13JUCB11

ALGAE **I**NDUSTRIAL **F**ARM

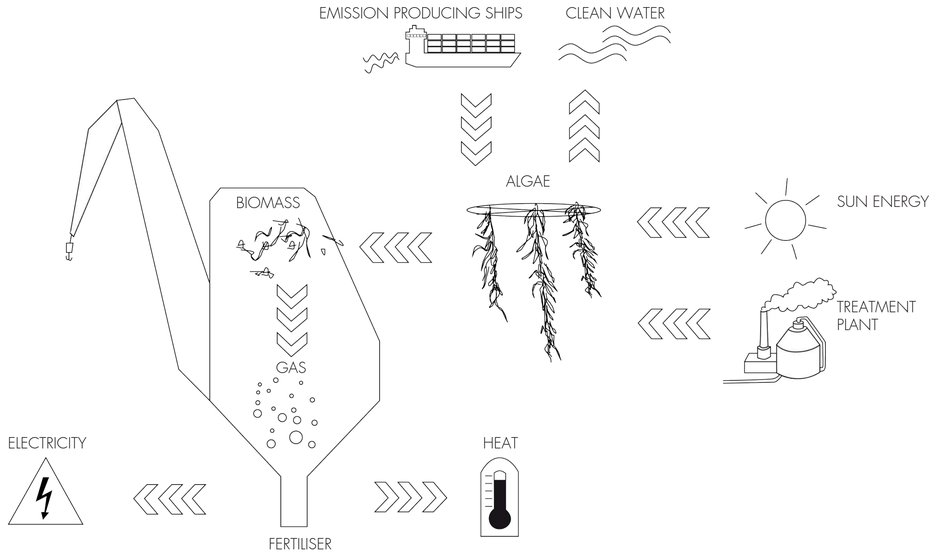
Technology:

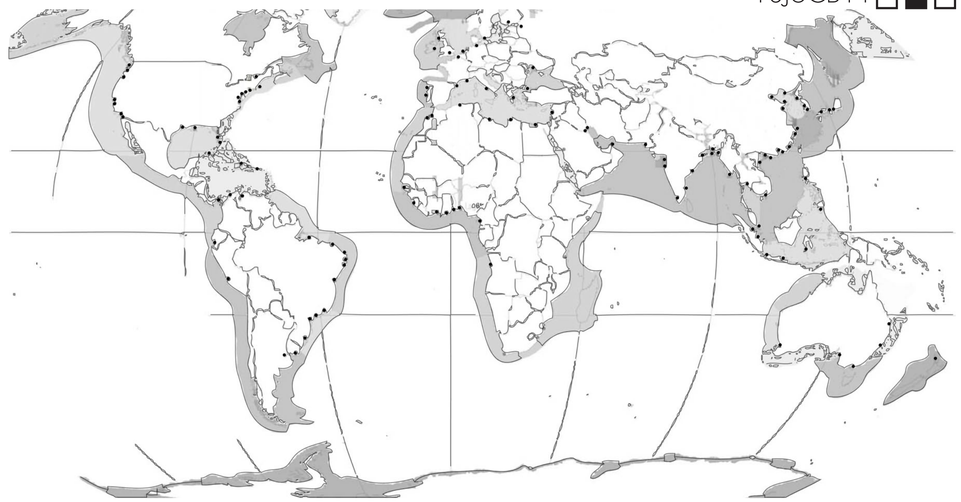
Due to the fact that world population is rapidly growing in the next years, the pressure on the environment, global food supplies and energy resources is growing. Hence, a system must be found, which produces clean energy on the one hand and on the other does not waste important agricultural or settlement areas.

By growing algae as energy resources at sea, the environment will gain fresh air and water. Nutrients are given back to the marine life, which makes the system a complete ecology. Due to the fact that algae do photosynthesis, they are in need of CO2. Binding of CO2 reduces global warming and improves the city's climate.
Simultaneously the ecological system offers public access to the sea and creates important recreational areas for the city's inhabitants.
There are many facts, why algae are not only an ecological, but also a very efficient way to produce energy:
- algae has compared to land crops 5 to 10 times higher productivity of biomass
- beside sun light and CO2 algae are in need of few nutrients like nitrogen and phosphor
- the cultivation of algae is not in concurrence with agricultural land
- due to the cultivation of algae in the sea it is transferable to all coastal areas in the world
- in comparison to other crops algae do not need extra watering, instead they even fight against marine pollution or use wastewater streams as nutrient sources

The most efficient way to produce energy from algae is to cultivate them in sea water and harvest them by cranes, which reduces the transport routes.
The crane is a multifunctional machine and combines all steps of the energy production, from the harvest of the algae, over chopping, to the gasification process. Consequently, the crane is a combination of a biogas unit and a combined heat and power plant (CHP). It produces electricity, heat and fertiliser, which can be used for the algae cultivation. All in all the energy production of algae is a circulation process, which is well integrated in the existing marine environment and improves the water quality, while gaining fresh air and energy.

To increase the productivity of algae several swimming aquariums are used for breeding the algae in their sporophyt stage before bringing them as gametophyts in sea water basin. Saccharina latissima' is a algae type which grows very fast, produces a lot of biomass and is well adapted to the conditions in the danish sea water.





Many capitals in the world lie on the coast and can cultivate algae on the sea to gain energy