

A Positive Lens on Sustainability through a Systems Approach

Teaching to
Make a
Difference
PDW

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Industrial Ecology Defined

- The study of material and energy flows in industrial and consumer activities
 - ▣ effects of these flows on the environment
 - ▣ and influences of *economic, political, regulatory, and social factors* on them

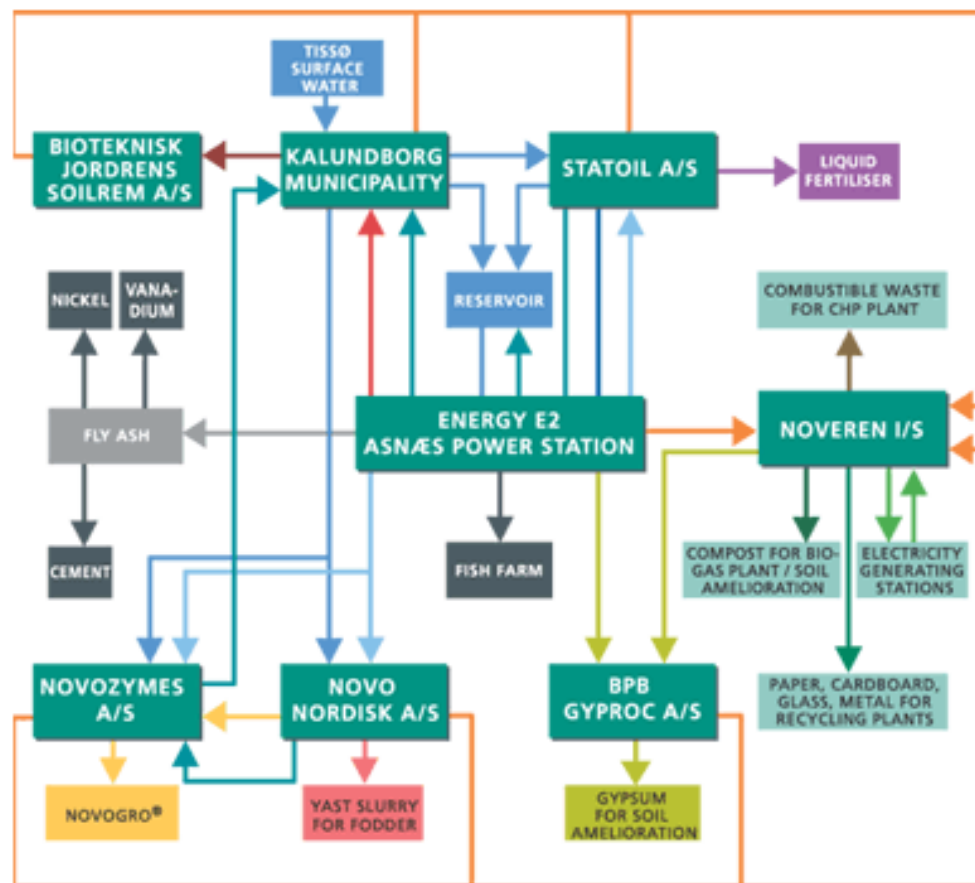
(White, 1994)



How ‘Industrial Ecology’ is Used

- As a metaphor
 - “The industrial ecosystem would function as an analogue of biological ecosystems... An ideal industrial ecosystem may never be attained in practice, but both manufacturers and consumers must change their habits to approach it more closely if the industrialized world is to maintain its standard of living and the developing nations are to raise theirs to a similar level without adversely affecting the environment.” (Frosch & Gallapoulos, 1989)
- As specific tools for process and product evaluation
 - Lifecycle analysis, Materials flow analysis
- As a way of moving toward organizational and policy changes needed to realize ecosystem metaphor

One application of IE: Closing material and energy loops at Kalundborg, DK



Kalundborg, Denmark

- 6 core firms + waste processor & municipality
- 20 exchanges of by-products

ASH	WATER	STEAM	COOLING WATER	WASTE-WATER	GYPHUM	LIQUID FERTILISER	RESIDUAL HEAT	YEAST SLURRY
NOVOGRO®	SLUDGE	OTHER	OTHER WASTE	PAPER, CARDBOARD, GLASS, METALS	ELECTRICITY	COMBUSTIBLE WASTE	COMPOST BIOMATERIAL	

Another application of IE: Life cycle assessment for product innovation



Nike Considered Design

Teaching Industry Ecology

- “It’s the system”
 - Save the world, but prioritize your actions
- “Do the math”
 - Carbon calculators
 - EIO/LCA (<http://www.eiolca.net/>)
- “Find the leverage”
 - With whom must I work, and how will they care?
- Experiential opportunities
 - Engage across entities and sectors