retrofitting.

Reduction of production costs and time to market is also expected.

CE-SPIRE-04-2019: Efficient integrated downstream processes (IA)

Expected 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;
- Effective dissemination of major innovation outcomes to the current and next generation of employees, through the development of learning resources with flexible usability. These should be ready to be easily integrated in existing curricula and modules for undergraduate level and lifelong learning programmes.

Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.

EUR from 10 to 14 million

CE-SPIRE-05-2019: Adaptation to variable feedstock through retrofitting (IA 50%)

Scope:

Proposals need to cover the following:

- Implement **simulation models and decision support tools** for the production chain in an energy intensive sector, including the **detection of inefficiencies**, in order to allow flexibility with respect to feedstock of variable composition, while offering energy efficiency and product quality;
- The development of tools and **methodologies to streamline and support retrofitting**;
- Find the **most efficient operational input conditions to optimise the performances**;
- Develop indicators to **modify input variables and its potential of replication** across the industry;
- Facilitate and **adapt the equipment** towards a larger number and more diverse feedstock in order to be ready for a transition in which variability in quality, quantity and price of feedstock are key to make the production competitive and sustainable;
- Solutions should demonstrate the **feasibility and suitability of the concepts of retrofitting at industrial scale**.

Demonstration of the technology in different process industries should be undertaken, covering both the technology (new 'plug-ins'), as well as the process control (higher variability of the process requires new Monitoring & Control Systems).

Proposals submitted under this topic should include **actions designed to facilitate cooperation with other projects**; to enhance user involvement; and to ensure the **accessibility and reusability of data** produced in the course of the project.

CE-SPIRE-05-2019: Adaptation to variable feedstock through retrofitting (IA 50%)

Expected impact:

- Increasing the resource and energy efficiency of the targeted processes by 20%;
- Decrease GHG emissions through retrofitting by at least 30%;
- Decreased utilisation of fossil resources in the process industry of at least 20%;
- Reduced OPEX by 30% and increased productivity by 20%;
- Effective dissemination of major innovation outcomes to the current next generation of employees of the SPIRE sectors, through the development, by education/training experts, of learning resources with flexible usability. These should be ready to be easily integrated in existing curricula and modules for undergraduate level and lifelong learning programs.
- Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.

EUR from 8 to 12 million

CE-SPIRE-06-2019: Digital technologies for improved performance in cognitive production plants (IA)

Scope:

- Improvement of **online monitoring and innovative control technologies** in terms of process performance and flexibility, maintenance needs and product quality;
- **Digital retrofitting of existing assets**, integration towards and holistic optimisation of operations, **data-analytics**, real-time capability, use role-specific representation of information, feedback control & detect deviations and adjust operations immediately **decision support** (e.g. advanced process control, reactive scheduling);
- Several **among the following 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**;
- **Replicability and scalability of the concepts** should be considered appropriately.

CE-SPIRE-06-2019: Digital technologies for improved performance in cognitive production plants (IA)

Expected impact:

- Improved capabilities for valid, reliable and real-time control logics of the properties, efficiency and quality of process streams and final products for existing and for more flexible process operation concepts;
- Show potential for improved performance in cognitive production plants;
- Increased production performance, energy and resource consumption, or waste or by-products production will be significantly improved by more than 20%. The targets should be quantified in the proposal and validated during the execution of the demonstration;
- Project outcomes should demonstrate a positive environmental impact, by reducing CO2 emissions compared to the state of the art and in the scale relevant for the different applications;
- Effective dissemination of major innovation outcomes to the current next generation of employees of the SPIRE sectors, through the development, by education/training experts, of learning resources with flexible usability. These should be ready to be easily integrated in existing curricula and modules for undergraduate level and lifelong learning programmes.
- Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.

EUR from 6 to 8 million

Indicative Budgets & Deadlines 2018-2019

Topics (Type of Action)	Budget 2018 (M€)	Budget 2019 (M€)	Deadlines
CE-SPIRE-02-2018 (IA) CE-SPIRE-03-2018 (IA) CE-SPIRE-10-2018 (IA)	Total: 97.5		31 Oct.17 - 22 Feb.18
CE-SPIRE-04-2019 (IA) CE-SPIRE-05-2019 (IA)		Total: 65.8	16 Oct.18 - 21 Feb.19
DT-SPIRE-06-2019 (IA)		32.9	16 Oct.18 - 21 Feb.19

A.SPIRE @ACHEMA

BROKERAGE

– 14 June

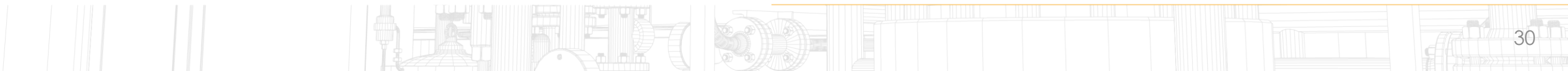


Draft Agenda

9h00 - 9h30	Registration and welcome coffee
9h30 - 9h45	Welcome address <ul style="list-style-type: none">- Daniel Gauthier, A.SPIRE President- Àngels Orduña Cao, A.SPIRE Executive Director
9h45 - 10h45	Outlook on the 2019 H2020 Work Programme and results of the SPIRE-2018 calls <ul style="list-style-type: none">- Nicolas Segebarth, DG Research & Innovation, SPIRE Programme Officer- Other EC services, TBC
10h45 - 11h15	Industry in FP9 and SPIRE 2.0 Vision <ul style="list-style-type: none">- Nicolas Segebarth, DG Research & Innovation, SPIRE Programme Officer- Daniel Gauthier, A.SPIRE President
11h15 – 11h30	Coffee break
11h30 - 12h00	Technological areas tackled by SPIRE 2014-2017 projects, identified synergies and future opportunities (tbc)
12h00 - 13h00	Lunch
13h00 - 15h00	Presentations of project ideas for 2019 calls
15h00 - 17h00	Networking session

SPIRE 2020 topics to be finalized by A.SPIRE members in 2018

- ❖ **CE-SPIRE-01-2020:** Industrial symbiosis (IA)
- ❖ **CE-SPIRE-07-2020:** Recovery of industrial water, thermal energy and substances contained therein (IA)
- ❖ **CE-SPIRE-08-2020:** Improved Industrial Processing using novel high-temperature resistant materials (RIA)
- ❖ **CE-SPIRE-09-2020:** Making the most of mineral waste, by-products and recycled material as feed for high volume production (IA)



Political Objectives:

- **2050 Decarbonisation targets** (at least 80% GHG reductions)/ COP 21 global commitments
- **Renewable Energy Directive, Fuel Directive**, SET Plan
- **ETS Directive** (Innovation fund, Study by DG CLIMA)
- **Circular economy package** (Industrial Symbiosis-Waste to value) since 2015
- **Industrial Policy Strategy** 2017
- R&I policy at EU level – currently Horizon 2020 and **Proposal for Horizon Europe** (2021-2027)



The level of ambition of environmental targets has grown exponentially

- Paris Agreement: keep **global warming “well below 2 degrees”** by end of century
- EU: **reduce GHG emissions by** 40% (2030), 60% (2040) and **80% (2050)**
- EU circular economy package, ...

The required R&I capacities and the level of investments needed to develop, pilot and deploy related technologies also grow exponentially.

The need to restore EU global competitiveness levels remains crucial

The market shares of Process Industry in relation to countries like China or USA continue declining what hinders creating, and even keeping, jobs in the EU.

While EU Process Industry lags behind in international markets, it is fundamental to keep jobs and the whole value chain in the EU.

SPIRE Challenges and Opportunities ahead

SPIRE2 VISION 2050 *Under definition*

Technology Drivers for Efficient Processes: Electrification, CCU, Energy and Resources mix

Transversal topics: Industrial Symbiosis and Digitalisation

SPIRE Test Bed on new working groups model

New opportunities for A.SPIRE members to participate in shaping our future, e.g:

- SPIRE TOPICS 2020
- Industrial Symbiosis and the connection to EU MS and the regions
- Digital Process Industry

HORIZON EUROPE & PARTNERSHIPS

SPIRE 2050 Vision, cornerstone to position SPIRE for Horizon Europe and continue delivering results for the next decade of R&I in the EU.

EU Climate Change targets will not be achieved without SPIRE industries playing a big role.



SPIRE 2018 EVENTS

- EU Industry Days, **Sustainable Industry session**, 22-23 February 2018, Brussels
- Advanced Factories Congress, **Circular economy – SPIRE session** 13-15 March 2018, Barcelona
- **ACHEMA 2018 (A.SPIRE booth)**, 11-15 June 2018, + **SPIRE Brokerage event**, 14 June, Frankfurt am Main
- **cPPPs Conference**, Partnerships, a new impetus, 26 June 2018, Brussels
- **SET PLAN Workshop**, **developing IDEAS**, 27-28 June 2018, Brussels
- **ProcessNet-Jahrestagung 2018 (A.SPIRE booth + session on Industrial Symbiosis)**, 10-13 September 2018, Aachen
- **3rd SPIRE Thematic workshop**, 1 October 2018, Brussels
- **SPIRE Strategic Workshop (EC-A.SPIRE)**, 2 October 2018, Brussels
- **Industrial Technologies Conference 2018**, 29-31 October 2018, Vienna
- **A.SPIRE General Assembly + SPIRE WGs Future - workshop + 5 years of SPIRE**, November 2018, Brussels

SPIRE + BBI COLLABORATION

- ❖ Joint Working Group
- ❖ Synergies
- ❖ Avoid overlaps
- ❖ Share knowledge

QUESTIONS?

Thank you very much
for your attention!



Sustainable Process Industry through
Resource and Energy Efficiency



SPIRE 2050 Vision

European Process Industry
boosting transitions