

Emerging Role of EID in Asian Green Economy

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Green Growth, UN ESCAP
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Cleaner Production to Green Supply Chain to Industrial Ecology

**Eco-efficiency
versus
Sustainability?**

MICRO ← MACRO

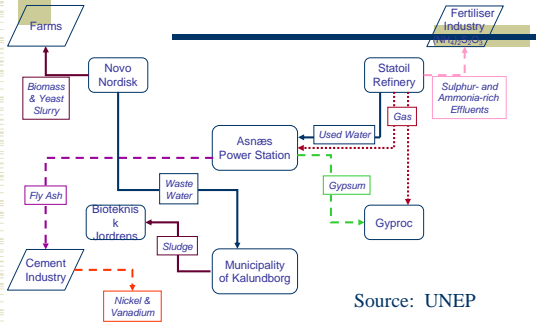
NTNU - Industrial Ecology Programme 2001 Internet: www.bigg.ntnu.no/ief/ief/ Source: ISIE/Alpa Buithe

Kalundborg Industrial Symbiosis

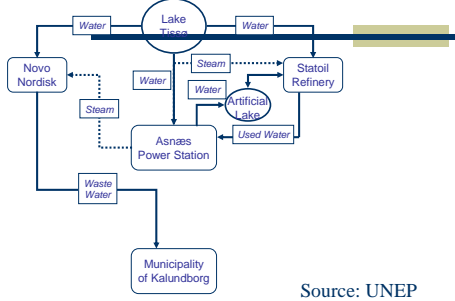
[C.G. Francis - adapted from J. Christensen, 1999]

Source: UNEP

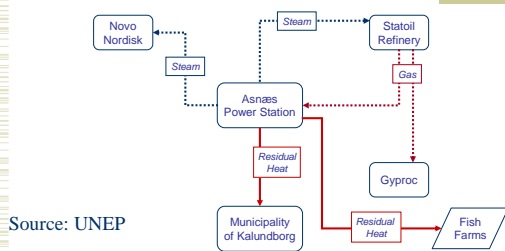
Kalundborg Industrial Symbiosis - Waste Flow

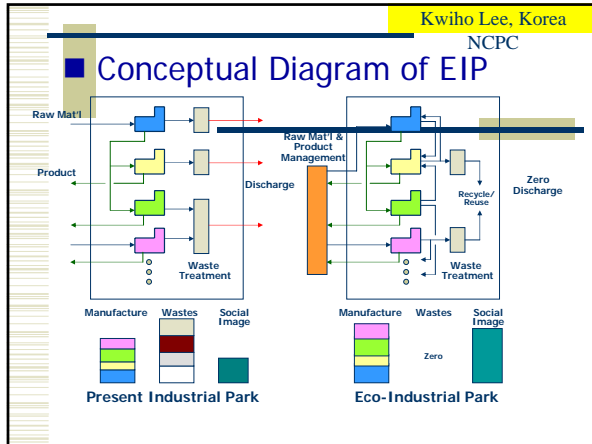


Kalundborg Industrial Symbiosis - Water Flow



Kalundborg Industrial Symbiosis - Energy Flow

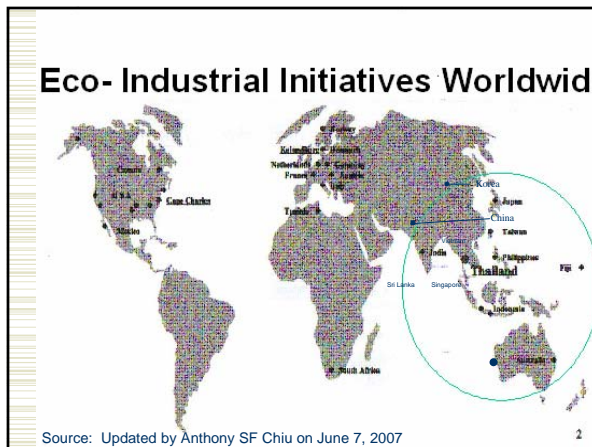




EID Components [Chiu]

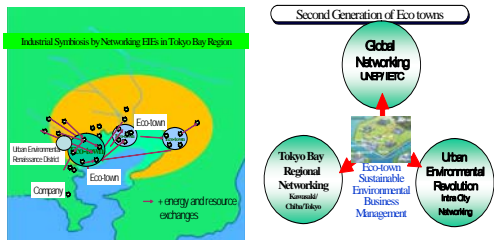
(Scale ... Temporal, geographical, human factors)

- ◆ **Primary (Hardware): Interaction - Industrial Metabolism**
 - Energy and material flow (physical accountability)
 - System Design: Product, process, and service (determinants) [e.g. micro-forest design at Burnside for the social benefits vs. ISO14001-certified reservoir design] [e.g. Factor X, green planning and architecture, transportation system, ecosystem restoration, etc.]
 - information management (catalyst)
- ◆ **Supportive (Software): Inter-relationship among the elements in the industrial system**
 - Stakeholders participation (government, citizen, NGO, academe, researchers, etc.) – **network concept**, political will, policies, management, participatory process, PPP ...
 - Quality of life, consumer education, capacity development



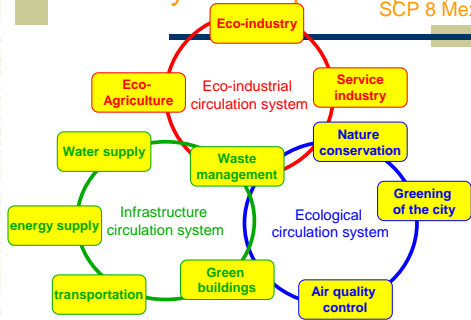
Regional Environmental Effects by Networking Eco-towns

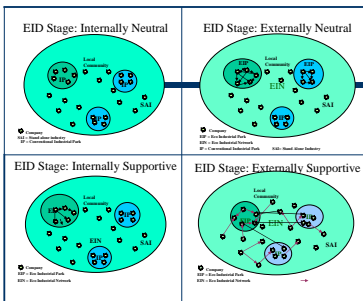
[Fujita & Chiu, GRC 2004 Oxford]



Overall framework for Circular Economy development

[Zhao, UNEP SCP 8 Mexico]





Continuum Stages Model of EIP Development in Southeast Asia

Source: Chiu, 2001

