

Futraheat 'Greensteam' High Temperature Heat Pump installation at Hepworth Brewery, UK



Figure 1: The Greensteam 330 installed at Hepworth Brewery

Summary of demonstration case

Futraheat installed its beachhead Greensteam 330 high temperature heat pump at Hepworth Brewery in 2025. The heat pump was designed to deliver up to 300kWt of steam, and a 30K temperature lift from source to sink. Core to Futraheat's solution is its proprietary TurboClaw® compressor, a unique turbo-compressor design that brings the benefits of centrifugal compressors to application capacities otherwise only addressable using positive displacement technologies.

At Hepworth, the unit has been applied to the wort-boiling process, where traditionally oil-boiler generated steam is fed through a coil in the 'kettle' to boil the wort in batches, and the resulting vapour from the wort is vented to atmosphere. In the demonstration case, this vapour (~100°C) instead provides the heat source for the Greensteam unit, where a closed-loop cycle incorporating a single-stage TurboClaw compressor raises the refrigerant temperature by up to 34K.

Steam up to 130°C is then generated directly in a steam-condenser and delivered back to the kettle, closing the energy loop and off-setting the boiler steam.

"Hepworth partnered with Futraheat in support of our long-term 'roadmap' to decarbonise operations. The project has shown that through offsetting the need for boiler steam, the efficiency of the heat pump technology can deliver the expected CO2 and cost savings over the long-term"

– Andy Hepworth, Founder and Chairman of Hepworth Brewery



The project was part-funded by a UK government grant and intended to prove the brewery application concept, whilst providing real-life performance data to both inform further product development and Hepworth's business case.

The heat pump was integrated with just one brewing line at Hepworth, but has sufficient capacity to serve all four lines due to the batch-nature of the wort boiling schedule. This wider integration is planned for 2026 and will progress the project from a proof-of-concept, to demonstrating an economically viable solution.

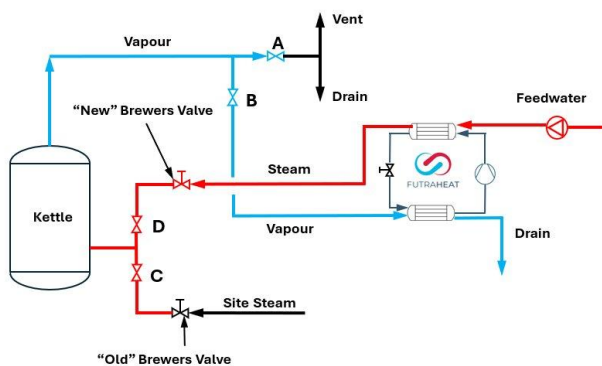


Figure 2: Simple system schematic for the Greensteam heat pump installation within the wort-boiling process

Operating experiences

Whilst the source heat was consistently vapour at ~100°C, the sink temperature varied between 123°C and 130°C depending on the beer product being produced. COPs of in excess of 6.5 were therefore demonstrated at the lower lifts. Heat demand was typically less than 300kW, with the heat pump operating down to 200kW in some cases. In contrast, the compressor also demonstrated the ability to deliver greater mass flow than expected – the equivalent of ~350kW.

Due to the limited boiling-hours per kettle, the absolute savings from the demonstration were limited, but heat-pump utilisation will be increased four-fold when integrated across site, with a proportional increase in monetary savings.

CO2 savings were calculated using grid-electricity carbon figures, but existing on-site solar power presents the opportunity to increase these further.

The greatest area of learning was in the automation of the control system, which required considerable development time owing to the number of novel elements of technology within the system.

FACTS ABOUT THE CASE

Installation year: 2025

Operating hours: 700 hours of trials – limited by batch process operation

Working fluid used: HFO R1233zd (also compatible with Hydrocarbons at demonstration operating conditions, and Steam from 130°C to 200°C)

Compressor technology: TurboClaw®, oil-free turbo-compressor

System manufacturer: Futraheat

Sector: Brewing

Performance in design point:

- **Heat source:** 100°C vapour
- **Heat sink:** 130 °C steam
- **Heat supply capacity:** 300kW
- **COP_{Heating}:** >5

Investment cost: £300k

Savings: £70k /a

Estimated annual CO₂ savings: 268 t/a

Link to webpage or report:

www.futraheat.com

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