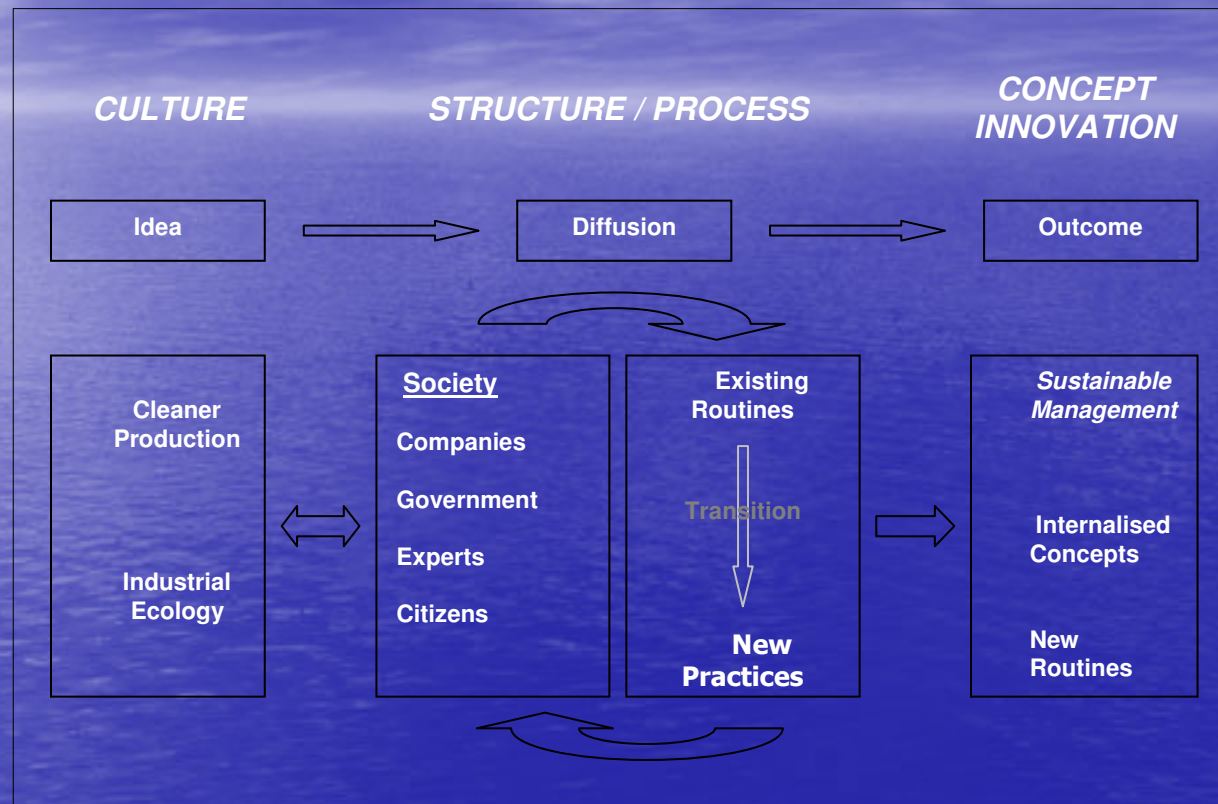


**Cradle to Cradle in Venlo:  
aan de slag met ambities en ervaringen  
31 januari 2008, Venlo**

**Leo Baas,  
Erasmus Universiteit Rotterdam**



# Transition processes: from Idea to New Routines



# Industrial Ecology

Industrial ecology is described as:

*An integrated system, in which the consumption of energy and materials is optimised and the effluents of one process serve as the raw material(s) or energy for another process*

(Frosch & Gallopoulos, 1989)

# Rotterdam Industrial Symbiosis

- INES Project 1994-1997  
(INdustrial EcoSystem)
- INES Mainport Project 1999-2002
- R3: Sustainable Enterprises 2003-2010
- Rotterdam Climate Initiative 2007-

# Rotterdam Industrial Symbiosis

Aim of Industrial Symbiosis Activities in the Rotterdam Harbour and Industry Complex

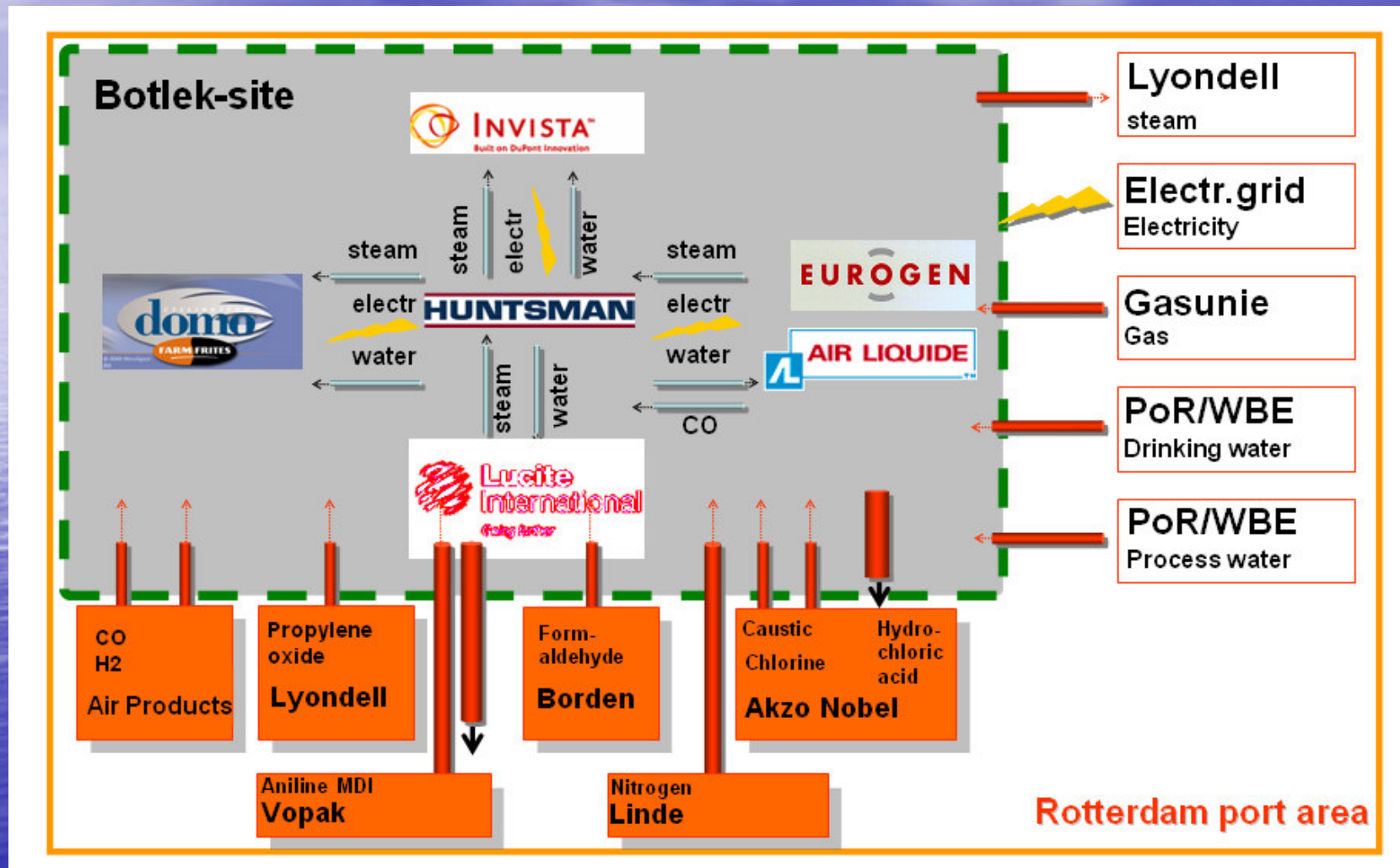
*The decoupling of economic growth and environmental pollution, the closing of loops between companies, the optimizing of energy streams, the joint use of facilities, and co-siting*

# Rotterdam Industrial Symbiosis

Joint facilitation of Staff Organisation for the Strategy Platform R3 – Sustainable Enterprises in the Rotterdam Harbour and Industry Complex - as Strong Network of Stakeholders from:

- Industry
- National and Local Government
- Academia
- Special Task groups, i.e. Sustainable Mobility
- Environmental Advocacy Organisation

# Co-siting at the Huntsman site



# Rotterdam Industrial Symbiosis

- Waste heat (from Shell, later others):
- District heating:
  - agreement in December 2004:
  - Construction infra-structure in 2005/2007
  - 3000 houses in 2007
  - 500,000 houses in 2020
- Heat and CO<sub>2</sub>:
  - From Shell refinery to 400 Greenhouses
  - from July 2005

# R3 Rest Heat Infrastructure



# Embeddedness

Human activities are embedded: they are shaped by the context in which they occur, *such as Cognitive embeddedness:*

- The way in which individuals and organisations collect and use information
- The cognitive maps they employ in making sense of their environment
- The mental disposition of individuals

# Capabilities I

- *Boundary capability:*

The ability to look at activities in terms of the selection of an optimal system boundary by actors when they develop Sustainability goals and form clusters

- *Actualisation capability:*

Given the selection of a system boundary, actors need to be able to mobilise the players that are part of the present or envisioned future system

# Capabilities II

- *Trust capability:*

This capability refers to the ability to build up, and be part of inter-organisational relationships based on trust

- *Unlearning capability:*

Learning processes within clusters include unlearning processes: the questioning and shedding of institutionalised routines that provide a barrier to collaborative approaches to sustainable development

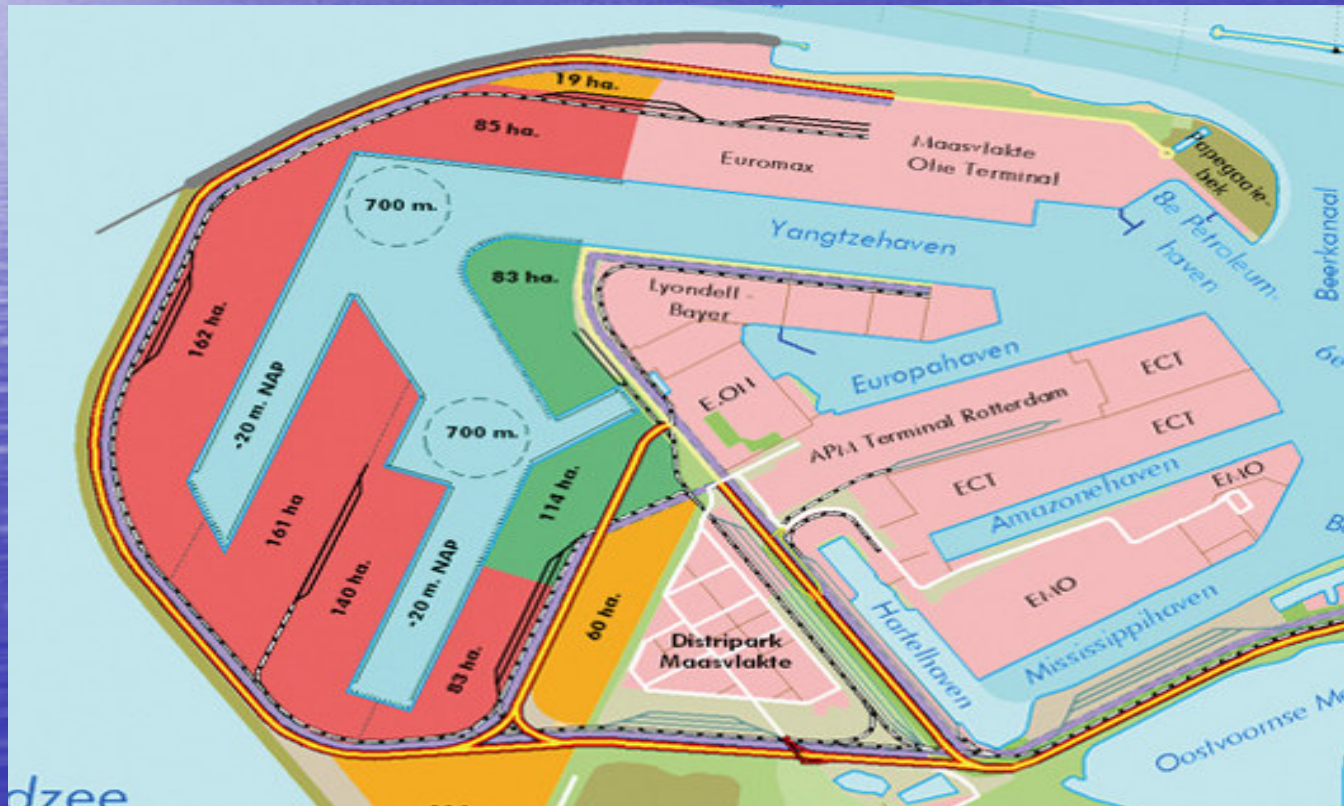
# Rotterdam Industrial Symbiosis

*'To C or not to C' Sustainability Routes:*

- Fuels & Resources: bio mass, syngaz, wind, H<sub>2</sub>
- Infrastructure: rest heat use, warmth infrastructure, clean fossil (CO<sub>2</sub> removal)
- Industrial ecology: co-siting, continuous design, stimulation and application of innovative and efficient production processes

# Maasvlakte2 on Industrial Ecology basis

- Industrial Ecology as attractor for industry
- Industrial cluster of Maasvlakte2



# Rotterdam Industrial Symbiosis

- *Spontaneous developments:*
  - A compressed air supplier develops a new niche in the market: a joint compressed system for 17 companies (state-of-the-art in 2005)
  - Heat delivery from a chemical company to a truck cleaning company
  - Outsourcing utilities in a new plant
  - Happy Shrimp Farm

# System concept



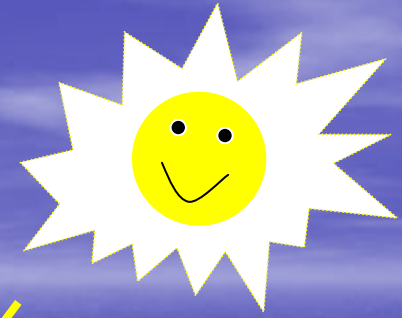
CO<sub>2</sub> & NO<sub>x</sub>



Biofuel



O<sub>2</sub>



Sunlight

Farm-water media  
Water & heat



Waste heat



# Social Systems & Industrial Ecology

- *Physical Systems:*

Technology, Material and Energy Flows



interconnectedness



- *Social Systems:*

Individuals, Organisations, Culture,  
Values, Institutions

# Rotterdam Industrial Symbiosis

*The clock for social change needs time*

- *Acknowledgement:* Evaluation INES projects and creating conditions for sharing knowledge
- *Vision:* Transition to Sustainable Community
- *Trust:* Goodwill and Competence built up on the results of real projects and dialogues in Strategy platform of stakeholders
- *Long term programme:*  
ROM Rijnmond programme 1993 – 2010:  
transition on the basis of reflexive evaluation of sustainability projects in practice

# It Takes a System to Change a System

- A comprehensive organisational support and involvement, including stakeholders' participation
- Multi-loop learning processes (incl. unlearning)
- Vertical and horizontal integration
- The implementation of a new concept should be integrated within the economy, ecology, technology, culture, and sustainability plans of the region
- Trust, transparency and confidence must be developed through an open, reflective and on-going dialogue designed to ensure involvement of stakeholders in charting the future of their organisations and regions as part of the transition to sustainable societies
- The role of key persons and significant others

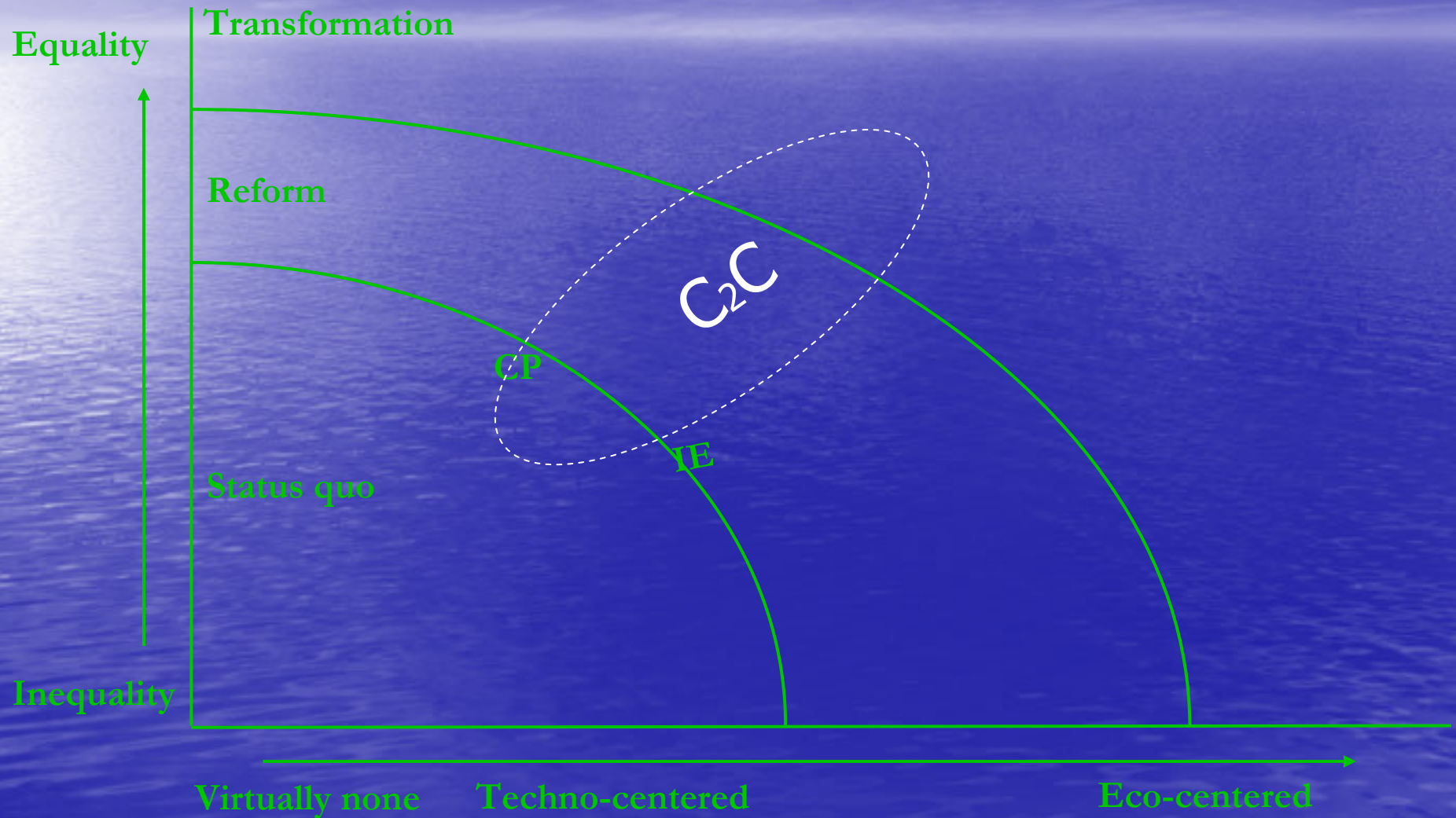
# Towards Sustainability

## Major Lessons Learned:

You need acknowledgement, commitment, vision, trust and a long term program to make it happen!

And reinforcement of the sense of urgency - ecologically (climate change, water), economic (market) and socially (poverty reduction) - from time to time.

# Phases to sustainable development



A photograph of a vast blue ocean under a bright blue sky with wispy white clouds. The sun is visible on the horizon, creating a shimmering reflection on the water's surface.

**Do not miss the point!**



**Nothing is more practical  
than a good theory**

Linking knowledge systems !