

New Low Temperature District Heating grid in Brunnshög (Lund, Sweden)

Summary

The world's largest low-temperature district heating (LTDH) grid was inaugurated in Lund, Sweden, in the fall of 2019. The grid is based on fossil free energy from recovered waste heat. Many new technologies are introduced in the production, distribution and use of the heat resulting in less energy losses and cheaper energy for the customers.

In 2009 two historic decisions meant that two large research facilities were to be placed in Lund; the European Spallation Source (ESS) and the MAX IV Laboratory. The two facilities would be located in close proximity and form the basis for an entirely new city district called Brunnshög. Plans for Brunnshög include setting an example for sustainable city development. Over a period of 40 years, Brunnshög will reach 40 000 people living and working within its limits.

Science heats the city! Using more than 50 years of experience in district heating, plans were made to use the district heating grid as a cooling system for ESS and MAX IV to make them as environmentally efficient as possible. Already in operation, MAX IV generates enough heat to supply all of Brunnshög when it is completed. Kraftringen, in cooperation with the City of Lund, therefore committed to building a next-generation low temperature district heating grid in Brunnshög. Making sure that the residual heat from MAX IV come to good use.

Description of the new Low Temperature District Heating grid in Brunnshög (Lund, Sweden)

Vision

Kraftingen's vision is "Energy for future generations". We strive to deliver electricity, heat, cooling, communications and other services with minimal impact on the environment. As such, we are always looking for new solutions to lower the climate impact of our services. The low temperature district heating system in Brunnshög, Lund, described below, is an excellent example where residual heat from a research facility is used to heat an entire city district through innovative technical solutions as well as novel business models. "Science heats the city" is a tagline for the project, illustrating both a scientific approach as well as indicating the actual energy sources supplying heat for Brunnshög.



Background

2009 was a very important year for the city of Lund. Within one month decisions were taken to fund two large research facilities to be placed in Lund. European research ministers awarded Lund the opportunity to host the European Spallation Source (ESS) and the Swedish Ministry of Education decided to fund the MAX IV Laboratory.

The two facilities would be located in close proximity and form the basis for an entirely new city district called Brunnshög. Lund Municipality have since built plans for Brunnshög to be a leading example of sustainable city development. Over a period of 40 years, Brunnshög will reach 40 000 people living and working within its limits.

Kraftringen has more than 50 years' worth of experience in district heating systems. Our main grid is one of Sweden's largest, connecting the cities of Lomma, Lund and Eslöv into one large heating grid. Half of the yearly demand is met by the combined heat and power plant in Örtofta, which has been online since 2014. From spring of 2018, all of our heating has been produced from fossil free fuels. Contributing to the fact that the City of Lund reached its climate goals for 2020 a full two years early. The district heating grid is also connected to the grids in the cities Landskrona och Helsingborg, providing possibilities to optimise production further with our partners Landskrona Energi and Öresundskraft.

The energy solution

Kraftringen Energi AB (publ) is an energy company, owned by the municipalities of Lund, Eslöv, Hörby and Lomma. The district heating grid owned and operated by Kraftringen is one of Sweden's largest. The possibility to use Lund's district heating grid as a cooling system for ESS was an important factor in the facility's excellent plan for being as environmentally efficient as possible.

The technical prerequisites at the MAX IV Laboratory are slightly different and it does not generate as much high-grade residual heat as its neighbour ESS. Krafringen, in cooperation with the City of Lund, therefore committed to building a next-generation low temperature district heating grid in Brunnshög. Making sure that the residual heat from MAX IV came to good use.

Cool DH

As part of the Horizon 2020-project Cool DH (www.cooldh.eu), the backbone of the world's largest low-temperature district heating (LTDH) grid was inaugurated in the fall of 2019. The first client was connected at the same time and has been heated by LTDH since then. As Brunnshög grows, more and more clients are connected and new and innovative uses of heat has been implemented. A tramway connects Brunnshög to the center of Lund and all tram stops will have shelters that will be heated by the LTDH system. Bike ways and sidewalks will be heated to make them free of snow and ice in the winter, amongst many other ideas and plans.

Description of the LTDH grid

Since Brunnshög is a completely new district, all buildings in the district will be built according to current building codes and using state of the art building techniques, meaning that they will have a very high standards of insulation and have low heating needs. Nevertheless, there is a heating requirement during the cold months, and year-round need for hot tap water. Given that there are heat sources available which can supply residual heat for the entire district at zero primary energy use, there was a need for technology that transfers heat as effectively as possible to ensure as low climate impact as possible.

The system temperature of 65 °C was chosen to eliminate the need for extra equipment to handle growth of legionella bacteria. The lower temperature also means plastic pipes, specially de-

veloped for the Cool DH project, could be used. These can be laid closer to the surface, meaning shallower digging and thereby narrower working area and less intrusion on the surrounding area. The new pipes are delivered on 100 meter rolls which can be rolled out very effectively compared to previous technology where 16 meter sections needed to be lifted into the ground. This also means that the LTDH grid needs far fewer joints, leading to further reduction in costs.

The MAX IV energy central is also connected to the high temperature district heating grid, meaning that there is a redundant heat supply with extremely low primary energy usage (primary energy factor of 0.04) in periods when there is no production at the MAX IV Laboratory.

The future

Construction projects in Brunnshög have been delayed over the covid-19 pandemic but agreements are in place with many construction entrepreneurs to supply their projects with low temperature district heating going forward.

