#EUCircularTalks

Industrial symbiosis: A tool for the Green Deal

Innovation for Industrial Symbiosis

Klaus H. Sommer, PhD

Brussels, June 16, 2021

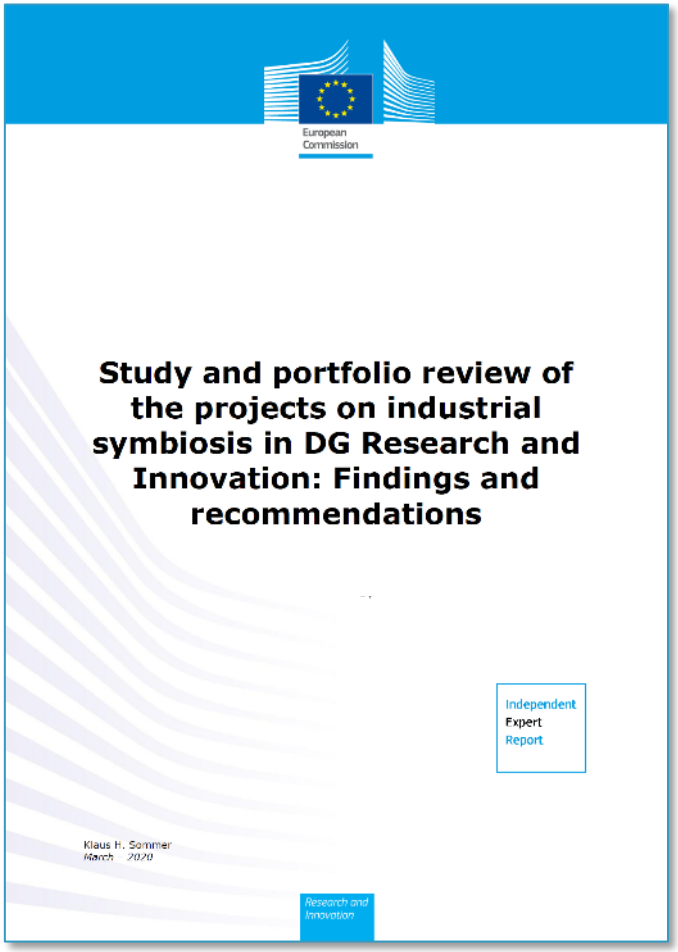
Study of Cluster of Projects on **Industrial Symbiosis** in Dir. Prosperity in DG Research & Innovation

Validation Workshop

Presentation and Discussion: Study Results, Recommendation and Path Forward

Klaus H. Sommer

Brussels, November 4, 2019




European Commission
What is the European Green Deal?
December 2019
#EUGreenDeal
The European Green Deal is about improving the well-being of people. Making Europe climate-neutral and protecting our natural habitat will be good for people, planet and economy. No one will be left behind.
The EU will:
Become climate-neutral by 2050
Protect human life, animals and plants, by cutting pollution
Help companies become world leaders in clean products and technologies
Help ensure a just and inclusive transition

What will we do?

CLIMATE

The EU will be **climate neutral in 2050**.
The Commission will propose a European Climate Law turning the political commitment into a legal obligation and a trigger for investment.

Reaching this target will require action by all sectors of our economy:

ENERGY

Decarbonise the energy sector

The production and use of energy account for more than **75%** of the EU's greenhouse gas emissions

BUILDINGS

Renovate buildings, to help people cut their energy bills and energy use

40% of our energy consumption is by buildings

INDUSTRY

Support industry to innovate and to become global leaders in the green economy

European industry only uses **12%** recycled materials

Major Findings, Recommendations and Innovations I

- Further **strengthen R&I support and investments** for Industrial Symbiosis

- **Link promising R&I projects at appropriate maturity level to investors and financing.** Proactively evaluate all **financing options** to encourage private investment and **investor confidence**.

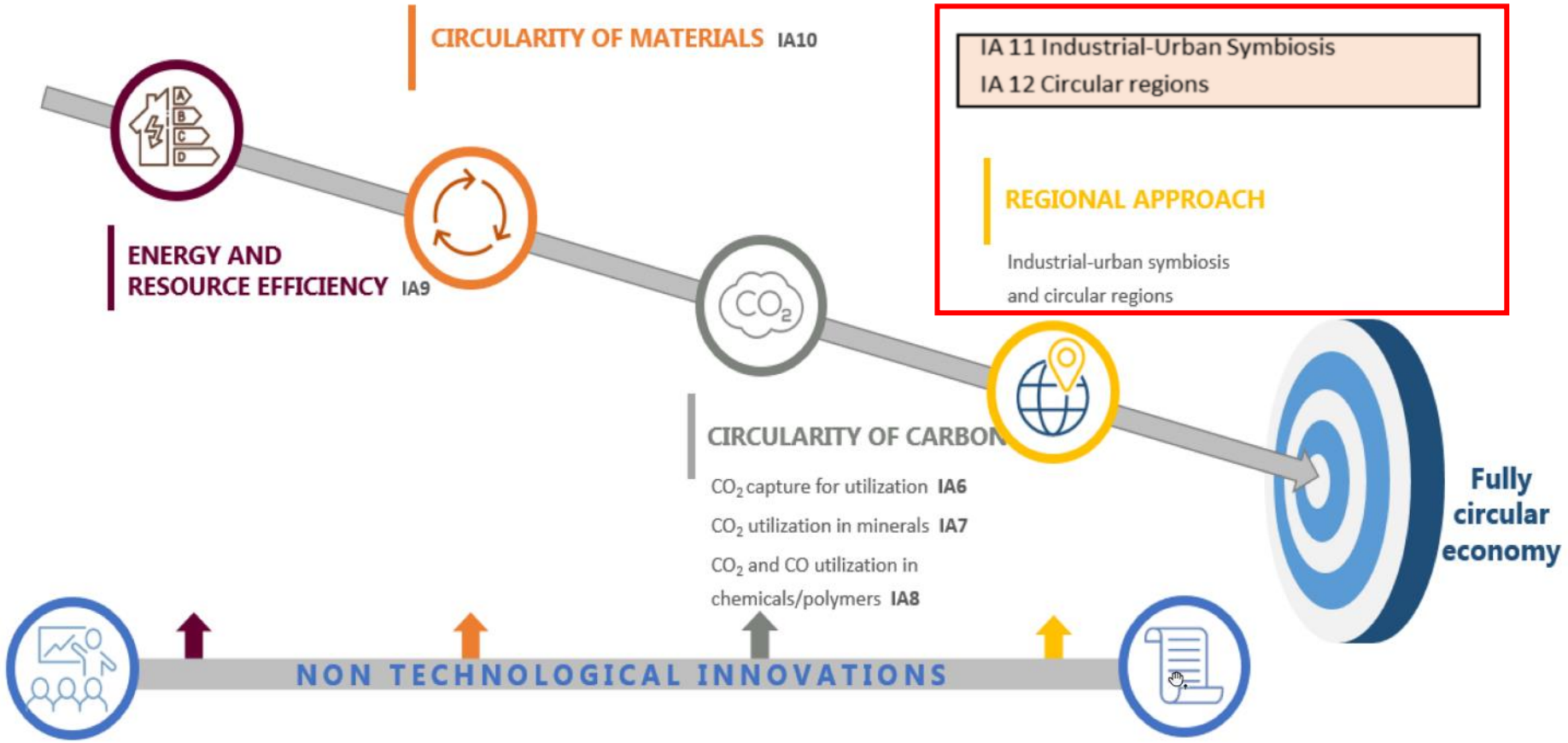
- Focus on **methods and tools**, e.g. for identification of opportunities and **technologies**, (e.g. CO_2 capture, storage and reconditioning, electrification of processes, processes for hydrogen and methanol, water purification, biotechnological processes for renewable resources) and **pilot and demonstration facilities ➔ H4C**

- Industrial Symbiosis approach **can be applied** broadly to **many** different industrial **sectors**
- Involve **Industrial Park Owner/Operator**, **Municipalities** or the **Chamber of Commerce** and/or the **Association** of a cluster of companies as **facilitators**

- Develop actions for a **better understanding of the process** how Industrial Symbiosis can be **started**, which **barriers** need to be overcome, how the **potential** can be identified and how **facilitation** is needed to accelerate implementation

A tapestry of innovations to achieve circularity

PROCESSES4PLANET



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14 April 2021 | Brussels, Belgium | Research and Innovation

‘A new flagship initiative – Hubs for Circularity’ Concept, opportunities & challenges for successful implementation

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INDUSTRIAL – URBAN SYMBIOSIS: FACILITATION ASPECTS

PROCESSES4PLANET

UPCYCLING AND ECO-DESIGN: "THE" NEW EU MODEL OF REAL CIRCULARITY

Setting the circular value chain into motion

HUB MODUS OPERANDI FOR BUSINESS:

Every decision of each company to consider the possibilities of impact in the other companies in the hub (A small loss can later revert in a bigger benefit, collectively and individually)

Large industry in a tracking role with innovative SMEs growing as providers of solutions.

«Working together is just smart business»
(Kalundborg)

ENGAGEMENT OF ALL RELEVANT STAKEHOLDERS
Public sector, industry, academia, civil society, community, investors… Facilitator to build trust & synergies needed

OVERCOMING REGULATORY BARRIERS
Through continuous dialogue by the EU, MS, regions and the industry

CO-INVESTMENT STRATEGIES for joint **BUSINESS2TERRITORY PLANS** need to be defined by all stakeholders.

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Major Findings, Recommendations and Innovations II

- Establish a **Community-of-Practice** for Industrial Symbiosis

- Consider the use of the **"Symbiosis Readiness Level"** concept

- Include the concept of Industrial Symbiosis in **education**

- Establish **portfolio management** for clusters of EC funded projects

- **Ensure close cooperation and alignment of different Directorates General** supporting Industrial Symbiosis. Establish a **joint sponsorship of the Community-of-Practice**.

  ➔ **Today DG GROW, DG ENV and DG RTD are represented**

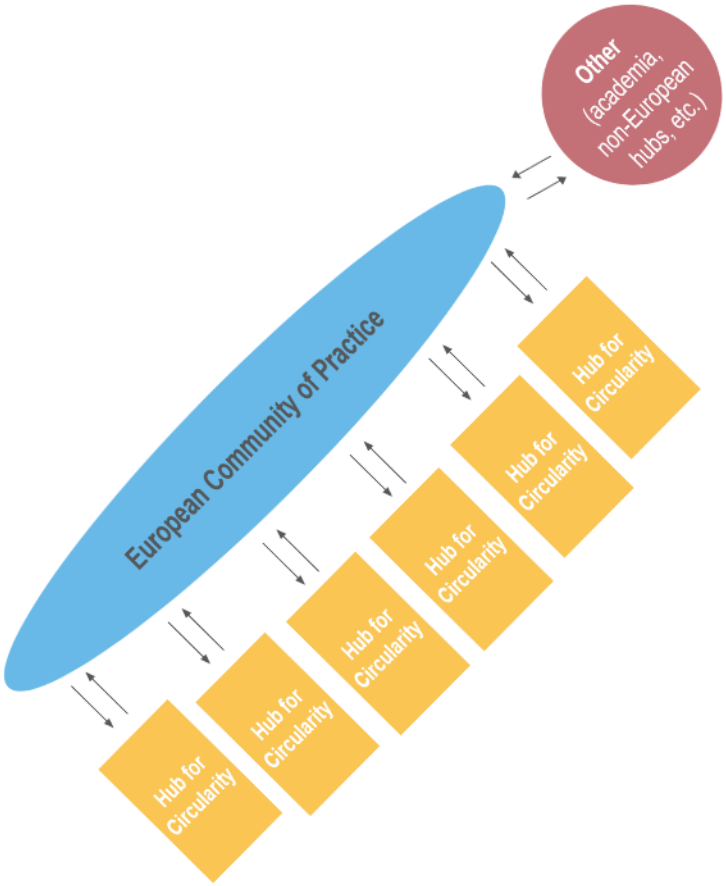
7. Community-of-Practice

Establish a **Community-of-Practice** for Industrial Symbiosis

- Representation
- Mandate
- Best practices
- Up-to-date inventory of opportunities
- Promotion
- Educating
- Handbook
- Trusted, safe and secure data and information exchange platform

For the latter use **modern digital tools** like **digital twins** for process modelling and control or **blockchain** and **artificial intelligence** for confidential data management.

ECoP: A network of networks connecting resources for H4Cs



ECoP INNOVATION ACTIVITIES

1. Build the European Community of Practice that connects H4C on the level of knowledge management and services
2. Synthesise findings into generic learning/frameworks and keep knowledge about state-of-the-art solutions updated
3. Enable evaluation of I-US projects
4. Facilitate education

On a regional level,

- Knowledge on local availability of material and heat flows and resulting opportunities and requirements
- Value chains need to be developed based on the flows, optimizing logistics.
- Create regional value loops in an inter-plant scenario.

On the European level,

- Development of the technologies, knowledge, tools and best-practice exchange to accelerate roll-out of I-US.
- Bringing together the regional H4C in one network of networks
- Collaboration with other initiatives (EIT KICs, The H2 Valleys, the Digital Innovation Hubs or other pan-European initiatives).

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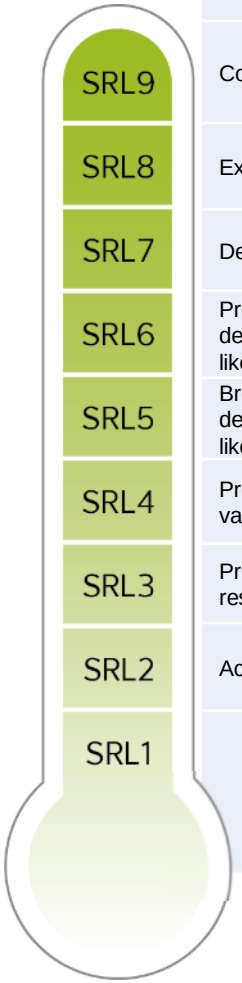
6. Proposed “Symbiosis Readiness Level”

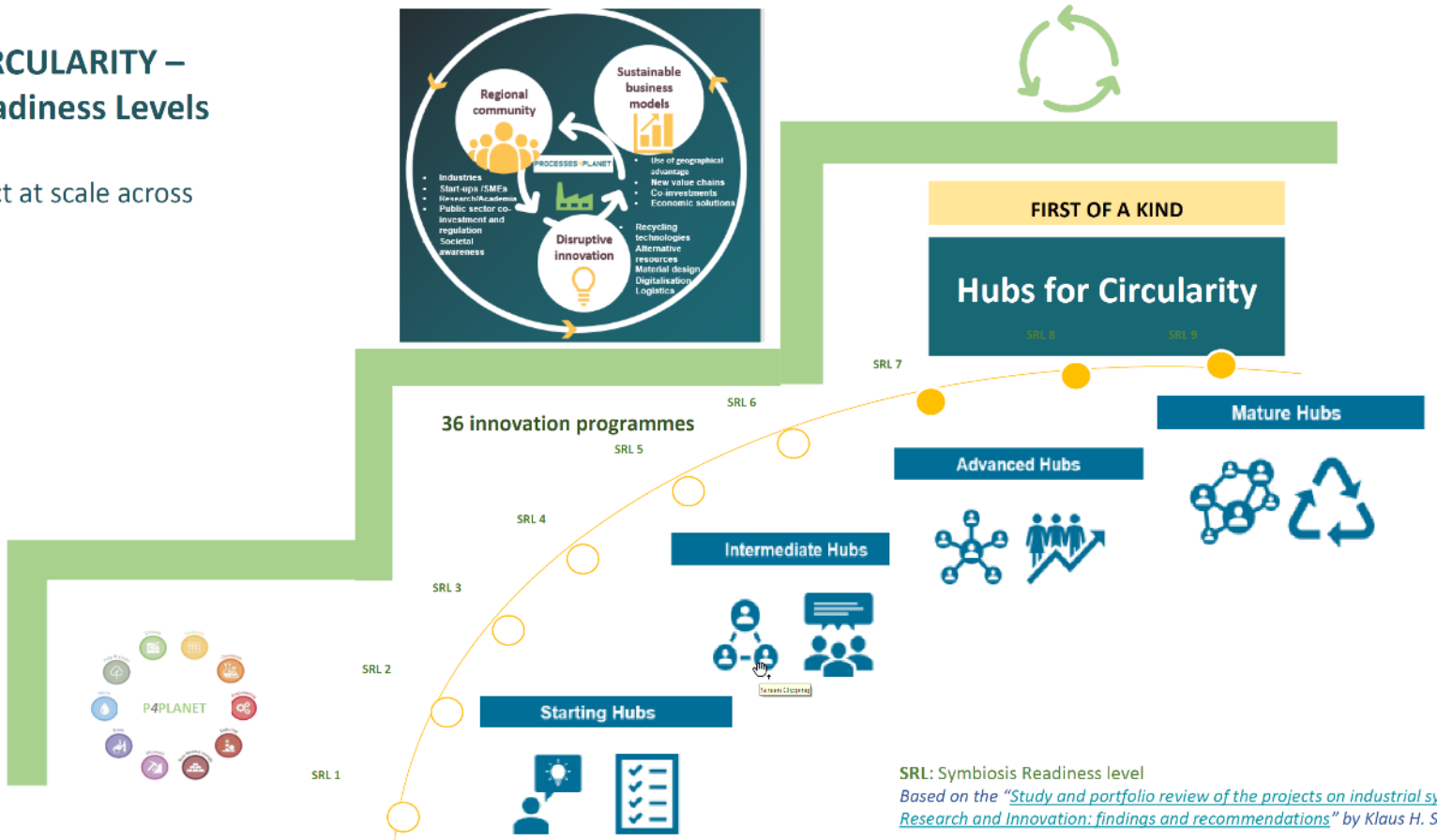


	Technology	Business	Ecology	Management
SRL9	Commercialization	Business case continuously controlled, reported and shared	Sustainability benefits proven	Resilient partnership
SRL8	Extended operation	Finalize legal framework	Benefits routinely monitored and reported	Practical operation and management starts
SRL7	Demonstration	Partners committed	Monitoring and reporting begins	Senior management is involved and supports Ind Symb case
SRL6	Prototype demonstration "looks like"	Business case with all details	Permits applied for	Concept for joint management is developed
SRL5	Breadboard demonstration "acts like"	Evaluate competitiveness	Sustainability assessment finalized	Partners start joint evaluation of Ind. Symb. potential
SRL4	Proof of concept validation	Check resources and criteria	Sustainability assessment in execution	Partners indicate interest
SRL3	Proof of concept research (bench scale)	Check fit with strategies of partners	Thorough data collection	First contact with partners
SRL2	Academic research	Develop concept	Rough estimate	Potential partners identified
SRL1	Initial ideas			

* “Partners” in this context means all stakeholders in the process of implementing Industrial Symbiosis, including e.g. the broader public, public authorities, industrial partners.

HUBS FOR CIRCULARITY – Symbiosis Readiness Levels

Generating impact at scale across EU regions



SRL: Symbiosis Readiness level

Based on the "Study and portfolio review of the projects on industrial symbiosis in DG Research and Innovation: findings and recommendations" by Klaus H. Sommer

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P4Planet: Hubs4Circularity

- **Broad cross-sectorial symbiosis to achieve a step change in circular utilization of resources and GHG emission reductions, building on regional strength.**
- **First-of-a-kind, lighthouse demonstrator plants of commercial size.**

Relevant topics:

- **HORIZON-CL4-2021-TWIN-TRANSITION-01-14: Deploying industrial-urban symbiosis solutions for the utilization of energy, water, industrial waste and by-products at regional scale (Processes4Planet Partnership) (RIA)**
- **HORIZON-CL4-2021-TWIN-TRANSITION-01-16: Hubs for Circularity European Community of Practice (ECoP) platform (Processes4Planet Partnership) (CSA)**
- **HORIZON-CL4-2022-TWIN-TRANSITION-01-10: Circular flows for solid waste in urban environment (Processes4Planet Partnership) (IA)**

European Commission

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Progress

Potential Gaps

… for making Industrial Symbiosis even more successful

- **R&I support and funding** through EC, but …
- Enable **piloting and demonstration** (H4C)
- **Systematic** analysis (Symbiosis Readiness Level (SRL)), but …
- **Community of Practice** (ECoP) and importance of facilitation
- **Broadening** of sectors (I-US), but …
- Involve **Industrial Park Owner/Operator**, **Municipalities** or the **Chamber of Commerce** and/or the **Association** of a cluster of companies as **facilitators** (Regional Approach), but …
- Close cooperation and alignment of different **Directorates General**, but …

- **Technologies** need to be developed to enable new and farther-reaching approaches. E.g. hydrogen, CO_2 capture, renewable electricity, heat, methanol, water … (see e.g. Smart Delta Resources (SDR))
- Link to **Financing** (EIB, ECBF, …)
- Systematically generate and **openly make available** transparent **Data** on Industrial Symbiosis potential. See EPOS, SCALER, … .
- **Broadening** cooperation with other sectors, e.g. Manufacturing (FoF – Made in Europe)
- When setting up or reforming Industrial Parks create **Industrial Symbiosis by Design**. Move **business model** from Supply-based to **Demand-based**.
- Include Industrial Symbiosis in **Education. Involve Academia.**
- **Regulation**: "Less Waste, More Value"
- Ensure **sustainable** close cooperation and alignment of different **Directorates General**

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Final Thoughts

Many of the **topics** which the **community** had identified to be important for the successful implementation of Industrial Symbiosis have been taken up in the **concepts** and **programming**.

As always in life, **implementation, execution and impact** are now of the essence.

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Thank you for your kind attention