

Kingston Heights - London



Figure 1: Kingston Heights [2]

Context

NHP Leisure Developments have pioneered a new eco-friendly residential development in Kingston upon-Thames using water source heat pumps. Kingston Heights is a £70 million mixed use development situated a few hundred meters from the river Thames. It includes 56 affordable homes, 81 luxury apartments and 145 rooms Hilton Doubletree Hotel. Its peculiarity is to be heated and cooled by a heat pump system that uses the heat of the Thames River.

How does the scheme work?

This system recovers solar energy naturally stored in river water. Water is abstracted from the river having passed through a technologically advanced stainless steel filter that ensures that no marine life can enter the system. The abstraction filters are fitted with an automated backwash system that is able to 'blow away' any detritus from the filter's mesh in order to ensure that an optimum flow is maintained at all times. That water is then

Revolutionary project using abundant solar energy stored in the river Thames to deliver 2.3MW of heat to 137 apartments and a 145-bedroom hotel.

passed through a second, even finer filtration process, to get rid of any silt before being fed through the heat exchangers. Once the low-grade heat has been harvested, the water is immediately fed back to the river untreated in any way. It may have a slight temperature change $\pm 3^{\circ}\text{C}$ but the water becomes instantly assimilated into the main body of water and returns to the ambient temperature immediately (As an element of the agreement with the Environment Agency (EA), any water returned to the river will be within $\pm 3^{\circ}\text{C}$ of the river temperature). The heat exchangers transfer this low-grade heat from the river to an internal 'closed' loop water system. The closed loop contains a refrigerant composed of water and antifreeze. The loop moves energy across 200m to a number of plant rooms within the development. The massive volume of the

closed loop acts as a thermal store. Plant rooms contain heat pumps that deliver refrigerant to flats. Each flat contains a heat pump connected to a hot water cylinder and an underfloor heating system.

The hotel requires both space heating and space cooling. Therefore, the hotel uses VRF fan coils connected to a closed loop to answer this demand.

Results

Installed at a cost of £2.5million, the system currently saves over 500 tonnes of CO₂ emissions per year by using water source heat pumps instead of burning biomass in a CHP plant. Kingston Heights shows the great potential of renewable energy that could be replicated in other towns and cities across the UK.

References

- [1] "Low carbon heat: heat pumps in London", Greater London Authority, September 2018
- [2] "Case Study: Kingston Heights", Richerd Venga, GSHP association, 2016

[3] "Heat Networks Investment Project: case study brochure", BEIS, 2018

[4] "Water Source Heat Pump (WSHP) report", Mike Martin, Aberdeen Heat and Power, February 2017

Key facts

Building type: 137 apartments and a 145-bedroom hotel

Heat source: Thames River source heat pumps coupled with heat pumps in each unit

Heat capacity: 2.3MW

Carbon savings: 500 tonnes of CO₂ per year

Closed loop temperature: Between 4 and 25°C, depending on the temperature of the river

Contact: Mitsubishi

Time frame: In operation since October 2013 (the hotel since 2016)

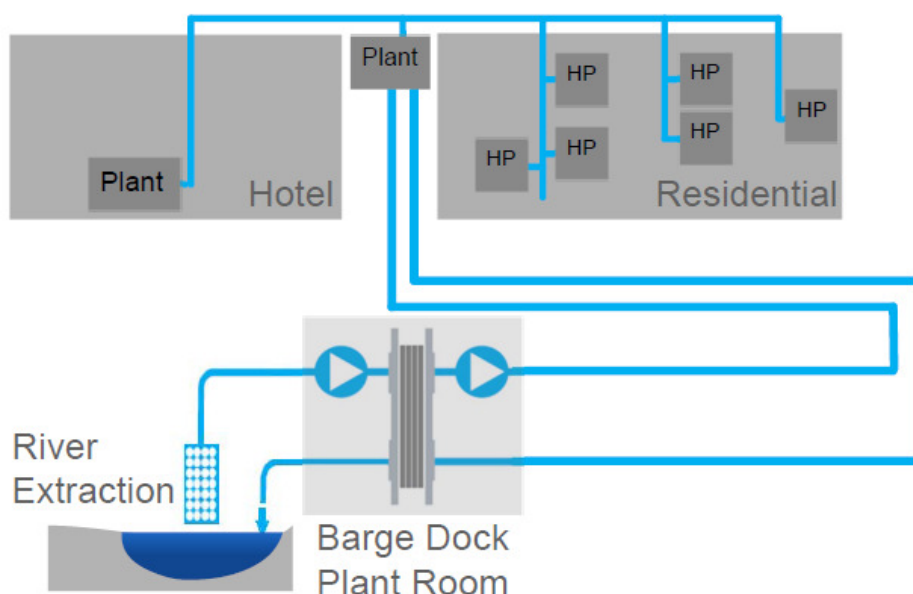


Figure 2: System overview [2]

