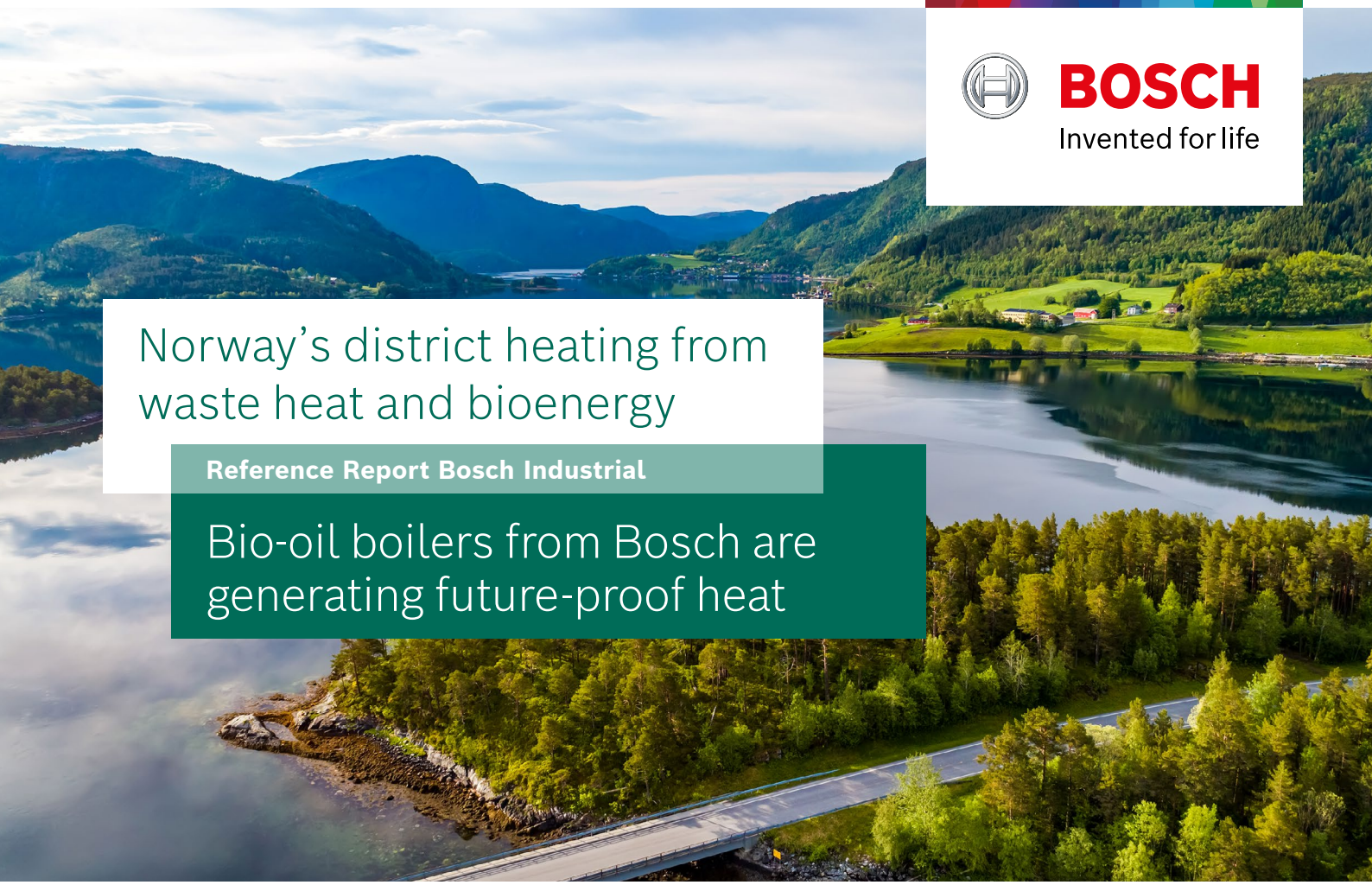


Norway’s district heating from waste heat and bioenergy

Reference Report Bosch Industrial

Bio-oil boilers from Bosch are generating future-proof heat

Two new Bosch hot water boilers are integrated into the heating plant from Eidsiva Bioenergi at the Hamar site. The technology of this innovative system is designed for 100 % biofuel and therefore supports the future-proof heat supply for the third-largest district heating supplier in Norway.

Over 400 GWh – this is how much energy is generated by Eidsiva Bioenergi AS annually at nine sites in Norway. In addition to district heating, steam and electricity are also supplied for cities and industry. The objective here is to exclusively use existing and regional resources for energy generation that would otherwise go to waste – such as residues from wood processing. This is particularly sustainable since, at the same time, the energy that is used offers a significantly improved carbon footprint when compared to conventional fuels. The Hamar heating plant predominantly uses recovered waste heat from waste as well as bioenergy. This comes from by-products of industrial processing, for example. The bioenergy, in the form of bio-oil, is also used as an energy source for the new Bosch hot water boilers.

The Unimat UT-M boilers are integrated into the district heating grid for the town of Hamar and, together, can provide up to 30,000 kW of heat. In theory, this corresponds to heat supply for approximately 3,500 households. The heat generators from Bosch are primarily used as a back-up for solid fuel boilers and for covering additional load peaks. In particular, the compact design of the hot water boilers allows for quick heating-up and availability in order to provide heat flexibly. In total, the heating plant in Hamar generates up to 120 GWh of district heating for the town of 30,000 inhabitants annually.

Industrial boiler experts from Bosch Denmark and their long-standing partner Compab AB from Sweden, along with Reng Consulting AB (consulting the customer on issues of technology and energy),

among others, worked on the project for adding the two new heat generators. The common goal was to flexibly integrate different biofuels in a system and to design the technology for this. “Above all, the fully automatic switch between heavy/medium bio-oil and light bio-oil from three fuel tanks placed high demands on the technology used,” reports Peder Lyckerius from Compab. Boiler and burner technology interact here effectively and, using combustion-optimising control systems, the fuels can be efficiently converted into heat.

Even though bio-oil as a fuel has a high potential for environmentally friendly energy generation, this may vary due to its characteristics and may cause operational fluctuations. To use it, you require additional technological components in order to perfectly balance the efficiency and the service life of the boiler. For example, when compared to natural gas, bio-oil occasionally burns at higher temperatures.

Bio-oil boilers from Bosch

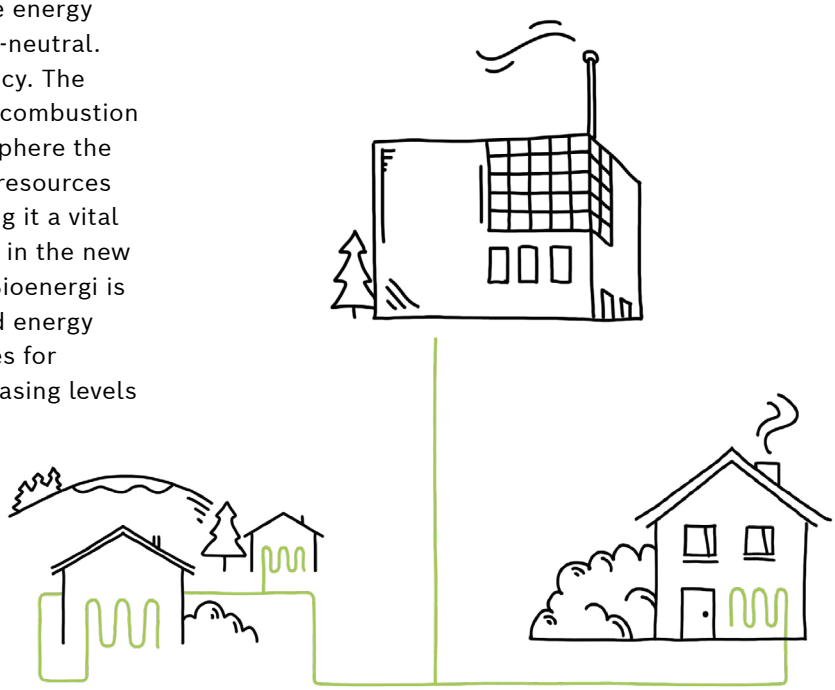
- Boiler and burner technology interact effectively
- Flue gas recirculation for low NO_x levels
- Innovative cleaning system with compressed air without manual cleaning effort
- Clean, flexible and efficient combustion of biofuel

With the installed flue gas recirculation, the prescribed NO_x emissions can be reliably complied with. With biofuels, fire-side coatings also often occur on heat exchanger surface areas, and this may affect the heat transfer and efficiency. The solution is a special cleaning system based on compressed air, which always achieves optimum efficiency and avoids the need for manual cleaning. Together with Compab, Bosch brought their expertise from projects that were already implemented with bio-oil boilers in Denmark. “This allowed us to offer a customer-specific system that burns the bio-oil flexibly, cleanly and efficiently,” summarises sales manager Martin Lambrecht, who was responsible for the project on behalf of Bosch Denmark, together with project manager, Tom Juhl.

The bio-oil that is used in the heating plant in Hamar comes from combustible waste from sunflower oil, rapeseed oil and vegetable oil. As an energy resource from industrial by-products, the energy source must be considered to be climate-neutral. These biofuels have a one-year CO_2 latency. The entire amount of CO_2 generated through combustion has already been absorbed by the atmosphere the year before. Biofuel preserves our finite resources and avoids disposal costs, thereby making it a vital component in climate protection. Usable in the new Bosch boilers to generate heat, Eidsiva Bioenergi is able to further expand its future-oriented energy supply – in line with the company’s values for achieving a better environment and increasing levels of sustainability.

Martin Lambrecht
Bosch Denmark

“Our expertise allowed us to offer a customer-specific system that burns the bio-oil flexibly, cleanly and efficiently.”



Geir Hagen, Head of Operations at the Hamar heating plant, talks about the successful implementation of the project:

“It was a really exciting project for us. A lot of components had to harmonise with the waste incineration plant that generates most of the heat in Hamar. The bio-oil boiler system has been fully integrated into the existing automation and monitoring system. This is very important to us as it means we can achieve optimal operation together with the other systems. The two boilers have been running since being commissioned in autumn 2020, and they have already generated 3.5 GWh of heat. In particular due to the extremely cold winter in January and February 2021, we used the boilers a lot and were able to meet the additional heat demand without any problems. Without the new boiler system, this year’s temperatures would have posed a great challenge for us.”

Bio-oil boiler project at the Hamar site

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