-------- Videresendt meddelelse --------
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Request for support and funding
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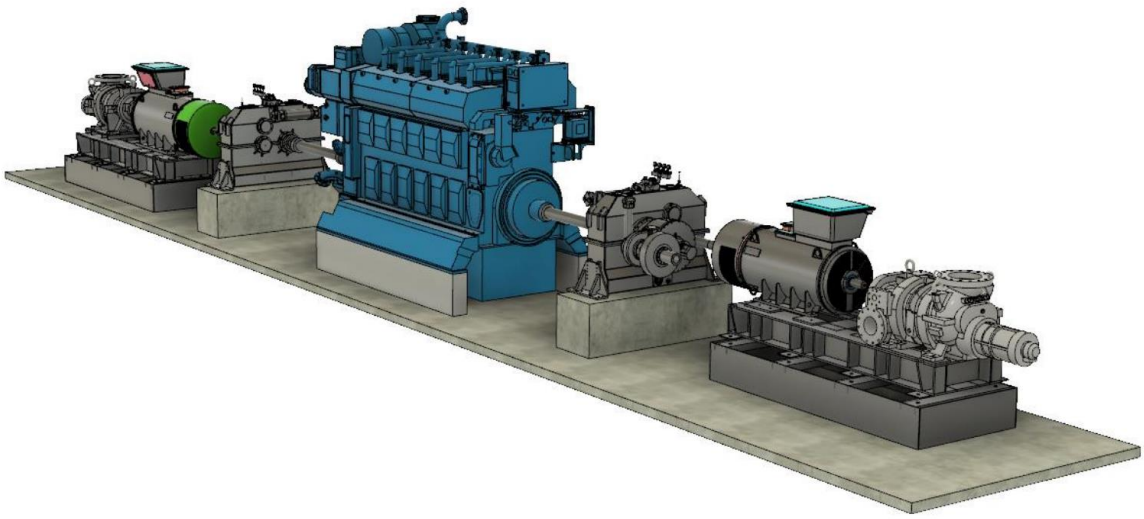
Proposal for District cooling and energy system in Dubai

Greetings,

My name is Niels Hansen, coming from Denmark, one of the leading countries in the world with best technologies when it comes to sustainability and green energy solutions.

In the early 1990s, I graduated from Aalborg University in Mathematics and Computers, and have worked since then in developing softwares for industries.

Since 2005 I have worked energy and especially with a focus on heat pumps for district heating supply, for instance, I have developed a gas engine heat pump together with Rolls Royce as shown below



The engine's gas consumption together with energy from the air cooler was supplied in hot water for district heating supply.

The below picture illustrate the large air coolers for energy absorption for the heat pump

This technology with ice as back in 1985 was developed here in Denmark by Johnson Control (http://www.nhsoft.dk/work/FG26/Jan/VIM.pdf) I have worked a lot with this ice technology when the phase transition is utilized in the ice.

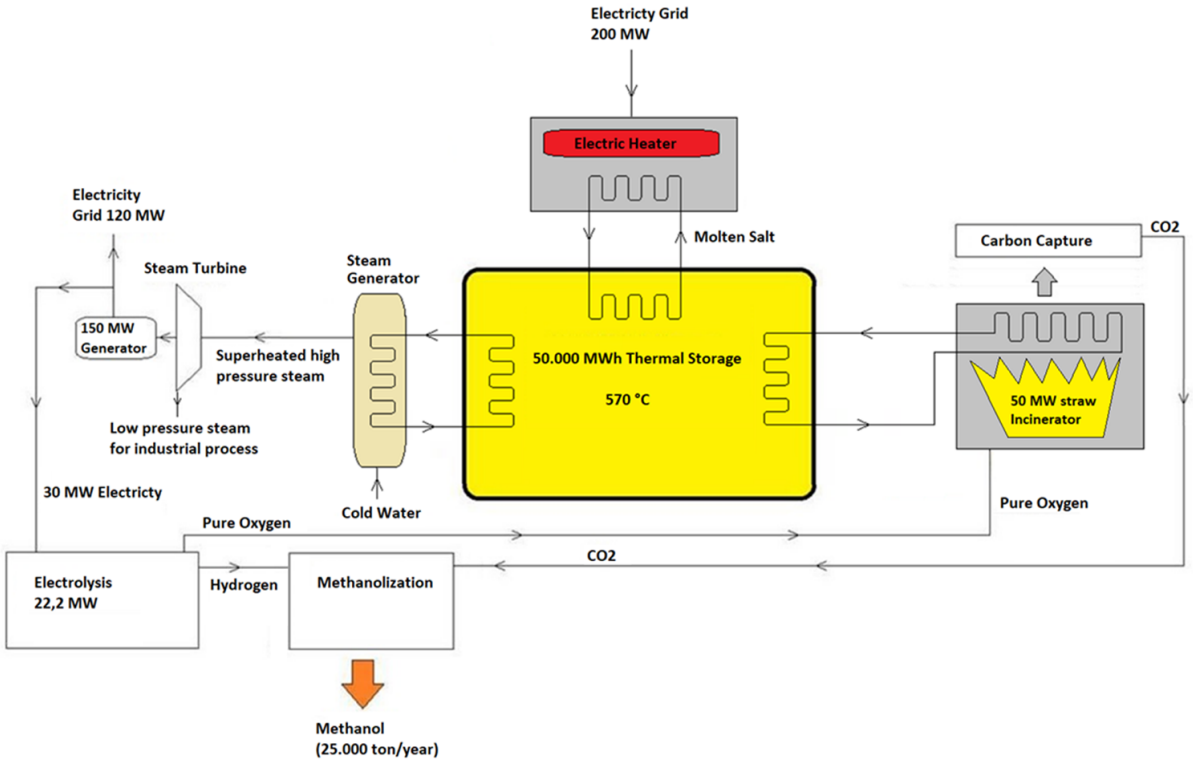
In details, here in Denmark, this technology is used when water freezes to absorb energy from the phase transition and this energy could now form the basis for district heating production via heat pumps. For example, when the plant had produced 100 tonnes of ice, the same energy had been supplied to the heat pump as the energy in 1000 l of oil.

Also, I have worked with the Danish Technological Institute (https://dti.dk/) on the development of the technology where there were some very interesting properties of the ice crystal that formed in this vacuum chamber. This crystal is completely clean even if the frozen water was contaminated. If wastewater is frozen then the ice will be almost clean and large amounts of water can be purified.

Over the last 3 years I have developed this concept together with multiple companies like MAN-es, Danish Burmaister & Wain, Norwegian Yara and the Professor at the Technical University of Copenhagen John Bagterp.

The technology in the overall setup utilizes high temperature thermal storage which operates at solar power plants today (as below)

The overall holistic plan for the power plant, which can actually provide large battery capacity is also shown below:



Furthermore, when a certain city or a region's waste is consumed in the plant, then the waste acts as a catalyst that can store electricity as heat in the thermal storage.

Subsequently, the setup can recover large amounts of electricity 100%, when the waste has been used as a catalyst and the power plant can supply a region for several days without electricity from sun or wind.

The overall system setup makes the production of fossil-free electrofuel possible.

The plant can advantageously be made at old power plants and the steam turbines and generators can also be recycled.

Water desalination from osmosis or multi-effect water distillation:

The preferred water desalination systems today are based on Rev. Osmoses like this plant in Melbourne (https://en.wikipedia.org/wiki/Victorian_Desalination_Plant) with a price of 4 billion. $. Such a plant can provide 410,000 tons of water daily.

The plant in Melbourne uses very little electricity and less than 3 KWh per. tons of drinking water.

Systems such as multi-effect distillation operated by water vapor compressors via heat exchangers have a price of 4 - 500 million $ for the same daily capacity as the plant in Melbourne, but the electricity consumption is much higher and 3-4 times as high as Rev. Osmoses.

On the other hand, Alfa Laval Multi-effect water distillation plant operates by an electric driven water vapor compressor (http://xqw.dk/a2020/VVC-2000-9-SW%20Rev%2001.pdf)

Now most importantly, in the future, Dubai could rely on power from large production of solar cells that will produce cheap electricity and from power plants with the battery capacity, the overall setup with multi effect distillation will be able to provide the necessary amount of drinking water Dubai needs, and cheaper than Rev. Osmoses which consumes power from fossil power plants.

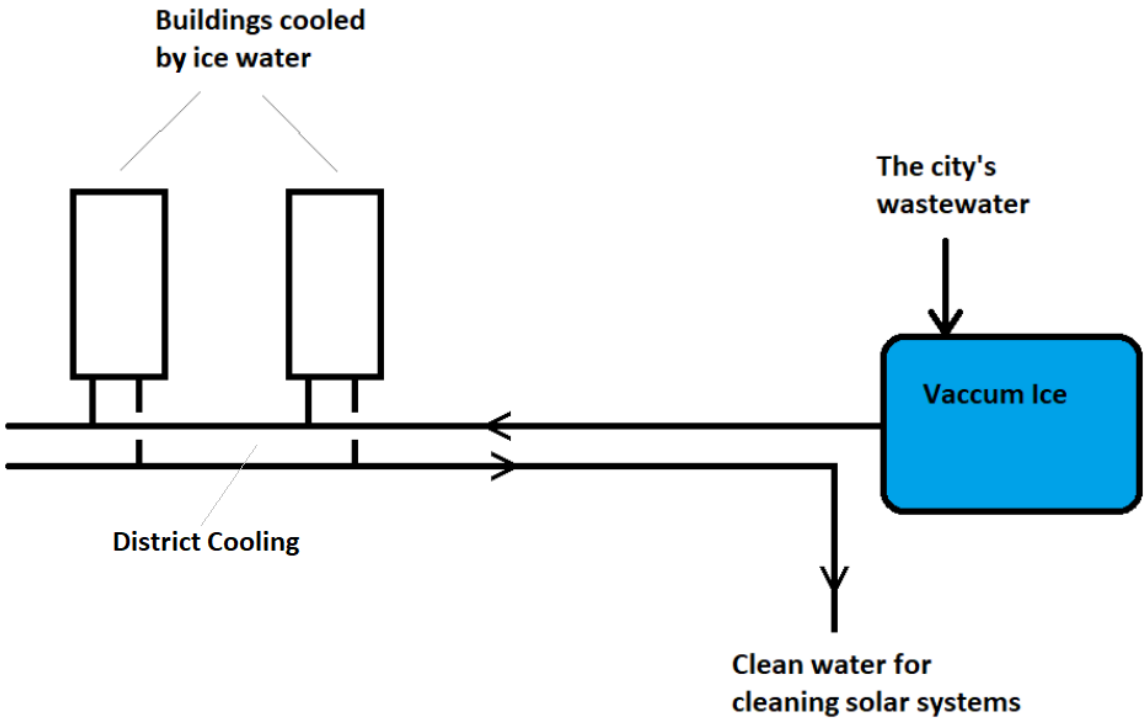
Cleaning solar cells and district Cooling in cities:

The tough question remains with cleaning the solar cells which requires a lot of water in countries like the United Arab Emirates, since there is a lot of dust in the air. This water is considerable very expensive to supply for this cleaning.

Let’s take the example of the District Cooling with a Ice Thermal Storage in Chicago city as here: https://www.youtube.com/watch?v=FXzPg1u2lcY

If such district cooling system could be laid out in Dubai, where the city's wastewater is frozen as in a system as per the Danish district heating system, now the wastewater is purified through the freezing process and then ice can be produced day and night and stored.
During the day, when the need for cooling in Dubai is huge, the ice is pumped out into the city through the district cooling system, which cools the buildings. And now (almost) clean water can now be used to clean the large photovoltaic systems.

The overall principle can be seen here:



Total integration:

Today, there are huge power plant capacities that have been reserved for the operation of air conditioning in the United Arab Emirates as known. A comprehensive solution as I am suggesting with power plants that operate together with large photovoltaic systems, can provide large amounts of drinking water, and by freezing the urban wastewater, it will provide cooling that will have great benefits when solar power and urban waste drive the entire electricity, water and cooling supply.

Niels Hansen
Denmark