HEAT NETWORK EFFICIENCY SCHEME

Department for Energy Security & Net Zero

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Welcome

Please mute microphones if you're not speaking to limit disruption

Please also turn off webcams to improve video quality

Please ask questions using the Q&A functionality

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Agenda

Session	Speaker
Introduction to the Net Zero Hubs	John Hart – North East Net Zero Hub
HNES Overview	Louise Singleton - Gemserv
HNES Demonstrator Project – The Keel	Joseph Cooper – The Keel Liverpool
HNES Demonstrator Project – Mildmay	Jennifer McLean – Notting Hill Genesis
Support available for applicants	Samantha Shea – Gemserv
Q&A	Samantha Shea – Gemserv

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Net Zero Hubs – HNES Webinar

July 2023

north east & yorkshire
NET ZERO HUB

Local Net Zero Hubs

- Five Local Net Zero Hubs across England – North East & Yorkshire, North West, Midlands, Greater South East and South West
- Funded and directed as part of the Local Net Zero Programme within DESNZ
- Aim to accelerate & realise local energy/ net zero ambitions
- Building capacity - including funding of local capacity support
- A forum to aid understanding local energy/ net zero activity

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NET ZERO HUB

NEY Net Zero Hub Geography and Partners

North East Local Enterprise Partnership

HEY Hull and East Yorkshire Local Enterprise Partnership

TEES VALLEY COMBINED AUTHORITY
TEES VALLEY MAYOR

West Yorkshire Combined Authority

York & North Yorkshire LOCAL ENTERPRISE PARTNERSHIP

SOUTH YORKSHIRE SYMCA MAYORAL COMBINED AUTHORITY

north east & yorkshire NET ZERO HUB

Net Zero Hub Objectives

1. Attract commercial investment into projects and help to develop investment models which accelerate progress to net zero.
2. Increase the number, quality, and scale of local Net Zero projects being delivered across the region
3. Develop and support Net Zero elements to wider programmes and initiatives delivered across England
4. Support a national knowledge transfer programme to improve information sharing, training, and evaluation
5. Raise local awareness of opportunities for and benefits of local Net Zero investment

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NET ZERO HUB

north east & yorkshire
NET ZERO HUB

Introduction to HNES

Louise Singleton

HNES Programme Manager

Department for Energy Security & Net Zero

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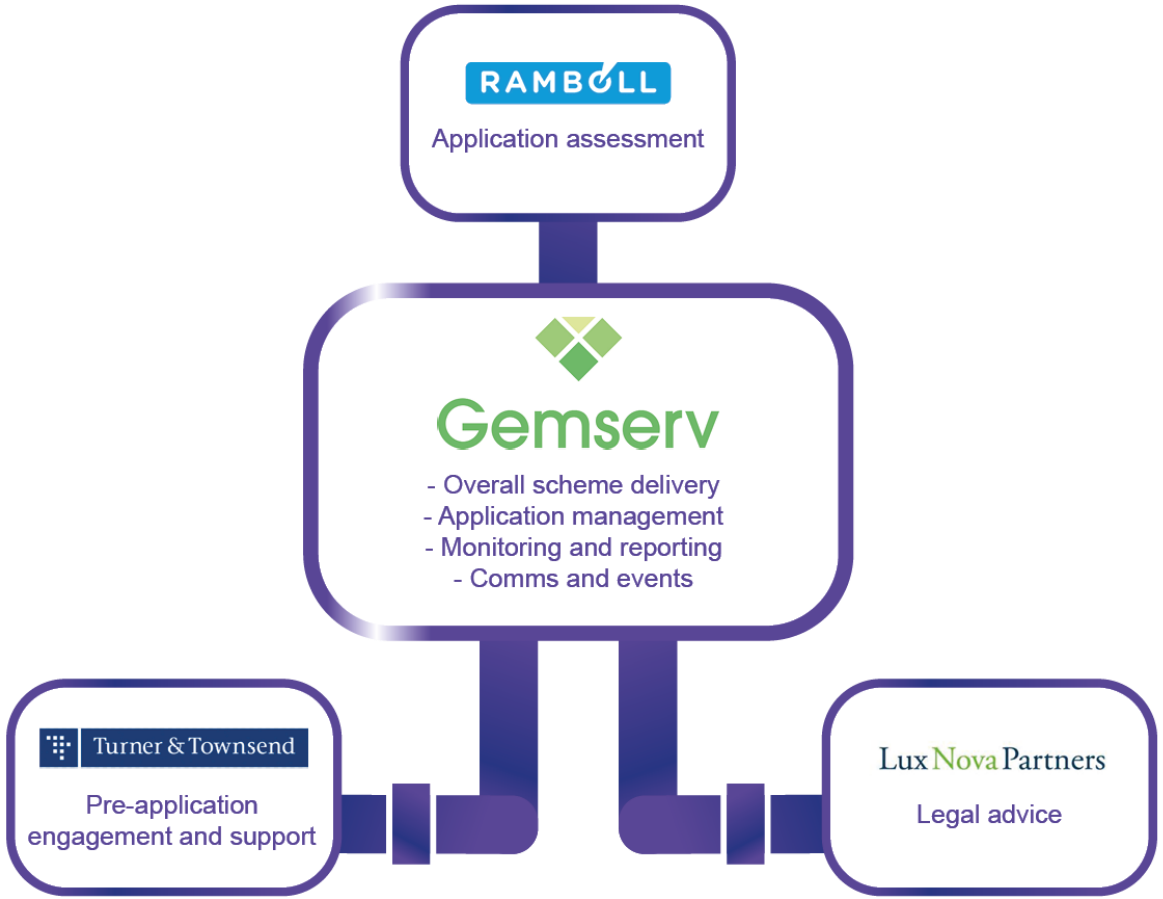
HNES Delivery Partner



- Gemserv and Ramboll have already successfully delivered the HNES Demonstrator together, supporting 110 projects to claim £5M+ in grant funding
- Turner & Townsend and Lux Nova have joined the Delivery Partner team for the Main scheme

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Aims and Objectives of HNES

1. Reduce carbon emissions by making heat networks more efficient

2. Reduce customer detriment to improve consumer confidence

3. Help prepare the heat network market for sector regulation and technical standards

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How much funding is available?

Revenue Grants	Capital Grants
Full funding available for procurement or mobilisation of external third-party support to carry out Optimisation Studies. These studies will assess heat network projects to identify causes of sub-optimal performance and recommend costed intervention or improvement measures.	Part funding **(up to but not including 50%)** available for the delivery (installation) of eligible intervention / improvement measures.
Up to £2m across FY23/24 and FY24/25	Up to £30m across FY23/24 and FY24/25

Projects can apply for funding across both financial years, but must spend all funding within each allocated financial year.

We still have funding available this year

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Who can apply?

Operators of existing district heating networks or communal heating systems

Public sector, private sector or third sector organisations

Legal entities, with authority to sign-off investment decisions for the heat network they are responsible for

Heat networks situated in England or Wales

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Funding round closing dates (changes)

Round	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	May-24
Round 4			★	Friday 22nd September 2023							
Round 5					★	Friday 10th November 2023					
Round 6								★	Friday 2nd February 2024		
Round 7							Friday 22nd March 2024	★			
Round 8									Friday 10th May 2024	★	

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HNES Eligibility Criteria

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Capital grants

Eligible costs

- Category 1: Energy centre / plant room
- Category 2: Primary / secondary distribution network
- Category 3: Tertiary network
- Category 4: Metering

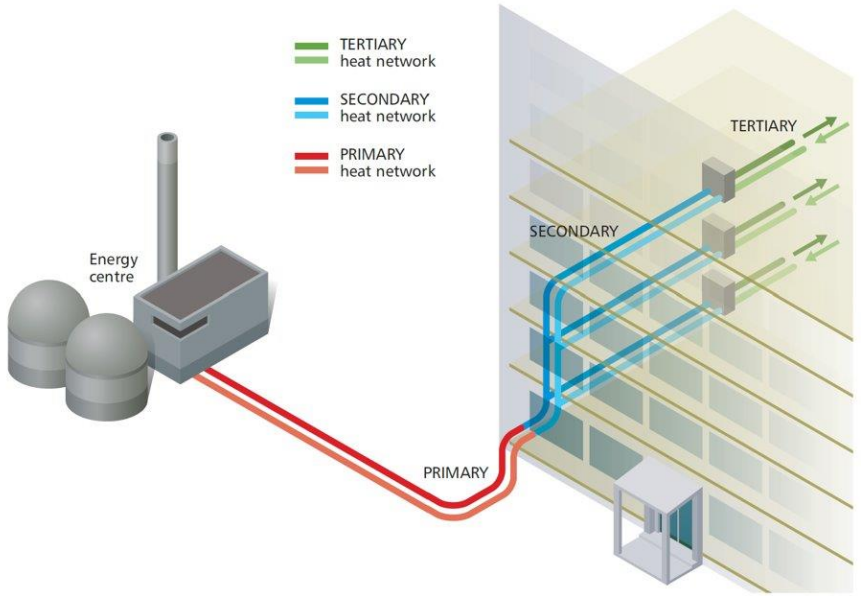

Image: Heat networks CP1: 2020

Ineligible costs

- Any capital costs already **incurred prior** to an HNES award having been made
- Any capital costs **unrelated** to heat network infrastructure, e.g., improvements to building fabric
- Any costs relating to **engagement activities** (e.g., stakeholder management)
- Energy centre / plant room – costs for **replacement** of the primary heat generation source
- Tertiary systems – costs for **buying or replacing heat emitters** (e.g., radiators) within buildings or dwellings
- Metering – costs for metering that is required under the **HNMBR**

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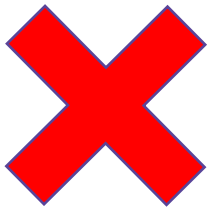
Revenue grants

Eligible costs

- Optimisation Studies delivered according to the outline specification provided in Annex A of the Guidance for Applicants document



Ineligible costs

- Work **already commissioned** or incurred before the application
- Internal applicant staffing or secondment staff or charged agencies within applicant organisations, including for **project management** of the third party support / Optimisation Studies
- **Construction, operation and maintenance** of a heat network

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Monitoring and Reporting requirements

- A condition of grant funding is regularly submitting Monitoring and Reporting (M&R) returns
- M&R returns are essential to track whether grant funding will be spent and also to ensure the Aims of HNES are being met

Revenue M&R Returns

• Required from grant award until sign off of Optimisation Study
• Monthly returns covering:
  • Project progress updates
  • Risks and issues
  • Budget drawdown
• Final return to include:
  • Optimisation Study Outputs Annex

Capital M&R Returns

• Required from grant award until 24 months after commissioning date
• Monthly returns covering:
  • Project progress updates
  • Risks and issues
  • Budget drawdown
• Quarterly returns covering:
  • Progress against benefits and KPIs for each of the previous 3 months

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HNES – The Keel, Liverpool.

An overview of The Keel’s application and subsequent awarding from the first round of optimization study funding, as well as plans moving forward in line with the funding application for capital works.


THE
KEEL
THE
KEEL

Background

The Keel is a 240 apartment residential block in Liverpool.

The site is a striking development within the city, situated on the River Mersey, with large private grounds and its own internal dock.

A repurposed site, it was originally used as the HMRC customs and excise building in the city.

Built in 1993, the site was converted to a BTR scheme in 2015. At the time this was one of the first BTR developments in the UK and was a groundbreaking scheme.

On conversion, the site was retrofitted with a district heat network, with a circulation of heating and hot water available within the apartments instantaneously on demand, via a heat interface unit (HIU) within each dwelling.

Background (cont.)

Allsop Lettings and Management took mgmt. of the site in March 2020. It became apparent that the HIUs in situ were unreliable and in poor condition, making them extremely inefficient. Even with an increased maintenance schedule, which has been a large annual expense, the components proved to be prone to breakdowns and poor performance. From April 20 – October 21 there were a monthly average of 14 HIU faults per month, with the worst single month seeing 85 HIU related issues being raised by residents.

Along with this, the existing plant room and pipe network had limited controls integrated and the 8 gas fed boilers within the plant room ran on ‘full tilt’ to supply the system.

The DHN efficiency historically hasn’t been favorable, and the heat losses around the system have been identified in the past as a concern, as well as poor supply of heat within apartments.

With the residents at the forefront of our minds, we looked into the HNES scheme on recommendation and identified that this could potentially be extremely helpful to improve efficiencies.


THE
KEEL
QUEENS DOCK
LIVERPOOL


LET'S TALK


LE
NOIR

HNES round 1 application

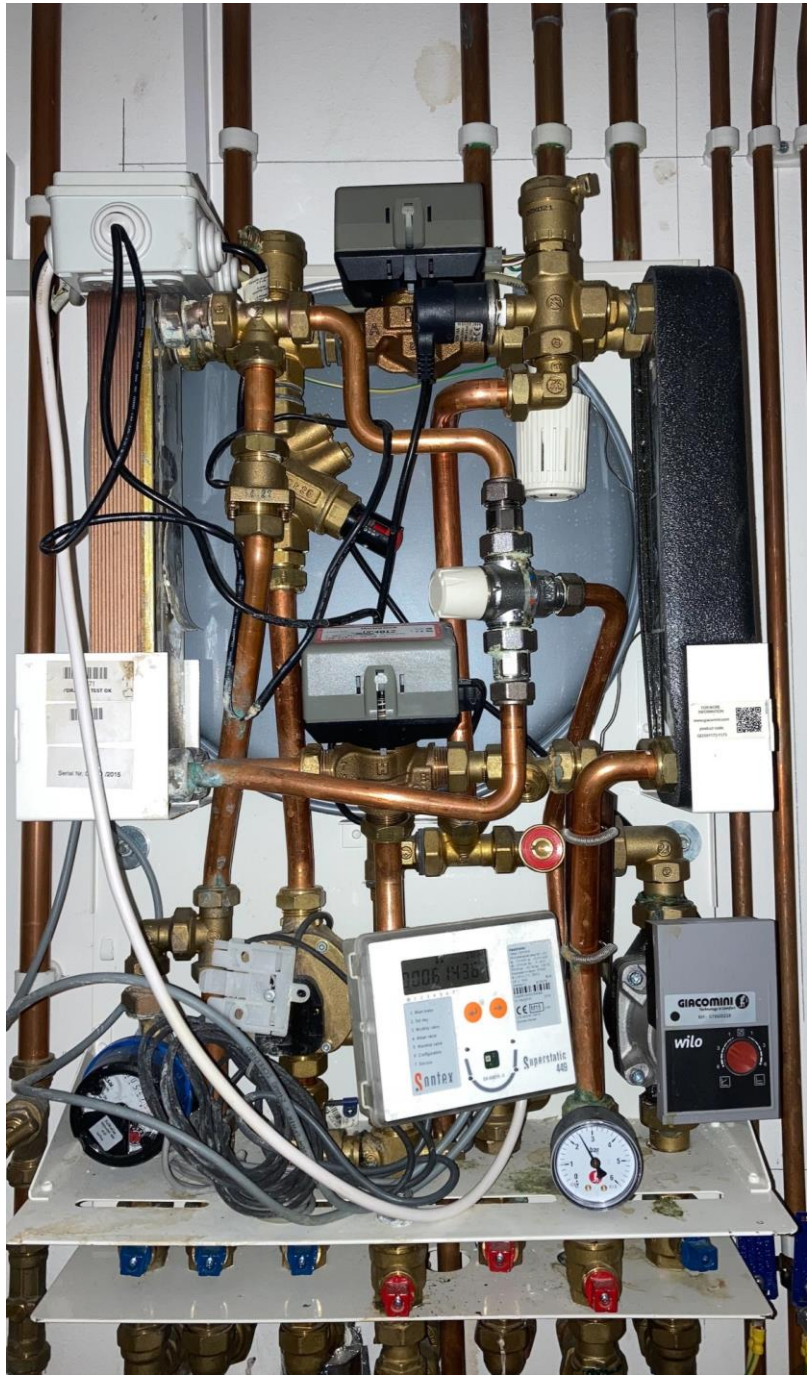
- We successfully applied for round 1 funding via the HNES scheme to carry out an optimization study.
- Aims of the study were to improve the heat network in terms of:
- Efficiency and reducing energy costs.
- Reliability.
- Customer satisfaction.
- Environmental impacts.
- Alongside this study, it became apparent the owner of the site would be installing a water sourced heat pump (WSHP) that would make use of our location straddling the canal and our private dock. This would be considered during the study as improved efficiencies could be achieved.
- The funding for the study was granted and therefore we instructed this.
- The study was carried out through site visits, installation of monitoring equipment, and using pre-recorded data held.

Study findings

- The findings within the study showed:
- Potential to reduce gas use, in addition that significant electricity savings could be achieved.
- Existing HIUs had several poorly performing / low efficiency / poor reliability components, therefore new units could be justified (especially with potential HNES capital funding).
- New HIUs would achieve even larger savings in line with a heat pump, as they will allow a lower DH flow temperature and the return temp will in turn be significantly lower.
- New HIUs would reduce heating costs for residents, improving affordability and satisfaction levels.
- Significant CO2 savings would meet corporate objectives and work towards decarbonization of the site. Positive for conscious residents as well as the landlord of the site.
- That data collection on heat and gas meters installed was helpful and identified issues within the network for us to reactively respond to.
- New HIUs, installation of a WSHP, and a large thermal store would yield projected savings of £80,000 per year on utilities costs. This was based on gas costs of 6.67p pKWh at the time. This tariff has recently increased to 13p so savings will now be considerably larger.

How we modeled the report

- Connected wired heat meter data collection to 4 new data collectors for input to Meterpoint.
- Installed a temporary heat meter on one of the pairs for distribution pipework.
- Retrieved half hourly data collection from the gas meter that supplies the boiler.
- Survey HIUs in 4 apartments.
- Estimate system efficiency.
- Identify issues reducing system efficiency.
- Model heat pump economics and CO2 saving based on current set up and improved set up.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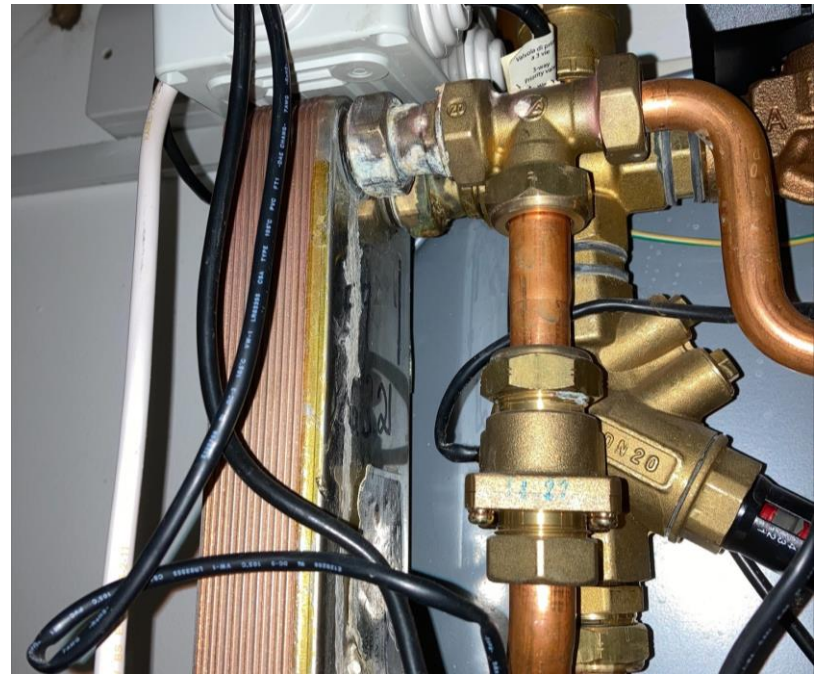
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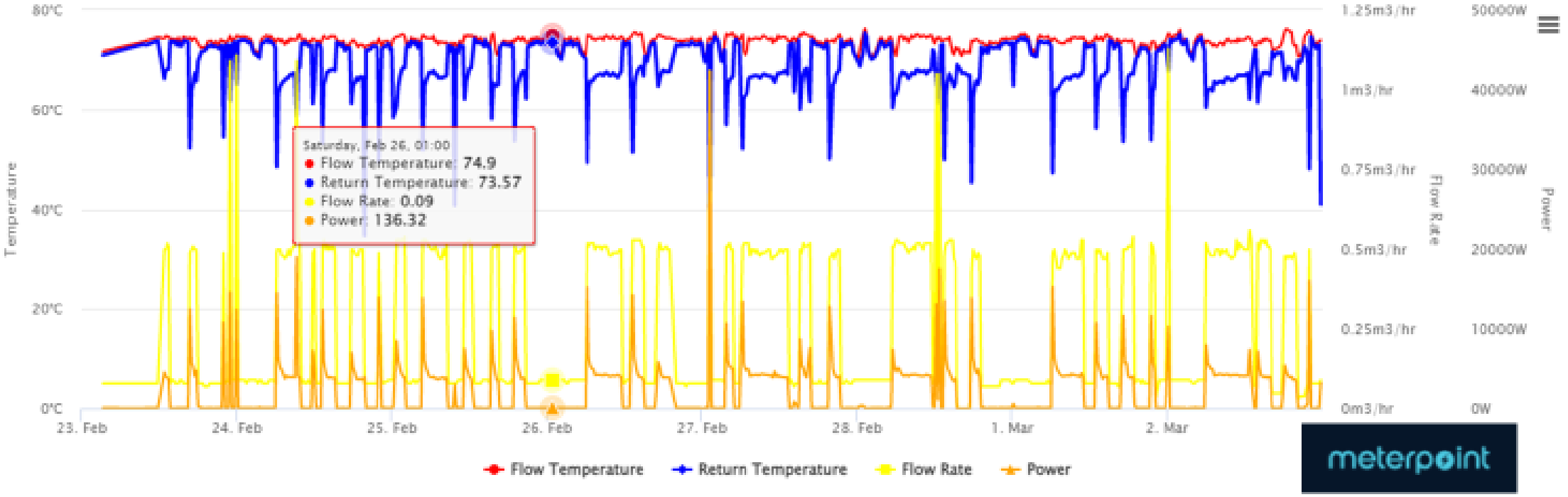
Optimization recommendations

- The report subsequently identified 3 immediate adjustments that could be made to increase efficiencies marginally.
- These were to:
- Close bypasses at the top of HIUs to reduce flow rates and lower return temperatures.
- Reduce pump differential pressure setpoints. Both points above would save around £30 per apartment annually (£7,200 per annum).
- Isolate boilers when they are not providing heat. This would require a motorized isolation valve installed on each boiler and a new boiler shunt pump / or inverter fitted to current pump.

Recommendations cont.

- The prominent recommendation was to replace all existing HIUs due to their poor condition, reliability and efficiency when providing heat within the apartments.
- The economic case to carry out this work was significantly strengthened by the installation of a WSHP and potentially achieving capital funding through HNES.
- New HIUs would reduce / remove all heating and hot water supply issues the residents have experienced previously.
- Installation of new HIUs could improve metering within the site concurrently and improve data collection.
- Changing from an indirect, to direct DHN system would improve efficiencies and reduce O&M costs year on year.

Heat network efficiency – Typical HIU



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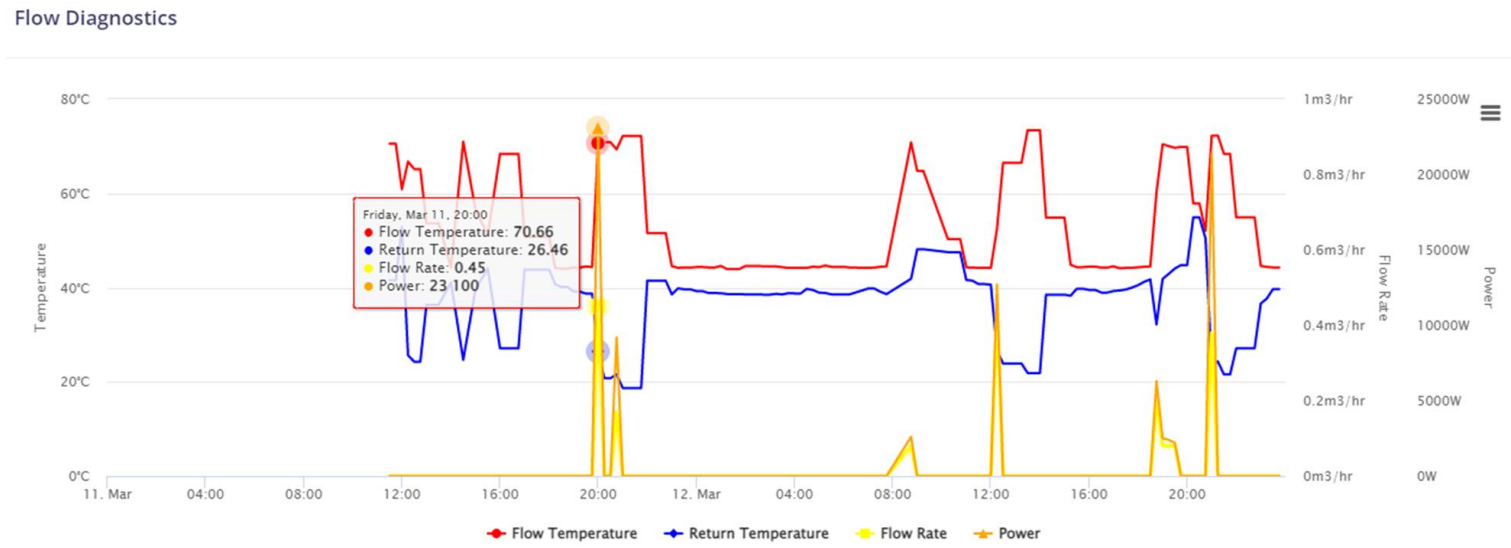
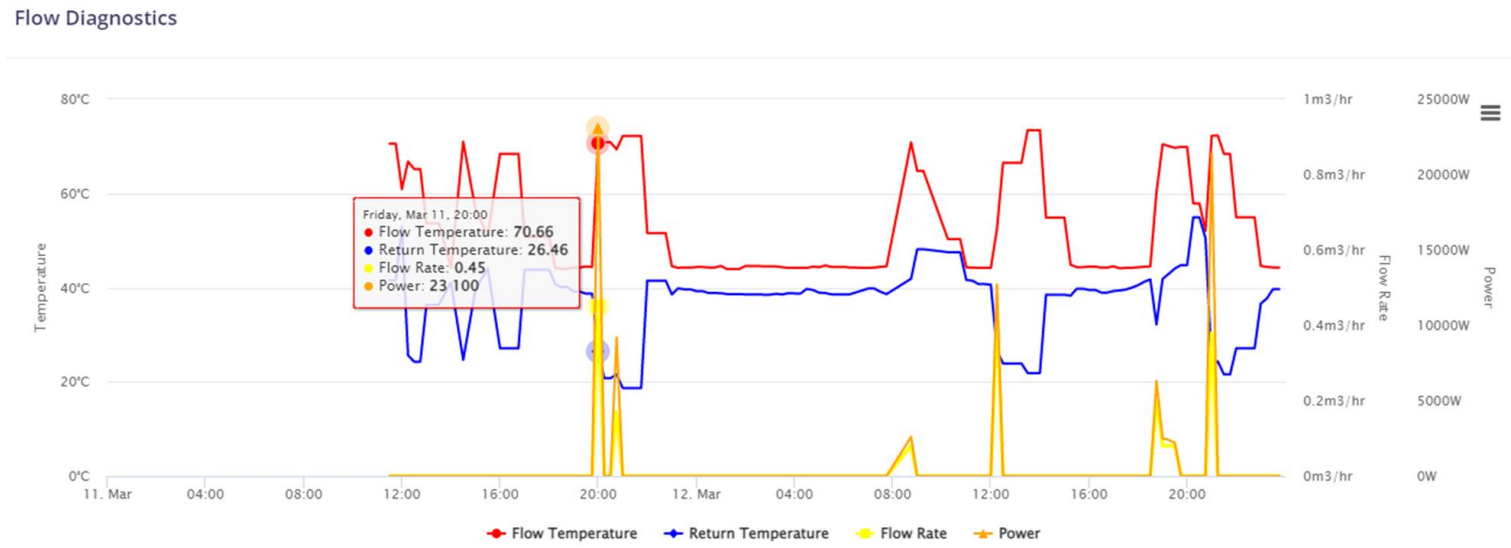
carbon alternatives

‘Good’ HIU hot water and standby



‘Good’ HIU space heating



Benefits of changing to a direct connection with new HIUs

- Lower HIU cost.
- More efficient system operation, so higher plant efficiency and lower heat loss.
- Longer life for heating system components in apartments (radiators and TRVs) .
- Reduced maintenance for HIU and apartment heating system, no more leaks etc.
- Much simpler HIU required to enable weather compensation.
- DH flow temperature down to 55°C
- Low DH return temperature
- Lower pipe temperatures during standby
- Reliable 35kW of DHW @50°C
- Fully insulated so standing losses of less than 50 Watts
- New heat meter installed for just the cost of the meter
- Use BESA HIU Test as a basis to select on the basis of independently verified performance

Cost savings projected

Scenario	BAU	1	2	3	4	5
Description	Gas boilers current HIUs	WSHP current HIUs	WSHP new indirect HIU no Thermal Store	WSHP new indirect HIUs and 20m³ thermal store	WSHP new HIUs and 70m³ thermal store	WSHP new HIUs and 70m³ thermal store
Total electricity and gas cost	233,917	260,777	218,155	191,361	186,877	179,933
Heating cost per flat £/yr	975	1,087	909	797	779	750
Saving from new HIUs and thermal store per flat £/yr			178	289	308	337
Heat sales cost that recovers energy costs p/kWh	11.47	12.78	10.69	9.38	9.16	8.82
Energy cost saving compared to heat pump with current HIU £/yr			42,622	69,416	73,900	80,844
Capital cost of HIUs and thermal store £k			388,800	408,800	478,800	432,000
Payback			9.1	5.9	6.5	5.3
Payback with 50% capital funding			4.6	2.9	3.2	2.7

Table 3 Energy costs and economics of HIU replacement for the modelled scenarios – exclusive of O+M costs.

- Gas cost 6.67p/kWh
- Electricity day 25p/kWh
- Electricity night 20.5p/kWh

Outcomes and next steps

- Immediate recommendations were followed up and a number of bypasses closed.
- A proposal and full findings were sent to the landlord for plant room alterations and HIU replacements.
- These were accepted based on round 2 capital funding being applied for and hopefully approved. The commencement is dependent on this being achieved.
- A scope of works were created for the plant room alterations to implement controls on boilers, pumps and WSHP. Efficiencies will be realized with weather compensated controls etc.
- Costings and a scope of works were implemented for a site wide HIU replacement.
- Cost savings will need to be remodeled based on new gas / electricity prices. These will increase.
- Since, we have applied for capital funding from HNES and we are hopeful we can achieve this.
- Data collection from the initial study has allowed us to better understand failings in the system and already achieve improved efficiencies within the system and each apartment.
- This data has been invaluable to us as a managing agent and landlord for knowledge when planning future projects and site management contracts.

HNES Funded Projects at Notting Hill Genesis

Jennifer Mclean – Major Works
Project Manager

18 July 2023

Heat Network Efficiency Scheme– Improvements Funded

Four HNES Schemes	Dwellings – HIU's	Plant and Network Improvements
Thomas Road, Tower Hamlets, E14	Servicing and re-commissioning of 182 HIU's.	Isolate and decommission CHP and biomass boiler, Network pump replumbing, Top of riser pipework re-configuration, Insulation to new pipework.
Mildmay Estate, Hackney, E2	61 HIU retrofits Servicing of 78 HIU's.	Pipework modifications at thermal store, Network pump modifications, Decommissioning of 5 substations.
Grange Walk, Southwark, SE1	Replacement of 18 worst performing HIU's.	Install buffer vessel, shunt pumps and 3-port valves, Split low loss header, Remote BMS monitoring device.
Windmill Park, Merton, CR4	HIU replacement programme at 110 properties.	Riser retrofit, Lateral pipework alterations, Installation of Guru Install Vacuum Degasser and water quality monitoring devices

Mildmay Estate, E2

Overview of the site:

- Shoreditch, East London
- Built in 2014
- 139 units
- Mixed tenure (leasehold, private rented and general needs)
- District Network with 5 connected substations within blocks
- 3 Commercial Units: Mildmay Mission Hospital, Mildmay Tabernacle Church, and Café
- Fairheat Optimisation Report 2017/18

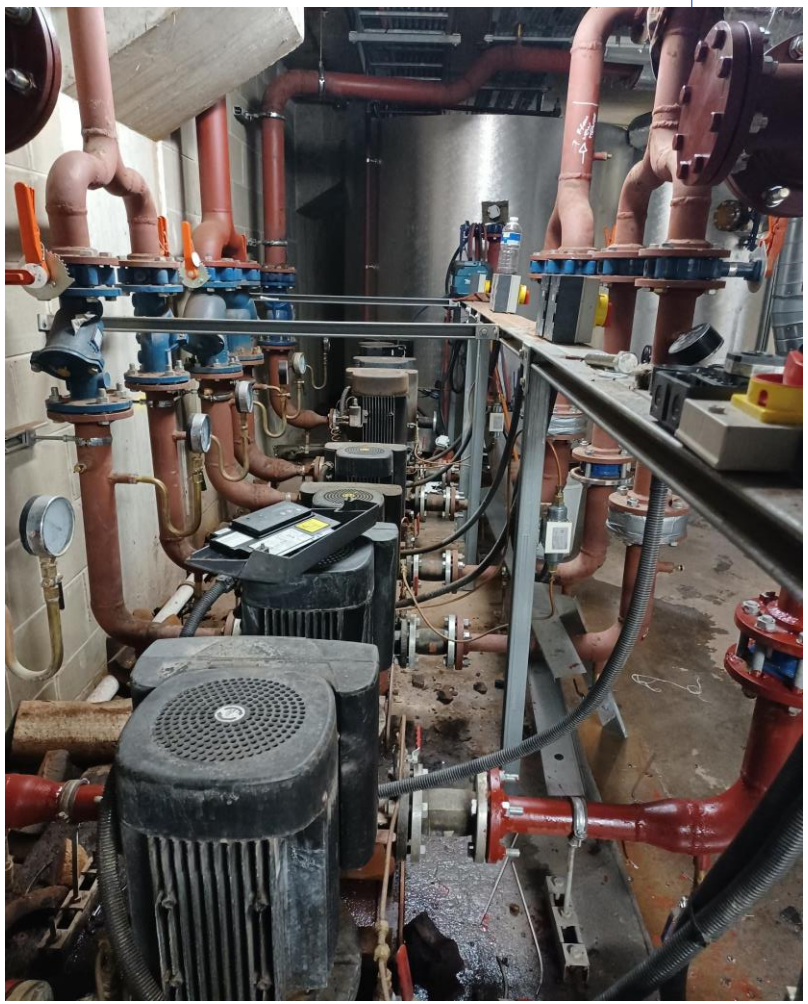
Mildmay Estate, E2

Mildmay – Heat and Hot Water Issues

Network Issues Pre-HNES Works

- Regular unplanned outages (bellows bursting, pipework splitting, and local pressurisation units failing).
- The levels of heat efficiency were low – around 21% pre works.
- The buildings suffered from overheating in the communal areas due to bypassing risers.
- HIUs in block E specifically were poorly performing.
- Inadequate pipework insulation.
- Poor water quality.
- High cost of heat.
- Dissatisfied residents and commercial customers.

Before HNES Funding…



Too many heat pumps leading to inefficiencies

Burst bellows causing heat network outages

Before HNES Funding…

Unnecessary substation, and oversized pipework/low loss header

HNES Match Funded Works

HNES Work Package

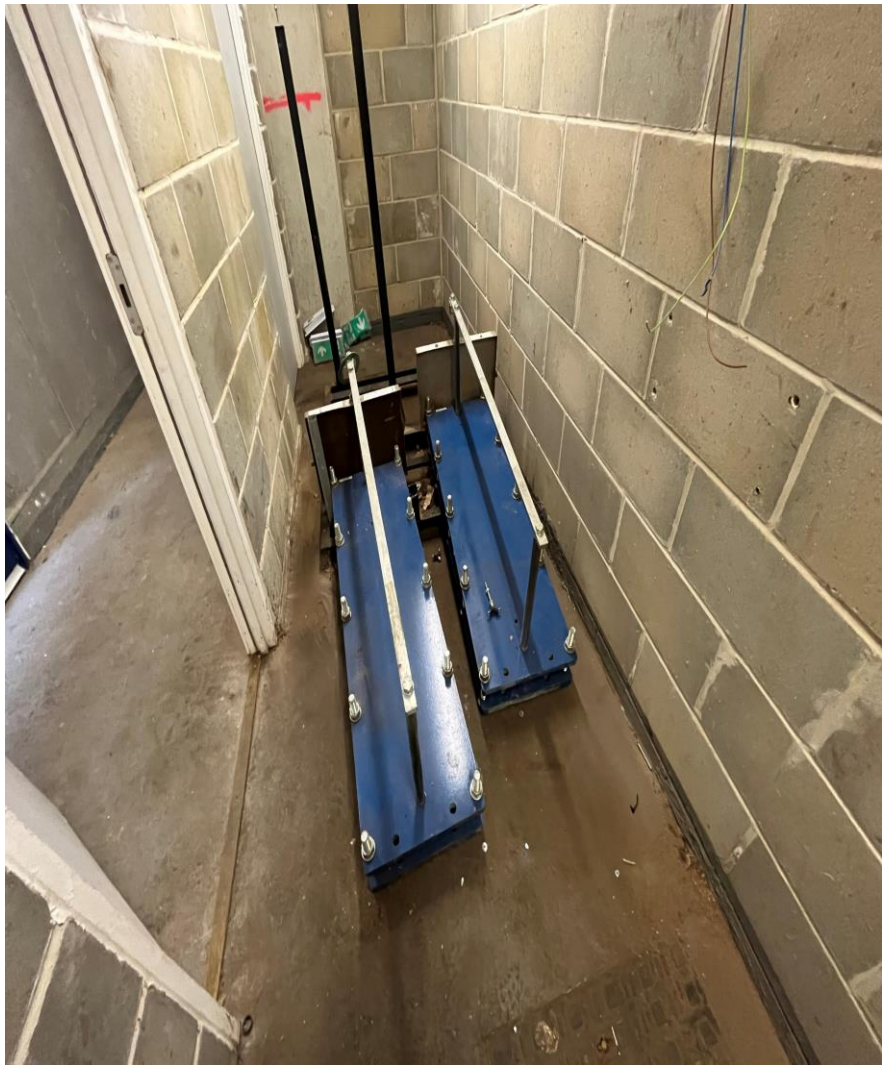
- Replacement of HIUs in Block E (61 units)
- Recommissioning of all other HIUs
- Installation of Guru in all homes and blocks to monitor network performance.
- Reduction of the number of heat pumps and pipe sizes.
- Decommissioning of 5 substations connected to blocks
- Removal of top of riser bypasses.
- Enhanced insulation to pipework.
- Fitting of an X pot side stream filter and Hevasure water monitoring unit.

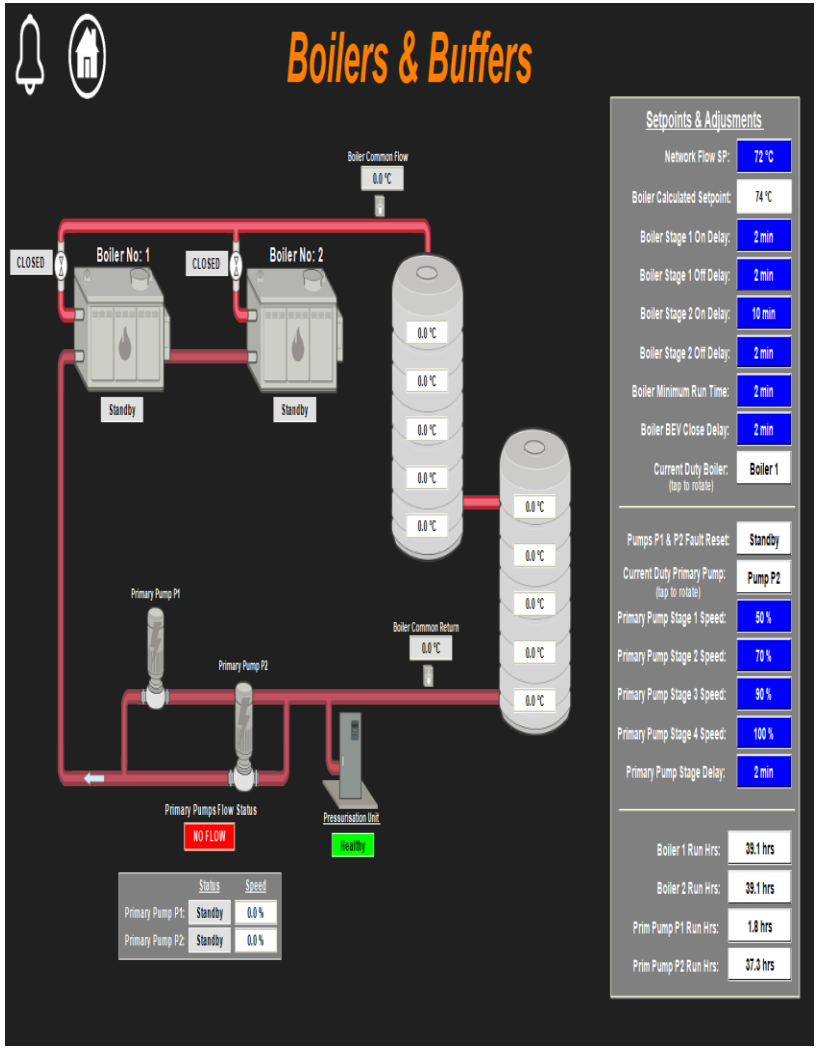
After HNES Funding…

High Performing/Non bypassing Heat Interface Units

Remote water quality device

After HNES Funding…





Former substation with all pipework removed and upgrade BMS system

Cost of HNES Improvement Works

- **Mildmay Estate**

Estimated cost of works	HNES Funding awarded	Final Cost of Works	Capital Funding by NHG
£620,909	£309,833	£716,037	£406,204

Impact of HNES Works

Early Performance Indicators

- HNES plant works were fully completed in Feb 23.
- Gas consumption for the period October 22 to April 23 compared with the same period previous year has decreased by 422,010 kwh's (32%)
- This equates to a cost saving of £27,852 (based on 6.6 pence per kWh) and a carbon saving of 119.1 tons.
- Network efficiency of 77% for May 23.
- Minor unplanned plant outages resolved within 4 hours due to remote notifications and monitoring of pinpoint data.
- Operating Flow temperature of 77 °C reduced to approximately 65 °C
- Bulk meter return temperature of 68 °C reduced to approximately 40 °C
- Hevasure data indicates improved water quality.

HNES Project – Lessons Learnt

- **Resident engagement** is key: access to occupied properties is one of the biggest blockers to project progress
- **Prefabrication**: significantly reduces install time, length of outages, and health and safety risk
- **Plantroom pipework**: fabricate offsite for easy assembly on-site, reducing hot works and time needed for plant room outages.
- **HIUs**: heat meter and AMR equipment can be pre-wired, and pipework retrofit kits used to reduce installation time and disruption within dwellings.
- **Piloting:** helps iron out teething issues and obtain accurate costs.

Pre-application Support

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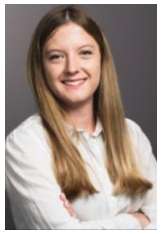
Where to find help and support

If you have a general enquiry about HNES, want to be added to our mailing list, or would like an application form, please email hnes@gemserv.com

To discuss your project in more detail with one of our Relationship Managers, please email hnes.support@gemserv.com


Louise Singleton


Samantha Shea


Sam Hales


Rosie Knight


Neil Smillie


Angela Rose


Billy Cliffen


Chris Forster


Elin Pain

DESNZ has published eight heat network optimisation guidance videos, which can be accessed on the gov.uk website

Further detail on the scheme can be found in our HNES Guidance for Applicants document

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Pre-application Support

Prospective applicants can access front end support from our Pre-Application Support team to discuss the application process, or to begin their application for submission.

The Pre-Application support team can provide:

- Initial contact and issue of application form
- 1-2-1s with dedicated Relationship Managers to discuss application
- First pass review of application with feedback
- Responding to applicant enquiries prior to submission
- Signposting to applicants that they are ready to submit

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