SOLSTICE® REFRIGERANT HELPS DECARBONISE LONDON HOMES

Case Study

As part of its ambition to become carbon neutral by 2030, Southwark Council in south east London developed a plan to decarbonise the gas-powered heat networks used by thousands of council homes across the borough. It brought in renewable energy provider Vital Energi (with its partners ICAX and J&E Hall) to replace legacy gas boilers with modern heat pumps powered by low global warming potential (GWP) Solstice® N15 (R-515B) refrigerant – a 91% blend and sister product of Solstice® ze (R-1234ze) from Honeywell.

BACKGROUND

Situated along the south bank of the River Thames, the London Borough of Southwark is home to one of the most socially and ethnically diverse communities in the English capital.

In March 2019, the council declared a climate emergency, recognising that urgent action needed to be taken to tackle climate change. This was followed by a climate strategy which set out how the council would achieve its ambition to become carbon neutral by 2030. To achieve that goal, the council would have to immediately tackle the CO2 emissions generated by the vast, gas-powered district heating networks supplying heat to 17,000 of its 55,000 council houses, among other measures.

To reduce the CO2 emissions generated by its public housing stock, the council planned to add more insulation to the homes, use more Energy from Waste via the nearby South East London Combined Heat and Power (SELCHP) plant in Lewisham, and install high-efficiency heat pumps as an alternative to the traditional gas boilers that powered the heat networks.

Heat pumps are a cornerstone technology in displacing fossil fuel heating in the International Energy Agency's **Net Zero by 2050** report, and in the case of Southwark's council homes, they would not only cut gas consumption but would generate low carbon district heating.

However, there was an economic challenge: Heat pumps cost considerably more than gas boilers and electricity costs more than gas – which would mean an unacceptable increase in costs to residents. To resolve this issue, the council applied for public funds such as the Mayor's Energy Efficiency Fund (an EU backed low interest loan) and the UK Government's Renewable Heat Incentive, to offset the installation and ongoing running costs.

In tandem, renewable energy provider Vital Energi, who decarbonise organisations, towns, and cities across the UK, was appointed to design and build a new heat pump platform which would power the heat networks.

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SOLUTION

After conducting feasibility studies, Vital Energi and its partners ICAX and J&E Hall designed and installed four bespoke 600 kW heat pumps and one 1 MW heat pump in three of the council's existing plant rooms, each linked to new 125m water abstraction and discharge wells connected to the London aquifer.

To produce useable heat from the heat pumps, low global warming potential (GWP) Solstice® N15 (R-515B) refrigerant from Honeywell was selected.

Solstice for District Heating met Vital Energi and the council's requirements for safety, efficiency and cost. Both Solstice N15 and Solstice ze support temperatures up to 100°C (the council's heat network typically operates between 75-80°); offer low complexity, which helps to reduce capital costs; and deliver high efficiency, which helps to decrease both the financial cost and CO2 emissions related to power consumption. Safety-wise, both provide low-risk, Class A toxicity and are classed as 'non-dangerous' PED Group 2 substances.

Moreover, Solstice for District Heating offered the application flexibility Vital Energi was looking for. In this case, due to the heat pumps proximity to gas boilers, Solstice N15 would be used as an A1 non-flammable solution with its low GWP of less than 300. Without proximity to a gas source, as in other heat pump projects, in the future it could migrate to the sister product Solstice ze, which boasts ultra-low GWP of less than 1.

Another reason for using Solstice for District Heating was that it could use the council homes' existing pipework and thus minimize disruption for residents – a key project consideration.

Once the heat pump platform was completed, the heat networks were switched over to the new heat pumps while the legacy gas boilers were retained for back-up resilience.

The outcome of the first phase of the project was that over 2,000 council homes witnessed a reduction in carbon emissions. Over time, Vital Energi and the council plan to migrate all of Southwark's public housing stock to low carbon heat.

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Image courtesy of Vital Energi.

For More Information
sustainability.honeywell.com
fluorines.europe@honeywell.com

Honeywell Advanced Materials
Riverview House
Harvey's Quay
Limerick
V94 R3DE
Ireland
www.honeywell-refrigerants.com

CAS-22-22-EN I 09/22

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