Sustainable urban energy solutions

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Development of livable cities

Precondition

City infrastructure for buildings, transport, environment and energy is planned carefully and provide the basic needs in a cost effective way, offering more money for quality of life.

Examples from Copenhagen

- Carefully planned new city districts
- Bicycle infrastructure and metro providing good mobility
- Wastewater treatment which allow the city to establish several harbour baths
- Integrated district heating with 99% connection eliminating the need for individual heating
- District cooling systems in the business districts
- Waste incineration and CHP plants to generate 95% of all heat
- Waste management system and a cost effective degree of recycling
- How to combine risk of flooring, water and green areas
- Offshore wind farms
- Green roofs and roof terraces.

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Facebook and surplus heat

Partner

RAMBØLL

Challenge

- How to provide sustainable district heating for Denmark's 3rd largest city
- Datacentres produce a lot of surplus heat.

Solution

- Use of surplus heat from data centres
- Connecting energy systems and integrating large amounts of renewable energy into the existing infrastructure.

Result

- Data centre will be able to provide heating for appr. 6,900 houses in the area.
- The project supports Fjernvarme Fyn's ambition to provide 100% renewable energy by 2030.

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District cooling – seawater intake

Challenge

- There is an increasing demand for air conditioning and cooling in Copenhagen, as in many other cities around the world.

Solution

- A district cooling system, which consists of a distribution net and two cooling plants.
- Uses seawater to chill down the water supplied to the customers.

Result

- In the capital of Denmark, district cooling results in close to 70% reduction in CO_2 emissions
- Zero-carbon cooling.

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Seasonal thermal energy storage

Partner

ARCON SUNMARK

Challenge

- When light from the sun peaks, DH is not necessary
- When need for DH peaks, the sun is not easily harvested
- This limits solar coverage to 20-25%.

Solution

- In Dronninglund, 35,000 m² solar collectors have been installed
- Seasonal storage makes the heat last
- Pit heat storage in Dronninglund contains a total of 60,000 m³.

Result

- The world's largest solar heating plants for district heating now cover up to 50% of the annual heat consumption
- Citizens can now use district heating in the winter from solar power.

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Avedore power station

Challenge

How can the demand from the citizens of Greater Copenhagen for reliable heat and power that is derived from clean energy sources be met in a cost-effective manner?

Solution

A multi-fuel boiler was installed that is linked to a steam turbine and generator. This allows the plant to switch between different fuel sources depending on availability and demand.

Result

The conversion means the plant will reduce its CO_2 emissions by one million tonnes a year and optimization of the plant during the conversion has expanded its lifetime.

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Amager Bakke
waste-to-energy

Partner

arc
amager ressource center

Challenge

- Keeping waste from landfills
- Supplying heat and electricity to Copenhagen.

Solution

- State-of-the-art facility doubling as a recreational area for citizens
- Placement near the city to reduce transportation costs.

Result

- Amager Bakke converts 332,000 tons of waste each year supplying heat and electricity to 150,000 households in Copenhagen
- Includes a year-round ski slope, hiking trail, and a viewpoint overlooking the city.

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Billund BioRefinery

Partner
Billund BioRefinery
Resource Recovery for the Future

Challenge

A growing world and irresponsible consumption and production puts the planet's resources under strain. How can we extract maximum value and conserve precious resources?

Solution

By rethinking wastewater as a resource, it is possible to produce biogas from the sludge that arises from treated wastewater.

Result

The biogas production reuses the energy resource from the biomass and can be used for electricity and heat production that can be sold on the grid.

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Thank you

…any questions?

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