Bunhill II is the largest series three insulated pipe expansion in the UK, and follows industry best practice. It includes an innovative 1MW heat pump that extracts low-grade waste heat from the London Underground and reutilises it to provide heating and hot water to the very residents who commute along it every day – the first of its kind in Europe. The heat pump's two-stage high temperature refrigeration system (utilising a refrigerant that has no detrimental contribution to climate change or the ozone layer) works in tandem with a coil that can both draw heat from, or release cooling into the London Underground.

Co-located with the heat pump are two low NO_x 237 kW_e CHP gas engines that supply electricity to the heat pump (effectively a 'gas fired' heat pump) and export electricity to the grid. As a result the new energy centre provides demand response to the national grid by;

- Consuming electricity directly (heat pump only operation)
- Operating with no electrical load on the national grid (heat pump and CHPs both operating)
- Exporting electricity to the national grid (CHP only operation)

The current expansion of the network is being delivered in collaboration with London Underground, the Greater London Authority and Colloide Engineering. Bunhill II is being developed through Horizon 2020 and the EU FP7 framework. Through our work on the EU FP7 Celsius and Horizon 2020 Thermos projects we have partnered with 35 different organisations, across 11 countries

Based on the latest national grid carbon emission estimates, our network has a carbon intensity of 0.107kg/kWh

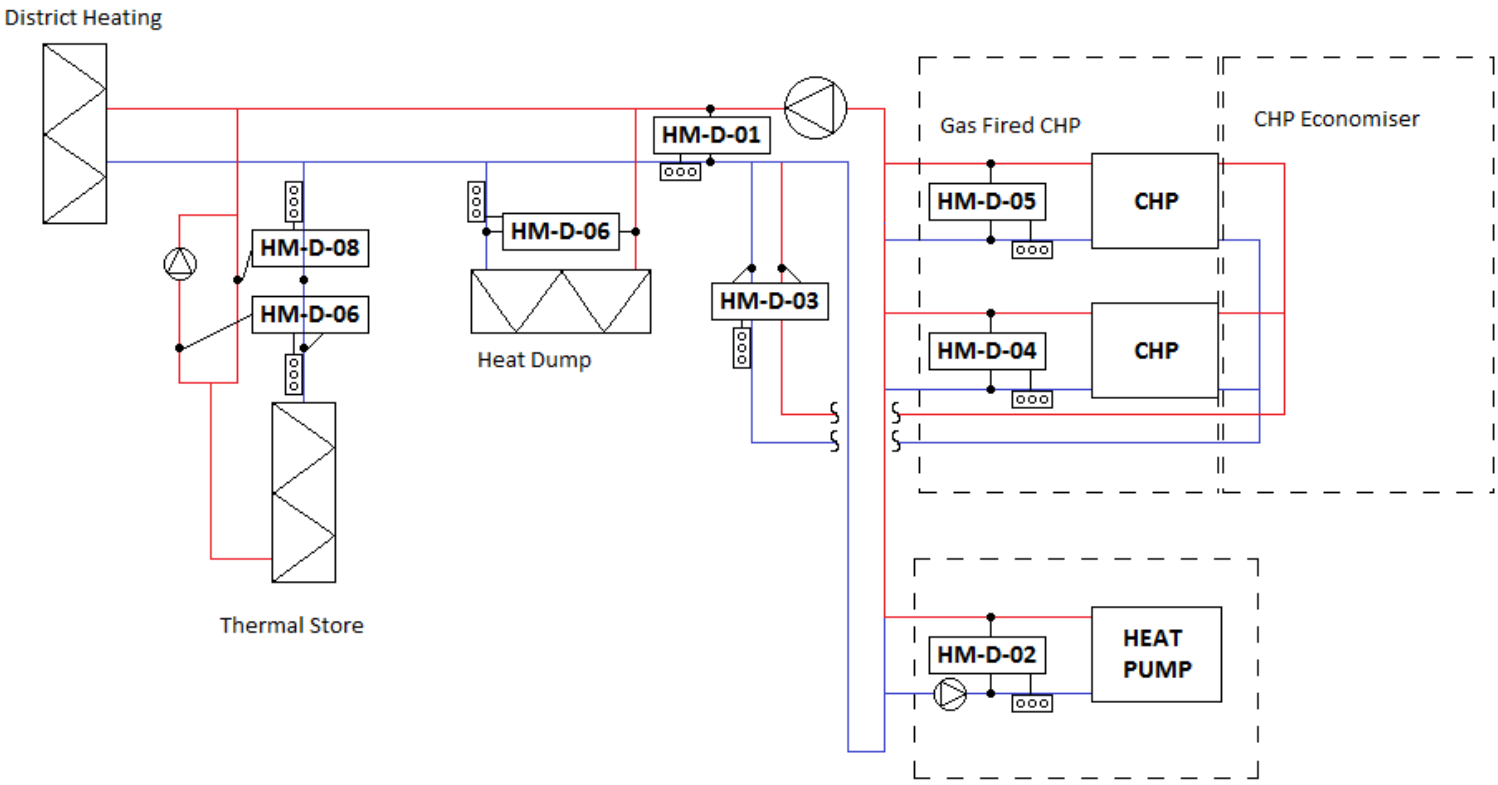
A testimony to the sustainability of our network is that it has been developed whilst affording residents a minimum 10% reduction in their energy bills, with no public or private subsidy for the operational costs. In a time of exceptional public financial constraints and budget deficits, it is through collaborating with partners such as the Homes and Community Agency, London Underground, The Department for Business Energy and Industrial Strategy, Innovate UK and the European Union that we have endeavoured to keep our networks publicly-owned to ensure it is the public who benefits.

The network provides a customer-focused approach to energy; it is integrated into the core functions of the council and provides a high level of customer service. This includes unrestricted contact hours, a four-hour response time for vulnerable customers (66% quicker than Heat Trust regulations) and an annual flat rate price to protect residents from volatility in global energy markets.

Ensuring that the network is future-proofed after every expansion provides an opportunity to scale the network and build on its 1,300 connections. It means we can achieve a connected heat transmission network, not only in Islington, but across London, with the potential to connect to networks outside of Islington, in Hackney, Camden and the City

The second stage of the network is being delivered as part of the EU-funded Celsius Project, which will deliver a blueprint of best practice to help cities develop replicable projects to evolve into energy smart cities. Working with the Greater London Authority and London Underground, the project will develop a detailed understanding of how networks can be integrated into the urban infrastructure, whilst utilising waste heat.

Configuration of Production Units



This diagram consists of:

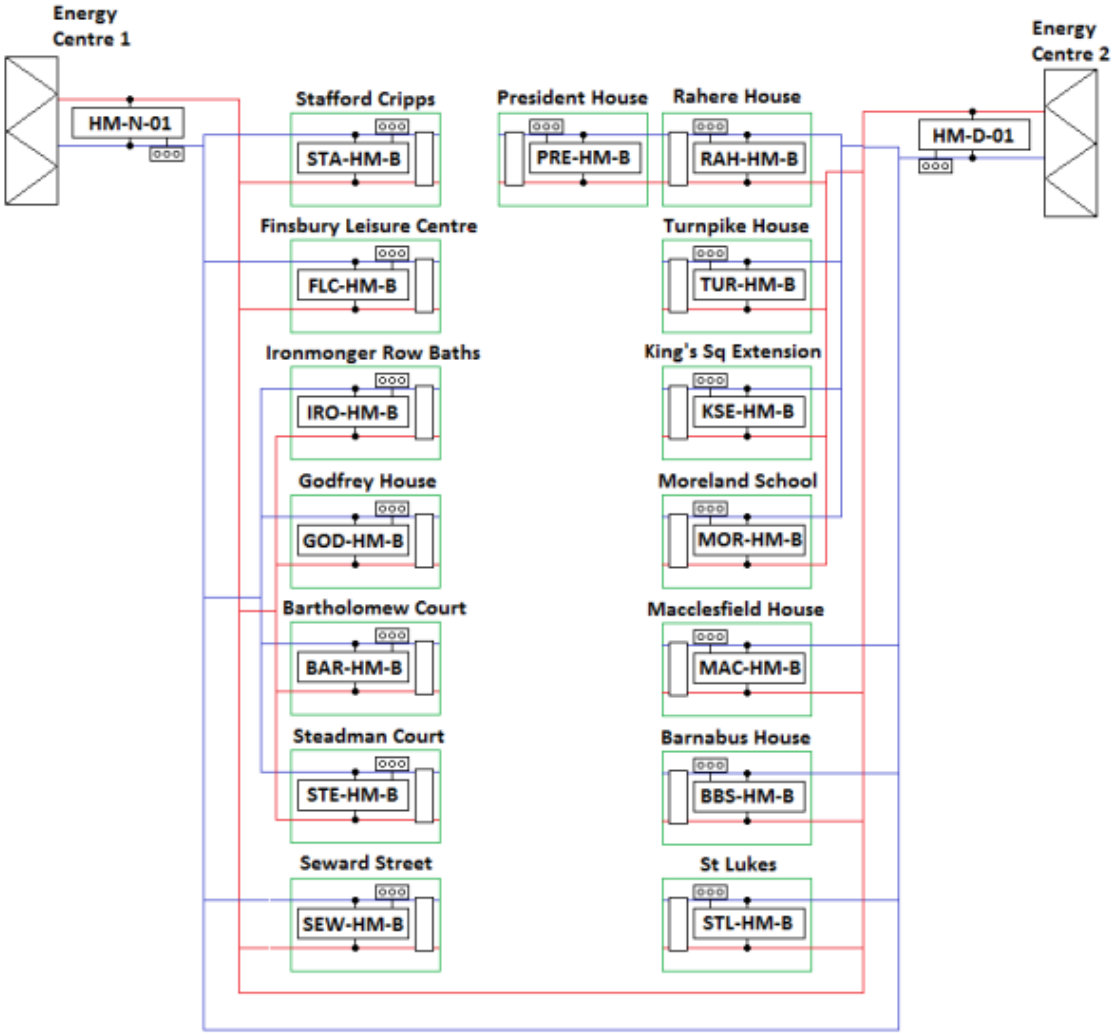
- 1MW heat pump that extracts low grade waste heat from the London Underground and reutilises it to provide heating and hot water
- Two low NO_x 237 kW_e CHP gas engines that supply electricity to the heat pump
- One 50m^3 Thermal Store used to meet peak demand
- A heat releasing facility able to release cooling into the London Underground.

Average age of production and distribution network

All the equipment used within the Bunhill II network is modern and was procured for the development of Bunhill II Heat and Power which launches in 2017. The distribution network consists of insulated series three piping and meets the industry's guidance on best practice.

Satellite boilers at the individual sites are used to meet peak demand when the energy centre in unable to. These boilers are diverse which can be evidenced through their installation dates ranging between the 1990's and 2012. They are used for the sole purpose of back up generation. Their new role in providing auxiliary heating will increase their lifespan, and save the council maintenance and upgrade costs in the future.

Configuration of Distribution Network



The network will connect to 450 existing social housing units, 150 new-build homes and a primary school in the Bunhill Ward, Islington area with the potential to supply a further 1,000 homes

The network has been future proofed for further expansion. This allows the network to grow organically, adapting to meet the regeneration and development of the Bunhill area, providing a long term, holistic approach to decentralised energy networks. Through this mechanism, Islington Borough Council are able to connect private developments to the network. Private developments are encouraged to connect through the Islington planning guidance (Development Management Policy 7.3), which requires major developments within 500 metres, and minor developments within 100 metres to connect if economically reasonable.