

Examples of industrial symbiosis with description

Symbiosis in Kalundborg (Denmark)

The network in Kalundborg has evolved over five decades. It all started in 1961, when the local refinery needed a water supply. The first pipes supplying water from a nearby lake were laid by the town of Kalundborg and financed by the refinery. In 1972, the refinery entered into an agreement with a local gypsum company to supply surplus gas from the refinery's production. The gypsum manufacturer used the gas to dry the plasterboard produced in their furnaces. The following year, 1973, the power plant was connected to the Statoil water supply. Over the years, more and more companies were combined in the Kalundborg symbiosis, and in 1989 the term 'industrial symbiosis' was used for the first time to describe the cooperation. The Kalundborg symbiosis now has 17 private and public partners and involves around 50 symbiotic exchanges. The Kalundborg Symbiosis was developed based on commercial agreements between the partners. The early development of the network was based on the initiatives of the companies themselves, especially the efforts of the refineries to find a solution for the supply of water to the refineries. Several industries are located in close proximity, which made it possible to install pipes for water and energy exchange. The companies are not key competitors to each other, which facilitated mutual trust. This trust was essential in the development of the network.

More information: <https://www.symbiosis.dk/en/>

Symbiosis at Kawasaki in Japan

The challenge that led to the implementation of Industrial Symbiosis in Kawasaki was the need for the municipality to find a solution to dispose of municipal waste in a sustainable way, while strengthening the local economy. The linkage process began in 1997. The national government funded the establishment of several waste recycling facilities in the region to enable the reuse of municipal and industrial waste in the area. The municipality then began a series of discussions with local companies to identify and implement potential waste exchanges.

The main prerequisite for implementing Industrial Symbiosis at Kawasaki was the presence of relatively large iron, steel and cement industries. These industries proved to be suitable consumers for a wide range of different waste streams. In addition, some exchanges involving iron and steel mills and cement were already well known and widely used at the time (e.g. the use of blast furnace slag for cement production).

More information: <https://www.sciencedirect.com/science/article/abs/pii/S0360544213009675>

Symbiosis in Kwinana, Australia

Australia has developed an Industrial Symbiosis project where the entire city of Kwinana shares water, energy and waste. There are about 150 resource flows operating on a commercial basis among industrial companies located in the area. These exchanges have developed organically over at least 40 years.

According to data provided by the official website of the town of Kwinana, the industrial symbiosis has avoided the disposal of around 25 000 tonnes of waste per year, thus reducing the industry's CO₂ emissions by around 100 000 tonnes per year. An example of the link created is as follows: the chemical industry supplies cooling water to the steel company, while slag from the steel industry is used as a base material for asphalt. The by-products are considered an input product for the chemical processes of others. Energy in the form of steam or hot water is seen by someone else as an economically viable resource.

More information: <https://kic.org.au/industry/synergies/>