Invented for life

Climate-neutral steam supply in Iceland with a Bosch electric steam boiler

Between the mountains and the sea – an exceptional location for a boiler house. The core is a steam boiler from Bosch, operated with green electricity. The ELSB electric steam boiler generates no flue gases and can be operated economically and reliably at the same time. The project in a fish factory in Iceland shows that electricity-based steam and heat solutions are an important cornerstone for climate-neutral production.

Búlandstindur ehf is located directly on the east coast of Iceland, surrounded by a breathtaking landscape. Specialising in sustainable fish production, the family-managed company is an important employer in the region. One of the founders is Elís Grétarsson: “Fishery management in Iceland is one of the most progressive, and we are part of this with our fish factory in Djúpivogur.” Progressive means focusing on strict management of fish stocks, conservation of resources, certification and excellent quality standards.

Búlandstindur ehf originally obtained the packaging for fish products from Reykjavík – over 500 km away. Today, the company manufactures its own packaging under the name of BEWI. “We are consequently independent of supply chains, can pack the fresh fish directly and save on transport routes that damage the environment,” explains Elís Grétarsson. Sustainably generated steam is required to produce this recyclable packaging. Bosch Industriekessel provided the appropriate technology for this and supplied the ELSB electric steam boiler from its carbon-neutral boiler range. This was preceded by good planning and project management together with the customer, Bosch and its long-standing industrial boiler partner Sveiseverkstedet KG Karlsson AS. After it had been delivered over land and sea, Sveiseverkstedet KG Karlsson AS was responsible for the integration and installation of the system. In June 2022, the service team of Bosch also made their way to Iceland, to put the system into operation.

Location
Djúpivogur, Iceland

Production
Recyclable packaging
2.6 MW electrical output
4 t/h of steam at 8 bar

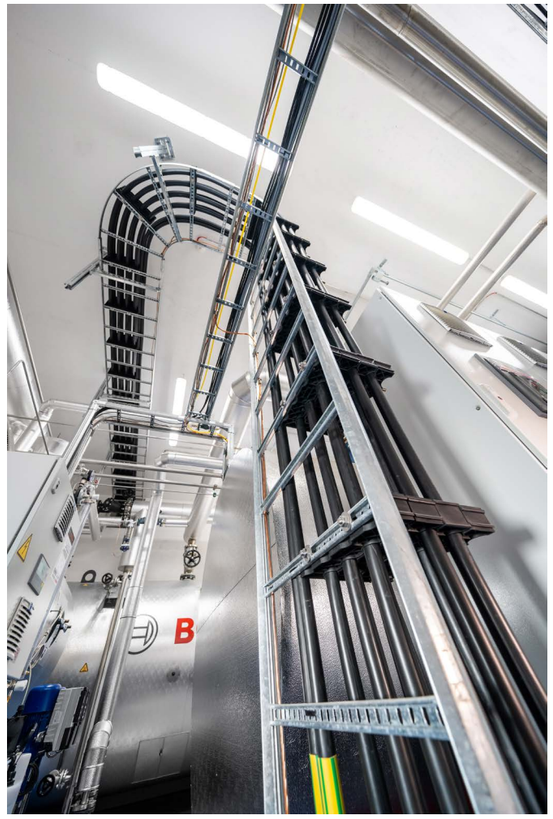
Environment
CO_2-neutral, no flue gas

Efficiency
>99 %

Electrification of steam supply
Due to its geographic and geological location, Iceland possesses very large quantities of renewable energy, and covers around 85 % of its primary energy requirement through this. Firstly, this is an important contribution to the climate and environment, and secondly, it allows independence from fossil energy sources. Natural gas and oil are scarce on the island, and therefore economically unattractive. To operate the electric steam boiler, the fish factory uses approx. 2.6 MW of green electricity, which comes mostly from hydro-power. The boiler generates up to four tonnes of saturated steam per hour at 175 °C and 8 bar from this – without flue gases. A heat pump was not in question for these temperatures, as this would require the high temperature of a megawatt heat source.

Placed between the mountain scenery and the rough coast of Iceland, it’s difficult to recognise the boiler house for what it is. Neither a chimney, flue gas facilities nor infrastructure for fuel supply can be found. “With our technology, we offer exactly what our customer was looking for – a purely electrical solution for generating steam in a climate-neutral way,” says Martin Lambrecht from the Bosch sales team. This is in line with Búlandstindur ehf’s values of acting sustainably throughout the entire process of fish production.

Manufacturing of fully recyclable packaging



2.6 MW electricity generates 4 t/h of steam

Power cabinets secure the power supply

The stainless steel heating bundle is designed for a long service life

Further advantages are high flexibility and availability in operation. Compared with conventional boilers with burner systems, the ELSB can be heated up faster. This means saved time, quick availability, lower thermal load and lower energy consumption by avoiding preventilation losses. The dynamic response to greatly fluctuating steam demand, which is also typical in manufacturing packaging, should be highlighted here. This ensures stable processes. The modulation range of the thyristor circuit is practically unlimited from 0 to 100%. So the ELSB can automatically adapt its performance to the demands, without frequent switch-on and switch-off processes. “We can flexibly operate our production with the system. If we need steam, it is available,” says Elís Grétarsson. There are no efficiency losses; even with strong load fluctuations, the boiler used achieves consistent efficiency values of around 99%. As a result, the high energy efficiency of the electrical heating system exceeds all combustion systems and optimally exploits the used energy.

However, this high level of flexibility and energy efficiency also require an appropriate design and automation. The electrical power supply and the Bosch boiler control (BCO) are accordingly tailored to the entire system. The software in the BCO is configured by Bosch on a project-specific basis, and optimises the interaction between the electrically heated steam boiler, steam accumulator and consumer in production. This ensures consistently high steam quality, efficiency and process reliability.

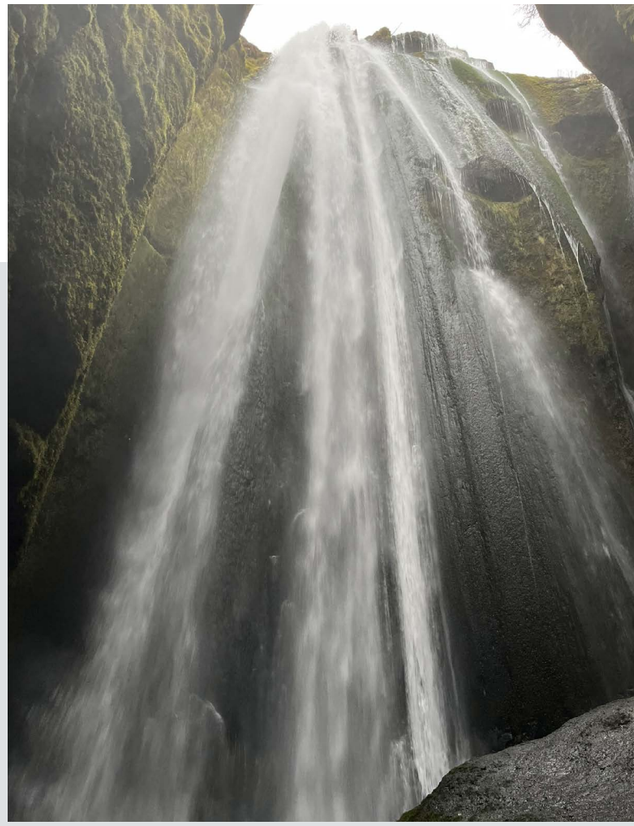
Boiler control BCO

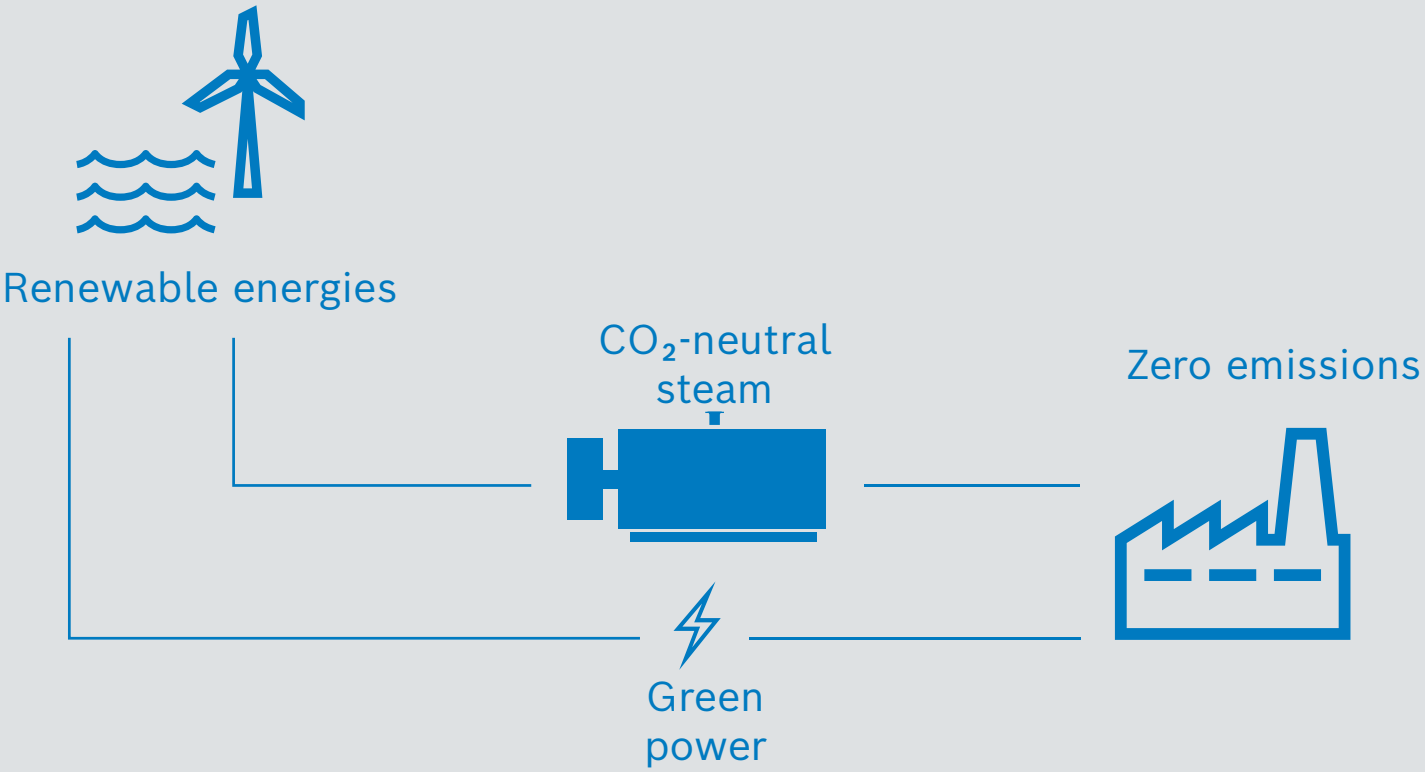
System from a single source
Bosch produced the electric boiler system at its main factory in Gunzenhausen, Germany. The stainless steel heating bundle used is designed for a long service life, thanks to spare elements fitted as standard, a moderate surface load and needs-based control. In addition to the boiler as well as control cabinets and power cabinets, a steam accumulator and a water service module add to the boiler house. The water service module automatically provides the ELSB with thermally treated feed water. The process of water treatment is identical to conventional steam boiler systems. Components can be used 1:1 and require no special solution for water quality. The entire system technology is modular, customised and pre-assembled. This also offered advantages during implementation on site: Coordination, integration and installation went smoothly. „We don’t have a project like the one in Iceland every day. Due to the remote location, we attached great importance to a complete solution, reliable technology and uncomplicated cooperation. In Bosch, we have had the right partner at our side for many years,“ says Tor Svensli from Sveiseverkstedet KG Karlsson AS.

Iceland covers around 85 % of its primary energy needs with renewable energy such as hydro-power.

Summary

The system has now been successfully in use since June 2022. “For us, the new factory was a very large project and an important investment in the future. We want to grow further, and simultaneously protect resources and the environment. The new steam boiler system from Bosch, which we operate completely with green electricity, is also suitable for this,” sums up Elís Grétarsson. Projects like in Djúpivogur show that power-to-heat solutions are an important component for the industries of the future. Due to the increasing extension of renewable energies and the associated surpluses, electrically heated steam boilers or hybrid systems are becoming more attractive worldwide. Industrial processes can be easily covered due to the high pressures and temperatures of electrical direct heating. Independence from fossil energy sources and enormously high energy efficiency are further arguments for the use of such systems.





Electrification of process heat in Djúpivogur, Iceland

The companies involved

Operator: Búlandstindur ehf
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Subject to modifications | 02/2023 | MKT_en_RB_ELSB_Iceland_01