INTRODUCTION TO INDUSTRIAL SYMBIOSIS

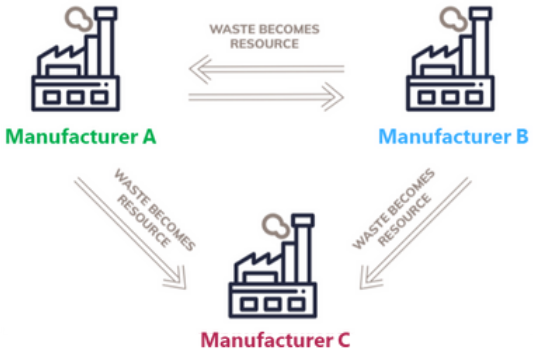
What is Industrial Symbiosis?

Industrial Symbiosis is a circular economy model where businesses work together to use each other's waste or byproducts, creating a network of collaboration that reduces environmental impact and improves resource efficiency.

1. Traditional manufacturing:

2. Symbiotic exchange:

3. Industrial symbiosis:



Source: Kalundborg Symbiosis, Guide for Industrial Symbiosis Facilitators.

Benefits of Industrial Symbiosis

Industrial symbiosis is a step towards building an economy around carbon reduction:

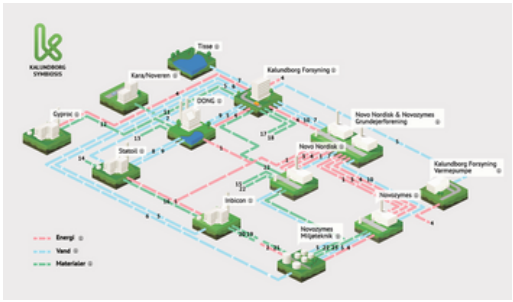
Social
- Economic resilience through collaboration
- Job creation & workforce development
- Improved quality of life

Environmental
- Waste reduction
- Efficient resource use
- Decarbonization

Economic
- Cost savings
- Technological innovation
- New revenue streams

Example Project: Kalundborg, Denmark

Kalundborg Symbiosis is a network of 16 public and private industrial facilities that share resources.



Source: Kalundborg Symbiosis

Example Project: Perth, Australia

The Kwinana Industrial Area reuses industrial wastewater for a cogeneration power plant. This project reduced groundwater extraction, freed up public water supply for domestic use by nearby residents, and replaced jobs lost after nearby closures of manufacturing plants.

Source: Kwinana Industries Council

INDUSTRIAL SYMBIOSIS IN THE PORTLAND AREA

A just transition for Portland's industrial sector...

Our team at the Portland Clean Industry Initiative is unified around the vision of a just transition for Portland's industrial sector. **With the pursuit of industrial symbiosis, we aim to shift production from extraction to regeneration and circularity, while centering communities most impacted by the climate crisis** through creation of green jobs, pursuit of environmental justice, and community-led projects.

...centered in the Columbia Corridor.

Our work is focused in the Columbia Corridor, the region's largest industrial district that employs thousands of middle-wage workers and is located adjacent to some of the region's most disadvantaged neighborhoods. Deliberate, equitable investments in industrial symbiosis could bring significant benefits to the disadvantaged communities in the Columbia Corridor.

The Enabling Environment

Funded by the Department of Energy's Community Energy Innovation Prize, we set out to build the social infrastructure needed to enable industrial symbiosis in Portland. Our work resulted in an **expansive network of partners, stakeholders, and coalitions dedicated to industrial symbiosis**, which is visualized in the diagram to the right. This network catalyzed multiple new coalitions and potential symbiosis projects, such as a large waste innovation accelerator with co-located symbiosis partners.

COMMUNITY ENGAGEMENT TOOLKIT FOR INDUSTRIAL SYMBIOSIS

This toolkit is intended to help organizations pursuing industrial symbiosis or similar projects engage with disadvantaged communities and address historical inequities. Each recommendation is accompanied by a description of how we put it into practice at a community workshop in Portland, Oregon.

01. INCLUSIVITY AND ACCESSIBILITY

Follow best practices for inclusive engagement.

- Meet accessibility needs such as providing food and childcare if needed, and holding engagement events at convenient locations and times.
- Involve community members early in the process.
- If possible, compensate community members to encourage participation.

HOW WE DID IT: We hosted our workshop at a nonprofit community meeting space in our focus neighborhood and provided food for attendees.

02. FRAMING THE ISSUE

Build trust by grounding the conversation in common values and goals, providing important context, and acknowledging shared histories and past harms.

- Share your mission, vision, and values for the project, such as centering communities of color and shifting from extractive to regenerative approaches.
- Situate industrial symbiosis in the context of local, state, or national climate goals.
- Be transparent about challenges and past harms that may have impacted relationships and trust among community members.

HOW WE DID IT: We opened our workshop with a long-term vision for a just transition and shift in the government approach to industry. We then shared maps of environmental justice issues in Portland and acknowledged our role in perpetuating harms through past approaches. We shared our overarching climate and sustainability goals, and asked for feedback from community members.

COMMUNITY ENGAGEMENT TOOLKIT FOR INDUSTRIAL SYMBIOSIS

03. EXPLAINING INDUSTRIAL SYMBIOSIS

Use accessible language and visuals to improve understanding of technical topics.

- Use images to make a technical topic more accessible to a layperson.
- Provide case study examples of industrial symbiosis projects with community benefits.
- Show how industrial symbiosis projects will impact people and communities, not just businesses.

HOW WE DID IT: We used simple graphics to make industrial symbiosis easily understandable (see page 3), and shared examples of international projects that created community benefits similar to local community priorities.

04. FOSTERING PRODUCTIVE DISCUSSION

Design engagement activities so that community members can meaningfully participate and feel heard.

- Have a conversation, not a lecture. Allow people to challenge your assumptions about the community by asking questions such as, “Are there any additional perspectives or information that we should know?”
- Develop a mix of interactive activities such as small breakout sessions, free writing, post-it note exercises, and group brainstorming.

HOW WE DID IT: We prompted people to discuss positive and negative industrial impacts in a large group setting. We also held small group breakouts with notetakers and report-outs to brainstorm potential community benefits. We used open-ended questions to encourage deeper engagement.

05. KEEPING PEOPLE ENGAGED

Community engagement shouldn’t be a one-off. Build in ways for people to stay engaged after the project wraps.

- Ask people how they would like to stay involved and what kind of support they need. For example, would they prefer an email list or a quarterly meeting? Do they require compensation?
- Be transparent about next steps, including how you will use the information they shared during the meeting. Send updates at major project milestones.

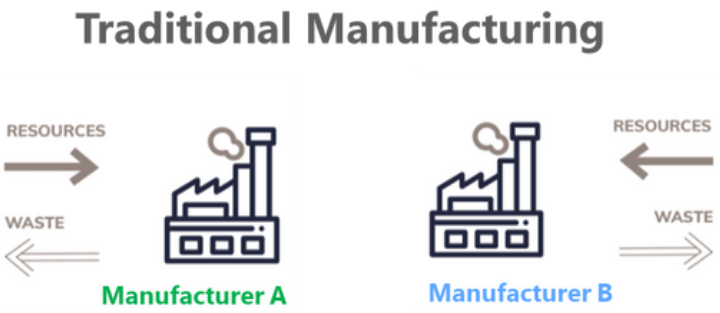
HOW WE DID IT: We had people fill out the survey before leaving while their minds were fresh.

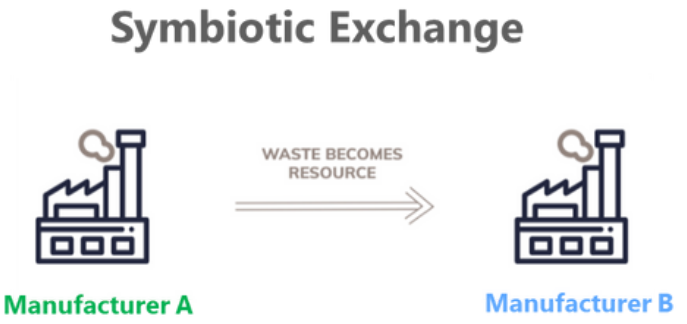
ADDITIONAL RESOURCES

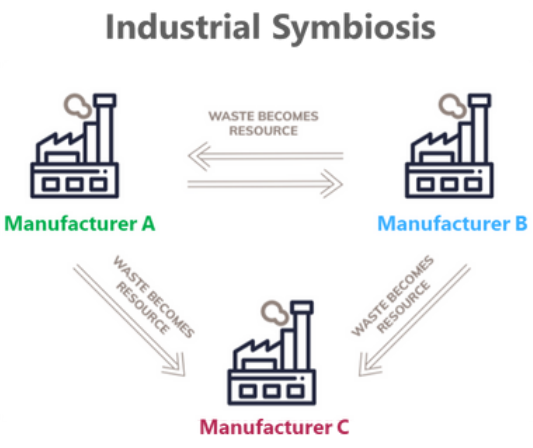
The Spectrum of Community Engagement to Ownership is a helpful framework to increase community capacity and participation in climate projects. The steps below are essential for building capacity for community collaboration and governance. We rely on the spectrum to recognize where we are at and set goals for equitable solutions development and decisionmaking.

Source: Movement Strategy Center, "The Spectrum of Community Engagement to Ownership".

We recommend simplifying technical images to distill industrial symbiosis into easily understandable formats. These images were very illustrative for community members learning about industrial symbiosis for the first time.







Source: Kalundborg Symbiosis, Guide for Industrial Symbiosis Facilitators.