



European
Commission

European Commission activities related to carbon footprint reduction in Industry

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print of the steel industry**
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Outline

Political Context and relevant EC policies, approaches

SPIRE PPP

EC activities on CO₂ utilisation (direct and indirect)

*Current calls and projects and future opportunities in
Horizon 2020 for industry decarbonisation*

Conclusions

Political Context- strategic approach

- *Main Objective: Keep the European industry competitive to provide jobs and growth while building a sustainable economy and society in Europe*
- *How to reach this ambitious objective:*
Ambitious policies setting clear targets: SET Plan, Energy Union, Circular Economy Package, COP 21 global commitments, Clean energy Package (30/11/2016)
- **Integrated approach to Research and Innovation through engagement of stakeholders (e.g. PPPs in Horizon 2020) complemented by suitable instruments (H2020, EFSI)**

Approaches to carbon footprint reduction in industry

- *Improve Energy and Resource Efficiency (e.g. SPIRE cPPP)*
- *CO₂ utilisation (e.g. Coordination and support activities, support from H2020)*

Other important approaches not addressed in this talk:

- *CO₂ capture storage*
- *Hybrid approaches CCUS*



SPIRE: Sustainable Process Industry through Resource and Energy Efficiency

- Is a cPPP initiative part of H2020, with a foreseen EU contribution of 900 Million Euro for the period 2014-2020.
- It covers 8 EU industrial sectors, representing together around 6.8 million jobs in 450,000 enterprises, with over €1,600 billion/year in turnover.
- The process industry sectors involved have in common a with high dependence from resources (energy, materials and water) and a significant environmental footprint (e.g. GHG emissions).
- These strategic industrial sectors are subject to strong global competition and are striving to ensure their long-term sustainability.



SPIRE Main objectives

- Strengthen cross sectorial integration to improve efficiency (energy, resources)
- A reduction in fossil energy intensity of up to 30% by 2020
- Efficiency improvement of CO₂-equivalent footprints of up to 40%
- Achievement, where possible, of carbon-neutral sectors

- 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
 - Creating new high quality knowledge intensive jobs through knowledge transfer and training



SPIRE Approach in a nutshell

- Develop industrial symbiosis concepts to achieve cross sectorial integration with potential breakthrough improvements in energy and resource efficiency.
- Develop and deploy advanced process monitoring and control technologies to optimise the operations at process, plant and multi-plant level (moving towards Industry 4.0).
- Develop more efficient and flexible process technologies
- Support the transition to renewable energy sources and raw materials (electrified processes).
- Develop tools and methods for sustainability assessment in Industry.

SPIRE funded projects:

<https://www.spire2030.eu/projects/our-spire-projects>



EC Coordination and support activities to support CO₂ utilisation

Two major CCU workshops have taken place, gathering MSs, Industry and relevant stakeholders.

- *26/03/2015 Brussels: "Transforming CO₂ into value for a rejuvenated European Economy"*
<http://bookshop.europa.eu/en/transforming-co2-into-value-for-a-rejuvenated-european-economy-pbKI0215532>
- *26/10/2016 Brussels: "Valorisation of carbon emissions for a sustainable, competitive European Industry"*
- *Coming-up on the 6th June 2017, Brussels: Benchmarking LCA for CCU applications*

To register: <https://ec.europa.eu/eusurvey/runner/LCAinCCU>

Scope of these activities:

- Gather a critical mass of stakeholders (industry, MSs, EC and relevant organisations, etc.) in order to exchange information and connect the relevant actors.
- Understand the status of the technological base (maturity of the different approaches) to assess their actual industrial potential and the Research needs (e.g. piloting and DEMO).
- Explore the potential interest of the stakeholders in setting-up a major European initiative (e.g. IPCEI- "Important project of common European interest") to complement other existing instruments (e.g. EFSI 'Juncker fund' and ESIF).

The way forward:

- *From the outcome of the seminars, it was clear that industry is ready to invest, and that several Member States and European regions are willing to participate and contribute in order to de-risk investments on these strategic technologies.*
- *There was a wide agreement on the benefits that could arise from a major integrated European initiative (e.g. IPCEI), in terms of defragmenting efforts, utilising efficiently the available resources and maximising impact.*
- *Talks are ongoing, if an IPCEI is to be established, the process should be led by MSs and Industry, but could be facilitated by relevant organisations such as CEFIC.*
- *EC (DG Grow and DG RTD) could coordinate and support the activities, while DG COMP would assess the IPCEI proposal in terms of compliance to existing rules (state aid).*

Other EC Coordination and support activities supporting CO₂ utilisation

- *CSA CarbonNext (495000 Euro, 24 months, started 1st September 2016) to investigate potential opportunities for alternative carbon feedstocks, including CO₂.
http://dechema.de/en/49_2016Neu-p-20060910.html*
- *Upcoming policy review on decarbonisation of industry, to design a roadmap and provide policy recommendations to support the development and deployment of CO₂ utilisation technologies.*



Current projects for CO₂ technologies in Horizon 2020

- *CO₂ relevant technologies have received support throughout FP7, with a large number of projects and a funding exceeding 60 Million Euro. Among the finished and ongoing projects include: CARENA, CYCLICCO2R, ECO2CO2, CEOPS, SUNBIOPATH, GIAVAP, D-FACTORY, BISIGODOS, MIRACLES, DIRECTFUEL , DEMA , FUEL4ME , SOLAR-JET*
- *In Horizon 2020, the approach to CO₂ utilisation is more integrated, including both, groundbreaking research to develop the technologies of the future (ERC) and collaborative research projects, to develop and demonstrate industrial (high TRL) technologies for the short/medium term commercial deployment. In total, funding for CO₂ utilisation projects accounts so far in H2020 to more than 65 million Euro*
 - **H2020 Groundbreaking research (ERC): SYBORG, HyMAP, COFLeaf, 3MC**
 - **H2020 Industrial projects: PHOTOFUEL, STEELANOL, MefCO2, FReSMe**



Current relevant calls under evaluation (2nd stage)

BIOTEC 05 – 2017: Microbial platforms for CO₂-reuse processes in the low-carbon economy (2-stage)

NMBP 20 – 2017: High-performance materials for optimizing carbon dioxide capture (2-stage)

NMBP call, pilot lines, Biotechnology call: **04/05/2017**
(2nd stage)

Relevant SPIRE 2017- Topics

SPIRE 8 – 2017: CO₂ Utilisation to produce added value chemicals - 3 projects selected for funding

SPIRE 9 – 2017:

Pilot lines based on more flexible and down-scaled high performance processing – 4 projects selected for funding

SPIRE 10 – 2017: New electrochemical solutions for industrial processing, which contribute to a reduction of CO₂ emissions – 2 projects selected for funding

Outline of potential Industry decarbonisation opportunities in the SPIRE WP 2018-20

- *Industrial Symbiosis (energy, material and water streams)*
- *Refitting concepts (making existing installation more efficient and productive)*
- *Transition to renewables (electrified processes, flexibility in feedstock and throughput)*
- *Digitalisation (moving towards industry 4.0)*
- *Process intensification paradigms (move from batch to continuous processes)*



Conclusion

- *The EU has set ambitious political targets for decarbonisation. Breakthroughs in energy and resource efficiency and Carbon Dioxide utilisation are seen as viable approaches to contribute to decarbonise industry.*
- *The Commission is supporting and coordinating several activities in these fields (e.g. SPIRE, potential IPCEI)*
- *The Commission is directly supporting relevant activities (CSA, policy reviews, topics).*
- *Further support may be available from the final H2020 WP*



HORIZON 2020

**Thank you
for your attention!**

Find out more:

<http://ec.europa.eu/programmes/horizon2020/en/what-work-programme>

HORIZON 2020

Horizon Prize for CO₂ Reuse

- To accelerate innovation in CO₂ utilisation technologies
- To contribute to climate mitigation
- To increase transparency about technology readiness, barriers, costs, environmental performance and innovation needs

The winner

- The most significant and measurable improvements in the technology for CO₂ utilisation
- While overcoming technical, commercial and/or financial barriers
- And demonstrating future commercialisation potential and scalability

- **Prize:** 1.500.000 euro
- **Timeline:**
 - ✓ Detailed rules of contest published: **4Q 2015**
 - ✓ Opening of registration: **3Q 2016**
 - ✓ Deadline submission of applications: **2Q 2019**
 - ✓ Award of the prize: **4Q 2019**

Further information:

Horizon Prizes: <https://ec.europa.eu/research/horizonprize/>

DG Climate Action: <http://ec.europa.eu/clima/>

Horizon Prizes

A new instrument to generate **breakthroughs, induce innovation** and **raise awareness about** new technologies or solutions

To create future **game changers** able to bring to life **innovative products, services** and **successful SMEs** with tangible benefits for the citizens

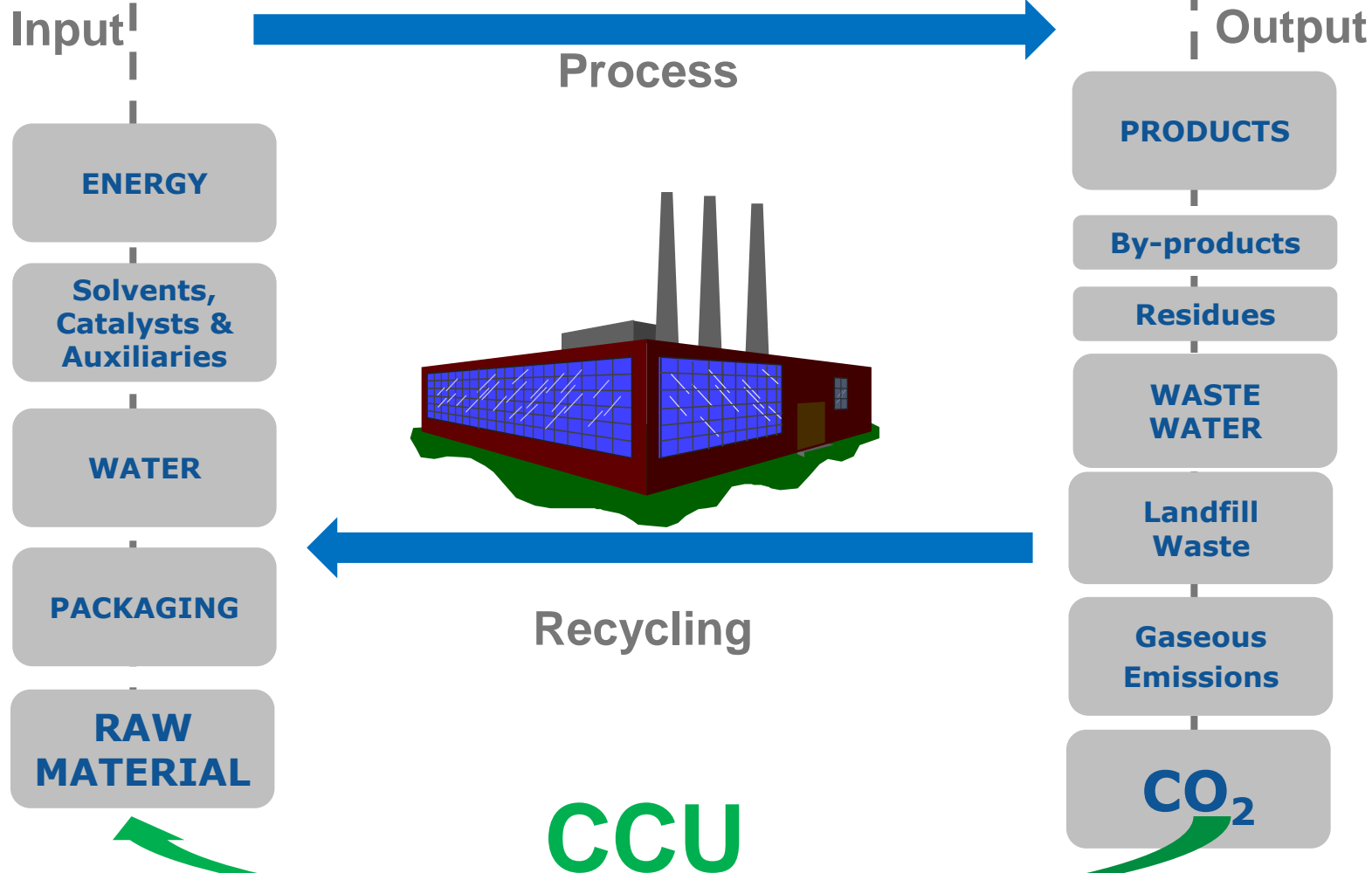
Financial reward is given through an **open competition**

Award criteria do not prescribe how objectives should be achieved

The future of processing



Resource Efficiency in the whole production process

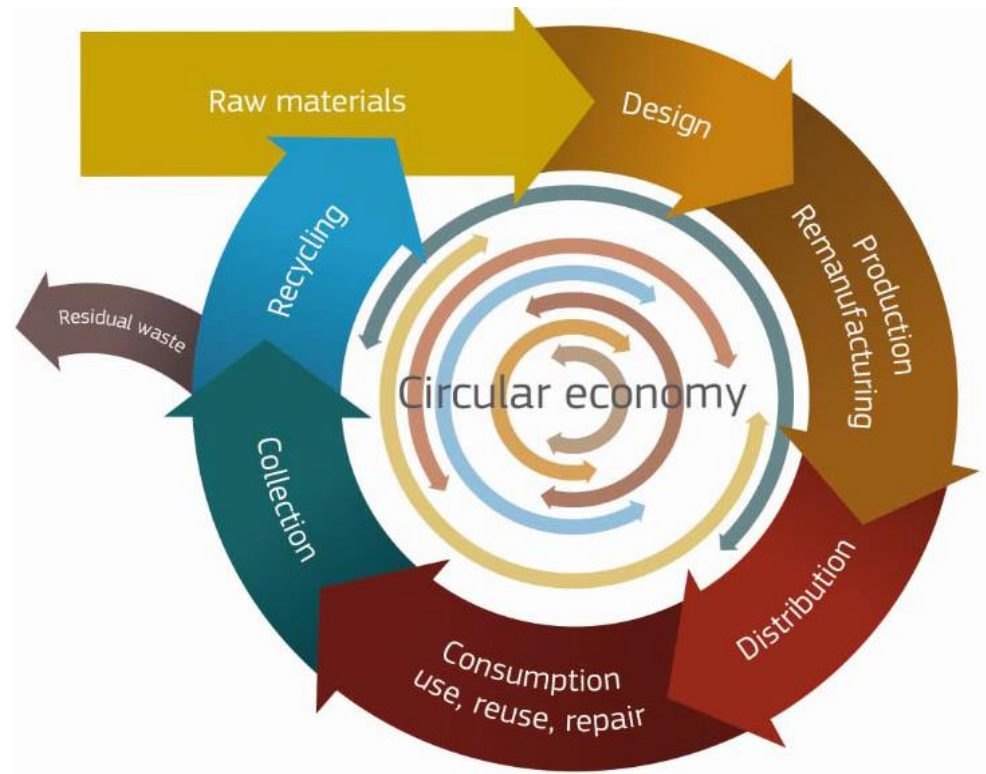




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CIRCULAR ECONOMY

- no longer linear
- extended life time
- collaborative approach
- cross-sectors
- multi-stakeholders
- innovation in all forms
- design strategies
- new business models
- demand-side measures
- etc...



towards a GLOBAL IMPACT

**RESEARCH and
INNOVATION**
(Horizon 2020)

**STAKEHOLDERS
involvement**
(e.g. PPPs)

**Enabling
FRAMEWORK**
(e.g. Refit,
InnovRefit)

**FUNDING
instruments**
(Horizon
2020, EFSI,
ESIF)



Aim of the workshop "Transforming CO₂ into value for a rejuvenated European Economy"

The overall aim of this initial scoping workshop was to provide an overview of the ongoing activities in the field of CO₂ conversion in the EU Member States and by EU companies, and to provide clarity about necessary actions at European level to facilitate technology deployment, contributing to EU objectives.

Objectives:

- *Presentation of technology options, potential impact, economic opportunities;*
- *Discussion on existing barriers, such as lack of investment and non-technological obstacles;*
- *Presentation of existing national and regional initiatives, opportunities for synergies;*
- *Identification of links and complementarity between existing R&I activities;*
- *Understand if the necessary conditions are present to move towards a large-scale European CO₂ conversion initiative.*

Feedback from the Workshop

- *Workshop held 26.3.2015 – Covent Garden – A2 03/187 – 9.30 to 16.00*
- *Very successful workshop with 80 participants (limit of the meeting room) of which 66 came from outside the Commission, mostly from industry. Opening and closing statements by the DDG of DG RTD and DG GROW.*
- *Presentations from 7 Member States (BE, DE, ES, FR, NL, NO, PL) on their national activities in regard to CO₂ transformation. Some of the MSs were represented by companies.*
- *Presentations from 18 European companies on their respective activities on CO₂ conversion (e.g. ArcelorMittal, AUDI, BASF, BAYER, Clariant, LaFarge, Linde, Siemens, Solvay, ThyssenKrupp).*
- *CO₂ conversion activities span between TRL 2 and TRL 9, with the majority being in the range 4-6, therefore requiring further upscale and DEMO.*

Link to workshop proceedings: <http://bookshop.europa.eu/en/transforming-co2-into-value-for-a-rejuvenated-european-economy-pbKI0215532/>

Aim of the workshop "Valorisation of carbon emissions for a sustainable, competitive European Industry" (follow up of the first one)

This second workshop focused more on the ongoing activities on CO₂ utilisation in the EU industry, and on the needed developments for the regulatory framework to support CCU technologies. It also aimed at providing clarity about necessary actions at European level that could facilitate the deployment of CO₂ utilisation technologies in industry to contribute to EU objectives.

Objectives:

- Presentation of technology developments and industrial activities, including potential impact, economic opportunities and hurdles;*
- Discussion between stakeholders and European decision makers on needed developments in the regulatory framework to support CO₂ utilisation technologies*
- Define the requirements to set up major pan-European initiatives (e.g. IPCEI)*
- Gather a critical mass of stakeholders to explore the next steps towards major integrated European CO₂ conversion initiatives*

Feedback from the Workshop

- *Workshop held 26.10.2016 – Committee of the Regions- room JDE 52– 9.30 to 16.00*
- *Very successful workshop with 150 participants, including significant industry representations, relevant stakeholders (associations and technology platforms) and European Commission representatives from several DGs, including: DG ENER, DG GROW, DG CLIMA and DG RTD.*
- *Presentations from European companies on their respective activities in CO₂ conversion (e.g. Heidelberg Cement, BASF, EVONIK, DOW Chemicals, Arcelor Mittal, Thyssen Krupp).*
- *The presentations included a variety of technological approaches applicable in different sectors (e.g. cement, steel, chemicals).*
- *It is clear that an appropriate regulatory framework would support the prompt deployment of CO₂ conversion technologies in industry.*