

## GEOHERMAL DISTRICT HEATING IN THISTED - DENMARK

### Geotermisk fjernvarme i Thisted



Fig 1: Geothermal district heating in Thisted [www.thisted-varmeforsyning.dk].

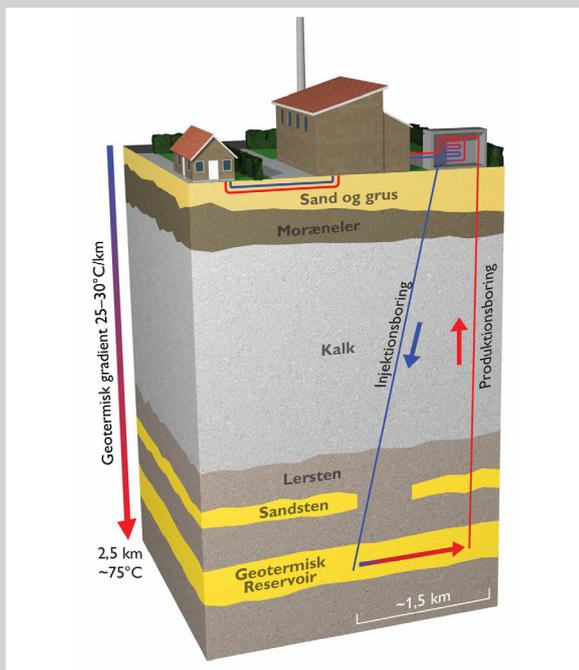


Fig 2: Overview of the geothermal district heating in Thisted. [GEUS].

” THE OVERALL HEAT PRICES IN THISTED ARE SOME OF THE LOWEST IN DENMARK PARTLY DUE TO GEOTHERMAL ENERGY ”

#### Summary of the project

Geothermal energy is heat that flows continuously from the core of the earth to the surface hereby warming water in the underground sandstone layers. In 1984 the first Danish geothermal energy plant was commissioned in Thisted. Underground hot water is extracted with pumps and utilized in the local district heating network through two absorption heat pumps from 1988 and 2000. The heat produced from the underground is 7.7 MW which is combined with 10.8 MW of driving heat through the absorption heat pumps. The driving heat is partly from a waste incineration plant and a straw fired boiler. The local district heating plant in Thisted further have a natural gas boiler as a peak-load unit.

The geothermal water is extracted with a temperature of 43 °C which is cooled through the two heat pumps to



12 °C. It is then pumped back into the underground through an injection well to gradually replenish the large hot water reservoir. The heat pumps operate mainly at partial loads in line with the heat produced from the straw fired boiler unit and waste incineration. Geothermal energy consequently replaces both biomass and natural gas and accordingly lowers the CO<sub>2</sub>-emissions from the plant. As investments in the current wells and heat pumps are amortized, the heat production costs are very low. The overall heat prices in Thisted are some of the lowest in Denmark partly due to geothermal energy.

After more than 30 years of extracting geothermal energy, the permission to continue utilizing underground heat has been extended with 30 years. Additionally, the local district heating company in Thisted have gained permission to extend the geothermal energy extraction with a third well, which potentially can increase geothermal heat production by 50 %. The potential of using geothermal energy in Denmark is large, however technical, and economic risks have stalled multiple projects and there are merely three existing geothermal plants in Denmark.

## Results

- The initial absorption heat pump has operated for nearly 30 years without mayor breakdowns or replacement of mayor components.
- Geothermal heat pumps contribute with approximately 16 % of the total heat production.
- The budget of the new well, which can increase production with 50 %, is 38 million DKK.
- Thisted Varmeforsyning have some of the lowest heat prices in Denmark.
- Underground geothermal conditions are local and there are great uncertainties with respect to lifetime and performance of the reservoirs.

## FACTS ABOUT THIS PROJECT

**Building type:** -

**Heated floor area [m<sup>2</sup>]:** -

**Installed heat capacity [kW]:** 2 700 kW and 5 000 kW

**District heating network:** 5 117 consumers

**Heat source:** Geothermal energy

**Investment cost:** Investments are amortized

**Participating countries:** Denmark

**Time frame:** Heat pumps where constructed in 1988 and 2000

**Link to web page or report:**

<http://www.thisted-varmeforsyning.dk/> and <http://www.danskfjernvarme.dk/groen-energi/projekter/drejebog-om-store-varmepumper> (both in Danish)

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**IEA Technology Collaboration Programme on Heat Pumping Technologies (HPT TCP)**