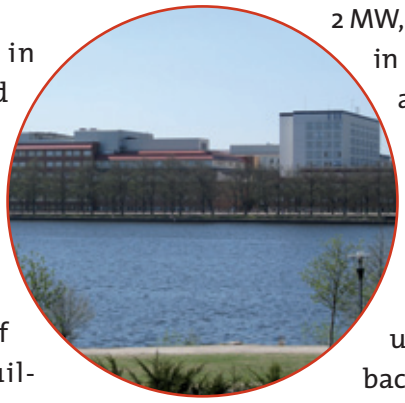
V1 ABSORPTION COOLING
IN THE HOSPITAL AND UNIVERSITY


Credit: Henrik Johansson

Synopsis

District heating produced from biomass in the Combined Heat and Power (CHP) plant in Växjö is used to produce cooling for the hospital and the university via absorption chillers.

Background



The demand for cooling in Växjö is driven by increased indoor temperatures due to several factors: the climate, powerful lighting, the flow of people and widespread use of electronic equipment, excessive solar exposure of glass areas in modern buildings. Electrical systems were commonly used to solve this until now. Växjö Energy Ltd (VEAB) demonstrated that electricity can be saved through absorption cooling, which is driven by district heating produced in the CHP plant. The additional heat production for cooling allows electricity production during the summer period, previously impossible due to too low heat demand in the summer.

Objectives

- Provide new knowledge on heat driven cooling technology coupled with a biomass fired CHP plant, thus creating polygeneration based on renewable energy sources.

The interaction between the load curves for the three products (heating, electricity and cooling) and its impact on technical conditions for optimal system performance are the key issues to be addressed.

Project description

The project has been carried out in close co-operation with the Royal Institute of Technology (KTH). The operation started in June 2007 and the performance was evaluated in order to obtain design criteria for larger chillers.

The hospital and the university were then connected, with plans to extend the district cooling system to more customers later on. Two full scale chillers in the CHP plant, each of 2 MW, produce cooling that is being distributed in pipes to the hospital and the university area. Within the district heating system are also installed 2 MW of free cooling and an accumulator that increases the peak capacity. The result is that the electric driven compressor machines, still in the university and the hospital, are only used for peak loads and as an emergency backup.

Results

The cooling demand from the hospital and the university is estimated to 8,000 MWh per year, of which 6,400 MWh can be supplied by absorption and free cooling. The previous use of electricity for cooling purposes can be reduced by nearly 2,000 MWh per year. At the same time, the use of district cooling makes it possible to produce about 2,000 MWh electricity from biomass in the CHP plant. All in all, this is equivalent to reducing CO_2 emissions by 4,000 tonnes on the European electricity market.

Next Steps

During the coming years, more customers will be connected to the system, such as shopping malls, industries and offices. A fully developed system is estimated to have a capacity of 25 MW.

Further Information

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