

Case Story

Huge demand for district cooling in central Copenhagen

Copenhagen, Denmark - By Journalist Jesper With



**45%
saving**
on cooling expenses

Climate friendly district cooling (DC) saves customers up to 45 % of their cooling expenses. At the same time it is stable, easy to use and needs only a little maintenance

The bank Sydbank A/S at Kongens Nytorv has been waiting for a district cooling solution for some time. There was a still growing demand for cooling in the elegant five-storey building here at one of the most beautiful squares in the Danish capital of Copenhagen. Therefore the offer from Copenhagen Energy Ltd. to deliver it in 2009 was received with relief.

Together with Svend Aage Petersen, engineer and external consultant at Sydbank, we go down in the cellar to take a look at the newly installed district cooling system. "It wasn't that easy to bring in the substation for cooling here into the cellar. It is very narrow and therefore we had to bring the heat exchanger from Danfoss and the different pieces into the cellar in several parts", Svend Aage Petersen says. He has taken part in designing and installing many cooling systems throughout the years in different Sydbank branches all over Denmark. However, all the previous ones have been traditional cooling systems,

which demanded a lot of pipes and equipment in the cellars and tons of installations on the rooftops. In Sydbank it would even have demanded a special steel construction to keep the installations, which couldn't be made without the assistance of specialists in static constructions - in case a traditional cooling system was installed!

Copenhagen Energy Ltd. had been constructing the pipeline network for cooling around Kongens Nytorv Square over the last couple of years and in spring 2009 it was ready to deliver DC to a few companies in a pilot project.

The district cooling system in Sydbank is one the first at all in Copenhagen, mainly due to the fact that Danish regulations were not ready for DC before 2009. There is no doubt in the mind of Svend Aage Petersen, that district cooling is a huge step forward concerning offering a stable and cost-effective cooling system.

"A traditional cooling system, which would include 2-3 tons of installations on the rooftop would, according to

to our calculations, cost the double amount of the district cooling solution. This correspond to a cost reduction of 42 %, so the company saves a lot of money and gets a much better cooling system at the same time. A traditional system moreover looks terrible placed on a rooftop", Svend Aage Petersen says. Concerning operational costs the cost reduction adds up to 45 %, which includes huge savings on electricity (The electricity bill is 110 times lower for district cooling than for a traditional cooling system) and expenses for service and repairing. "Naturally the yearly costs can vary, since you never know how much the bank will actually use the cooling system. Will they use it additionally 3 or 4 months per year? That depends on the demands of the staff and how warm the summer will be", Svend Aage Petersen says.

District heating and cooling goes hand in hand

The bank receives district heating and now also district cooling from Copenhagen Energy Ltd. by the use of a DC



Engineer and external consultant at Sydbank, Svend Aage Petersen, explains how the cooling station functions and the benefits of district cooling.



The old historic Sydbank building at Kgs. Nytorv in Copenhagen.

substation from Danfoss. The company has developed a substation for cooling, which exchanges the water coming from the district cooling pipeline water from the water in the Sydbank system. The chill from the water in the street pipeline is used to cool the water of the building. Through an already existing ventilation system the cool air (down to 17 degrees in the summertime) is then blown out in most rooms of the building. "The temperature can be regulated internally in the building through our heat exchanger, whereas the staff cannot regulate the cooling temperature individually. Moreover it is also possible to regulate through the ventilation system", Villiam Rasmussen, technical sales consultant from Danfoss says. Many years of company experience in district heating have been used in working with district cooling, since the principal is basically the same, Villiam Rasmussen explains. Still, it was necessary to develop a special control system for the district cooling systems.

The ventilation and air-conditioning system is designed for 25,000 m³ air per hour, but this top level is not expected to be reached. "The heat exchanger is 150 kW now, but can be enlarged 30 %, so that it is ready in case the demands are changing", Svend Aage Petersen says. The constructional department is taking care of the daily

operation. Through a building management system (BMS) in Sydbank, they monitor the system on daily basis.

Better cooling for journalists

Just a few hundred meters from Sydbank we find another district cooling customer: Berlingske Karré. The old domicile of the oldest Danish newspaper Berlingske Tidende has gone through a serious modernization from 2006-2009. This process was used also to install a district cooling system, which supplies the employees with comfort cooling and moreover provides server rooms with cooling. The building is no longer owned by the media company, but bought by the real estate company Jeudan A/S. The company owns not only Berlingske Karré, but also several other buildings in the area. "Therefore we have installed a district cooling network not only in this house, but in a whole range of shops and buildings in what is called Berlingske Karré, so that we can distribute cooling to all of them", Ole Frederiksen says.

He is operational manager at Jeudan and we find him in the garage under Berlingske Karré, where he has come to show us the DC system. The heat exchanger for cooling has a capacity of 1,380 kW and much bigger than the one in Sydbank, since it is supplying several big customers. "We have

installed the network in all shops, no matter if they want cooling or not. In that way it is very easy to connect the shops, if they later decide that they do want to join the system. There is huge satisfaction among connected customers and we can feel that the word is spreading around. Almost everybody, who gets the possibility, are actually joining the system now", Ole Frederiksen explains.

We go up in the lift to the rooftop of Berlingske Karré, where we get an impressive view of central Copenhagen. A traditional cooling system would demand almost all the space on the flat roof, but due to the district cooling system, Jeudan A/S has been able to build a brand new canteen for the employees of the media house and a conference center. "This is fantastic. In stead of ugly installations we almost get an extra floor of the house and a beautiful terrace as well", a satisfied Ole Frederiksen says.

From the rooftop there is a view to several other buildings, which are equipped with traditional cooling and therefore have tons of installations placed on the rooftop. It definitely isn't a nice view.

A bonus of district cooling here is that Jeudan A/S in this way receives extra rentals and Berlingske Media has got a nice new canteen with a terrace. Moreover, the media company saves a



On the rooftop at Berlingske Karré in Copenhagen, operational manager at Jeudan A/S, Ole Frederiksen and technical sales consultant from Danfoss A/S, Villiam Rasmussen inspect the new canteen with a terrace overlooking central Copenhagen. It was possible to make space for the brand new canteen and terrace by installing a district cooling substation in the basement and removing the old cooling tower which took up most of the space on the rooftop.



lot of expenses on cooling compared to a traditional cooling system. Finally the DC system reduces the CO₂ emissions dramatically compared to a traditional system. The demand for cooling has been constantly increasing over the last 10 years. One of the reasons is that growing use of IT and a connected growing need for storage of information increases the electricity use in offices and server rooms. According to Copenhagen Energy Ltd. 40-50 % of the cooling demand is actually used in server rooms.

Facts about District Cooling in Copenhagen

According to calculations made by Copenhagen Energy Ltd. the CO₂ reductions are 67 % compared to traditional cooling. A centralized district cooling production increases efficiency 5-10 times compared to decentralized electrical driven cooling solutions.

A capacity of 7-8 MW cooling is now connected to the pipeline by Copenhagen Energy and in use. Within the next 2-3 years this will go up to 30-35 MW installed capacity in central Copenhagen.

New parts of Copenhagen like Kalvebod Brygge, Islands Brygge, Sydhavn and Nordhavn (all areas along the harbour) are the next in line to receive cooling through newly installed pipelines for district cooling.

District cooling in Copenhagen is produced by the use of heat exchangers, compression and absorption chillers. The source is free cooling and waste heat (summer time) from incineration plants. The idea behind district cooling is utilization of resources that would otherwise be wasted

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Danfoss A/S • DK-6430 Nordborg • Denmark • Tel.: +45 74 88 22 22 • Fax: +45 74 49 03 95
E-mail: districtenergy@danfoss.com • www.districtenergy.danfoss.com

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