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State of the art district heating
and cooling.
City of Umeå in Sweden
Umeå Energi AB

1 Application

Umeå is a district heated city

Umeå Energi AB offer environmentally adapted district heating and district cooling as well as electrical power. The Group has some 300 employees and an annual turnover of just over EUR 100 million. The Group is certified in accordance with ISO 14001 and has an occupational health and safety management system that fulfils the requirements of AFS 2001:1. Our head office is located in Umeå – a dynamic and innovative centre in the north of Sweden with 110 000 inhabitants, two universities, and an expanding business sector. The city of Umeå will be the European Capital of Culture 2014 together with Riga.

Today, approximately 80 % of the total indoor area in Umeå is heated by district heating and the figure continues to rise. The total length of the district heating system is 350 km. The district heating net has been one of the fastest growing nets in Sweden a number of years and environmentally adapted district heating has replaced thousands of polluting oil boilers and reduced the amount of electricity used for heating.

Umeå is also a district cooled city

District cooling replace conventional electricity driven refrigerators that contain refrigerants contributing to the greenhouse effect. Umeå Energi uses heat pumps and absorption refrigerators to produce district cooling. These hi-tech refrigerators are driven by district heating from our own heat production. Consequentially, we make cold out of heat!

The success of these systems and the new and exciting plants Dåva 1 and 2 makes the city of Umeå the perfect benchmark for district energy in Europe.

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2 Photographs

The success of district heating in Umeå is clear when showing these two photographs taken in the middle of the winter.

2.1 - Year 1960



2.2 - Year 2000



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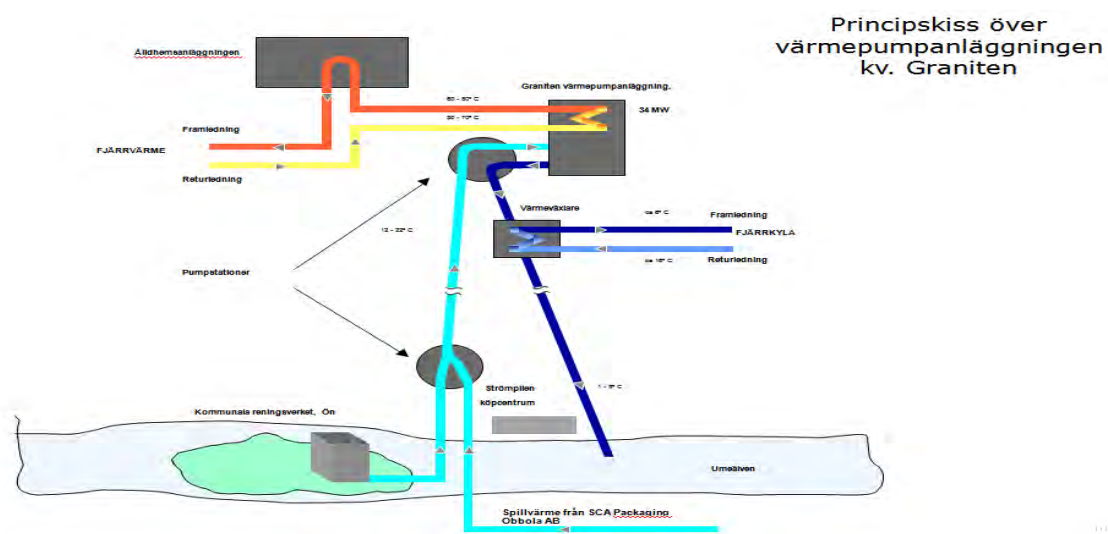
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Umeå Energi have two main sites where the energy is produced and distributed.

2.3 - The Ålidhem plant, located in the central city has 2 biomass boilers (25/35 MW) and two heat pumps using industrial waste heat (15/20 MW). It also has accumulators storing district heating and district cooling.



2.4 - Umeå Energi uses waste heat from a paper mill and a waste water cleaning plant to produce district heating with heat pumps.



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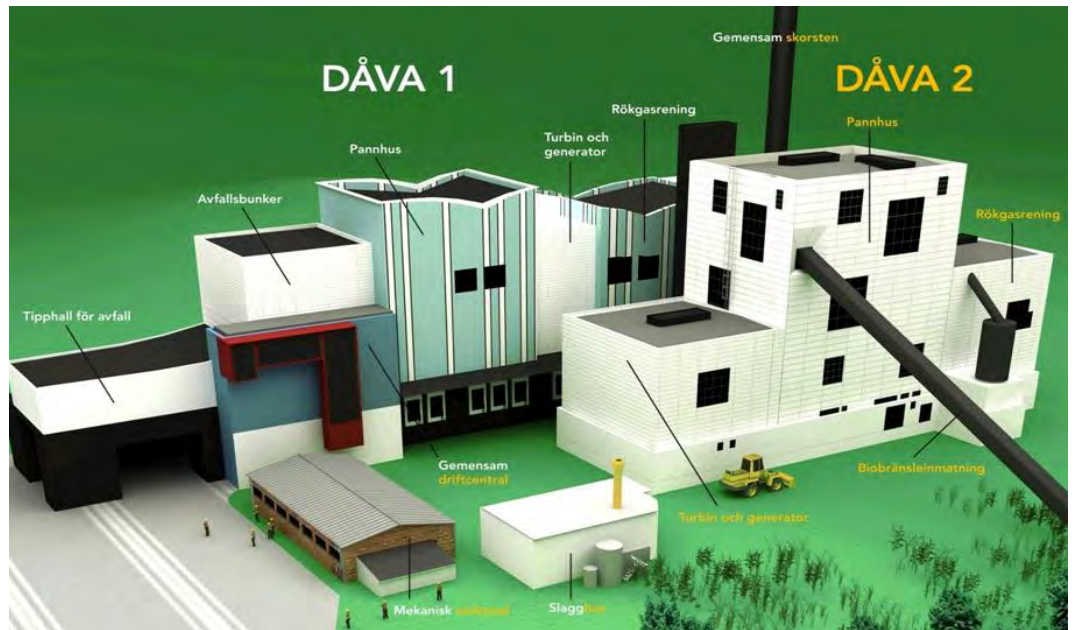
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2.5 - Dåva 1: 65 MW waste fuel combined heat and power plant
 . Dåva 2, 105 MW biomass combined heat and power plant



2.6 - Dåva 1 in the night.



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2.7 - Dåva 2 and 1 in the background of our waste water cleaning pond.



2.8 - Dåva 2 biomass fuelhandling and storage.

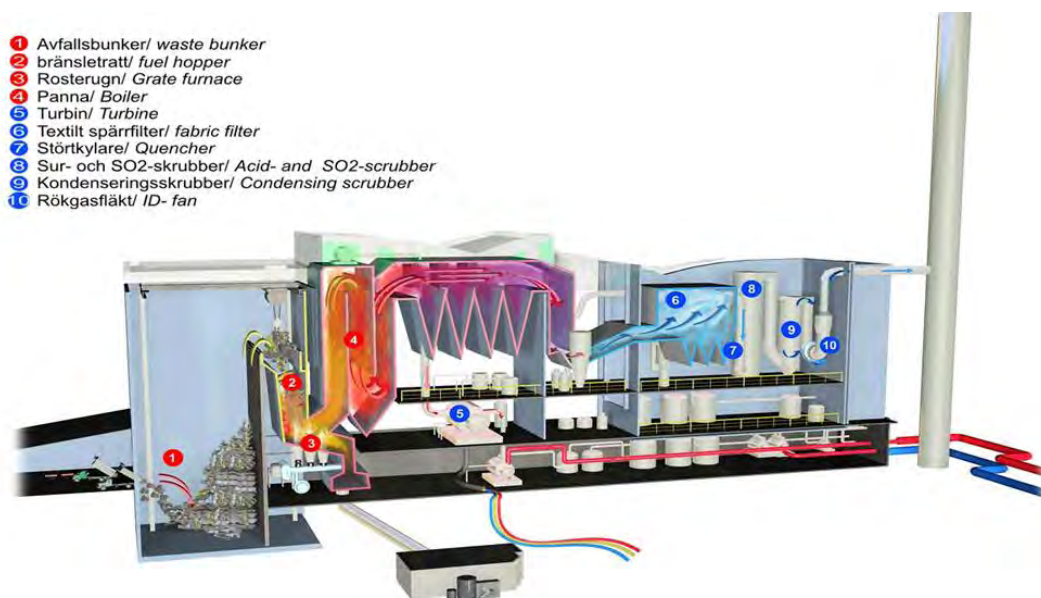


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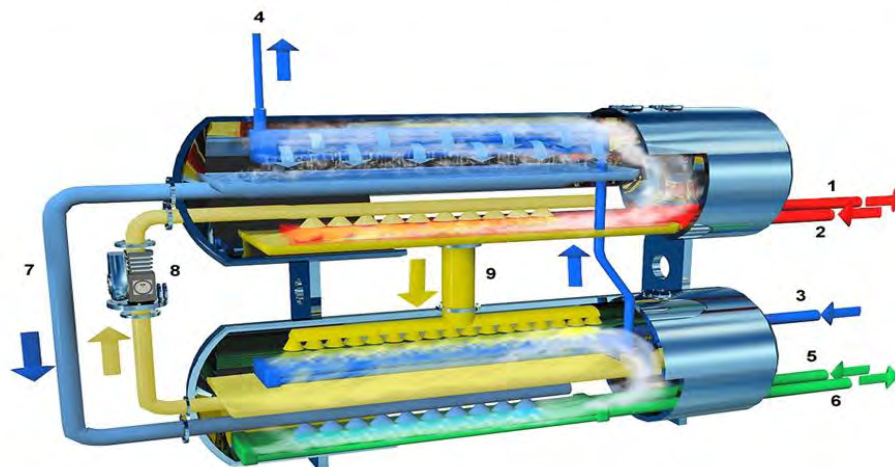
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2.9 – Dåva 1 uses the latest technology to clean and extract as much energy as possible out of the flue gas.



2.10 – District cooling is produced with 2 absorption refrigerators, using district heating as the main energy source.

1 Fjärrvärme ut, 2 Fjärr in, 3 Kylvatten in, 4 Kylvatten ut, 5 Fjärrkyla in, 6 Fjärrkyla ut, 7 Vatten, 8. Pump litiumbromid, 9. Litiumbromid kons.



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3-6 Description of system

The district heating system in Umeå has been developed since the 1970 when the first waste fired boiler was built. The growth of the system and the technical choices that was made regarding the production units reflects the energy situation at that time. Umeå Energi has a number of district heating production plants and the two newest and largest plants are Dåva 1 and 2 just outside the city of Umeå.

Dåva 1 has been voted one of the world's most energy effective and environmentally adapted waste-fuelled combined heat and power plant. Thanks to a combination of innovative solutions essentially the entire energy value of the fuel can be recovered.

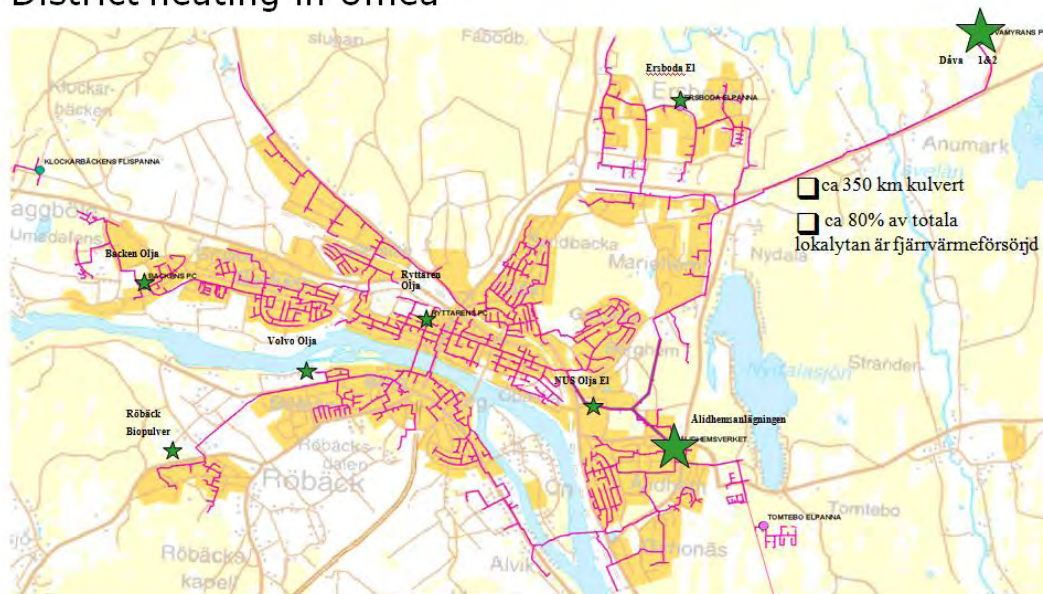
Dåva 2 is a brand new biomass boiler with maximized capacity to produce electricity from forest residues etc. Umeå Energy also uses heat pumps to upgrade industrial waste heat from a local paper mill and a waste water cleaning plant to be used in the district heating net.

Production 2007 – District cooling	8,5 GWh
Production 2007 – District heating	950 GWh
Production 2007 – Electricity	80 GWh
Environmental impact 2008:	Fossil CO ₂ : 54,9 g/kWh
	NO _x : 0,19 g/kWh
	SO ₂ : 0,04 g/kWh

The estimates for 2010 is that the primary energy factor for the district heating in Umeå will be as low as 0,39.

Fuel (unit)	Primary energyfactor	Energy 2010
Waste CHP (Dåva 1)	0,66	330 GWh
Heat pump (Dåva 1)	0,63	60 GWh
Biofuel CHP (Dåva 2)	0	395 GWh
Biofuel condensation	0	80 GWh
Biofuel (P6,P7,RB)	1,08	100 GWh
Waste heat pump	0,83	15 GWh
Oil	1,18	15 GWh
Electricity	2,5	5 GWh
Totalt	0,39	1000 GWh

District heating in Umeå



District cooling in Umeå



Best wishes

UMEÅ ENERGI AB

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