Champions & Legacies

US Eco-Industrial Development/Park Networking Event
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Devens, Massachusetts

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ecomaine
the future of regional waste systems

Legacy

Refs: BioDiversity Research Institute

- How can we capture & share lessons learned?
- Could we establish a depository to preserve & retrieve data from research studies and information from projects started and those that never did?
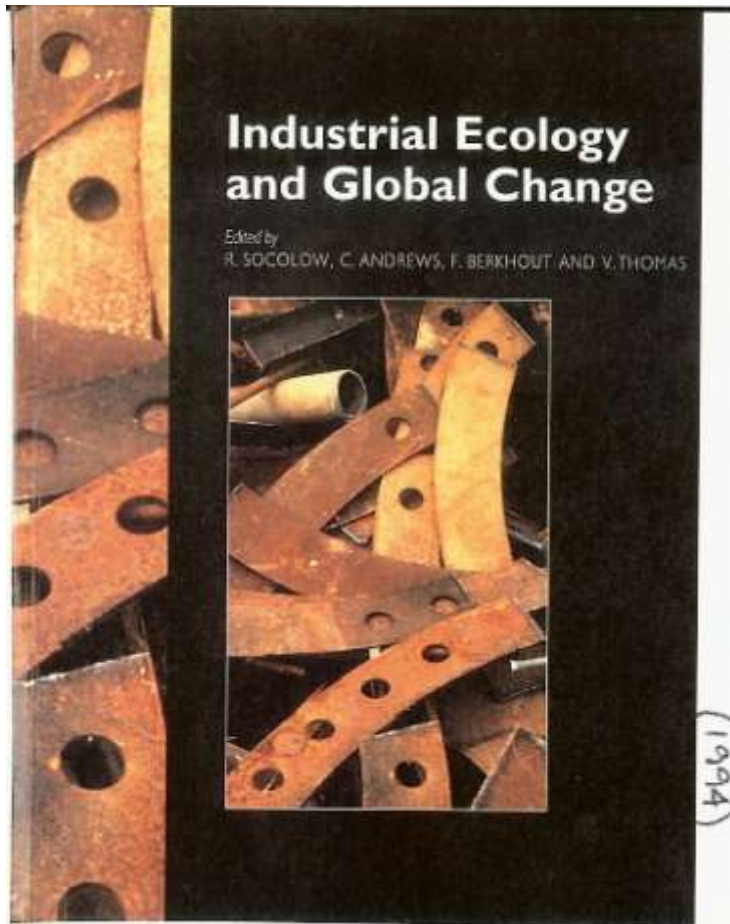
Industrial Ecology developed from the recognition that waste disposal systems were not keeping pace with an expanding global population. Industrial ecologists looked to nature for a model - just as no by-product is wasted in a biological ecosystem, no element need be wasted in an industrial ecosystem.

Modeled on natural ecosystems - producers, consumers, decomposers, regenerators - an industrial ecosystem optimizes the exchange of energy and waste materials between manufacturers & processors. The IE concept of closing material cycles has led to new technologies. Prominent among them are Eco Industrial Parks, closed-loop mechanisms to maximize *by-product* capture and reuse in an industrial ecosystem. By co-locating industries that exchange reusable waste resources, EIPs can minimize the release of pollutants, thus achieving environmental stewardship, economic benefits, and sustainable development. IE is the Science of Sustainability

Industrial Ecology and Global Change

Edited by
R. SOCOLOW, C. ANDREWS, F. BERKHOUT AND V. THOMAS

(1994)

T. Graedel: Industrial Ecology

materials extractor or grower

materials processor or manufacturer

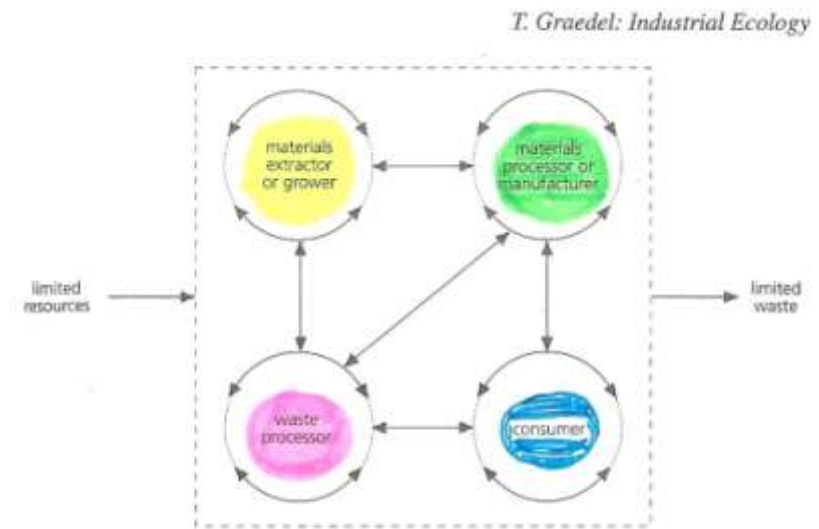limited resources

limited waste

waste processor

consumer

Figure 2. The "Type III" model of the industrial ecosystem.

is, the system is "running down." To be ultimately sustainable, biological ecosystems have evolved to be almost completely cyclical when sufficiently long time scales are considered. "Resources" and "waste" are undefined, since waste to one component of the system represents resources to another. This Type III system, in

Champions

Peter Lowitt
Londonderry EIP & Devens EcoStar

Valdemar Christensen
Kalunborg Industrial Symbiosis & Ukraine

Refs: Both Photos by AK Hewes, Ph.D. 2003

What is the Role of Champions in establishing EIPs?

- Well what was their role?
- Their role involved emphasizing social relationships as opposed to developing technological connections. They were interested in people and not technology

- My Qualitative Research revealed numerous traits of Peter & Valdemar such as:
  - Developing Social Networks, Interpersonal, Identifying Resources, Trust, Rivalry, Visionaries, Pioneer, Caring, Invested in Project, etc.
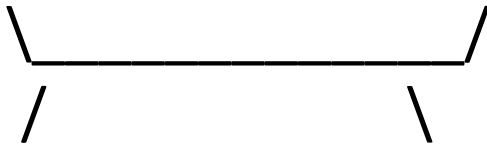- Data categorized by *Who They Are* and *What They Do*

Qualitative Research

Ethnography & Grounded Theory

Who They Are   *What They Do*

Visionaries   Develop Strategies

    _____/   caring   trust

   /   \\   \\   /

Investment   Develop Social   interpersonal

Relationship Networks _____/

               \\

networks

     \\

bring people together, etc.

District Heating

- WHAT LESSONS can be gained from reviewing global Eco-Industrial Parks?

- Well if possible achieving District Heating is a very efficient use of waste water and steam.

- I am fascinated with district heating.

- Residual hot water from Power Plant conveyed through pipes to residences and businesses as a source of heat and the cooler water returns to the power plant, for reuse in the plant or possible redistribution to adjacent fish farms and green houses if available. Steam is also a by-product of the power plant and is available for neighboring businesses. The obvious example is Asnaes Power Plant and Novo Nordisk in K-borg

- Kalundborg EIP also captures sustainable development through Gyproc's use of feedstock for drywall manufacturing from Asnaes waste product of calcium sulfate (industrial gypsum) from desulfurization process: One Industry's waste is another Industry's raw material.

KALUNDBORG MODEL
INDUSTRIAL SYMBIOSIS

Refs: Photo by AK Hewes, Ph.D. 2001
Industrial Symbiosis Institute,
Kalundborg Denmark

District Heating Examples

Coal Fired Power plants as anchors

Kalundborg, Denmark   Komsomolske, Ukraine

AKHewes©2001 *District Heating* Denmark

AKHewes©2003 *District Heating* Ukraine

Refs: Photos by AK Hewes, Ph.D.

Granite Ridge LEIP

Natural Gas Power plant as anchor

Exchange of waste water potential growth for District Heating

Many industrial ecologists define an Eco Industrial Park (EIP) and its waste exchanges as dependant on geography (Chertow, Portlock, & Coppock, 2002)

Londonderry Eco Industrial Park (LEIP) is defined by its location in an area designated by a physical boundary with industrial plants linked together by physical structures (such as the pipe in the adjacent photo) on contiguous properties.

Manchester, NH WWTP water is piped to the Granite Ridge Natural Gas power plant in LEIP – it is a physical exchange of waste by-product

Businesses located inside/outside of LEIP have the possibility to tap this by-product loop/district heating-cooling system if feasibility study conducted

AKHewes©2002 District Heating LEIP
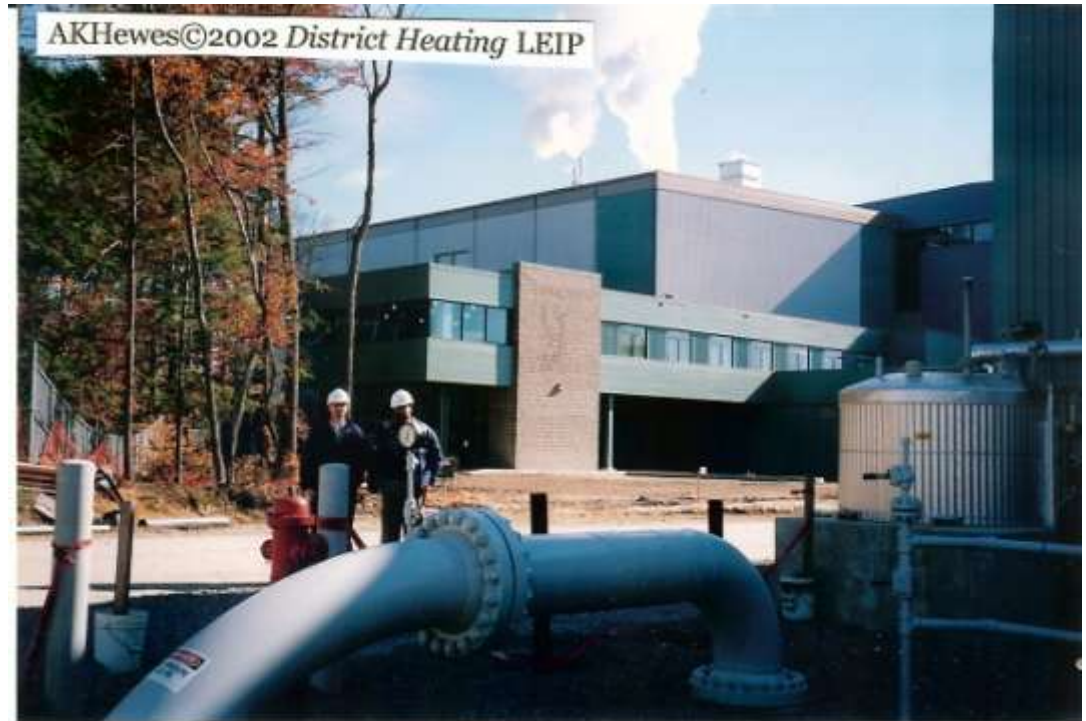
Refs: Photo by AK.Hewes, Ph.D. 2002
Granite Ridge, Londonderry EIP

Rochester, Minnesota

Waste-to-Energy power plant as the anchor
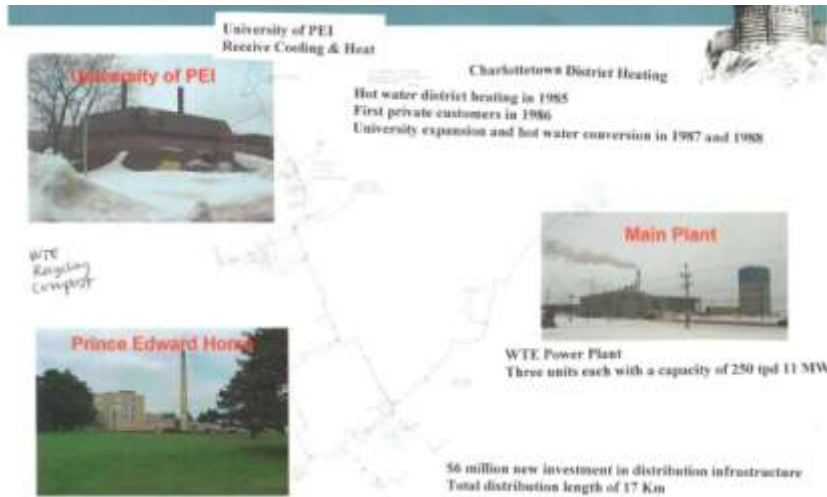
Charlottetown District Energy System
Waste-to-Energy power plant as anchor
Prince Edward Island, Canada

University of PEI
Receive Cooling & Heat

University of PEI

WTE
Recycling
Compost

Prince Edward Home

Charlottetown District Heating

Hot water district heating in 1985
First private customers in 1986
University expansion and hot water conversion in 1987 and 1988

Main Plant

WTE Power Plant
Three units each with a capacity of 250 tpd 11 MW

$6 million new investment in distribution infrastructure
Total distribution length of 17 Km

Distribution Piping

Refs: Dave Godkin, PE, PEI Energy FCP

ecomaine

Waste-to-Energy power plant as anchor *potential*
Portland, Maine

- An Integrated Waste Management System

- Cooperative owned & operated by >45 communities in Maine

- Waste-to-Energy Plant

- Single-sort Recycling

- Ashfill / Landfill

- Feasibility Study conducted to assess potential waste exchange

Refs: www.ecomaine.org

District Heating

Feasibility Study ecomaine/Unum

Refs: ecomaine WTE www.ecomaine.org

ecomaine Recycling Center

Glass in addition to reuse paper, plastic, aluminum, etc

Refs: www.stonecraftonline.com

Refs: ecomaine's single-sort recycling center www.ecomaine.org

EcoStar - Devens

Membership in EcoStar is a voluntary process, and the program focuses on environmental achievement and recognition.

As Peter explains: "the focus is on recognizing businesses, as they are the ones targeted to implement the eco industrial changes and to embrace and advocate the standards listed in the EcoStar Mission Statement."

Benefits of Waste-to-Energy
Burning waste at WTE reduces landfilling by 90% & generate renewable electricity
.
Disposal of MSW –vs- Ash at landfill

* Photo from Lancaster County Solid Waste District

Addressing waste disposal is critical

Our Common Future!

Refs: Naples, Italy 2007

http://www.corriere.it/gallery/Cronache/vuoto.shtml?2007/05_Maggio/rifiuti/1&1