



International perspectives and learnings for Australia and Asia Pacific

WRF Workshop: Industrial Symbiosis

1 June 2015

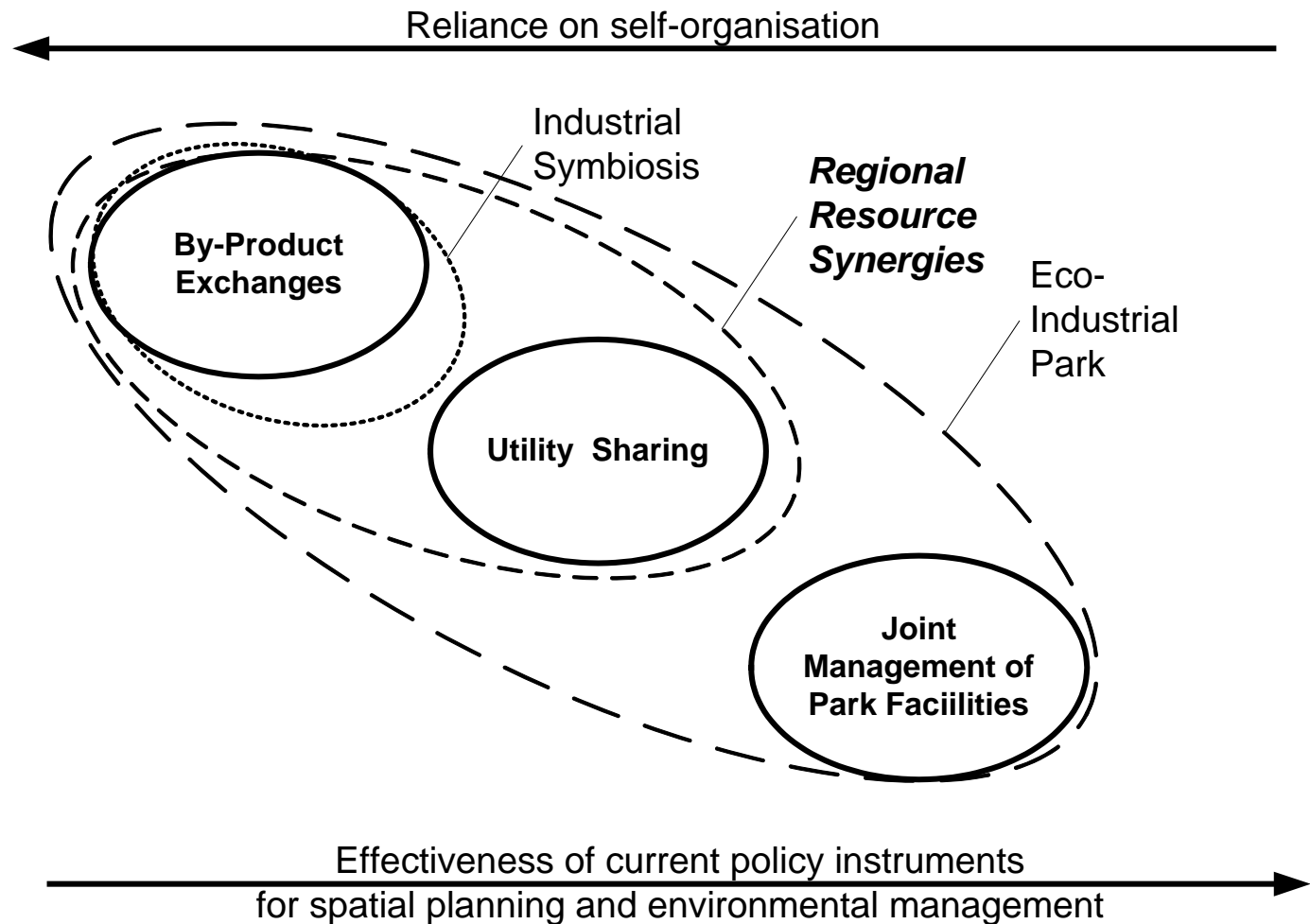
Dick van Beers

This presentation

- Defining industrial symbiosis and eco-industrial development
- The business case
- Some international good practices
- Learnings from international practices
- Conclusions and recommendations



Defining eco-industrial cooperations



Source: van Berkel, R 2006, Regional Resource Synergies for Sustainable Development in Heavy Industrial Areas: an Overview of Opportunities and Experiences, Centre of Excellence in Cleaner Production, Curtin University of Technology, Perth, Western Australia.



Eco-industrial development - Why?

Maximise resource efficiencies

- Reduced costs, increased revenue, reduced material use

Collaborative business opportunities

- Supply, utility, by-product, and service synergies

Smarter design and operation of industrial estates

- Ensure long-term license-to-operate of estate
- Lower cost: infrastructure, capital, and operational costs

Minimise short and long term risks

- Business, environment, and social risks

Meet government requirements & community expectations

- Streamlined approval processes



Origin of initiatives and support mechanisms

Diversity of support mechanisms for industrial symbiosis and eco-industrial park in Europe



National Industrial Symbiosis Program, UK

'Connecting Industry and Creating Opportunity' for business

www.nispnetwork.com

- Platform established in 1999

NISP identifies mutually profitable synergies between business members

- Recovery and reuse of materials, energy and water

Helping companies cut waste related costs and generating sales

- Create a circular economy

Best practice in the 'European Waste Framework Directive'

- Policy recommendation for EU 'Roadmap to a Resource Efficient Europe'



Results to date:

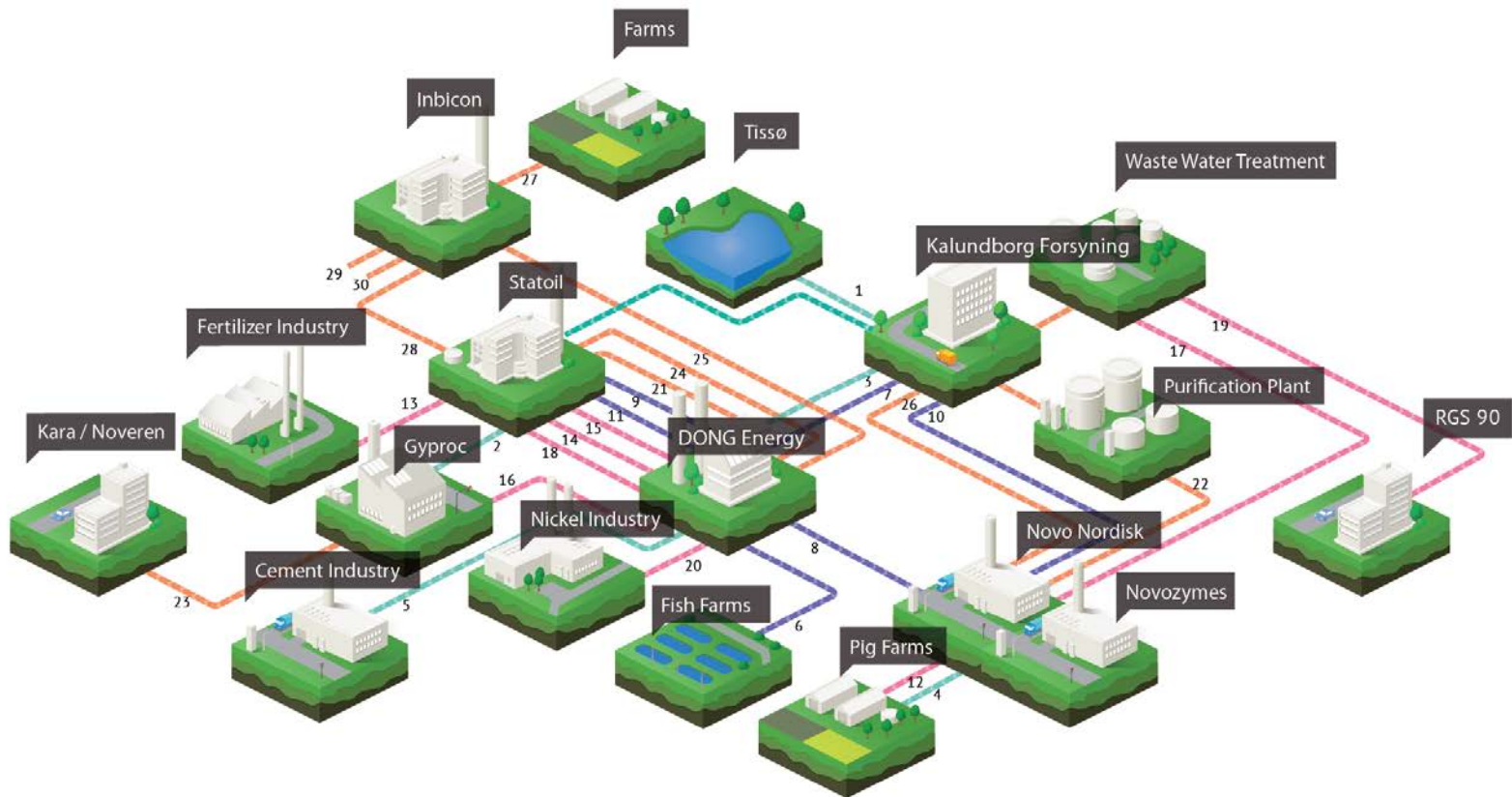
- £1 billion cost savings achieved
- £993 million generated in additional sales
- Over 10,000 jobs created or safeguarded
- 38 million tonnes materials recovered and reused
- 39 million tonnes industrial carbon emissions reduced
- 71 million tonnes industrial water savings made



Kalundborg, Denmark

Most quoted example of industrial synergies (industrial symbiosis)

— 2000-2010 —



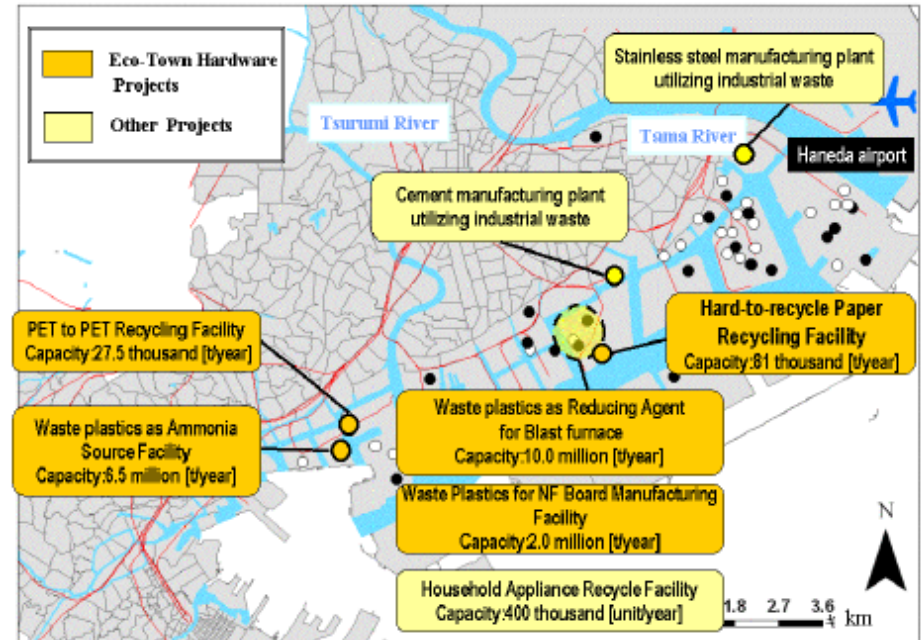
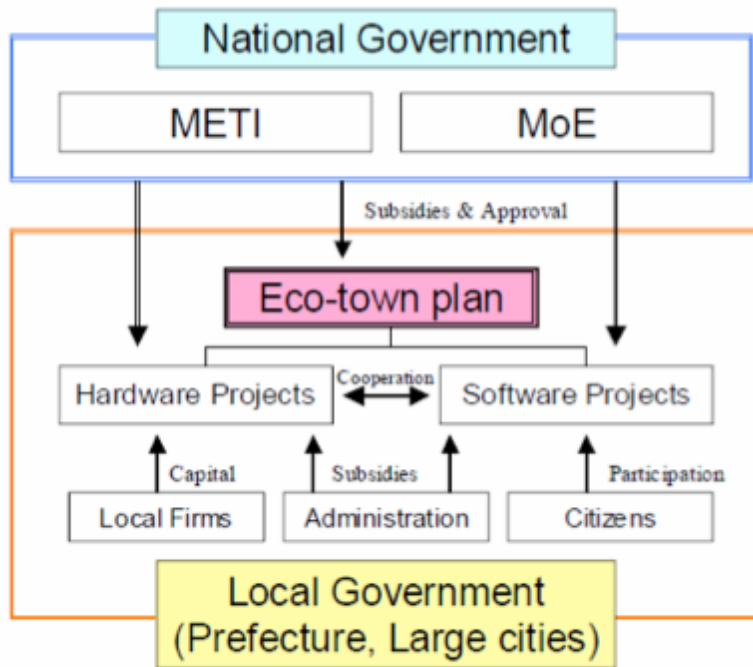
Source: www.symbiosis.dk



Kawasaki Ecotown, Part of Japan Ecotown Program

Driven by serious shortage of landfill sites in Japan and need to revive local economy

Figure 2: Eco Town Support structure overview



Promotion of eco-industrial parks in China

Significant number of eco-industrial parks

- Concept is well accepted in China

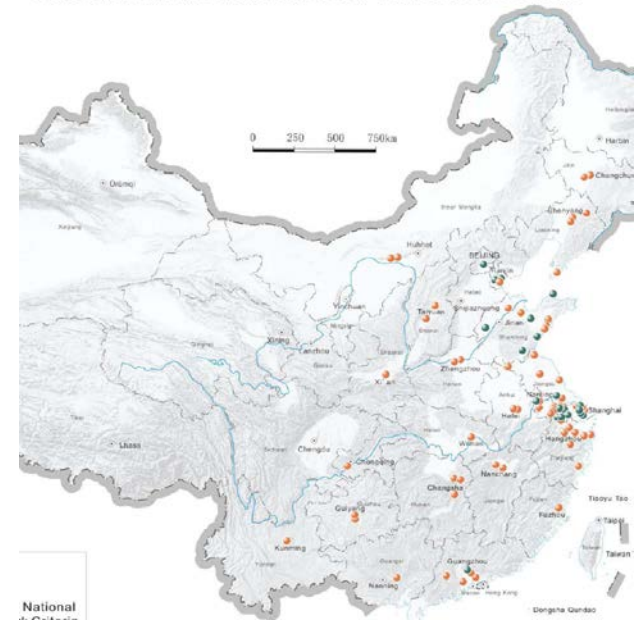
Government driven initiatives

- National Demonstrative Eco-industrial Parks (NDEIP)
- National Circular Economy Parks (NCEP)
- Low-carbon Parks (LCP)

Strong focus on EIP indicators

- Covering range of economic and environmental topics
- Different indicator sets for three government programs
- Lack of indicators on industrial symbiosis, diversity, and collaboration
- Vague and intricate indicators
- Institutional barriers on implementing this standard

Distribution of National Eco-industrial Parks



Source: Geng Y. (2014). Eco-Industrial Park in China: Three case studies. Presentation at UNIDO workshop on Eco-Industrial Parks in Emerging and Developing Countries: Achievements, good practices and lessons learned. Vienna, 5 May.



Eco-industrial related policy initiatives

Drivers, barriers, and success factors



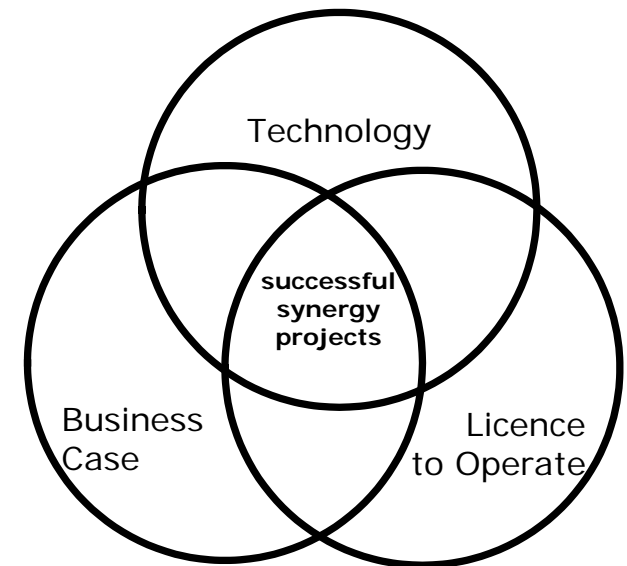
Drivers

- Business networks
- Industry champions
- Government policies
- Understand full range of benefits
 - Economic, environmental, social

Barriers

- Sustainability not perceived as core business
- Lack of resources
- Long-term versus short-term benefits

Success Factors



Source: van Berkel, 2006



Selecting estates for eco-industrial development

Prioritisation criteria

1. Local conditions and issues
2. Industry interest and industry champions
3. Number and diversity of industries
4. Industry organisation / business network
5. Culture of involved organisations
6. Regulations
7. Community needs and support
8. Know-how and expertise
9. Funding



All these factors affect approaches, priority areas, and potential outcomes

Source: Van Beers D. (2009). Application of the Cleaner Production Framework to the Development of Regional Synergies in Heavy Industrial Areas: A Case Study of Kwinana (Western Australia). PhD Thesis. Curtin University of Technology, Perth, WA, Australia.

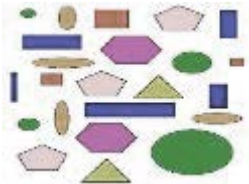


Conclusions



Eco-industrial development is proven concept

- Integrating economic, environmental, and social benefits
- Many case studies already exist



Each industrial estate is unique

- Need for customised approaches



Success factors for eco-industrial development

- Business case, technology, license to operate



Need to recognise opportunities and challenges

- Long-term and short-term
- Environmental and social risks are business risks!



Multi-stakeholder approaches are most successful

- Industry, government, and CSOs



Recommendations



Learn from international experiences and case studies

- Customise, and do not re-invent the wheel



Apply collaborative approaches

- Industry organisations, companies, government



Focus first on key opportunity areas

- Create early successes with “quick wins”



Keep flexibility into industrial parks!!

- Do not lock into one concept

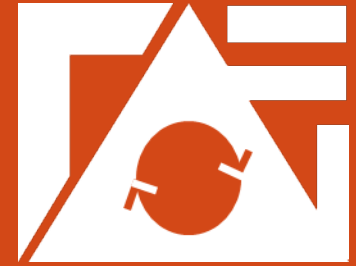


Aim for integrated solutions

- Addressing multiple impacts (e.g. waters, energy, employment)



Questions or comments



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Associated with:



World leading example of industrial synergies

Kwinana Industrial Area, Western Australia



Heaviest industrial area in Western Australia

- 40 km south of Perth,
- Coastal strip of about 8 km long (2 km wide)
- Resource processing: alumina, nickel, oil refineries, HIs melt, etc
- Utility: power, water treatment, co-gen plants, etc
- Manufacturing: cement, chemical, fertiliser plants, etc

Best practice example of industrial synergy implementation

- 47 diverse and matured existing synergies
- World leading industry collaboration

Existing synergies result in significant benefits

- Economic, environmental, and social

Source: Van Beers D., Corder G.D., Bossilkov A., Van Berkel R., (2007). Industrial Symbiosis in the Australian Minerals Industry: The Cases of Kwinana and Gladstone. Journal of Industrial Ecology, vol. 11, no 1, pp. 55-72.



Planning of eco-industrial parks in the Netherlands

EIP planning methods used:

- Eco-classification system
- Environmental grading system
- Sustainability scan
- Helping hand
- Roadmap and quickscan
- Development vision

Learnings

- Unclear definitions
- No quantitative standards
- Information on industrial synergies is scarce
- Economic and organisational implications were largely ignored
- Environmental impacts were insufficiently monitored

Source: Van Leeuwen, Vermeulen, Glasbergen (2003). Planning of Eco-Industrial Parks: An Analysis of Dutch Planning Methods. Business Strategy and the Environment. 12, pp. 147-162.



Modifying existing industrial parks or plan new industrial parks?

Planning new eco-industrial parks

- + Optimise design of park from start - “blank canvas”
- + Allow for strategic planning of parks
- Uncertainties about industry mix and needs
- Upfront investments for eco-industrial initiatives



Optimising existing industrial parks

- + Build upon existing industry initiatives
- + Certainty about industry mix and needs
- Retrofitting existing infrastructure can be costly
- Dealing with “historical legacies”



Eco-industrial parks and industrial synergies

One sector versus multiple sector approach

One sector approach

- + Create economies of scale (e.g. waste recycling)
- Potential competition between industries



Multiple sector approach

- + Diversity of inputs and outputs → more synergies
- Potential lack of economies of scale



Eco-industrial development

Policy development



Starting points:

- Carefully assess targeted outcomes of policy
- Prioritise industrial estates
- Prioritise opportunity areas for policy intervention
- Success factors for eco-industrial development
- Success factors for policy intervention



Learn from international experiences

- Customise, not copy



Government and industries to harmonise activities

- Need to involve industry stakeholders from start



Management models for industrial parks



Industry ownership is key

- Facilitate multi-stakeholder processes



Focus on issues affecting industrial estate as a whole



Clearly define roles and responsibilities

- *E.g. coordination, liaison, promotion, viability and growth*
- *Formation of priority based committees*



Focus on key priorities of estate initially

- Expand priorities of management body over time



Eco-industrial development

Public-private investments



Ensure that shared facilities in estate meet needs of industries

- Shared facilities and infrastructure require upfront investment



Opportunities for flexible module based facilities

- Expand facilities / infrastructure as demand grows
E.g. Water treatment, energy supply, waste processing



Existing versus new industrial estates

- New estates: incorporate costs into industry contribution scheme
- Existing estates: distribute costs among users (industries)



Consider AND communicate full benefits as part of business case

- Long-term and short-term
- Environmental and social risks are business risks!

