15. ATES FOR DISTRICT COOLING IN STOCKHOLM

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Abstract. Aquifer Thermal Energy Storage (ATES) system is used to serve the district cooling of the inner city of Stockholm in Brunkebergs Torg with natural cold from a lake, which is stored during night and recovered during peak hours at daytime. The wells are situated at two narrow streets, six wells each street. The system is designed for a capacity of approx. 25 MW cooling power at a storage working temperature of +4 to +14 °C and at a flow rate of 600 l/s. The operational problems, solutions and economic aspects are discussed.

Keywords: Aquifer Thermal Energy Storage, district cooling

15.1. Type of Application

The storage is linked to a district cooling system that serves the inner city of Stockholm in Brunkebergs Torg (Figure 90) with natural cold from a lake (Värtna). The surface water is produced from a depth of 35 m and has a temperature ranging from +4 to +6 °C. A heat pump system can lower the supply temperature to +3 °C if required.

The designed capacity with the surface water is 60 MW. The purpose with the Aquifer Storage is to increase the capacity in order to connect more customers to the system. This is achieved by short-term storage where cold from the lake is stored during night and recovered during peak hours at daytime.

The storage system contains two groups of wells with a set of heat exchangers in between (Figure 91). The system is designed for a capacity of approx. 25 MW cooling power at a storage working temperature of +4 to +14 °C and at a flow rate of 600 l/s. The wells are situated at two narrow streets, six wells each street. The distance between the streets is approx. 60 m and the distance between wells approx. 10 m (Figure 91). All the wells are completed with Ø 360 mm continues slotted filter screens 10–14 m in length and a Ø 400 mm production casing, 14–20 m in length.
15.2. Operational Experiences

The plant was constructed in late 1997 and early 1998 and it was functionally tested in the summer 1998. It was then reviled that a major part of the wells produced sand. It was established that the wells were not sufficiently developed and that this was the reason for the problem. During the winter season