Closing the Loop:
Exploring Opportunities for Materials Exchanges & Industrial Symbiosis in Maine

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AGENDA

THE PROJECT

- Policy
- Planning
- Partners

MATERIALS

- Per capita
- History
- Trade

CIRCULARITY

- Economics
- Environment
- Community

CASES

- Maine cases
- Global cases
- Industrial symbiosis

Maine Won't Wait 2024

Strategy F part 9:

"Maine should also investigate opportunities for industrial and regional materials exchanges"

Municipal & Industrial Savings

Municipal Waste Management

- Waste disposal one of the top three expense categories for municipalities
- Some high volume/weight materials could be diverted and reused
- Savings could be directed to other essential programs
- We are running out of landfill space...

Maine Manufacturers

- Inputs increasingly expensive, waste management expensive
- Supply chains are often unreliable
- Increased resilience and local economic development with local inputs

“Opportunities for Industrial Materials Exchange in Maine”

1. Workshops

Engage partners to understand needs & build networks

2. Surveys

Survey partners about high volume wastes, inputs, opinions

3. Mapping

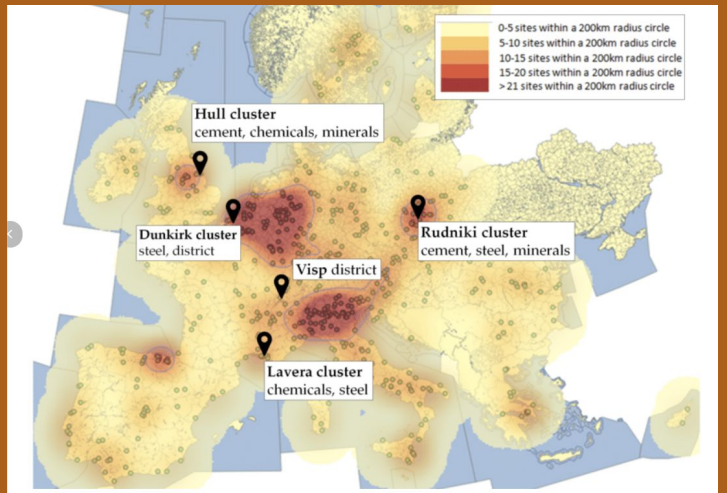
Map materials flows to identify opportunities for materials exchange

4. Collaboration

Collaborative proposals for the next steps

1865 THE UNIVERSITY OF MAINE

Senator George J. Mitchell Center for Sustainability Solutions



Map of the European industrial symbiosis hot spots and the locations of industrial symbioses in the case study (adapted from (Strane Innovation SAS, 2016))

Maine Resource Recovery Association

MAINE MUNICIPAL ASSOCIATION SINCE 1936

MAME MANUFACTURERS ASSOCIATION OF MAINE

Project Timeline

Activity	Fall 2025	Spring 2026	Summer 2026	Fall 2026	Spring 2027	Summer 2027
Workshops	We are here!					
Surveys						
Mapping						
Collaboration						

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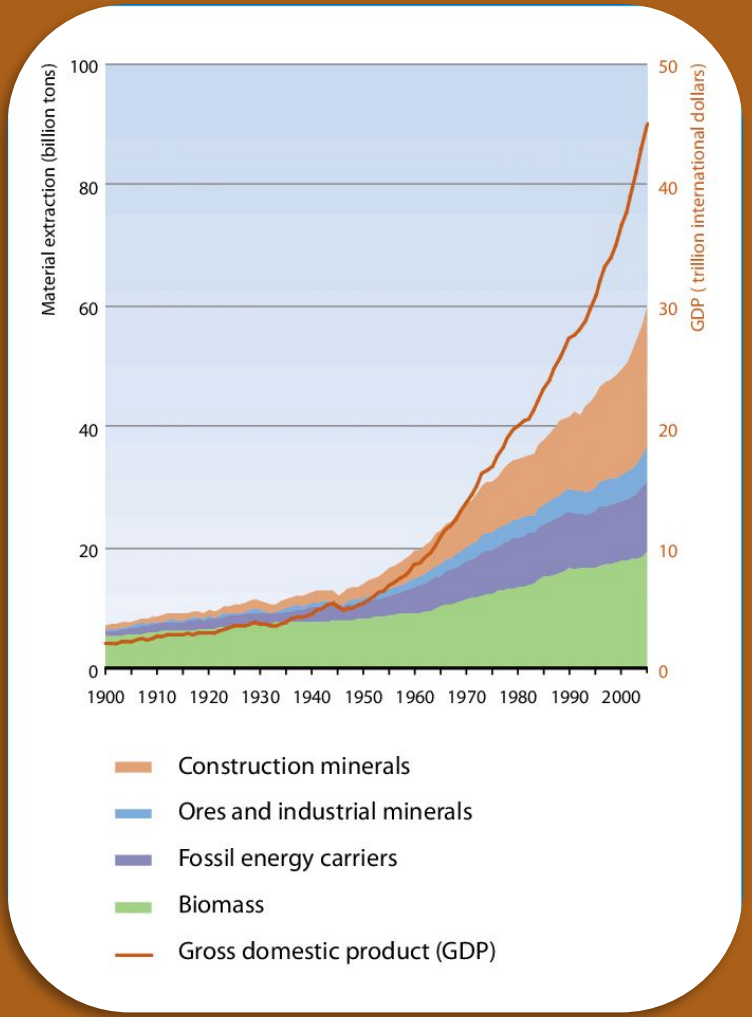
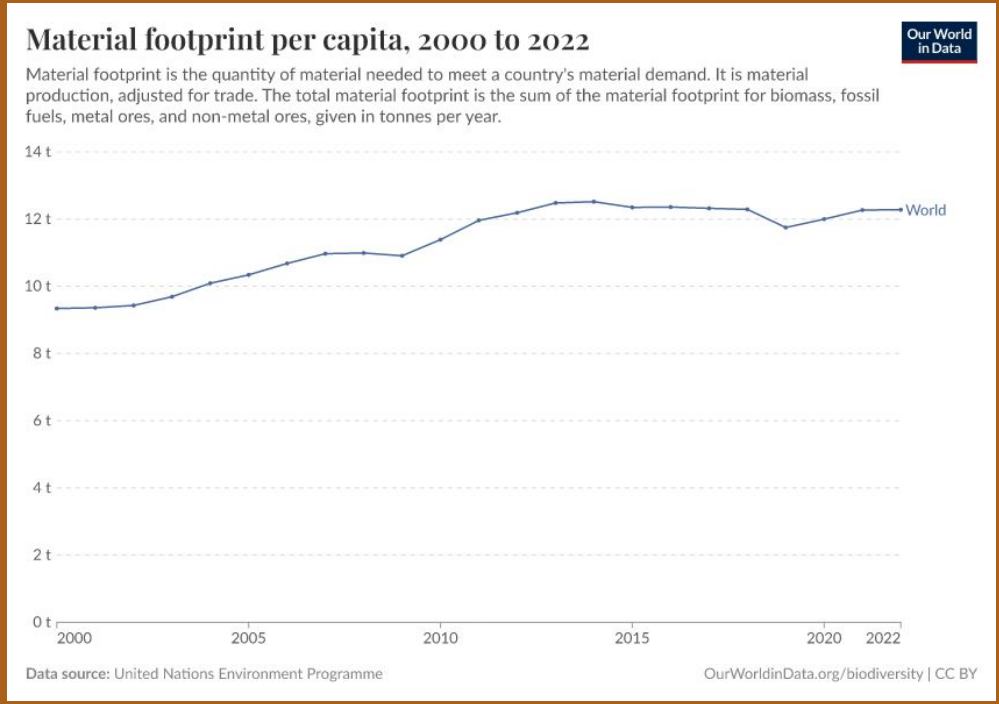
materials use



materials use per capita



linear materials systems

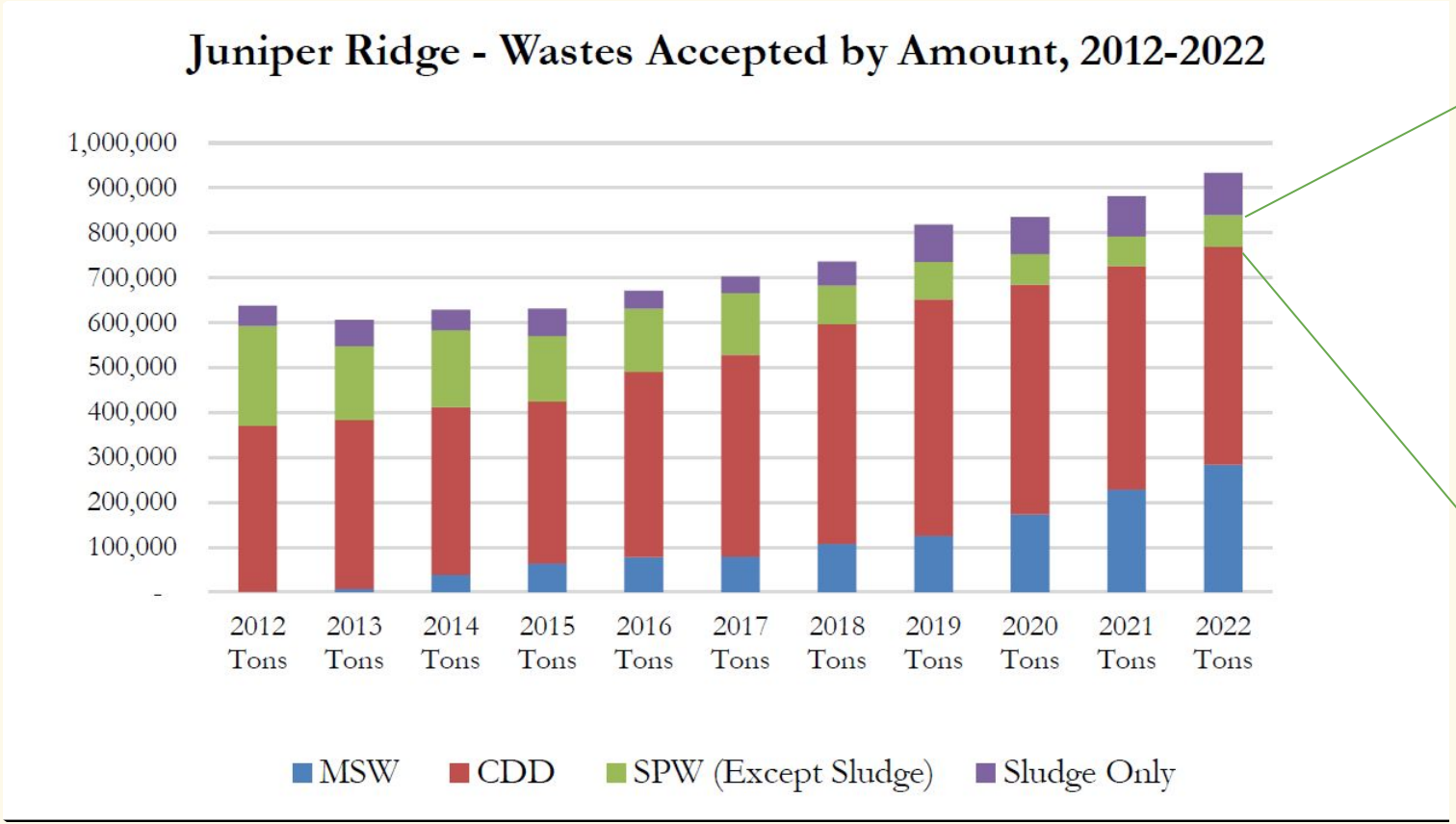
Involves energy, water and labor inputs, and pollution output at every stage

RESOURCE EXTRACTION

PRODUCTION & MANUFACTURING

TRANSPORTATION & RETAIL

USE & DISPOSAL



Some interesting industrial SPW:

1,917t polyethylene and cellulose trimmings

1,033t non-hazardous chemicals

751t pulp mill waste

525t Industrial Miscellaneous

Juniper Ridge receives Special Wastes (SPW)

2022 Waste Generation and Disposal Capacity Report

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Circular Economy

Material Savings (WBCSD 2024)

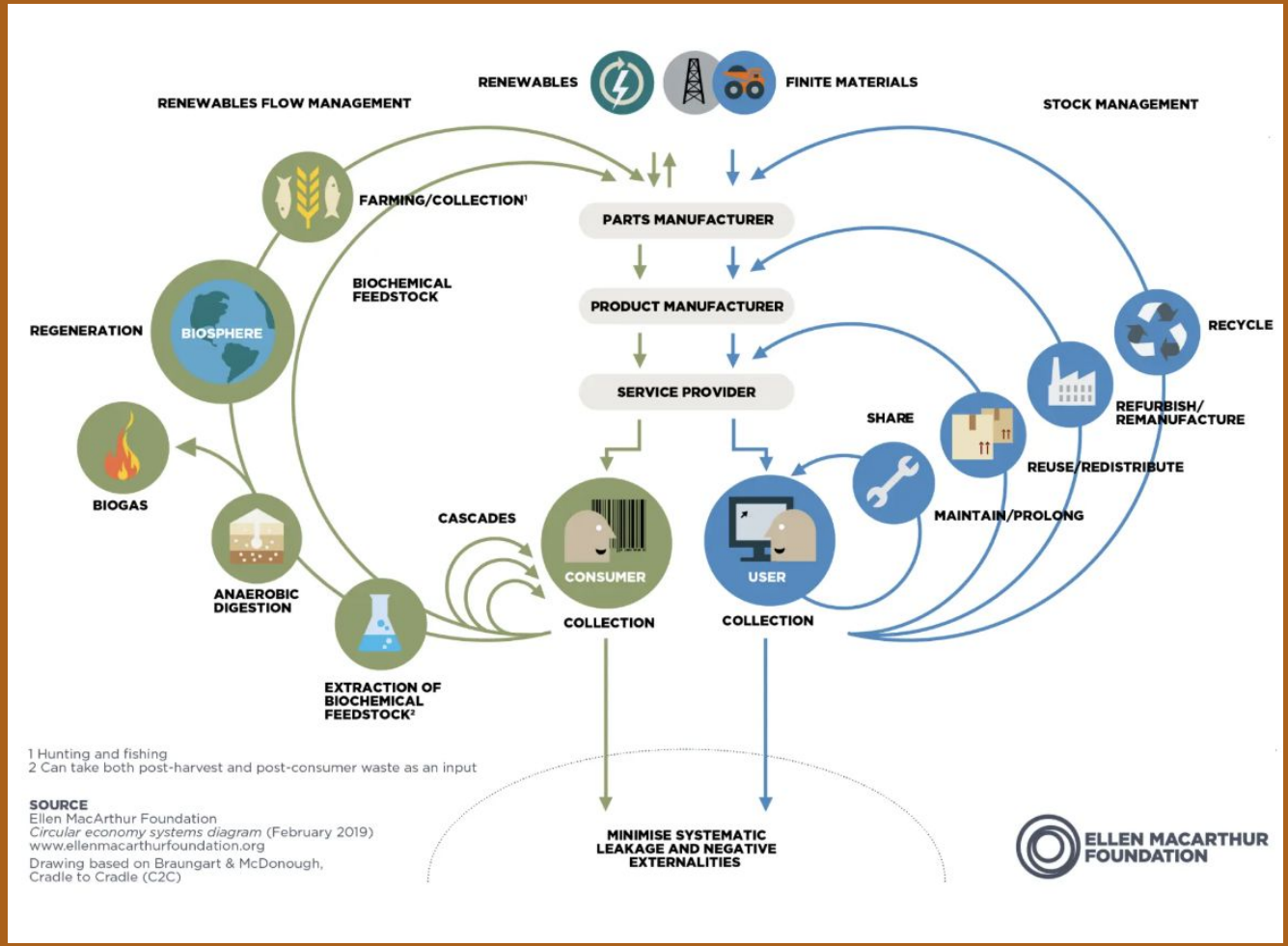
Environmental Benefits (EMF2024)

Economic Savings (EMF 2024)

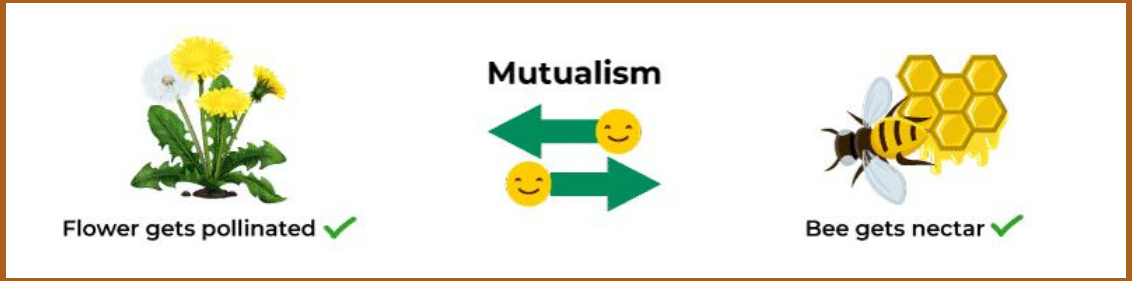
Regional Resilience (Howard et. al 2022)

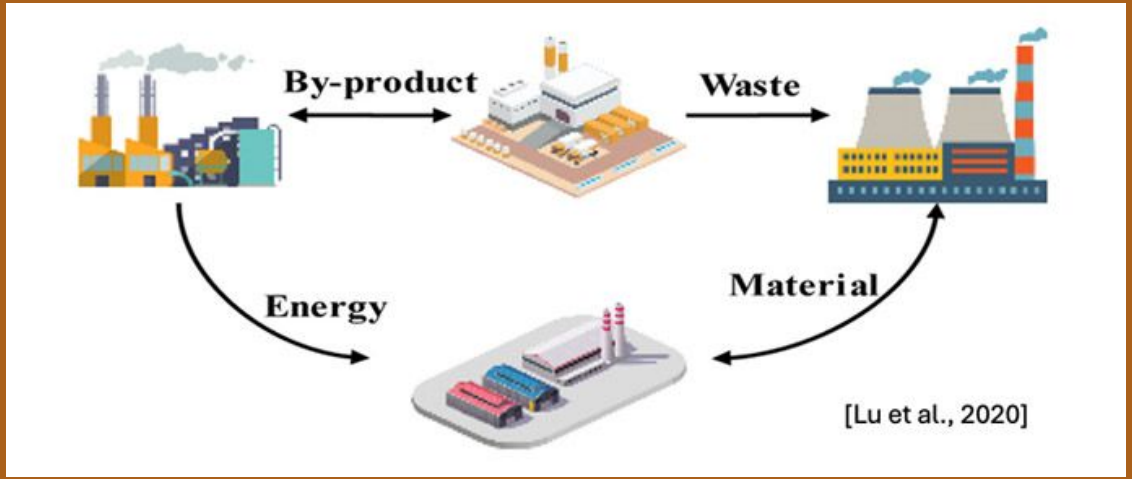
Economic Development (WRI 2021)

Social Capital (Berry 2019)



Industrial Symbiosis: inspired by mutualistic symbiosis in biological ecosystems





What high-quantity and/or problematic materials would you like to prioritize for circularity?

- High costs to dispose?
- Bulky? Heavy?
- Reusable?
- Still valuable?

Construction and Demolition Debris	**Plastic films**
Solar Panels	**???**
???	**???**

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Allagash Brewing

"Waste to Wares" initiative led by the Manufacturers Association of Maine (MAME)

98% of brewery waste out of landfill

Recycling CO-OP from partners ship to be correctly recycled

PHOTO / TIM GREENWAY

Rob Tod, left, founder of Allagash Brewing, and facilities manager Luke Truman, inside the brewery at 50 Industrial Way in Portland. Allagash, which sells more than 100,000 barrels of beer a year in 17 states plus the District of Columbia, is leading a cross-industry initiative to reduce and repurpose manufacturing waste in Maine.

By Renee Cordes

At Allagash Brewing Co. in Portland, founder Rob Tod speaks as enthusiastically about reducing waste as he does about product expansion at Maine's largest brewer. It's known for its Belgian-style ales.

FRESHWATER STONE

Freshwater Stone

Stone Slurry from cutting stone slabs and shapes

500-1000 cubic yards of slurry annually

Currently stockpiled in a quarry can it be used as a cement additive or value add additive for other products?

Cases

Ready Seafood

$ 100K annually to dispose of Lobstershell

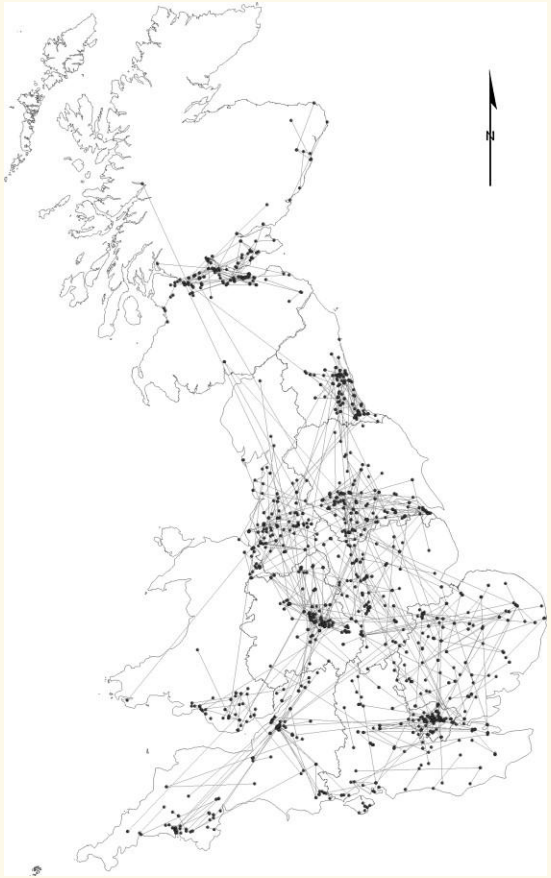
Shells have desirable compositions and can be turned into Nutraceuticals or Bioplastics

Research at UMaine to turn lobstershell into value add products

Austin Materials Marketplace

- B2B, 274 companies
- $372,000 in savings or value creation for participants
- Diverted an estimated 45,000 cubic feet from the landfill
- Avoided 758 metric tons of carbon dioxide equivalent

https://rheaply.com/materials-marketplace/



Voluntary, government-supported private sector initiative started in 2005

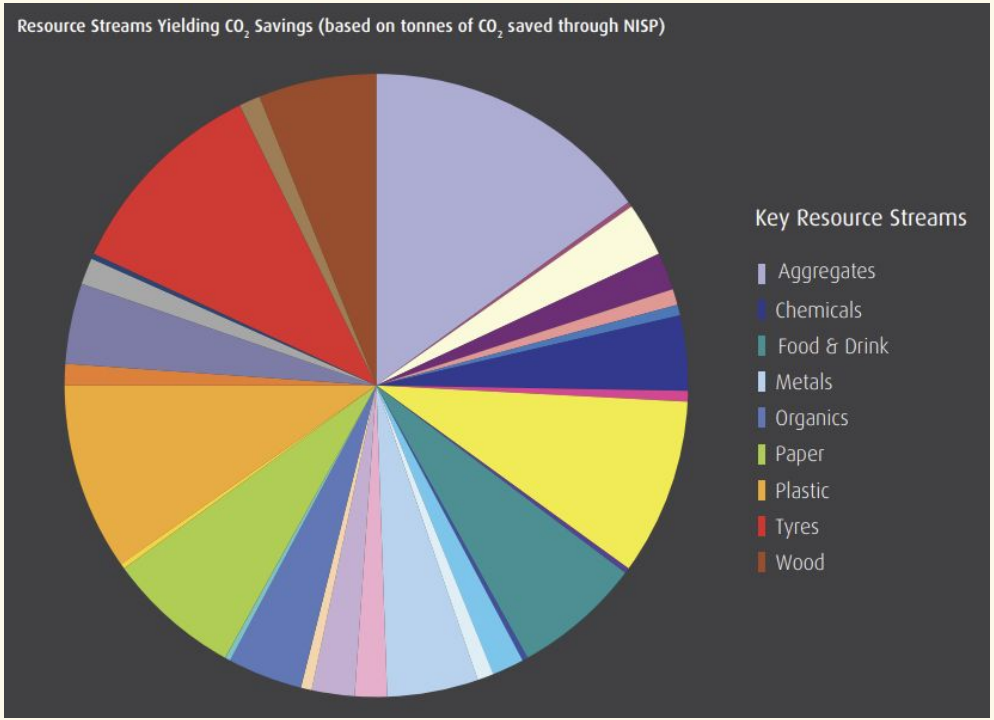
- 13,000 companies
- 20 miles average distance
- Trust & cooperation required

In 5 years, diverted or prevented:

- >5,2 million tonnes industrial waste
- 357 thousand tonnes hazardous waste
- 7.9 million tonnes raw materials
- 9.4 million tonnes industrial water

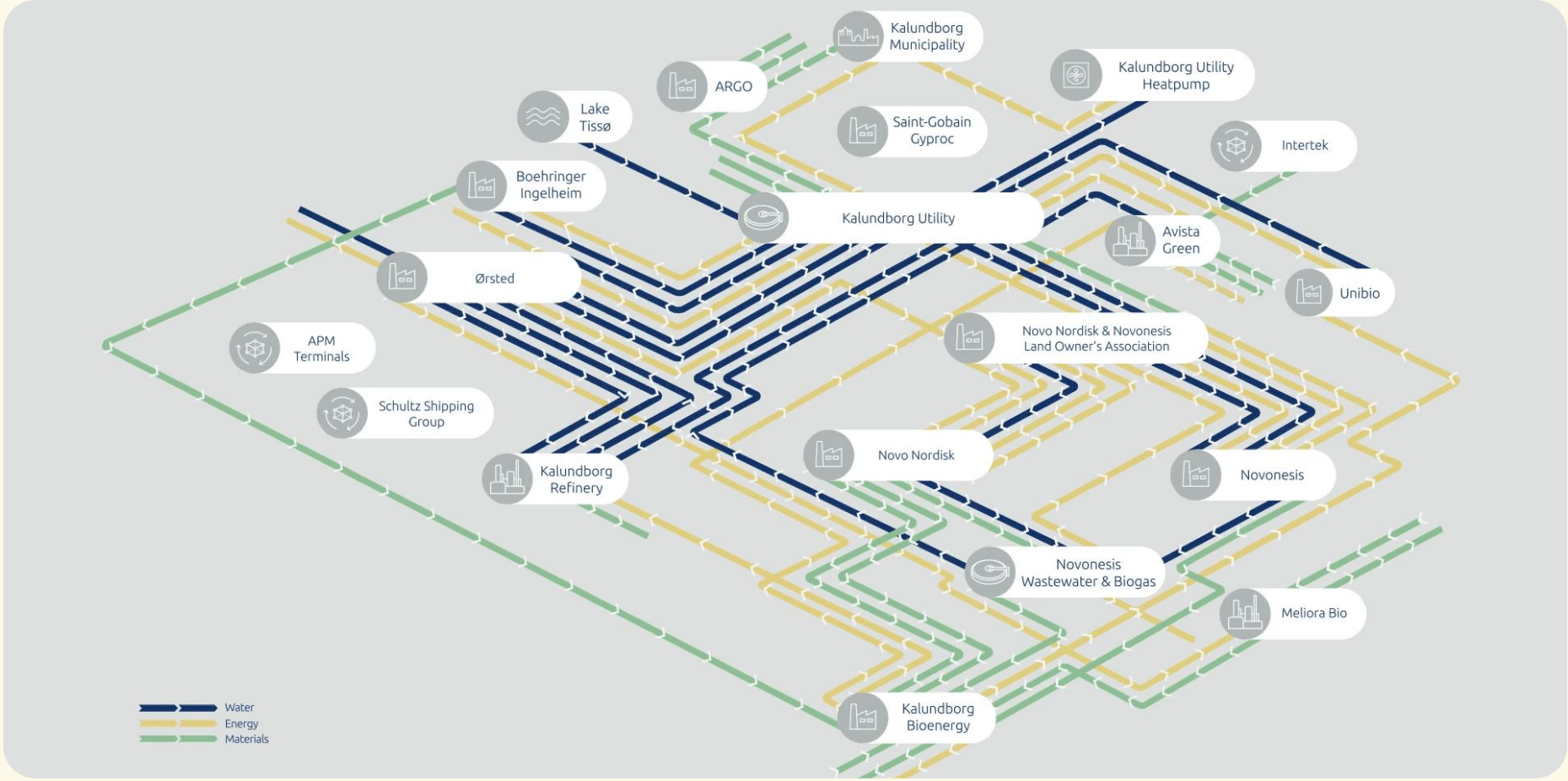
UK National IS Program (NISP)

Bio Intelligence Service (2009), Jensen (2011)



Resource streams yielding carbon dioxide savings. Source: Laybourn & Morrissett (2009)

- Members collectively reduced their emissions by over **6 million tonnes.**
- Achieved at a cost of only **$0.9 USD per tonne** of carbon dioxide reduction
- Persistence-based lifetime savings of carbon dioxide are as low as **$0.2-$0.3 USD per tonne.**



Kalundborg, Denmark

symbiosis.dk/en

Results to Date

The Eco-Industrial Park saves Kalundborg €24 million in bottom-line savings annually. But the savings aren't just financial—this process saves 635,000 tons of CO2, 3.6 million m3 of water, 100 GWh of energy, and 87,000 tons of solid materials.

635K
tons in savings of CO2.

3.6M
m3 savings in water.

100
GWh in energy savings.

87K
tons of savings in solid waste.

The Kalundborg Eco-Industrial Park demonstrates how resource sharing among industrial actors in the same locality can be beneficial both ecologically and financially. For today's organizations, applying circular models can yield enormous benefits in several business-critical areas.

Kalundborg annual savings

www.engieimpact.com/insights/eco-industrial-park-case-study-kalundborg

explore opportunities to save your municipality money...

Join the Maine Materials Exchange Network

Open your camera app, center on the QR code, tap the link, then fill out the form, CLICK SUBMIT!

We need your help!

What data about materials could you provide?

Who should we contact?