Wandsworth Riverside Quarter

Figure 1: Wandsworth Riverside Quarter (source: Riverside Quarter)

Context

Wandsworth Riverside Quarter is a development of apartments on the banks of the Thames in south-west London. The development will provide 504 apartments and substantial commercial and leisure space when fully built out. The first apartments were occupied in 2013.

An Aquifer Thermal Energy Storage (ATES) system has been installed providing both space heating and cooling to the mixed-use buildings. Heat supply for domestic hot water and heat pump back-up comes from gas boilers and a gas CHP.

How does the scheme work?

The scheme consists of three heat pumps coupled to an aquifer below the site via an

It is a large Aquifer Thermal Energy Storage system with a capacity of 2.5MW. There are eight 120m deep boreholes connecting the heat pumps to the aquifer.

open-loop system of 8 x 120m deep boreholes. The heat pumps supply a peak cooling capacity of 2.25 MW and a heating peak output of 1.2 MW. The aquifer warms over the summer due to the injection of the waste heat from the cooling loads, leading to better heat pump performance in winter. In the winter, the aquifer is cooled as heat for the space heating is drawn out, and this cooling of the aquifer leads to higher cooling COPs during summertime operation. Under ideal design conditions, the aquifer is cold enough to directly cool the space cooling circuit. Heat is distributed via separate distribution pipework for space heating and

DHW supply, operating at 45/35°C and 75/55°C respectively.

Furthermore, the function of the ATES as a heat sink means that no heat rejection plant is needed for the building cooling system. It's a useful benefit in dense city locations, especially as it has become increasingly common for building occupants to make use of the roof space where such heat rejection plant was typically put.

How much did this project cost?

The capital cost for the Wandsworth scheme was high, around £2 million for 500 flats. However, in areas of high property value this cost is viewed as inevitable for obtaining planning permission. Due to the interseasonal heat recovery leading to more ideal heat pump source temperatures, ATES systems should have low operating costs. Achieving maximum efficiency requires the building heating and cooling systems to be designed to allow the ATES to yield its full potential. This requires a good understanding of system optimisation and good attention to detail.

Key facts

Building type: residential building (504 apartments)

Heat source: 2.5 MW Aquifer Thermal Energy Storage system using heat pumps

Capital cost: £2 million

Supply temperatures: 45°C (heating) and 6°C (cooling)

Heat pump type: J&E Hall WHP 602 with R134a Refrigerant

Time frame: In operation since 2013

References

"Heat Pumps in District Heating: Case studies", Element Energy and Carbon alternatives for DECC, 2016

"Heat Pumps in District Heating: Final report", Element Energy and Carbon alternatives for DECC, 2016

"Low carbon heat: heat pumps in London", Greater London Authority, September 2018

"Three riverside: the penthouse", Riverside quarter, London SW18

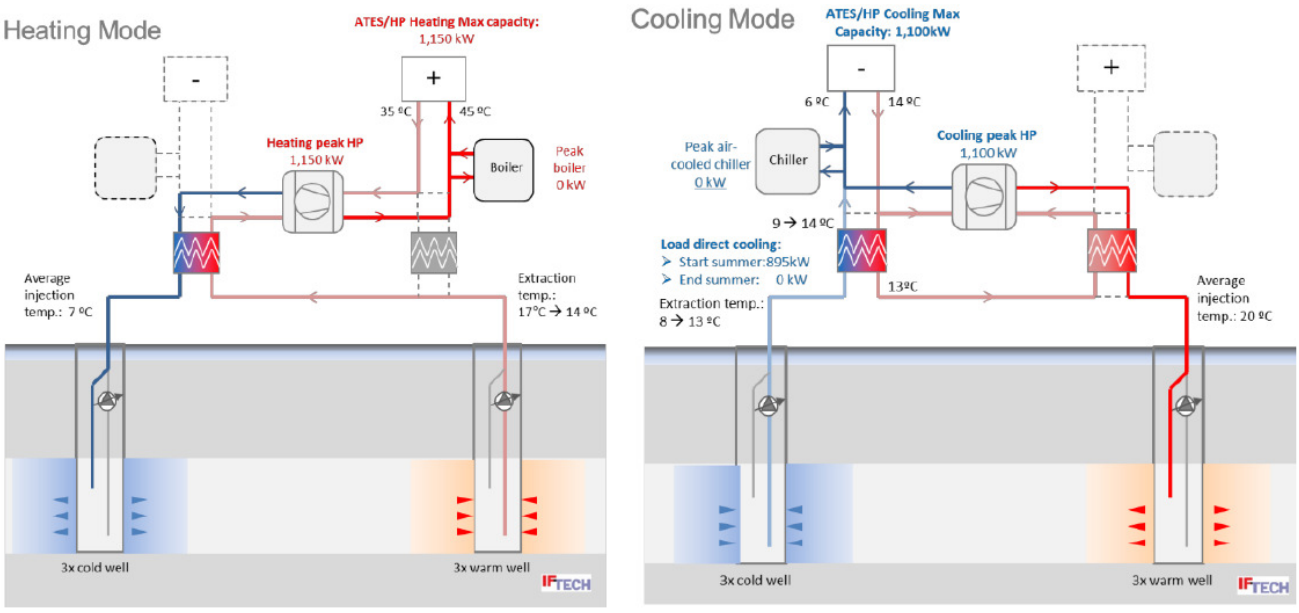

Figure 2: Schematic describing operation of the system in heating and cooling mode (Source: IFTech)