

Advancements in Industrial Symbiosis Standardization

Where are We Now?
a perspective from circular
economy

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Industrial symbiosis – Typical representations

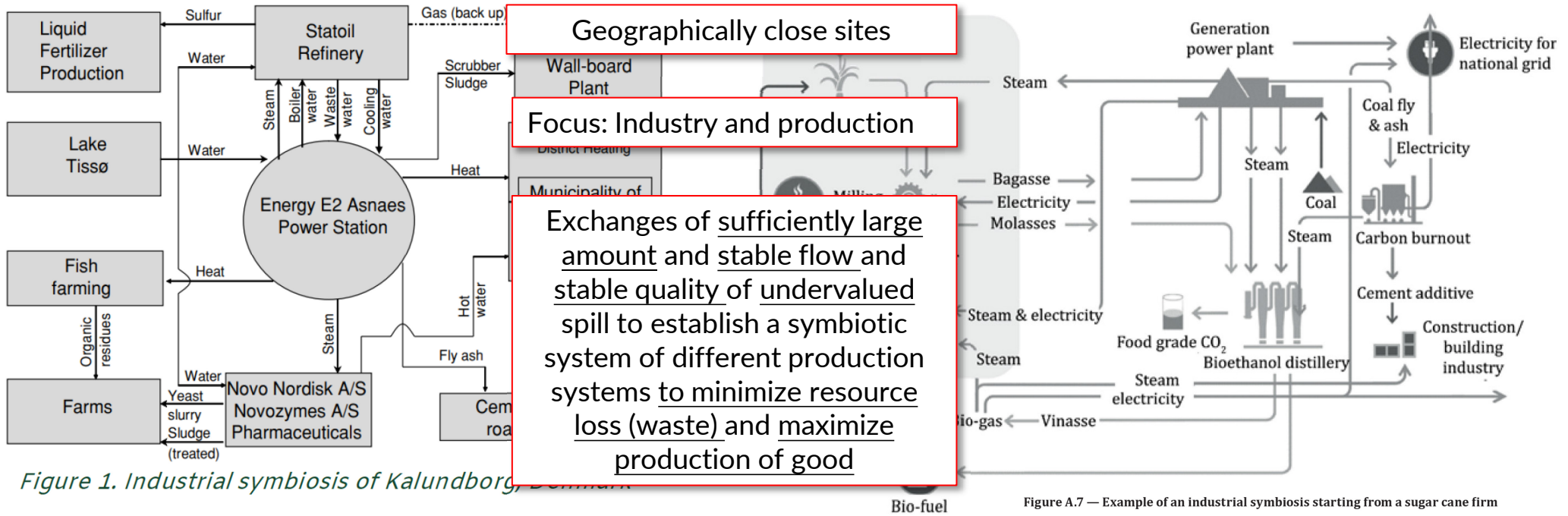


Figure 1. Industrial symbiosis of Kalundborg, Denmark

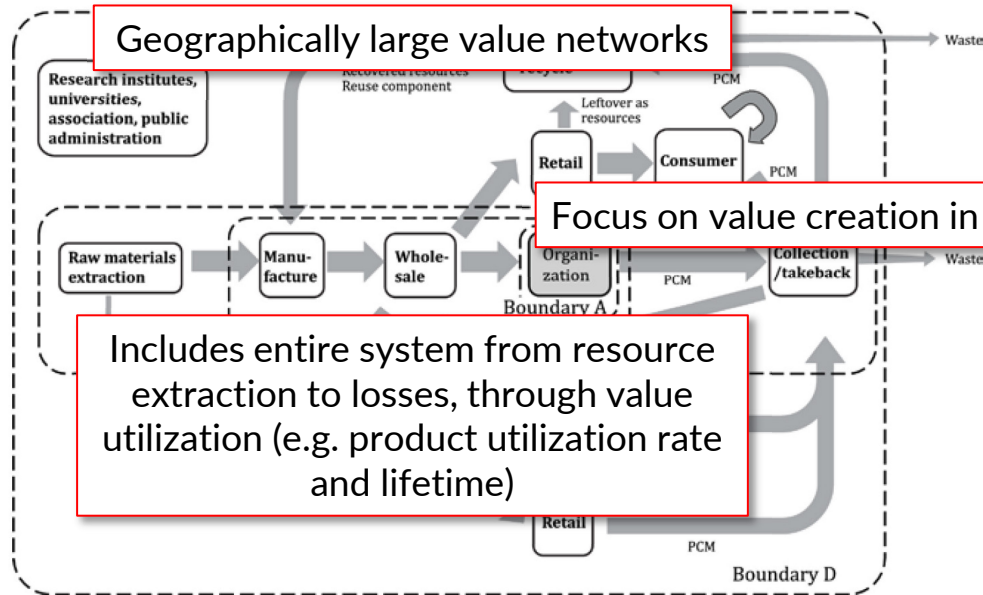
Figure A.7 — Example of an industrial symbiosis starting from a sugar cane firm

Picture sourced from: Report on industrial symbiosis standardisation needs, SCALER Project June 2020

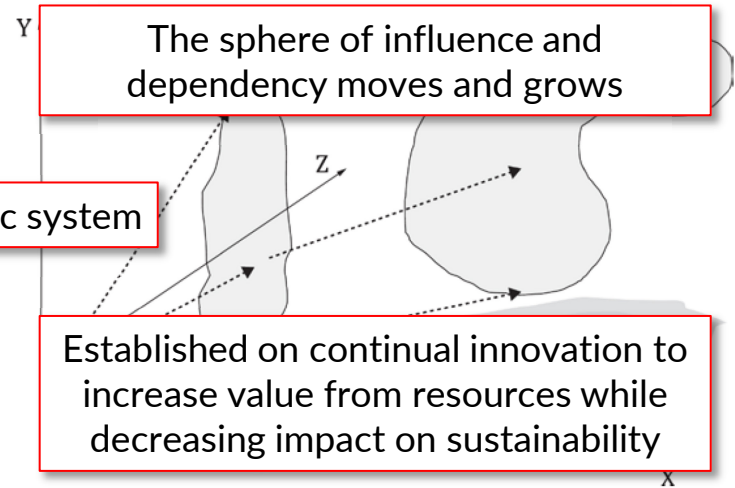
Picture sourced from: ISO 59010:2024 Circular economy – Guidance on the transition of business models and value networks

Circular economy – Typical representations

Figure A.1 illustrates a hypothetical organization's value network.



Key
PCM post-consumer material



Key
X time
Y dimensions of complexity
Z sphere of influence
1 time 1
2 time 2
3 time 3

Figure A.3 — Image of boundary transition over time

Pictures sourced from: ISO 59010:2024 Circular economy – Guidance on the transition of business models and value networks

Definitions

International standard ISO 59004:2024

Circular economy - Vocabulary, principles and guidance for implementation

Definition 3.1.1

circular economy

economic system (3.1.2) that uses a systemic approach to **maintain a circular flow of resources** (3.1.6), by **recovering, retaining or adding to their value** (3.1.7), while contributing to sustainable development (3.1.11)

CEN Workshop Agreement CWA 17354:2018

Industrial Symbiosis: Core Elements and Implementation Approaches

“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**. It presents a systems approach to a more sustainable and integrated industrial economy that identifies business opportunities to improve resource utilisation and productivity. “

Differences and relationships

Application

- **Industrial symbiosis** is applicable to systems that **produces value**
- **Circular economy** is applicable to **economic systems**, e.g. systems which produces, utilizes and maintains value

Relationships

- Industrial symbiosis is a strategy for value **production systems in a circular economy**
- Circular economy provides **context and effective platform for symbiotic industrial** systems



So, what about standards?

standardized so far?

What has been

Standards necessary for industrial symbiosis

- Defining the concept 'industrial symbiosis' **CWA 17354 Industrial Symbiosis: Core Elements and Implementation Approaches**
- General and specific requirements of symbiosis carrying resources **Mainly lacking sufficient standards**
 - General includes specifyability, quality variability, amounts, frequencies, etc.
 - Specific includes relevant sets of standardized material property measurement methodologies and appropriate statistical ranges per quality, etc.
- Guidance for stable mutual responsibility symbiotic relationships **Mainly lacking sufficient standards**

Standards necessary for circular economy

- What is the concept 'circular economy' **ISO 59004 and ISO 59010**
- How to measure 'circularity' **ISO 59020**
- Guidance for establishing and maintaining in circular value networks **ISO 59010, ISO 59040, IEC 82474-1, DPP**
- How to specify product lifetime, appraise resource value, include natural generative resources such as biodiversity and many other nuts and bolts **Mainly lacking sufficient standards**

What else has been standardized so far?

Examples

Resource impact and value assessment

- ISO 1404ff - Life cycle assessment
- ISO 14051 and -52 – Material flow cost accounting
- ISO 14007 and -08 - Economic of environmental costs



Data structuring for material identification and specification

- IEC 62474 - Material Declaration for Products of and for the Electrotechnical Industry
- IEC 62474 DSL updated on July 21, 2024
- Soon replaced by: ISO/IEC 82474-1 - Material declaration - Part 1: General requirement



Circular economy

- ISO 59000:2024 -series of standards
- Ongoing, sector specific
 - CEN/TC 248/WG 39 - Circular Textiles Chain - Requirements and categories
 - CEN/TC 466 - Circularity and recyclability of fishing gear and aquaculture equipment
 - ISO Plastics
 - CEN TC 207 Furniture
 - CEN Construction sector

What is being standardized now?



CEN/TC 473 Subcommittees and Working Groups

Working group	Title
CEN/TC 473/WG 01	Circular Economy Terminology, Framework & Principles
CEN/TC 473/WG 02	Information sharing
CEN/TC 473/WG 03	Extended Producer Responsibility
CEN/TC 473/WG 04	Circular Business Models
CEN/TC 473/WG CAG	Chair Advisory Group

What standardization is starting up?



"Sustainable Cities and Communities"

CEN/TC 465

**Project Decision 59/2024 – Adoption of preliminary work item on
Industrial Symbiosis**

The CEN/TC 465 members are invited to vote on adoption of preliminary work item on Industrial Symbiosis **before the 23rd August 2024.**



Challenges

- Business cases need to be economically localized
- Symbiosis carrying resources need stable quality, supply and relative value
- System external market dynamics may impact stability

Drivers

- Legislation (waste directive, eco-design directive, critical raw material directive etc.)
- Decrease CO2-emissions
- Innovation as driver (increased revenue from new business models, green branding, decreased costs etc.)
- Consequences of innovation (wasteful/non-efficient solutions phased out)
- Resilience to global dynamics

Actors

- Authorities' standardization request e.g. digital product passport and standardization on battery and critical raw materials
- Impacted sectors e.g.
 - Intermediaries, like plastics, aluminum, concrete, steel, slag, casting sand
 - Bio energy, like forestry and paper production spill, agricultural spill, waste water sludge, biogas, st fashion
 - Fast, high volume consumption, like fashion, furniture, construction material,
 - Special sectors, like fishing gear, textile, automotive, mining, phosphorous,
 - NGOs and advocacy groups
- Local actors in the fields of industrial symbiosis

Thank you for your
attention!

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