Homerton Healthcare NHS Foundation Trust

Heat Decarbonisation Plan

Ref: R/2622.01
Date: December 2023
Produced by: Marco Romani
Reviewed by: Darren Jones

TABLE OF CONTENTS

1 EXECUTIVE SUMMARY

1.1 Purpose

Climate change threatens the foundations of good health, with direct and immediate consequences for patients, the public and the NHS. In 2019, the UK became the first major economy to commit to net zero emissions by 2050. In 2020, the NHS became the first national health system in the world to commit to net zero emissions, launching its national programme for a Greener NHS.

Homerton Healthcare NHS Foundation Trust provides hospital and community health services for Hackney, the City and surrounding communities. The Trust is already on a journey of sustainable development, with an ever-growing focus on the climate emergency and is continuously evaluating optimal solutions to reduce its impact on the environment. In 2022, the Board approved the "Green Plan – Strategy towards Net Zero for Homerton Healthcare NHS Foundation Trust 2022-25", which sets overarching objectives in relation to governance, energy and carbon management, designing the built environment and the site, procurement and food, water and waste, low carbon travel, transport and access, workforce, role of partnerships and networks. In 2023, The Trust applied to the Phase 4 Public Sector Low Carbon Skills Fund (LCSF) to access the required technical expertise to support the delivery of its first Heat Decarbonisation Plan (HDP).

Most of the Trust's heat is generated using carbon intensive technologies such as boilers and a CHP. Decarbonisation of the Trust's heat will lead to a 57% reduction of the Trust's NHS Carbon Footprint. Combined with the natural decarbonisation of the electricity grid, the Trust can decarbonise 92% of its NHS Carbon Footprint by focusing on heat decarbonisation alone.

1.2 Summary

Further to being selected as a successful applicant to Phase 4 of the LCSF, the Trust engaged LCE to develop a bespoke Heat Decarbonisation Plan for the organisation.

There are four main components in any organisation's decarbonisation journey: energy use reduction, energy efficiency, generation of on-site electricity and low carbon heat technology installation. This document outlines the recommended phased approach by which the Trust can implement these steps, the cost of each opportunity and the impact each opportunity will have on operational cost and carbon emissions.

Following detailed building assessments, various optimisation opportunities were evaluated that would minimise electricity and heat consumption. The primary aim of these opportunities is to:

- drive down operational costs,
- minimise size of the low carbon heat technologies, which will drive down total project costs,
- minimise cost of enabling works required to implement low carbon heating.

The current electricity infrastructure at Homerton Healthcare NHS Foundation Trust is unsuitable for immediate transition to low carbon heat technologies. Enabling works are required to ensure that the Trust delivers the facility required to operate any new assets. These enabling works can swing the total cost of each project significantly, therefore controlling the parameters that can minimise the amount of required enabling works facilitates the decarbonisation journey and reduces the risk associated with each project.

During the first two phases of transition, work will begin on the implementation of a series of energy efficiency measures that can immediately improve the building performance.

A key element to support efficient operation is a modern Building Management System (BMS). The current BMS serving the main site is outdated and, in some parts, obsolete; its replacement with an updated system, possibly including connectivity to the community sites, would provide increased intelligence and control, which would drive significant operational cost and carbon savings. Furthermore, it is important that staff and visitors are encouraged to reduce or eliminate unnecessary wasteful energy consumption. Studies have shown that by providing appropriate training and raising staff awareness on the issue of energy efficiency, energy consumption can be substantially reduced.

Some LED lighting has already been installed. However, it is estimated that over 5,100 fittings still need to be upgraded to LED. Furthermore, most of the existing AHUs are not fitted with any heat recovery device, and therefore, consideration should be given to 'run around coil systems' being installed.

Some of the most energy intensive buildings on the main site date from 1984 (i.e. Blocks 1 to 4) and have significant heat loss due to poor insulation and single glazed windows. Consideration should be given to replacing single glazed windows with a low emissivity double glazing, as well as improving wall and roofs insulation to minimise energy waste and reduce heating requirements.

During the third period of transition, it is recommended the Trust install solar PV to reduce grid electricity usage and associated costs, as well as partially offset the increase of overall electrical demand that electrification of heat will generate. It is recommended that consideration be given to installing these as soon as possible, ideally at the same time the first two phases are implemented, to allow for paybacks before decarbonisation starts.

The final period of transition will involve the implementation of low carbon heat sources. The gas-fired boilers, along with the CHP, will be due for replacement with electrically-driven, heat pumps. This transition will preferably be delivered in line with Salix funding announcements.

By 2032 the Trust's reliance on gas will be significantly reduced, although not completely (approximately 50% of the buildings peak heat demand will still be reliant on LTHW gas boilers), and the total carbon footprint will be reduced to approximately 1,000 tCO_2e/year as a result of optimisation works and grid decarbonisation. This will allow the Trust to meet the intermediate 80% carbon reduction target set by the NHS. The Trust between now and 2032 will re-visit low carbon technologies, as well as the opportunity of connecting into a local District Heating Network (DHN) and opt for the most economically feasible solution to move the sites away from their reliance on natural gas. This will allow low carbon technologies such as hydrogen and the Hackney Council decentralised energy master plan, to develop further.

2 INTRODUCTION

2.1 Context

Our planet is facing a climate emergency which is predominantly being driven by our reliance on fossil fuels for heat, power and transport. In response, the UK has set a legally binding target under the Climate Change Act 2008 to reduce its emissions to Net Zero by 2050. The heating of buildings represents a significant proportion of current emissions, 2% of which can be attributed to the public sector. It is therefore clear that the public sector has a significant part to play in the drive towards Net Zero and should demonstrate leadership through early action on the decarbonisation of heat.

"Delivering a Net Zero National Health Service" (2020) sets out a strategy and two clear targets to respond to this challenge:

- Net zero by 2040 for the emissions the NHS controls directly (the NHS Carbon Footprint), with an ambition to reach an 80% reduction by 2028 to 2032;
- Net zero by 2045 for the emissions the NHS can influence (the NHS Carbon Footprint Plus), with an ambition to reach an 80% reduction by 2036 to 2039.

Since, the publication of the strategy the NHS has made good progress, investing over £550 million in energy efficiency and renewable energy as part of the Government's Public Sector Decarbonisation Scheme (PSDS). In late 2020 the department of Business Energy & Industrial Strategy (BEIS) announced the Phase 1 Low Carbon Skills Fund (LCSF), a grant scheme which enabled public sector bodies to engage specialist and expert advice to identify and develop energy efficiency and low carbon heat upgrade projects for non-domestic buildings. The LCSF was administered by Salix Finance on behalf of BEIS. In early 2023 Salix Finance announced a fourth phase to the LCSF which made £17m of grant funding available for public sector bodies to apply for additional consultancy support to develop Heat Decarbonisation Plans.

2.2 What is a Heat Decarbonisation Plan

The purpose of this Heat Decarbonisation Plan (HDP) is to describe how the Trust intends to replace fossil fuel reliant systems with low carbon alternatives to meet the challenges of achieving net zero and to decarbonise its buildings. This HDP describes the current state of Homerton Healthcare NHS Foundation Trust's energy use, and its plans for reducing and decarbonising this use. The HDP also explains what heat decarbonisation actions are recommended to be taken, over what timescales, and the intended outcomes.

Whilst it is important to note that the proportion of emissions linked to the NHS Carbon Footprint Plus is larger than those associated with the NHS Carbon Footprint, the purpose of this HDP is to create a plan that specifically addresses the short-term challenge of reducing the NHS Carbon Footprint by 2040.

2.3 Background

Homerton Healthcare NHS Foundation Trust provides hospital and community health services for Hackney, the City and surrounding communities, as well as a range of specialist services for a wider population. The Trust comprises Homerton Hospital, Mary Seacole Nursing Home and community and homecare services across Hackney and the City. The hospital has almost 500 beds spread across

11 wards, a nine-bed intensive care unit and maternity, paediatric and neonatal wards, and the Mary Seacole Nursing Home.

The Trust is already on a journey of sustainable development and increasing focus on the climate emergency. In 2017 the Trust took a systemic pledge via the Board approved Sustainable Development Management Plan (SDMP) which integrated various activities into the Net Zero agenda. In 2022, the Board approved the “Green Plan – Strategy towards Net Zero for Homerton Healthcare NHS Foundation Trust 2022-25”, which outlines the Trust’s commitment to tackling climate change and reducing its impact on the environment and is now in process of implementing the priority actions needed to strengthen the control framework to manage its commitment to achieve the objectives outlined within the document.

Homerton Healthcare NHS Foundation Trust was the first healthcare trust to achieve Planet Mark certification and the Trust is now in its seventh year of business carbon footprint reporting. Since certifying to the scheme in 2017, the Trust has set a target to reduce carbon emissions by 5% annually. The total carbon footprint of the Trust in the year ending March 2022 was 5,816.7 tCO2e, with an absolute carbon reduction of 9.2%. The Trust’s total carbon per employee was 1.6 tCO2e.

With the aim of the HDP to target emissions resulting from building energy use, a breakdown of the Trust’s carbon emissions is shown in ***Figure 1***. The Trust’s buildings emissions for year ending March 2022 equate to 5,735.8 tCO_2e and the pie chart indicates that the Trust can target approximately 57% of its carbon via the HDP.

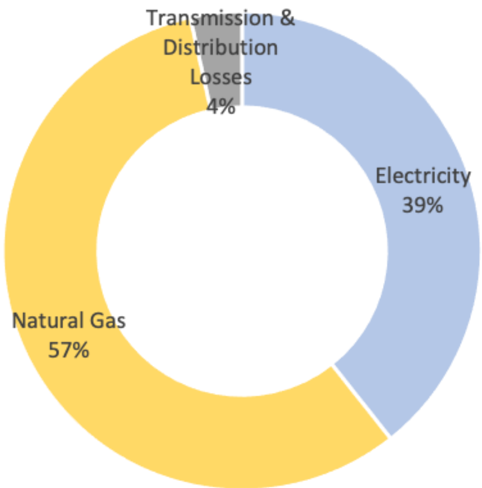


Figure 1 Carbon breakdown by resource (source: Planet Mark Certification Report YE March 2022)

2.4 Methodology

Pre-survey data analysis involved evaluating the buildings within each site to assess their size, type and use, as well as the meters on site and the quality of the associated energy data. Furthermore, a desktop evaluation of the building’s electrical capacities was undertaken, and a carbon baseline was defined by mapping both the current energy use and the forecasted changes in carbon intensity based on BEIS forecasts.

Next, site surveys were undertaken to review existing heating systems on site. This involved identifying and assessing the assets and fuel types in each building and the distribution infrastructure used. Furthermore, the site visits were used to assess the thermal performance of building fabric and estimate the heat loss from each building. Once a picture was developed by collecting this information, a technical solution was produced to consider low carbon alternatives and to estimate the project costs.

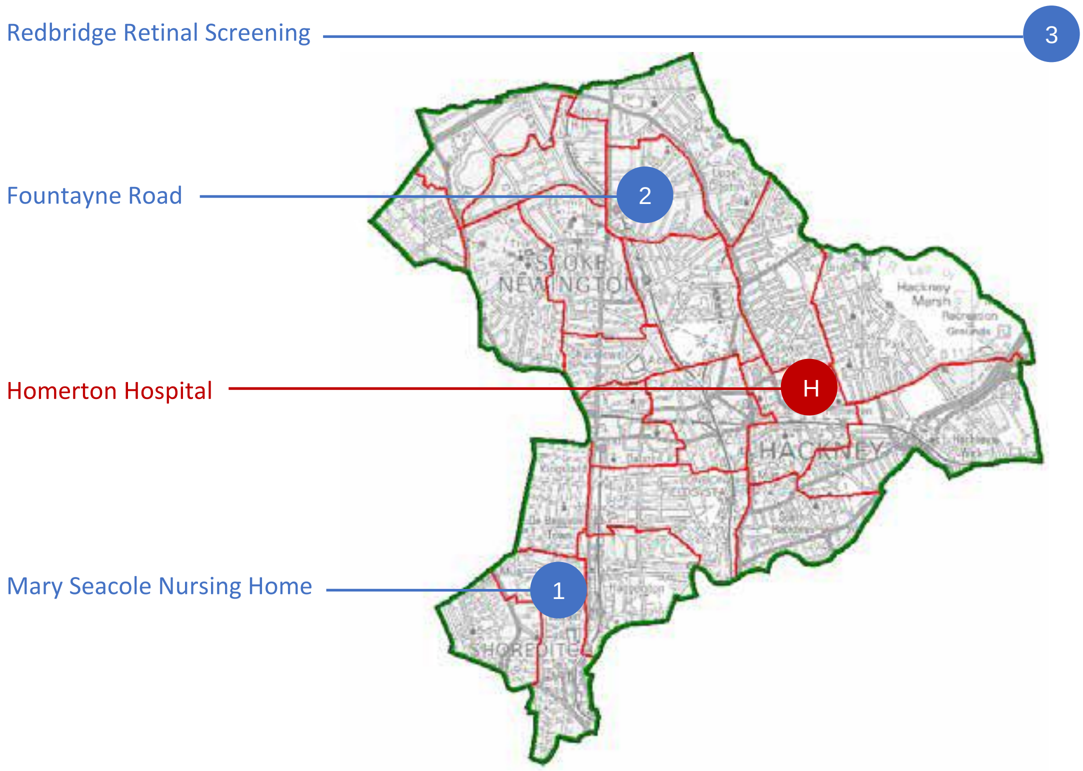
Finally, the findings of the surveys were summarised and used to evaluate energy and carbon impact, as well as estimate operating cost implications, of the proposed projects. Delivery plans were then developed, and key challenges were identified. This was then summarised in a draft HDP report for the Trust Board to review and provide feedback before issuing the final report.

Further findings will be added to the document after its completion as the Trust will continue developing the HDP following its submission to Salix on the 15 January 2024.

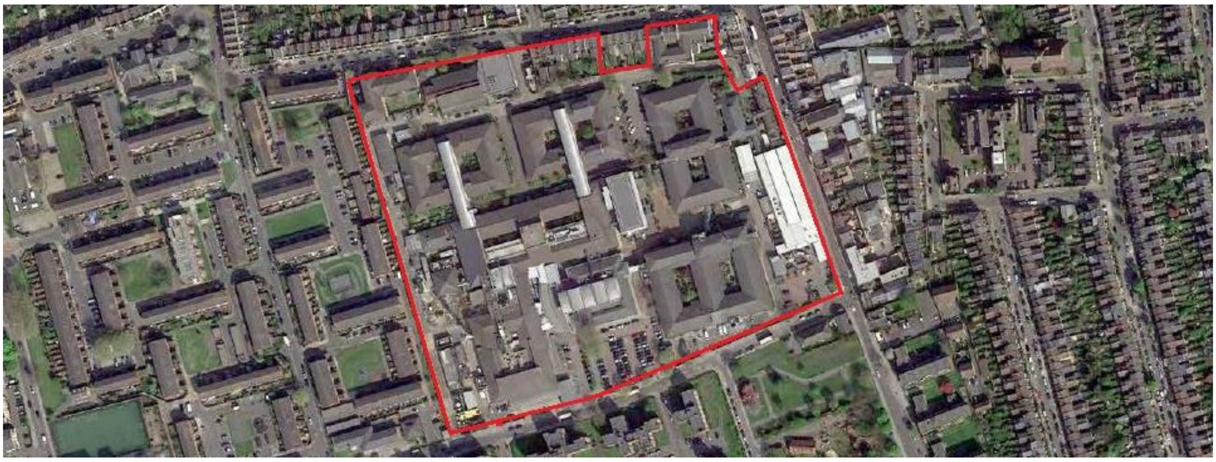
3 BUILDINGS

3.1 Portfolio

This HDP covers Homerton Hospital (main site) and the 3 small community sites owned by the Trust: Mary Seacole Nursing Home (long lease 999yrs), Redbridge Retinal Screening and Fountayne Road.



The Homerton Hospital is a relatively modern medium sized acute Hospital constructed largely in two distinct phases: the 1984 blocks to the west of the site including ward accommodation, theatres and emergency departments and the mid-1990s mental health buildings to the east. There are also smaller buildings of varying ages to the north and east of the site including late 18th century terraced houses, Victorian ward block and more modern steel framed estates buildings.



01 - Wards including Cardiology
02 - Wards including Physiotherapy
03 - Theatres, Wards including X-Ray Pathology
03a - Main Entrance Block
03b - Women's Services Building
04 - Pharmacy/Kitchen/ Restaurant
05 - Mental Health Block - North Block
06 - Mental Health Block - South Block
07 - Energy Centre
11 - Chatsworth House
12 - Education Centre
13 - Clifden Road Houses 44
13 - Clifden Road Houses 46/48
13 - Clifden Road Houses 50/52
13 - Clifden Road Houses 54/56
13 - Clifden Road Houses 62
14 - Clifden Centre
17 - Brooksby House

Theatres and wards (Blocks 1 to 6) operate 24/7, while all other buildings are a mix of clinical and non-clinical areas and operate mostly during normal business hours.

Most of the buildings are a combination of brick masonry and concrete and steel frames, with traditional roof designs. With respect to windows, only blocks built after 1984 have double glazing, with single glazing for the other premises.

Currently, the majority of the site is heated by the energy centre. This houses three gas fired boilers and a combined heat and power (CHP) plant, which is able to generate and supply electrical power and low temperature hot water (LTHW) to the blocks to the west of the site. In addition, a different network distributes LTHW from the gas fired boiler heating system located in the first-floor plantroom of Block 5 to the mental health blocks. Smaller buildings to the north and east of the site have their own boilers and supply of gas from the grid.

To date, the Trust has replaced a fair amount lighting with LED through a three-phase project. Furthermore, to improve the energy efficiency of the buildings and reduce energy required for cooling purposes, the majority of windows had solar control films installed.

Table 1 provides an overview of key information relating to the surveyed buildings.

Site Name	Building Name	Building Use	UPRN	Postcode	GIA (m^2)	Age Profile	Heating Fuel	MPAN	MPRN	DEC Rating
Homerton Hospital (main site)	Block 1	Clinical	10008276479	E9 6SR	5,019	1984	Gas	1200052135213	9322117509	G
	Block 2	Clinical	10008276478	E9 6SR	5,005	1984	Gas	1200052135213	9322117509	G
	Block 3	Clinical	10008339229	E9 6SR	7,627	1984	Gas	1200010097579 1200010097588 1200010097597	9322117509	G
	Block 3a	Clinical	10008339229	E9 6SR	3,594	2008	Gas	1200010097579 1200010097588 1200010097597	9322117509	G
	Block 3b	Clinical	10008339229	E9 6SR	1,100	2010	Gas	1200052135213	8818435710	G
	Block 4	Clinical	10008339230	E9 6SR	5,207	1984	Gas	1200010097579 1200010097588 1200010097597	9322117509	G
	Block 5	Clinical	10008339238	E9 6SR	5,869	1994	Gas	1200010097602	8818435710	E
	Block 6	Clinical	10008339231	E9 6SR	6,633	1994	Gas	1200010097602	8818435710	E
	Education Centre	Lecture Room	10008339234	E9 6SR	2,587	1997-2001	Gas	1200052135213	20606902	F
	Clifden Centre	Office	100023001886	E9 6SR	1,300	1994-2001	Gas	1200052135213	8820607903	G
	Brooksby House	Office	10008339237	E9 6SR	2,393	1994	Gas	1200010097523	8820899808	N/A
	Chatsworth House	Office	10008339233	E9 6SR	360	pre-1975	Gas	1200021975906	20609403	N/A
	44 Clifden Road	Office	100023001878	E5 0LJ	140	pre-1975	Gas	1200039810048 1200039810057	81755501	N/A
	46-48 Clifden Road	Office	10008240994	E5 0LJ	255	pre-1975	Gas	1200039810093 1200039810075	20607500/81755209	N/A
	50-52 Clifden Road	Office	100023001881	E5 0LJ	275	pre-1975	Gas	1200039810127	20607803/81755400	N/A
	54-56 Clifden Road	Office	100023001883	E5 0LJ	275	pre-1975	Gas	1200039810154	22100408/81755703	N/A
	62 Clifden Road	Office	100021033199	E5 0LJ	100	pre-1975	Gas	1200039810233	20606307	N/A
Mary Seacole Nursing Home		Residential Care Home	100021062678	N1 5JS	2,103	pre-1975	Gas	1200010109115	8856884002	D
Redbridge Retinal Screening		Clinical & Admin	10034932416	IG1 4TD	235	pre-1975	Gas	1200023890858	3262650406 8935944006	N/A
Fountayne Road		Clinical & Admin	100023159228	N16 7EA	914	pre-1975	Gas	E13Z027500/E13Z027494 E13Z027486/E13Z027104	K004421D6	F

Table 1 Summary of Homerton Healthcare NHS Foundation Trust buildings

4 ENERGY CONSUMPTION AND CARBON EMISSIONS

4.1 Energy Data Analysis

Not all buildings within Homerton Hospital consume gas directly, but instead use LTHW generated within the energy centre. As with gas, there are no submeters for electricity usage on site and, therefore, energy usage cannot be effectively measured for each building.

Tables 2 and 3 detail the energy consumption for the electricity and gas supplies that serve the entire estate.

<table>
<tr><th>Site Name</th><th>Building Name</th><th>Electricity Annual Demand (kWh)</th></tr>
<tr><td rowspan="11">Homerton Hospital (main site)</td><td>Blocks 1,2,3b</td><td rowspan="3">3,604,653</td></tr>
<tr><td>Education Centre</td></tr>
<tr><td>Clifden Centre</td></tr>
<tr><td>Blocks 3,3a,4</td><td>3,780,305</td></tr>
<tr><td>Blocks 5,6</td><td>1,937,861</td></tr>
<tr><td>Brooksby House</td><td>243,198</td></tr>
<tr><td>Chatsworth House</td><td>24,022</td></tr>
<tr><td>44 Clifden Road</td><td rowspan="5">99,354</td></tr>
<tr><td>46-48 Clifden Road</td></tr>
<tr><td>50-52 Clifden Road</td></tr>
<tr><td>54-56 Clifden Road</td></tr>
<tr><td></td><td>62 Clifden Road</td></tr>
<tr><td colspan="2">Mary Seacole Nursing Home</td><td>187,721</td></tr>
<tr><td colspan="2">Redbridge Retinal Screening</td><td>13,628</td></tr>
<tr><td colspan="2">Fountayne Road</td><td>103,805</td></tr>
<tr><td colspan="2">Total</td><td>9,994,547</td></tr>
</table>

Table 2 Annual electricity consumption

<table>
<tr><th>Site Name</th><th>Building Name</th><th>Gas Annual Demand (kWh)</th></tr>
<tr><td rowspan="12">Homerton Hospital (main site)</td><td>Blocks 1,2,3,3a,4</td><td>10,973,432</td></tr>
<tr><td>Blocks 3b</td><td rowspan="2">3,318,894</td></tr>
<tr><td>Blocks 5,6</td></tr>
<tr><td>Education Centre</td><td>265,937</td></tr>
<tr><td>Clifden Centre</td><td>208,852</td></tr>
<tr><td>Brooksby House</td><td>440,133</td></tr>
<tr><td>Chatsworth House</td><td>109,930</td></tr>
<tr><td>44 Clifden Road</td><td rowspan="5">171,260</td></tr>
<tr><td>46-48 Clifden Road</td></tr>
<tr><td>50-52 Clifden Road</td></tr>
<tr><td>54-56 Clifden Road</td></tr>
<tr><td>62 Clifden Road</td></tr>
<tr><td colspan="2">Mary Seacole Nursing Home</td><td>412,908</td></tr>
<tr><td colspan="2">Redbridge Retinal Screening</td><td>36,858</td></tr>
<tr><td colspan="2">Fountayne Road</td><td>220,265</td></tr>
<tr><td colspan="2">Total</td><td>16,158,469</td></tr>
</table>

Table 3 Annual gas consumption

Table 4 summarises the annual electricity and heat loads for each building versus the benchmarks set by CIBSE (good practice - typical practice). For buildings served by the same fiscal meter, annual energy demands were calculated based on the building's percentage gross internal area, thus affected buildings have the same heat and electrical demand per m^2. The addition of submeters for those buildings will allow for better analysis in the future.

Electricity usage for the main blocks including ward accommodation, theatres, emergency departments and the mental health buildings ranges between 155 and 240 kWh per m^2 per year. Based on CIBSE data, an electricity load of 118 kWh per m^2 per year is expected at a typical Acute General Hospital.

Similarly, ranging between 244 and 415 kWh per m^2 per year, gas consumption for the above-mentioned buildings is very high, significantly above the "typical practice" expected for General Acute Hospitals. This is most likely due to the overheating in many areas across the site.

Site Name	Building Name	Building Use	GIA (m^2)	Electricity Annual Demand (kWh/m^2)	Method of Determination	CIBSE Benchmark (kWh/m^2)	Gas Annual Demand (kWh/m^2)	Method of Determination	CIBSE Benchmark (kWh/m^2)
Homerton Hospital (main site)	Block 1	Clinical	5,019	240	Calculated	84-118	415	Calculated	229-303
	Block 2	Clinical	5,005		Calculated	84-118	415	Calculated	229-303
	Block 3	Clinical	7,627	230	Calculated	84-118	415	Calculated	229-303
	Block 3a	Clinical	3,594	230	Calculated	84-118	415	Calculated	229-303
	Block 3b	Clinical	1,100	240	Calculated	84-118	244	Calculated	229-303
	Block 4	Clinical	5,207	230	Calculated	84-118	415	Calculated	229-303
	Block 5	Clinical	5,869	155	Calculated	84-118	244	Calculated	229-303
	Block 6	Clinical	6,633	155	Calculated	84-118	244	Calculated	229-303
	Education Centre	Lecture Room	2,587	240	Calculated	113-129	103	Fiscal Meter	110-132
	Clifden Centre	Office	1,300	240	Calculated	65-89	161	Fiscal Meter	79-108
	Brooksby House	Office	2,393	102	Fiscal Meter	65-89	184	Fiscal Meter	79-108
	Chatsworth House	Office	360	67	Fiscal Meter	65-89	305	Fiscal Meter	79-108
	44 Clifden Road	Office	140	92	Fiscal Meter	65-89	159	Fiscal Meter	79-108
	46-48 Clifden Road	Office	285	92	Fiscal Meter	65-89	159	Fiscal Meter	79-108
	50-52 Clifden Road	Office	275	92	Fiscal Meter	65-89	159	Fiscal Meter	79-108
	54-56 Clifden Road	Office	275	92	Fiscal Meter	65-89	159	Fiscal Meter	79-108
	62 Clifden Road	Office	100	92	Fiscal Meter	65-89	159	Fiscal Meter	79-108
Mary Seacole Nursing Home		Residential Care Home	2,103	89	Fiscal Meter	66-83	196	Fiscal Meter	256-337
Redbridge Retinal Screening		Clinical & Admin	235	58	Fiscal Meter	60-76	157	Fiscal Meter	108-148
Fountayne Road		Clinical & Admin	914	114	Calculated	60-76	241	Calculated	108-148

Table 4 Annual electricity and heat demand versus CIBSE benchmarks (good practice - typical practice)

4.2 Energy Costs

Based on the current gas and electricity rates for half-hourly and non-half-hourly supplies, ***Table 5*** details energy costs for the Trust. It should be noted that these utility costs do not reflect the price fluctuations being experienced within the energy sector at the time of writing and these values are likely to rise from April 2024 onwards.

Site Name	Electricity Cost (£)	Electricity CCL (£)	Gas Cost (£)	Gas CCL (£)	Total Energy Cost (£)
Total	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX

Table 5 Annual energy costs

For completeness, the table above also includes the Climate Change Levy (CCL), which is an environmental tax charged on the Trust's energy consumption. The CCL rates for gas have risen by 281% since 2018/19 and next financial year (2024/25) will be on par with the charges for electricity. It is possible that the CCL rate for gas could continue to rise going forward, as the pressure to reduce the use of carbon-intensive energy sources continues.

However, given the uncertainty associated with the future of carbon pricing in the UK at the time of writing, CCL was not included in the projection of the energy costs throughout the proposed decarbonisation pathway.

4.3 Carbon Emissions

Having defined the Trust's current energy consumption, it is important to create a carbon emission baseline, as well as consider how this can be expected to change in a Business as Usual (BAU) scenario within the timescale of the targets set out by the "Delivering a Net Zero National Health Service" document (*section 2.1*). For this reason, forecasts of the carbon intensity of electricity provided by the Department for Business, Energy & Industrial Strategy (BEIS) were utilised to project emissions towards the 2040 net zero target date for the NHS Carbon Footprint.

Table 6 details the annual carbon emissions for each site. These are based on the latest UK Government GHG Conversion Factors for electricity generated (i.e. 0.20707 $kgCO_2e/kWh$) and natural gas (i.e. 0.18292 $kgCO_2e/kWh_{(Gross\ CV)}$).

Site Name	Electricity Annual Demand (kWh)	Electricity Carbon Emissions (tCO_2e)	Gas Annual Demand (kWh)	Gas Carbon Emissions (tCO_2e)	Total Carbon Emissions (tCO_2e)
Homerton Hospital (main site)	9,689,393	2,006.4	15,488,438	2,833.3	4,839.7
Mary Seacole Nursing Home	187,721	38.9	412,908	75.5	114.4
Redbridge Retinal Screening	13,628	2.8	36,858	6.7	9.6
Fountayne Road	103,805	21.5	220,265	40.3	61.8
Total		**2,070**		**2,956**	**5,025**

Table 6 Annual carbon emissions by site

Figure 2 shows that, with no action, no change in energy demand and a continued reliance on gas fired boilers and CHP, the effects of the UK's electricity grid decarbonising will reduce the Trust's carbon emissions by 38% in 2040.

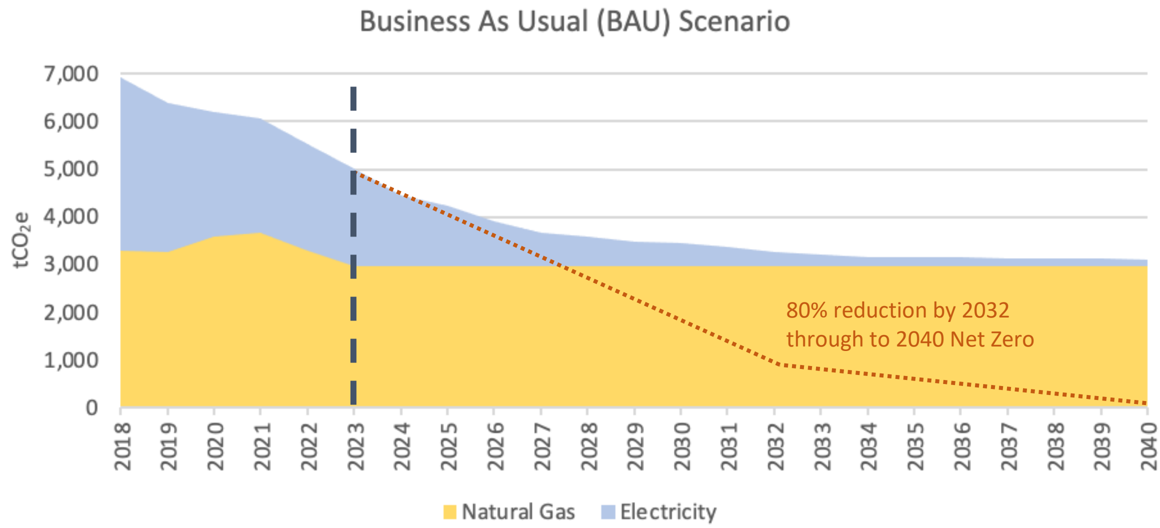


Figure 2 Carbon emissions projected to 2040 - BAU scenario

As outlined by BEIS in late 2021, the UK has committed to decarbonise the electricity grid by 2035. However, these effects have a limited impact on the Trust's overall carbon emissions due to the current high reliance on natural gas.

Even if the Trust did not make any improvements to the buildings, it would still see a reduction in carbon emissions from 5,025 tCO_2e to 3,113 tCO_2e by 2040. Of this 3,113 tCO_2e, 2,956 tCO_2e is from fossil fuels. Taking into account the red dotted line in ***Figure 2***, the Trust has to take action in order to reach Net Zero by 2040 and 80% reduction in NHS Carbon footprint by 2032. To achieve Net Zero, fossil fuels will need to be replaced with 'electric' heating and domestic hot water systems.

5 HEATING AND HOT WATER SYSTEMS

LTHW from the energy centre and Block 5 plantroom are used to supply heat and DHW to most of the main site.

Upgraded in 2014, the three boilers and CHP in the energy centre supply heat to the main circuit that feeds the buildings to the west of the site. Notably, LTHW from the energy centre is used to supply heating to the heating coils of the AHUs and radiator heating circuits, as well as HWS for the three 1,400 litre calorifiers located in Plantroom 7. The older boilers located in the first-floor plantroom of Block 5 supply heat to the second circuit, that feeds the two mental health blocks.

Decarbonisation will require all heating and hot water systems currently fed by gas to be replaced with 'electric' alternatives. The secondary system pipework can be retained and insulated where needed (e.g. pipework suppling DHW from Plantroom 7 to Blocks 1, 2 and 3) to allow optimal thermal distribution efficiency. Some of the radiators on site are over 30 years old and will need to be replaced with efficient heat exchange pannels, should they be required to radiate heat from heat pump systems running at 50°C.

Smaller buildings to the north and east of the main site (as well as the community sites) are provided via local natural gas-fired boilers. The boilers supply heating to radiators and DHW systems for the whole building. These buildings have no real control due to not being connected to the BMS, thus having an impact on comfort levels.

Table 7 summarises the existing heat generators.

Site Name	Building Name	Heating Fuel	Type	No. of Assets	Make and Model No.	Rating (kW)	Year of Mfg.	Gross Eff.
Homerton Hospital (main site)	Blocks 1,2,3,3a,4	Gas	Boiler	2	Hovel Royalist 3500	3,500	2013	85%
			Boiler	1	Hovel Royalist 2500	2,500	2013	85%
			CHP	1	Ener-G E310	357	2014	44%
	Block 3b	Gas	Boiler	3	Pottern NXR4	345	2008	85%
	Blocks 5,6	Gas	Boiler	2	Nu-Way NDFL50	1,170	1994	85%
			Boiler	1	Nu-Way NDFL50	930	1994	85%
	Education Centre	Gas	Boiler	2	Buderus GB112-43	43	ca. 2015	90%
			Boiler	3	Ideal Concord CXA100/H	100	ca. 2010	83%
	Clifden Centre	Gas	Boiler	2	Ideal Evomax	120	2007	80%
	Brooksby House	Gas	Boiler	2	Ideal Imax Xtra	120	2017	85%
	Chatsworth House	Gas	Boiler	1	Vaillant EcoTEC Plus 824	19	2022	89%
	44 Clifden Road	Gas	Boiler	1	Vaillant EcoTEC Plus 837	28	ca. 2015	85%
	46-48 Clifden Road	Gas	Boiler	2	Vaillant EcoTEC Pro 24	24	ca. 2015	85%
	50-52 Clifden Road	Gas	Boiler	2	Vaillant EcoTEC Pro 24	24	ca. 2015	85%
	54-56 Clifden Road	Gas	Boiler	2	Vaillant EcoTEC Plus 824	19	ca. 2015	85%
	62 Clifden Road	Gas	Boiler	1	Vaillant EcoTEC Pro 24	24	ca. 2015	85%
Mary Seacole Nursing Home		Gas	Boiler	2	Ideal Concord CXA100/H	100	ca. 2010	83%
Redbridge Retinal Screening		Gas	Boiler	1	Worcester 28i Junior	28	ca. 2010	80%
			Boiler	1	Vaillant EcoTEC Plus 618	18	ca. 2010	80%
Fountayne Road		Gas	Boiler	1	Ideal Imax Xtra	120	2021	90%

Table 7 Heating systems summary

6 ELECTRICAL INFRASTRUCTURE AND LOADS

The main site currently has three UKPN owned substations, these are all operated at 6.6KV with a number of transformers providing the Trust with seven low voltage supplies. The Trust have a maximum permitted import agreement of 2,500kVA, with the Ancillary (Plantroom 9) substation and Brooksby House substation sharing a 1,500kVA capacity limit, and the Clifden Road substation having a 1,000kVA capacity limit.

It is important to note that the Trust have recently embarked on a major project delivering a New Elective Centre (NEC) on the first-floor refurbishment of Block 5 and these new loads are driving an immediate requirement to upgrade the site electrical capacity as an enabling works package.

The NEC project was designed to RIBA stage 4 by [INFORMATION REDACTED] and the proposed electrical loads were subsequently reviewed by [INFORMATION REDACTED]. The former identified Brooksby House as the connection point to which they intend to connect for the project. Whilst the Brooksby House substation is ideally located for the project, it does not have sufficient capacity to accommodate the additional load in its current condition, nor does the UKPN supply or capacity limit that serves it. The review of electrical loads identified that the load increase for the NEC would be 686kVA or 473kVA depending on whether an ASHP system was to be included in the scheme or a traditional gas solution was to be used for the heating and hot water generation and air-cooled chillers to meet the cooling requirements.

The Ancillary and Brooksby House supplies have approximately 100kVA available for use on site. On this basis the maximum demand would be increased from 1,500kVA either to 2,100kVA (for the current NEC design proposal including ASHP) or 1,900kVA (for the gas solution). The medium-term Trust requirements are for an ASHP system, however, there is no funding currently in place for this project. Therefore, the immediate short-term need, is to have a site capacity limit increased by a minimum of 400kVA, however this solution would not afford the net zero carbon objectives set by the NHS.

In April 2023, UKPN was approached to discuss the Trust’s immediate requirements and the availability on the existing Brooksby House 6.6kV network. UKPN confirmed that two 1,000kVA transformers configured on an N+1 basis can be added to this network, facilitating the NEC project load.

[INFORMATION REDACTED] suggested that the Trust should plan over the next five years to provide their own 11kV network. This upgrade would result in the Brooksby House substation 6.6kV transformers to be replaced with 11kV versions. Having two installed as part of the NEC project might allow migration across to the new network in a phased manner with limited clinical impact.

Table 8 summarises the current electrical infrastructure and loads, without considering the NEC project.

Site Name	Building Name	Substation	UKPN MPAN	Agreed Capacity Limit (kVA)	Maximum Demand (kVA)	Spare Capacity at Peak Demand (kVA)
Homerton Hospital (main site)	Blocks 1,2,3b Education Centre Clifden Centre	Clifden Road	1200052135213	1,000	751 19 Jul 22	249
	Blocks 3,3a,4	Ancillary (Plantroom 9)	1200010097579 1200010097588 1200010097597	1,500	989 12 Mar 22	119
	Blocks 5,6	Brooksby House	1200010097602		392 19 Jul 22	
	Brooksby House	Clifden Road	1200010097523	200	83	117
	Chatsworth House	Clifden Road	1200021975906	71	19	52
	44 Clifden Road			-	12	-
	46-48 Clifden Road			-	10	-
	50-52 Clifden Road			-	10	-
	54-56 Clifden Road			-	6	-
	62 Clifden Road			-	4	-
Mary Seacole Nursing Home			1200010109115	225	58	167
Redbridge Retinal Screening				-	12	-
Fountayne Road				-	N/A	-

Table 8 Electrical infrastructure and loads summary

Figures 3 and 4 plot the maximum electrical consumption for the time of the day. The graphs below identify the Trust load profile over the worst-case periods, based on the 2022 electrical half-hourly data. These are identified as 19th July 2022 (this day was noted as the UK hottest day on record) for the Clifden Road substation and 12th March 2022 for the Ancillary and Brooksby House supplies.

As can be seen below, under the current maximum demand conditions, little spare capacity exists in the Clifden Road substation for future decarbonisation projects. Notably, this substation has a maximum of 249kVA spare capacity.

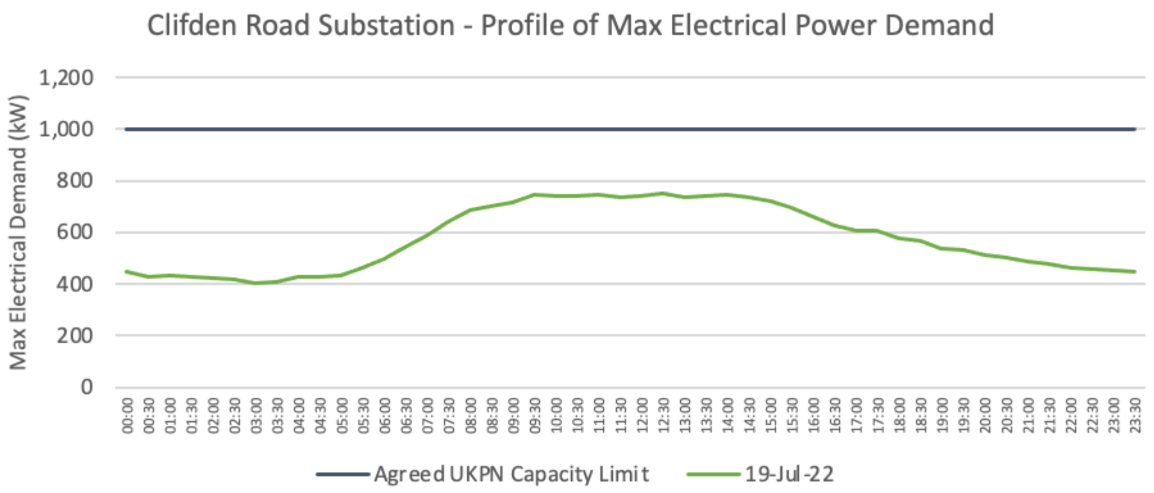


Figure 3 Maximum electrical power consumption from Clifden Road substation

It is important to note that the Ancillary (Plantroom 9) metering data, considerably dropped when comparing April, May, June and July 2021 against the same period in 2022, due to failure of metering on MPAN 1200010097588 and 1200010097579. As a result, the peak electrical demand recorded on 19th July 2021 was added to the graph for the Ancillary + Brooksby House substations. This shows only 93kVA spare capacity under peak conditions.

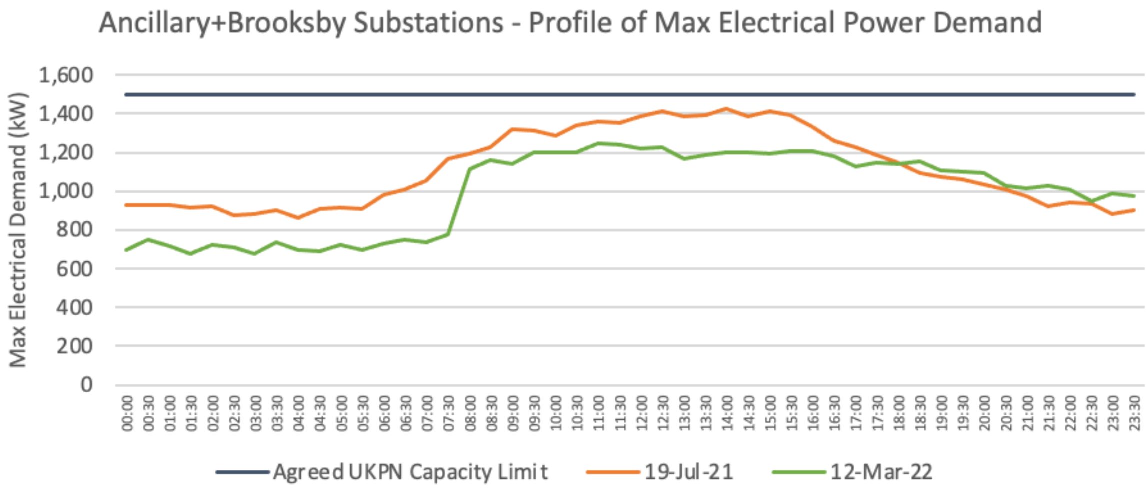


Figure 4 Maximum electrical power consumption from Ancillary and Brooksby House substations

Brooksby House and Chatsworth House are connected to the Clifden Road substation, however, do not share the mentioned 1,000kVA capacity limit. The Clifden Road houses take electricity from separate supplies.

Based on the analysis of the current electrical infrastructure and consumption, as well as the NEC project loads, the main site will not have sufficient capacity to decarbonise without improvements and a site capacity increase.

UKPN confirmed that the maximum size transformer that can be added to the 6.6KV network is 1MVA, with a N+1 configuration possible. On this basis the Trust will need submit formal applications to UKPN for further 6.6kV 1MVA transformers to be provided. Alternatively, the existing UKPN 6.6kV network will need to be replaced with a Trust owned 11kV network. This option would provide increased resilience over the existing network and allow a significant upgrade to the Trust in terms of capacity from 2.5MVA to 5MVA.

7 HEAT NETWORKS AND OPPORTUNITIES ON SITE

District heat networks (DHNs) connect multiple heat producers through pipework to recover waste heat arising as a by-product of industrial and commercial activities for building space heating and domestic hot water, potentially replacing building heating plants (e.g. gas boilers) and their maintenance. The London Heat Map was created for the Greater London Authority by the Centre for Sustainable Energy (CSE) in July 2019 to identify areas of high heat demand, as well as explore opportunities for new and expanding DHNs.

Hackney London Borough Council has recently completed a decentralised energy master plan to investigate the initial potential for district heating schemes in the borough. The Council already operates the Shoreditch Heat Network which serves the Wenlock Barn, Cranston and Fairbank estates. Several private networks also exist across the borough.

The master plan study shortlisted 10 opportunity areas for consideration, including Homerton. Initial viability analysis suggested that several of these areas may be suitable for DHN. Hackney Council is currently taking some of the opportunities to detailed feasibility stage for further analysis.

Due to the complexity of the project and the Hackney Council study still being in its early stages, the opportunity to connect to a potential Homerton DHN will require further reassessment over the next five years. Should Hackney Council decide to move this opportunity forward, detailed surveys will be required to determine the feasibility, however, the potential to access a local DHN would help significantly to reduce the Trust carbon emissions.

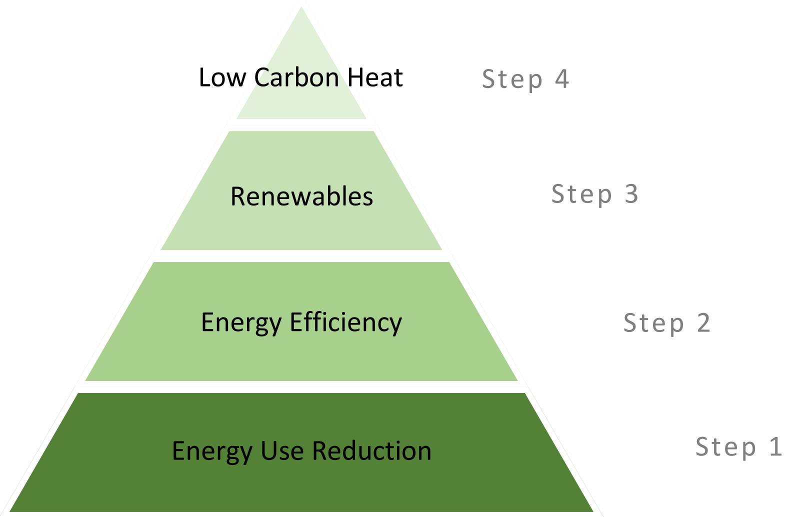
Having an N+1 redundancy is critical on a hospital heating system. Therefore, the potential Homerton DHN must have built-in redundancy within its central plants, to ensure that if a piece of equipment or utility source is compromised or experiencing any issues, the system can continue to operate. With that being the case, a DHN could eliminate the need for onsite N+1 redundancy.

8 DETERMINING THE WHOLE SOLUTION

8.1 Methodology

Following the analysis of energy consumption, creation of a carbon emission baseline and projection of Trust emissions towards 2040, as well as detailed surveys of the building portfolio, the next sections of this HDP outline the proposed technical solution.

A successful decarbonisation strategy is a four-step process based on the energy hierarchy shown below.



The first two phases involve the implementation of a series of energy efficiency measures that can immediately optimise the building performance to minimise peak electrical and thermal energy demand. Energy use reduction step targets energy wastage and inefficient practices via simple measures such as behaviour change to turn off lights and close windows, and improved BMS controls to accurately modulate heating and cooling, while energy efficiency step includes improvements to building fabric and services equipment. These stages generate operational cost savings, as well as capital cost savings as the size of low carbon generation technology can be minimised.

During the third period of transition, generation of renewable electricity must be implemented where possible on site. Given the potential increase of overall electrical demand due to electrification of heat, on site renewable electricity generation can reduce grid dependence and increase self-consumption.

The final period of transition involves the implementation of low carbon heat sources. This HDP primarily focuses the use of heat pumps to switch fossil fuel to electricity. However, district heating could also be considered should it become a viable option over the next five years.

Although carbon offsetting is likely to play an important part in the Trust's overall journey to net zero, it will not be discussed within this HDP.

It should be emphasised that, as outlined within the hierarchy above, the first two steps in the HDP are to optimise electricity and heating fuel consumption, thus providing the best foundation for the installation of low carbon technologies.

Taking a 'whole building' approach, thereby considering together all the factors that contribute to the building's energy consumption to identify the most cost-effective way to achieve decarbonisation, will lead to a reduction in operational costs as less electricity and natural gas is consumed, but will also lead to a reduction in capital expenditure as the reduction in heat and electricity peak demand will minimise the size of low carbon heating plant required, as well as any electrical infrastructure upgrades resulting from the shift to low carbon heat technology.

8.2 Step 1: Energy Use Reduction

The first energy conservation measures to be implemented target operational level changes, such as behaviour change and BMS controls optimisation.

8.2.1 Metering

The Trust has several meters installed, as indicated in ***Table 1***, however, some of them serve multiple blocks and, therefore, energy use cannot be effectively measured for each building. As a result, for buildings served by the same fiscal meter, annual energy consumptions used for the HDP calculations were apportioned based on the building's gross internal area.

The Estates Net Zero Carbon Delivery Plan Technical Annex, which was published in October 2022, reinforced the existing NHS guidance and set out new recommended actions for NHS Foundation Trusts, as well as target dates. One of them invited organisations to establish a programme to install energy metering (both electricity and heat) at various levels: building level by 2022/23, floor level by 2026-28 and department level by 2028-30.

It is understood that there are a few heat submeters which were installed on the main site as part of a previous pilot, although the majority of these are not connected as they required a site shutdown. Furthermore, there is no clear information available as to which areas they specifically serve.

Installation of additional meters to ensure energy consumption for each building can be precisely measured, along with the connection of existing submeters, would provide the Trust with a wider energy monitoring system, as well as a more reliable infrastructure to collect the necessary data for effective measurement and verification (M&V) of the savings associated with the energy efficiency projects outlined in the next sections of this HDP.

The existing electricity and gas meters are installed with technology to ensure automatic meter reading (AMR), with the main seven electricity supplies on the main site having capability to send half hourly data. The water meters are in process of being upgraded to AMR technology.

8.2.2 Behaviour Change

It is important that all staff and visitors are encouraged to reduce or eliminate unnecessary wasteful energy consumption. However, for any behaviour change campaign to be successful, it is critical to ensure support and commitment from the senior leadership team. There are many ways to implement a campaign and some mechanisms will work better than others. The communications team should try as many tools as possible, measure the level of engagement and amend as necessary.

A key to a successful behaviour change campaign is to support this through clear and consistent communication strategies. Reinforcing energy saving behaviours and promoting the message that energy reduction is everyone's responsibility can be achieved with a range of tools:

- Dashboards or internal reporting
- Stickers and posters
- Relevant pages on the Trust's website
- Staff newsletters
- Screensavers

A behaviour change campaign needs to be accompanied by a clear and comprehensive communication strategy in which different audiences are identified so that tailored messages can be delivered to these audiences.

In addition to a behaviour change program, responsibility for energy reduction should be incorporated into relevant job roles. Furthermore, incorporating energy KPIs into established senior leadership reporting mechanisms helps to keep energy consumption on the agenda and provides targets to measure progress.

Procurement accounts for a large proportion of carbon emissions, so it important to apply life cycle thinking. For example, the decision-making process for the procurement of electrical appliances should consider the product's energy efficiency, running costs and disposal. Although policy has a role to play, the Procurement department has a supportive role in helping departments make fully informed decisions in relation to the energy use of purchased goods.

Whilst it can be difficult to estimate the savings that the provision of a comprehensive behaviour change programme can achieve, the Carbon Trust suggests that this should lead to savings in the order of 10%, with a typical budget between 1% and 2% of the total annual utility cost required to create a successful behaviour change programme.

8.2.3 Building Management System (BMS)

The Trust should consider replacing the existing Building Management System (BMS) on the main site, possibly including connectivity to the community sites. The main site is currently monitored by a Schneider Electric Satchwell Sigma BMS system located within the Estates office; this is approximately 25-years old and is now obsolete. The Trust would benefit from a new BMS with more user-friendly interfaces. This would facilitate the ongoing control and monitoring of the energy use.

BMS operational checks and service works are carried out monthly by Schneider Electric. Notably, the contract with Schneider is based on eight days per month, which appears to be entirely required to react to day-to-day issues and to maintain the systems ongoing operation. Due to the significant volume of reactive work being undertaken to keep the plant equipment running, the BMS energy optimisation prospective is being neglected at present.

Most buildings are fitted with modulated controls (weather compensated heating slopes) that allows the temperature of the hot water for heating to be adjusted according to the outside air temperature. These slopes may be better programmed in some instances and, thereby, reduce the energy consumption associated with unnecessary heating requirements.

Temperature setpoint dead-bands do not appear to be set for several systems, and where set these could be often widened to 4°C (+/- 2°C). Implementing appropriate control dead-bands would help to reduce energy consumption and associated costs on both heating and cooling circuits, that would otherwise result from simultaneous heating and cooling.

Theatre areas may benefit from PIR sensors to control the setback operation, with temperature and air speed operating at lower levels, until activated.

The replacement of the existing BMS serving the main site, with connectivity to the Clifden Road houses and the community sites, is expected to save 10% in energy use.

8.3 Step 2: Energy Efficiency - Buildings Fabric Improvements

The second stage of the proposed strategy targets energy saving opportunities relating to building fabric and services equipment. The building fabric refers to the roof, walls, windows, floors and doors. Taking a "fabric first" approach is fundamental to the energy performance of a building and this section details the recommended improvements and their impact on heat loss. Other measures include LED lighting upgrades in areas where inefficient luminaires and lamps are still in place, and the installation of heat recovery devices in HVAC systems.

For building fabric improvement projects, the paybacks may be unrealistic to implement without grant support. It should be noted that no improvement has been recommended where existing fabric performance levels were found to be acceptable, and where it is expected that any interventions would only have a small impact on overall heat loss.

8.3.1 LED Lighting

The Trust should undertake the fourth and the last phase of LED lighting upgrades in order to update the remaining areas that require a lighting replacements with LED fittings. Through the most recent Phase 3 of the LED lighting project (2021/22), the Trust installed approximately 570 LED light fittings in several areas of the hospital estate.

As part of the first three phases of the project, LED fittings were installed throughout the main site and the corridors in Mary Seacole Nursing Home. However, most of the smaller buildings and the community sites have either no LED fittings or only between 10% and 30% LED fittings installed.

[INFORMATION REDACTED] has recently carried out a LED assessment to determine the remaining areas that require a lighting replacement, as well as to ascertain how much energy could be saved if LED fittings were installed. The results showed that over 5,100 LED lights could be installed, saving approximately 980,000kWh per year from reduced electricity usage.

Table 9 details the various areas that require LED lighting upgrades in addition to the associated load reductions within each of the areas.

Site Name	Building Name	Area	Load Reduction (W)	Annual Electricity Reduction (kWh)
Homerton Hospital (main site)	Block 1	ACU	2,723	16,850
		ASKF	2,890	17,883
		Cardiology	2,091	12,939
		Care of Elderly	2,890	17,883
		Core Offices	4,573	10,701
		Edith Cavell	2,890	17,883
		Lamb	2,890	17,883
		Office	2,632	6,159
		Plantroom	1,040	3,191
	Block 2	Bryning Ward	2,878	17,809
		Core Offices	327	765
		DEFOE Ward	2,516	15,569
		Graham Ward	3,456	21,386
		Neonatal	3,160	19,554
		Nicu	1,948	12,054
		Office	2,378	5,565
		Physio	3,894	9,112
		Picton	3,007	18,607
		Plantroom	1,040	3,191
		Templar	2,460	15,222
	Block 3	2012	750	4,641
		Antenatal	2,232	13,812
		Cardio	3,422	21,175
		Delivery	3,055	18,904
		Diabetes	2,289	5,356
		Plantroom	3,861	11,846
		Priestley	1,865	11,541
		Retinal Screen	2,749	6,433
		Theatres	10,130	62,684
		MRI	849	3,708
		Ultrasound	1,010	2,363
		XRAY	824	3,599
		Pathology - Breast Screen	539	1,261
		Pathology - XRAY	1,557	6,801
	Block 3a	Corridor	78	183
		Fertility	2,513	5,880
		Plantroom	570	1,749
		Starlight Ward	686	4,245
	Block 3b	Delivery Unit	3,835	23,731
		OPD	3,447	10,575
	Block 4	A&E	1,490	13,017
		Corridor	689	1,612
		Female Change	363	2,246
		IT	2,546	8,341
		Kitchen	2,020	10,294
		Male Change	522	3,230
		MDU + PUCC	765	4,734
		Pharmacy	3,383	20,934
		Plantroom	4,128	12,665
	Block 5	Corridor	297	695
		Day Case	5,780	35,767
		Endo	3,431	8,029
		Gardener Ward	4,408	27,277
		Junction Day Centre	1,945	4,551

Site Name	Building Name	Area	Load Reduction (W)	Annual Electricity Reduction (kWh)
		Mother & Baby Unit	3,363	20,810
		Perinatal	706	1,652
		Pharmacy	1,067	6,603
		Plantroom	813	2,494
		SAU Offices	1,430	3,346
		Therapy & Life Skills	1,691	3,957
		Tuke	2,350	14,542
	Block 6	RNRU	920	5,693
		Bevan	3,416	21,138
		Brett	2,871	17,766
		Joshua	3,096	19,158
		Raybould Centre	2,048	4,792
		Ruth Seifert	2,871	17,766
	Education Centre	Education Centre	14,432	63,039
	Clifden Centre	Clifden Centre	5,774	25,221
	Chatsworth House	Chatsworth House	3,272	7,656
		Offices	1,992	4,661
	44 Clifden Road	44 Clifden Road	2,047	4,790
	46-48 Clifden Road	46-48 Clifden Road	3,729	8,725
	50-52 Clifden Road	50-52 Clifden Road	4,022	9,410
	54-56 Clifden Road	54-56 Clifden Road	4,022	9,410
	62 Clifden Road	62 Clifden Road	1,462	3,422
Mary Seacole Nursing Home		Mary Seacole Nursing Home	4,920	42,980
Redbridge Retinal Screening		Redbridge Retinal Screening	1,848	4,324
Fountayne Road		Fountayne Road	10,068	23,592

Table 9 Load and electricity reductions with LED upgrade

8.3.2 Air Handling Units (AHUs)

Since most of the existing AHUs are not fitted with any heat recovery device, the recommendation of installing 'run around coil' systems was identified for these AHUs. Heat recovery in HVAC systems typically exchanges heat between the discharged room air and the fresh air being introduced from outdoors, thereby reducing demand on heating coils. The duty of each AHU was investigated, and the associated energy savings estimated, assuming a conservative heat recovery efficiency of 50%.

Table 10 details the identified units and their locations.

Site Name	Building Name	Location	AHU Ref.	Area Served
Homerton Hospital (main site)	Block 1	Block 1	AHU A	Unknown
		Block 1	AHU B	Unknown
		Block 1	Edith Cavell	Edith Cavell Ward
		Block 1	Elderly Care	Elderly Care
		Block 1	ECU	ECU
		Block 1	AHU A	Unknown
	Block 3	Plantroom 5	Plant F	Unknown
		Plantroom 5	AHU H	Radiology
		Plantroom 5	AHU N	ITU
		Plantroom 5	Plant 2N	New ITU
		Roof	AHU EPAU	Emegancy Pregnacy Assesment Unit
		Plantroom 5	Plant F	Unknown
		Plantroom 7	AHU M	Theatre 1

Site Name	Building Name	Location	AHU Ref.	Area Served
		Plantroom 7	AHU L	Theatre 2
		Plantroom 7	AHU K	Theatre 4
		Plantroom 7	AHU J	Theatre 5
	Block 3a	Plantroom 3a	AHU 3	24hr Supply
	Block 4	Plantroom 3	AHU P	Unknown
		Plantroom 3	AHU Q	Old Pharmacy
		Plantroom 3	AHU R	Mortuary
		Plantroom 3	AHU S	Kitchen
		Plantroom 3	AHU T	Dining Room
		Plantroom 3	AHU P	Unknown
	Block 5	South Block	AHU 4	Gardener Ward
		South Block	AHU 5	ECT/DDU
		South Block	AHU 6	E London/Moth + Baby/ELMH
		South Block	AHU 8	Day Stay General + Perinatal
		South Block	AHU 9	Colposcopy, Tuke Ward
	Block 6	North Block	AHU 1	Bevan & Joshua Wards
		North Block	AHU 2	Brett, Connolly & Ruth Sdeifert Wards
		North Block	AHU 3	Raybould Centre
		North block	AHU 7	RNRU

Table 10 List of AHUs requiring run around coils

It important to note that several units were found to be in excess of 30 years old and, therefore, there is significant risk of component failure. As a result, an overall consideration should be given to replacing this equipment. Notably, HTM03-01 suggests replacement of AHU's aged 20 years or more.

Furthermore, several air handling units consist of belt driven centrifugal fans driven by two motors (run and stand-by). Changing a belt driven fan for a high efficiency directly driven equivalent is expected to reduce the associated energy consumption by at least 30%. This technology should be incorporated into new replacement equipment.

8.3.3 Windows

Most windows are single glazed, with some double-glazed windows across the main site's blocks built after 1984 (i.e. Blocks 3A, 3B, 5 & 6, Education Centre, Clifden Centre and Brooksby House) and the community sites. Windows are currently estimated to account for 18% of the total heat loss.

Single glazed windows should be replaced with a low emissivity double glazing to minimise energy waste and reduce heating requirements. ***Table 11*** details the percentage of heat loss that would be saved by replacing all windows with low emissivity double glazing.

Site Name	Building Name	Recommended Improvement	Bldg Heat Loss Reduction with Windows Improvement (%)
Homerton Hospital (main site)	Block 1	Low emissivity double glazing	37.7%
	Block 2	Low emissivity double glazing	37.5%
	Block 3	Low emissivity double glazing	35.0%
	Block 3a	No improvement needed	-
	Block 3b	No improvement needed	-
	Block 4	Low emissivity double glazing	31.2%
	Block 5	No improvement needed	-
	Block 6	No improvement needed	-
	Education Centre	Low emissivity double glazing (no	43.3%

Site Name	Building Name	Recommended Improvement	Bldg Heat Loss Reduction with Windows Improvement (%)
		improvement needed for 2001 extension)	
	Clifden Centre	Low emissivity double glazing (some double-glazed windows across building)	42.1%
	Brooksby House	No improvement needed	-
	Chatsworth House	Low emissivity double glazing	33.9%
	44 Clifden Road	Low emissivity double glazing	31.2%
	46-48 Clifden Road	Low emissivity double glazing	28.8%
	50-52 Clifden Road	Low emissivity double glazing	27.7%
	54-56 Clifden Road	Low emissivity double glazing	27.7%
	62 Clifden Road	Low emissivity double glazing	25.7%
Mary Seacole Nursing Home		No improvement needed	-
Redbridge Retinal Screening		Low emissivity double glazing (most windows are already double-glazed)	11.7%
Fountayne Road		No improvement needed	-

Table 11 Building heat loss reduction with window improvement

The table above details the minimum recommended improvement to low emissivity double glazing, so where triple glazing can be fitted instead of double glazing, the energy reductions would be greater.

It is important to note that behaviour change also has a role to play. To reduce the loss of heated or cooled air, windows should be kept closed when heating or air-conditioning systems are in operation.

8.3.4 Walls

Around 13% of the current heat lost in the building portfolio is estimated to take place through the fabric of the walls. Improvements to the wall thermal capacity can be achieved by installing external/internal insulation or cavity insulation.

Installing cavity wall insulation is relatively simple, preferably with expanded polystyrene beads. The procedure causes minimal disruption to building occupants, making it suitable to carry out at any time. Alternatively, the most common and effective method of insulating solid walls is by applying insulation boards to the outer surface of the building and protecting it with a specialist render system. This method can bring several benefits, such as reduced opportunities for thermal bridging and retention of thermal mass on the inside of the building, however, it is generally more expensive than cavity wall insulation.

As a result, cavity insulation is always recommended where feasible and external insulation is proposed for solid walls. Whilst internal wall insulation is a less expensive option, external insulation is preferred in order to avoid any loss of space or disruption to building occupants. Furthermore, internal insulation requires specialist advice to overcome potentially significant risks, such as the introduction of unavoidable thermal bridging due to not being able to achieve a complete covering.

Table 12 shows the savings in heat loss that can be achieved when upgrading to current standards.

Site Name	Building Name	Recommended Improvement	Bldg Heat Loss Reduction with Walls Improvement (%)
Homerton Hospital (main site)	Block 1	Cavity wall insulation	18.2%
	Block 2	Cavity wall insulation	18.1%
	Block 3	Cavity wall insulation	16.9%
	Block 3a	No improvement needed	-
	Block 3b	No improvement needed	-
	Block 4	Cavity wall insulation	15.1%
	Block 5	No improvement needed	-
	Block 6	No improvement needed	-
	Education Centre	No improvement needed	-
	Clifden Centre	No improvement needed	-
	Brooksby House	No improvement needed	-
	Chatsworth House	External wall insulation	31.8%
	44 Clifden Road	External wall insulation	39.0%
	46-48 Clifden Road	External wall insulation	36.1%
	50-52 Clifden Road	External wall insulation	34.7%
	54-56 Clifden Road	External wall insulation	34.7%
	62 Clifden Road	External wall insulation	32.2%
Mary Seacole Nursing Home		NA - Trust only owns part of the building	-
Redbridge Retinal Screening		External wall insulation	51.1%
Fountayne Road		Cavity wall insulation	39.7%

Table 12 Building heat loss reduction with walls improvement

8.3.5 Roofs and Lofts

Throughout the survey of the main site, several buildings were found to have roof insulation installed. At the same time, the 1984 blocks and the smaller buildings to the north and east of the site were found to have perishing loft insulation, or no insulation at all.

Installing loft insulation in an uninsulated pitched roof, or upgrading existing insulation, is generally the most cost-effective way to reduce heat loss through the roof. Blocks 1, 2, 3 and 4 would benefit substantially from this measure to reduce the rate of heat transfer through the roof structure.

Table 13 details the estimated savings from heat loss reduction, per building, when upgraded to current standards.

Site Name	Building Name	Recommended Improvement	Bldg Heat Loss Reduction with Roofs & Lofts Improvement (%)
Homerton Hospital (main site)	Block 1	Loft insulation	21.1%
	Block 2	Loft insulation	21.3%
	Block 3	Loft insulation	24.8%
	Block 3a	No improvement needed	-
	Block 3b	No improvement needed	-
	Block 4	Loft insulation	30.0%
	Block 5	No improvement needed	-
	Block 6	No improvement needed	-
	Education Centre	No improvement needed	-
	Clifden Centre	No improvement needed	-
	Brooksby House	No improvement needed	-
	Chatsworth House	Pitched roof insulation	18.1%

Site Name	Building Name	Recommended Improvement	Bldg Heat Loss Reduction with Roofs & Lofts Improvement (%)
	44 Clifden Road	Pitched roof insulation	13.6%
	46-48 Clifden Road	Pitched roof insulation	19.2%
	50-52 Clifden Road	Pitched roof insulation	21.8%
	54-56 Clifden Road	Pitched roof insulation	21.8%
	62 Clifden Road	Pitched roof insulation	26.8%
Mary Seacole Nursing Home		Loft insulation (owned part)	14.2%
Redbridge Retinal Screening		Flat roof insulation	18.3%
Fountayne Road		Flat roof insulation	37.3%

Table 13 Building heat loss reduction with roofs and lofts improvement

8.3.6 Floors

Floor areas of many of the buildings are considered to have low heat loss. Given the complexity of intervention and the minimal impact in overall heat loss, no site-wide floor upgrade was recommended. However, where flooring is being replaced from dilapidation, low U-value flooring should be installed with under floor insulation where possible.

8.4 Step 3: On-site Renewable Power Generation

Renewables should be implemented as part of the third period of transition. Given the increase of overall electricity demand due to electrification of heat (fourth and final step), on site renewable electricity generation projects can reduce the impact on local electrical infrastructure, and the need for upgrade.

8.4.1 Solar Photovoltaic (PV)

The solar survey undertaken by [INFORMATION REDACTED] in April 2022 identified that there is the potential for approximately 2MW of Solar PV which could be deployed on the main site.

Table 14 highlights the buildings that are viable options for solar PV, as well as the total power of each array and the electricity generated annually. Cumulatively, there is potential for 1,900,000 kWh/year from solar PV. Calculations are based on PV panels rated at 405W each, and a specific annual yield of 838.13 kWh/kWp.

Site Name	Building Name	PV Output (kWp)	Annual Electricity Generation (kWh/year)
Homerton Hospital (main site)	Block 1	388	325,194
	Block 2	391	327,709
	Block 3	263	220,428
	Block 3a	110	92,194
	Block 3b	58	48,276
	Block 4	181	151,534
	Block 5	72	60,345
	Block 6	424	355,367
	Education Centre	73	61,183
	Clifden Centre	41	34,481
	Brooksby House	176	147,511
	Chatsworth House	Area technically not suitable	
	44 Clifden Road	Area financially not viable	

Site Name	Building Name	PV Output (kWp)	Annual Electricity Generation (kWh/year)
	46-48 Clifden Road	Area financially not viable	
	50-52 Clifden Road	Area financially not viable	
	54-56 Clifden Road	Area financially not viable	
	62 Clifden Road	Area financially not viable	
Mary Seacole Nursing Home		21	17,573
Redbridge Retinal Screening		10	8,422
Fountayne Road		58	48,399

Table 14 Electricity generation from solar PV

Based on the above, as well as the assumption that all the energy produced by the PV panels will be used on site, the Trust can provide up to 18.6% of the current grid electricity annual demand through self-generation.

8.5 Summary of Proposed Measures (Steps 1, 2 & 3)

Table 15 provides a summary of the optimisation opportunities detailed within the previous sections (8.2, 8.3 and 8.4) and the estimated reduction in energy demand.

		Step 1 Energy Use Reduction		Step 2 Energy Efficiency			Step 3 Renewables
Site Name	Building Name	Behaviour Change	BMS	LED	AHUs	Building Fabrics	Solar PV
		Annual Reduction (kWh)	Annual Reduction (kWh)	Annual Reduction (kWh)	Annual Reduction (kWh)	Annual Reduction (kWh)	Annual Reduction (kWh)
Homerton Hospital (main site)	Block 1	295,860	361,606	121,373	176,143	331,318	325,194
	Block 2	295,035	360,598	138,834	-	325,352	327,709
	Block 3	442,718	541,099	174,125	472,511	454,791	220,428
	Block 3a	208,618	254,977	12,057	112,752	-	92,194
	Block 3b	47,929	58,580	34,306	-	-	48,276
	Block 4	302,246	369,412	77,072	235,526	291,445	151,534
	Block 5	210,758	257,593	129,722	360,806	-	60,345
	Block 6	238,194	291,126	86,313	285,638	-	355,367
	Education Centre	79,845	97,588	63,039	-	60,920	61,183
	Clifden Centre	46,892	57,313	25,221	-	42,405	34,481
	Brooksby House	61,500	75,166	-	-	-	147,511
	Chatsworth House	12,056	-	12,318	-	107,933	-
	44 Clifden Road	3,263	-	4,790	-	38,906	-
	46-48 Clifden Road	5,943	-	8,725	-	46,882	-
	50-52 Clifden Road	6,409	-	9,410	-	48,814	-
	54-56 Clifden Road	6,409	-	9,410	-	48,814	-
	62 Clifden Road	2,331	-	3,422	-	19,973	-
Mary Seacole Nursing Home		54,057	-	42,980	-	22,344	22,344
Redbridge Retinal Screening		4,544	-	4,324	-	51,432	51,432
Fountayne Road		29,166	-	23,592	-	106,071	106,071

Table 15 Energy conservation measures summary

8.6 Step 4: Low Carbon Heating

By implementing the recommendations across the previous three stages, the Trust can optimise its energy consumption to minimise peak electrical and thermal energy demand, as well as reduce its reliance on the national grid. The final step of the recommended heat decarbonation route requires replacement of all fossil fuel systems to electric heating and hot water solutions.

8.6.1 Low Carbon Heat Technologies

Several sources of heat generation were considered to decarbonise the hospital's heat demand, including currently available technologies such as biomass or direct electric boilers. However, these have been discounted as viable options to decarbonise heat in this HDP on the reasons outlined within ***Table 16***.

Low Carbon Heat Technology	Rationale for omission
Biomass	High operating costs Resilience, space and safety challenges associated with delivery and storage of fuel
Direct Electric	High operating costs Large supporting electrical infrastructure required
Solar Thermal	High capital cost Utilises space that could be used for solar PV systems
Hydrogen	Projected high operating cost Unlikely to be entirely zero carbon Technology not expected to be available within initial part of decarbonisation timescale

Table 16 Low carbon heat technologies considered unviable

With the technologies outlined in the table above deemed unsuitable, the heating option that has been selected to deliver the widescale heat decarbonisation, is heat pumps. As the compressor and other pieces of equipment within a heat pump are electrically driven, heat pumps are able to take advantage of the decarbonising grid to provide a low carbon heat source.

8.6.2 Heat Pumps

The major advantage that heat pumps have over direct electric heating system is efficiency. The efficiency of a heat pump is referred to as its coefficient of performance (COP) and this typically ranges between 2 and 4. Therefore, for every 1kW of electricity input, 2-4kW of heat output can be delivered. When compared to the efficiency of an electric boiler (COP of 1), the utilisation of a heat pump requires significantly less electricity, which makes the technology much more affordable to operate, and the supporting electrical infrastructure not as highly rated.

The COP of a heat pump is dependent on the temperature difference between the heat source (e.g. air, ground, water) and the flow temperature of the heating system. The greater this difference, the lower the COP will fall and, therefore, more electricity will be needed to achieve the same level of heating thus increasing operational costs. For this reason, any heating systems being supplied with heat pumps should be operated at as low a temperature as possible.

Where a heat pump is to be retrofit into a building which was previously supplied with heat from boilers, there are generally a range of enabling works which may be required. Notably, most of the gas boilers at Homerton Hospital were originally designed to operate at 80°C, whereas a heat pump should be designed to run at closer to 50°C to maximise its efficiency. With this in mind, enabling works should be carried out to convert the secondary heating network and replace the heat emitters (i.e. radiators and AHU coils) with larger-surface area equivalents, which enable the same quantity of heat to be emitted at lower temperatures.

Nevertheless, due to the very high capital costs associated with these enabling works and the significant DHW loads present on site, 'high temperature' Air Source Heat Pump (ASHP) systems with the ability to supply primary hot water temperatures up to 80°C are recommended. On this basis heat pump conversion can be applied to all buildings in a relatively straightforward manner without significant alteration to the existing heat distribution systems.

Table 17 details the recommended heat pump capacity for each area or building. Sizes were calculated with peak heat loss of each building after the implementation of Step 1 and Step 2 to ensure systems are not oversized following improvements. Capacity calculations were based on a seasonal COP of 2.2 being achieved by the new heat pumps.

Site Name	Building Name	Heat Pump Output Load (kW)	Heat Pump Capacity (kW)
Homerton Hospital (main site)	Blocks 1,2,3,3a,4	1,726	785
	Block 3b	72	33
	Blocks 5,6	764	347
	Education Centre	49	22
	Clifden Centre	36	16
	Brooksby House	67	31
	Chatsworth House	16	7
	44 Clifden Road	4	2
	46-48 Clifden Road	6	3
	50-52 Clifden Road	7	3
	54-56 Clifden Road	7	3
	62 Clifden Road	3	1
Mary Seacole Nursing Home		64	29
Redbridge Retinal Screening		7	3
Fountayne Road		29	13

Table 17 Heat pumps output load and capacity

Due to the utilisation of electricity within heat pumps, the current electrical infrastructure will have to be improved to ensure the various stages of equipment installation will have sufficient capacity. Based on the electrical infrastructure review outlined in ***Section 6*** of this HDP, it is evident that there is insufficient existing spare electrical capacity at peak demand for the new ASHP systems and subsequentially the Trust will not be able to decarbonise without a site capacity increase.

Costs for these upgrades will vary dependent on the selected option and final design of each decarbonisation solution. This will form a future piece of work for the Trust. Further study will be also necessary to determine potential space available for locating the units, as well as the noise emission limits.

9 ENERGY AND CARBON IMPACT

Figure 5 highlights the projected impact of the decarbonisation projects outlined in prior sections on the Trust's carbon emissions in 2040.

The first bar represents the carbon emissions associated with energy use in 2023. Decarbonisation of the national electricity grid is forecast to reduce emissions by 35% with energy efficiency, building fabric and solar PV opportunities saving a further 28% resulting in annual emissions of 1,884 tCO_2e following optimisation projects.

In order to meet the 80% carbon reduction target, set by NHS England, the transition from boilers to air source heat pumps will have to start before 2032. This will eliminate a further 17% of emissions to leave just 1,005 tCO_2e in 2032. The remaining carbon emissions can then be mitigated by transitioning away from the remaining gas.

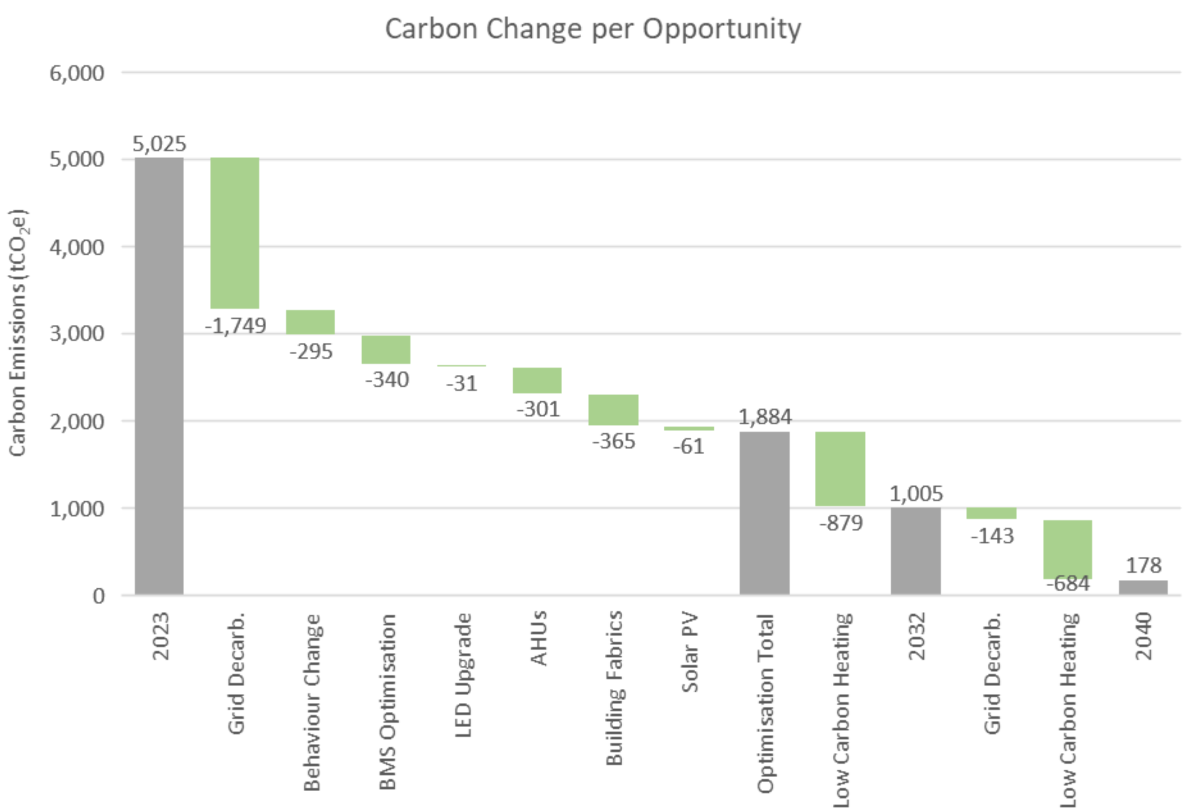


Figure 5 Carbon change per opportunity

Figure 6 shows the projected annual carbon emissions through implementing each of the decarbonisation projects compared with the annual carbon emissions in the Business as Usual (BAU) scenario.

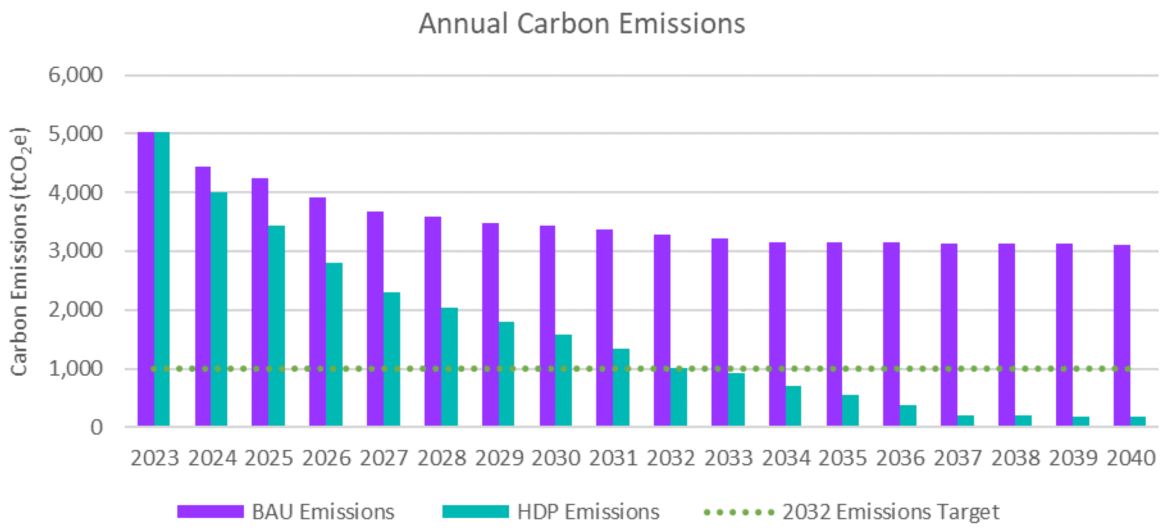


Figure 6 BAU vs HDP annual carbon emissions

10 ESTIMATING COST

Table 18 summarises the estimated costs of each opportunity whilst also including the impacts on annual utility costs. The savings identified in this table combine both heat and electricity costs, and are based on the current utility rates. Budget costs were determined using a combination of supplier quotes following surveys, cost factors published in literature and experience of similar project delivery within other Trusts.

		Step 1 Energy Use Reduction		Step 2 Energy Efficiency					Step 3 Renewables	Step 4 Low Carbon Heat
Site Name	Building Name	Behaviour Change	BMS	LED	AHUs	Glazing	Wall Insulation	Roof Insulation	Solar PV	Heat Pump
Capital Budget		£XXXXX	£XXXXX	£XXXXX	£XXXXX	£XXXXX	£XXXXX	£XXXXX	£XXXXX	£XXXXX
Annual Operational Cost Impact		-£XXXXX	-£XXXXX	-£XXXXX	-£XXXXX	-£XXXXX	-£XXXXX	-£XXXXX	-£XXXXX	£XXXXX
Payback Period (Years)		X.X	X.X	X.X	X.X	X.X	X.X	X.X	X.X	NA

Table 18 CAPEX and OPEX impact for each opportunity

Figure 7 shows the operational cost change for each opportunity, with the modelling assumption of continued 2023 utility prices.

The first bar represents the total costs associated with energy use in 2023 excluding Climate Change Levy (CCL) and standing charges. Energy efficiency, building fabric and solar PV opportunities are forecast to reduce utility costs by 47% following optimisation projects.

Switching to air source heat pumps will have a negative impact on utility costs, causing an increase in costs after all optimisation measures have been implemented. However, the implementation of all decarbonisation projects will drive down total energy costs by 9% in 2040 from the 2023 costs.

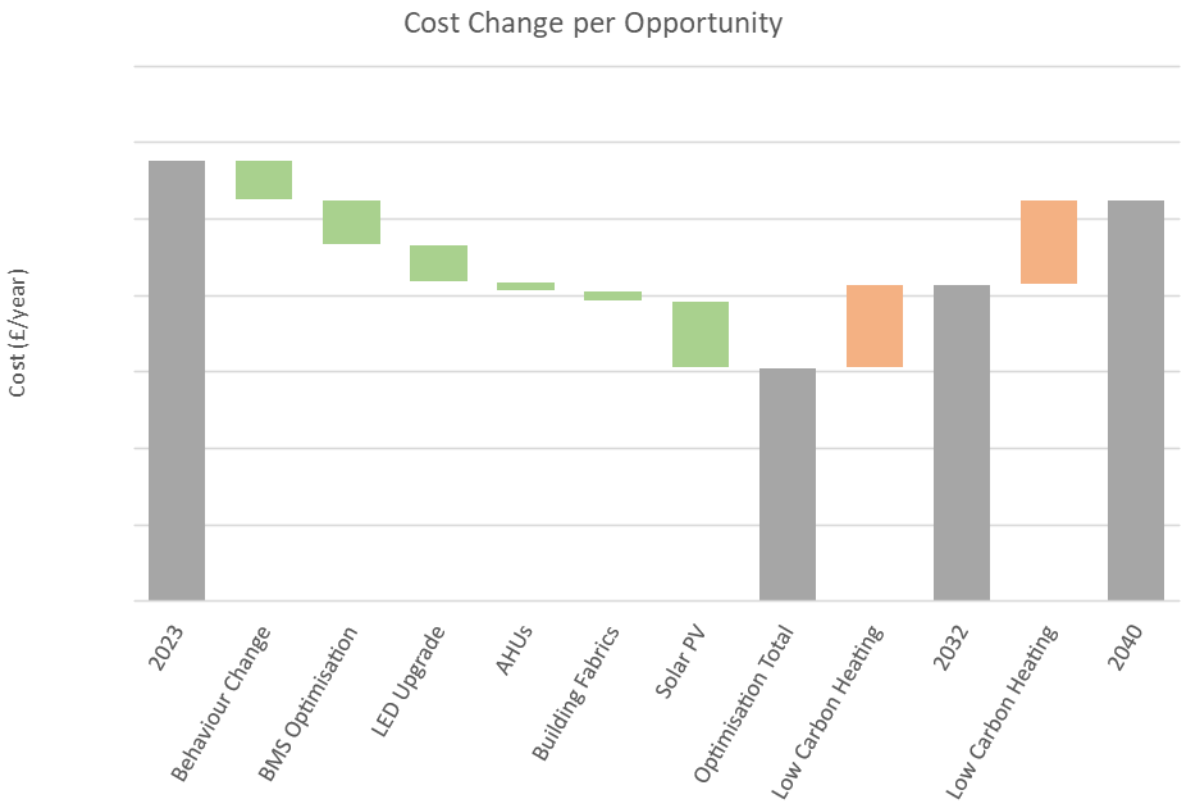


Figure 7 Energy cost change per opportunity

To achieve the decarbonisation and energy reductions detailed in this HDP, the Trust will need to invest financial resources from 2024 to 2040. This can be obtained from capital or alternative funding options. Ideally, projects that have longer payback periods (i.e. grazing, wall and roof insulation, heat pumps) should be undertaken when funding options are available.

Figure 8 shows the projected annual operational cost (continued 2023 utility prices), along with the annual capital investment required to implement the decarbonisation programme.

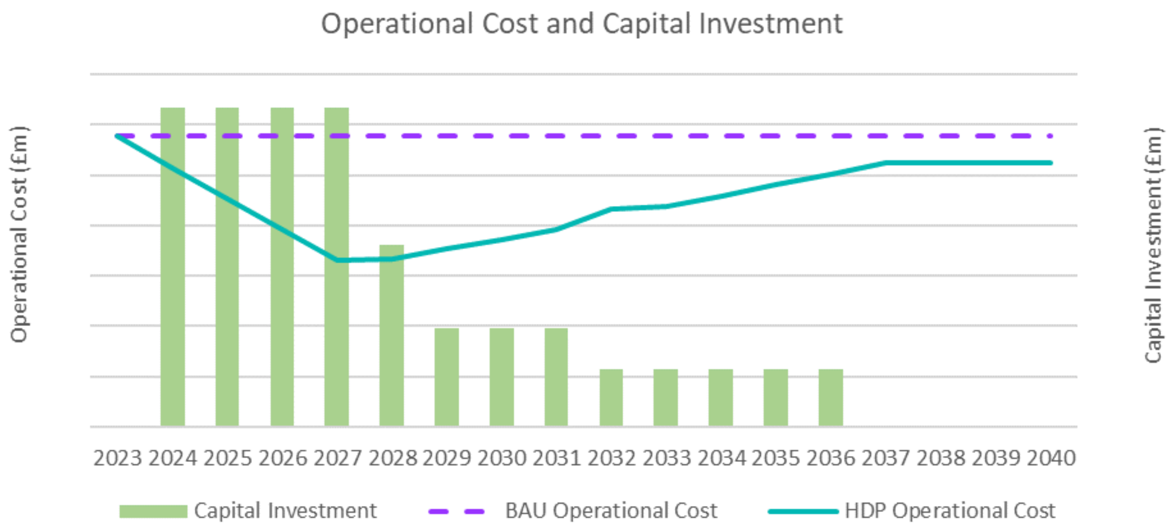


Figure 8 Annual operational cost and capital investment

11 DELIVERY PLAN AND RESOURCES

11.1 Project Phasing

Figure 9 outlines an indicative timeline for the implementation of the Trust's heat decarbonisation programme. It should be noted that this is provisional and will be largely dependent on successfully securing suitable sources of funding (discussed in further detail in section 11.3).

The proposed timeline shows that the short-term priorities for the Trust are the implementation of the energy efficiency projects detailed in sections 8.2, 8.3 and 8.4, as well as the progression of enabling works to transition to widescale deployment of low carbon heating systems.

Furthermore, over the next five years, it will be important for the Trust to re-evaluate the opportunity of connecting into a local District Heating Network, as well as reassess the low carbon heat technology landscape to consider whether the long-term strategy needs to incorporate other options.

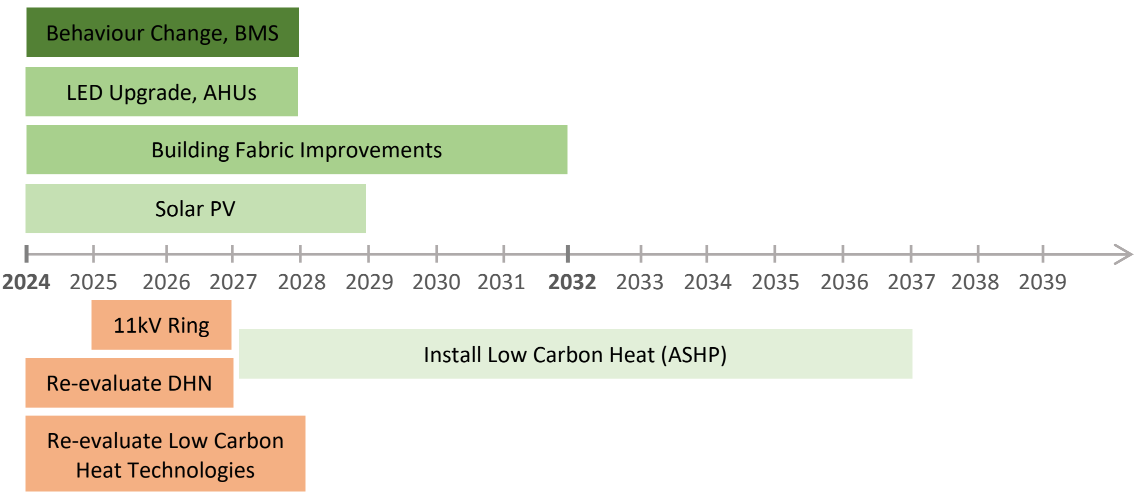


Figure 9 Indicative project phasing

11.2 Resourcing

Planning and implementation of the projects outlined within this HDP will be led by Estates & Facilities. Since the Trust's capital budget is under pressure, financial resourcing will be dependent on the availability of grant funding. Furthermore, the Trust's project management resource is currently constrained below the expected scale demanded by works of this scope.

As a result, it is anticipated that, to ensure a successful delivery of the multiple projects outlined, a full time Project Manager (PM) would need to be hired. For a project manager within the NHS, this would typically require a budget of £60,000 per annum. When budgeting for this and other project costs, a 'rule of thumb' will be applied for project costs calculated at 2.5% of the total capital expenditure.

The PM will be responsible for engaging suppliers and tendering for the project works, ensuring continued operations of the heating and electrical infrastructure during project installation, commissioning and performance testing, among other things.

It is also anticipated that the Trust will need continued external, independent, expert consultancy support to ensure the delivery of the decarbonisation programme. This will help to ensure value for money for capital monies expended, and that decarbonisation targets are achieved.

11.3 Funding Options

The significant capital costs involved with delivering the entirety of the heat decarbonisation scope outlined in this report is unlikely to be available within the Trust's standard capital programme. As a result, it is critical that alternative options for funding elements are considered and pursued.

Initially launched in September 2020 and currently in its third phase, the Public Sector Decarbonisation Scheme (PSDS) administered by Salix Finance provides grants for public sector bodies to fund heat decarbonisation and energy efficiency measures. Given the scale of the challenge of decarbonising heat across the public sector, both from a complexity and cost perspective, it is anticipated that there will be future phases of the PSDS or similar grant-based schemes. Without further PSDS phases (or equivalents) it is difficult to see how significant progress can be made to the ambitious net zero targets set by the NHS. It is therefore critical that the Trust maximises its chances of successfully securing grant funding to deliver the projects laid out in this HDP.

Grant funding represents the most favourable route for the Trust to fund its heat decarbonisation programme, but it is conceivable that this option will not provide all or any of the funding required to support the net zero agenda. In this case, alternative schemes to be considered include Energy Performance Contracting (EPC) approaches: funds such as the Mayor of London Energy Efficiency Fund (MEEF) or procurement initiatives such as the Re:fit programme may be utilised to deliver specific elements of the HDP.

11.4 Measurement and Verification (M&V)

Measurement and Verification (M&V) should be an integral part of any major energy project and development of a plan to monitor energy savings from the various projects outlined in previous sections of this report is recommended. To collect the necessary data for effective M&V the aim within each project is to include the installation of relevant types of meters to existing and new infrastructure.

As the energy savings cannot be directly measured, since they represent the absence of energy use, savings must be determined by comparing measured consumption before and after implementation of the project, making appropriate adjustments for changes in conditions. ***Figure 10*** is extracted from International Performance Measurement and Verification Protocol (IPMVP) and illustrates this principle.

A baseline period must be selected to best determine the changes made by the various projects. This baseline will use actual data and cover a period of 12 months of 'normal' operation. Normalisation factors (e.g. HDD and occupancy rate) need to be utilised to allow for changes to energy consumption from variables such as weather and occupancy to be accounted for, which is key to ensuring the true benefits of the projects are determined.

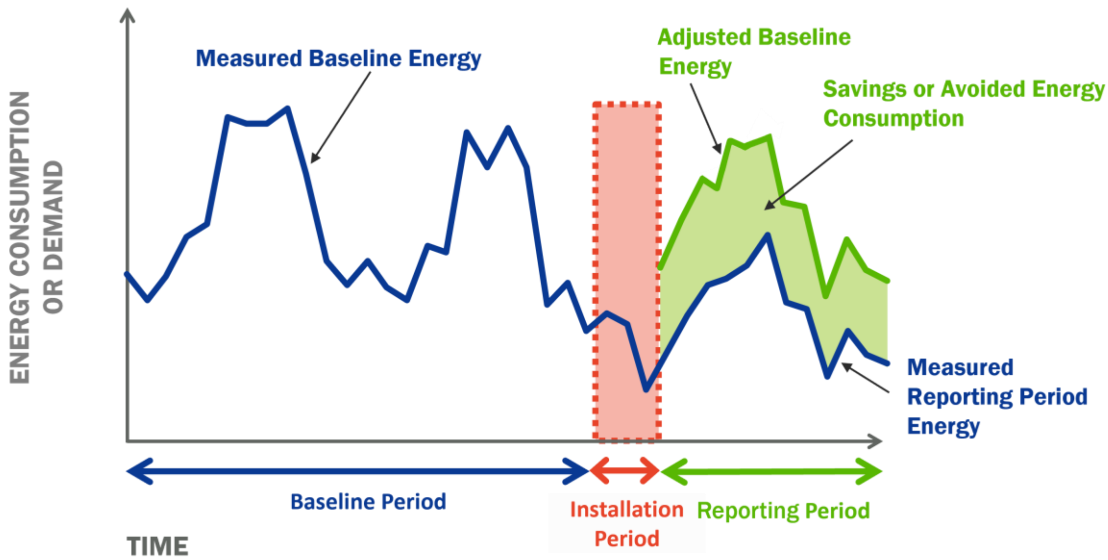


Figure 10 Illustration of standard M&V approach from IPMVP

11.5 Risk Register

Although risks associated with the delivery of individual projects will be captured within the capital projects process, ***Table 19*** outlines the identified key challenges (i.e. barriers or key risks) at this stage.

Description of Risk	Level	How will the risk be managed
Lack of funding to complete the implementation	High	As an alternative to Trust capital or grant funding, the Trust may opt for an Energy Performance Contract (EPC) or, alternatively, an Energy Service Agreement (ESA) whereby the equipment is fully owned and operated by the supplier. This comes with higher service costs but avoids the capital constraints.
Insufficient electrical site capacity to deploy low carbon heating systems	Critical	The delay in deployment of low carbon heating systems may provide UKPN with suitable time to upgrade the 6.6KV network to 11kV; this upgrade would then be the responsibility of UKPN rather than the Trust. However, until this is is confirmed the Trust should plan over the next five years to provide their own 11kV network.
Changes to the decarbonisation options available	Moderate	Exploration of potential DHN and a full re-evaluation of available low carbon heating technologies will be carried out before 2028.
Insufficient provision of internal human resourcing	Critical	A limited internal resource is present to drive the HDP; more support will be sourced as needed.
Trust senior management not being engaged	Low	The HDP will be reviewed annually; the various stakeholder involved will continue to raise the profile of this agenda.

Table 19 HDP risk register

12 RECOMMENDED NEXT STEPS

Homerton Healthcare NHS Foundation Trust will implement the decarbonisation programme with the phased approach detailed in section 11.1, in line with the availability of capital through various forms, including capital budgeting and external grants or loans. In order to progress these opportunities further, other enabling actions will be carried out alongside securing the capital required, which are summarised below:

- Engage potential suppliers relevant to all projects outlined in this report, in order to obtain quotes and timeframes for works, thus enabling the creation of a portfolio of shovel-ready projects. This portfolio will best support applications to funding routes.

- Determine available funding routes for the optimisation and low carbon heating projects, utilising options outlined within section 11.3 of this report.

- Progress other enabling activities that could be investigated whilst Homerton Healthcare NHS Foundation Trust awaits potential funding and in preparation for deployment of low carbon heating sources:

    - Create a detailed submeter plan to obtain maximum visibility of energy consumption at building level. Connect existing and new submeters to collect granular data for future analysis.

    - Engage relevant parties within Hackney Council regarding the potential Homerton district heating network project to investigate the development of this opportunity.

    - Engage the relevant District Network Operator, UKPN, to confirm option available to increase the site capacity and investigate feasibility of replacing the existing UKPN 6.6kV network with a Trust owned 11kV network.

    - Conduct ASHP studies to confirm suitability, locations, infrastructure modifications, and related performance.

13 SUPPORTING INFORMATION

Separate documentation used to support the HDP (e.g. energy consumption data including half hourly data, Display Energy Certificates, floor plans, heat loss calculation for the buildings, images of the systems and building fabric) to be supplied on request.

This Page Has Been Left Intentionally Blank

LCE
12a Marlborough Place
Brighton
BN1 1WN

T: 01273 030154
E: info@lce-gkt.com
W: www.lowco2.uk