

HEAT FROM UNDERGROUND ENERGY LONDON

LOT-NET PROJECT MEETING

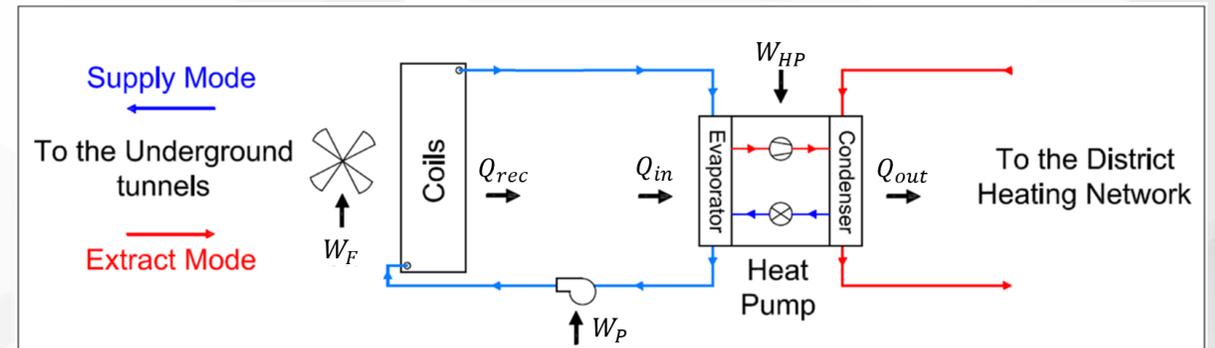
HENRIQUE LAGOEIRO | 11 Jan 2022

LOT-NET  EST 1892 **LSBU**



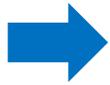
HEAT FUEL PROJECT

- Average of **780 kW** of heat recovered from the London Underground
- Upgraded by a **1 MW** heat pump
- Can also provide cooling when operating in Supply Mode
- Heat FUEL investigates both the heating and cooling benefits based on EES model
- Latest work incorporates flexibility when analysing benefits of waste heat



WASTE HEAT AND FLEXIBILITY

energyPRO
Model



Heat demand
profiles

+

Ambient and
tunnel temps

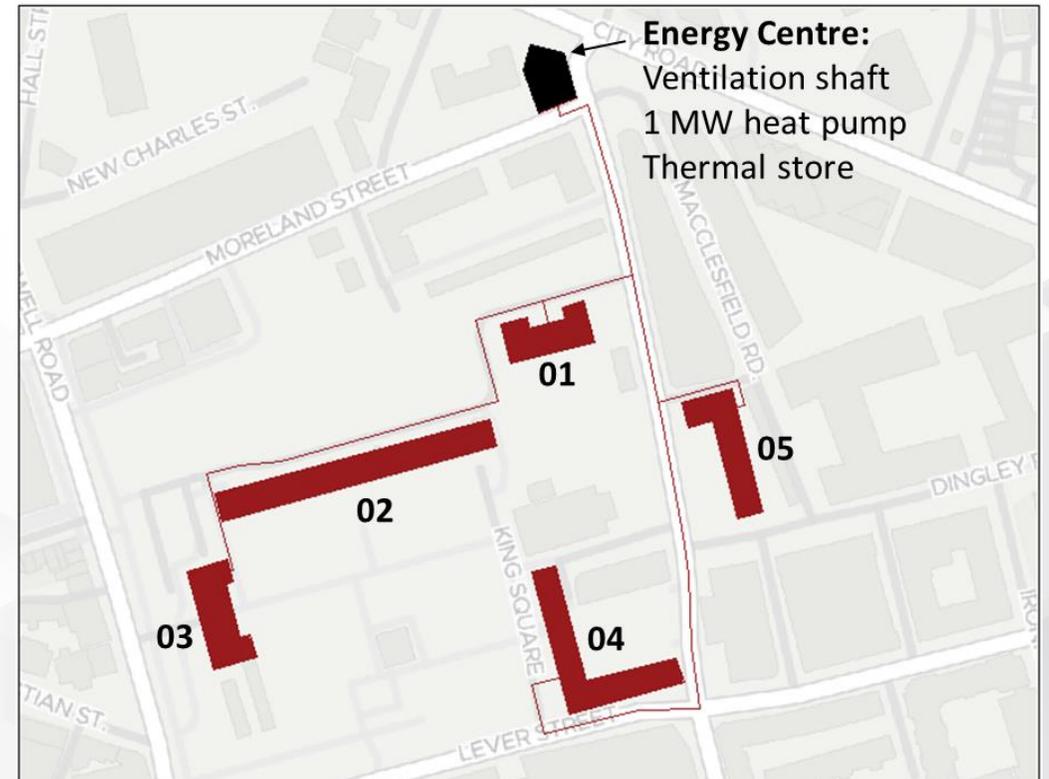
+

Conversion
and storage

+

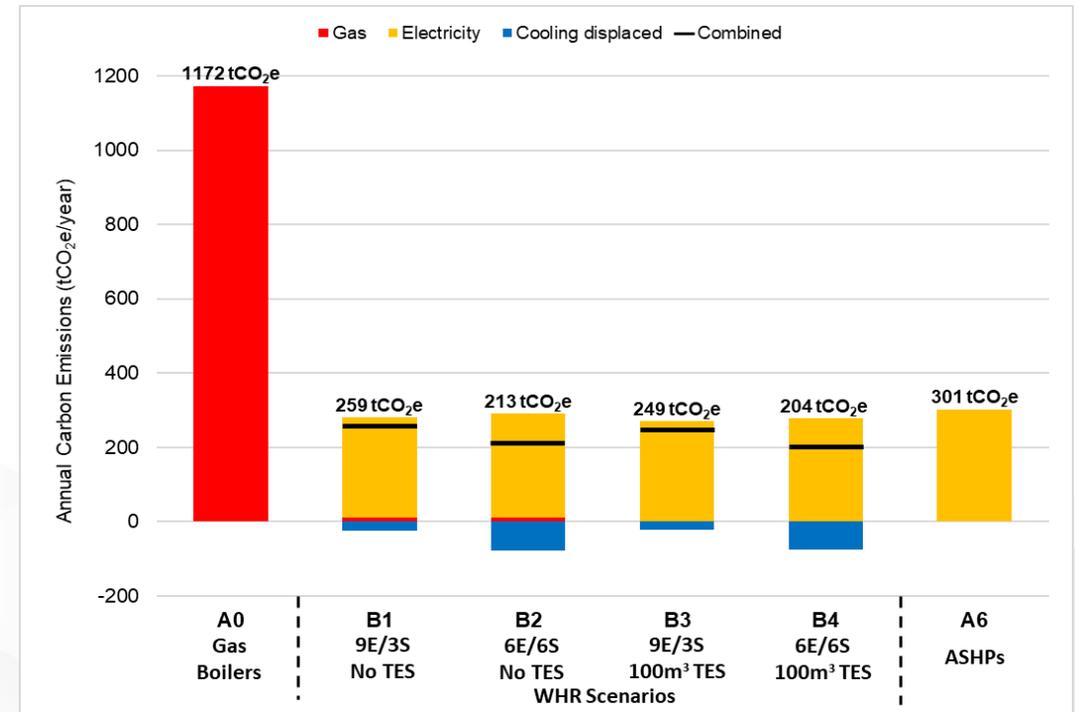
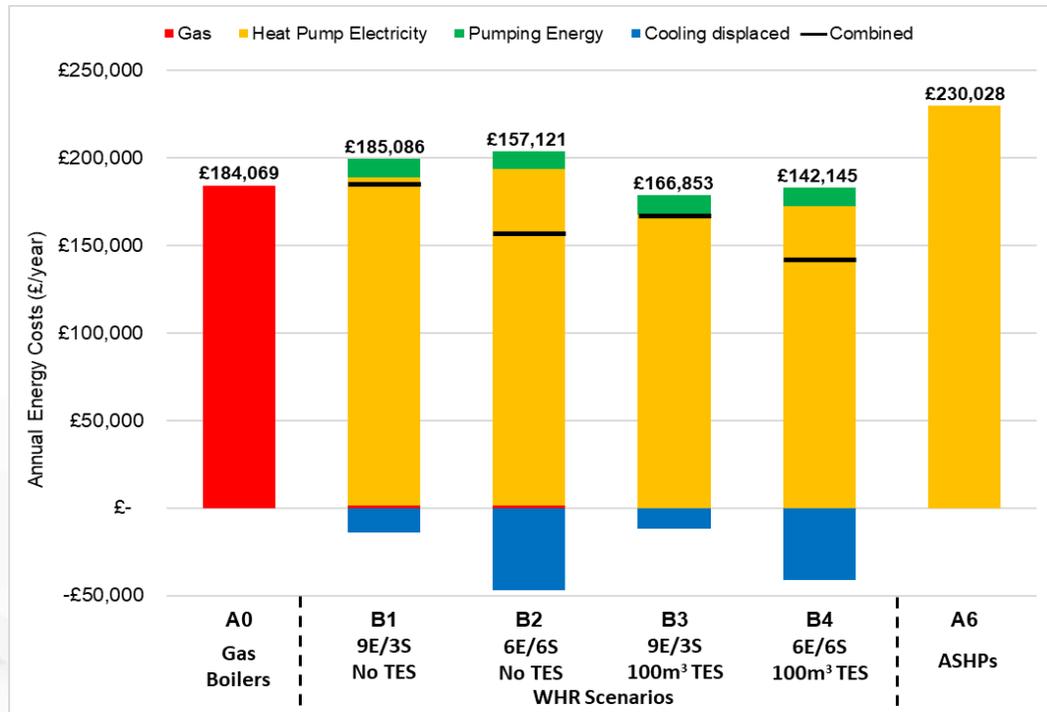
Energy tariffs

- Benefits of combining WHR system with thermal energy storage (TES) investigated with energyPRO
- Heat network supplied by vent shaft heat pump, meeting a combined demand of around 5.5 GWh/year
- Hourly electricity prices included in the analysis
- Cooling benefit incorporated: chiller displacement
- Comparison against communal gas boilers and air-source heat pumps for each building



CARBON AND COST SAVINGS

WHR could potentially achieve significant savings p.a. against counterfactuals



WHR + 6 months of cooling + flexibility:

23% cost savings against gas

38% cost savings against ASHPs

Waste heat from the Underground:

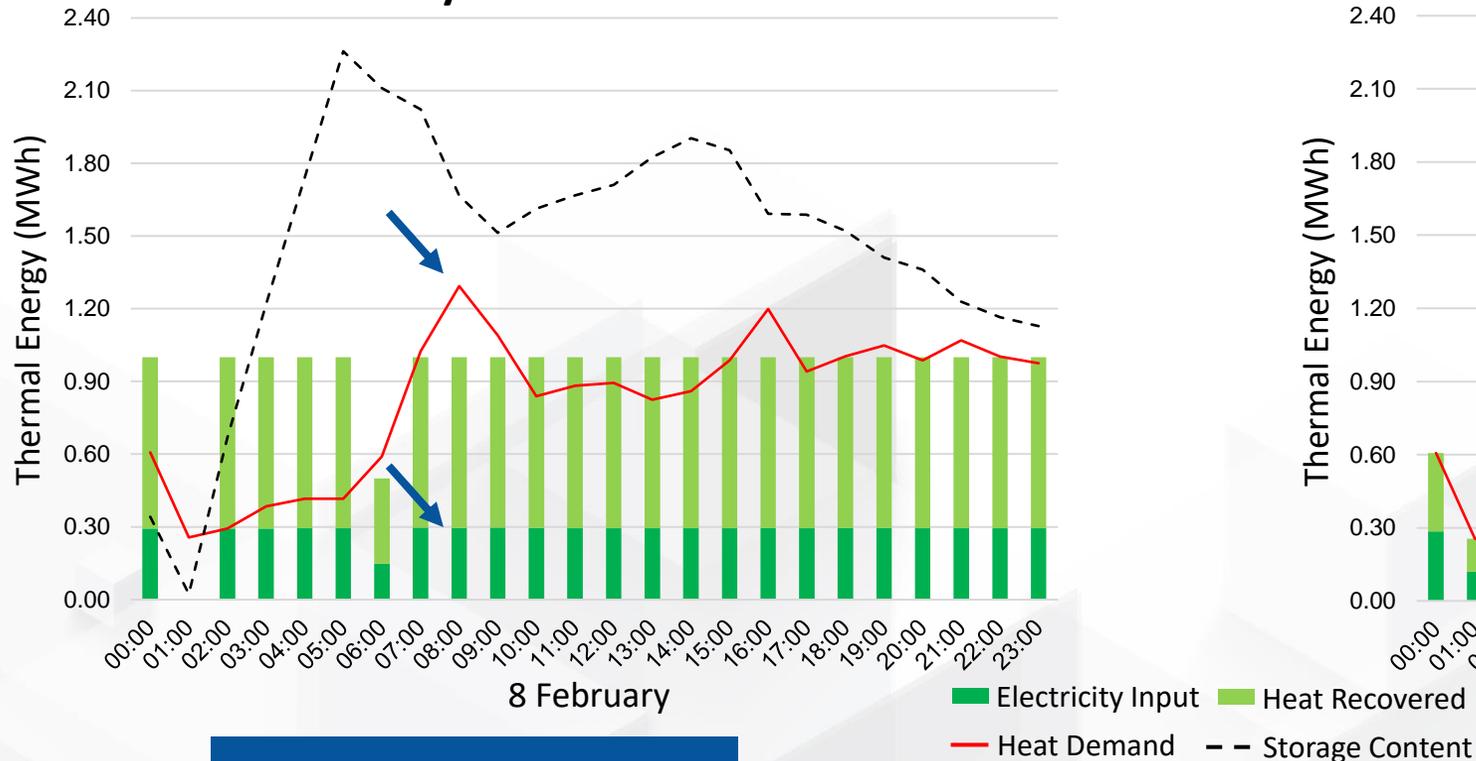
Average carbon savings of 80% vs. gas boilers

Up to 32% of carbon savings against air-source HPs

PEAK ELECTRICITY DEMANDS

Wider energy system benefits can also be achieved through lower peak demands

WHR System + 100 m³ of TES



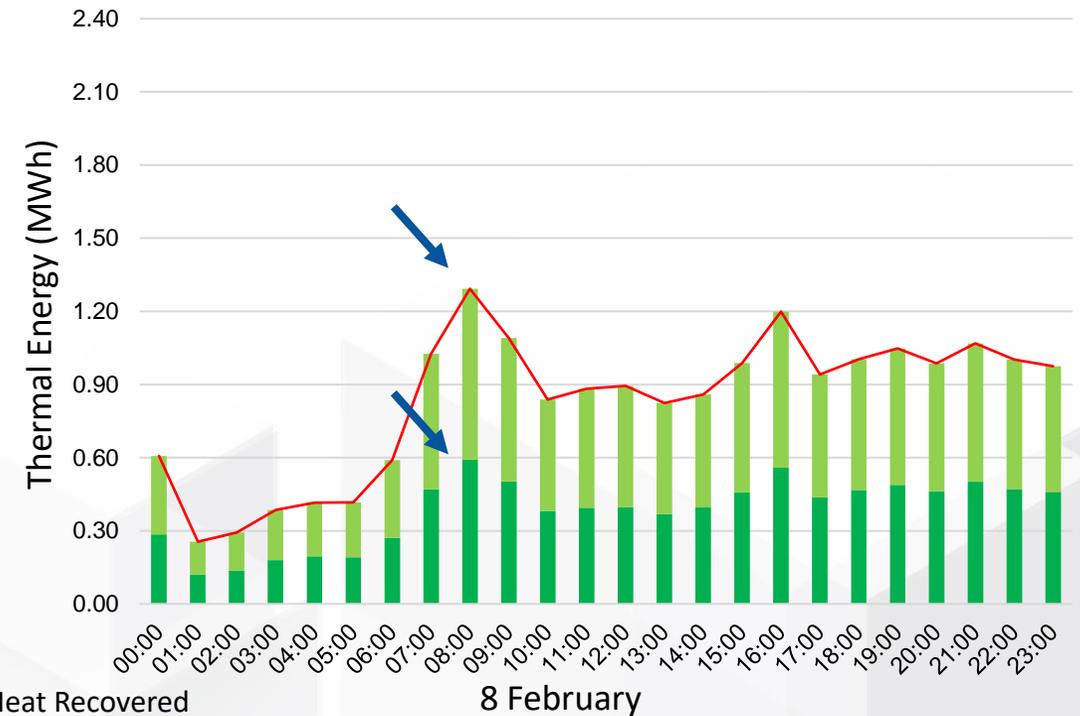
Heat demand profiles during day of peak hourly demand

Power demands:

ASHP Scenario: 593 kW hourly peak

WHR System + TES: 297 kW hourly peak

Combined ASHPs



Annual peak demand is reduced by 44% with WHR system