



Open District
Heating™

Open District Heating

Fortum Värme



Summary

- Open District Heating is a business model for recovered heat in Stockholm
- Customers are businesses with excess heat with the primary segments data centers and supermarkets as well as other industries with excess heat
- The existing vast district heating network in the greater Stockholm area is the energy carrier for the recovered heat
- With the district heating network energy can be transported from areas with surplus to places with need of energy
- The programme was initiated during 2012-13 with a pilot phase and launched public 2014 as the worlds first marketplace for recovered heat
- The business model and pricing is transparent and based on our own production cost
- 66 GWh heat was delivered into the district heating network during 2016 from the Open District Heating customers and contributed to heating of approximately 20.000 apartments in Stockholm

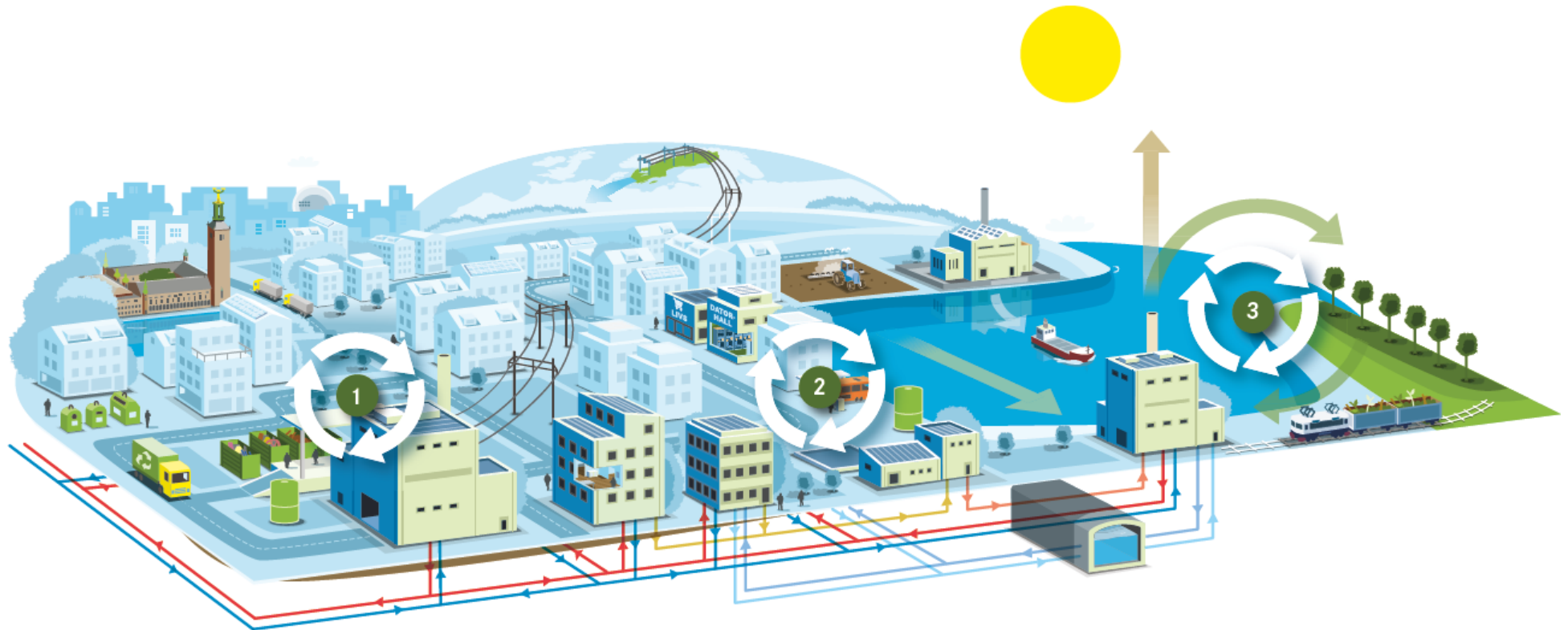
Fortum Värme's district heating network in Stockholm



Key Facts

- Fortum Värme produces district heating, district cooling and electricity
- The company has 10,000 district heating customers in Stockholm
- Fortum's network comprises 2,800 km of district heating pipelines
- Fortum Värme is equally owned by Fortum and City of Stockholm.
- Supply of district heating in the greater metropolitan area is 8 TWh p.a. corresponding to 70% of total demand
- District heating in Stockholm will be entirely produced from renewable or recovered energy no later than 2030

Local sources provide efficient energy supply



1. Energy from sorted waste from companies and households

2. Waste heat in sewer water, district cooling returns and from server farms

3. Renewable biofuels from the forest industry and sun energy from the sea



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will be entirely produced from
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Open District Heating - A unique marketplace for Recovered energy



Systemvariabler Prognoser Anbudspriser Stockholm Norr **Anbudspriser Stockholm Söder** Avrop Värme Stockholm Norr Avrop Värme Stockholm Söder Avrop Kyla Stockholm Norr Avrop Ky Stockholm

Anbudspriser Stockholm Söder

Följande anbud riktar sig till leverantörer av Öppen Spotvärme och öppen Returvärme tillhörande Grupp Stockholm Söder enligt avtal. Rätt att acceptera och leverera Öppen Spotvärme och Öppen Returvärme enligt anbud i tabellen nedan tillkommer endast den som har ingått gällande Avtal avseende leverans av Öppen Spotvärme eller Avtal avseende leverans av Öppen Returvärme ("Leveransavtal") med AB Fortum Värme samägt med Stockholms stad. Rätten att acceptera och leverera Öppen Spotvärme respektive Öppen Returvärme avser endast den Anbudsklass som omfattas av Leveransavtalet. Övriga villkor för leverans och försäljning av Öppen Spotvärme och Öppen Returvärme enligt anbud i tabellen nedan anges i Leveransavtalet.

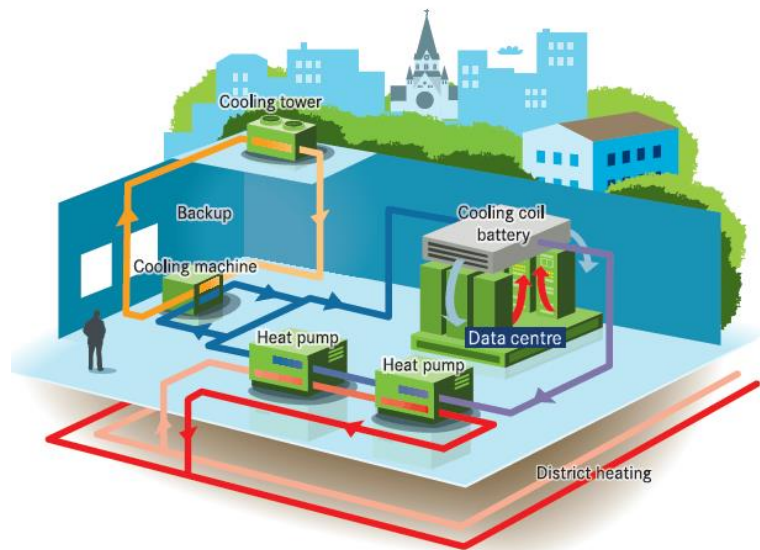
ANBUDESKLASS LEVERANSTID 2017-05-30 KLOCKSLÄG:	Öppen Spotvärme Prima Söder			Öppen Spotvärme Inblandning Söder		
	TUTE P T STOS PROGN. UTOMRÅJSTEMP. °C	SPOT P STOS ENERGIPRIS KR/MWH	TLEV P STOS TEMPERATURKRAV °C	SPOT I STOS ENERGIPRIS KR/MWH	TLEV I STOS TEMPERATURKRAV °C	
00 - 01	10,5	108,00	68,0	108,00	68,0	
01 - 02	10,5	108,00	68,0	108,00	68,0	
02 - 03	10,5	108,00	68,0	108,00	68,0	
03 - 04	10,5	108,00	68,0	108,00	68,0	
04 - 05	10,5	108,00	68,0	108,00	68,0	
05 - 06	10,5	108,00	68,0	108,00	68,0	
06 - 07	11,5	63,00	68,0	63,00	68,0	
07 - 08	12,5	61,00	68,0	61,00	68,0	
08 - 09	12,5	61,00	68,0	61,00	68,0	
09 - 10	13,5	0,00	68,0	0,00	68,0	
10 - 11	13,5	0,00	68,0	0,00	68,0	
11 - 12	14,5	0,00	68,0	0,00	68,0	
12 - 13	15,5	0,00	68,0	0,00	68,0	
13 - 14	16,5	0,00	68,0	0,00	68,0	
14 - 15	16,5	0,00	68,0	0,00	68,0	
15 - 16	16,5	0,00	68,0	0,00	68,0	
16 - 17	16,5	0,00	68,0	0,00	68,0	
17 - 18	16,5	0,00	68,0	0,00	68,0	
18 - 19	16,5	0,00	68,0	0,00	68,0	
19 - 20	15,5	0,00	68,0	0,00	68,0	
20 - 21	15,5	0,00	68,0	0,00	68,0	
21 - 22	14,5	0,00	68,0	0,00	68,0	
22 - 23	14,5	0,00	68,0	0,00	68,0	
23 - 00	13,5	0,00	68,0	0,00	68,0	

Fundamentals

- Open District Heating is a business model which gives large as well as small businesses the opportunity to sell excess energy which had otherwise been wasted and turn costs for cooling into revenue from heat recovery
- Fortum Värme launched in 2014 the world's first market place for recovered energy
- We offer long-term transparent contracts and open prices for trade in excess heat and cooling



Technical example from a data center



1

2 Carrier 30XWH 802-HT heat pumps connected in series. Cooling capacity 690kW, heating capacity 975kW

2

Data center with cooling coils

3

Cooling machine with cooling tower (back up system)

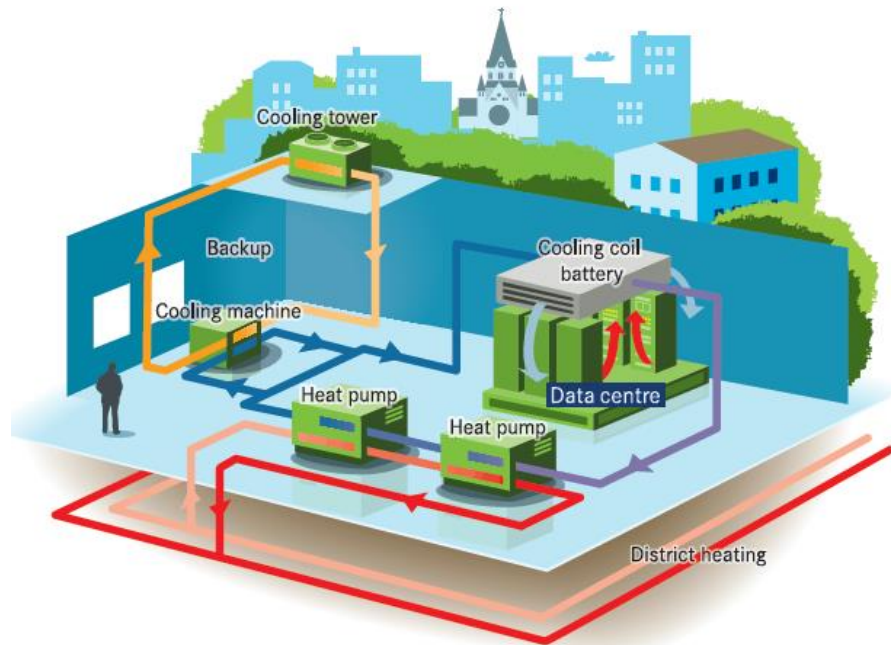
4

Heat delivered to the district heating network

A Simple Solution

- Cool the data center with a heat pump
- Sell excess heat to the district heating network
- Reduced cooling OPEX for the data center (or turned to income)
- Long term and transparent contracts, 10 + 5 years
- The data center invests in the heat pump
- Fortum Värme invests in the connection to the distribution system

Recovered heat with Open District Heating contributed to heating of 20,000 apartments in Stockholm during 2016



22 suppliers as per today

- During 2016 a total amount of 66 GWh was recovered into the district heating and cooling network
- The recovered heat contributed to heating of up to 20,000 modern apartments
- New contracted suppliers during 2016 with ongoing installations has the potential to add another 100 GWh recovered heat p.a. as per 2019
- Suppliers from several different segments such as data centers, supermarkets and other industrial businesses with excess heat

Don't Waste Your Energy!

More information: www.opendistrictheating.com