Welcome to the Symbiosis Center

Hans Berndt Jespersen
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Kalundborg Symbiosis: How it started.

• The Symbiosis was not invented, but developed organically over many decades.

• Kalundborg Symbiosis was a “non-project”, created by a “non-organisation”.

• Symbiosis means ‘collaboration between different organisms for mutual benefit’ — a metaphor used about the system since 1991.
Kalundborg Symbiosis is the world’s first working industrial symbiosis.

• One partner’s bi-product is the raw material in another partner’s production.

• Kalundborg Symbiosis is based upon commercial agreements between independent partners.

• Today, over 45 waste streams exist between partners.
Kalundborg Symbiosis: How it started.

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The Symbiosis Model - a model for business development encompassing 3 dimensions:

- **Economy**: Minimizing costs and improved bottom line and competitive edge

- **Environment**: Resource efficiency through reuse, recycling, and reduced intake of virgin materials

- **Innovation and development**: Improved introduction and access to new technologies and R&D, job creation and regional development
Three types of projects:

- Recycling of water: 23 Projects
- Exchange of energy: 13 Projects
- Recycling of waste products: 13 Projects

+ a special project: The Industrial Symbiosis Centre
a little bit of history…

KALUNDBORG
SYMBIOSIS
1961
WHY KALUNDBORG?

Why did it evolve at Kalundborg?

• The industrial potential existed:
  Several large industries
  Limited physical distances
  “A good fit”

• The economic incentive existed
• There were no legal barriers
• The communication was good
GOOD COMMUNICATION

Why was the communication good?

- The size of the community
- Existing relations between the managers
- No competitors involved
- Open management style (not secretive)
- One project (steam) involved 4 partners
Environmental Aspects

Resource savings:
Examples:

- Ground water .................. 2.0 mill. m³/year
- Surface water ................... 1.0 mill. m³/year
- Natural gypsum .................. 100,000 tonnes/year
- Oil .................................. 25,000 tonnes/year

Reduction of CO₂ emission (2008):

300,000 tons
Illustration of the Global water resource. The "big" blue globe represents the total resource, the smaller one the fresh water resource and the little one freshwater from rivers and lakes (Graphic: USGS)
New projects in Kalundborg Symbiosis

Innovation and test facilities – a pitstop between research and market

- DONG Energy’s demonstrationsanlæg Inbicon
- DONG Energy’s Pyroneer
- E4Water mikroalge-testanlæg
Olie (39% af tørstof) udvundet fra mikroalge dyrket på procesvand
USE OF ALGAE PRODUCTS

Price / kg

- 200 $/kg: Medicine, cosmetical products
- 50 $/kg: Nutrients, biochemical
- 1 $/kg: Protein, animal food
- Energy use: Bio plastics, lubricants
Vi bygger et demonstræranlæg for at bringe teknologien til industriel skala

Input:
30,000 t hvedehalm

Output:
5.4 mill. liter ethanol
8,250 tons biopiller
11,250 tons C5-melasse

Produktionsstart:
December 2009 (COP15)

Prækvalificerede enzym-
leverandører: Danisco og
Novozymes

Investering:
Kr 326 mill, heraf
Kr 76,2 mill fra Energistyrelsens
EFP og EUDP programmer

Kalundborg, Danmark – 08. juni 2009
The Regional Symbiosis Centre

A Symbiosis Center to facilitate new symbiosis projects and expand the learnings from Kalundborg Symbiosis
Industriel Symbiose

Development

Dansk SymbioseCenter

GRØN INDUSTRISYMBIOSE

KALUNDBORG SYMBIOSIS

SYMBOIS CENTER
Service to companies

- Initial screening of area or waste fractions
- Training of Management and employees
- Matchmaking between potential partners
- Facilitating of new projects

DEN EUROPÆISKE UNION
Vi investerer i din fremtid
The greatest shortcoming of the human race is our inability to understand the exponential function

- *Dr. Albert A. Bartlett*
Please visit
www.symbiosis.dk
www.symbiosecenter.dk
to find more information.

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