Subtask 3: Energy- and Carbon oriented industrial symbiosis

Task XXI, Decarbonizing industrial systems in a circular economy framework
So, why industrial symbiosis?
Sustainability is not an individual property but a property of an entire web of relationships

“A Systems View of Life”

The part of industrial ecology known as industrial symbiosis engages traditionally separate entities in a collective approach to competitive advantage involving physical exchange of materials, energy, water, and by-products. The keys to industrial symbiosis are collaboration and the synergistic possibilities [often] offered by geographic proximity

/Chertow (2000)
Industrial symbiosis is the use by one company or sector of underutilised resources broadly defined (including waste, by-products, residues, energy, water, logistics, capacity, expertise, equipment and materials) from another, with the result of keeping resources in productive use for longer.

/European Committee for Standardisation (2018)
And the potential?

**Facilitated:** where a third-party intermediary coordinates the activity, working with organisations to identify opportunities and bring them to fruition. Industrial symbiosis practitioners play the critical role of facilitating and coordinating the contributions of the various stakeholders. By engaging with organisations from all sectors, the practitioner enables the flow of information across sectoral boundaries; practitioners often provide technical support to overcome technical or regulatory barriers associated with synergies.

**NISP**

**NATIONAL INDUSTRIAL SYMBIOSIS PROGRAM**

**Impact**

NISP has enabled its business in England to:

- Divert 47 million tonnes of industrial waste from landfill
- Generate £1 billion in new sales
- Reduce carbon emissions by 42 million tonnes
- Cut costs by £1 billion by reducing disposal, storage, transport & purchasing costs;
- Reuse 1.8 million tonnes of hazardous waste
- Create and safeguard over 10,000 jobs
- Save 60 million tonnes of virgin material
- Save 73 million tonnes of industrial water

**Self-organised:** a bottom up approach resulting from direct interaction among industrial actors, without any external coordination, generally motivated by business concerns arising from context, including resource risk, pending legislation, and economic gains.
Since 2007 International Synergies has exported the NISP® model to more than 20 countries at a national or regional level through a capacity building model. Additionally, International Synergies has provided strategic industrial symbiosis consultancy and readiness training to over 10 additional countries.

To help educate lawmakers about the opportunities provided by industrial symbiosis (IS), CSI organized tours in 2017, 2018, and 2019 of Kalundborg.
Gas imports from Russia

Fertiliser plants shut down production as natural gas prices surge
Production has been either stopped or slowed at plants belonging to Yara, CF Fertilisers, Azoty, Anwil and Achmea, Siddhak Walsh and Amy Fortune report.

Greenhouse gas: how soaring energy bills are squeezing Dutch fruit-growers
Rising prices have forced many greenhouses owners to stop production or close a season.

High natural gas prices lead to a shutdown of British fertilizer plants.
Companies reliant on natural gas and electricity are feeling the pinch of soaring fuel prices.

Biggest tomato supplier shuts greenhouses due to gas price
posted by Juliette Rowell
in Risk, Supply chain
12 October 2021
The UK’s biggest tomato supplier has warned production is threatened by soaring gas prices that mean it is too expensive to heat greenhouses.
Excess heat → Flue gases → Products

Primary resources → Main products

Organic waste → BIOGAS

H₂O → \frac{1}{2}O₂ + H₂

Dubbed 'Green Wolverine', this is Fertiberia's first green ammonia project outside Spain. The new facility will be constructed in the Lulea-Boden area and will feature over 600MW of electrolyser and a green ammonia plant producing 1,500 tonnes per day.
Symbiosis adds complexity, and the system perspective is fundamental.

Avoidable residuals?
=> Risk of lock-in. Incremental improvements at the cost of transformative potential!

Unavoidable residuals?
=> Symbiosis!
Task XXI, Decarbonizing industrial systems in a circular economy framework

Subtask 3: Energy- and Carbon oriented industrial symbiosis

• Start Spring 2023
• End December 2024

“Various hotspots such as complexity, relevant business models and practical examples were identified as most interesting in regard to industrial symbiosis in general.”

/Conclusion from Subtask 1
Activities

• Definition of industrial symbiosis in connection to this subtask

• Networking – connection to other tasks within the IETS and beyond

• Good Practice Examples and New Development of Knowledge

• Business Models for industrial symbiosis
Networking

Industrial symbiosis and its scope overlaps with part of the work done in many other IETS Tasks as well as other IEA TCPs.

It is therefore important to develop channels of communication that allow for not only exchange of information but also to explore possibilities for carrying out joint actions (for instance workshops) that would be of mutual benefit.
“Best Practices” are developed by people solving for a particular problem. They have done the hard work of trying to understand all the finer details of a specific problem. They have likely tested different applications of the practice and can predict the outcomes. Through this they have developed an understanding of what to do to improve to the next level and or grow.

They have developed and applied their “Best Thinking”.

• Non-conventional technical applications
• Removing barriers
• Resilience issues
• Added values
• Risks
• Legislation
• Transformative approach
• ....
Business models for industrial symbiosis

The architecture, engineering, construction and facility management of industrial symbiosis are known to be risk-averse and highly sensitive to capital cost.

The task will review and explore:

- barriers and incentives of the adoption and implementation of industrial symbiosis
- existing business models of industrial symbiosis
Thank you for your attention!

Hope to meet you in one of our Activities in Subtask 3!

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Lunchtime

12:15 - 13:30