WORLDCLASS, CLIMATE-FRIENDLY HEATING

1984 2009

CTR – Centralkommunernes Transmissionsselskab I/S

CONTENTS

COVER

The transmission system's 26 exchanger stations is located underneath the squaes of the city. The stations transfer the heat from the transmission system to the district heating network that supplies heat to households in the 5 Municipalities.

WORLDCLASS, CLIMATE-FRIENDLY HEATING

Twenty-five years ago, the five central municipalities of Greater Copenhagen – Frederiksberg, Gentofte, Gladsaxe, Copenhagen and Tårnby – joined forces to ensure that their citizens would have a well-thought-through system for supplying electricity and heat for many years to come. This required an investment of billions of DKK in a vast heat transmission system that would protect the environment, stabilise consumer prices and ensure highly reliable supplies.

Looking back, we now see how the founding of the CTR I/S partnership on 29 February 1984 and the pioneering efforts preceding it were not just ambitious and carefully considered. They also resulted in an energy system that now – 25 years later – is still one of the best in the world. The interconnected transmission grid makes it possible for the consumers of an entire region to be supplied by every large-scale producer of heat in that region and for the heat purchased to be organised to optimise the utilisation of surplus heat from the electricity production and waste incineration processes.

Back then, the political decision was prompted by a world-wide oil crisis, and the remedy for counteracting sharply rising costs for consumers and businesses was to implement district heating on a large scale. We still have to be prepared to deal with supply crises today, but it is equally important that district heating helps us to combat man-made global climate change.

On the following pages, you can read how the five municipalities' agreement to found CTR was finalised and about the technical feat posed by constructing the system in CTR's early years. You can also read about what it means to be a heating utility for the municipalities involved and the benefits of district heating – in the future as well.

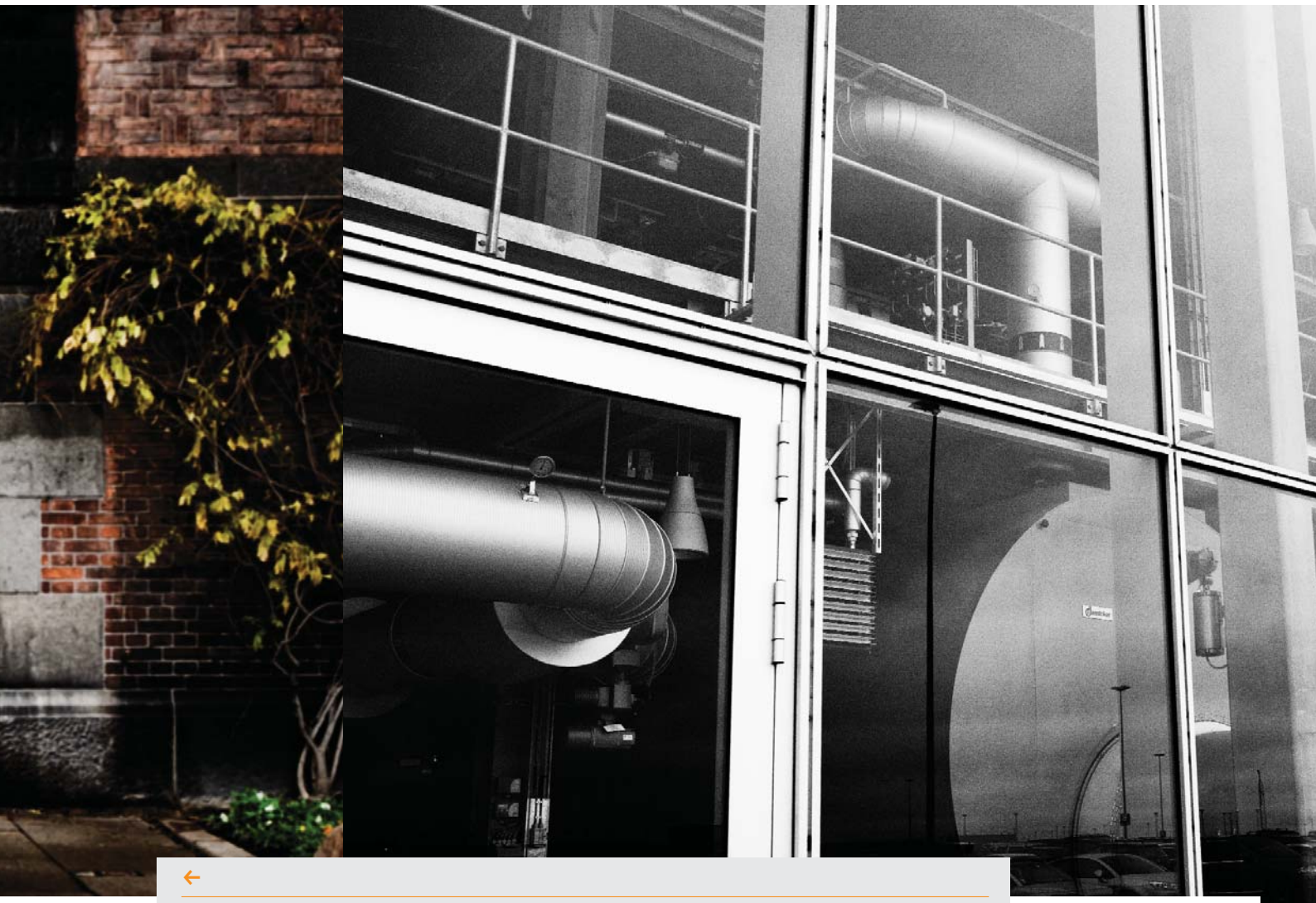
CTR is a multifaceted success story involving many crucial factors for our society and our citizens: economy, safety, environment and comfort. The catchword for CTR's activities is "teamwork" – which has been exemplary throughout the process. These efforts give us cause for celebration and I would like to take this opportunity to also highlight that one of our goals for the next 25 years of teamwork is to supply carbon-neutral heat.

Klaus Bondam
Mayor for the Technical and Environmental Administration, City of Copenhagen, CTR's Chairman of the Board

CTR COMES INTO BEING:

REAMS OF REPORTS AND A FIGHT TO THE FINISH

FIVE YEARS AND TWO BILLION DKK WERE SET ASIDE IN 1984 FOR THE FOUNDING OF A JOINT HEAT TRANSMISSION SYSTEM FOR GREATER COPENHAGEN. THE AGREEMENT LED TO THE CONNECTION OF ALMOST EVERY POSSIBLE RECIPIENT IN FREDERIKSBERG AND COPENHAGEN. AT THE SAME TIME, DISTRICT HEATING WAS ESTABLISHED IN AREAS WITH BLOCKS OF FLATS IN TÅRNBY, GENTOFTE AND GLADSAXE. YET HOW DID THE AGREEMENT TO ESTABLISH A HEAT TRANSMISSION SYSTEM, WITH THE RESULT THAT **HALF A MILLION PEOPLE** NOW BENEFIT FROM DISTRICT HEAT SUPPLIED BY CTR, ACTUALLY COME INTO BEING?



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PETER ELSMAN was in charge in the City of Copenhagen, when heat as a by-product of electric power generation became a high priority for the first time. Peter Elsman helped to work out the details of the agreements that resulted in the founding of CTR (Danish acronym for the Central Municipalities Transmission Partnership) in 1984. Today, Peter Elsman is the assistant director of the City of Copenhagen's Finance Administration in the Centre for Urban Development.

Prompted by the energy crisis in 1973, the idea of a district heating system based on surplus heat from the generation of electricity became a high priority. By exploiting surplus heat, it would be possible to reduce energy consumption by 40% and reduce the dependence on imported oil by basing power plant-produced heat on the burning of coal and refuse – reductions that were badly needed in the early 1970s.

Dispute with the western municipalities

Increasing consumption of electricity throughout the Copenhagen area fostered the need to enlarge capacity in the near future. But where should the next power plant be located?

In the City of Copenhagen, policymakers were already talking about the need for extra heat-capacity. An additional CHP plant in Amager would make it possible to increase the number of district-heating consumers.

Though the western municipalities of Greater Copenhagen as well started to make their move. They were also interested in having district heating, and to achieve this they intended to build a huge new CHP plant at Avedøre that would supply oil-free heat to citizens throughout the western municipalities of Greater Copenhagen.

The battle lines were drawn for a prolonged dispute and it actually took almost three years of studies, calculations and reports before it was finally settled. A union of electricity producers on Seeland Elkraft calculated that a power station at Avedøre made financial sense. In addition, even though the City of

Copenhagen was a co-owner of Elkraft, Copenhagen politicians insisted that the capacity enlargement should be built within the City of Copenhagen for the benefit of the most densely populated area in Denmark. In their view, this was the only solution that made sense – both financially and environmentally.

Minister steps in to resolve the issue
Finally in 1982, the Minister for Energy resolved the issue. Reports from the ministry showed that two new CHP plants – one in Amager and one at Avedøre – would be just as economically viable as one large CHP plant at Avedøre. And that's what were realized.

"Some of the technical calculations were probably skewed a little to reach these results," says Peter Elsman, who was a young head of section in the City of Copenhagen at the time. But the agreement resulted in two plants instead of one.

This paved the way for a large new transmission grid for distributing heat throughout Greater Copenhagen. The City of Copenhagen had no funds with which to finance the enlargement on its own, however. For this reason, the municipality's chief financial officer and young Elsman paid a round of visits to the mayors of the outlying municipalities.

We visited the mayors in the outlying municipalities to discuss whether they would be interested in founding a company that would manage the capacity-enlargement project," says Peter Elsman.

One system – two companies
The mayors of Gladsaxe, Gentofte, Frederiksberg and Tårnby were interested. But it was hard to reach a consensus with the other municipalities in the west. Although there were initial attempts to establish a single transmission company for all of Greater Copenhagen, it quickly became apparent that the parties could not agree.

"There were probably too many conflicts about where to site the plants," says Peter Elsman.

So this led to the founding of two transmission companies: VEKS, covering the western municipalities, and CTR, covering the central municipalities of Frederiksberg, Gentofte, Gladsaxe, Tårnby and Copenhagen.

Starting out in a modest setting
"I drew up the first draft of CTR's articles of association," remembers Peter Elsman.

"The City of Copenhagen was indeed strapped for funds back then. I used Elkraft's articles of association as a source of inspiration and didn't bring in a lawyer until the next phase of the project. After the articles of association were finalised, without a lot of dramatics, we set about staffing the organisation. We found our first modest facilities out near Bella Center, and I copied the most important documents I possessed to constitute CTR's records. After this, we succeeded in attracting three seasoned professionals from the energy sector, including H. C. Mortensen, who left a directorship at the Danish District Heating Association. He started out as the technical director for CTR and later served as managing director for many years."

Now CTR was up and running. The project required an investment of DKK 2 billion. Five years were set aside for construction activities, and the design work was set in motion immediately.

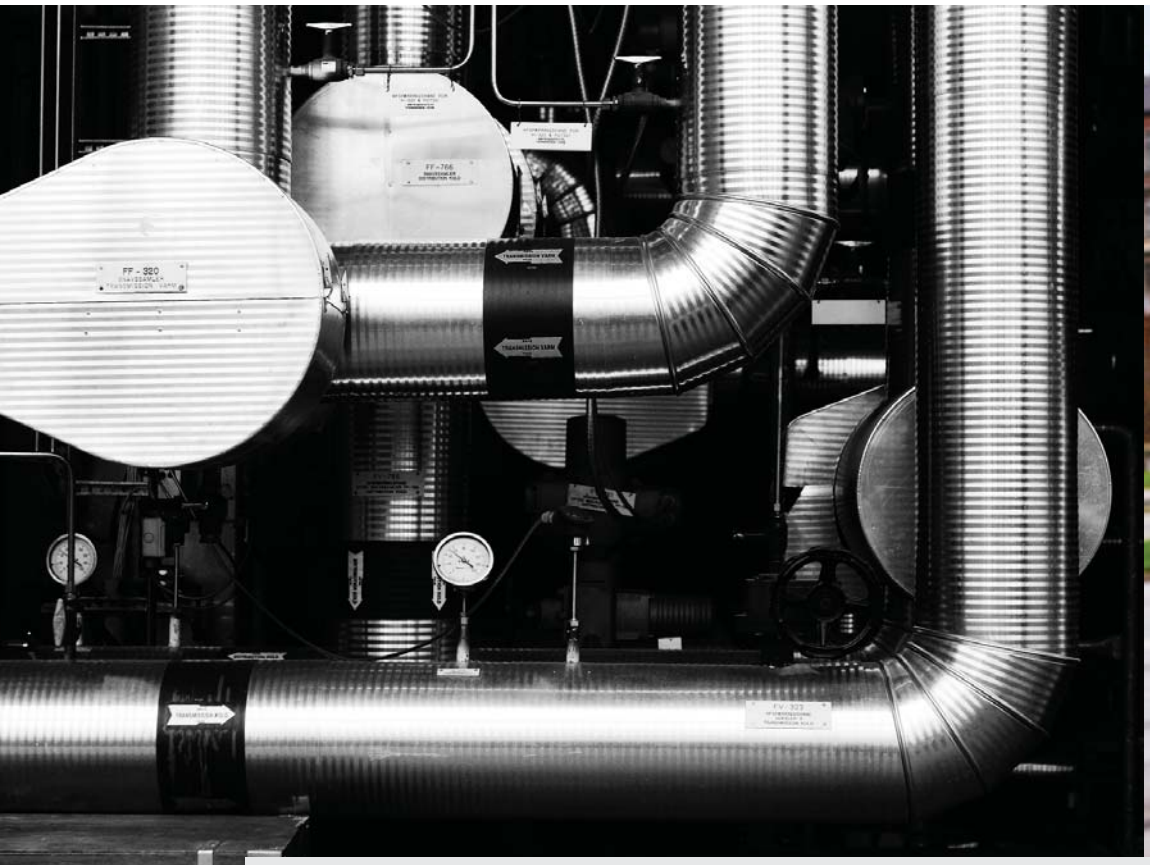
Close collaboration today
The two transmission systems in Greater Copenhagen are physically connected, and the system operations are jointly optimised. The transmission companies and Københavns Energi also established a formal working relationship to coordinate the day-to-day production of heat at the power plants and the incineration plants. This collaboration occurs at a joint working unit, associated with CTR's control room on Stæhr Johansens Vej, where CTR is headquartered. The entire system supplies 400,000 households all told. CTR is responsible for supplying 250,000 households, encompassing half a million people.

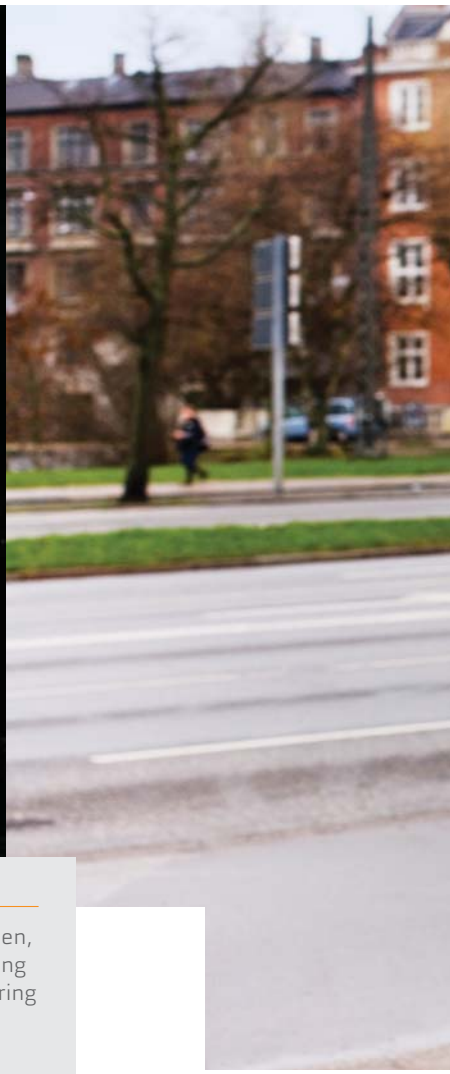
CTR was founded in 1984 by the five partnering municipalities: Frederiksberg, Gentofte, Gladsaxe, Copenhagen and Tårnby.

H.C. MORTENSEN was CTR's managing director from 1985 to 2003. He was part of CTR's management from the very beginning, after being headhunted to be the technical director in late 1983, from the Danish District Heating Association where he was a director. In his own opinion, his decisive accomplishment was that the newly founded CTR succeeded in getting the large-scale investment of DKK 2 billion earmarked as a framework allocation. "Otherwise we would have been swamped by subsidy applications and would have never been able to build a 1.6-km long submerged tunnel under the harbour or to construct most of the transmission grid through Copenhagen out to Tårnby in just three years."

THE TECHNICAL FEAT:
ON TIME AND WITHIN THE BUDGET – WITHOUT SACRIFICING QUALITY

FOR YEARS, THE CITY WAS ONE BIG CONSTRUCTION SITE DURING THE LAYING OF THE TRANSMISSION SYSTEM, AND THE PROJECT WAS COMPLETED ON TIME AND WITHIN THE BUDGET – WITHOUT COMPROMISING ON QUALITY ALONG THE WAY. EVEN A QUARTER OF A CENTURY LATER, THERE IS **NO MEASURABLE DETERIORATION** IN THE SYSTEM'S QUALITY.





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JAN ELLERIIS has worked with district heating in Greater Copenhagen since 1978 when, as a young engineer in a consulting engineering firm, he was charged with determining the most advantageous design of a transmission system in Greater Copenhagen. During the construction phase, he served as project manager for the consulting consortium engaged to design and establish the transmission system. He joined the CTR organisation as an assistant director in 1995.

The five central municipalities' establishment of the large-scale transmission was initiated in 1984 on the basis of a number of long-term decisions. In the municipalities of Tårnby, Gladsaxe and Gentofte, areas with large blocks of flats were designated to receive district heating, whereas the residential areas of single-family houses received natural gas, which is relatively inexpensive to set up. Frederiksberg's politicians wanted to supply district heating to everyone, as did Copenhagen City Council, which wanted everyone in the municipality to have the same opportunities. For this reason, the residential areas of single-family houses in the districts of Brønshøj, Husum and Vanløse also received district heating, even though the construction costs were higher than for natural gas. As a result, the areas supplied with district heating in Copenhagen and Frederiksberg went from 30% and 20% respectively to almost 100%.

"Looking back, it's easy to see it was the right decision," says Jan Elleriis, Assistant Director in CTR since 1995.

"The price of natural gas might increase so much in the future that converting areas where natural gas has already been established into district heating will pay for itself. Gladsaxe Municipality has reacted to expected higher prices by looking into the possibility of district heating in several areas."

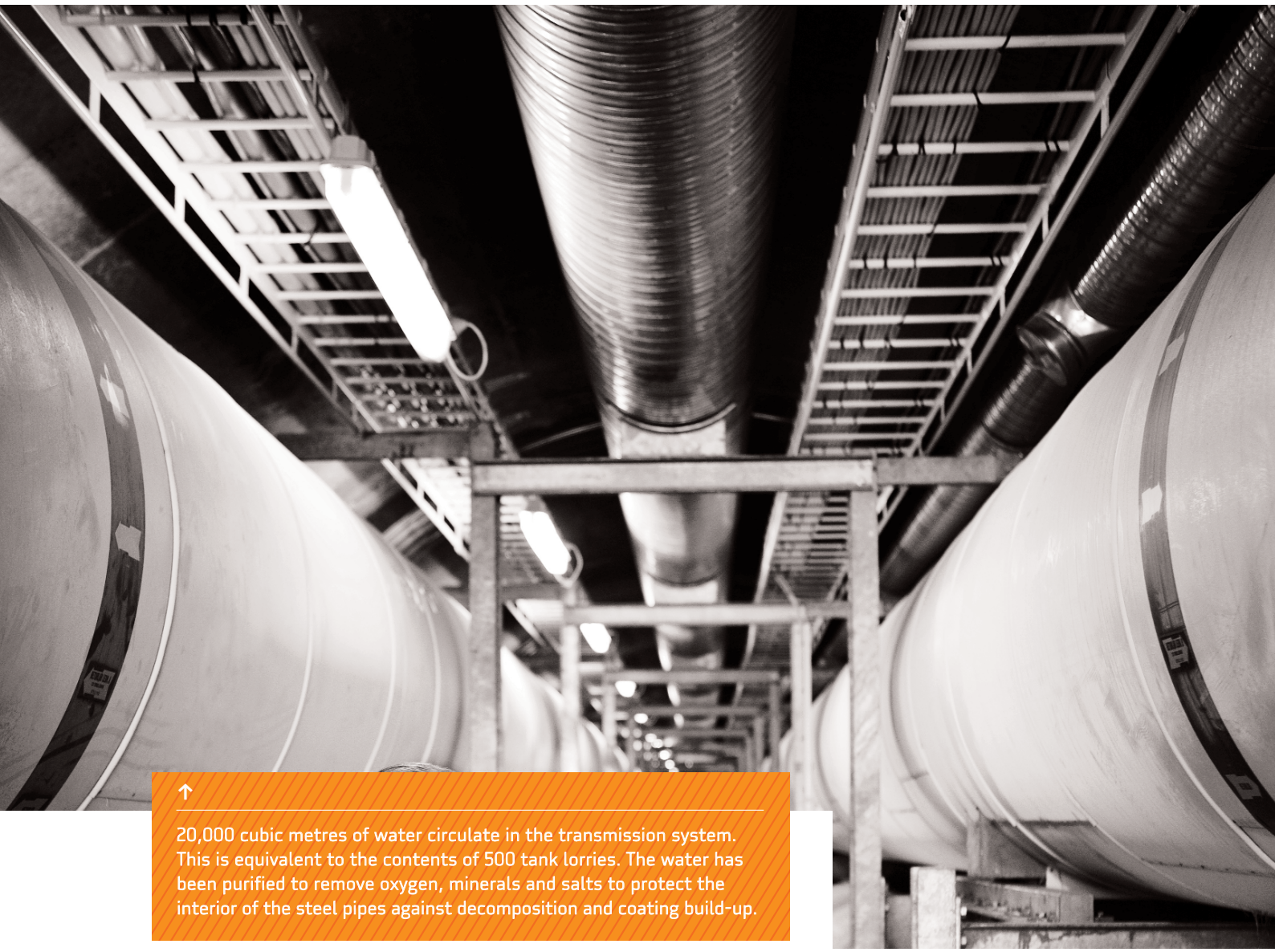
Construction site for years

In 1985, Jan Elleriis was appointed project manager for a consortium of consultants engaged to design

and establish the transmission system, and more than 200 technicians and 1,000 other workers were involved in the task in the peak period of activity from 1985 to 1987. Construction, excavation and pipe laying were going on all over the city.

"I was signing invoices every month, some for hourly wages and fees, others for disbursements. And I clearly remember a month when I had to approve disbursements of more than one million DKK. That says something about the scale involved; this large sum of money in the course of just one month covered expenses for photocopying, collotype, surveying, environmental sampling, and more," explains Jan Elleriis.

In addition to the land-based construction works, a tunnel was dug under the harbour fairway between the power stations in Amager, i.e. south of Copenhagen Harbour, and the many Copenhageners on the north side. It took three years to complete the tunnel and to lay the east-west line of the transmission grid through the most densely populated area of Copenhagen and inner Frederiksberg, which included a connecting line to H. C. Ørsted Power Station. The stretch to Tårnby and Copenhagen Airport was completed in just two years, so these were the first two stretches put into service, in 1986 and 1987. After this, the northernmost line through Gentofte, Gladsaxe and the north-eastern districts of Copenhagen were laid so they could be put into service from 1988 to 1990.



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20,000 cubic metres of water circulate in the transmission system. This is equivalent to the contents of 500 tank lorries. The water has been purified to remove oxygen, minerals and salts to protect the interior of the steel pipes against decomposition and coating build-up.

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Along the lakes north-west of Copenhagen city centre, the pipes are laid almost one metre below ground level as steel-in-steel because of their close proximity to water. Along most stretches, the pipes are preinsulated and the pipe insulation is furnished with live copper wires that send an immediate alarm if moisture is detected. Although the pipes are so well protected that damage is rare, any damage detected is pinpointed with an accuracy of one metre.

Well protected

The transmission system is constructed of steel pipes encased in either concrete, steel or plastic. The preinsulated pipes with plastic protection were – and still are – the least expensive and lightest to work with along uncomplicated stretches.

On stretches such as along the lakes, Amager Strand and the Hillerød motorway, the pipes run virtually undisturbed almost one metre below ground level.

It was much more difficult to lay piping through densely populated areas, where in many instances pipes were laid in heavily trafficked streets that already had a complicated network of sewer, water, electricity and telephone utility lines. In these locations, the pipes had to change direction frequently and for this reason were laid in a concrete structure cast in situ.

An added benefit is that they are now so well protected that it is almost impossible to damage them – which is practical because they are extremely difficult to repair. This also explains why the water circulating in the system is of an extraordinarily high quality, i.e. to prevent decomposition of the pipes from within.

Unchanged quality

If damage occurs, the pipes and sockets can be located using GPS, because the entire installation process was surveyed electronically by a surveyor during the construction phase. The preinsulated pipes are also equipped with live copper wires. This enables an alarm to be sent to the control room if moisture is detected on the line, which can be pinpointed with an accuracy of one metre.

"We usually find five to ten defects every year, typically involving a leaky sleeve joint where water is seeping in. But these are minor occurrences in the overall scheme of things," Jan Elleriis says.

"When the Metro was being constructed, we had to move some of the pipes that were encased in concrete and took the opportunity to cut out a thin slice from the entire structure so we could study it in detail. And we couldn't detect any measurable deterioration – at all. We actually discovered that the insulation capacity of the pipes was better than that of new pipes used in construction today," concludes Jan Elleriis.

GREATER COPENHAGEN'S HOTLINE

HEAT SUPPLIERS: Vattenfall, DONG Energy, Amagerforbrænding and Vestforbrænding
CTR receives surplus heat from CHP plants and waste incineration plants in Greater Copenhagen, including Amager Power Station, H. C. Ørsted Power Station, Svanemølle Power Station, Avedøre Power Station, Amagerforbrænding (waste incineration plant) and Vestforbrænding (waste incineration plant).

PRODUCTION → TRANSMISSION →

CTR
CTR manages, regulates and monitors heat supplies round the clock using signals emitted at more than 10,000 points.

29 EXCHANGE AND PUMPING STATIONS
As most exchange stations are underground, steps leading down to the station are usually their only visible feature. The exchange stations exchange the heat from the transmission system to the local district heating systems.

"The best way for us at DONG Energy to achieve our goal of reducing carbon emissions from our power plants is by combining the production of heat with the generation of electricity. This is one important reason why CTR, a buyer of large volumes of heat, is an essential partner for us. Our plans to increase the use of biomass should also help to reduce our overall production costs, and these targets can only be achieved because we can sell the heat."

PETER LEMMING JACOBSEN
Heat Sales Manager, DONG Energy

14 PEAK-LOAD FACILITIES
The peak-load facilities are started up in extremely cold weather when the need for heat exceeds the volume of deliveries from power stations and waste incineration plants.

FIVE MUNICIPAL DISTRIBUTION COMPANIES
Københavns Energi A/S, Frederiksberg Forsyning A/S, Gentofte Kommune Kraftvarme, Gladsaxe Fjernvarme and Tårnby Fjernvarmeforsyning.

THE CONSUMERS
More than 250,000 households in Greater Copenhagen with roughly 500,000 people benefit from CTR's district heat, which is primarily based on surplus heat.

DISTRIBUTION → CONSUMPTION

"As a distribution company, our biggest advantage from joining forces with CTR was, and still is, being able to receive reliable supplies at competitive and stable prices. CTR is responsible for procuring supplies from the large CHP and waste incineration plants. By being connected to CTR's large, modern transmission grid, we can supply the entire municipality of Frederiksberg with district heat that never fails. The heat lost along the supply line is appreciably less than on our old supply line, and the district heat is delivered to the customer at prices 25% below that of heat supplied by an oil furnace, for instance, and the heat is eco-friendly to boot. All things considered, it's a good investment and a good solution for Frederiksberg."

EGON ERLANDSEN
Technical Manager, Frederiksberg Forsyning

"When we moved into our house two years ago, we decided to replace the old oil furnace right away. We used to live in a flat that also had an oil furnace, and we grew tired of it going out every day or two. So even though we had to invest in this system, we get effortless heat that's better for the environment and far less expensive at the same time."

IDA STEENSBORG OG ADAM FALBERT
district heating customers, Frederiksberg

AIMING FOR ZERO CARBON EMISSIONS

IN DENMARK, WE HAVE MANAGED TO IMPROVE OUR STANDARD OF LIVING BY 70 %, WHILE STABILISING ENERGY CONSUMPTION AND CARBON EMISSIONS AT THE SAME TIME. BUT WE CAN DO EVEN BETTER. HEAT PLAN DENMARK EXPLAINS HOW HEATING SUPPLIES CAN BE VIRTUALLY **CARBON-NEUTRAL** BY 2030.

Today, the heating of one square metre of housing in Denmark generates an average emission of 10 kg of CO_2 a year. In 1980, this figure was 25 kg for each square metre. The sharp decline is mainly the result of two factors. First and foremost, surplus heat from power plants and waste incineration plants started to be utilised for supplying district heating in the 1980s. Also, the utilisation of the heat itself has vastly improved in the interim. The combined effect of these two factors is that Denmark has managed to keep energy consumption and carbon emissions at a stable level since 1980, at the same time that Denmark's standard of living has increased by around 70 %.

We can do even better, however. Denmark can cut its heating-related carbon emissions in half by 2020, and supplies of heat in Denmark can be virtually carbon-neutral by 2030. The way this can be accomplished is explained in Heat Plan Denmark, and the plan is based on the assumption that carbon emissions in CTR's area are reduced by 75 % from 2006 to 2030. The Heat Plan was published by the Danish District Heating Association in late 2008.

More district heating is one of the key ingredients
In order to achieve these ambitious goals, a nationwide effort must bring greater focus to bear on the use of district heating, on increasing the number of carbon-neutral energy sources for district heating, on transmitting the heat over greater distances, on reducing heat loss in buildings and on using new non-polluting types of heating, such as heat pumps and solar heating in areas that are too remote to be part of district heating systems. In order for these efforts to succeed, heat planning needs must be combined with the need for electricity and waste removal – completely in keeping with the heat plans of the 1980s that led to the large-scale development of CHP nationwide and the creation of projects like CTR.

"In Copenhagen and Frederiksberg, district heating has been enlarged to almost 100% of the capacity since the early 1990s, so there is little room for expansion here," explains Inga Thorup Madsen. "But Tårnby, Gentofte and Gladsaxe have enlargement potential, and the two of them are currently looking into the possibility of supplying other residential areas currently receiving natural gas, where district heating would be less expensive."

More biofuels at the CHP plants
CTR, KE and VEKS are currently looking into how Greater Copenhagen could achieve the ambitious goals for energy supplies set by the municipalities. The result of these investigations exposed in Greater Copenhagen was published in the summer of 2009.

Preliminary assessments indicate that it is possible to remove two-thirds of carbon emissions from district-heating supplies in 2025 by increasing their use of waste and biomass as fuel at the power stations.

The heat plan for Greater Copenhagen gives us a good basis for negotiating with the owners – i.e. DONG Energy and Vattenfall – to get more eco-friendly heat", says Inga Thorup Madsen.

*The Greater Copenhagen Heat Plan has been published on **www.ctr.dk** and in other media.*

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INGA THORUP-MADSEN has been CTR's managing director since 2003. She was previously head of section in the Danish Energy Agency, where her responsibilities included regulating heat supplies, distributing electricity and, most recently, electricity production. At CTR she has been responsible for ensuring that the major buyers of heat – CTR, KE and VEKS – are ultimately responsible for deciding which plants, owned by the electricity production companies, should generate heat at any given point in time. Right now, optimising the utilisation of heat production and helping to reach the carbon-reduction targets take high priority.

TIMELINE

'84: Inaugural board meeting for CTR on 29 February.

'85: A new plant, Unit 7, at H. C. Ørsted Power Station opens, enabling Valby to be supplied with district heat, and at the same time VEKS (Transmission Company of the Western Municipalities) can draw on the added capacity in a transitional period.

'86: Tårnby is the first municipality to be supplied with heat from the CTR transmission grid.

'87: The tunnel underneath Copenhagen Harbour is completed. Most of Copenhagen and Frederiksberg are now on the overall grid. Round-the-clock monitoring is also in place. The transmission system is officially opened on 1 October. VEKS receives heat from CTR until the Avedøre Power Station is in operation.

'88: The municipalities of Gentofte and Gladsaxe are connected to the transmission grid.

'89: The first phase of the decision from 1983 to enlarge power stations is realised by putting Elkraft's new Unit 3 at Amager Power Station into operation.

'90: The sixth and final stage of the transmission grid is put into service. All that remains is the establishment of some peak-load centres and exchange stations. About DKK 2.2 billion of an investment framework of DKK 2.5 billion (1990 prices) has been used. The new power station at Avedøre Holme is put into service by Elkraft and supplies VEKS, after which it do not need to receive heat from CTR, except when overall operation can be optimised by coordinating the two systems.

'93: A heat accumulator is set up at the Avedøre Power Station. Together with the reinforcement of the grid between CTR's and VEKS's systems, this enables further optimisation of the overall transmission grid. A heat accumulator is added to Amager Power Station a few years later. CTR's administration and control room are gathered to the same building in Frederiksberg.

1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996

The first oil crisis in 1973 made reliable sources of efficient energy a high priority issue for the first time. The question was how to reduce our dependency on oil. In 1976, the Danish government presented "DE76", Denmark's first overarching energy plan, and in 1978, Elkraft published the report "Transmitting electricity and heat in Greater Copenhagen". The report concluded that it was financially attractive to establish a heat transmission grid and that the location of the new CHP plants would not affect the overall economy of the venture. In 1979, the world experienced its second oil crisis and Denmark passed the Heat Supply Act requiring all municipalities to implement heat planning. The municipalities of Greater Copenhagen discussed the prospect of collaborating. From 1982, heat-planning activities were in progress throughout Denmark, the Minister of Energy's task force – the Bülow Committee – issued a report about Greater Copenhagen's combined heat and power supply. Five municipalities prepared to establish CTR. In 1983, Elkraft and the two power companies Københavns Belysningsvæsen and the Isefjord Power Station entered into a compromise to establish two new power stations situated in Amager and at Avedøre Holme respectively after discussing a new power station for several years.

WASTE	27%
GEOTHERMAL SOURCES	2%
COMBINED HEAT AND POWER	70%
PEAK LOAD	1%

Breakdown of fuel based on CTR's sales of heat to the partnering municipalities in 2007.

Households supplied with district heat

	1984	2008
Copenhagen	85,000	266,000
Frederiksberg	9,500	47,000
Gentofte	545	11,700
Gladsaxe	1,200	7,500
Tårnby	2,400	9,000

The number of households supplied with district heat in the City of Copenhagen also includes supplies from KE's steam grid, which amounted to approximately 25 % in 2008.

Source: Statistics Denmark.

'94: CTR concludes an outline agreement to buy heat from a future CHP plant, Unit 2, at Avedøre Power Station. The new plant is designed to ensure a continuous supply of heat and power to the entire system.

'01: Unit 2 of Avedøre Power Station is put into service.

'04: Unit 2 at Amager Power Station is rebuilt to be capable of firing with biomass, and CTR agrees to buy heat from an upcoming newly renovated Unit 1.

'08: The heat-load collaboration involving CTR, KE and VEKS assumes the role of the coordinating load distributor for the power companies' CHP plants, previously the remit of Elkraft and then of Energi E2. This enables continued overall optimisation of the production of heat and electricity in Greater Copenhagen, even though the two power companies compete in the electricity market.

1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009

'00: CTR's construction of a number of peak-load facilities throughout the period ends with two new facilities. CTR participates in joint exploration and extraction efforts for geothermal energy in Greater Copenhagen.

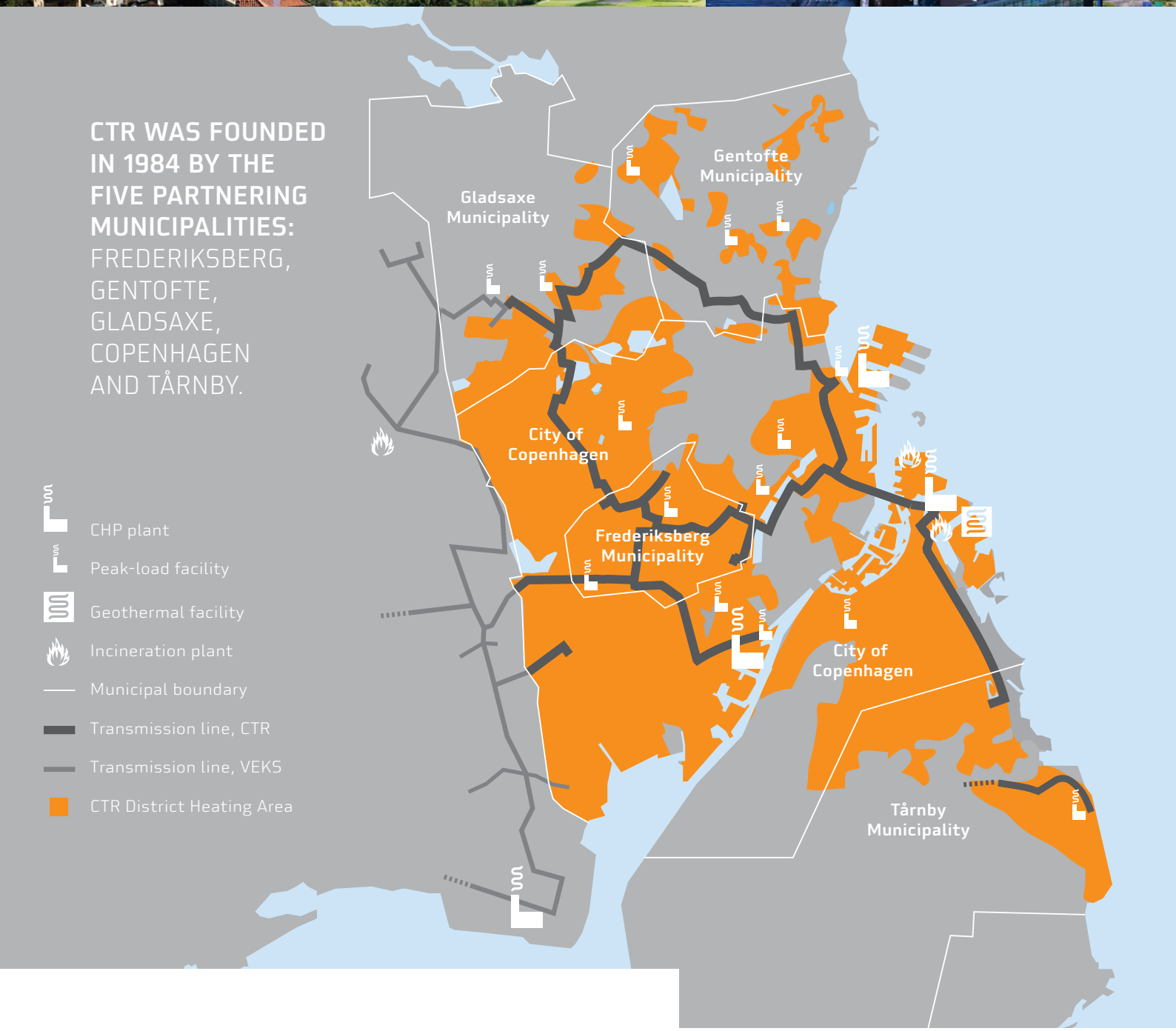
'06: Greater Copenhagen's geothermal facility is opened and, later in the year, CTR's peak-load facility at Copenhagen Airport, originally established to replace an older facility, is shut down. Energi E2 merges into DONG Energy, and Vattenfall takes over Amager Power Station.

'09: The newly renovated Unit 1 at Amager Power Station is put into operation. CTR celebrates its 25th anniversary.

EASY, INEXPENSIVE AND ECO-FRIENDLY

Compared to other types of heating, district heating is an easy, convenient and operationally reliable solution. Users do not have to worry about buying fuel or about the furnace suddenly breaking down in mid-winter. District heat usually costs less than oil, natural gas or electric heat and is an eco-friendly way to heat one's home at the same time. Heat from CTR is based on surplus heat from the generation of electricity and incineration of waste. This leads to annual net savings of almost 290,000 tonnes of oil.

CTR WAS FOUNDED IN 1984 BY THE FIVE PARTNERING MUNICIPALITIES: FREDERIKSBERG, GENTOFTE, GLADSAXE, COPENHAGEN AND TÅRNBY.



CTR's board of directors represents the five municipalities involved in the partnership. The Municipality of Copenhagen appoints four of the eight members of the board and the other municipalities each appoints one member.

Administration and Operation
A president and a vicepresident carry out the day-to-day management of the company.

There are 28 other members of staff associated with the running of the transmission network.

Furthermore, a number of agreements have been reached with the individual partner municipalities' operational organisations whereby these organisations have responsibility for carrying out the day-to-day maintenance and monitoring of CTR's pipe network and stations.

The Cost of Heat
CTR sells heat at the heat exchanger stations to the municipalities involved at a pool price.

CTR's pool price comprises a fixed effect charge and a variable energy charge. The effect charge covers fixed costs such as the producers' fixed charges, wages, administration costs and depreciation of investments. The energy charge covers the actual cost of fuel, the cost of running pumps and other variable operational costs.

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