



PART C

**OVERVIEW OF
STRATEGIES FOR
INDUSTRIAL SYMBIOSIS
PROJECTS
IMPLEMENTATION**

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All research, data and content was developed by SCALER partners ISQ and The University of Cambridge - Department of Engineering, with support from Strane Innovation, Quantis and EIT Climate-KIC. For more information and access to the full reports, please visit www.scalerproject.eu

Published in June 2020



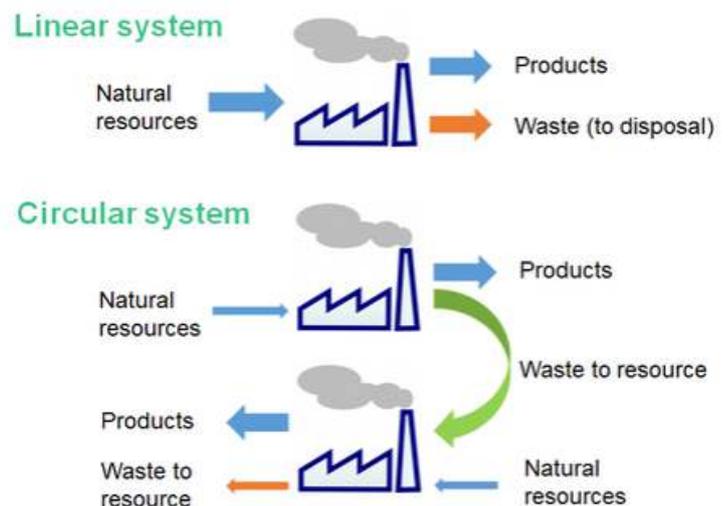
This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement no 768748

GUIDELINES FOR INDUSTRIAL SYMBIOSIS IMPLEMENTATION

PART C - OVERVIEW OF STRATEGIES FOR INDUSTRIAL SYMBIOSIS PROJECTS IMPLEMENTATION

We currently live in a world of constrained resources, growing populations and exceeding planetary boundaries. There is a need for industries to change the way they make things and shift towards a more sustainable industrial system.

Industrial symbiosis has surfaced in the last years as a business model for companies willing to become more sustainable. There is a need to change from linear to circular production systems, where waste from one industry can become a resource for another.



This document summarises the main aspects that must be considered when setting strategies for the implementation of industrial symbiosis projects.

The document first explores opportunities from a company level, followed by regional/national and European levels. Industrial symbiosis can only be fostered through joint endeavors by actors across all levels, who all have a critical role to play.

- A - Introduction to industrial symbiosis (video)
- B - Intervening factors
- C - Overview of strategies for IS projects implementation
- D - Synergy technical implementation
- E - Sectoral outlook
- F - Strategic recommendations

This document is part of a series of guidelines that aim to assist industry players in their implementation of industrial symbiosis.

The full series is available for download at:

www.scalerproject.eu

STRATEGIES FOR INDUSTRIAL SYMBIOSIS AT A COMPANY LEVEL

The potential gains and benefits that industrial symbiosis offers to industries are well established and known. But how to get started and what needs to be done by industries and other stakeholders?

The starting point of any industrial symbiosis initiative in a company is typically the discovery of value uncaptured (e.g. waste), which can unlock new opportunities.

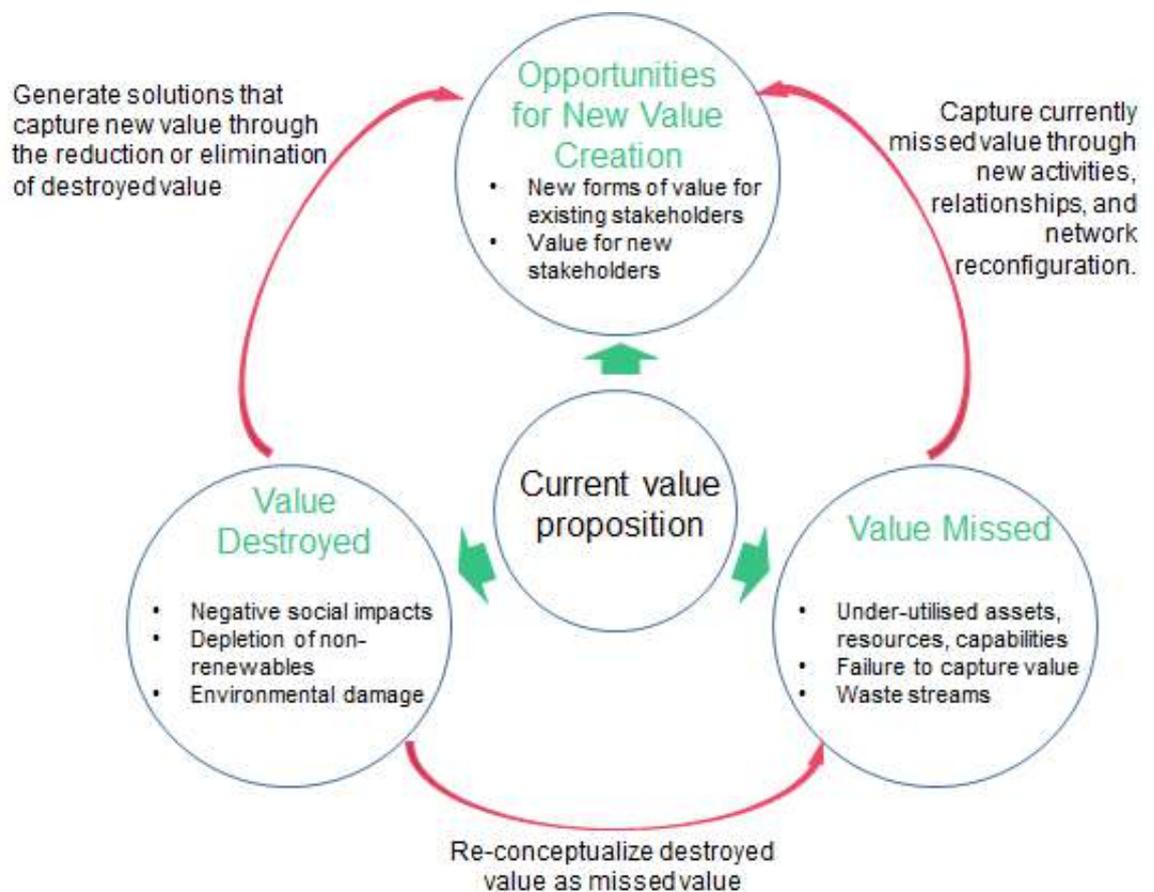
Companies may not be fully aware of the full range of potential value outcomes. Most existing business models are based on creating, delivering and capturing economic value, with limited or no attention to environmental and social value.

The changing business environment, wider range of stakeholders engaging in the debate on industry, resource limitations and the emphasis on social responsibilities of firms has raised the need for sustainable value creation.



Rana et al. (1) and Bocken et al. (2) propose a framework for business model innovation for sustainability, by explicitly considering value destroyed and value missed within the business model, as these often represent important opportunities for sustainability innovation.

Their research provides a qualitative framework to facilitate systematic exploration of the different forms of value for each stakeholder.



- **Value captured** — current value proposition
- **Value destroyed** — negative value outcomes of current model
- **Value missed** — value currently squandered, lost or inadequately captured by current model
- **Value opportunities** — new opportunities for additional value creation and capture through new activities and relationships

1. Rana, P., S.W. Short, N. Bocken, and S. Evans. 2013. Towards a sustainable business form: A business modelling process and tools. In SCORAI Conference, 12–14 June, Clark University, Worcester, USA.

2. Bocken, N., S.W. Short, and S. Evans. 2014. A literature and practice review to develop sustainable business model archetypes. *Journal of Cleaner Production* 65: 42–56.

The first step towards the implementation of an industrial symbiosis project is to create a team responsible for looking at the processes, by-products and waste, and try to figure out what can be made differently.

The goal is to discover value in the waste streams (material or energy) and by-products.

Companies need to create a dedicated organisational function to explore and drive synergistic opportunities; this delivers more rapid progress than project-based assignments that are typically given to individuals, in addition to running business as usual.



Strong leadership and commitment from top management to shift organisational/corporate mindsets away from the current unsustainable paradigm and business as usual is a must. All people in the organisation must understand and feel that things must be done differently and that they have strong support from their leaders.

We recommend starting with small scale initiatives and experiments, to then gradually build capability, capacity and most importantly confidence. This will allow people to become more involved in the spirit of industrial symbiosis and gain experience, which will allow them to later become more ambitious and develop industrial symbiosis projects that will have a larger impact in their business and on the environment.

Once you have started looking for potential synergies you will find that some of them may be happening internally - within the company borders - but for some of them you will need cooperation from other stakeholders.

You will need to start collaborating with other parties and this requires building trust.



ESTABLISH A COORDINATED NETWORK



There is a need to build circles of trust with other stakeholders, namely other industries with which you want/need to start industrial symbiosis projects. For these projects to work it is essential to have guarantees that the material or energy flows, as well as their quality, will be available over a long period of time.

It is necessary to foster strong private sector leadership and build links between industry and research institutes/knowledge intermediaries, essential for effective industrial symbiosis.

Raising awareness of the potential benefits of industrial symbiosis is also a strong supporting factor.

Projects can be implemented by building a coordinated network that collectively designs and implements appropriate business models.

Most of the time, this will require a long-term view for even modest economic, social and environmental benefits to be realised. Local authorities need to be called into action to support this. They need to create conditions for industrial symbiosis in urban areas/cities, and facilitate public and private sector capabilities to form industrial symbiosis networks in an increasingly urban environment.

Finally, there is also the need for people and/or entities to take a leading role in coordinating and developing industrial symbiosis platforms.

RECOMMENDATIONS FOR REGIONAL/NATIONAL LEVEL ACTORS

- Industrial symbiosis is a complex endeavour that requires a **coordinated effort** among multiple public and private stakeholders - policy makers must take the lead.
- **Regional material flows** should be mapped, as that will allow companies to better find potential synergies with neighbouring companies.
- For industrial symbiosis to accelerate rapidly, national governments need not only a **clear, comprehensive and on-going engagement policy** but a Minister and proper department/body that is accountable for delivering specific targets.
- Within this is the need for **comprehensive structures** (at multiple levels that are synchronised) to be established in each country. These should be **fully funded by national governments**, and would allow for the dynamic development of industrial symbiosis networks driven by on-going support and interventions.
- Industrial symbiosis **best practices** must be publicised to promote learning and knowledge sharing among regional/national actors.



RECOMMENDATIONS FOR REGIONAL/NATIONAL LEVEL ACTORS

- Increase efforts to include industrial symbiosis and circular economy activities in regional/national strategies.
- Invest in accessible high-quality specialist knowledge databases that are continuously updated and supported.
- Invest in actors with deep knowledge and expertise who understand the sectors in-depth, as sector-specific knowledge is critical.
- National and regional/local governments, in some places, can exert powerful leverage by mandating and actively managing industrial symbiosis activities to ensure compliance with national laws, in addition to supporting agencies operating at the level of EIPs and individual firms. This top-down/bottom-up approach advances industrial symbiosis at greater speed, as opposed to fragmented approaches elsewhere.
- Organise industrial symbiosis discovery and business model design workshops with world-leading experts for local clusters.
- Enable and create private-public circular economy partnerships.
- Create conditions and build trust among industries, research institutes/knowledge intermediaries and public authorities.

ACTORS AT EUROPEAN LEVEL

There is an acute need for **standardisation** across Europe, similar to the approach taken for the food value chain. This allows stakeholders at all levels to develop a shared understanding of existing challenges and opportunities.

There is need for **enduring effort** to support industrial symbiosis through direct EU, national and regional government investment; this is a pivotal enabler in starting networks and supporting the expansion of existing networks.

Competitive and accessible private investment specifically designed for industrial symbiosis is also needed. Banks and financial institutions should develop expertise for such financing and incorporate industrial symbiosis and circular economy initiatives in their portfolios.

Requirements for metrics must be devised and targets should be set to allow direct and measurable links to be made between industrial symbiosis and higher productivity, while simultaneously reducing environmental impacts.



Financial incentives must be provided for industry (e.g. tax exemptions) and research institutes/knowledge intermediaries (public investment) to engage with industrial symbiosis initiatives.

A **regulated waste market** (similar to financial markets) should be created as it would allow the market to function in a more transparent way.



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