Case 4 Kalundborg, Denmark
Sustainable city / symbiosis

→Tool GI 1, →Tool GI 2

Project data:

Name	Kalundborg – Sustainable City
Geography	Denmark, Kalundbrog
Type of Green Industries	Combined
Size	3,831 jobs, 50,000 inhabitants
Number of Companies	9
Eco-criteria	Renewable Energy Energy Efficiency Waste Management: Water Management Material Flow
More information	http://www.symbiosis.dk/en http://www.dac.dk/en/dac-cities/sustainable-cities/all-cases/waste/kalundborg-industrial-symbiosis---waste-makes-resource/

Description:

In 1961 the world's most well-known example of an Industrial Symbiosis and Eco-Industrial Park was constructed, located in Kalundborg in Denmark. The scarcity of water was the motivation factor behind the project and led to cooperation among the different economic players. By using surface water from a nearby lake for a new oil refinery, the limited supplies of groundwater were saved. The reduction of costs led to even more innovative approaches. The focus was especially on how to income-produce uses for "waste" products.

Among the companies participating in the symbiosis are the world's largest producer of insulin (Novo Nordisk), the world's largest enzyme producer (Novozymes), the largest sewage treatment plant in Northern Europe (Kalundborg Forsyning A/S), the largest power plant in Denmark (DONG Energy) and the largest oil refinery in the Baltic Region (Statoil).

The by-product synergies include:

- organic waste from Novozymes is made into agricultural fertilizer;
- smoke from DONG is made into gypsum at Gyproc;
- Insulin production at Novo Nordisk A/S releases material which is used in production of pig fodder.

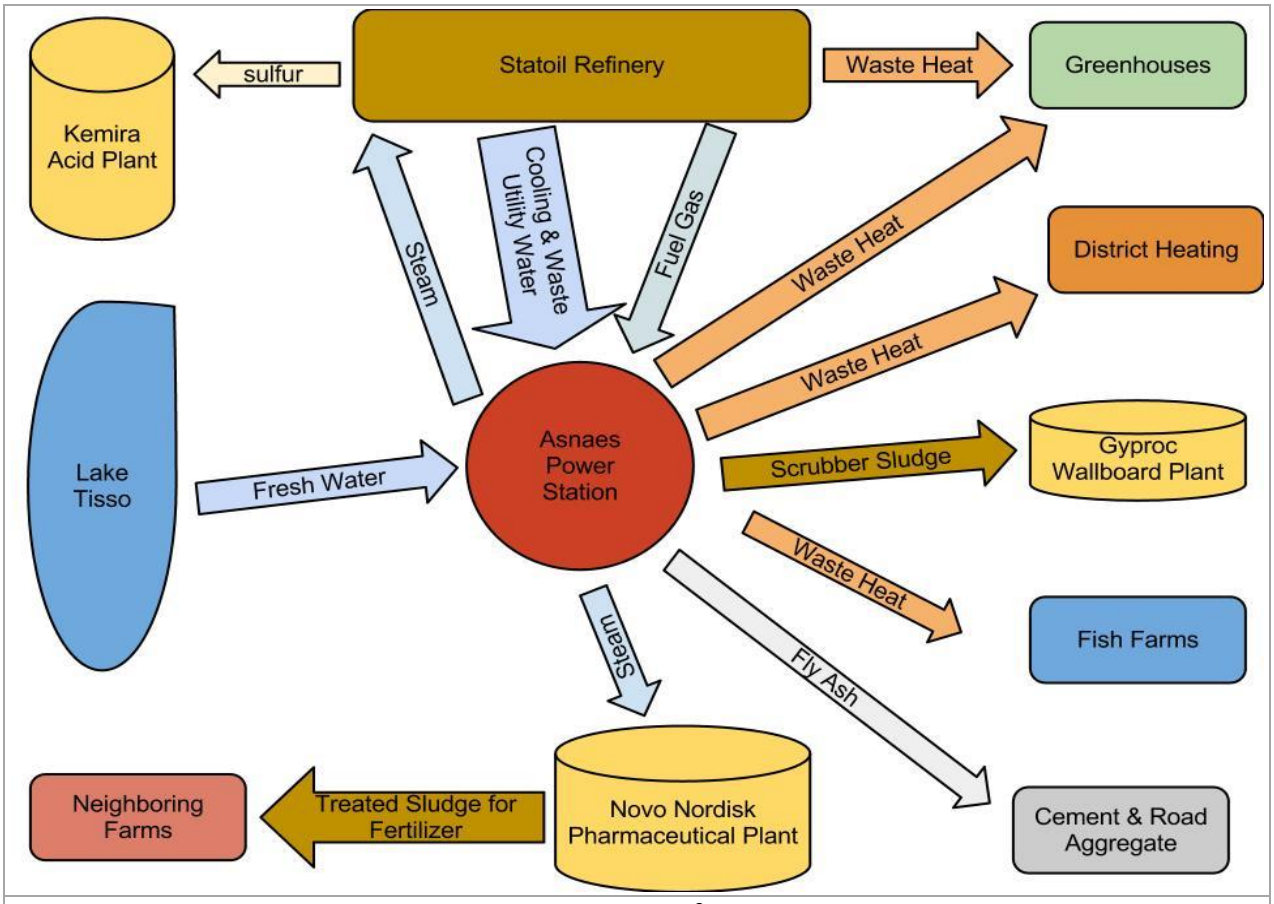
Kalundborg City is now setting its focus on renewable energy and resources. Asnaes Power Station has recently pledged a 50% switch to renewables by 2020. Another future goal is to facilitate more collaboration where public and private enterprises buy and sell residual products, resulting in mutual economic and environmental benefits.

Success factors

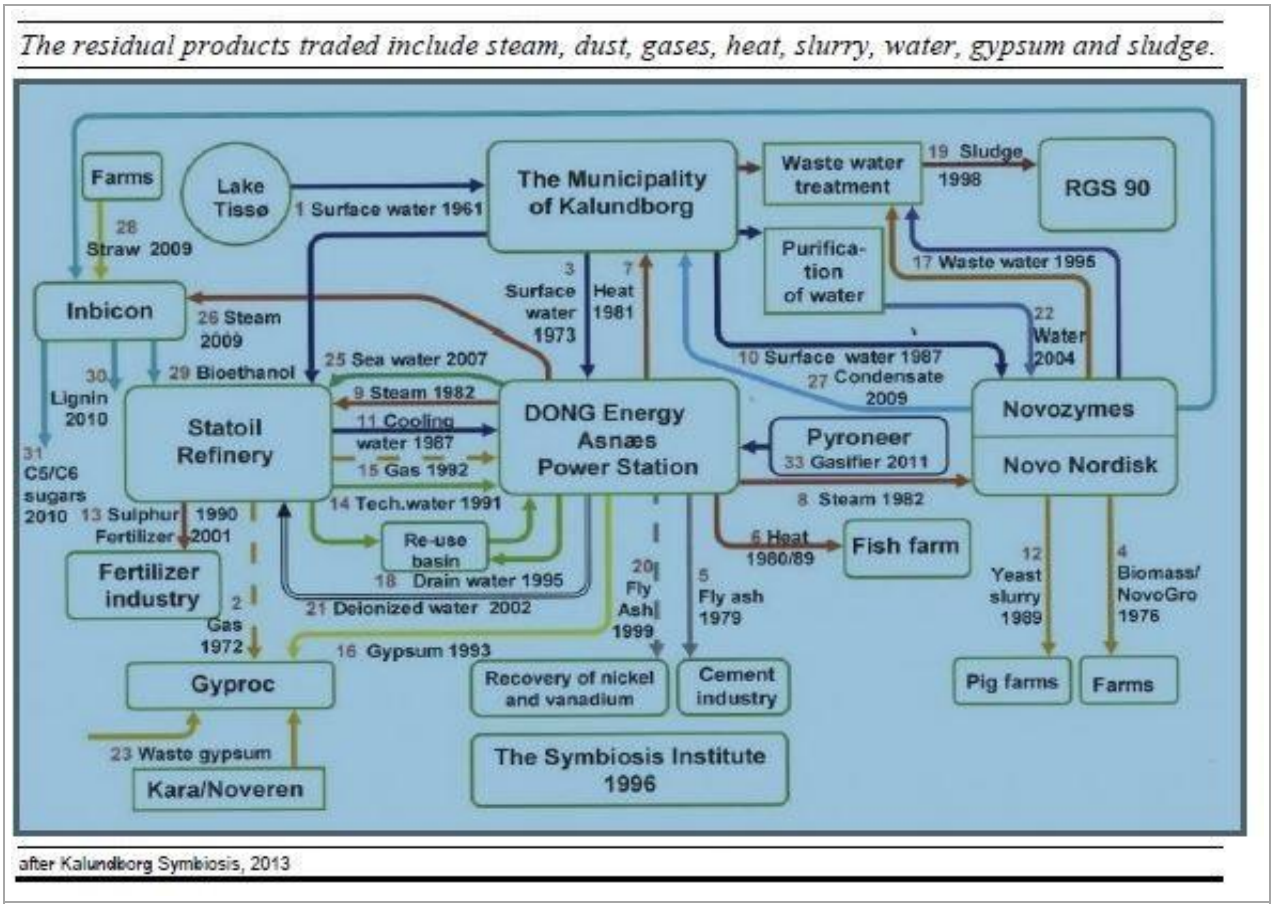
The basis of the Industrial Symbiosis cooperation in Kalundborg is open communication and mutual trust between the partners. The diversity of businesses, the relative geographical isolation of the companies and the awareness of the economic value added of the synergies facilitated the emergence of the network.

Cooperation between companies in Kalundborg Symbiosis has occurred from the bottom-up, initiated by the companies themselves with continuous support from the Kalundborg Municipality.

Industrial Sysbioses in Kalundborg [1]



Material Flow of Industrial Sysbioses in Kalundborg [2]



Industrial Sysbioses in Kalundborg [3]

Credentials

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References

[1] *Source: http://www.symbiosis.dk/en/lokalomraadet*

[2] *Source: by Nagilmer - Own work, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=25638116*

[3] *Source: International Survey on Eco-Innovation Parks, Schwitzerische Eidgenossenschaft*