

South East Florida Utility Council

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Denmark- A Study Tour of Industrial Symbiosis



Population about 6 Million people

Most live in urban settings

Educational spending is 7% of their Gross Domestic Product (GDP), the use is about 5.4%

Life Expectancy is around 82 year, one of the highest in the world

Denmark ranks among the most digitally advanced countries in Europe

Healthcare and Education are paid for however they are taxed at 55%

Their population is rank as one of the happiest in the world.

Denmark Statistics

Center for Sustainable Infrastructure and Water Environment Federation



Center for Sustainable
Infrastructure

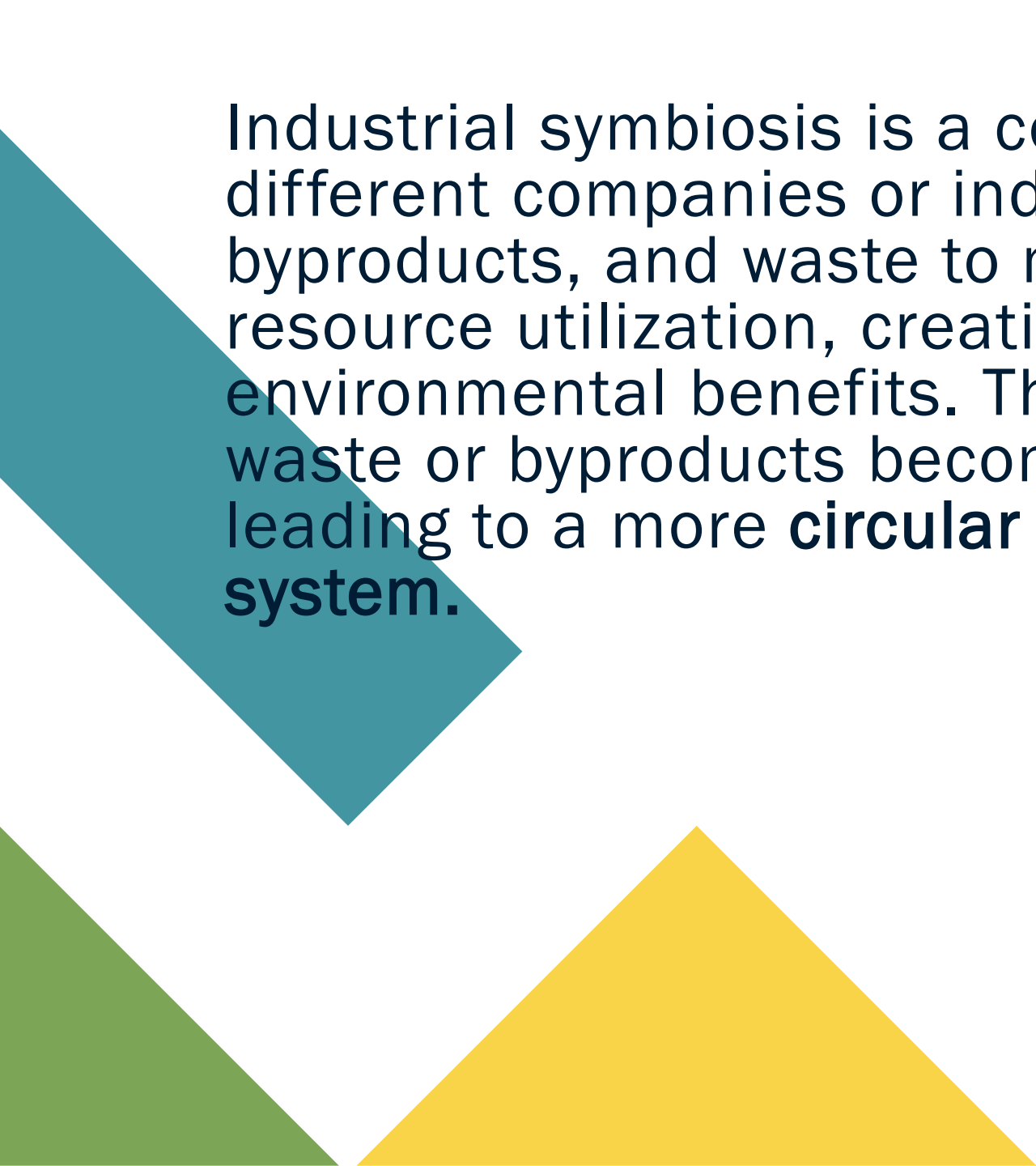
CSI - Our mission is to catalyze state-of-the-art integrated infrastructure that helps communities of every kind thrive economically, socially, and environmentally.

<https://www.sustaininfrastructure.org/>

WEF is a not-for-profit technical and educational organization of more than 30,000 individual members and 75 affiliated Member Associations (MAs) representing water quality professionals around the world since 1928.

<https://www.wef.org/>





Industrial symbiosis is a collaborative approach where different companies or industries share resources, byproducts, and waste to minimize waste and maximize resource utilization, creating economic and environmental benefits. This involves one company's waste or byproducts becoming another company's input, leading to a more **circular and sustainable industrial system.**

Industrial Symbiosis

Program for the Week

- Sunday - Introductions
- Monday - House of Green, DANVA, DHI and BIOFOS Utility
- Tuesday – Topsil, GlobalWafers, Hillerod Utility and DI Water
- Wednesday – Kalundborg Symbiosis
- Thursday – Nye WWTP, Grundfos & Water Valley Denmark
- Friday – VCS Sonderso, VCS Ejby Molle & Closing Dinner



Sunday



Monday in Copenhagen

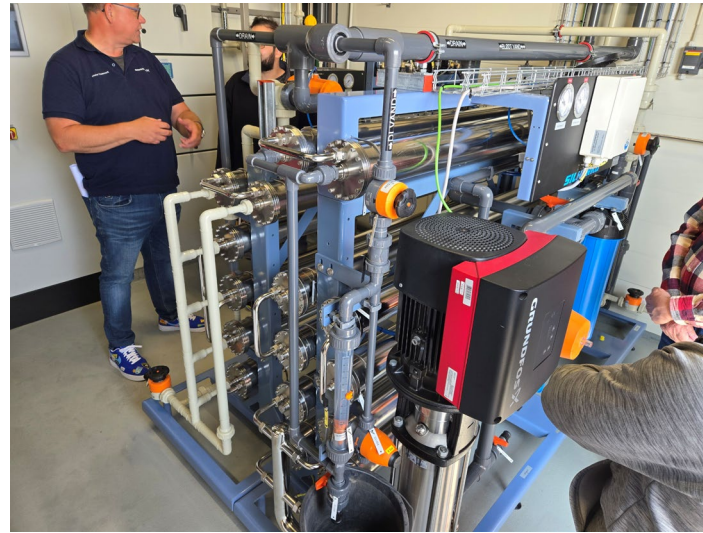


- We visited the House of Green, State of Green is a not-for-profit, public-private partnership between the Danish government and the country's three leading business associations (Danish Industry, Green Power Denmark, and the Danish Agriculture and Food Council). <https://stateofgreen.com/en/>
- Miriam Feilber spoke on the Danish Water & Wastewater Association (DANVA) and then we toured the BIOFOS Lynetten WWTP.

Incinerator and Ski Hill



Tuesday



Topsil - They produce silicon for semi conductors with ultra pure water.

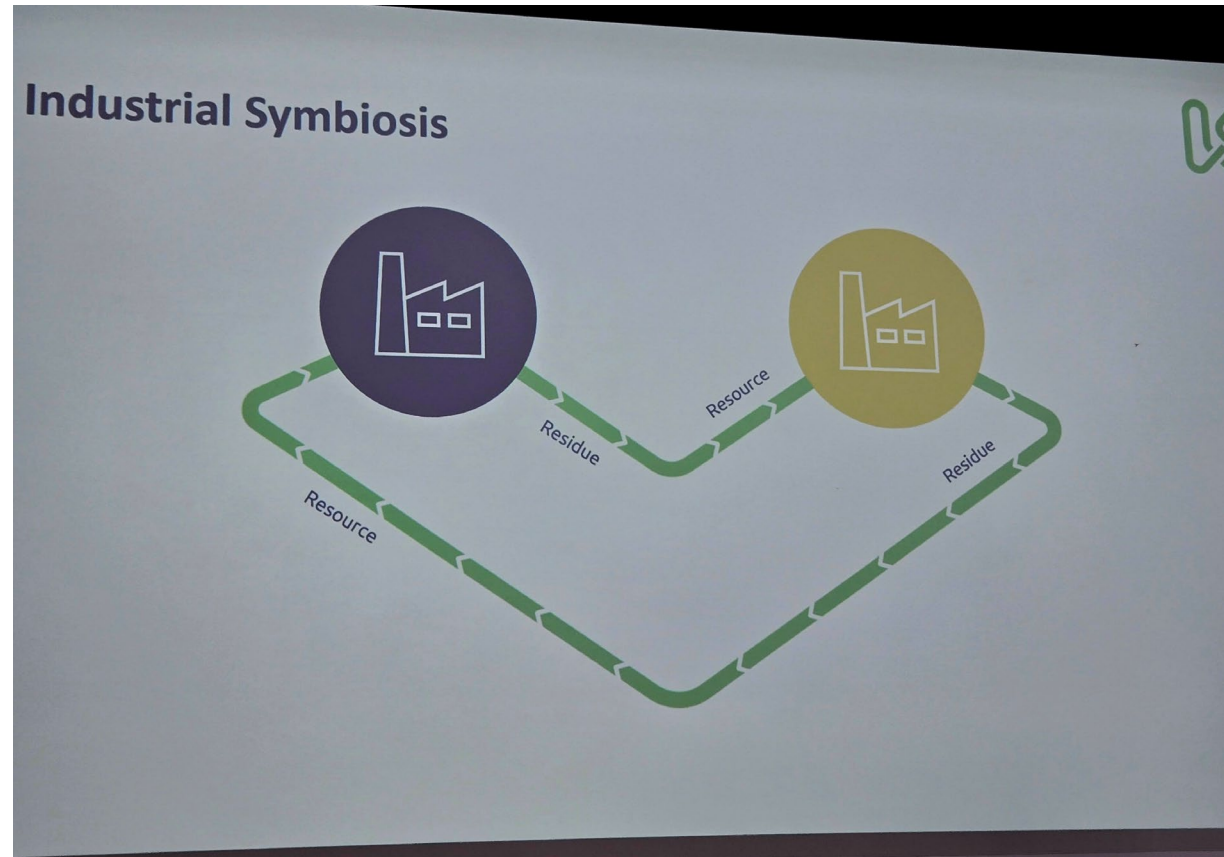
Solrodgard WWTP (most of it was buried underground).

In the afternoon we had a round table Danish Water Industry, a manufacturers trade group.

The evening was spent at the beautiful Aggersvolds Estate.



After a great overview, we visited Kalundborg's water and wastewater treatment facilities. Then at the end of the day we took the ferry to Aarhus.



Wednesday



Each water treatment plant we donned blue booties. The plants were spotless.

How can you tell if your drive is working well?



Wednesday



The Nye neighborhood is in the northern part of Aarhus. The entire development was designed for sustainable living. The water plant operated by Aarhus Vand Utility is unmanned.

It is the country's first surface water treatment plant (RO, UV). The water can only be used for irrigation, toilet flushing and car washing.

Most places we visited there were few mowed public areas.



Thursday

Thursday



Touring Risvangen neighborhood where they did a project to separate combined sewers.

Part of the project was creating Urban Wetlands to handle the water run off.



The headquarters of Aarhus Vand Utility, one of Denmark's largest utilities. The offices have a very unique design.

Nature and art were required to be part of the design.

The first floor was designed to be the bottom of a lake and each floor is designed to be a different level of the lake to the top of the water.

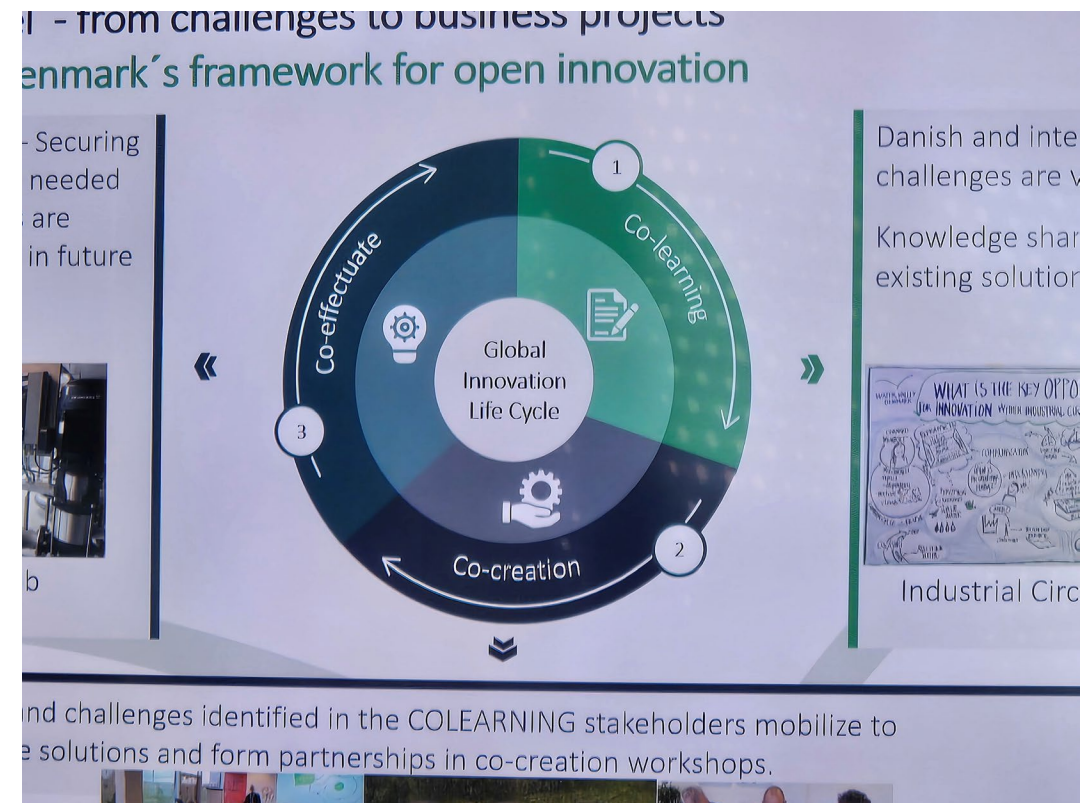
Thursday

There are no assigned seats and no personal items are allowed on the desks.

Aarhus Vand Utility



Thursday



Meetings with AVU and Water Valley Denmark to brainstorm on utility issues and ways to work together to reach a workable solutions.

Friday

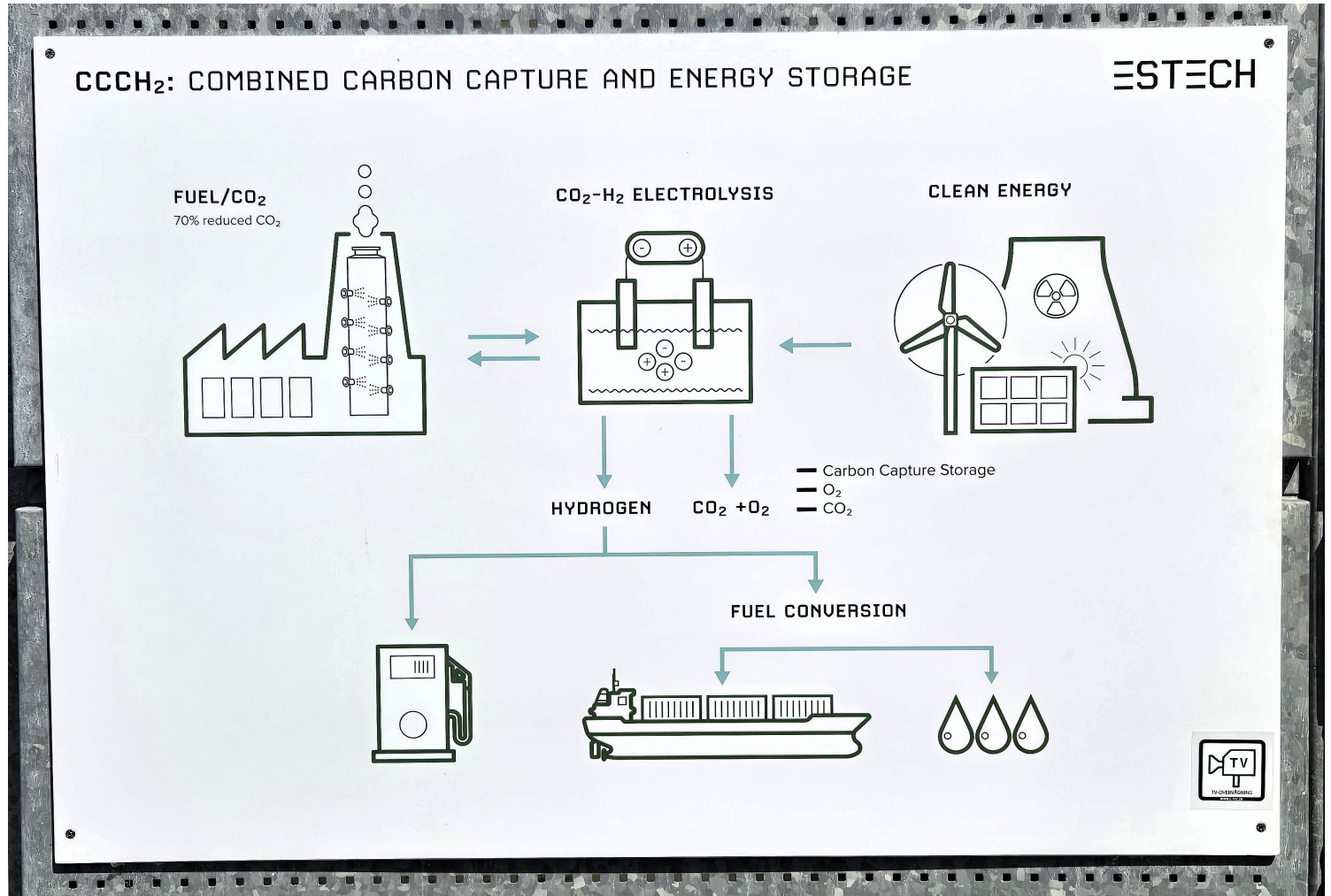
The study group toured the Sonderso WWTP reviewing their pilot on Membrane Aerated Biofilm Reactor (MABR) installation and their Pyrolysis project that produces Bio Char.

They feed 23% solids and the pyrolysis delivers 90% bio char that when mixed with soil helps the soil hold more water.



We travelled to Ejby Molle and were introduced to VSC Denmark WWTP operations and strategic goals and projects to reduce green house emissions.

We toured the only green combine carbon and CO2 capture facility in the world.



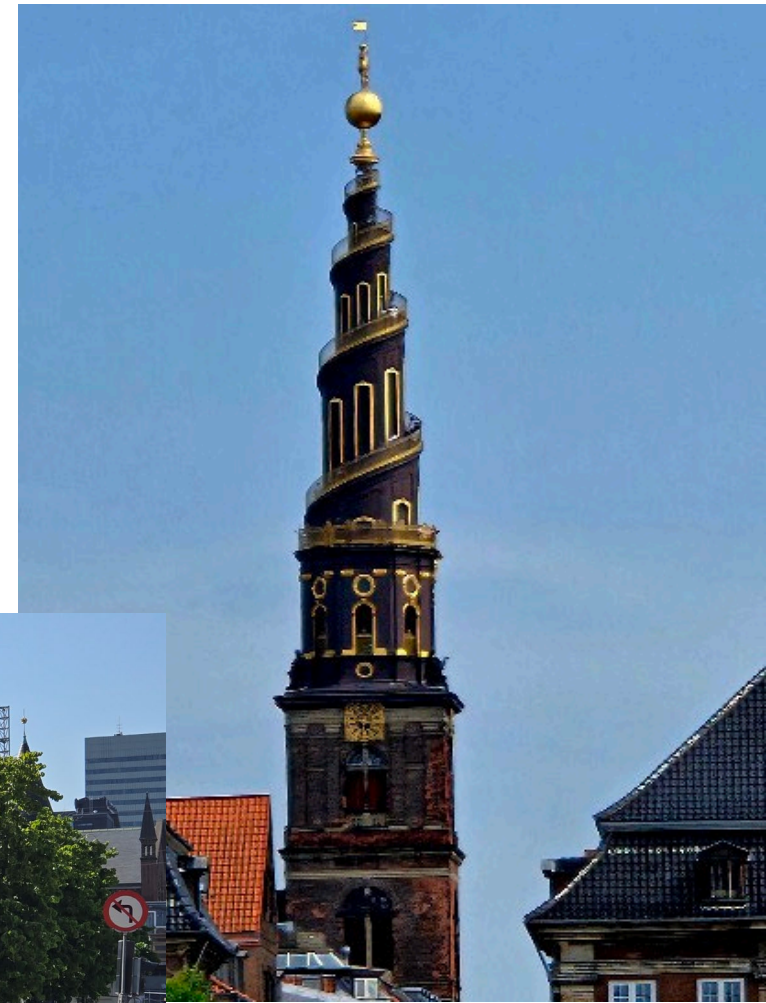
Friday

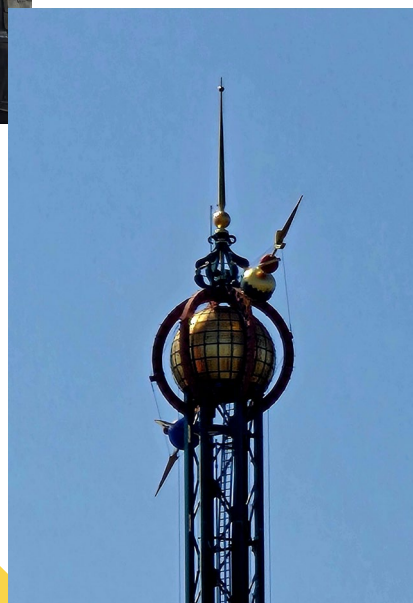
Utilities In the United States

How can we bring about more awareness concerning Industrial Symbiosis?

- CO₂ capture.
- Treating our sludge to the point we can reuse minerals to move towards zero waste.
- Carbon neutral goals.
- Utilizing our byproducts with private industry.

Around Denmark in Six days





Epic Trip



Thank you

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