District Cooling in Helsinki

Marko Riipinen
Manager
HelenCooling

Nordisk Fjernvarmesymposium

Ålesund - Norge
15.06.2004

Helsinki Energy

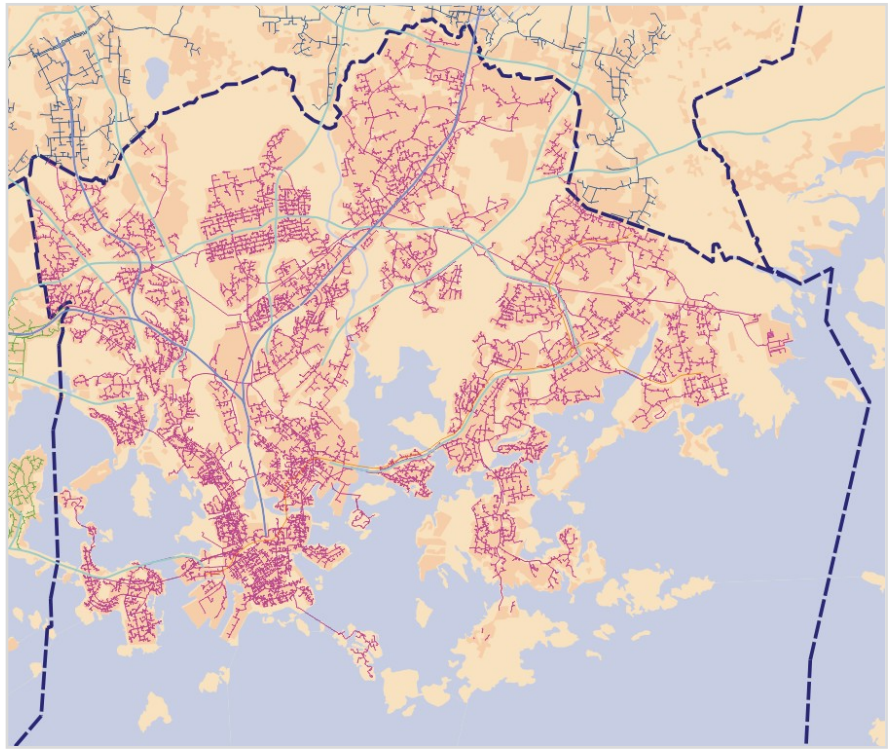
Helsinki Energy

• **Helsinki Energy is one of the Finland's biggest energy companies producing, distributing and selling electricity and District Heat.**

- Company's turnover 575 million €
- Operating profit 208 million €
- 1500 employees.

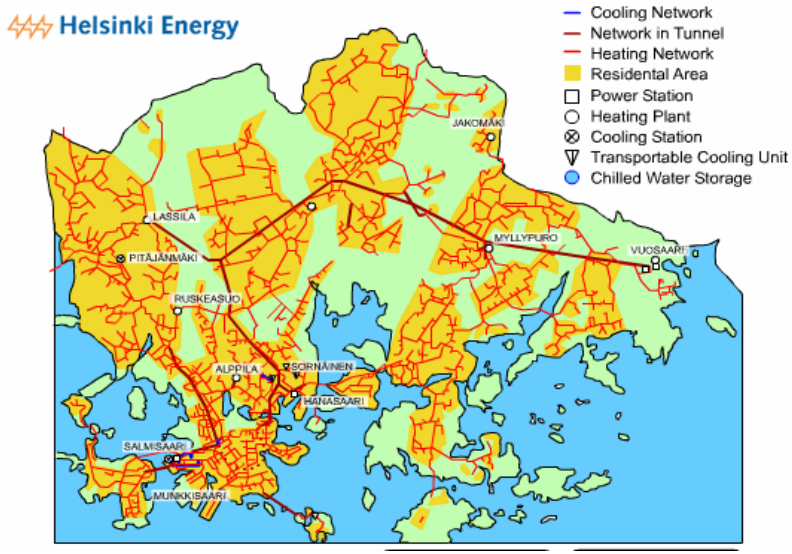
• **Company is own by the city of Helsinki, but it operates as an independent econimic unit, in the form of commercial enterprice.**

(Data of the year 2003)



District Heating

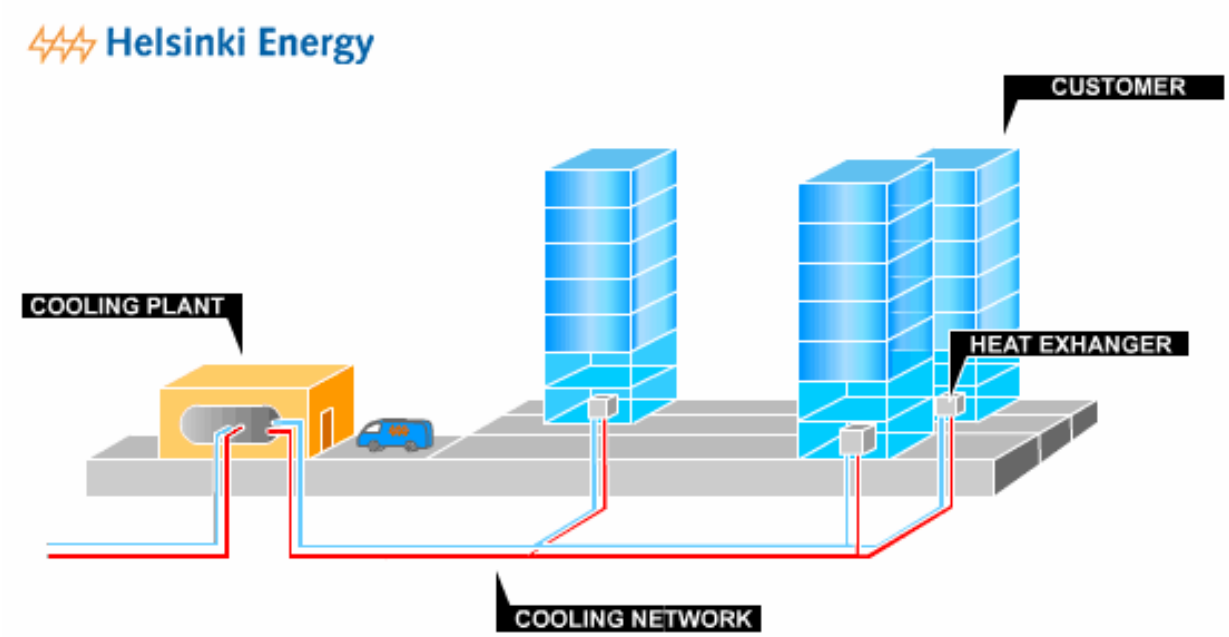
- Number of customers: 12000
- Lenght of distribution network: 1200 km
- District Heat sales: 7000 GWh
- Turnover: 200 million €
- New customers/year: 300
- Connected power/year: 55 MW
- Customers connection power totally: 3000 MW
- More than 93 % of the heat demand of the buildings in Helsinki is satisfied with District Heating.
- District Cooling used to be a part of the District Heating business unit formerly, but at present it is totally own business unit.



District Cooling in General

- District Cooling means the centralized production and distribution of cooling energy. Chilled water is delivered via an underground pipeline to office, industrial and residential buildings to cool the indoor air of the buildings.

- District Cooling entails the distribution of chilled water from one or more centralized cooling plants to several buildings.



Benefits of District Cooling

- The environmental factors are strongly valued by society. A centralized District Cooling system is more economical and environmentally friendly than a group of small individual cooling plants.

- Compared to building-specific cooling, District Cooling is a more price competitive alternative.

- For the customer, District Cooling is a reliable and convenient source of cooling energy, because the need to acquire, service or maintain cooling equipment in buildings is eliminated. In addition, the noise, vibration and structure-born sounds of cooling equipment are removed. The space reserved for cooling equipment is freed for other purposes and the coolers visible on roofs and walls are no longer needed.

Benefits of District Cooling

- **Carefree and convenient cooling**
- **Real estate customers can concentrate on their core activities**
- **Increases the value of the building**
- **Employers start to pay attention to working efficiency in offices, which is an indirect consequence of District Cooling**

District Cooling in Helsinki

• Cooling of buildings is becoming more and more popular also in Finland.

• Cooling is mostly needed in afternoons during the summer season. More and more buildings require cooling also in the winter, because lighting, ADP equipment and solar heat entering through large windows heat the indoor air.

• It is possible that a building needs both District Cooling and District Heating at the same time Even if it is cold in winter time, the south facing part of the building can be warmed up by the sun so fiercely that extra cooling is needed.

• The main reason for simultaneous systems, however, is that normally the buildings are heated in the morning to maintain a comfortable working temperature, but in the afternoon they must be cooled because of the heat produced by people and computers.

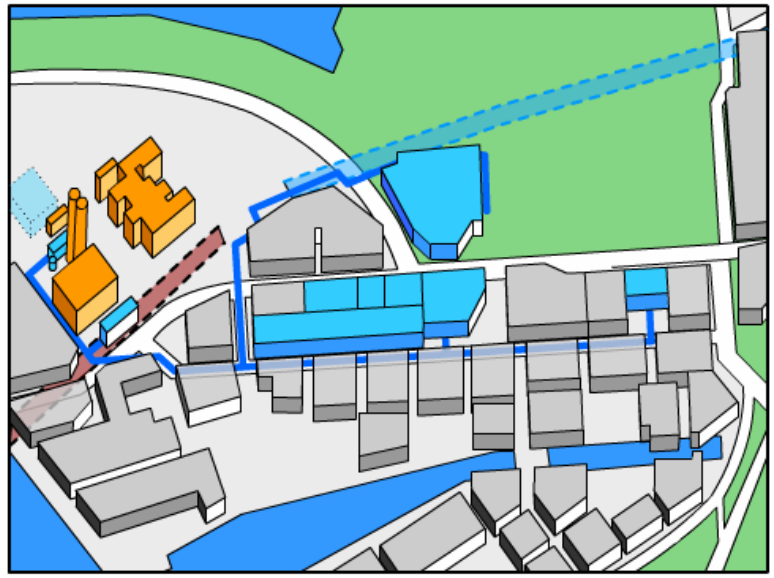
Customers

- From Helsinki Energy's point of view the owner of the building is the most important negotiation partner, because he controls the purse strings.
- Very often the constructor (who works for the owner and is responsible for the whole construction project) is the one who contacts Helsinki Energy in connection with District Cooling. It is also possible that the future owner of the building is not yet known during the construction stage and it is the big construction company who independently makes all the decisions concerning technological solutions.
- Then there are the end users: the tenants who want to enjoy a comfortable interior climate in their offices. The final interest group are the visitors, who occasionally or regularly visit the building.
- There are also different consultants working as subcontractors for the owner or for the constructor, and they can greatly influence the decisions taken with regard to cooling solutions. Most important among these parties are architects and utility engineering designers.

Production since 1998

• Helsinki Energy started to produce cooling energy in summer 1998. The first District Cooling customers were industrial and office buildings in the district of Pitäjänmäki. The project was implemented in co-operation with the European Union and ABB. The equipment comprises two absorption chillers and three chilled water storages. The total output is 1.2 MW.

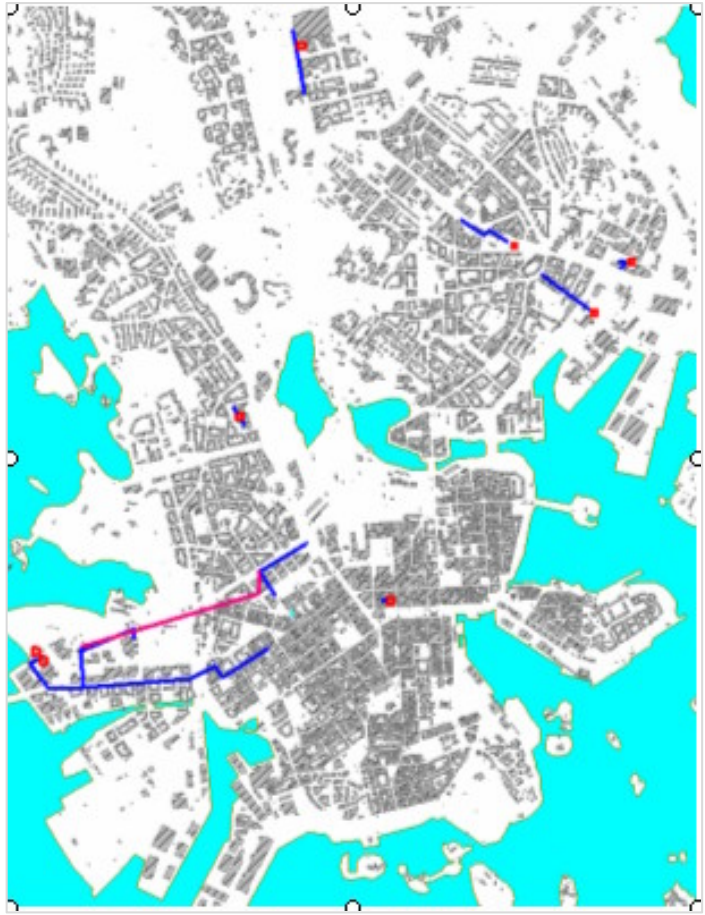
• Cooling energy supply to office buildings in the district of Ruoholahti started in 2000. Total output of two plants is 17 MW and it comprises four 3.5 MW absorption chillers and a 3 MW chilled water storage. Final outputof these two plants will be 45 MW in 2006.



District Cooling in Helsinki

2004:

- **2 centralized cooling plants**
  - Installed power: 17 MW
- **9 transferable cooling containers**
  - Installed power: 9,2 MW
- **Customers**
  - Number of customers: 20
  - Connected cooling power: 22 MW
  - Mean power per customer: 1100 kW
  - Energy sold (2003): 9 GWh
  - Lenght of distribution network: 7 km



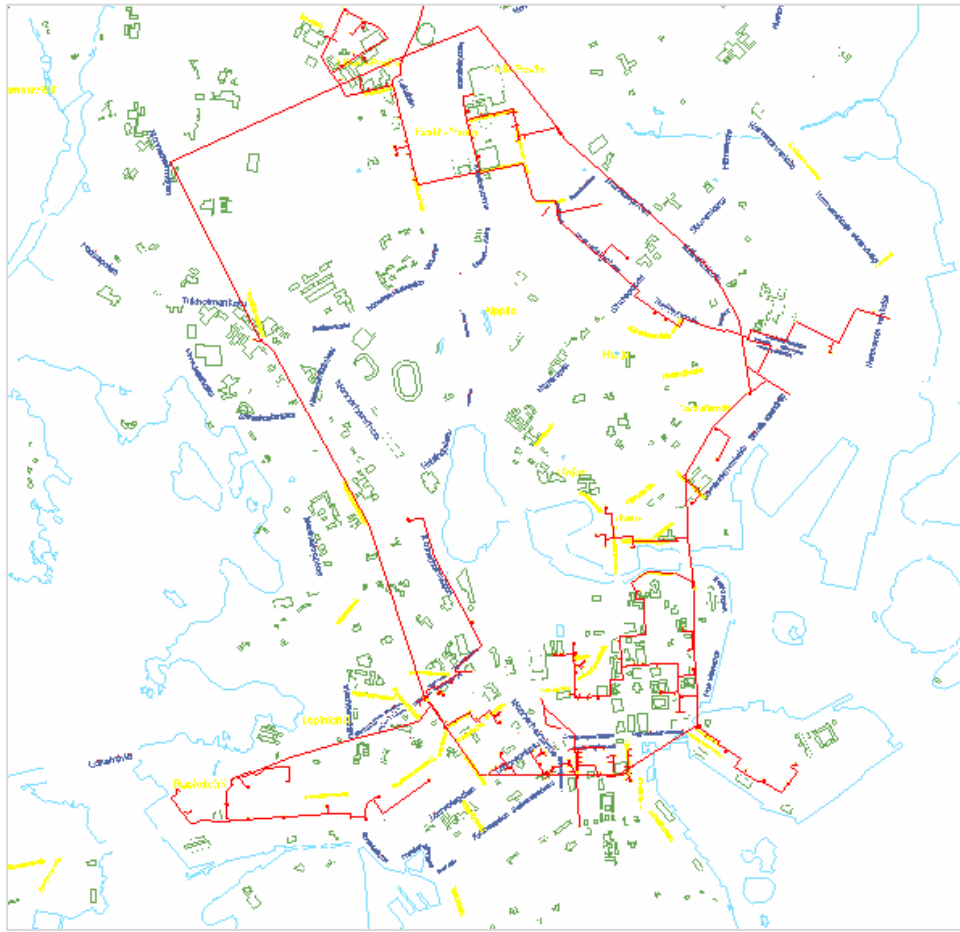
Helsinki Energy

Outlook for the future

- The demand for District Cooling has increased rapidly in the past few years. The reason for the popularity of the system is its environmental friendliness and benefits compared to conventional compressor technology.

- Due to the heavier demand, Helsinki Energy will increase its District Cooling production capacity significantly in the near future.

- District Cooling business concentrates mainly on big business premises and office buildings.

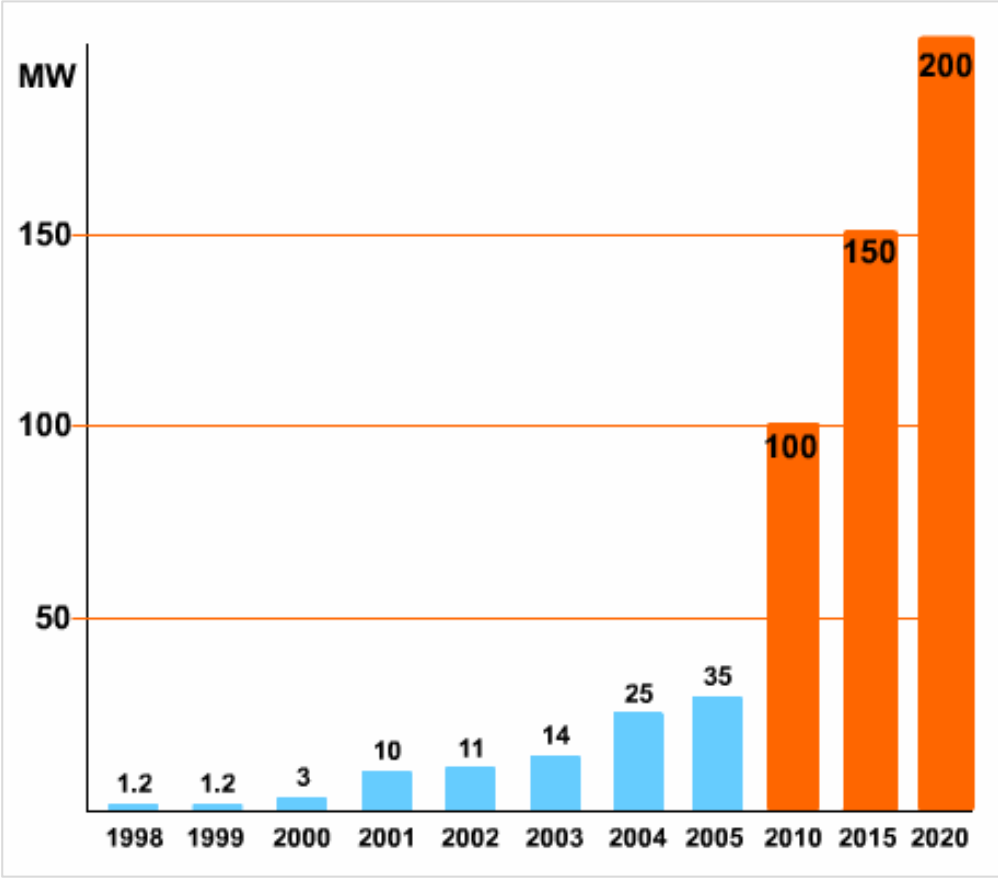


Outlook for the future

- **It is estimated that in 2010 the connection power of District Cooling will exceed 100 MW and in 2020 connection power is more than 200 MW.**

Vision:

District Cooling is the primary form of cooling energy production in Helsinki Energy's cooling areas.



Prospects for District Cooling

- Compared to conventional solutions, environmental friendliness is the most important trend steering the development of District Cooling.

- The European Union is encouraging its member states to use legislation and taxation to speed up development of combined heat and power (CHP) production as well as District Heating and District Cooling systems (DHC).

- One of the main reasons for the growing popularity of District Cooling has been increased outsourcing of operations in the 1990's. Firms have adopted outsourcing to be able to concentre their resources on their core business areas.

- From Helsinki Energy's point of view, District Cooling increases further the energy efficiency of CHP production. Along with electricity and district heat sales, District Cooling constitutes a new form of energy service.

Why is Helsinki Energy going in for District Cooling?

- **Now for the first time there is an opportunity to make the cooling business profitable. Customer expectations have changed over the last few years and there is a demand for this kind of product.**

- **It fits in with our customer concept “Healthy and productive indoor climate” which combines heating and cooling.**

- **Geographical compatibility: Cooling market potential is a part of existing heating market, not a separate market.**

- **District Heating customers are very close to new cooling business.**

- **It chimes fine with Helsinki Energy’s general business idea of carrying through long term investments.**

- **It fits our corporate image.**

Why is Helsinki Energy going in for District Cooling?

- It is a business activity and it fits in with our district heating skills.
- Since the growth prospects for district heating are reduced, we must find new business areas somewhere else.
- The basis is that it must be a profitable business.
- We already have the skills for building pipeline networks.
- We already have combined heat and power production, and district cooling increases the utilization rate of summertime heat energy .

Expectation from the business

- It is a finished product and believe in it is progress
- It is a strategically important product which in the long run brings continuity since the heating markets are already saturated
- The values of society have changed: environmental, scenic and noise factors will have more and more emphasis in the future. So, there is a firm reason to believe that our customers will want this.
- Integrated building technology = District heating and District Cooling together guarantee good interior air to customers
- It is a business which is growing strongly
- It brings with it the chance to strengthen co-operation with big property owners and consultants (utility engineering companies) and also with authorities
- A completed District Cooling infrastructure in Helsinki after 10 to 15 years

Risks

- **Underpricing**
- **The problem in the management of construction resources and materials.**
- **We cannot keep promises to customers → We will lose our reputation → The demand will decrease.**
- **Mistakes in profitability calculating may have gone unnoticed.**
- **Are we going to get as many customers as we estimated?**
- **Scheduling problems: customers do not meet the agreed deadlines and/or we cannot keep ours**

Success factors for the District Cooling

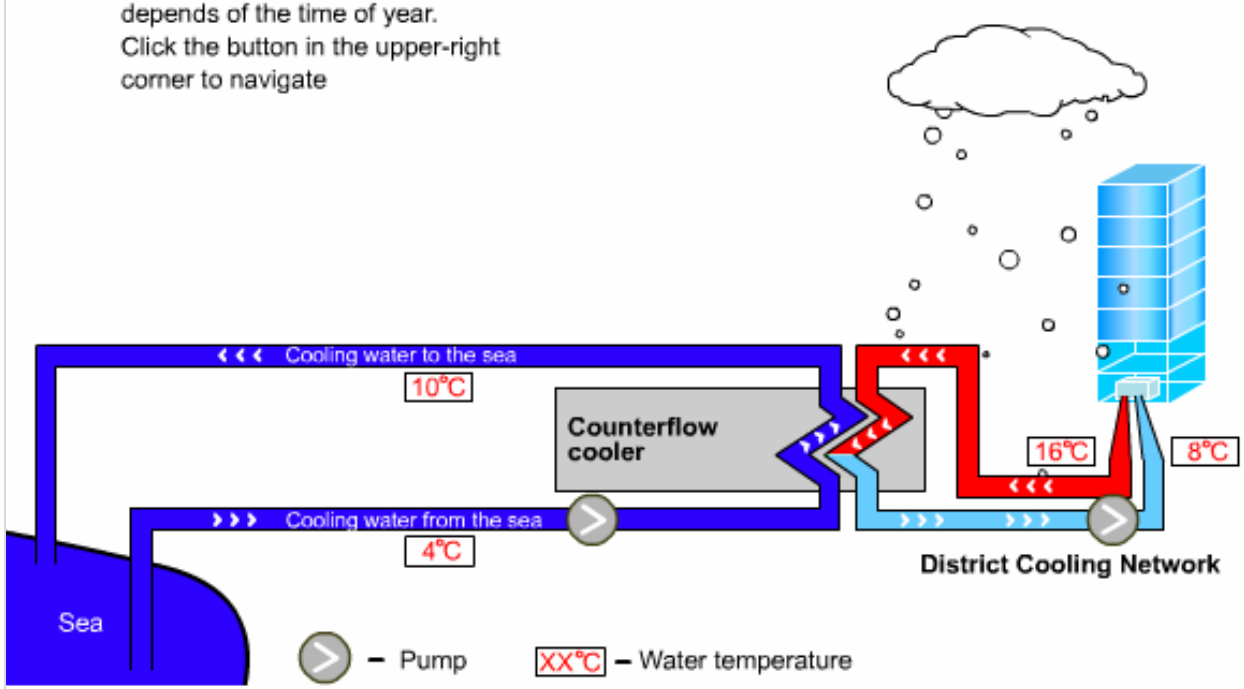
- **Maintaining a positive image!**
- **We must able to keep the whole process under control and sell in a remunerative way.**
- **Co-operation with property owners, consultants and authorities.**
- **Construction contractors resources and Helsinki Energy's planning resources must be adequate.**
- **Committed company management and fluent go-operation with other business units.**
- **Systematic expansion => There must be a general plan!**
- **Right and phased timing of investments.**
- **Intentional over-dimensioning of cooling networks carried out appropriately.**

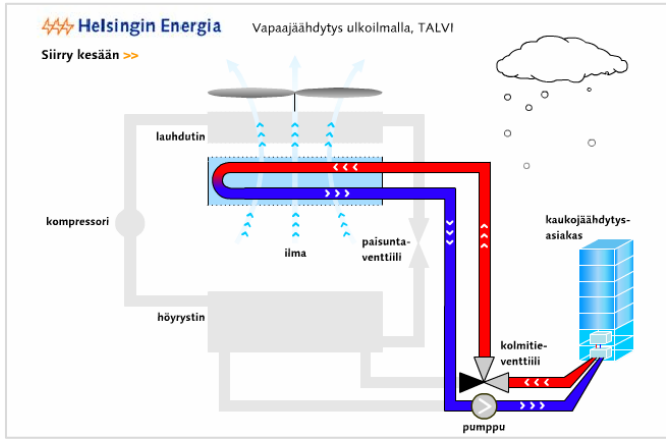
Chilled water production – Free cooling

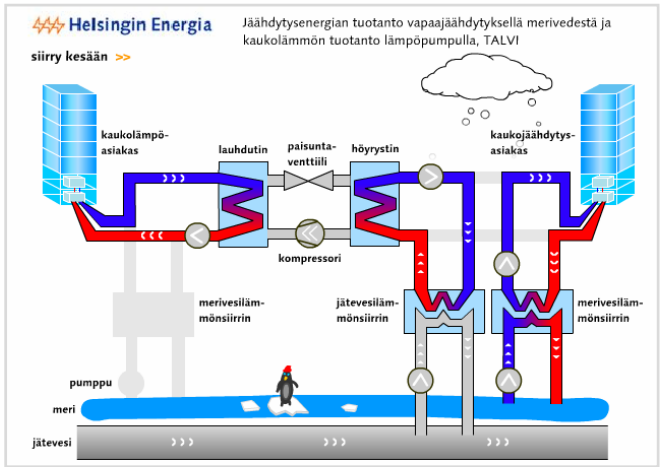
Helsingin Energia

View summer time production >>

The production of District Cooling depends of the time of year. Click the button in the upper-right corner to navigate

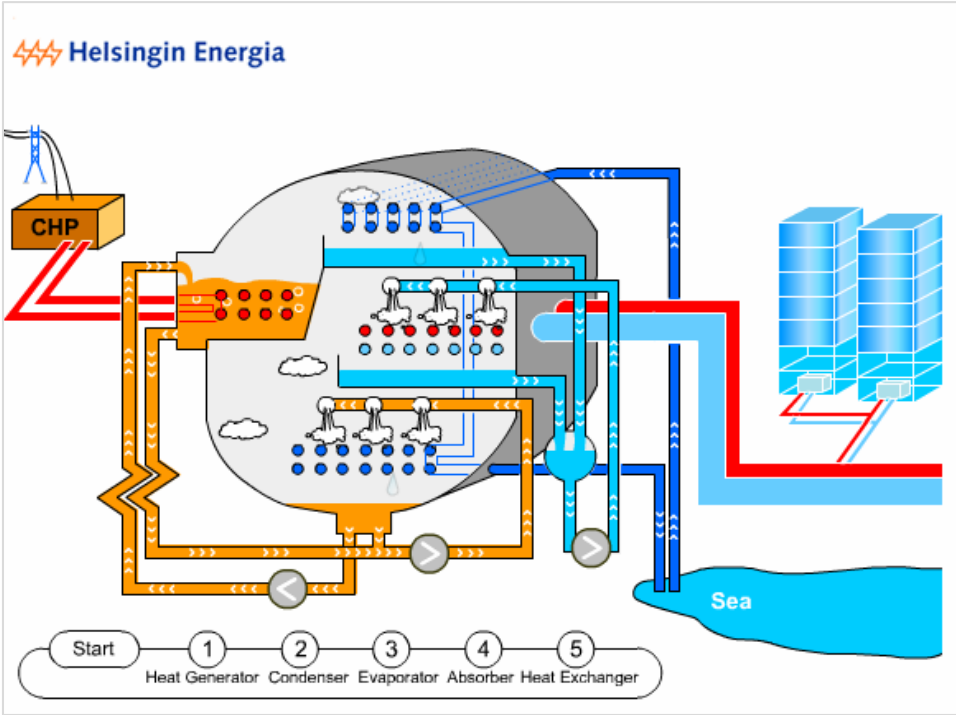




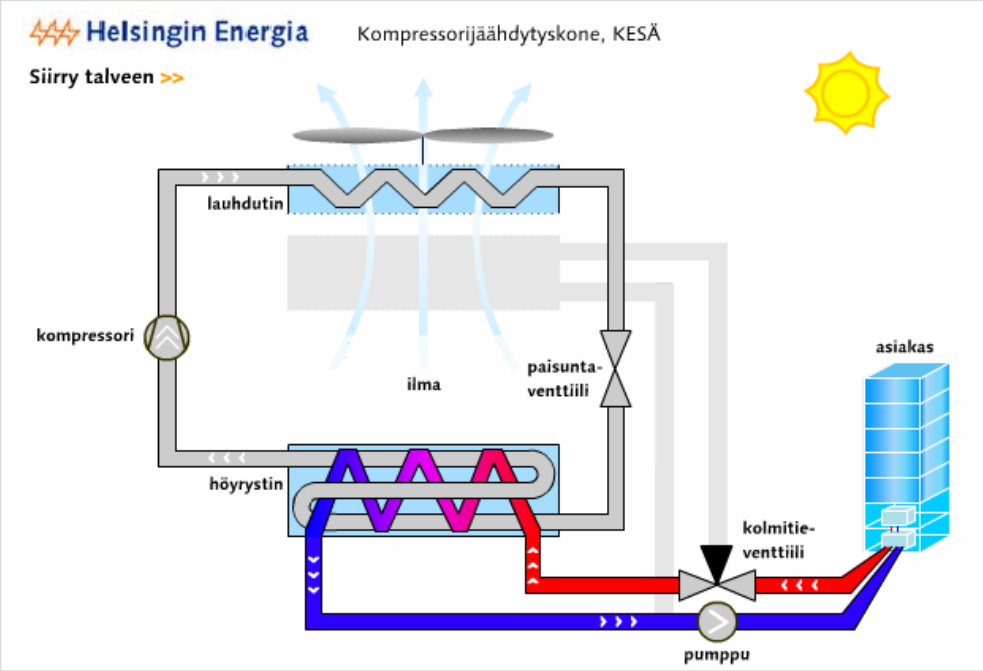


Helsinki Energy

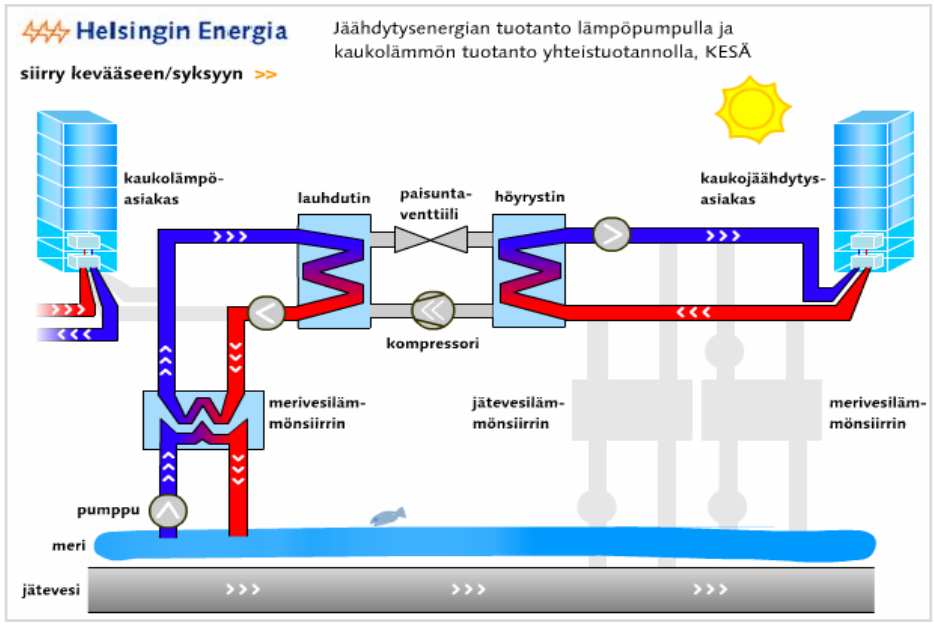
Chilled water production – Absorption chiller

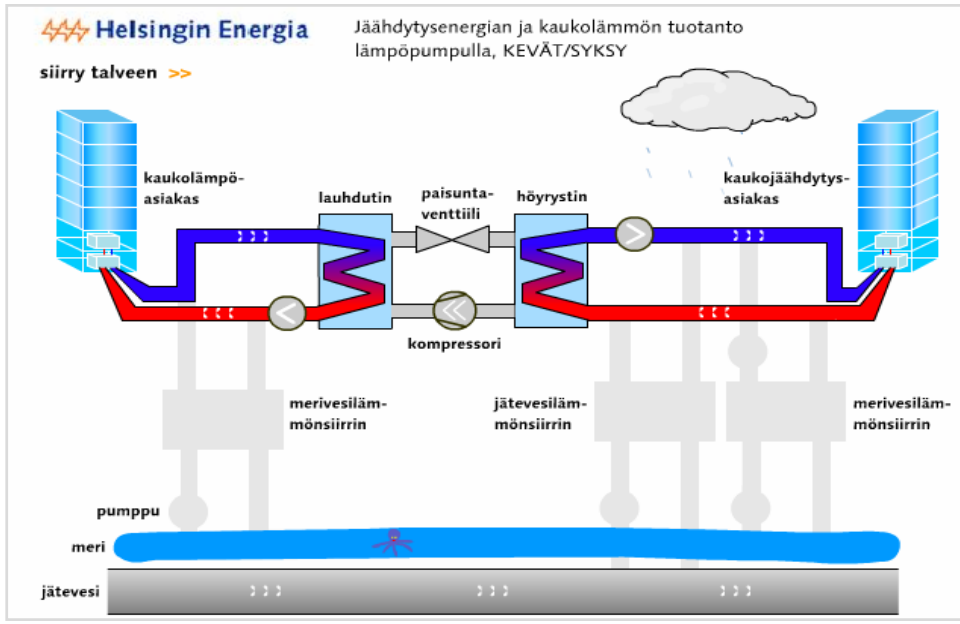


Chilled water production – Compression chiller



Chilled water production - Heatpump





Chilled water production – Storage tank