Public Document Pack

Cambridge City Council

Performance, Assets and Strategy Overview and Scrutiny Committee

Date: Tuesday, 3 March 2026

Time: 5.30 pm

Venue: Council Chamber, The Guildhall, Market Square, Cambridge, CB2 3QJ [access the building via Peashill entrance]

Contact: democratic.services@cambridge.gov.uk, tel:01223 457000

Agenda

Performance, Assets and Strategy Overview and Scrutiny Committee Members: Porrer (Chair), Gawthrope Wood (Vice-Chair), Clough, Dalzell, Davey, Griffin, Pounds and Sheil

Information for the public

The public may record (e.g. film, audio, tweet, blog) meetings which are open to the public. For details go to:
www.cambridge.gov.uk/have-your-say-at-committee-meetings

For full information about committee meetings, committee reports, councillors and the democratic process:

- Website: http://democracy.cambridge.gov.uk
- Email: democratic.services@cambridge.gov.uk
- Phone: 01223 457013

PERFORMANCE, ASSETS AND STRATEGY OVERVIEW AND SCRUTINY COMMITTEE

27 January 2026
5.30 - 8.25 pm

Present: Councillors Porrer (Chair), Gawthrope Wood (Vice-Chair), Clough, Dalzell, Davey, Griffin, Pounds and Sheil

Officers:

Democratic Services Manager: Dan Kalley
Democratic Services Officer: Sarah Michael
Jody Etherington: Chief Finance Officer (S151)
Jane Wilson: Chief Operating Officer

Other councillors in attendance:

Councillor Karen Young, Chair of Services, Climate and Communities Overview and Scrutiny Committee
Councillor Martin Smart, Cabinet Member for Nature, Open Space and City Services
Councillor Simon Smith, Cabinet Member for Finance and Resources
Councillor Tim Bick, Leader of Liberal Democrat Group
Councillor Mark Ashton (Cherry Hinton Ward)
Councillor Richard Robertson (Petersfield)

FOR THE INFORMATION OF THE COUNCIL

26/1/P&A Apologies for Absence

There were no apologies received.

26/2/P&A Declarations of Interest

A non-pecuniary declaration of interest was made by Councillor Davey in respect of Item 5, as a Director at Cambridge United Football Club.

26/3/P&A Minutes

i. The minutes of the meeting held on 9 December 2025 were agreed as a true and accurate record.

ii. Councillor Pounds gave an update on the Waterbeach railway station reporting that a public consultation would take place and include options to ‘mothball’ or retain the current station.

26/4/P&A Public Questions

There were no public questions.

26/5/P&A Budget Setting Report and Medium Term Financial Strategy 2026/27

Budget Setting Report

The Chief Finance Officer gave a presentation on the Housing Revenue Account (HRA) highlighting the following points:

General:

i. This was the first combined Budget Setting Report (BSR) bringing together the General Fund (GF), HRA, as well as the Medium-Term Financial Strategy (MTFS), HRA 30-year Business Plan, Capital Strategy and the Treasury Management Strategy. Officers hoped this would provide a more holistic view of the Council’s finances.
ii. LGR (Local Government Reorganisation) had made ‘no practical change’ to the 2026/27 budget setting process.

HRA:

iii. There were significant variances between allocated budgets and actual expenditure within the HRA, with an operating overspend of £2.3 million reported in 2024/25, and a further overspend of £3.1 million forecast for 2025/26.
iv. The Council’s capital programme included plans to spend £709m within the HRA over the next 10 years on delivering new homes, energy efficiency and the retrofit of existing stock.
v. External consultants, Savills, had been employed to review the HRA budget and 30-Year Business Plan.
vi. Ongoing (revenue) bids and pressures totalling £2.2 million per year had been identified with the bulk to be spent on housing repairs. Much of the

investment would be funded through rent convergence, expected to generate an additional £2.1 million per year by 2030/31.

vii. The Business Plan has been refreshed, and officers confirmed that the 10-year new homes programme was affordable within the current parameters.

viii. The budget plans proposed that social and affordable rents increase by 4.8% from April 2026, and Garage rents also increase by 4.8%.

ix. Rent convergence, the process of aligning current social rent levels with formula rent levels (calculated using a formula set by the Regulator of Social Housing), would allow the council to increase rents by an additional annual amount for those currently paying below the formula rent. This would be on top of the 4.8% rent increase.

x. The government had promised an announcement on the outcome of the rent convergence consultation in January 2026; this had not been published, however, for the purposes of the proposed budget it was assumed that rent convergence of £2 per week would be applied beginning from 1 April 2026.

xi. With this convergence, the average rent increase for 2026/27 would be 6.1%.

xii. The HRA revenue surplus projections demonstrated that the reserves were able to be maintained at or above the minimum level (£8.2m), with surplus utilised as revenue contributions to capital outlay (RCCO).

xiii. The total capital investment over the next ten years was expected to be £867.2m on existing stock, development and other capital spend. The plan was predicated on a successful bid for ‘strategic partnership’ with Homes England. If this was not secured, bids would be submitted on a site-by-site basis.

xiv. HRA borrowing would total £478m over the next 10 years and to ensure financial resilience an ICR (Interest Cover Ratio) of 1.25 had been set.

Following the presentation, Members were invited to ask questions and as a part of these discussions the following key points were raised:

i. Proposed rent convergence increases would be a fixed amount per property (i.e. £2 per week) and not a percentage amount.

ii. Officers noted that recent changes to 'Right to Buy' (RTB) had seen maximum discounts reduced, changes to eligibility, and the ability for local authorities to keep 100% of receipts from sales.

iii. The level of sales under RTB was modelled at 40 in 2025/26 (whilst the Council worked its way through the influx of applications received before the changes to discount levels) and 15 sales per annum from 2026/27.

iv. It was summarised that the Rent Standard allowed councils to charge social rents at 5% above the formula rent (10% for supported housing).

v. Plans for new builds were informed by the Housing Register and the greatest demand remained 1- and 2-bedroom properties (representing 78% of the Register).

vi. Officers reported that the situation on rent arrears had worsened, largely due to ongoing work to resolve historic rent regulation errors.

vii. Officers reported that the Council was still awaiting government guidance on rent convergence, and the papers included a sensitivity analysis on the key assumptions underpinning the budget (including deviation from the £2 per week convergence modelling).

viii. Officers noted that if there was no government decision before the Cabinet meeting (10th February 2026), rent convergence could not be implemented in 2026/27.

ix. The budget proposals included plans to streamline the processes on Universal Credit (UC) including the implementation of a system to automate UC rent verifications and other related processes.

x. Officers reported that most residents had migrated to UC and those that hadn't (those who had seen no changes to their circumstances since UC's introduction) included some of the most vulnerable residents.

xi. Officers confirmed that borrowing was at fixed rates and was looked at in conjunction with treasury management advisors (as outlined in the Treasury Management Strategy) with a focus on securing a balance between low rates and minimising risk levels (specifically re-financing risks).

xii. Officers outlined plans to integrate potential additional software (Voicescape and UC Bot) with existing housing management software (MRI Orchard) to tackle issues such as rent arrears.

xiii. Officers reported that a strategic partnership with Homes England would provide financial certainty for the Council and a 'lump sum' of funding to support house building.

xiv. It was recognised that the budget proposals contained a significant amount of borrowing (and therefore associated risk), but officers gave assurances that they had worked closely with Savills and assumptions would be kept under constant review.

In summation on the HRA, the Chair confirmed the following points on behalf of the Committee:

i. Concerns about the tight deadline to have national government confirmation of rent convergence and the risk that further delays may miss the necessary deadline to notify tenants of rent charges.
ii. Request officers to provide examples of the maximum and minimum impact that rent convergence could have on residents.
iii. Concerns on the robustness of the savings assumptions relating to bad debt, void improvements and the related software implementation.
iv. Note the overall level of risk and borrowing contained within the HRA proposals, and the need for constant monitoring and regular review of underlying assumptions.
v. Request officers provide further detail in the BSR on the following bids:
   - B5464 - Damp, condensation and mould (DCM) repairs
   - B5465 - Housing disrepair claims and compensation costs
   - B5466 - Increase cost of void repairs
   - B5453 - Housing Management Teams.

Following additional questions the below points were clarified:

i. Rent levels when a tenancy was succeeded were summarised by officers.
ii. Officers were aware that void costs were increasing and had commenced a project to review processes to bring down re-let times and costs.
iii. Officers outlined that the risk profiles of the HRA and General Fund were very different, and the Council had received specific advice from Savills on the benchmark that should be applied to the HRA.
iv. The current capital programme included an investment of £47.7m over 5 years to deliver EPC C rating on the current housing stock and then an additional £43.2m to undertake further energy efficiency / retrofit work.

General Fund

The Chief Finance Officer gave a presentation on the General Fund highlighting the following points:

i. The public consultation received 512 responses after being promoted through direct emails, the council website, digital screens at Mandela House and via Cambridge Matters.
ii. 72% of respondents rated the Council as excellent, good or acceptable for value for money.
iii. Financial resilience was assessed by reference to the ‘five-year funding gap’ (how much projected expenditure exceeded projected income). The budget plans, with the savings outlined in the General Fund, outlined how this gap would be reduced to £1.5m by 2030/31.
iv. The national funding settlement saw the implementation of the Fair Funding reform and the core spending power of the Council decrease by 4.1% with ongoing uncertainty around business rates.
v. The budget was modeled on a maximum allowable Council Tax increase of 2.99% over the next 3 years (roughly 13p per week for Band D property).
vi. A full review of the Capital Plan had been undertaken. Application of transitional funding along with use of revenue reserves would remove the requirement in the General Fund to borrow to fund capital expenditure.
vii. The prudent minimum balance (PMB) and target level of General Fund reserves had been reviewed and increased in the context of the uncertainty surrounding LGR.

Following the presentation, Members were invited to ask questions and as a part of these discussions the following key points were raised:

i. The budget proposals reflected the decisions taken on the Civic Quarter (two investments of £4m) with nothing additional projected except the allocation of a further £1million to the Civic Quarter Development Reserve.
ii. On the Cambridge Folk Festival, concern was raised over the one-off nature of the bid (£60k) relating to marketing.
iii. An explanation was given on the changes to the national funding formula with officers noting that each council’s ‘relative need’ is calculated by

reference to seven individual funding formulas (two of which apply to Cambridge).

iv. Through this formula, the Council has both benefitted (due to significant population growth since the last funding review together with the inclusion of ‘daytime population’) and lost (through a refresh of national deprivation data and a resetting of the business rates system).

v. The budget provision for business rate appeals has been increased from 2026/27 in light of recent experience and the additional uncertainty generated by the 2026 revaluation.

vi. On the public consultation, the responses received were well represented in terms of income and gender but not in terms of age (with younger people not engaging as much).

vii. The pension fund was currently ‘overfunded’ (following triennial valuation) and this meant that the budget included a proposal to reduce the employer pension contribution rate.

viii. On the crematorium, it was confirmed that there had been a £300,000 income reduction due to increasing competition from new providers and online-only direct cremation services, as well as cultural and environmental shifts driving demand for lower-cost options.

ix. It was confirmed that the county council provided statutory street lighting services and what the city council was paying for is an enhancement of those services.

x. Officers confirmed that local authorities were no longer permitted to make new investments in commercial property primarily for yield although investment in an existing portfolio was permitted. It was reported that the council’s current portfolio was performing well.

xi. On LGR, it was reported that there would be significant transitional costs; however, reorganisation would deliver savings in the long-term. The Budget set aside £2.5 million for the purpose of covering the Council’s share of pre-transition costs.

xii. The ‘free text’ comments in the consultation had seen residents raising concerns over issues such as condition of roads and the need to focus on ‘basic’ services.

xiii. Transitional funding (£8.3million available over the current 3-year settlement period) was discussed including its use on the historic (previously funded by internal borrowing) and future capital programme.

In summation, the Chair confirmed the following points on behalf of the Committee:

i. Concern about the one-off nature of the bid for the Folk Festival relating to marketing and the need to highlight to Cabinet that this will require careful monitoring. It was noted that the issue will come back to the Committee after the delivery of the new style event.
ii. Concern over the response to the consultation, specifically that young people were not that well represented. It was noted that the Committee had requested plans for the 2026/27 consultation (when ready).
iii. Request that officers provide a summary of movements in/out of the Civic Quarter Development Reserve.
iv. Request more details from officers on the following (and where necessary for the BSR to provide more narrative):
    - RI5356 - Crematorium reduced income proposal
    - B5341 – Playground investments proposal.
    - Weed Clearance proposal.

Financial Strategies

The Chief Finance Officer gave a presentation on the Medium-Term Financial Strategy (MTFS), Capital Strategy and Treasury Management Strategy highlighting the following points:

i. Key financial risks included the impact of LGR (Including transitional costs); high inflation, interest rates, economic stress, variance from assumptions made, cost of waste reform, future government rent policy, unforeseen spending and the ability to deliver and identify remaining.
ii. The Section 25 report concluded that the Chief Finance Officer considered the estimates for the financial year 2026/26 to be sufficiently robust and the reserves up to 21 March 2027 to be adequate. However, attention was drawn to uncertainty on the impact of LGR, the inherent risk posed by the scale of the council's new homes development, and that the council currently did not have detailed plans to meet its five-year savings requirement in full.

Following the presentation, Members were invited to ask questions and as a part of these discussions the following key points were raised:

i. Officers outlined the stress testing that had been undertaken on the MTFS and the significant impact that changes to government funding could have.

Ward Councillors were invited to ask questions and as a part of these discussions the following key points were raised:

i. Clarification was given on the business rate baseline (the amount that the government would expect the council to retain based upon rateable values set for all existing business premises as at 1 April 2026) and the accumulated business rate growth (additional rate generated through growth).
ii. Members sought information on the current budget for the Operational Hub at the Cowley Road Depot.
iii. Concern was raised about the lack of detail on the proposed bid relating to car park ‘entry and exit systems’ (CAP5337).

In summation, the Chair confirmed the following points on behalf of the Committee:

i. Request more details from officers on the following (and where necessary for the BSR to provide more narrative):
   - CAP5337 - Car park entry and exit systems – to include what savings this will deliver and when.
   - B5470 - Cowley Road Depot and Hub - covering where the projections came from and how this sits alongside existing budgets.

26/6/P&A Work Programme

The Work Programme was noted including the plan to undertake further scrutiny of the Civic Quarter project.

The meeting ended at 8.25 pm

CHAIR

This page is intentionally left blank

REPORT TITLE: CITY CENTRE HEAT NETWORK PROJECT DEVELOPMENT

To:

Performance, Assets and Strategy Overview and Scrutiny Committee, 3 March 2026

Lead Cabinet Member: Cllr Rosy Moore, Cabinet Member for Climate Action and Environment

Report by:

Jaques van der Vyver, Senior Development Manager, Development
Tel: 01223 450000 Email: jaques.vandervyver@cambridge.gov.uk

Wards affected:
All

Director Approval: Director Lynne Miles confirms that the report author has sought the advice of all appropriate colleagues and given due regard to that advice; that the equalities impacts and other implications of the recommended decisions have been assessed and accurately presented in the report; and that they are content for the report to be put to the Committee for decision.

1 Recommendations

1.1 Performance, Assets and Strategy Overview and Scrutiny Committee is invited to consider the report and provide feedback to officers and the Cabinet when they consider the matter on 24 March 2026.

1.2 Performance, Assets and Strategy Overview and Scrutiny Committee are recommended to note:

1.2.1 Officers are recommending that Cabinet supports the release of £0.6m from the Councils Climate Change Fund reserve to fund the next stage of the project to develop the strategic objectives for a council led joint (51% ownership) venture, apply for grant funding of approximately £20m from the Green Heat Network Fund and to progress procurement to identify and appoint a specialist delivery and management contractor.

1.2.2 Officers are targeting a date of no later than March 2028 to present a final report on recommendations to proceed or not with council investment. With the planned Local Government Reorganisation (LGR), subject to the Structural Changes Order (SCO), it is recognised that this final decision to proceed or not will need scrutiny and agreement from the Shadow Authority. We note that the County Council is a Partner to the current project and has been significantly engaged to date.

1.2.3 The project will be governed through an updated memorandum of agreement in line with that agreed for Detailed Project Development (Appendix 1), including establishment of oversight and Steering groups with partner representation and led by the Council.

1.2.4 If this project is approved at the next stage, no later than March 2028, members should note:

I. this is a large infrastructure project, and contains finance, partner engagement, and construction risks (See part 6)

II. This council led proposal, will deliver a rapid decarbonisation in the city centre and significantly improve local air quality by reducing an estimated c. 506,000 tonnes of CO_2 (93%) against business as usual and a reduction of c2.5 million m^3 of gas usage. Benefits are set out in Part 6.

III. The current proposals suggest that it will cost the council £8.1m of direct capital cost, with the council on lending £18.4m to finance the project. All costs are set out in part 7.

2 Executive Summary

2.1 Since June 2023 officers have been working with experts and academic partners to develop an Outline Business Case for a Cambridge City Centre Heat Network.

2.2 The Detailed Project Development (DPD) has now proposed a network using air source and river source heat pumps supported by a transition to electric boilers from gas boilers to generate energy.

2.3 As part of this work, a Memorandum of Agreement was jointly signed with the County, and 19 Academic institutions with significant heating demand in the city centre. Connections to many of these partner heat loads forms the basis of a Minimum Viable Product identified for delivery at a cost of c. £121m.

2.4 Compared to business as usual using gas boilers, the proposed district heating network could produce a **93% carbon emissions reduction** over a 40 year project lifetime. A heat network would play a significant role in reducing the Council's emissions as well as key anchor institutions in the centre of Cambridge.

2.5 Current modelling suggests that this communal approach to decarbonisation is more cost effective than individual institutional approaches by c.15-20% over 40 years. From the council perspective, it has been calculated that there is a saving of c £1m capital cost if DH is used rather than trying to decarbonise four strategic assets individually.

2.6 The estimated cost of the £121m is made up of: connection costs of £70.5m (£75m as inflated in the Financial model). This is split £4.1m to Council and £66.4m other customers); grant of £19.7m; on-lending by the council of £18.4m; and equity funding of £7.9m (£4m council and £3.9 from other investors).

2.7 To date, 19 of the projects 20 Academic Partners have expressed an in-principal support as customers, subject to continued review and viability. Seven Academic Partners have expressed interest in potential joint investment with the Council.

2.8 The DPD confirms that a council led Joint Venture (51% council ownership) offers the best outcomes for all parties. Alternatives considered and rejected are summarised in section 2.4.

2.9 A council led Joint Venture will mean the council shares construction, delivery and reputational risk with established academic partners; ensures a small return on investment; and ensures targeting a low enough connection charge to incentivise all partners to fast-track decarbonisation.

2.10 Current modelling for a Council led JV shows a respectable post-tax nominal equity IRR of 12% assuming c. £20m of grant is received from the Green Heat network Fund.

2.11 This report outlines the next steps, which would be to develop the strategic objectives for a council led joint (51% ownership) venture to a market led scheme, applying for grant funding and progress procurement to identify and appoint a specialist delivery and management contractor.

2.12 Officers would then produce a further report for Cabinet and Full Council no later than March 2028 outlining, if officers are minded to recommend, the final proposals and development costs, and to seek approval to appoint a long-term contractor and operator for a City Centre District Heating Network which can be expanded over time. This will be subject to scrutiny from a Shadow Authority if LGR proceeds.

3 Background

3.1 In June 2023, the Environment Scrutiny Committee approved funding of £180,000 to match grant funding, to develop the Outline Business Case for a renewable heat network in the city centre.

3.2 The DPD study was facilitated by the council working with 17 colleges, Cambridge University, ARU and the County Council. Sustainability Co (Project Management), Buro Happold (Technical), Amberside Advisors(Commercial and financial advice) and Sharpe Pritchard (Legal) were appointed to undertake specialist works packages. A service agreement was signed with the National Wealth Fund (NWF) to provide further commercial advice, and the project has additionally benefited from review input from the Greater South-East Net Zero Hub, the Danish Board of District Heating, and an Expert Advisory Panel consisting of academic specialists.

3.3 Current working proposals - Minimum Viable Product (MVP)

3.3.1 The map below highlights a network using air source and river source heat pumps supported by electric boilers and transitional gas boilers in the interim of up to 15 years, to supply peak demand (10-15% of overall generation). Two phases (2030-2032 and 2032-2035) are proposed with three energy centres at a cost of c. £121m (including design build and contingency)

3.3.2 The proposed scheme will deliver heat to a significant portion of academic and Council properties within the city centre. This is forecast to produce a 93% carbon reduction over a 40-year project lifetime compared to Business As Usual (BAU) gas heating systems.

3.3.3 Ground source heat capture has been confirmed as not viable at city-scale without future linked cooling demand to replenish geological heat reserves.

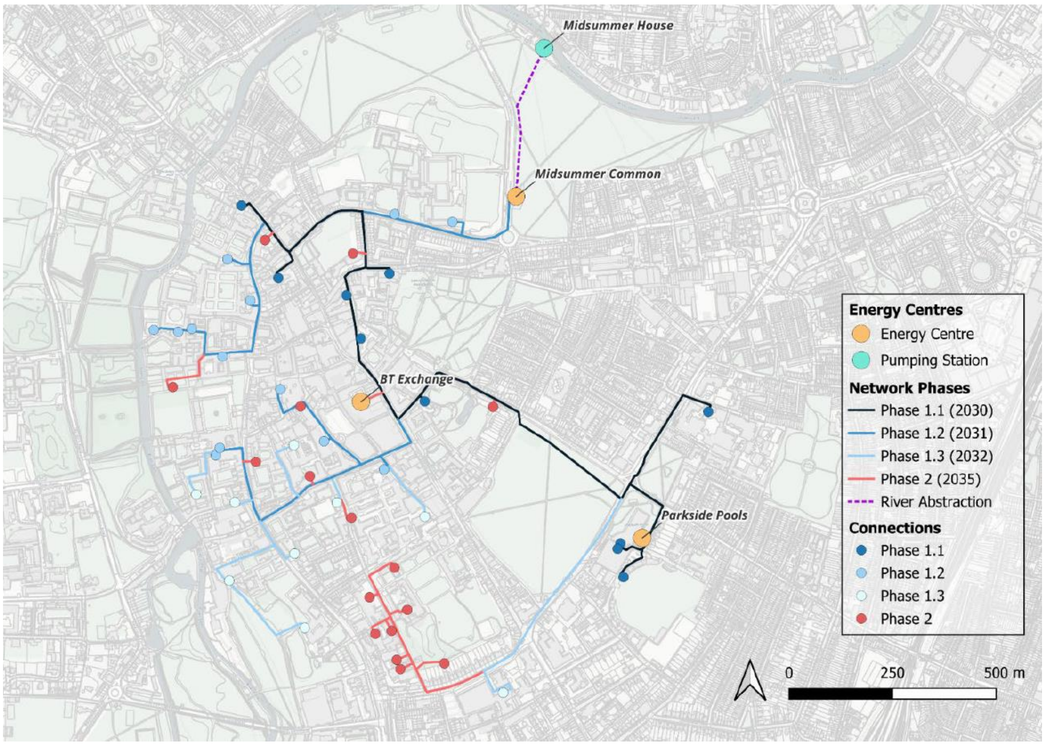


Figure 1: Proposed Heat network and Connection Phasing

3.3.4 From the Council perspective, it has been calculated that there is a saving of c £1m capital cost if the heat network is used, rather than trying to individually decarbonise four strategic assets – the Guildhall, Corn Exchange, Parkside Swimming Pool and Kelsey Kerridge. Similar blended efficiency figures have been calculated for academic partners.

3.3.5 This also allows full decarbonisation of listed assets such as the Corn Exchange, which due to structural constraints cannot be fully decarbonised on site. A heat network is the only viable decarbonisation option for such buildings.

3.3.6 A high Temperature (85-80Deg) network is currently proposed – this allows maximal connection of both historic and new buildings. Subject to fabric improvements, there is flexibility to reduce operating temperatures in future, which would improve efficiency over time.

3.3.7 Thermal storage is anticipated to form part of the heat network proposals and will be maximally incorporated to best balance performance efficiency and cost.

3.4 Proposed Delivery Model

3.4.1 Different delivery models have been reviewed from Concession (private sector delivery) through to a 100% council owned Special Purpose Vehicle (SPV)

3.4.2 A private sector led scheme - a Concession model - is expected to increase tariff costs over time, disincentivising the council and other parties from connecting. However, it does mean minimal construction, operational and reputational risk, with less management costs.

3.4.3 A Concession model will be considered as a viable alternative delivery option during Commercialisation Stage. Whilst it reduces overall level of control, it could be facilitated by council and Partner involvement, which facilitation would be subject to agreement on Key Performance metrics and requirements.

3.4.4 It would however require a balance to be struck between additional requirements vs Concession's freedom to practice within their business model.

3.4.5 Whilst a 100% council led SPV is attractive, all the construction, operational and reputational risks would sit with the Council. This delivery option is not recommended for further consideration during Commercialisation Stage.

3.4.6 Officers recommend that Commercialisation Stage focuses on the preferred delivery option of a council led (51% ownership) Joint Venture, together with Academic Partners. This would mean the council can obtain lower cost financing (and lend to onward for a margin in line with subsidy control regulations). The Council also shares construction, delivery and reputational risk with Partners who hold a long term vested interest in the City; ensures a return on investment; and ability to implement Connection Charges at levels which can incentivise all partners to fast track decarbonisation.

3.4.7 Modelling for a Council led JV shows a respectable post-tax nominal equity IRR of 12% compared to a funding eligibility target of at least 10%. The NPV is positive for the council due to the on lending and is 0 for other equity investing partners.

3.4.8 The council led JV balances the competing needs of:

i. reduced connection charges (to incentivise the switch to the heat network);

ii. a return on investment (to justify financing the scheme);

iii. lower borrowing costs being facilitated (to enable connection and expansion);

iv. direct control of delivery for all interested parties (rather than being passive customers),

v. ability to target long term expansion, social value opportunities and reinvestment in the city

3.4.9 to date, nineteen of twenty Academic Partners have expressed in-principal support as customers, subject to continued review and viability.

3.4.10 Additionally, seven Academic Partners have expressed interest in potential joint investment with the Council.

3.4.11 Formal legal agreements will only be confirmed at point of Final Investment Decision.

3.5 Potential for growth due to Heat Zoning Regulations

3.5.1 The Government's Heat Zoning Guidance consultation response has now been published and has confirmed that Regulations are to be put in place which would require heat loads (currently noted as above c100MWh/yr) to connect to a heat network, where it is shown to be the most economically viable route to decarbonisation.

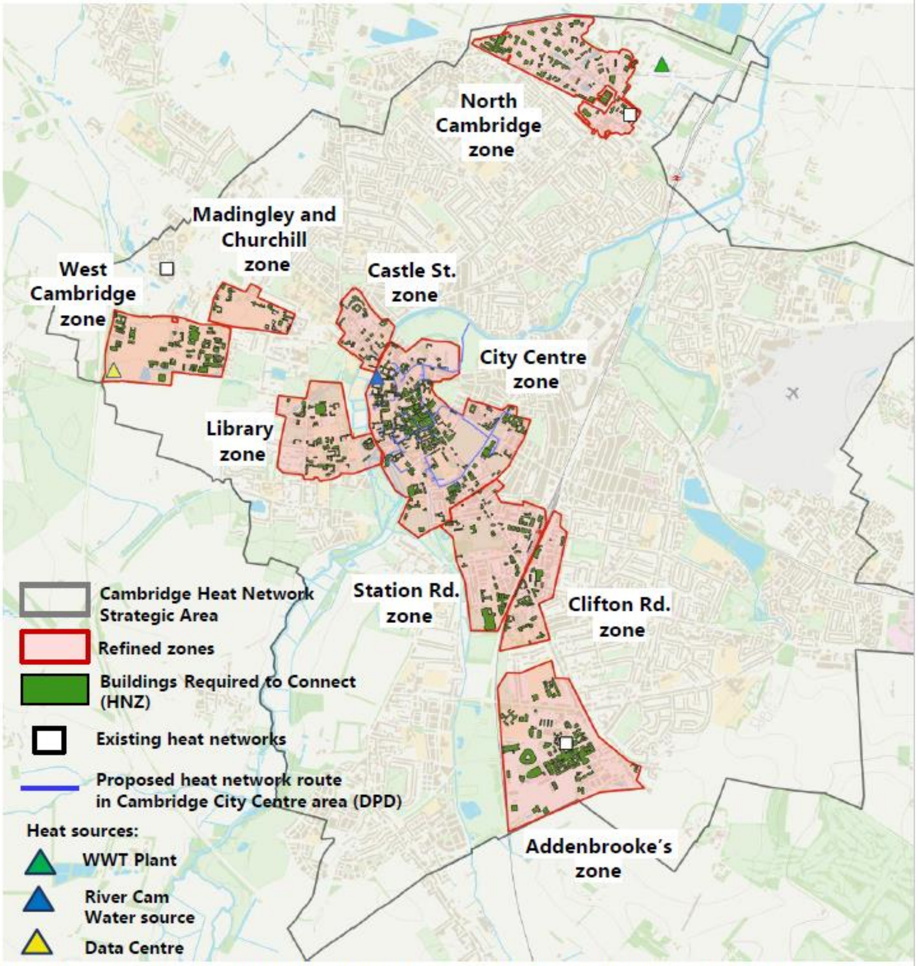
3.5.2 Early Zoning Studies by Department for Energy Security and Net Zero (DESNZ) indicated potential Heat Zoning for Cambridge City, opening up the opportunity for the City to land within the hands of potential Heat Network Developers who first reach gateway signoffs for heat network Incumbency Rights.

3.5.3 The current work undertaken by officers has targeted early consideration of Zoning implications for the Council and funding partners, ensuring that the Council positions itself with the greatest level of control of a heat network, should these Regulations be put in place as forecast.

3.5.4 There is identified additional expansion capacity of c. 45% within the core Minimum Viable Product area, formed of commercial heat loads which may be required to connect to a heat network within Cambridge City Centre, should Zoning be enacted.

3.5.5 Expansion opportunities are identified across the Council and Strategic Partner's pre-emptive Zoning Refinement Study and highlights c. 600% additional heating demand expected to be captured by government regulations, providing significant long-term expansion opportunities across the City.

3.5.6 Linked to these expansion opportunities is a further opportunity for infill residential connections, at a cost competitive to property-by property retrofit. Such residential expansion is, however, only realisable as a viable proposition once a core heat network is delivered and active (discussed further in Part 9).



Refined heat network zones showing the Required to Connect building within designated zones based on the most recent HNZ model results.

Figure 2: Heat Network Commercial Load Expansion opportunity, as identified by Zone Refinement Study

4 Corporate Plan and Council Vision

4.1 This project meets 3 of the Councils 4 key priorities as set out in the Corporate Plan for 2022-2027.

4.1.1 Leading Cambridge's response to the climate and biodiversity emergencies and creating a net zero council by 2030;

4.1.2 Tackling poverty and inequality and helping people in the greatest need;

4.1.3 Modernising the council to lead a greener city that is fair for all.

4.1.4 This Project fully enshrines the vision of the Council, working collaboratively with partners, and ensuring "one Cambridge Fair for all", through

I. Residents enjoy a high quality of life and exemplar public services, establishing a New utility and significant improvements to air quality

II. Decarbonisation and sustainability, as a core objective of this project

III. Innovation, leading on renewable infrastructure delivery

IV. Ensuring Development Is sustainable and inclusive

5 Development Programme

5.1 Figure 3 below outlines the development programme. This is a ten year phased programme.

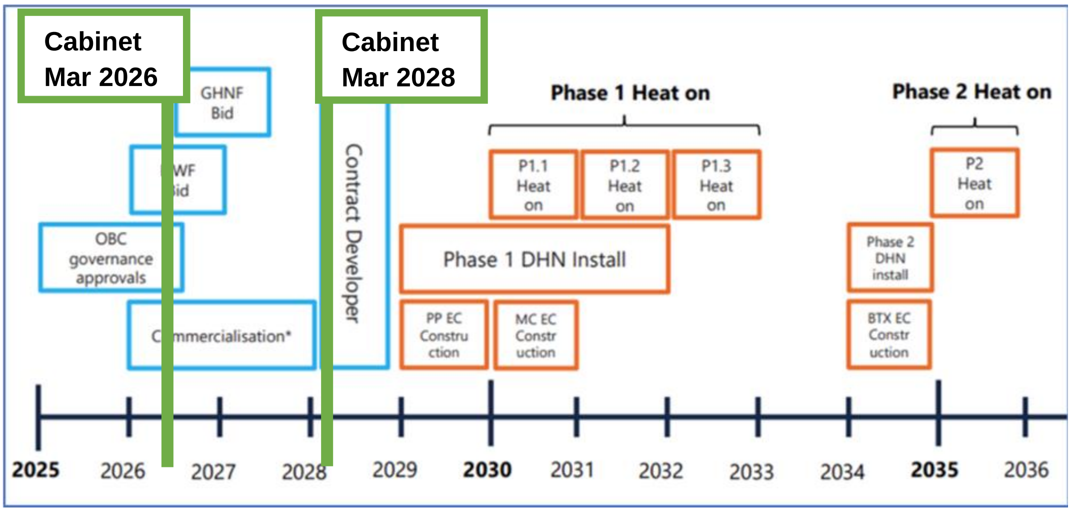


Figure 3: Heat Network Delivery Phasing

11

5.2 Phase 0 (blue): applying for grant funding, market testing and developing the Final Business Case.

5.3 Next steps toward delivery would be to proceed to Pre-Commercialisation, and to commence Commercialisation should Government funding be realised. Bridge Funding is needed to carry programme through gateways to:

5.3.1 Develop, strengthen and de-risk the Business Case
5.3.2 Market testing with specialist Design Build Operate and Maintain (DBOM) specialists or alternatively potential concession partners
5.3.3 Seek legal advice on delivery model, Joint Venture and Company structure
5.3.4 Establishment of an appropriate Joint Venture Holding Company for a JV customer Owned Energy Company, should this favoured approach be realised
5.3.5 Procurement of early specialist contractors for derisking activities
5.3.6 establishment of Power Purchase Agreements with potential consumers
5.3.7 Key Stakeholder consultation and engagement

5.4 If the decision is to proceed with further technical work, officers would produce a further report for Cabinet and then to Full Council no later than March 2028 outlining, if officers are minded to recommend, the final Investment proposals, development costs, and to seek approval to enter into the main Design, Build, Operations and Maintenance contract with a specialist heat network developer.

5.5 Figure 3 (5.1) outlines the phased approach to installation, and then operating the Cambridge City Centre Heat Network.

IMPLICATIONS

6 Benefits and Risks

6.1 Benefits

6.1.1 Council control of decarbonisation and expansion

6.1.2 Fast-tracked decarbonisation in Cambridge City Centre and helping to work towards the Council's vision of a net zero Cambridge

6.1.3 Reducing the emissions of Council buildings, playing a significant role in progress towards the Council's net zero targe

6.1.4 Reduction of c506,000 tonnes of CO2 (93%) against business as usual, and within a fast-tracked timeline (7.1% of which directly attributed to Council emissions, refer Part 10)

6.1.5 Reduction of c2.5 million m3 of gas usage, leading to significant local air quality improvements across the City.

6.1.6 Linked Biodiversity improvements targeted at 20%, to align with Council Planning targets.

6.1.7 Electrical infrastructure improvements to accommodate large-scale move away from gas usage, as well as possibility to link electrical events and mooring infrastructure to works at Midsummer common (associated smaller-scale decarbonisation).

6.1.8 Long term expansion opportunities (+600% commercial expansion capacity indicated), and ability to direct such expansion.

6.1.9 Disruption mitigation through single project approach, and linked clearly to roadway improvements.

6.1.10 Subject to overall business viability, opportunity to link to social value undertakings.

6.2 Dependencies and Risks

Risk	Mitigation
Decision making cycles require coordination across 20 partner institutions	Early engagement and long lead-in periods allowed. Confirming bridging approvals of support provide sufficient comfort to proceed, while investment and final connection undertakings are retained for formalisation once delivery has been sufficiently derisked for Council and Partners.
Financial Risk – Costs of investment and connection are High, however remain lower that the option of decarbonisation at an individual level	Several Strategic Partners and additional external stakeholders have expressed an interest in providing support and investment, together with expressing interest in connecting Partner investment is led by associated benefit of long term facilitation and shared control as opposed to direct financial return
Viability reliant on grant funding	Funding bid is seen as competitive but would aim to maximise funding. Strong partnership undertaking, commitments to Social Value and expansion opportunity will increase opportunity for successful grant bid
Reliant on significant borrowing	Any improvement in GILTS Rates will also improve the NPV On-lending margins assumed in line with Subsidy Control
Planning	Planning Permissions will be required. Location of appropriate energy centres has been difficult, and development will include significant constraints. Selected sites have been through 3 rounds of pre-application advice and are considered deliverable, subject to appropriate Design and Conditioning.

Risk	Mitigation
Highways Disruptions	Disruption is a key consideration however it must be seen in context. Should 20 Strategic Partners and other commercial property owners in Cambridge city centre progress standalone decarbonisation activities, the cumulative city impact will also be higher, and can be expected to be over an extended period, as opposed to the heat network programme with dedicated construction periods. Early engagement with highways authorities has commenced but it is flagged that Political-level support and engagement between City and County will be a key requirement to ensuring deliverability. We have also partnered with the CPCA on pilot consideration of Multi-utility tunnels
Archaeological risk	Archaeological risk is considered high within the city centre. Early engagement and studies are being undertaken as priority derisking works and additional contingencies have been factored into cost considerations together with exploratory core sampling.
reliance on interim gas usage	In common with many new UK heat network projects, interim gas usage for peak heating demand is needed to reduce early capital, thereby ensuring project viability by maximising the number of connections in the Minimum Viable Product, with linked connection recharge reduction and later (15-20yr) spend. This is a time limited exercise, with a longstop date of 20years currently considered, after which electric boilers will be used for peak heating, making the heat network fully electrified. As a result, the decarbonisation

Risk	Mitigation
	achieved during the full 40 years has reduced from a 97% to 93% reduction. This however will remain under review.

7 Financial Implications

7.1 The estimated cost of £121m is made up of:

7.1.1 connection costs of £70.5m (£75m as inflated over time in the Financial model). This is split £4.1m to Council and £66.4m other customers at current value;

7.1.2 grant of £19.7m;

7.1.3 lending by the council of £18.4m;

7.1.4 and equity funding of £7.9m (£4m Council and £3.9 from other investors)

7.2 Modelling for a Council led JV shows a nominal post tax equity IRR of 12% compared to a funding eligibility target of at least 10%. The NPV is positive for the council due to the on lending and is 0 for other equity investing partners. Partner investment remains subject to individual consideration of benefit and return, with long term control and surety of supply being a shared core value between partners and Council. An investment decision is on this basis of benefit.

7.3 This project is however fully reliant on grant funding from the government to be viable, and proposals to proceed are subject to such successful receipt of Funding from the Green Heat Network Fund.

7.4 Given the complexities of the project, sensitivities to cost overruns have been considered, including a worst case scenario 30% cost overrun, ensuring that return hurdle rates remain met and can be balanced through shared consumer/investor/developer risk.

7.5 Additional consideration of full electrification at early stages is covered in Part 10, however the current approach to ensure flexibility and cost effective benefit to all parties is reflected in the model for interim gas usage to subsidize peak heating demand.

7.6 Once operational, additional equity investment at points of network expansion would be met through Business as usual investment management and budgetary processes.

7.7 To ensure timely delivery within target timeframes, avoiding delays which would reduce consumer interest given pressures to replace existing eating infrastructure, bridge funding of a pre-commercialisation period is proposed.

7.8 £600,000 of funding to cover pre-commercialisation activities will be applied for from the Council's Climate Change Fund, which is subject to the application meeting the fund's criteria and being approved by the Council's Net Zero Programme Board and Cabinet Member for Climate Action and Environment. This funding request would only be made subject to Cabinet approval to proceed with the next stage of work. This expenditure is undertaken at risk as ability to proceed with full heat network delivery is reliant on successful funding bid to the Green Heat Network Fund. The next round of funding from GHNF is expected to open for bidding in March/April 2026, with outcomes expected to be reported by September/October 2026. Successful bidding is targeted to coincide with the early establishment of a Joint Venture Vehicle, and proceeding to procurement of a specialist Design, Build, Operate and Maintenance contracting partner.

7.9 Should pre-commercialisation not be undertaken, there would a delay period of 6-9 months, which will strongly impact ability of partners to rely on heat network connection, in the face of ageing heating infrastructure which needs to be replaced, and pressure to develop timeous decarbonisation plans. Internal funding aims to streamline all processes to maximise buy in from partners and other potential consumers. There is also significant competition for expertise in the sector, which will increase over time. A rapid approach to retain delivery momentum balances risk and opportunity for successful delivery and adoption.

7.10 Pre-commercialisation expenditure will additionally be subsidized by any underspend carried forward from the DPD Study. Such underspend is expected currently to be c£50-100,000, and has been jointly sourced from council and academic partner contributions.

8 Legal Implications

8.1 Specialist legal Services are appointed to advise on all aspects of Project delivery and delivery vehicle establishment.

9 Equalities and socio-economic Implications

9.1 The ability to deliver a City Centre Heat network as proposed relies on Government funding to ensure viability, and as part of this funding application is assessed against a set measure of Social Internal Rate of Return (SIRR).

9.2 This SIRR assesses the overall return value of a project to society, both economically and socially. It considers the full range of costs and benefits, both private and social, associated with a project. The SIRR is calculated in much the same way as the financial IRR, except that it instead considers both the private and social costs and benefits over the lifetime of the project.

$$Social\ IRR = Economic\ IRR + Carbon\ Abatement\ Value + Air\ Quality\ Damage\ Cost$$

9.3 To calculate the SIRR the costs and benefits are measured against the counterfactual where the proposed project is not implemented. As with a financial IRR, the SIRR is expressed in monetary terms. Therefore, to calculate the SIRR, it is first necessary to put a monetary value on all the relevant costs and benefits. The social benefits included are:

9.3.1 Air quality damage costs - The Green Book supplementary guidance provides air quality damage costs from primary fuel use in pence per kilowatt hour. These are used to evaluate the impact of the change in air quality of a proposed heat network

9.3.2 Carbon abatement value - The Green Book supplementary guidance provides guidance on the value to society in saving one tonne of carbon. Therefore, the net social impact on carbon emissions can then be given a monetary value using DESNZ carbon prices. This can be used to compare the carbon emissions associated with supplying heat through the counterfactual heating technology and the proposed heat network.

9.4 Using the above methodology, the Social Impact for the Network as proposed returns a social value IRR of 47.9% post grant funding (20.5% pre-grant), well exceeding the target SIRR of “3.5% or greater”. It is worth noting that the transitional gas option being adopted shows a greater SIRR than a full electric scenario (25.2% post grant) as the calculation considers both carbon/air quality abatement and overall project Rates of financial return.

9.5 In addition to standard Market Transformation social value commitments required by GHNF, the project aims to deliver strategic added value by capitalising upon both the strength of its strategic partnership and Cambridge’s academic prowess. It is proposed to achieve this through shared commitment to social value and education, with potential avenues being investigated for reinvesting into expansion of the CCCHN, addressing of fuel poverty, and linked education/training.

9.6 In accordance with the Public Sector Equality Duty under section 149 of the Equality Act 2010, the Council has given due regard at this early stage to the potential equalities implications of the proposed study. National public health evidence, including from the UK Health Security Agency, demonstrates that the health impacts of poor air quality and climate change are not evenly distributed. Older people and disabled people, in particular, are at greater risk of adverse health outcomes from heat, air pollution and related environmental stressors.

9.7 There is also strong evidence that people living in areas of socio-economic deprivation are disproportionately exposed to environmental harms; while poverty is not a protected characteristic under the Equality Act, it frequently intersects with protected characteristics and may therefore compound disadvantage.

9.8 As this decision relates to commissioning further technical work rather than implementation of specific measures, no direct equalities impacts arise at this stage. However, should the project proceed to the development of options or interventions, a full Equality Impact Assessment will be undertaken to assess distributional impacts in detail and to inform mitigation measures.

9.9 A specific point of note is the focus on commercial heat usage for the heat network Minimum Viable proposition. Case studies both locally and abroad have shown clearly that bringing residential connections into a heat network in a cost-viable manner requires an active base network first being established. We note that this project as identified is a Minimum Viable Product, which allows such activation for the City. Future expansion into both residential and commercial heating supply is treated as a Primary Critical Success Factor by all Partners to ensure shared long term benefit across the City.

Critical Success Factors Table

Primary

1. Help decarbonise individual Estates, while enabling potential future heat network expansion
2. Provide cost-competitive & reliable low carbon heat:
   a. Offer low carbon energy that is better value over contract lifetime against counterfactual(s)
   b. Provide long-term reliability and at minimum, heat supply availability in line with industry standards

Secondary

1. Maximise social value & education
2. Minimise disruption & share the benefit from construction across the city
3. Showcase sustainability leadership & innovation

10 Climate Change and Environmental implications

10.1 Climate Change Strategy

10.1.1 In discussion around the 2026-2031 Climate Change Strategy, being brought to this meeting of the cabinet as a separate item, much has been said about the direct control the Council has on Carbon Emissions in the city, being only c0.7% direct emission attribution. Action will be needed by the city's institutions and businesses alongside the council to address city-wide emissions.

10.1.2 It has separately been noted that net zero targets are ambitious, and large scale operational changes are required to meet these. These targets are shared by the Academic Partners which have collaborated on the DPD Stage of work looking at a city centre heat network.

10.1.3 The proposals set out in this report, aim to address both the above points. Progressing toward a Joint Venture Partnership where the Council holds a controlling share ensures that direct guidance of decarbonisation can be enshrined in the long term management of the City. Likewise, investment by partners who have significant and long-term investment in the city ensure that all work to a coordinated outcome to the benefit of the City.

10.1.4 Should Market appetite indicate that a Joint Venture as preferred may not be best suited, there remains a fallback to a potential Concession model. Such a Concession would require facilitation by the Council and Academic Partners, and as such there would remain some ability to ensure core requirements are met, however there would be a loss in terms of the ability to directly guide expansion and city investment at scale, and a risk that it won't progress if the market doesn't judge it to be an attractive proposition.

10.2 Transitional arrangements

10.2.1 Bringing forward a large scale infrastructure project holds significant risk, and any increase on upfront capital requirements has significant downstream effects on financial viability.

10.2.2 A key cost item are Substation and electrical grid capacity works required for any significant new electrical usage loads, and the costs associated with meeting these.

10.2.3 Through the DPD stage an “ambitious” full electric and 100% degassed network proposal has been favoured by all partners, given shared decarbonisation commitments. This by necessity has however been reviewed against financial pressures; a full electric option reduces overall financial returns to a level which cannot comfortably be accommodated.

10.2.4 These cost pressures also need to be considered against the value added by such expenditure, and the Council and its parties have a duty of care to ensure that finances are utilised appropriately and provide value for money.

10.2.5 A full upfront move to 100% electrical generation would require c4.5% increase capital expenditure, but also a signficant 6.95% increase in lifetime fuel costs which would be met by both operator and consumers. This would be offset by only a c4% improvement in carbon emmissions reduction.

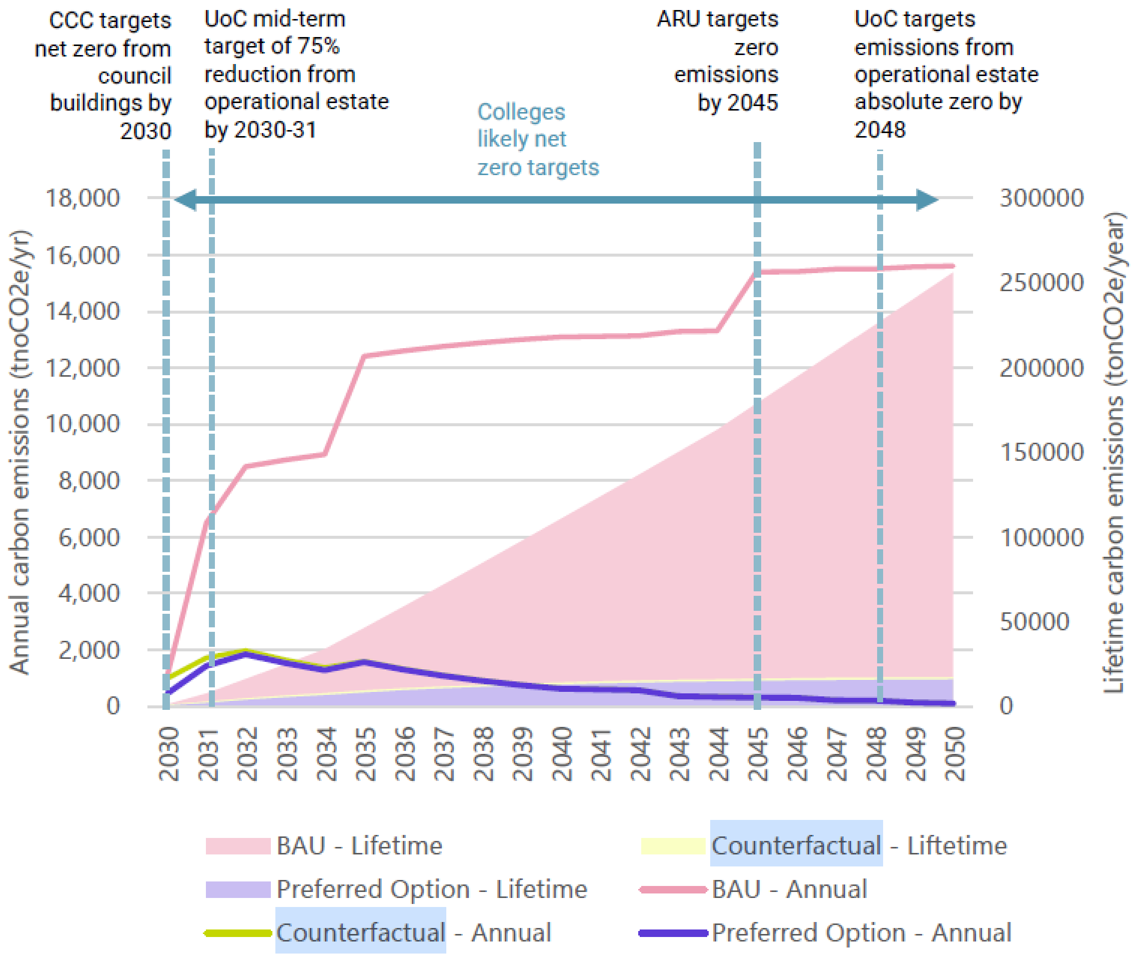
10.2.6 Ultimately such immediate reliance on 100% electric heating generation loads signficant risk to project deliverability, as well as increases costs to all parties which funds could be best used elsewhere, for example on fabric/insulation and secondary network efficiency imrpovements.

	modelled usage	**Reduction against BAU**	**Carbon reduction over 40 yrs**	**Social IRR**	**Financial IRR**
	tCO2e (40yrs)	tCO2e (40yrs)			
Business as Usual (counterfactual data)	546,000	-	-		
Ambitious full electric	17,400	528,600	**97%**	**25.2%**	**9.7%**
Transitional gas usage	39,900	506,100	**93%**	**47.9%**	**12%**

	tCO2e (40yrs)	tCO2e per year (to yr20)
Difference Interim vs full electric	22,500	1125
CCC portion of carbon emissions (7.1% of load)	1,598	80

10.2.7 Put forward as a current preferred option is an interim usage of gas boilers which would accommodate peak periods of usage (10-15% of overall generation), to be utilised for a fixed period of 17-20yrs (boiler lifespan) and moving to fully electric generation at point of replacement.

10.2.8 This proposal and evidence base echoes findings of the Governments recently published Heat Zoning Consultation response, which considers that 100% electric isn't realistic in the short term, as well as specialist advice from numerous sources, such as the Danish Board of District Heating.



10.3 Climate Rating Tool

10.3.1 A Climate Rating Tool Assessment has been completed and confirms this project as High Positive Impact.

11 Procurement Implications

11.1 It is proposed that the currently procured Specialist team be retained through pre-commercialisation stages to ensure continuity through this period. This will be conducted through Compliant procurement procedures.

12 Community Safety Implications

12.1 None for this stage of the project.

12.2 Should a full heat Network delivery in future come forward this will as noted be subject to final Cabinet signoff. Delivery will however be undertaken in line with compliance regulatory arrangements covering infrastructure works, and no additional safety implications are identified.

BACKGROUND DOCUMENTS

13 Appendices

Appendix 1: Memorandum of Agreement covering DPD Stage
Appendix 2: Outline Business Case (Partially redacted)

To inspect the background papers or if you have a query on the report please contact:
Jaques van der Vyver, Jaques.vandervyver@cambridge.gov.uk
Benedict Binns, Ben.binns@cambridge.gov.uk

UPDATED MEMORANDUM OF AGREEMENT,

CAMBRIDGE CITY-CENTRTE HEAT NETWORK

1 Introduction

2 This updated Memorandum of Agreement (**MoA**) for the ‘Cambridge City-Centre Heat Network Project’ (**Project**) is between the following “**Strategic Partners**”:

2.1 Cambridge City Council (as lead partner), which has facilitated the Project, has committed in principle to connect to the heat network and is considering becoming the majority shareholder through equity investment.

2.2 University of Cambridge, which is considering connection and equity investment.

[redacted]

[redacted]

2.5 Cambridgeshire County Council. Whilst not having any anchor heat loads in Cambridge city-centre, Cambridgeshire County Council provides strategic support through its energy, highways and archaeology teams.

3 **Status**

This MoA is not legally binding. No legal obligations or legal rights shall arise between Strategic Partners, who enter into the agreement intending to honour their obligations.

4 **Background**

4.1 The Project commenced in December 2021 (“**Start Date**”), with Detailed Project Development taking place between Spring 2024 and Winter 2025. It produced an Outline Business Case, which is now subject to formal governance review and feedback by individual Strategic Partners in Q1 2026.

4.2 This MoA builds upon the original Memorandum of Agreement between the same Strategic Partners for Detailed Project Development. This MoA will be used to confirm how Strategic Partners intend to collaborate during Pre-Commercialisation and Commercialisation Stages of the Project. It does not represent a final decision to proceed with the Project or to proceed with the Project in any specific manner.

Shared Vision

Our Vision for the Cambridge City-Centre Heat Network is to set a new standard for sustainable urban living. It is about making Cambridge a model city for the future, where history is preserved, the environment is protected and new technologies help the city thrive.

Cambridge City Council, the University of Cambridge, certain University Colleges, ARU and Cambridgeshire County Council are working together to develop the Business Case for the Cambridge City-Centre Heat Network.

We aim to remove existing and polluting gas boilers from individual buildings, replacing them with a renewable heat network. Our ambition is to connect individual buildings from both the Cambridge City Council, University of Cambridge, University Colleges and ARU estates by 2030.

5 Project Objectives

The Strategic Partners have the following objectives for the Project:

5.1 **Make Cambridge Greener Quicker:** heat networks can be the most cost-effective way to quickly decarbonise cities. We aim to test this further, with the ambition of providing Cambridge city-centre with clean and renewable heating. By avoiding harmful energy sources, we keep the air clean and protect the city's older buildings. We also help to protect against rising energy costs, positioning Cambridge as a leader in sustainable urban living and a case study for historic cities with sustainability ambitions. We will offer insights into collaborative strategies, delivering a heat network that balances modern energy needs with conservation.

5.2 **Strategic Collaboration:** by working together, Strategic Partners can de-risk their own decarbonisation by strategically addressing shared challenges in planning, conservation, power limitations, decarbonisation funding and infrastructure construction. This collaboration opens additional public sector funding opportunities, more cost-effective energy efficiency upgrades, and unites efforts towards shared carbon reduction goals.

5.3 **Spread the Benefits across Cambridge:** we provide a starting point for broader heat network expansion across Cambridge, further bolstering the Project's Business Case. The public sector, universities, schools, houses and businesses can all connect and use cleaner energy, making the entire city a healthier and better place to live for everyone.

5.4 **Boost the Local Economy and Innovation:** the heat network could be more than a way to keep buildings warm. It could also be the launchpad for a 'Living Lab for the city of Cambridge.' This could help improve the heat network's operational performance, reduce costs and help create a circular economy. Combining this new infrastructure with the established strategic partnership and Cambridge's academic expertise, could enable researchers to explore new energy generation technologies, innovative financing options and behaviour change strategies. This could lead to new inventions, smarter ways to use renewable energy and help make Cambridge a sustainable energy leader.

5.5 **Future-Proof Cambridge:** the heat network will play a pivotal role in reducing the cost of electricity upgrades as we electrify heat. We will reduce the city's peak electricity consumption during high tariff periods, helping Cambridge efficiently manage its energy system. The heat network will fully integrate with both existing buildings and new developments.

6 Pre-Commercialisation Workstreams

6.1 As is detailed in the Management Case, the following workstreams have been identified for the Pre-Commercialisation and Commercialisation Stages:

a) Programme management

b) Strategic Partner governance and quality assurance

c) Stakeholder engagement and communications

d) Technical derisking and betterment

e) Planning and architectural derisking

f) Procurement

g) Commercial derisking and development

h) Financial management

i) Joint venture set-up

j) Heat network digital twin (externally funded)

7 Principles of Effective Collaboration

7.1 All Strategic Partners agree to adopt the following principles in respect of their participation in the Project:

a) Collaborate and share knowledge to increase the Project's chances of success, responding promptly to support requests.

b) Acknowledge that success is not guaranteed - all Strategic Partners proceed at risk.

c) Act in good faith in all dealings with the other Strategic Partners and stakeholders, promoting common interests. Achieving Project objectives depends on mutual support and co-operation as outlined in this MoA.

d) Commit adequate resources to achieve project goals, understanding that each Strategic Partner's resource may vary. Note that heat network programme management resource for Pre-Commercialisation Stage is being funded by Cambridge City Council.

e) Follow legal requirements and best practice, including public procurement, data protection and freedom of information laws.

f) Provide updates on any internal decisions or changes to programme that may implicate the Project, timing, phasing, physical connection points, or likelihood to connect.

g) Communicate openly about significant risks, issues and opportunities, and collaborate to address risks and seize opportunities. Report any concerns to the Cambridge City Council for resolution.

h) Prepare for heat network connection through any necessary secondary heat network installations/upgrades.

i) Over time, seek to reduce the heat supply flow and return temperatures below 80°C/60°C through energy efficiency improvements at connections across the heat network. Reducing the heat network temperature over time will deliver collective financial and carbon benefits, and cost-competitive customer tariffs. The potential to reduce temperature is limited by the heat supply requirements of the customers and would require all connections to be compatible with the lower temperature regime.

8 Updated Governance Arrangements

8.1 As the Project moves from Detailed Project Development into Pre-Commercialisation and Commercialisation, governance arrangements have been reviewed to align with a likely future Preferred Delivery Model of a customer owned energy company.

8.2 The likely approach for the Preferred Delivery Model is a 51:49 joint venture between Cambridge City Council and up to eight Strategic Partners (such Strategic Partners having elected to take an equity role as well as a potential customer role). This is to be finalised in Pre-Commercialisation and Commercialisation, and the final delivery model needs to be ready to go live at Final Investment Decision in c. summer 2028. Ahead of this, all potential customers and equity investors need to be given the opportunity to influence further Project development through derisking and optimisation.

8.3 Strategic Partners may subsequently choose to update their customer and/or equity investment positions. The new governance arrangements need to be flexible enough to accommodate any such changes. For this reason, the following governance updates are recommended for Pre-Commercialisation and Commercialisation Stages:

a) **Cambridge City Council continues as lead partner**: facilitates Project development, including development of the joint venture customer owned energy company; procurement of DBOM contractor; and securing public-financing for the Project. Regular meetings will also be arranged with Cambridge City Council finance and procurement officers. Cambridge City Council will take all decisions with regard to Pre-Commercialisation and Commercialisation but will consult with the Shareholder Committee.

b) **Steering Group is replaced by a Shareholder Committee**, which is open to all potential equity investors and customers. This becomes the new strategic decision-making body until the joint venture is established.

c) **Core Group is maintained for operational decision making** until the heat company is established. The Core Group takes operational decisions, monitors progress and provides recommendations to the Steering Group and then its replacement Shareholder Committee.

d) **Expert Advisory Group continues to provide due diligence** during Pre-Commercialisation and Commercialisation.

e) **Non-Disclosure Agreement (NDA)** for all Strategic Partners at the point at which the Project moves into Commercialisation Stage.

9 Shareholder Committee

9.1 The Shareholder Committee provides overall strategic oversight and direction to the Project during Commercialisation Stage. It does not provide day-to-day decision making as to the Project, which shall rest with Cambridge City Council. Cambridge City Councillors provide political input into the reports before they go to Shareholder Committee, to ensure ongoing political buy-in.

a) **Frequency of meetings:** Quarterly

b) **Chair:** Cambridge City Council Senior Officer

c) **Vice Chair**: University of Cambridge Senior Officer

9.2 **Attendance:** The Committee is open to all potential equity investors and prospective heat network customers to promote transparency and fair participation. The Cambridgeshire County Council is invited to attend. Advisors/consultants may be invited to present updates and recommendations but will not have voting rights.

9.3 **Voting representatives:** To streamline decision-making, voting will be exercised through three voting blocks, with one voting representative each from (i) Cambridge City Council, (ii) the University of Cambridge, and (iii) the University Colleges.

9.4 **Voting:** Decisions will be taken by simple majority of the voting representatives. Only the three voting representatives may vote. As lead partner, Cambridge City Council needs to support each decision.

9.5 **Secretariat:** Minutes, actions and key decisions will be issued promptly after each meeting for review and agreement.

9.6 **Transition to HeatCo:** The Shareholder Committee will stand down 6–12 months prior to Final Investment Decision, at which point governance will transfer to the HeatCo Board (replacing both the Shareholder Committee and Core Group). The respective roles of equity investors and customers will be set out in the HeatCo governance documentation at that time.

10 Potential Contributions in Kind

10.1 During the Pre-Commercialisation and Commercialisation Stages, Strategic Partners may (but are not obliged to) offer contributions in kind (**Contributions in Kind**) to support development of the Project. Contributions in Kind are intended to assist Project development and de-risking and may improve the Project's affordability and investability.

10.2 Any Contribution in Kind is voluntary and provided at the contributing party's own risk. Nothing in this MoA creates any entitlement to:

a) equity, profit share, preferential customer terms, exclusivity, appointment as supplier/contractor, or priority connection; or

b) reimbursement, compensation, or other financial return,

unless and until expressly agreed in writing in a separate legally binding agreement (for example a Connection Agreement, Land/Wayleave/Lease, Heat Supply Agreement, Shareholders' Agreement, or other Project contract).

10.3 No Contribution in Kind shall be assumed or relied upon for procurement, delivery, funding, or Business Case purposes unless it is documented in a written "**Contribution Schedule**" signed by the Cambridge City Council and the contributing party. Each Contribution Schedule shall (as applicable) set out:

a) a description of the contribution (e.g. land/access rights, plant room space, utilities capacity, data, surveys, design input, river abstraction infrastructure, energy centre hosting, thermal storage hosting);

b) the timetable and conditions precedent (including any necessary internal approvals);

c) responsibilities for costs (including design, surveys, enabling works, permits, utilities upgrades, operation and maintenance, insurance, and reinstatement);

d) any assumptions, dependencies, and interfaces with other works;

e) health and safety, and site access requirements;

f) any necessary third-party consents;

g) the valuation approach (if relevant to the Business Case), clearly stating whether such valuation is for modelling purposes only or intended to form part of future commercial terms; and

h) termination/withdrawal arrangements (including notice periods and consequences).

10.4 Unless expressly agreed otherwise in a Contribution Schedule, each contributing party remains responsible for the condition, performance and safety of any asset, site or information it provides, and bears its own costs and risks in making the Contribution in Kind available. The Cambridge City Council does not accept responsibility for any loss or cost incurred by a contributing party as a result of offering a Contribution in Kind.

10.5 A Strategic Partner may propose to amend or withdraw a Contribution in Kind at any time prior to the relevant binding contract being signed. The Strategic Partner shall provide reasonable notice and use reasonable endeavours to mitigate any material adverse impact on the programme. Any withdrawal or change will be documented and reflected in the Project plan and Business Case.

10.6 For the purposes of the Outline Business Case only (and subject to clause 8.3), indicative Contributions in Kind currently under consideration include arrangements in relation to:

a) Parkside Pool Energy Centre (Cambridge City Council)

b) Midsummer Common Energy Centre (Cambridge City Council)

c) Midsummer House River Abstraction (Cambridge City Council)

d) BT Exchange Energy Centre (Christ's College)

[redacted]

11 Pre-Commercialisation and Commercialisation Funding

11.1 Subject to formal internal approvals and budget availability, Cambridge City Council intends to fund the Pre-Commercialisation Stage at its own risk as an initial contribution towards its anticipated future equity investment in the Preferred Delivery Model. Pre-Commercialisation funding may be supported by the roll-forward of any uncommitted underspends from the Detailed Project Development stage where individual Strategic Partners have confirmed in writing that such underspends may be applied to Pre-Commercialisation costs. All Pre-Commercialisation expenditure is at risk and does not, of itself, create any entitlement for any Strategic Partner to equity, preferential customer terms, reimbursement, or any other commercial return, save as may later be agreed in separate legally binding agreements.

11.2 Any uncommitted underspend arising from Pre-Commercialisation and/or Commercialisation budgets (i.e. funds not contractually committed and not required to meet outstanding liabilities) shall be retained by and returned to Cambridge City Council as the primary funder of those stages, unless otherwise agreed by Cambridge City Council in writing.

11.3 Progression to Commercialisation Stage will be subject to:

a) approval by the Shareholder Committee to proceed;

b) a successful application to the Green Heat Network Fund (**GHNF**) (or any successor scheme), and compliance with any associated grant conditions; and

c) confirmation of the overall Commercialisation budget and funding plan.

11.4 The Commercialisation Stage funding decision is currently anticipated to be taken in October 2026. While the GHNF application is expected to seek up to £1 million of Commercialisation funding, the Strategic Partners acknowledge that additional funding may be required (for example, to progress to RIBA Stage 3 design for energy centres and pipework in advance of Final Investment Decision). Any requirement for additional funding, and the proposed sources of that funding, shall be presented to the Shareholder Committee for consideration and (where applicable) approval. If GHNF funding is not secured, or if funding is otherwise insufficient, the Cambridge City Council may pause, rescope or discontinue the Project without liability, subject to any existing contractual commitments.

12 **Detailed Project Development funding**

12.1 Detailed Project Development was funded (at risk) as follows:

a) Cambridge City Council £180,000; University of Cambridge £180,000; Heat Network Delivery Unit (HNDU) £272,500; Contributing Colleges £330,000; and ARU £30,000. **Total**: £992,500.

b) "**Contributing Colleges**": Christ's £30k; Clare £20k; Corpus Christi £30k; Jesus £30k; King's £20k; Peterhouse £30k; Queens' £20k; Trinity £50k; Trinity Hall £50k; and St John's £50k. **Total:** £330,000.

12.2 Detailed Project Development contributions do not confer any right to equity. As such:

a) If the Project does not proceed: Contributing Colleges bear their own Detailed Project Development contributions, and no amounts are sought from non-contributing University Colleges.

b) If the Project proceeds: the intention is that the Contributing Colleges' total contributions are indexed by CPI from 31 December 2024 to the calculation date, and recovered from University Colleges that connect, via a Connection Charge allocated in proportion to heat demand served (recognising phased connections).

12.3 For clarity, at the date of this MoA, participating University Colleges who are Strategic Partners but have made no Detailed Project Development contribution are: Downing; Emmanuel; Gonville and Caius; Hughes Hall; Pembroke; Sidney Sussex; and St Catharine's.

13 Intellectual Property (IP)

13.1 For the purposes of this MoA:

a) "**Background IP**" means any intellectual property, know-how, information, software, data, documents, designs, methodologies and other materials that are generated prior to, or outside the scope of, the Project, including all academic intellectual property.

b) "**Results**" means all information, know-how, reports, drawings, designs, models, software, data, inventions and other outputs generated in the course of the Project.

c) "**Project IP**" means the intellectual property rights in the Results.

13.2 Strategic Partners intend that Background IP will remain the property of the relevant Strategic Partner (or its licensors). Nothing in this MoA is intended to transfer ownership of any Background IP.

13.3 Given Cambridge City Council's proposed role as primary funder and facilitator for Pre-Commercialisation and Commercialisation, The intention is that (unless otherwise agreed in writing), the Project IP created through the Project will be held by Cambridge City Council for the purposes of developing, procuring, delivering and operating the heat network and associated assets (and, where relevant, transferred or made available to any future delivery vehicle such as HeatCo). Nothing in this clause 13.3 or this clause 13 as a whole will grant a licence or change the ownership of any intellectual property as between a Strategic Partner and Cambridge City Council. This clause 13.3 only records the manner in which Strategic Partners are content for Cambridge City Council to instruct future work (and deal with future intellectual property) in respect of the Project.

13.4 Strategic Partners may enter into appropriate legally binding arrangements to give effect to this intention (including ownership/assignment and/or licence arrangements, as appropriate).

13.5 Strategic Partners recognise that certain Background IP may need to be used to progress the Project. Strategic Partners intend to negotiate and agree in writing (at the relevant time) any licences required to use a Strategic Partner's Background IP for Project purposes, including (where necessary) rights for Cambridge City Council (and any future HeatCo, funders, and delivery/operations contractors) to use and share that

Background IP for design, procurement, construction, commissioning, operation, maintenance and future expansion.

13.6 Strategic Partners intend that no licence to use, sub-licence or otherwise exploit any intellectual property rights (whether Background IP or Project IP) will be granted or implied unless and until expressly set out in a separate written agreement.

13.7 Strategic Partners intend that improvements or modifications to a Strategic Partner's Background IP will not affect ownership of the underlying Background IP. Where an improvement/modification is developed as part of the Project, the Strategic Partners intend to address ownership and/or licensing of that improvement in the relevant written agreement, taking account of Cambridge City Council's need to deliver and operate the heat network and the Strategic Partner's continuing rights in its Background IP.

13.8 Strategic Partners acknowledge the importance of academic teaching, publication and research. Strategic Partners intend that the University of Cambridge and ARU (and their staff/students) will be able to use Results for academic teaching, publication and academic research, subject to (i) protecting Confidential Information, and (ii) reasonable prior review arrangements to avoid prejudicing any intended protection of IP or Project commercialisation, to be set out in a separate written agreement.

14 Confidentiality

14.1 "**Confidential Information**" is identified as information which is not in the public domain, and which is marked or otherwise indicated in writing to be confidential, or which ought reasonably to be regarded as confidential owing to its nature. Each Strategic Partner agrees to use reasonable endeavours to keep information confidential and not to publish or disclose in any way such Confidential Information, other than to those of its employees, students, directors, officers, advisors or representatives who have a need to know such information for the purposes of the Project.

15 Signatures

15.1 This MoA shall commence on the date of signature by all parties, and subject to no mutual agreement to extend the MoA, shall expire two years later, or on the completion of Commercialisation Stage (whichever comes sooner). Any party may terminate / exit this MoA by giving at least three months' notice in writing to the other parties at any time.

Signed for and on behalf of by:

This page is intentionally left blank

Outline Business Case, Cambridge City Centre Heat Network

21 Strategic Partners

Project management

Technical consultants

Commercial & Financial Advisors

Legal consultants

CHANGE HISTORY

Version No.	Date	Details of Changes included in Update	Author(s)
1	22/04/2025	Basic template for Cambridge	DESNZ
2	20/10/2025	Strategic Case (v2)	Sustainability Co.
3	14/11/2025	Strategic Case (v3) and Economic Case (v2)	Sustainability Co.
4	18/11/2025	Combined Strategic Case (v3) and Economic Case (v2)	Sustainability Co. Buro Happold
5	02/12/2025	Combined Strategic Case (v4) and Economic Case (v3)	Sustainability Co. Buro Happold
6	18/12/2025	Management Case (v2)	Sustainability Co
7	12/01/2026	Combined Strategic Case (v5) and Economic Case (v4)	Sustainability Co Buro Happold
8	14/01/2026	Management Case (v3)	Sustainability Co
9	22/01/2026	Combined Strategic Case (v6) and Economic Case (v5)	Sustainability Co Buro Happold
10	24/01/2026	Management Case (v4) Commercial Case (v2)	Sustainability Co Amberside
11	15/01/2026	Commercial Case (v3)	Amberside
12	27/01/2026	Commercial Case (v4)	Amberside
13	27/01/2026	Financial Case (v2)	Amberside
14	28/01/2026	OBC: combined Strategic Case (v6), Economic Case (v6), Commercial Case (v4), Management Case (v5) and Financial Case (v2)	Sustainability Co, Buro Happold and Amberside
15	18/02/2026	OBC: combined Strategic Case (v7), Economic Case (v7), Commercial Case (v5), Management Case (v6) and Financial Case (v3)	Sustainability Co, Buro Happold and Amberside

APPROVAL HISTORY

NAME	ROLE	DATE BUSINESS CASE APPROVED	VERSION APPROVED
Ben Binns	Project Sponsor		
	Core Group		
	Steering Group		
	Individual Institutions: 1. Cambridge City Council 2. University of Cambridge 3. Anglia Ruskin University 4. Christ's College 5. Clare College 6. Corpus Christi College 7. Downing College 8. Emmanuel College 9. Gonville & Caius College 10. Hughes Hall College 11. King's College 12. Pembroke College 13. Peterhouse College 14. Queens' College 15. Jesus College 16. Sidney Sussex College 17. St Catharine's College 18. St John's College 19. Trinity College 20. Trinity Hall College 21. Cambridgeshire County Council		

Table of Contents

Table of Tables

Table of Tables

Table of Figures

1 Appendix List

Table 1—1 OBC Appendix List

Appendix	Description
A	Glossary
B	Strategic Partner Decarbonisation Studies
C	Risk Register
D	Steering Group Approvals, Detailed Project Development
E	Expert Advisory Group Recommendations
F	College Queries, 4 June 2025
G	Heat Zoning Study, December 2025
H	Updated Future Proofing Guidance Note
I	Concept Paper, Heat Network Digital Twin
J	Network Architecture Assessment Matrix
K	Heat Generation Technology Assessment Matrix
L	Energy Centre Location Assessment Matrix
M	Shortlist Risk Assessment
N	Road Closure and Traffic Management Risk
O	Techno-Economic Modelling Assumptions
P	Counterfactual Modelling Assumptions
Q	Financial Modelling Assumptions
R	Resilience Note
S	Cashflows (Nominal £'000s) Over Project Lifetime
T	Existing Heat Network Case Studies
U	Commercial Delivery Model Pros and Cons
V	Draft Principles for Drafting Heads of Terms (Heat Supply Agreement)
W	Programme, Pre-Commercialisation and Commercialisation

2 Executive Summary

2.1 Cambridge City Centre Heat Network (CCCHN) Strategic Partner Briefing

The Outline Business Case (OBC) for the Cambridge City Centre Heat Network has been developed by Cambridge City Council (lead partner), working closely with 20 Strategic Partners (University of Cambridge; 17 city centre University Colleges, Anglia Ruskin University and Cambridgeshire County Council). The OBC aims to answer three fundamental questions:

1) Is the Cambridge City Centre Heat Network viable?

a) Does it deliver the project's Critical Success Factors (CSFs)?

i) Yes. CCCHN delivers cost effective, reliable low-carbon heat, at a scale and in a timeline that's not otherwise possible. It provides an appropriate Cambridge response to the Climate Emergency.

b) Is it value for money?

i) *The current local counterfactual assessment used in the OBC is conservative, with forecast cost comparisons within the Margin of Error. Work is underway with Strategic Partners to better understand the actual cost of delivering local decarbonisation projects in Cambridge, noting significant space and conservation constraints. To date, informal analysis has indicated that local counterfactual costs are likely underestimated. If true, this makes the heat network overall more cost competitive, creating additional headroom. As and when this information is shared and fully validated, we will update Strategic Partners.*

2) Is there enough evidence for Strategic Partners in the Minimum Viable Product (MVP) to provide a strong intention to connect and commit to Commercialisation Stage?

i) Yes. The Outline Business Case provides the supporting evidence base, assumptions and Sensitivity Analysis results for Strategic Partners to provide Letters of Support for the project's forthcoming Green Heat Network Fund bid. This is in principle commitment to connect and/or invest, and to continue to work in partnership with other Strategic Partners to support further project development during Commercialisation Stage. Although Strategic Partners can still change their mind before Final Investment Decision in summer 2028, withdrawing from the project at such a late stage is likely to impact both project viability and confidence.

3) For Strategic Partners considering investing in the project, what is the associated risk, reward and control?

i) Extensive codesign with Strategic Partners has enabled development of an appropriate balance between risk, reward and control, which is fully described in the Business Case.

Through individual formal governance review, Strategic Partners are asked to:

1. **Feedback on the draft Outline Business Case**: An updated version will be reissued to Strategic Partners for formal approval in Q2 2026

2. **Provide Letters of Support for the forthcoming Green Heat Network Fund (GHNF) bid using the template and headed paper.** The aim is to showcase the strength of the strategic partnership and associated heat demand. This is key to unlocking £20 million of grant funding, including up to £1 million Commercialisation funding, both of which are essential to project viability.

3. **Sign the updated and non-legally binding Memorandum of Agreement (MOA) for this next project stage:** So that all partners are clear on what the next stage of project development entails, with the opportunity to still walk away if needed.

Cambridge City Council is in principle willing to fund at risk for Pre-Commercialisation Stage, acknowledging some roll forward of up to £100k Detailed Project Development (DPD) underspend. This financial commitment by the Council is contingent on Strategic Partners Letters of Support giving confidence that they are also fully vested in the next stage of project development. During Pre-Commercialisation Stage between March and October 2026, the Design, Build, Operations and Maintenance (DBOM) tender pack will be developed.

In autumn 2026, once the project's GHNF bid result is announced, Strategic Partners will be asked to approve the start of Commercialisation Stage, with additional gap funding likely to be required. During Commercialisation Stage the DBOM contractor will be procured; detailed technical designs will be developed; and the Joint Venture (JV) will be set-up, enabling the project costs to be finalised through the Final Business Case (FBC). Final Investment Decision (FID) is currently scheduled for summer 2028, when the Council will seek full recompense for its Pre-Commercialisation spend.

The OBC identifies the spending option which optimises value for money; confirms funding and affordability; and plans for successful delivery. This Minimum Viable Product (MVP), which supplies heat to all 20 Strategic Partners with anchor heat loads in the city centre. It's this OBC that is now subject to individual and collective governance approvals.

2.2 Strategic Rationale and Case for Change

2.2.1 Strategic Context

The Cambridge City Centre Heat Network (CCCHN) is a city-scale, low-carbon infrastructure programme developed collaboratively by Cambridge City Council, the University of Cambridge, 17 city-centre Colleges, ARU and Cambridgeshire County Council. It responds directly to the decarbonisation challenge of historic, dense urban estates where building-level solutions are constrained by decarbonisation funding, space, heritage, grid capacity and disruption risks. This strong partnership is grounded by significant individual decarbonisation commitments, as evidenced by the targets, progress reporting, and individual project case studies presented in Appendix B.

Heating and hot water for UK buildings make up 40% of our energy consumption and 20% of our greenhouse gas emissions (Next Steps for UK Heat Policy – Committee of Climate Change 2016). The OBC demonstrates that coordinated, shared infrastructure offers a lower-risk, lower-cost and faster pathway to decarbonisation than fragmented, asset-by-asset approaches. As government states in its recently produced Heat Zoning Consultation Response, heat networks are an essential part of our path towards lowering bills, decarbonising heat, enhancing energy security and achieving net zero by 2050.

As well as being cost effective, there are many other strategic benefits of connecting to CCCHN, which help justify collective and individual decisions to provide Letters of Support for the forthcoming GHNF bid:

1. Better carbon savings due to the pace and scale of the change
2. Control of future energy tariffs
3. Better reliability due to the thermal stores
4. The project is more deliverable in a space constrained and historic city centre than multiple on-site schemes
5. Access to decarbonisation grant funding from the Green Heat Network Fund (GHNF) that's otherwise unavailable
6. The City Council's facilitation role and strategic added value
7. The reduced hassle factor for decarbonisation delivery
8. Betterment opportunities that include an additional River Source Heat Pump Energy Centre and two additional potential thermal store locations. Much longer-term, opportunities could include heat network expansion connection to new data centre(s) and/or solar farm.
9. Heat network expansion opportunities across Cambridge highlighted by the Heat Zoning Study, with six times the heat demand Required to Connect through Heat Zoning.

In addition to standard Market Transformation social value commitments required by GHNF, the project aims to deliver strategic added value by capitalising upon both the strength of its strategic partnership and Cambridge's academic prowess. It is proposed to achieve this through:

1. **Heat Network Digital Twin:** seek external funding to Prove the Concept, procuring and delivering the digital twin as an integral part of the heat network's tender specification. This has the potential to strengthen the OBC across all CSFs (decarbonisation, cost, tariffs, reliability and social value); enhance the competitiveness of the Green Heat Network Fund bid, which is essential to project viability; and lay the groundwork for a city-scale Living Lab, aligned with Cambridge's growth and innovation agenda. This strategically aligns with the City Council's corporate objectives, University of Cambridge's research ambitions, and ARU's Sustainable Futures programme.

2. **Maximising Social Value:** shared commitment to social value and education, with potential avenues being investigated for reinvesting into expansion of the CCCHN, to help address fuel poverty and linked educational/training. Such a commitment would further strengthen our GHNF bid but is subject to Shareholder Committee review, noting that no up-front capital would be required by Strategic Partners. Reinvestment in the city could also deliver the social value requirements of the Council, who are project facilitators and contributing energy centre land. Considerations however need to be balanced against the need to ensure competitive energy tariffs for Strategic Partners.

Decarbonising heat in the UK is expensive compared to Business as Usual, due to the relatively high cost of electricity compared to gas. However, all Strategic Partners have committed to degasify, meaning the choice is whether:

1. **To develop a district heat network** with centralised heat pumps providing >85% of the annual heat demand, complemented by transitional gas for peak heating and Thermal Stores providing additional resilience and access cheaper time-of-use tariffs.

2. **Individual organisations or buildings pursue their own decarbonisation strategies**, primarily using individual heat pumps in combination with electric boilers at either a building and/or on-site level. Some buildings may not have the necessary space or be able to install heat pumps and will need to rely entirely on electric boilers, resulting in increased energy and connection costs.

Importantly, for any Institution that decides to stay with gas beyond MVP Phase 1 (2030-2033 Heat On) or MVP Phase 2 (2035 to 2037 Heat On), it is important to note that there is a **cost of doing nothing.** By not future installing the primary pipework to connect individual buildings and campuses to the renewable energy centres, the opportunity to connect to CCCHN may be lost for many years. The amount of cost and disruption incurred by installing 8km of primary network in Cambridge's historic centre is likely to be significant. The opportunity to add connections in the medium to long term would be difficult. The preferred approach is, where possible, to only dig once to minimise disruption to all stakeholders.

2.2.2 Policy and Regulatory Alignment

CCCHN is strongly aligned with:

- National net zero commitments and the Energy Act 2023
- Recently published national Warm Homes Plan- Growing the heat network market. One of their pillars is "*lowering the average cost of heat from heat networks, including through investment support, rebalanced fuel prices, and protecting against excess profits.*"
- Heat Zoning Consultation Response and Heat Network Zoning policy, which will mandate connections in designated zones from 2026
- Ofgem heat network regulation (from January 2026)
- Cambridge Local Plan Strategic District Heating Area (SDHA), which is already ahead of national policy
- Draft Climate Change Strategy for Cambridge and South Cambridgeshire

This alignment materially reduces long-term demand risk and improves investability. Importantly, Cambridge City Council's planning policy already anticipates mandatory connection for major developments, positioning CCCHN as the natural anchor for future city-wide expansion.

2.2.3 Strategic Objectives

The agreed Critical Success Factors prioritise:

- **Primary factors**: cost-competitive, reliable low-carbon heat; estate decarbonisation; and future expansion capability.
- **Secondary factors**: social value, minimise disruption, innovation and sustainability leadership.

The project has been designed to meet Strategic Partner decarbonisation targets, whilst preserving institutional autonomy and heritage assets.

2.2.4 Extensive Due Diligence

- **Technical Due Diligence:** Recognising the world leading academic excellence at the University of Cambridge, Colleges and ARU, as well as the influential role of College Fellows in decision making, an Expert Advisory Group (EAG) for CCCHN was established in Spring 2024. The EAG has provided technical due diligence during Detailed Project Development. All EAG recommendations have been accepted by the project's Steering Group.

- **Strategic Engagement to derisk CCCHN:** The University of Cambridge convened a thematic meeting of its Special Interest Group on the Built Environment in September 2024 focussed on heat network development; Planning Performance Agreement (PPA) for CCCHN; and separate early strategic discussions with statutory and non-statutory consultees including the Environment Agency; Cambridgeshire County Council (Highways, Archaeology and Local Area Energy Plan); Historic England; Greater Cambridge Shared Planning; Greater Cambridge Partnership (GCP); the Cambridge Archaeological Unit; and UKPN.

- **Financial Due Diligence:** Strategic engagement and funding from government and its Department of Energy Security and Net Zero (DESNZ) team; a Service Level Agreement with the National Wealth Fund (NWF), enabling its heat network team to be a critical friend for the CCCHN project; and regular meetings with the Green Heat Network's Fund Managers.

2.3 Economic Case and Preferred Technical Solution

2.3.1 Options Appraisal and Value for Money

A comprehensive longlist and shortlist appraisal assessed available energy sources and heat network architecture (3rd, 4th, 5th generation heat networks) against economic, carbon, risk and deliverability criteria. The preferred option is a **heat-pump-led district heat network**, delivering circa **93% carbon reduction** versus Business as Usual, while remaining cost-competitive against individual building counterfactuals.

The Economic Case confirms:

- Lower whole-life cost of heat relative to decentralised solutions for the majority of connected buildings
- Reduced exposure to electricity grid reinforcement costs through diversity and centralised plant

2.3.2 Minimum Viable Product (MVP)

The MVP focuses on a city-centre network with sufficient anchor demand to ensure early financial viability. Of the 20 Strategic Partners interviewed at the end of 2025, 19 have confirmed in principle commitment to connect. Interest from additional stakeholders with city centre land holdings as well as future Zoning policy, mean that any loss of heat demand can be likely backfilled and expanded upon. Key features include:

- Low carbon heat generation (River Source Heat Pumps & Air Source Heat Pumps) to meet baseline heating demands
- Phased delivery to manage capital exposure and disruption
- N+1 resilience embedded in plant design, with pipe sizing future-proofed for expansion beyond MVP
- Thermal stores to enable the operator’s access to cheaper time-of-use electricity tariffs, benefitting customer heat tariffs

The MVP is split across 2 Phases – Phase 1 (2030 to 2033) and Phase 2 (2035). This has been designed to enable both early adopters to connect by 2030, noting that this is still a challenging timeline, and those who’ve just invested in replacement gas boilers to connect 5 years later. The high temperature network enables all buildings to connect, regardless of the level of fabric energy efficiency improvements. CCCHN acts as a launchpad for wider Cambridge build-out, starting with 73GWH peak demand, 44MW of peak demand, 3 energy centres, 2 heat pump technologies and 8km of primary pipework.

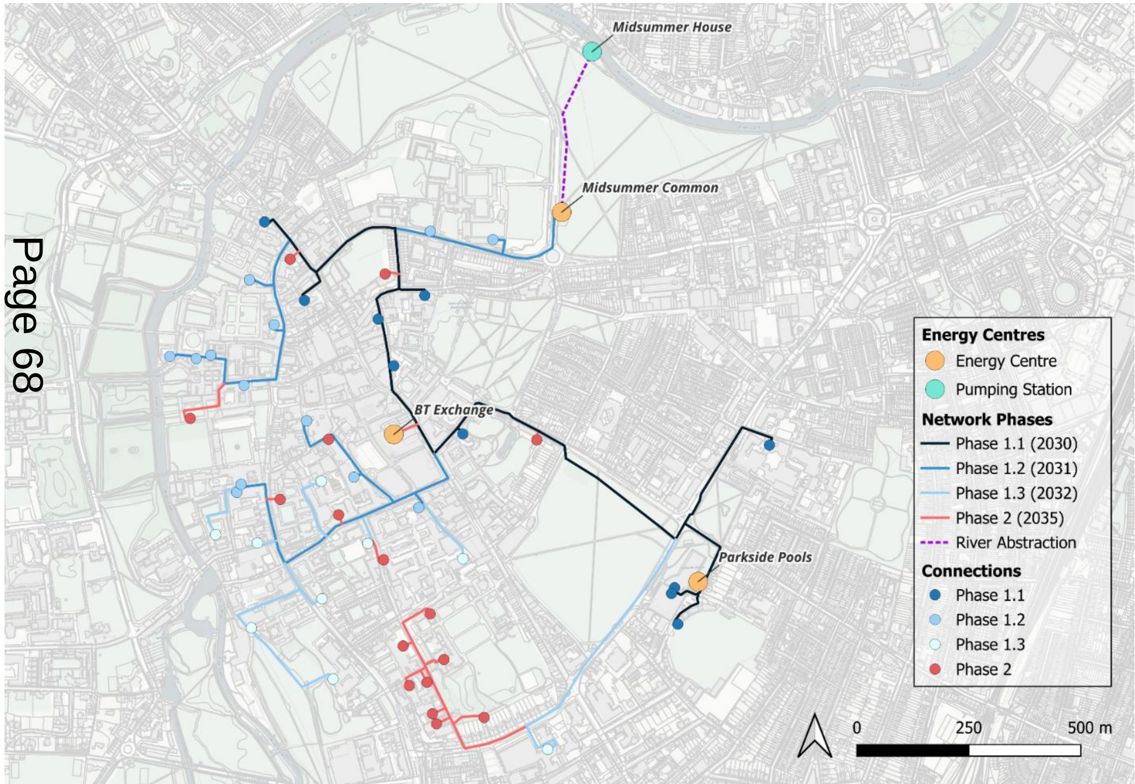
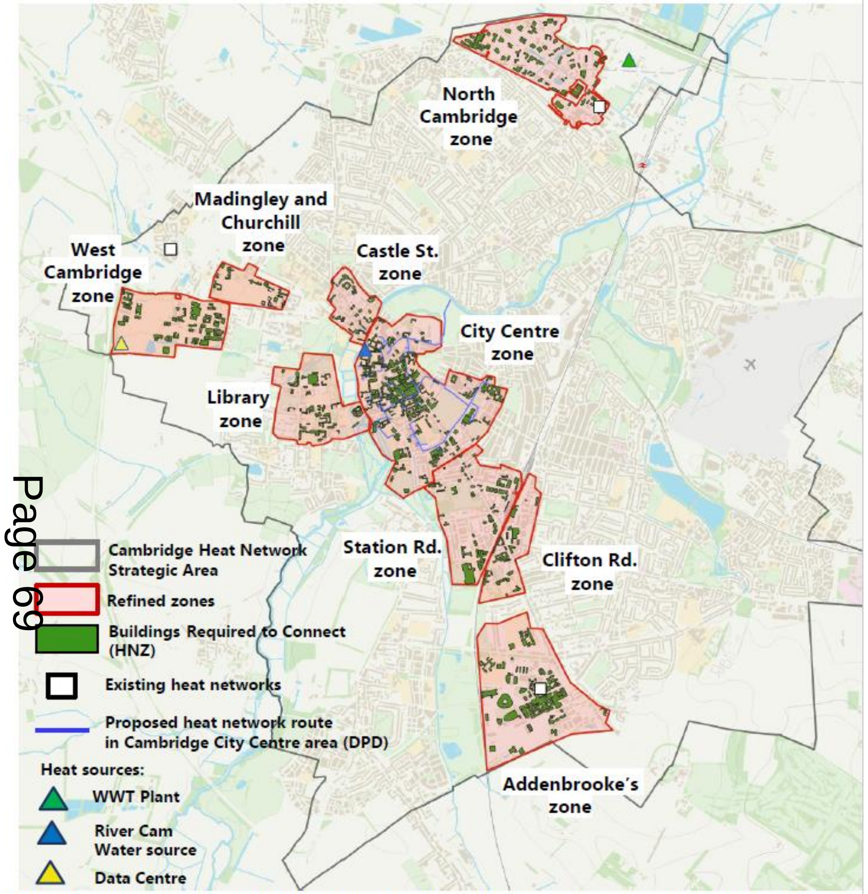


Figure 2—1 Preferred Option network layout & connections

The city-wide Heat Zoning Study identified a significant heat network expansion opportunity, with **over 300 GWh of future heat demand within immediate proximity of the city centre that's likely to be 'Required to Connect' by Heat Zoning. A total of over 450 GWh (6 times the MVP heat demand) is available in all surrounding zonal opportunities**, assuming a heat network proves to be the most cost-effective solution.



Refined heat network zones showing the Required to Connect building within designated zones based on the most recent HNZ model results.

Figure 2—2 Heat Network Expansion Opportunity, Cambridge Heat Zoning Study

2.3.3 Timeline

Final Investment Decision is currently scheduled for summer 2028, with first Heat On by 2030.

2.3.4 Decarbonisation Delivery

The heat network connects circa 50% of total heat load in the city centre area in the MVP, thereby introducing significant carbon benefits for the city centre's residents, institutions, businesses and visitors. The graph below shows how it is forecast to deliver 93% total carbon savings compared to gas (Business as Usual) over the 40-year Business Plan. It shows significant benefit realisation, with over 0.5 million tonnes of carbon saved in 40 years by the 20 Strategic Partners with anchor heat loads in Cambridge City Centre. This is a notable Cambridge response to the Climate Emergency, especially noting the ambition to expand the heat network across the city centre and wider Cambridge area.

Cambridgeshire County Council will soon produce its Local Area Energy Plan (LAEP) for Cambridgeshire. The heat network team has contributed evidence to this study and is working with the LEAP team to dovetail the conclusions with the CCCHN OBC. The LAEP will provide the evidence needed to demonstrate, quantify, and justify decarbonisation impacts in a way that is credible to funders, regulators, and decision-makers. Practically, it supports decarbonisation by establishing a defensible carbon baseline, quantified carbon savings for each potential pathway, and supporting investable Heat Zones. This avoids overstating decarbonisation benefits and improves credibility with scrutiny bodies.

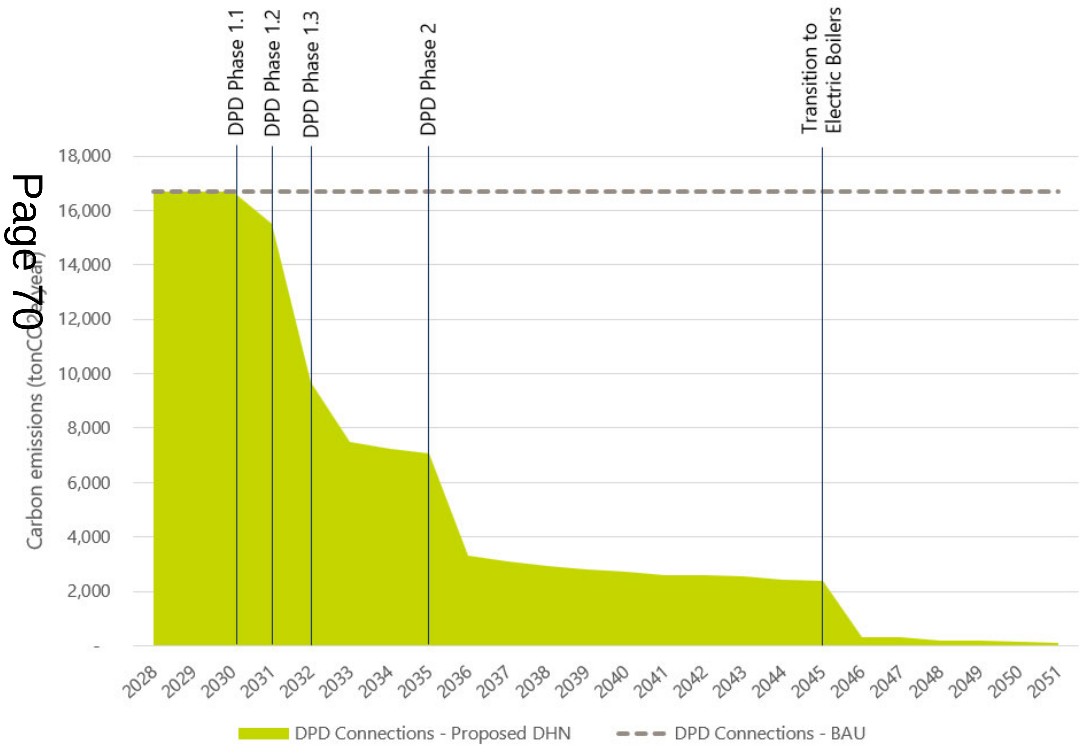


Figure 2—3 Carbon Savings Over 40-Year Business Plan

2.3.5 Lessons from Comparable Schemes

Evidence from UK schemes such as the Bristol Heat Network, Queen Elizabeth Olympic Park and Gateshead highlight consistent lessons applied in CCCHN:

- Early anchor demand commitment is critical to affordability
- Heat-pump-led baseload with transitional peak gas improves early economics
- Public sector leadership and facilitation enable strategic derisking

These lessons are embedded in the CCCHN preferred option.

2.4 Commercial Case and Investment Proposition

2.4.1 Preferred Delivery Model

Following structured commercial workshops, the agreed preferred model is a **51:49 co-investment Joint Venture**, with:

- 51% ownership by Cambridge City Council
- 49% ownership by investing Strategic Partners [redacted]

This structure balances control, risk and affordability; important to all Strategic Partners [redacted]. This financing structure enables access to public-sector financing (including National Wealth Fund) and to private financing via the Strategic Partners with financial capacity. Whilst a return is expected on all financing requirements, this approach provides Strategic Partner control of customer tariffs and collective Strategic Partner costs.

2.4.2 Rationale for Joint Venture

Compared to a Concession or fully public model, the JV:

- Retains strategic control with customers as owners, ensuring control of future Connection Charges, energy tariffs and focussed expansion
- Risk distribution between Developer, Operator, Customer and Owner. Development and operational risk is borne by the SPV. The debt risk is borne by the Council, as recipient of the NWF loan.
- Creates optionality for future refinancing or asset restructuring
- Can allow either existing investors or new investors to invest new capital to facilitate city-wide growth.

Private-sector delivery capability is retained through procurement of a **Design, Build, Operate and Maintain (DBOM)** contractor, mitigating capability risk while preserving customer ownership.

2.4.3 Customer and Investor Roles

Strategic Partners are clearly differentiated as:

- **Investing Strategic Partners**: equity participation, governance rights, exposure to returns and risks
- **Non-Investing Strategic Partners**: long-term heat supply contracts without equity exposure, where customers are asked to sign Heat Supply Agreements, with a likely term of at minimum 15 years, subject to negotiation. All MVP customers are Strategic Partners, materially reducing counterparty risk during early years.
- Flexibility exists for all Strategic Partners to review their equity positions as the project progresses.

2.4.4 Key Commercial Risks and Mitigations

- **Heat Demand risk**: is mitigated through MVP customer commitments, Heat Zoning, and identification of potential additional customers
- **Construction risk**: transferred via DBOM contract with performance regime. Soft market testing will be undertaken during Pre-Commercialisation to test and confirm the market position.
- **Regulatory risk**: mitigated through early compliance with Ofgem framework, which is borne by the JV owned Special Purpose Vehicle
- **Governance complexity**: managed through streamlined voting blocks and reserved matters

Experience from multi-party JVs (e.g. Newcastle Helix) has informed governance simplification to control transaction and operating costs.

2.5 Financial Case and Costs

Please note, version2 of the Financial Case, has been published. Subsequent iterations are to follow during Pre-Commercialisation. These will further verify the forecast cost implications. The current version presents robust and adequate detail for Strategic Partner review. No Financial Investment Decision (FID) is required based on the OBC. This is determined at Full Business Case (FBC) at the end of Commercialisation Stage, which is scheduled for summer 2028.

The Financial Case has been informed by Strategic Partner engagement at DPD leading to the following outcomes:

- Feedback from customers and potential equity investors regarding 'must haves' and 'nice to haves', with the aim of presenting a viable Business Case that works for customers, equity investors and the developer (once appointed).
- The financial model presents true equity investment market position and investor terms, with no hidden costs sitting on Strategic Partner books, as the starting point for further derisking and optimisation. Equity investors can't subsidise the cost of heat, given the inherent risks associated with developing and delivering a large infrastructure project. The OBC also includes the extra cost of owning and operating a customer owned energy company. The financial model has a **target equity IRR of [redacted] over 40 years**. Further validation and derisking of costs planned for Pre-Commercialisation. The second planned injection of capital at Year 18 will have its own Business Case.

- An equity investor position that is not solely a financial investment but also provides long-term strategic derisking. This is achieved by Strategic Partners retaining control of both customer energy prices; the pathway to full decarbonisation (using electric boilers for top up heat); and future heat network expansion.

The latest financial modelling forecasts that in the most spatially and historically challenging part of the city:

- **A total Capital Expenditure of [redacted] million excluding VAT (**£119m initial spend across first 5-years of project, followed by further £26m at Year 18 for full electrification)**:** in nominal price base, noting that construction isn't forecast to start until at least 2029. This assumes no fabric improvements to individual buildings and campuses; Strategic Partners individually funding any required on-site secondary upgrades; and replacement expenditure for gas boiler replacement. [redacted]
- **A forecast equity IRR of [redacted] at Year 40:** to ensure the returns reflect the risks of the project, [redacted]
- **Updated forecast customer costs:** Compared to the blended counterfactual (the total costs of alternative low-carbon heating solutions), the Preferred Funding Option, with an updated version 2 baseline position against the blended counterfactual is forecast to deliver:
    - [redacted] **reduction in Levelised Heat Price.** The Levelised Heat Price is the present value of revenues (variable tariff, fixed tariff and Connection Charges) divided by the present value of MWh (heat demand). It is the average lifetime cost to customers for heat, expressed per unit of heat delivered (p/kWh).
    - [redacted] **reduction in forecast customer Connection Charges**
    - [redacted] **reduction in forecast Variable Charges** at a network level, due to the use of transitional gas boilers for peak heating for a maximum of 15 years (one gas boiler life cycle), as compared to the original ambition of using electric boilers for peak heat.
    - [redacted] **increase in forecast Fixed Charge:** Due to the Management Costs of operating a customer owned energy company. This includes private-sector expertise to manage the Joint Venture; the Design, Build, Operations and Maintenance contract; and associated risks and opportunities associated with a kickstart heat network in the centre of Cambridge.

Individual updated forecast customer costs will be shared with individual Strategic Partners in early February 2026, noting that actual customer and equity investment costs won't be fixed and finalised until Final Investment Decision, which is scheduled for summer 2028.

In Year 18 of the project, the gas boilers will have reached the end of their useable life and will need to be replaced. As the aim is to further decarbonise, the project, as modelled, requires additional investment to fund the costs of replacing gas with electric boilers and will likely need to pay for electrical grid upgrades (the costs of which can only be estimated at this stage). Prospective investors advise that this investment carries less risk than the initial investment, so the return on investment of the later equity injection can be slightly reduced with forecast tariffs also reduced beyond Year 18. This is all based on the MVP, without any prospective expansion. This reduction in tariffs is factored into the 40-year Levelised Heat Price and the overall 12% Equity IRR.

Cost overruns are a particular concern for potential equity investors. In response, a **worst-case scenario of 30% cost overrun has been modelled**: noting that a 15% overall contingency and additional project specific risk factors are already included in the technoeconomic model. Even in this scenario, the Levelised Heat Price is still competitive against the blended counterfactual. Further due diligence of real-world construction costs is underway. The Commercialisation Stage will also be used to competitively test these assumptions through procurement, which may identify efficiencies to further reduce the Levelised Heat Price.

Assumed 50/50 Pain and Gain spilt between equity investors and customers on cost overruns: Further analysis of the assumed 50/50 Pain and Gain spilt between equity investors and customers on cost overruns is required. This will be negotiated during Pre-Commercialisation and Commercialisation Stages, with the aim of continuing to ensure cost competitiveness against blended and local counterfactuals, including in the event of a 30% 'worst-case' cost overrun scenario. This may be achieved if customers agree to take up to 50% of the cost overrun risk with equity investors. Upside scenarios with potential cost savings will also be considered as part of this discussion. There may also be the opportunity to push some cost overrun risk onto the DBOM contractor. The aim is to avoid the scenarios of:

- High Connection Charges, which albeit being fixed and risk free, may be unaffordable for some Strategic Partners.
- Significantly increased tariffs - which loads risk onto heat network financial viability and impacts long term consumer cash flows.

The following potential upsides will be investigated and quantified using Sensitivity Analysis during Pre-Commercialisation:

- **Incorporation structures:** Through engagement with specialist tax advice, the pros and cons of different incorporation structures for the energy company. Currently assumed to be a Company limited by shares, the energy company could also be incorporated in a different legal form
- **Subsidy Control:** Treasury Management advice regarding the On-Lending Margin, which is the premium covering for the Council for taking the project's debt risk with NWF.

2.6 Management Case and Delivery Readiness

2.6.1 Delivery Track Record

The project has completed two years of Detailed Project Development with:

- 19 of 20 Strategic Partners expressing in-principle commitment to connect
- 9 Strategic Partners considering equity participation
- Strong senior officer engagement and transparent governance

This represents a materially de-risked position relative to typical UK heat network projects at OBC stage.

2.6.2 Governance Arrangements

Governance evolves from development to operation:

- **Pre-Commercialisation/Commercialisation**:
    - Cambridge City Council as lead partner
    - Shareholder Committee replacing Steering Group
    - Core Group retained for operational oversight
- **From Final Investment Decision (FID) to Operations**:

- HeatCo Board established 6–12 months pre-FID
- Clear separation between shareholder oversight and executive delivery

[redacted]

2.6.3 Resourcing and Capability

The Management Case confirms adequate resourcing through to MVP "Heat On", including:

- Dedicated HeatCo Director with appropriate heat network experience
- Contract and stakeholder management capacity
- Owner's Engineer and Employer's Agent support

This addresses a common concern about public-sector-led energy companies needing adequately experienced executive and client-side management.

The Pre-Commercialisation and Commercialisation workstreams are:

1. Programme Management
2. Strategic Partner Governance & Quality Assurance
3. Stakeholder Engagement & Communications
4. Technical derisking & betterment
5. Procurement, including Procurement Strategy, tender pack preparation and procurement
6. Commercial derisking & betterment
7. Heat Network Digital Twin, Proof of Concept (external funding tbc)

2.6.4 Strategic Risks and Interdependencies

A detailed Risk Register supports the project and is regularly updated. As of December 2025, the top 5 strategic risks were identified as:

1. Insufficient heat demand, due to limited Letters of Support from individual Strategic Partners in Q1 and Q2 2026
2. Costly electrical power upgrades
3. National influences on Delivery Model consultations, including Devolution and the potential role of the City Council, as both majority shareholder and Zone Coordination Body
4. Unsuccessful GHNF funding bid in Spring 2026
5. Reputational and economic damage from heat network construction and disruption

Risk mitigation measures have been developed and are described in detail the Strategic Case.

Heat network interdependencies include Local government reorganisation; Cambridge City Council: Civic Quarter Redevelopment; University of Cambridge: Reshaping our Estate; Energy retrofit of Strategic Partner buildings; Heat Network Zoning; Local Plan Consultation; and UKPN Grid Reinforcements. The associated risk and benefits are described in Table 3—11.

2.6.5 Programme and Next Decisions

Key forthcoming decisions for Strategic Partners include:

- Formal in-principle confirmation of connection and/or equity position
- Participation in Pre-Commercialisation Stage, with development of the scope of works and tender pack to procure an experienced Design, Build, Operations and Maintenance contractor
- Final Investment Decision (target: summer 2028), subject to Final Business Case

Clear fallback scenarios are defined should project closure be required prior to FID, limiting downside exposure.

2.7 Strategic Partner Takeaways

- CCCHN is a **policy-aligned, investable, customer-owned decarbonisation solution** for Cambridge city centre
- The preferred JV structure provides customer control of Connection Charges, future energy tariffs and targeted expansion
- Strategic Partners retain control while sharing out delivery risk
- Early participation secures long-term heat price stability and strategic influence over expansion

The Outline Business Case demonstrates that CCCHN is **viable, value for money and deliverable**, with risks understood and actively manages

3 Strategic Case

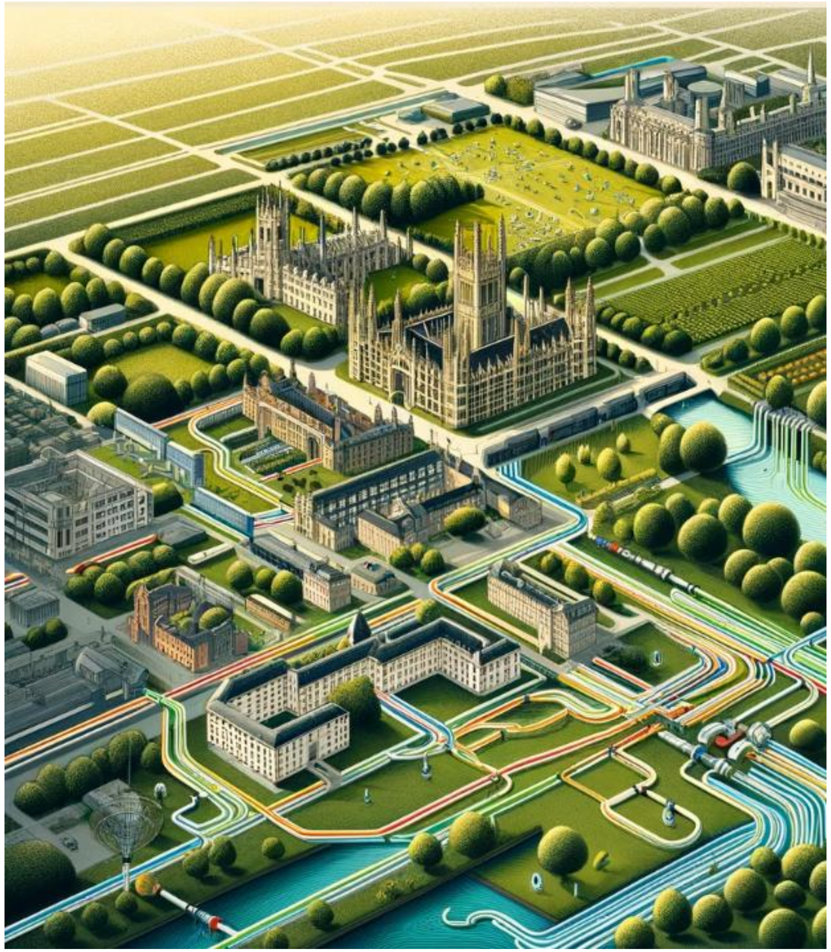
3.1 Strategic Context

The Strategic Case demonstrates how the spending proposal fits with national, regional and local policies, strategies and plans. It provides the strategic justification for the Cambridge City Centre Heat Network project. It demonstrates that the infrastructure investment delivers all primary and secondary Critical Success Factors agreed with 21 Strategic Partners. It is predicated upon a robust evidence-based case for change.

Our Vision for the Cambridge City-Centre Heat Network is to set a new standard for sustainable urban living. It is about making Cambridge a model city for the future, where history is preserved, the environment is protected, and new technologies help the city thrive.

Cambridge City Council, the University of Cambridge, 17 city centre University Colleges, Cambridgeshire County Council and Anglia Ruskin University (ARU) have worked together to develop the Outline Business Case for the Cambridge City-Centre Heat Network. It's a strategic Decarbonisation Partnership.

We aim to remove existing and polluting gas boilers from individual buildings, replacing them with a renewable heat network. Our ambition is to connect individual buildings from both the City Council, University of Cambridge, College and ARU estates by 2030.



The Outline Business Case (OBC) for the Cambridge City Centre Heat Network aims to answer three fundamental questions:

1. **Is the Cambridge City Centre Heat Network viable?** Does it deliver the project's Critical Success Factors? Is it value for money?
2. **Is there enough evidence for Strategic Partners in the Minimum Viable Product (MVP) to provide a strong intention to connect and commit to Commercialisation Stage?**
3. **For Strategic Partners considering investing in the project, what is the associated risk, reward and control**?

The OBC identifies the spending option which optimises value for money; confirms funding and affordability; and plans for successful delivery.

Subject to governance approvals, Commercialisation Stage will follow to procure the preferred delivery option. This culminates in the Final Business Case (FBC), with final detailed costs.

Please see Figure 3—1 for a summary of the Strategic Partner, Customer and Developer Journeys.

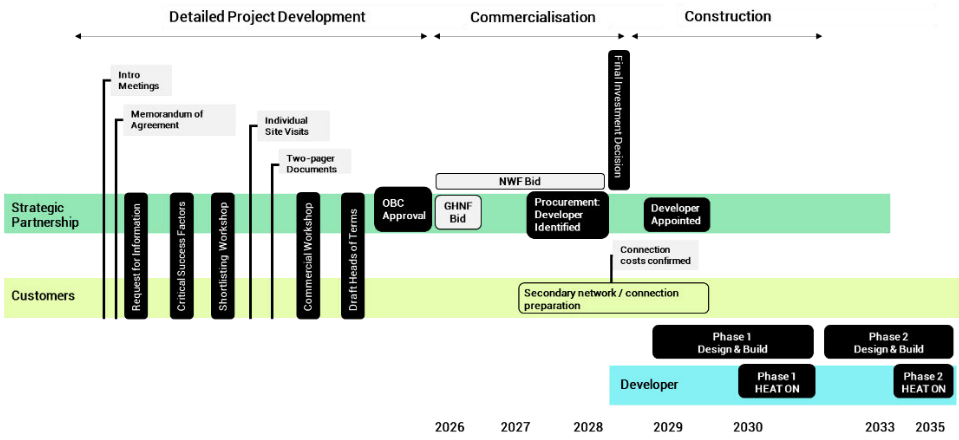


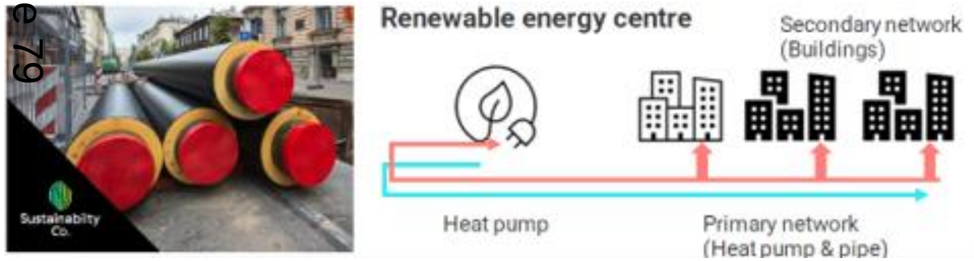
Figure 3—1 Strategic Partner, Customer & Developer Journeys

3.2 Background

3.2.1 What is a heat network?

A heat network delivers space heating, hot water and sometimes cooling to multiple buildings via an underground network of water pipes. There are two pipes – a flow and return.

Heat networks are Business as Usual for many continental European cities. The C40 Good Practice states that 98% of Copenhagen's heating is supplied by modern district heat networks. One third of Berlin's residential buildings are connected to a heat network (Eon 2024). In the Netherlands, the share of homes heated via district heating (or "block heating") was about 6.7% in 2021 (Energie Nederland 2021). In the Arenpoort area of Amsterdam, a digital twin enables integration of energy systems including heat pumps, buildings, solar and electric vehicles. This supports local flexibility, demand shifting, and utilising thermal storage / on-site flexibility, unlocking a new generation of city-wide systems (Energie Lab Zuidoost 2025).



Heat networks use mature technology, water pipes in the ground. They are also technology agnostic, so able to use different energy generation technologies. They can capture waste heat (from Energy from Waste plants, data centres and sewage treatment works) and environmental heat (air, water and ground) using heat pumps. Just a decade ago, gas Combined Heat Power (CHP) was the go-to technology. New heat networks now predominantly use environmental heat as renewable energy.

There are lots of operational UK heat networks (typically CHP led) that are decarbonising:

1. The heat network at Queen Elizabeth Olympic Park uses gas fired CHP but is now almost 15 years old and is actively developing its transition strategy to low carbon, which includes chiller heat recovery (operational) and may include further future decarbonisation through waste heat, river source and air source technologies.
2. The Citigen Heat Network in the City of London is one of the UK's largest urban-scale district heating & cooling networks, using gas CHP, gas boilers and deep borehole open loop Ground Source Heat Pumps (GSHPs)
3. Bunhill 2 in Islington uses waste heat from the London underground. It connects into Bunhill 1, which uses gas CHP.

In addition, there is a large pipeline of new UK heat networks under development, which are typically low carbon:

1. The Notting Dale Heat Network in North Kensington, with 2 x Air Source Heat Pumps (ASHPs) and a cascade system to a closed loop Water Source Heat Pump. This heat network is under construction
2. Brent Cross Town development will use ASHPs. It's at RIBA Stage 3 design and pre-construction
3. The Kingston heat network in Richmond will use Water Source Heat Pumps (WSHPs) to access waste heat from a large sewage treatment works (pre-construction)
4. The Oxford Heat Network is being developed using heat pump technologies for the baseload heat demand, with gas for peak heating
5. Bristol Heat Network uses multiple energy sources, including a 3MW River Source Heat Pump located in Castle Park.

Several UK heat network schemes have won national awards, including energetik (Energy from Waste in North London); Leeds PIPES (Energy from Waste); and Gateshead Heat Network (Phase 2 includes both a large WSHP and mine-water heat recovery).

Heat networks are future-proofed systems. Once installed, additional energy generation technologies can be added or changed. There's no building level disruption as energy generation technologies evolve. Importantly, heat networks have the flexibility to expand, with the opportunity to connect new buildings and interconnect with other heat networks.

More detailed case studies are provided in Appendix T, providing three UK case studies on both Enviroenergy in Nottingham, Worthing and Sheffield heat networks, including lessons learned and how they've been applied to the CCCHN Outline Business Case.

Figure 3—2 Citigen, Leeds PIPES, Gateshead, Queen Elizabeth Olympic Park, Bunhill 2, energetik & Leeds PIPES energy centres (clockwise)

3.2.2 Project History

In December 2021, Cambridge City Council appointed 'Sustainability Co' to bid for government funding from the Heat Network Delivery Unit (HNDU), to help develop a city-scale heat network in Cambridge city centre. Stakeholder engagement secured Letters of Support from the Leader and Chief Executive of Cambridge City Council; the University of Cambridge's Vice-Chancellor; and the Bursars of seventeen University Colleges. The bid was successful, with £98k grant awarded by government in Spring 2022.

3.2.2.1 Heat Mapping and Masterplanning, and Feasibility

As Heat Network Programme Managers, Sustainability Co procured AECOM engineering consultants, leafing work with partners to produce both a Heat Mapping and Masterplanning (HMMP) Study and a Feasibility Study for the Cambridge City Centre Heat Network (CCCHN). Officers from both Cambridge City Council, the University of Cambridge and Sustainability Co formed the Core Group. ARU's Head of Sustainability was also actively engaged.

The Heat Mapping and Masterplanning (HMMP) Study identified the opportunity to establish a low/zero carbon heat network within Cambridge city centre, with the potential to expand to create a city-scale heat network. Heat demands, renewable heat sources and potential pipe routes were identified and mapped. High-level technoeconomic modelling identified four potential heat network clusters, with the opportunity for full build-out of all 4 clusters as a city centre heat network. The study reported in May 2023.

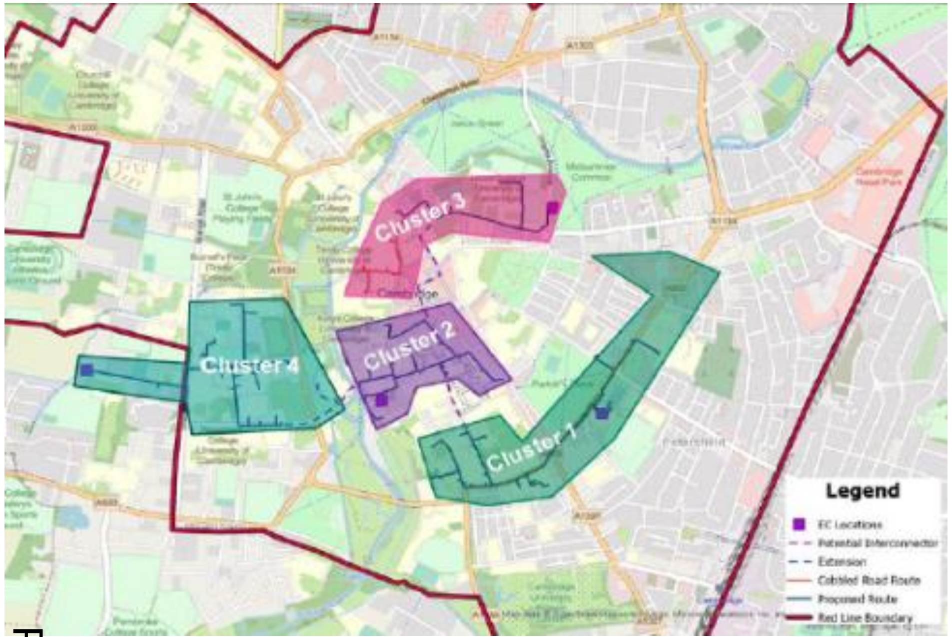


Figure 3—3 Heat Network Clusters from HMMP Study

Subsequently, a Heat Network Feasibility Study was undertaken, which reported in September 2023. It highlighted that Cambridge City Council, University of Cambridge, ARU and 17 city-centre based University Colleges are all seeking to decarbonise their Estates, all recognising the urgency of addressing climate change, with several Strategic Partners setting stretching decarbonisation targets.

Anticipating the continued decarbonisation of the UK's electrical grid, it is likely that heat pumps offer the fastest path to achieving low-carbon heating. The city centre area that was covered by this study evaluated two primary options for enabling the decarbonisation of heating:

1. **Develop a district heat network** with centralised heat pumps providing around 80% of the annual heat demand, complemented by transitional gas for peak heating and Thermal Stores providing additional resilience and access top cheaper time-of-use tariffs.
2. **Individual organisations or buildings pursue their own decarbonisation strategies**, primarily using individual heat pumps in combination with electric boilers at either a building and/or on-site level. Some buildings may not have the necessary space or be able to install heat pumps and will need to rely entirely on electric boilers, resulting in increased energy and connection costs.

The Feasibility Study reviewed these two options, demonstrating that a heat pump led district heat network in Cambridge city centre could be technically and financially viable, subject to Detailed Project Development (DPD). It included a RIBA Stage 2 Reference Design for both the energy centres, primary pipe route and bulk heat supply to each connection point via plate heat exchangers; techno-economic modelling; and financial modelling. CCCHN could help facilitate the transition from the city's current use of natural gas fuelled boilers to a low/zero carbon alternative that is cost competitive with the decarbonisation of individual buildings. This could benefit Strategic Partners and other potential heat loads.

AECOM's Preferred Option Summary from the Feasibility Study is shown in Table 3—1 for Full Build Out of the 3 city-centre clusters, with an ASHP based solution and electric top up boilers. It assumed 93 potential connections for bulk heat supply and a heat demand of 105GWh, with a heat peak demand of 42.5MW. The IRR is pre-finance but much higher than DPD; this is primarily because the total forecast CapEx was estimated to be £81 million, whereas design development in the DPD stage has seen this increase due to new energy centre buildings (rather than use of existing building rooftops); more conservative pipework costs (to sufficiently account for archaeology and other risks); and inclusion of river source offtake (which has higher development costs but lower operational costs).

Table 3—1 AECOM's Preferred Option, Feasibility Study, September 2023

Scenario	EC Location	CAPEX	IRR (40 years)	Carbon Savings vs Counterfactual (40 years) (tCO_2)	Carbon Savings vs Gas Boiler (40 years) (tCO_2)	LZC Technology and Capacity	Length of pipework
Full Build ASHP excl. Library	Midsummer Common, Mill Lane / New Museums, Parkside Pool	£80.9million	5.49%	5,500	595,000	13MW ASHP	11.9km

The heat network team opened a request for energy data and Expressions of Interest in CCCHN, which Strategic Partners responded positively to.

AECOM's Feasibility Study recommended that DPD:

1) Is based on a Study Area that is purely focussed on the city-centre, excluding the Library Cluster due to a lower heat density and the large amount of capital investment likely to be required to take heat network pipes across the River Cam.
2) Uses ASHP as the primary low carbon technology.
3) Further investigates the use of GHSPs, to determine practical deliverability and how they could further potentially optimise an ASHP led Preferred Technical Option.

AECOM also produced a Future Proofing Guidance Note for building owners across Cambridge, to help them plan for future heat network connection. This document has now been updated by Buro Happold and is included as Appendix H.

In July 2023, the University of Cambridge appointed Sustainability Co to more comprehensively engage University Colleges ahead of Detailed Project Development (DPD), recognising their importance to DPD as both large potential anchor heat loads and long-term Institutions with decarbonisation ambitions and large freeholdings across Cambridge. Sustainability Co's key findings from this College stakeholder engagement in summer 2023 are shown in Figure 3—4.

In December 2023 this engagement was extended to further derisk the project through individual meetings with senior officers at each College. Letters of support were provided by the College Bursars, Cambridge City Council, the University of Cambridge and ARU to support a second grant application. The resultant HNDU bid was successful, with £272,500 grant awarded for DPD. This was combined with £720k match-funding from the fourteen Strategic Partners listed in Table 3—2.

Because Strategic Partners own so much of the city centre, this relatively small group of stakeholders' control the anchor heat loads needed to create a Minimum Viable Product. This makes the proposition easier to deliver.

Figure 3—4 Summary of College Engagement, 2023

Many Colleges have already created long-term decarbonisation targets, in line with UK Carbon budgets. Other Colleges are operating on a project-by-project basis, as opportunities arise.

Colleges unanimously noted the challenges of a 'fabric first' approach for buildings that are up to 800 years old. These challenges include technical, financial, disruption, lack of space, conservation and planning policy.

Several Colleges have started to decarbonise heating and hot water within their estates. At this stage, most have delivered decarbonisation projects for specific buildings, rather than an estate-wide heat decarbonisation project. The city-centre heat network project is an important proposition, providing an alternative option to on-site heat networks and building level heat solutions. It brings economies of scale and reduced on-site complexities.

College **Decarbonisation Plans**	
6	Published decarbonisations plans
6	Due to release decarbonisation plans
5	Project-based action plans
Decarbonisation **of heating**	
11	Colleges with ASHP installed
4	Colleges with GSHP installed
0	Colleges with WSHP installed (5 potential projects emerging)
2	Completed UKPN upgrades

Table 3—2 DPD Funding Contributions

Strategic Partner	DPD funding contribution
Cambridge City Council	£180,000
ARU	£30,000
Heat Network Delivery Unit (HNDU)	£272,500
University of Cambridge - *the overarching body responsible for academic standards, degree awards, central policy, research strategy, major infrastructure, compliance, and external representation. It manages faculties, departments, laboratories and central services.*	£180,000
Contributing Colleges - Christs, Clare, Corpus Christi, Jesus, King's, Peterhouse, Queens', Trinity, Trinity Hall and St John's. *Colleges are legally independent, self-governing institutions responsible for admissions, pastoral support, accommodation, small-group teaching & the local student community.*	£330,000
	TOTAL **£992,500**

3.2.2.2 Detailed Project Development (DPD)

In October 2023, Sustainability Co was reappointed through open procurement as Heat Network Programme Managers for DPD Stage, with Cambridge City Council as the lead client. An open procurement exercise was also undertaken to appoint specialist heat network consultants - Buro Happold (engineers), Amberside Advisors (commercial and financial) and Sharpe Pritchard (legal advisors).

Formal governance arrangements were developed to manage engagement and decision making between 21 Strategic Partners, through the creation of a Core Group for operational decision making and a Steering Group for strategic decision making. Many thanks to the large number of officers who have given significant time to constructively challenge and support Detailed Project Development. These governance arrangements are summarised in Figure 3—5.

The project's updated Steering Group first met in May 2024, at the start of DPD. It includes senior representatives from Cambridge City Council, University of Cambridge, ARU and the University Colleges. During DPD the Steering Group has reviewed and approved the Core Group's recommendations in Appendix D, providing the strategic direction and decision making needed to enable the heat network team to deliver this Outline Business Case (OBC).

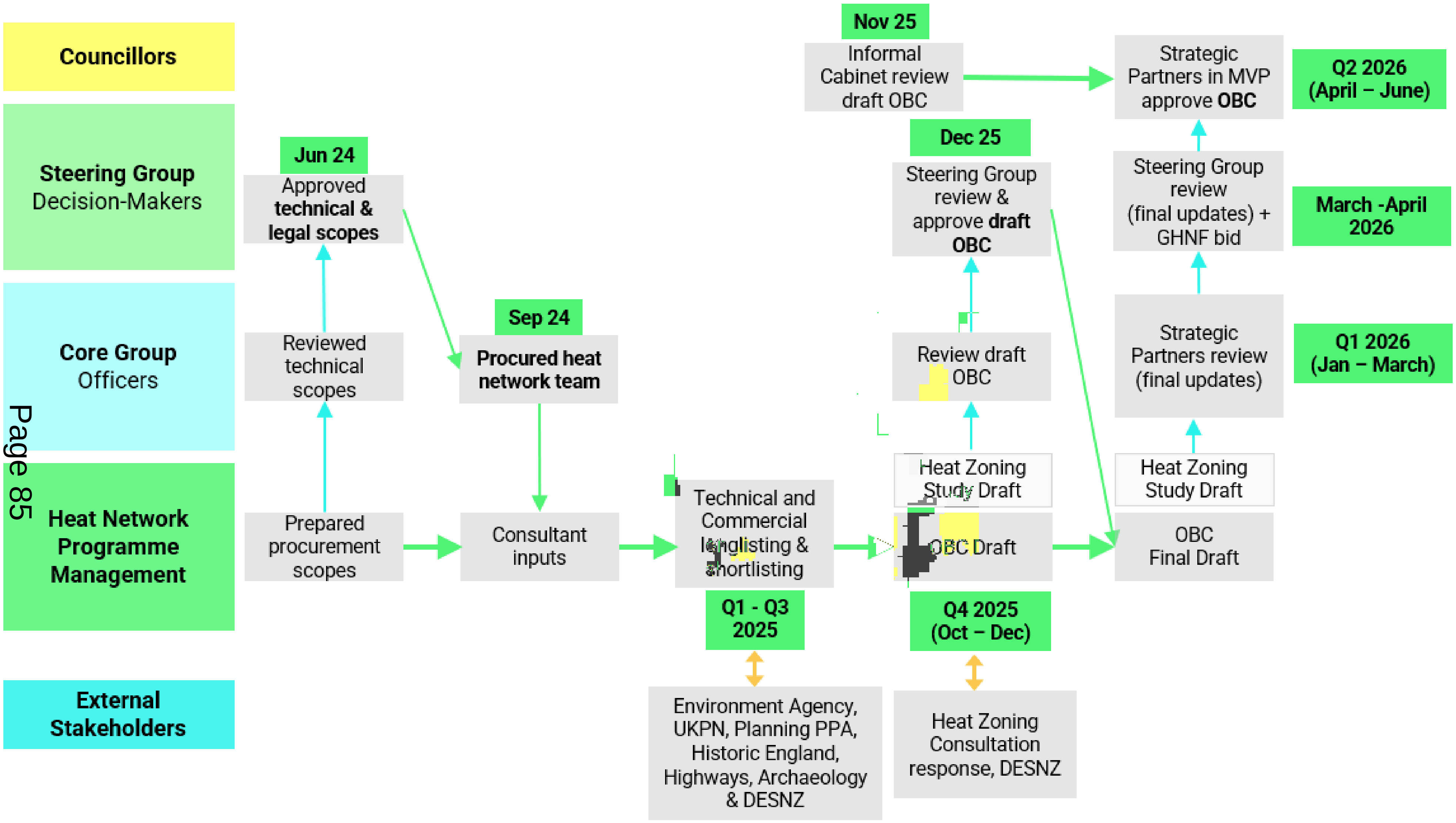
All 21 Strategic Partners signed a Memorandum of Agreement to confirm their commitment to collectively proceed with DPD, which was approved by Steering Group in January 2025. This included the seven 'Participating Colleges' that have supported DPD as potential heat network customers, albeit without DPD funding contributions. They are Downing, Emmanuel, Gonville & Caius, Hughes Hall, Pembroke, Sidney Sussex and St Catharine's Colleges.

Cambridgeshire County Council is also a Strategic Partner. Although it has no anchor heat loads within the city centre, it's archaeology, highways and strategic energy functions have an important role to play. Early strategic engagement with these teams has helped derisk the project. Most notably we can ensure strategic alignment with the Local Area Energy Plan (LAEP). The County Council also has first-hand experience of delivering the Swaffham Prior Heat Network, which is included as a case study in Appendix B.

Meeting	Expert Advisory Group	Core Group	Steering Group	
Chair	Professor Ruchi Choudhary	**Ben Binns/ Jaques van de Vyver**	**Ben Binns**	Councillors or Stakeholder Governance
Frequency	Stage Gates	Every 3 weeks	Quarterly	
Purpose	1. Provides academic expertise to constructively challenge real world consultancy 2. Provides clear recommendations, advice and technical assurance for review by the Core Group 3. Provides the Strategic Partners and public with extra assurance	Provides operational support for project delivery: 1. Operational decisions 2. Monitor progress 3. Test ideas with Project Sponsors 4. Plan for Steering Group meetings 5. Approve publication of Quarterly newsletter 6. Stakeholder reporting	Provides strategic oversight and direction for the project: 1. Strategic decisions. 2. Monitor progress 3. Engage Council Departments, University Departments & College Fellows	
Attendees	Professor Ruchi Choudhary (Chair) Dr Bryn Pickering, Professor Alan Short, Dr Alex White, Professor David Reiner, Professor Shaun Fitzgerald, Giles Greenfield, Professor Graham Pullan, Professor Jennifer Schooling, Professor Jonathan Cullen, Associate Professor Sarinova Simanjuntak, Professor Simone Hochgreb, Professor Stuart Scott and Dr Joel Gustafsson.	**City Council**: Ben Binns (Chair), Jaques van der Vyver, Emma Davies **UoC**: Suzanne Newman, Alex Reeve **Colleges**: Tim Harvey-Samuel, Stuart Websdale **ARU**: Simon Chubb **County Council**: Nicola Young, **Heat Network Team** (Jeff, Janet, Engineers, Finance, Amberside Advisors, Shapre Pritchard, **HNDU**: Alice Howarth	**City Council**: Ben Binns (Chair), Jaques van der Vyver, Jody Etherington, Lynne Mills **UoC**: David Hills, David Long, David Hills, **UoC Colleges**: Tim Harvey-Samuel, Richard Anthony, John Dix, Stuart Websdale, Giles Greenfield, **County Council**: Nicola Young, **ARU**: James Rolfe, **Heat Network Team** Jeff Laidler, Janet Hall, **Team** Sustainability Co., Buro Happold, Amberside Advisors, Sharpe Pritchard, **HNDU**: Alice Howarth	

Figure 3—5 Governance Arrangements

The Decision Pathway is summarised below.



Page 85

Figure 3—6 Decision Pathway

3.2.3 Cambridge City Council's Facilitation Role

Cambridge City Council has undertaken a proactive facilitation role, working closely with Strategic Partners to:

Chair the Core and Steering Groups, working closely with Strategic Partners

Procure and manage the heat network team

Use its local policy levers to enable heat networks. Local Planning Policy requires heat network connections, with the Council leading the way in UK heat network policy with its 'Strategic District Heating Area.' This fits well with national Heat Zoning policy, which also mandates connections

Complete Detailed Project Development

Enable successful strategic partnership with both DESNZ and the National Wealth Fund

De-risk the project through early engagement with future statutory consultees and strategic bodies, including Greater Cambridge Partnership; the Environment Agency, Historic England and UKPN

Facilitated strategic links with Cambridgeshire County Council to access specialist archaeological, highways and strategic energy masterplanning expertise. As a result, the Cambridge City Centre Heat Network project is being strategically aligned with the recently completed Local Area Energy Plan (LAEP) and its conclusions

Complete a Heat Zoning Study for Cambridge.

The Cambridge City Centre Heat Network project also aligns with Cambridge City Council's Strategic Objectives, Local Planning Policy, and its Climate Change Policy (with potential for Biodiversity Net Gain). The project would make the largest contribution to the Council's Climate Change Plan.

Cambridge Local Planning Policy on heat networks is ahead of national Heat Zoning Regulations, with large heat loads in the city's Strategic District Heating Area (SHDA) required to connect. Policy 28 of the adopted policy framework on Carbon Reduction, Community Energy Networks, Sustainable Design and Construction:

Requires major developments to consider communal or district heating where feasible

Encourages site-wide low-carbon energy solutions

Supported by the Sustainable Design and Construction Supplementary Planning Document (Greater Cambridge Shared Planning 2020), which sets technical expectations for heat network readiness (e.g. heat interface units, flow/return temperatures, and carbon reporting).

Policy 29 Renewable and Low Carbon Energy Generation (Greater Cambridge Shared Planning 2018), supports local energy schemes, including district heating, subject to viability and environmental impacts.

The Strategic District Heating Area (SDHA) shown in Figure 3—7 covers the city centre, with a current Local Plan consultation proposal to extend it to cover the majority of Cambridge (see Figure 8). Within the SDHA, connection to the heat network is a requirement for new developments and major refurbishments, unless technically or financially unviable. The SDHA aims to decarbonise heating for historic and public buildings that cannot readily achieve low-carbon heat on-site. Cambridge City Centre Heat Network Guidance (Cambridge City Council 2023) advises developers to "future-proof" buildings within and near the SDHA to enable later connection.

The list of Council decisions over the project life are shown in Table 3—3.

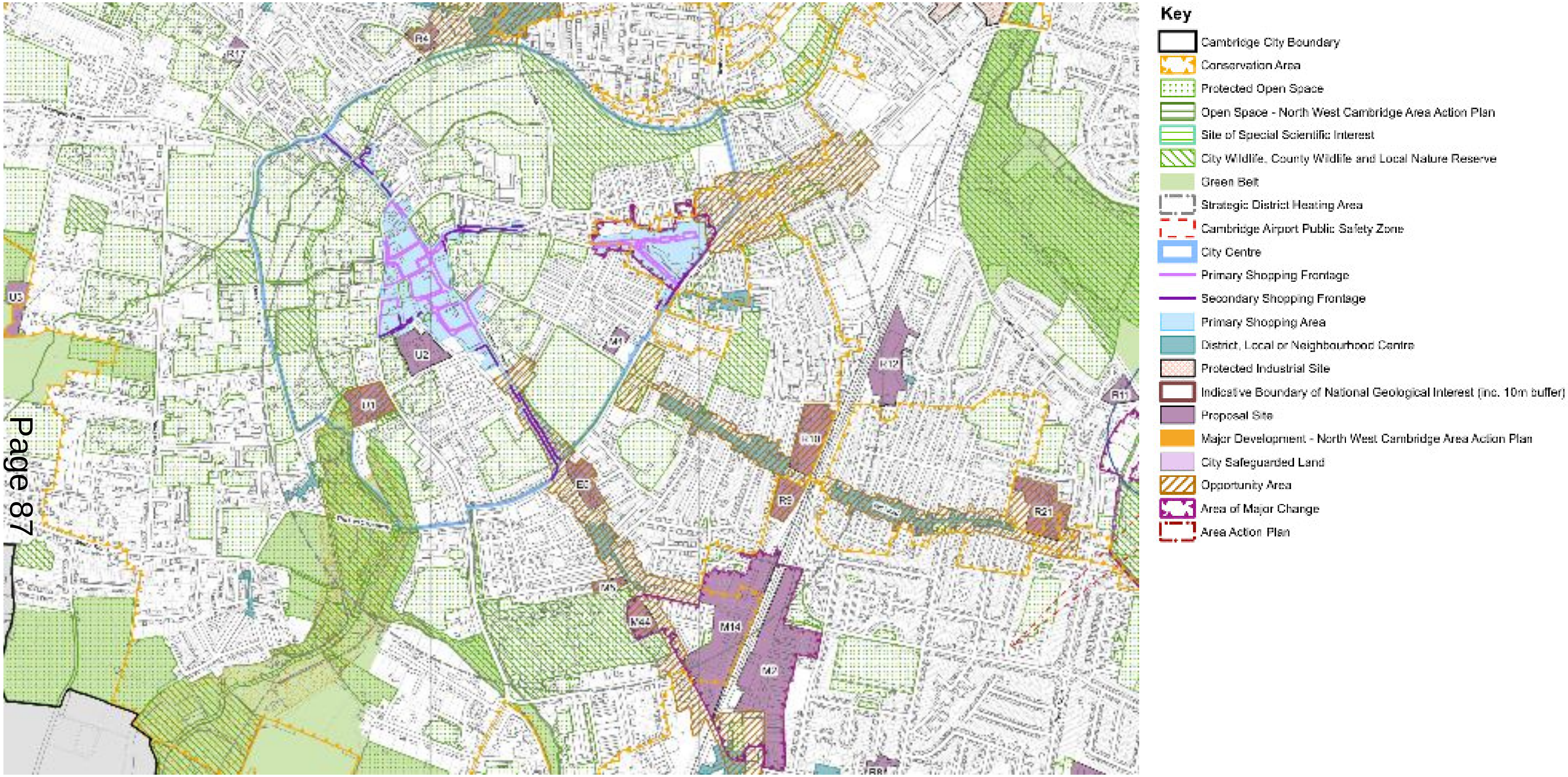


Figure 3—7 Current Strategic District Heat Area (Local Plan)

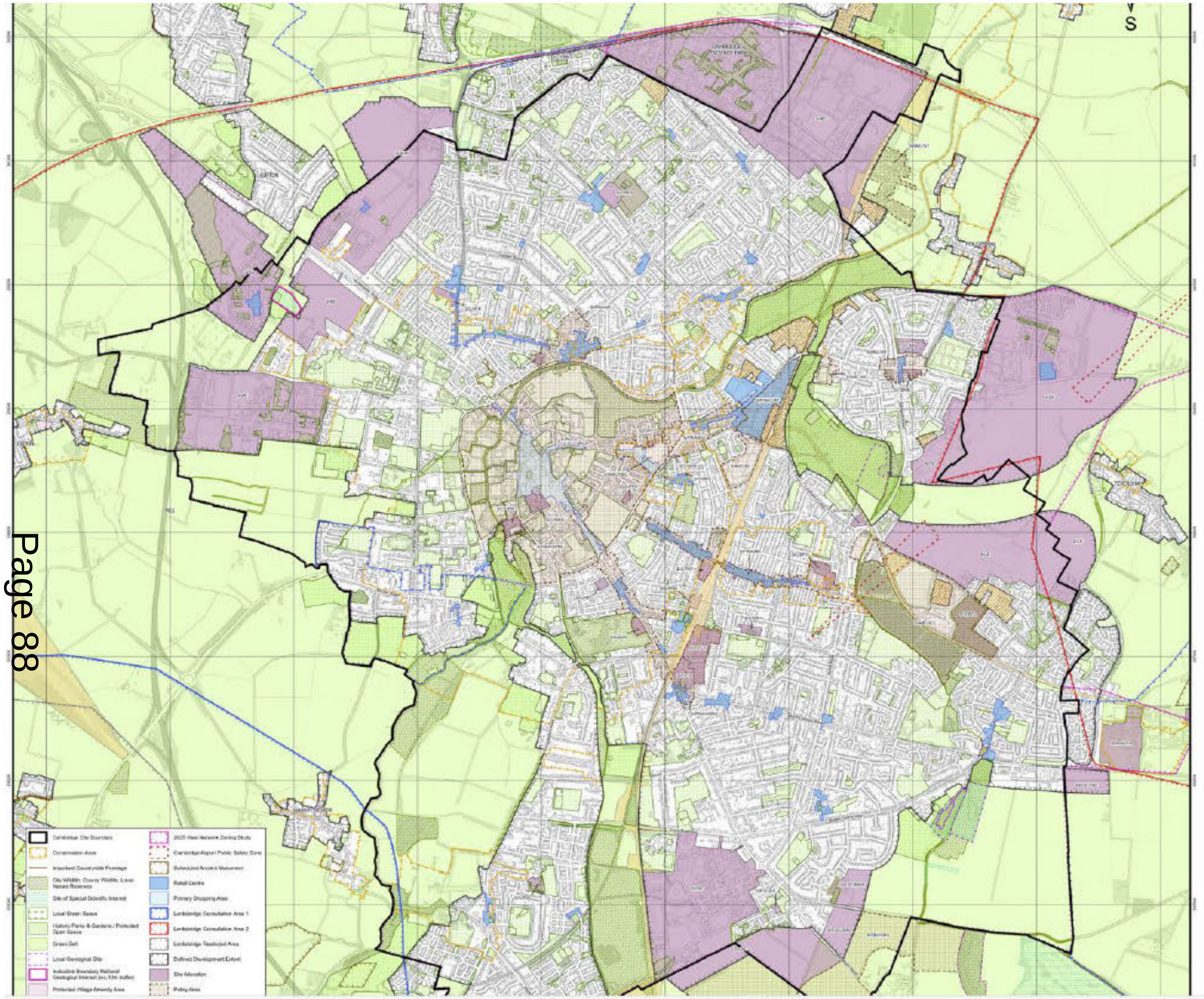
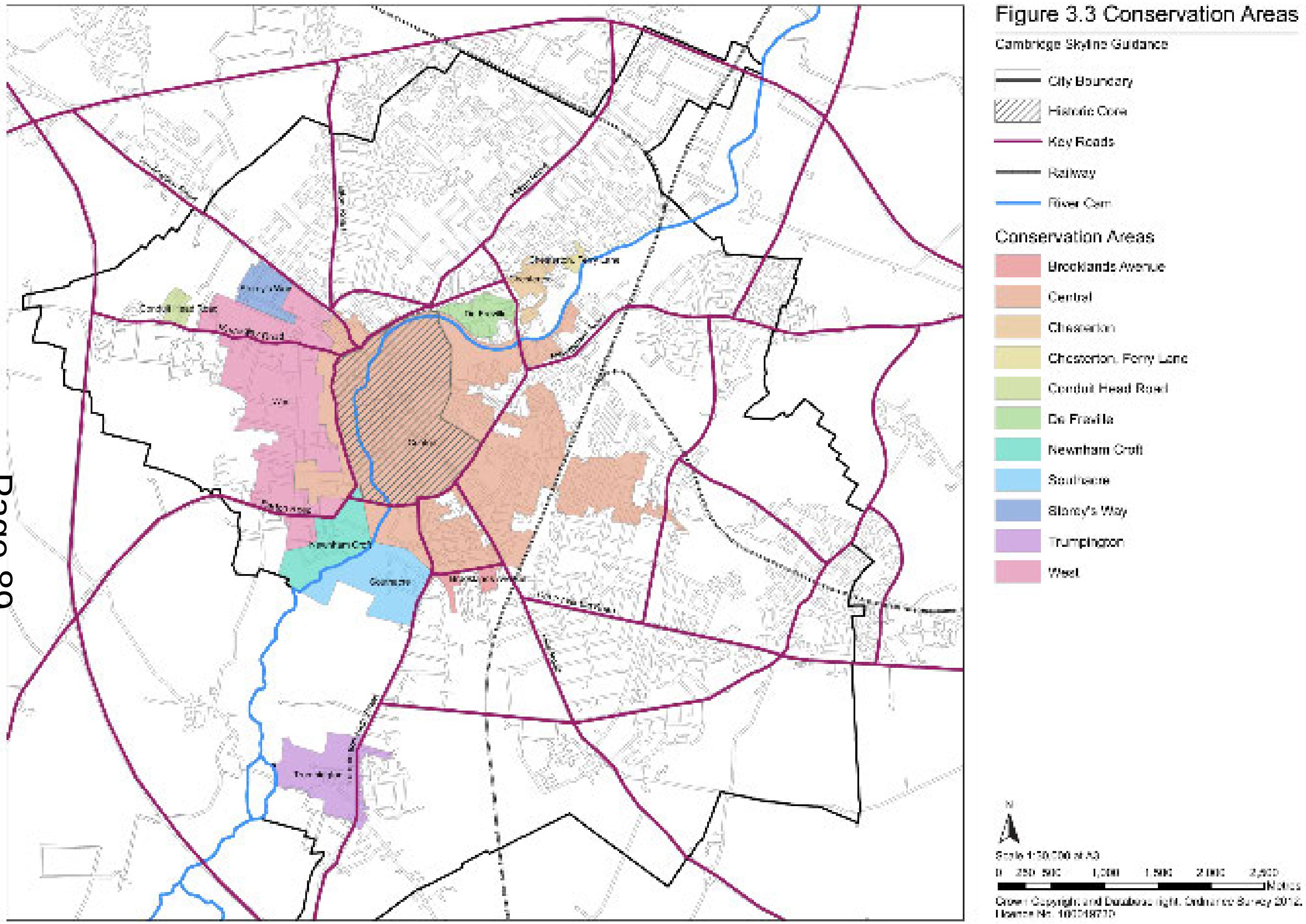


Figure 3—8 Local Plan Consultation with much larger Strategic District Heat Area (in grey)

The Cambridge City Conservation Area is shown for context in Figure 3—9, noting that it covers the entire city-centre.



Page 89

Figure 3—9 Cambridge City Centre Conservation Area

Table 3—3 Council Decisions over project life

Decision	Decision Maker	Date	Decision
DPD start	Environment and Communities Scrutiny Committee	29 June 2023	○ Provide 'In-principle' approval to use up to £180,000 of the Council's Climate Change Fund for match-funding of the next phase of DPD, subject to a satisfactory outcome from the feasibility study; a successful second government grant application; confirmation of a match-funding contribution from the University of Cambridge; clarification of additional expected resourcing requirements; and sources and approval from the Executive Councillor for Finance and Resources. ○ Approve delegated authority to the Assistant Chief Executive (as heat network Project Sponsor) to make the final decision in consultation with the Executive Councillor, chair of Environment and Communities Scrutiny Committee and opposition spokes, once the Feasibility Study is completed in summer 2023. ○ Note the potential requirement for a further additional Council and partner investment in technical assessment later, subject to exploration of alternative sources of funding.
OBC approval	Cabinet	Pending, March 2026	Tbc

3.2.4 Why are we developing the Cambridge City Centre Heat Network?

Heating Is Key to Cutting Scope 1 & 2 Emissions

Heating and hot water are the single largest sources of building-related carbon emissions, responsible for around one-third of the UK's total footprint. Despite two decades of progress in power decarbonisation, emissions from heat have barely changed:

- 31% of domestic CO_2 comes from heating in the average home (Energy Saving Trust 2025)
- 85% of UK homes still rely on natural gas (Energy Security Net Zero Committee 2025)
- Only 5% use low-carbon heating (Energy Security Net Zero Committee 2025)
- Including industry, heating accounts for 37% of total UK emissions. (Energy Catapult 2025)

To meet Net Zero, virtually all buildings must transition from gas to **renewable and electrified heat,** through building-level systems, campus networks, or city-scale heat networks. Electrification of heating and hot water can be expensive. This is true for both available decarbonisation options - heat networks and building level heat pump installations. This capital cost increases further when combined with building level energy efficiency improvements. This Energy Transition is necessary if we're to create a new, smarter and more decentralised energy system for the 21st century.

By 2050, government expects to see low carbon heat networks meet around one fifth of the UK's heating demand, reflecting the government's desire to support the lowest-cost, low-carbon solution. Government aims to double the size of the UK's heat network sector in the next 10 years, taking it from 2% to at least 7% (21TWh) by 2035.

As government states in its recently produced Heat Zoning Consultation Response, heat networks are an essential part of our path towards lowering bills, decarbonising heat, enhancing energy security and achieving net zero by 2050.

Crucially, heat networks enable use of heat sources that would otherwise not be available to consumers, such as waste heat from data centres and industrial processes, as well as higher temperature ambient sources (such as the River Cam).

As is noted in the government's recently published 'Heat Network Zoning Consultation Summary Response, heat networks can bring down the overall cost of electrifying the economy, saving money for all billpayers. By accessing larger sources of heat and operating at higher efficiencies than individual systems, they are estimated to save £5 to 7 billion in electricity distribution network savings alone.

Heat networks also help us make the most of the clean power system that is being built through their greater flexibility, using fuel-switching and large thermal stores to access cheaper electricity and save even more money.

The government's consultation response also notes that it is better to phase out the use of transitional gas boilers for peak heating later in the transition, to net-zero, when it will be easier to secure the additional investment needed to make heat generation low carbon, rather than adding these costs to heat network projects now, when they need high levels of capital investment. This is the approach we have taken with the Cambridge City Centre Heat Network (CCCHN).

In Cambridge, Decarbonisation Is Particularly Difficult

Cambridge faces a unique heat decarbonisation challenge due to its historic built environment:

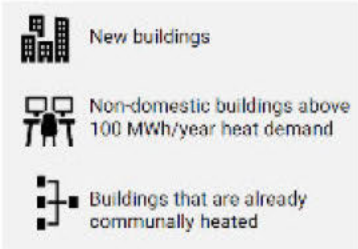
- A high proportion of *Grade I, II and II listed buildings** restrict deep retrofits
- Poor insulation and fabric efficiency drive high heating demand
- Dense urban areas offer strong potential for shared low-carbon heat networks, especially where there's consolidated ownership. However, coordinating infrastructure installation, planning, lack of space and electrical grid upgrades to minimise disruption in a historic city centre is difficult. This challenge exponentially increases with multiple heat pump upgrades across individual Estates.

For the city's institutions and estates, transitioning from gas is already a widely accepted goal. The wide range of decarbonisation case studies in Appendix B, showcase how Strategic Partners are already decarbonising their Estates. Whilst the heat network creates a strategic decarbonisation benefit, it's by no means the only decarbonisation project happening.

This prompts the important question - which scale of heat pump or network solution delivers the best overall cost, carbon and operational performance? An electrified baseload, with use of transitional gas for peak heating, is the now confirmed to be the baseline scenario. In common with many other new UK heat networks, this offers a pathway to full electrification after one lifecycle of peak heat gas boiler use (maximum of 15 years). It achieves a 93% reduction in carbon emissions, whilst ensuring that the project economics maximise customer connections in the Minimum Viable Product, providing the launchpad for a bigger heat network and even greater carbon savings.

Government has set an ambitious target to build an £80 billion UK heat market by 2050. Up to 20% of UK homes, around 6-7 million households and 1 in 5 homes, would be connected to a heat network (DESNZ 2024). To replicate the success of the UK's offshore wind industry sector, government has committed to support development of the UK heat network sector through policy, legislation and funding for all stages of heat network development. The UK government invested £288m in heat network development between 2022 and 2024. It is investing a further £435m between 2025 and 2028 (Capper 2023). In addition, the government has now successfully removed four of the main barriers to large-scale heat network development, as shown in Table 3—4.

Table 3—4 Barriers to Large-Scale Heat Network Development

	Barrier	Mitigation
1	**Lack of industry regulation / new regulations, impacting investment likelihood**	Heat Networks were an unregulated industry until the Energy Act 2023, supported by both the preceding Heat Network Metering and Billing Regulations 2014 (amended 2015 and 2020), and The Heat Networks (Market Framework) (Great Britain) Regulations 2025. This regulation ensures appropriate consumer protection for a monopoly utility supplier, with heat networks now regulated by Ofgem. The application and enforcement of this new legislation is untested. Whilst the basis of regulation has been drawn from other utilities, there are eccentricities in the UK Heat Network Market. There is a nervousness around utility investment and, the relationship between regulation, service provision, and capital growth, as exemplified in the water industry. As the regulations are rolled out, investors need to see that regulations and enforcement are proportionate, outcome focussed, and stable. CCCHN is being scoped to be best practice, taking regulations as the minimum standard.
2	**Lack of guaranteed heat demand:** critical to enabling capital investment in heat network infrastructure beyond the traditional red line development boundary	**Heat Network Zoning** represents a major legislative change introduced through the Energy Act 2023. It establishes a framework for designating geographic zones, where heat networks are identified as the lowest-cost pathway for decarbonising heat. The heat zones will primarily be in cities and areas of high heat demand density. Within these designated zones: • Specified building types will be mandated to connect to existing or planned heat networks from 2026 onwards, including:  • Zoning will be coordinated locally, led by Zone Coordination Bodies (typically Councils) working with heat network developers, utilities & Ofgem. • The framework is designed to remove investment barriers by providing market certainty over long-term heat demand, to secure and unlock private finance. • It also supports strategic network expansion, integration of waste and renewable heat sources, and the decarbonisation of dense urban areas, where individual building solutions are less practical or economic. **Connection Exemptions** Each Heat Zone will procure a Developer, with exclusive rights to design and build a heat network, thereby benefitting from heat loads that are mandated to connect. There are several exemptions, where heat network connections aren't required: • Connection is not technically/economically feasible e.g. due to distance from the network route or insufficient heat demand. • A building has recently invested in a low-carbon heating system that delivers equivalent or better emissions performance. • The building is listed or heritage-protected, where physical connection could compromise fabric integrity or heritage value. • The connection would breach existing contractual or operational constraints, such as long-term energy supply agreements. These exemptions are intended to ensure proportionality while maintaining the integrity and investment confidence of the zoning framework. Local Zone Coordinators & Ofgem will oversee approval & exemption governance to ensure consistent national application.

	Barrier	Mitigation
		Implementation Heat Zones are initially based on national government modelling, followed by local refinement, public consultation and designation of one or more specific Heat Zones by a newly appointed Zone Coordination Body. The current assumption is that this role could be filled by Cambridge City Council, noting that Devolution is also a factor. The government's Heat Network Zoning Consultation Response states that Zone Coordination Bodies could consist of a single body that fulfils all functions; a two-tiered multi-party structure; a multi-party structure with a lead local authority; or a consortium where resources are shared between different Zone Coordination Bodies. For example, a Zone Coordination Body may be led by a Combined Authority who delegates tasks to local authorities in their jurisdiction. **Scale and Implementation of Heat Network Zoning** The UK Government estimates that there could be up to 450 Heat Network Zones established across approximately 200 urban areas, including Cambridge (DESNZ, 2024a). These zones identify the areas where heat networks offer the lowest-cost pathway to decarbonising heat. It is anticipated that there will be a time lag between the national policy framework becoming operational and individual local zoning reviews being completed. For example, while zoning regulations are expected to come into effect, the formal zoning review for Cambridge is likely to follow at a later stage, once national guidance, data requirements, and governance structures are fully established. This phased implementation reflects the need for local capacity building, data standardisation, and coordination with wider spatial energy planning before full-scale delivery can commence. **Cambridge Heat Zoning Study** When deciding whether to connect to and potentially invest in the Cambridge City Centre Heat Network, it is important that Strategic Partners with land holdings across Cambridge are aware of the wider heat network expansion opportunity in Cambridge; and the requirement to connect large heat loads that's brought about by Heat Zoning legislation. This is why a parallel Heat Zoning Study for the entire city of Cambridge was commissioned in Spring 2025 and included as Appendix G. The Cambridge City Centre Heat Network provides the perfect launchpad for the identified heat network expansion across Cambridge, which has been quantified as over 100GWh in the City Centre and over 450GWh across the wider Cambridge area. Several important stakeholders have expressed an interest in future heat network connection.
3	**Business Rates**	Heat networks historically paid higher Business Rates than other utilities, making them less attractive to investors and harder to build. Under the Non-Domestic Rating (Heat Networks Relief) Regulations 2023, from 1 April 2024 eligible heat networks are now entitled to 100% relief from business rates, putting heat networks in an equivalent footing to other utilities.
4	**Statutory Undertaker Rights**	The Energy Act 2023, together with associated secondary legislation, provides powers to give heat networks enhanced rights analogous to those held by statutory undertakers of other regulated utilities: 1. The Heat Networks (Market Framework) Regulations (Great Britain) 2025 set out that operation and supply of heat networks is a regulated activity requiring authorisation from Ofgem. The Heat Networks regulations phase in authorisations from 1 April 2025, with full regulatory enforcement from 27 January 2026. 2. Authorised heat networks now have Undertaker-like-Rights, enabling them to undertake street works and excavate highways in the same manner as gas, electricity and water undertakers.

3.2.4.2 Heat Networks – the Cambridge picture

In a heritage and space constrained location such as Cambridge city centre, the case for centralised energy centres and city-scale heat networks becomes more compelling. The local problem we're trying to solve is how to kickstart a city-scale heat network in Cambridge.

The proposed solution is to work as a strategic partnership to share collective responsibility, resource and budget to kickstart Cambridge City Centre Heat Network. Testing has been undertaken to determine whether it is viable and able to compete against local building level counterfactuals, so that Strategic Partners can decide whether to seriously consider connection at Commercialisation Stage.

Through the creation of a Minimum Viable Product, with the opportunity for significant betterment over time (as demonstrated by the parallel Heat Zoning Study), the project seeks to set the pathway and standard for future heat network developments in Cambridge.

The OBC for the Cambridge City Centre Heat Network provides the quantified evidence base to demonstrate that project delivery will deliver all primary and secondary Critical Success Factors (CSFs), with a wide range of Strategic, Decarbonisation and Customer benefits for Strategic Partners and wider stakeholders in the city centre and across Cambridge.

3.2.5 Strategic Partners

The scope of the project is to develop and deliver CCCHN, future proofing it for potential expansion to a much larger city-scale heat network across Cambridge. The primary driver is cost efficient decarbonisation. This fits well with the decarbonisation targets set by individual Strategic Partners.

As is shown by the wide range of decarbonisation case studies in Appendix B, Strategic Partners have made credible in-roads into decarbonising their estates and have great knowledge of what works and what doesn't. Strategic Partners are increasingly willing to share lessons learned with each other and beyond, helping maintain Cambridge's position as an established global brand.

CCCHN builds on this collective experience, which includes heat pump installations at Darwin College (RSHP), Gonville and Caius (ASHP), Pembroke College (ASHP) and Emmanuel (GSHP). Cambridgeshire County Council has developed the Swaffham Prior Heat Network. The University of Cambridge has developed a heat network in Eddington and installed Ground Source Heat Pumps in West Cambridge.

The stretching carbon targets set by many Strategic Partners in Table 1 – 5 and the rate of decarbonisation shown in Table 1 - 6, mean that additional action is required and relatively quickly. CCCHN offers 93% carbon savings compared with Business-As-Usual (gas boilers and gas Combined Heat and Power units).

Work is underway to more accurately quantify a cost comparison with local counterfactuals, using cost data from these real-world decarbonisation projects in a historic and space-constrained city centre.

Even in those limited cases where the heat network is slightly more expensive than the local counterfactual, connecting to CCCHN may still be the preferred option for the reasons listed in Table 3—9. It may also be the only deliverable solution in a historic city centre and Conservation Area, where lots of individual heat pumps would be visually intrusive and challenging from a planning perspective. Local grid constraints might also prohibit building and/or on-site heat pump solutions.

Conversely, it is accepted that CCCHN is not the most appropriate solution for every building, especially those with relatively low annual heat demands, or that are hard to access, especially if they're isolated by archaeological, conservation or practical constraints. College and University site visits in 2025 identified several buildings for exclusion from the Minimum Viable Product, where it is recommended that independent building level heat solutions are instead explored.

Importantly, for any Institutions that ultimately decides to stay with gas for longer than MVP Phase 1 (2030-2033 Heat On) or MVP Phase 2 (2035 to 2037 Heat On), it is important to note that there is a **cost of doing nothing.**

By not future installing the primary pipework to connect individual buildings and campuses to the renewable energy centres, the opportunity to connect to CCCHN may be lost for many years. The amount of cost and disruption incurred by installing 8km of primary network in Cambridge's historic centre is likely to be significant. The opportunity to return may be difficult in the short to medium term. The preferred approach is, where possible, to only dig once to minimise disruption to all stakeholders.

Table 3—5 Strategic Partners' Decarbonisation Targets.

Organisation	Decarbonisation Target
Cambridge City Council	Reduce the Council's direct carbon emissions to net zero carbon emissions by 2030. Climate Change Strategy 2021-2026 (Cambridge City Council 2021) includes six objectives. Objectives 1, 2, and 6 are embedded within the heat network's Project Objectives, creating strong strategic alignment. **Climate Action Plan** 4. Reduce emissions from City Council buildings, land, vehicles and services 5. Reduce energy consumption and carbon emissions from homes and buildings in Cambridge 6. Reduce emissions from transport by promoting active travel and public transport, and encouraging a shift to electric vehicles and other alternative fuel sources 7. Reduce consumption of resources and waste, and increasing repair, re-use and recycling of goods and materials 8. Promote sustainable and local food sources 9. Support Council services, residents and businesses to adapt to the impacts of climate change
Cambridgeshire County Council	Cambridgeshire's carbon emissions will be Net-Zero by 2045. The County Council will reduce emissions from our buildings and fleet transport to net zero by 2030 (Scope 1 & 2). Projects delivered by the Council include: Decarbonisation of heating in all Council buildings Installation of local energy generation on available sites, & switching to 100% renewable energy Investments in green transport and biodiversity
University of Cambridge	The University of Cambridge was the first university in the world to announce adoption of a 1.5 degrees Science Based Target for carbon reduction, committing itself to reduce its energy-related carbon emissions to absolute zero by 2048. This requires a steep 75% decrease on 2015 emissions by 2030. The University is seeking to achieve absolute zero by 2048. Practical steps to achieve this ambitious goal includes: Procuring zero carbon electricity Reducing gas use Managing heating & cooling Supporting energy efficient research Carbon Reduction Fund, an in-house mechanism to lever additional project funding to help reduce the University's carbon emissions. Reducing the carbon impacts of construction Reshaping the Estate, a strategic estate transformation programme led by the University's Estates Division. Its primary aim is to deliver an estate that is more efficient, effective, environmentally sustainable and fit-for-purpose, supporting world-class teaching & research.
Anglia Ruskin University	ARU has published plans to reduce direct (Scope 1 & 2) emissions of carbon to zero by 2035 and all indirect (scope 3) emissions to zero by 2045, without the use of carbon offsetting. The ARU Climate Positive Plan includes measures to: Decarbonise all heating Replace all fleet vehicles with electric alternatives Strengthen the sustainable construction standards of new buildings and refurbishments Purchase zero-carbon electricity Strengthen management of business travel and reduce short-haul flights Work with suppliers to obtain carbon data for goods and services and identify improvement opportunities.
17 Colleges	Each College is working to decarbonise their carbon emissions, several with published decarbonisation targets. Some use Science Based Targets with fixed deadlines, whilst other Colleges are working on a project-by-project basis for each building as needs arise. All Colleges have committed resource to the decarbonisation of their Estates.

Table 3—6 Carbon Reduction Progress

Organisation	Target	Progress
Cambridge City Council	Net Zero by 2030	Scope 1 emission reduction in 2023/24, from 2014/15 baseline: 16% Total emissions reduction in 2023/24, from 2014/15 baseline: 48%
Cambridgeshire County Council	Net Zero by 2045	Scope 1 & 2 emissions reduction in 2019/20 from 2014/15 baseline: 48%
University of Cambridge	Absolute Zero by 2048	Reduced Scope 1 & 2 emissions in 2023/34 from 2015-16 baseline: 67%
ARU	Absolute zero by 2045	Scope 1 & 2 emission reduction in 2023/24, from 2014/15 baseline: 73%
Colleges	Individual targets	Not measured as a collective target.

3.2.6 Setting the DPD Study Area

The DPD Study Area is shown in Figure 1-10. It was set to give the best chance of developing a viable Minimum Viable Product (MVP) using city centre located anchor heat loads from the 20 Strategic Partners with anchor heat loads, whilst not incurring the expense of crossing either the River Cam or the railway line. The Study Area includes 3 of the 4 Clusters identified at Feasibility Study.

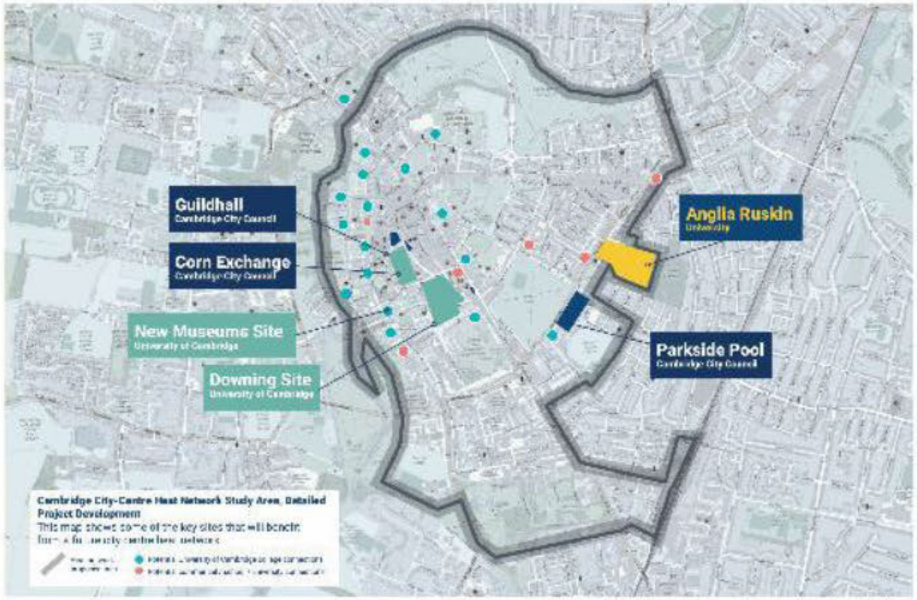


Figure 3—10 Cambridge City Centre Heat Network Study Area

Local authority responsibility for the Study Area is currently split between:

Cambridge City Council

Local Planning Authority (LPA) via Greater Cambridge Shared Planning Service, together with South Cambridgeshire District Council: responsible for integrating heat networks into spatial planning, development management, and Local Plan policies (e.g. setting connection requirements for new developments)

Climate & Sustainability Strategy: the City Council leads city-level net zero & decarbonisation initiatives, including emissions tracking and stakeholder engagement

Likely heat network asset owner of a customer owned energy company, together with several other Strategic Partner equity investors. Likely customer and equity investor in CCCHN

Building and estate management: oversees council housing, public buildings, and estates that could be mandated or prioritised for network connections.

Cambridgeshire County Council

Highway Authority: Responsible for consenting and coordinating street works and excavations for heat network installation and maintenance

Energy and infrastructure planning: Leads county-wide Local Area Energy Plan (LEAP) development and delivery, infrastructure coordination, and engagement with regional and national initiatives

Economic development and skills: Supports heat network growth through workforce development, business support, and coordination with major infrastructure programmes.

The role of Zoning Coordinator has yet to be confirmed. The working assumption is that it will be undertaken by Cambridge City Council. However, the ultimate decision will be affected by devolution. DESNZ has also stated that its general preference is for the Mayoral/Combined Authority to act as the Heat Zone Coordinator, overseeing zone designation, procurement of zone developers, and enforcement of mandated connections.

In the meantime, Strategic Partners continue to push CCCHN development, subject to the obtaining the individual and collective governance approvals required to move to Commercialisation Stage.

3.3 Project Objectives

Within the context of the Vision to enable heat on by 2030, Strategic Partners jointly agreed five Project Objectives in Autumn 2024:

1. **Make Cambridge Greener Quicker:** we aim to provide Cambridge city-centre with clean and renewable heating. By avoiding harmful energy sources, we keep the air clean and protect the city's older buildings. Heat networks can be the most cost-effective way of achieving this, helping to protect against rising energy costs, positioning Cambridge as a leader in sustainable urban living.
2. **Strategic Collaboration:** by working together, project partners can de-risk their own decarbonisation by strategically addressing shared challenges in planning, conservation, decarbonisation funding, power limitations and infrastructure construction. This collaboration opens up additional public sector funding opportunities and unites efforts towards shared carbon reduction goals. We are supported by an Expert Advisory Group of world-leading experts, led by Professor Ruchi Choudhary.
3. **Spread the Benefits across Cambridge:** CCCHN provides a starting point for broader heat network expansion across Cambridge, further bolstering the project Business Case. The public sector, universities, schools, houses and businesses can ultimately connect and use cleaner energy, making the entire city a healthier and better place to live for everyone.
4. **Boost the Local Economy & Innovation:** the heat network could be more than just a way to keep buildings warm. It could also support a 'Heat Network Digital Twin' for new ideas and business growth. This will help improve the heat network's operational performance, may reduce customer tariffs and create a circular economy. This could lead to new inventions, smarter ways to use renewable energy and make Cambridge a sustainable energy leader.
5. **Future-Proof Cambridge:** the heat network will play a pivotal role in reducing the cost of electricity upgrades as we electrify heat. We will reduce the city's peak electricity consumption during high tariff periods, helping Cambridge efficiently manage its energy system. The heat network will fully integrate with existing buildings and new development sites.

In January 2025, Strategic Partners went one step further and jointly agreed CCCHN's Critical Success Factor (CSFs), as shown in Table 3—7.

CSFs are strategic priorities that must be delivered by a successful CCCHN project. They are Strategic Partner must haves and were collectively agreed, with remarkable consensus between 21 Strategic Partners. The CSFs and supporting evidenced in the Outline Business Case, are the basis upon which Strategic Partners can individually and collectively determine their future roles in the project.

Table 3—7 Critical Success Factors, Cambridge City Centre Heat Network

Critical Success Factors Table

Primary

1. Help decarbonise individual Estates, while enabling potential future heat network expansion
2. Provide cost-competitive & reliable low carbon heat:
    a. Offer low carbon energy that is better value over contract lifetime against counterfactual(s)
    b. Provide long-term reliability and at minimum, heat supply availability in line with industry standards

Secondary

1. Maximise social value & education
2. Minimise disruption & share the benefit from construction across the city
3. Showcase sustainability leadership & innovation

3.4 Benefits Being Sought

The Cambridge City-Centre Heat Network creates a unique collaborative opportunity, delivering impact far beyond the sum of its parts. CCCHN can showcase Cambridge's economic, environmental and social sustainability to an international audience, providing a practical demonstration of how to decarbonise a historic city centre and create a truly sustainable place.

Most importantly, the OBC provides the evidence base to confirm that the MVP delivers all primary and secondary CSFs set by Strategic Partners at the start of DPD in Autumn 2024. See Table 3—8.

Table 3—8 Strategic Benefits and Critical Success Factors

	PRIMARY CRITICAL SUCCESS FACTORS	**Evidence**
1	Help decarbonise individual Estates, whilst enabling potential future heat network connections	Carbon savings against the gas 'Business as Usual' scenario for MVP Phase 1 and 2 are estimated to save 506,000 tonnes and deliver 93% decarbonisation over the 40-year Business Plan.
2	Provide cost competitive and reliable low carbon heat ○ Offer low carbon energy that is better value over contract lifetimes ○ Provide long-term reliability and as a minimum, provide heat supply availability in line with industry standards	Local cost comparisons have been issued to Individual Strategic Partners, showing forecast heat network cost estimates versus local counterfactuals for each bulk heat supply connection point. This data is confidential, only being supplied directly to each Strategic Partner. The case for developing CCCHN depends on this local counterfactual comparison, as shown in the Economic Case. Using standardised heat network cost assumptions, whilst the blended counterfactual is more expensive, local cost comparisons are within the Margins of Error. Real world counterfactual construction and operational cost data are due to be shared by the University of Cambridge, potentially demonstrating that real word counterfactual costs for decarbonisation costs in Cambridge are higher. Additional real-world examples are also being sought from Colleges to ensure effective decision making by Strategic Partners at Final Investment Decision.
	SECONDARY CRITICAL SUCCESS FACTORS	**Evidence**
	Maximise social value and education	Strategic Partner senior officer representatives confirmed their support for exploring the concept of a Heat Network Digital Twin in Autumn 2025. As a result, the heat network team is applying for external funding to prove the concept [redacted] The funding bid is built upon both the strength of CCCHN's strategic partnership and Cambridge's academic prowess. **Strategic Benefits** • Strengthens the Cambridge City Centre Heat Network business case across all Critical Success Factors (decarbonisation, cost, tariffs, reliability and social value). • Enhances competitiveness of the Green Heat Network Fund bid, which is essential to project viability: • Lays the groundwork for a city-scale Living Lab, aligned with Cambridge's growth and innovation agenda. • Aligns with Cambridge City Council corporate objectives, University of Cambridge's research ambitions, and ARU's Sustainable Futures programme. **Operational Benefits** • Supports delivery of a 21st-century heat network using real-time optimisation. • Reduces tariffs and improves resilience through predictive asset management.

		• Future-proofs the network through scalable data integration and extensibility. **Academic Benefits** • Unlocks a real-time city-centre dataset for research and teaching. Cambridge already has significant expertise and relevant case studies. • Enables interdisciplinary applied research and postgraduate projects. • Complements the Cambridge Digital Twin Programme with the Cambridge Institute for Sustainability Leadership (CISL), where the heat network is a potential flagship project.
2	Minimise disruption and share the benefit of construction across the city	• Managing disruption - see Top 5 Heat Network Risks and Mitigation in Figure 1 - 11. • Require reinvestment of a percentage of profits in social value delivery in Cambridge.
3	Showcase sustainability leadership and innovation	• Sustainability leadership and innovation are demonstrated by: • 21 Strategic Partners • Construction of a heat network in a historic and space-constrained city centre • Senior officer commitment from Strategic Partners to seek external funding to prove the concept of a Heat Network Digital Twin

The strategic benefits of the Cambridge City Centre Heat Network linked to the Project Objectives shown in Table 3—9.

Table 3—9 Strategic Benefits & Project Objectives, Cambridge City Centre Heat Network

No.	Theme	SMART Objective	Status
Make Cambridge Greener Quicker			
1	**Deliverability**	A centralised network reduces project delivery costs and effort. In addition to the cost and carbon comparisons made, local counterfactual comparisons also need to account for strategic risks, grid constraints, the commercial benefit of any Contributions in Kind and how realistic it is for Partners to develop and deliver multiple on-site heat decarbonisation projects in the time available.	The lifetime cost of heating for the City Heat Network is [redacted] lower when compared to the blended counterfactual. Local counterfactual data is being updated, in line with local real world counterfactual data that is being provided by Strategic Partners.
2	**Secured strategic connections**	One connection per Strategic Partner grouping is tight but potentially deliverable by the end of 2030, with all Strategic Partner city centre MVP sites connected by 2036. The heat network option streamlines funding, planning, programming, and approvals for all stakeholders. CCCHN helps customers meet decarbonisation and net zero targets more swiftly and efficiently.	Targeted phasing plan in place, allowing connection of: Grade I, Grade II* & Grade II Listed Buildings via high temperature network, with limited visual impact. In contrast, multiple building & campus heat pump installations is likely to have a significant visual impact in a heritage & space constrained city centre. Accommodates both early adopters pushing for net zero by 2030, and Strategic Partners who've replaced gas boilers and wish to wait until end of their useful life. CCCHN is technically able to connect lower temperature ambient heat networks.
[illegible]	**Significant carbon savings**	90%+ carbon savings over gas boilers targeted 10% carbon savings over individual ASHP solutions targeted	Design currently achieves these targets, with an overall 93% carbon saving against Business as Usual. Carbon savings vary for individual connections. The heat network has marginally greater carbon savings, due to the lower heat pump fraction in the blended counterfactuals. The big heat network benefit is that it's deliverable with this Business Case. Individual savings depend on the deliverability of on-site solutions.
[illegible]	**Sustainability leadership**	Be a demonstrator project for 100% renewable solutions, with no waste heat sources, in Cambridge's conservation and heritage context.	On target
5	**Derisk stakeholder decarbonisation**	Minimise heat network planning risk Create a pathway for secondary heat network development Secure heat network developer and transfer appropriate level of risk	Three initial Planning Performance Agreement meetings indicate positive outlook for energy centre and building connection delivery. Potential to set up a secondary heat network development framework proposed. Soft market testing in early 2026 for feedback on proposed risk transfer model.
6	**City-wide expansion**	Identify major anchor loads with potential to support ongoing heat network development, evident with Letters of Support	Two additional anchor heat loads in Cambridge city centre engaged
Strategic Collaboration			
7	**Customer benefits** Market readiness	Present a robust 40-year business case, demonstrating the strength of customer base in the MVP. The historic, long-standing and high-profile nature of our Strategic Partners should be hugely appealing to the heat network market, driving cost competitive customer tariffs.	Tbc via soft market testing, Q1 2026.
8	**Customer Benefits:** Cost effective for individual partners	Centralisation of CapEx, OpEx and RepEx to reduce whole-life heating costs for the customer's alternative	Levelised Cost of Heat estimated at [redacted] (incl. GHNF) [redacted]

9	**Customer Benefits** Resilience & efficiency	CCCHN can provide resilience in terms of contractual heat arrangements, legislated efficiency, and practical measures.	Resilience Note prepared and distributed to customers. See Appendix R.
10	**Customer Benefits:** Securing customer base	Targeting 100% of available connections from Strategic Partners with city centre assets in the MVP.	High temperature heat network identified as best option, enabling connections to be offered to all 20 Strategic Partners with anchor heat loads in Cambridge city centre.
11	**Customer Benefits** Procurement	As suggested at the College Update Workshop in June 2025, if there is Strategic Partners demand, the DBOM tender specification can be expanded to include an option for consultancy to support secondary heat network upgrades	Tbc by Strategic Partners at Commercialisation Stage.
12	**Economies of scale** Growth potential identified	Test potential for expansion through Zoning Study. Scaling up the heat network will provide greater demand and supply diversity, improving efficiency, heat pricing, and carbon reduction for an expanded customer base.	See Heat Zoning Study, which identified a further 30GWh of heat in the city centre and almost 500GWh in the wider Cambridge city area.
City Benefits			
13	**Improved air quality**	Reduce carbon impact of heating in Cambridge. This is a key health benefit, adding to the previous reduction in traffic pollution. The Cambridge City Centre Air Quality Management Area for nitrogen dioxide was revoked in 2025.	Carbon reduction is 506,000 tonnes over 40 years (Economic Case, Figure 2)
14	**Biodiversity Uplift**	Energy centre development areas to boost Biodiversity by at least 10%.	Biodiversity Net Gain Study
15	**Producing value from existing assets**	Uplift in value and revenue by adapting existing publicly owned assets to become renewable energy centres	To be calculated at Commercialisation
Boost the Economy			
16	**Supply chain**	Opportunities for: Use of local supply chain Development of local supply chain Training and youth employment	Targets to be defined at Commercialisation
17	**Social Value**	Target % of profits to be reinvested in expansion of CCCHN and energy retrofits via the Cambridge Pledge., to strengthen our *GHNF bid*. No up-front capital is required by Strategic Partners. It makes full use of existing and separate governance arrangements. It also delivers the social value expectations of the Council, who are project facilitators and contributing energy centre land. Competitive energy tariffs will still be provided to Strategic Partners.	Concept development ahead of GHNF funding bid in Spring 2026
18	**Heat Network Digital Twin**	Test social, research and financial value of developing an infrastructure dataset and Heat Network Digital Twin.	Tbc via Proof of Concept, subject to a successful external funding bid in first half of 2026
Future Proofing Cambridge			
19	**Electricity resilience**	Reduce local electrical upgrade requirements across Cambridge from the electrification of heat. Potential upgrades required for local heating systems is estimated to be at least 50% of proposed connections.	Grid upgrades will only be required at energy centre locations
20	**Expansion potential**	Identification of potential customers to back-fill excess heat demand due to successful energy retrofits, in unlikely event of no heat network expansion.	Significant expansion potential confirmed by Heat Zoning Study. [redacted]

3.4.1 10 Reasons to Connect to the Cambridge City Centre Heat Network

The following ten reasons to connect to the Cambridge City Centre Heat Network have been presented to the Strategic Partners, potential customers of the development. These outline reasons for connection beyond the cost and carbon comparison that each customer is expected to make.

Table 3—10 10 Key Reasons for CCCHN

Reasons To Act		Strategic Benefits of the Cambridge City Centre Heat Network (CCCHN)
1. Cost effective	£	CCCHN is cost effective compared to the blended counterfactual.
2. Control of energy tariffs		A customer led Delivery Model is being developed to help Strategic Partners retain control of their energy tariffs. Unlike private sector models, Strategic Partners use capital investment to hedge against energy price hikes.
3. Better carbon savings:		Strategic Partners can be supplied with very low carbon heat, with a 93% carbon reduction. It uses economies of scale to deliver the pace of change needed in the timeline available. This sustainability leadership provides a strong Cambridge response to the Climate Emergency, whilst helping deliver clean air in the City Centre.
4. Better reliability		Thermal stores enable access to time of use tariffs and cheaper nighttime electricity, helping reduce electricity bills. This option generally isn't available at a local level due to space, conservation & planning constraints. The heat network team is working with English Heritage to explore conservation appropriate thermal store designs to help engage the public on the Energy Transition.
5. More deliverable		Minimal visual impact in City Centre Conservation Area, compared to many individual heat pump solutions in a heritage & space constrained city centre. The heat network has developed early strategic relationships with statutory consultees, including the Environment Agency, Archaeology, Highways, Historic England, Greater Cambridgeshire Partnership, Greater Cambridge Shared Planning, Local Area Energy Plan & UKPN.
6. Access to decarbonisation grant funding		Green Heat Network Fund grant can only be accessed via the Cambridge City Centre Heat Network. The Public Sector Decarbonisation Scheme has recently been withdrawn by government.
7. City Council's facilitation role, working closely with Partners	CAMBRIDGE CITY COUNCIL	This is the glue that binds our efforts together, with policy levers, cross-party political support and close work with Strategic Partners to client the heat network project. This facilitation role isn't available with on-site decarbonisation projects, reducing the opportunity for a strategic solution that benefits everyone.
8. Reduced 'Hassle Factor' for decarbonisation delivery		The heat network project makes best use of limited capital, revenue and resource, with fewer governance approvals. Decarbonisation funding, grid, conservation & planning challenges move to the heat network project, which has far fewer energy centres.
9. Betterment opportunities		These are being explored through Sensitivity Analysis, including an additional River Source Heat Pump (RSHP) Energy Centre and two additional potential thermal store locations. Much longer-term, opportunities could include heat network expansion connection to new data centre(s) and/or solar farm.
10. Heat Zoning Study		The Heat Zoning study identified Heat Zones across Cambridge with 6x the City Centre heat demand. This includes a significant, potentially interconnected area expanding upon the initial City Centre Heat Zone. There is up to 50% additional heat demand in the City Centre amongst buildings that could be 'Required to Connect'. Inclusion of infill, or expansion would further improve the Business Case for customers and investors.

3.5 Inter-dependencies, Assumptions and Constraints

There are high level internal and external factors that affect successful project delivery. These interdependencies, together with their associated risks and benefits, are listed in Table 3—11. The heat network team has also identified several betterment opportunities, which are being investigated to further strengthen the OBC:

- Potential additional energy centre, using RSHPs to top up the main RSHP energy entre at Midsummer Common
- Thermal Stores at two potential Strategic Partner sites; subject to RIBA Stage 2 design. Design principles discussed in Planning Performance Agreement meeting in December 2025

Table 3—11 Project Interdependencies

No.	Interdependency	Risks	Benefits
1	Local government reorganisation	Political risk that CCCHN is stalled by uncertainty created through governance transition period	Potential that City and County services fall under a single local authority
2	Cambridge City Council: Civic Quarter redevelopment	May require phasing of some highways elements to prevent re-delivery	Large-scale development going before heat network construction Opportunity for co-delivery of works
	University of Cambridge: Reshaping our Estate	Heat network connections are delayed or deemed inappropriate	Optimum timing for the University to consider heat network development as it reshapes its Estate. Connection opportunities can be refined.
	Energy retrofit of Strategic Partner buildings	Capital constrained budgets and historic nature of buildings, make energy efficiency improvements too expensive to do quickly and at scale.	High temperature heat network solution enables maximum number of connections, with buildings able to connect, regardless of whether the energy efficiency of the building fabric has been improved. This mitigates the heat demand risk, whilst increasing operational costs. Possible co-delivery of projects, to prevent further disruption in city centre
5	Heat Network Zoning	Mandating connection of large heat loads becomes contentious and leads to stakeholder push back and appeals using 'exemptions'	Mandating heat network connections is a game changer for heat network expansion, significantly derisking the Cambridge City Centre Heat Network project. Nonetheless, we're still focussing on the benefits and added value, to incentivise connection regardless of legislation.
6	Local Plan Consultation	None	Heat network development has been included in new Local Plan, offering an early consultation opportunity ahead of any specific heat network development.
7	UKPN Grid Reinforcements	If it's not coordinated at a strategic level, electrical grid reinforcements could become prohibitively expensive to on-site and heat network decarbonisation solutions.	The new Local Area Energy Plan (LAEP) for Cambridgeshire enables co-ordination of long-term electrical grid development for Cambridge and CCCHN. The heat network team's UKPN Budget Application minimises the risk and maximises strategic alignment, with long lead in periods common for both power grid upgrades and heat network infrastructure delivery.

3.6 Identify, Assess and Mitigate High-Level Potential Risks

The Cambridge City Centre Heat Network has a Risk Register (Appendix C) from which the top 5 Strategic Risk and Associated Mitigations in February 2026 were:

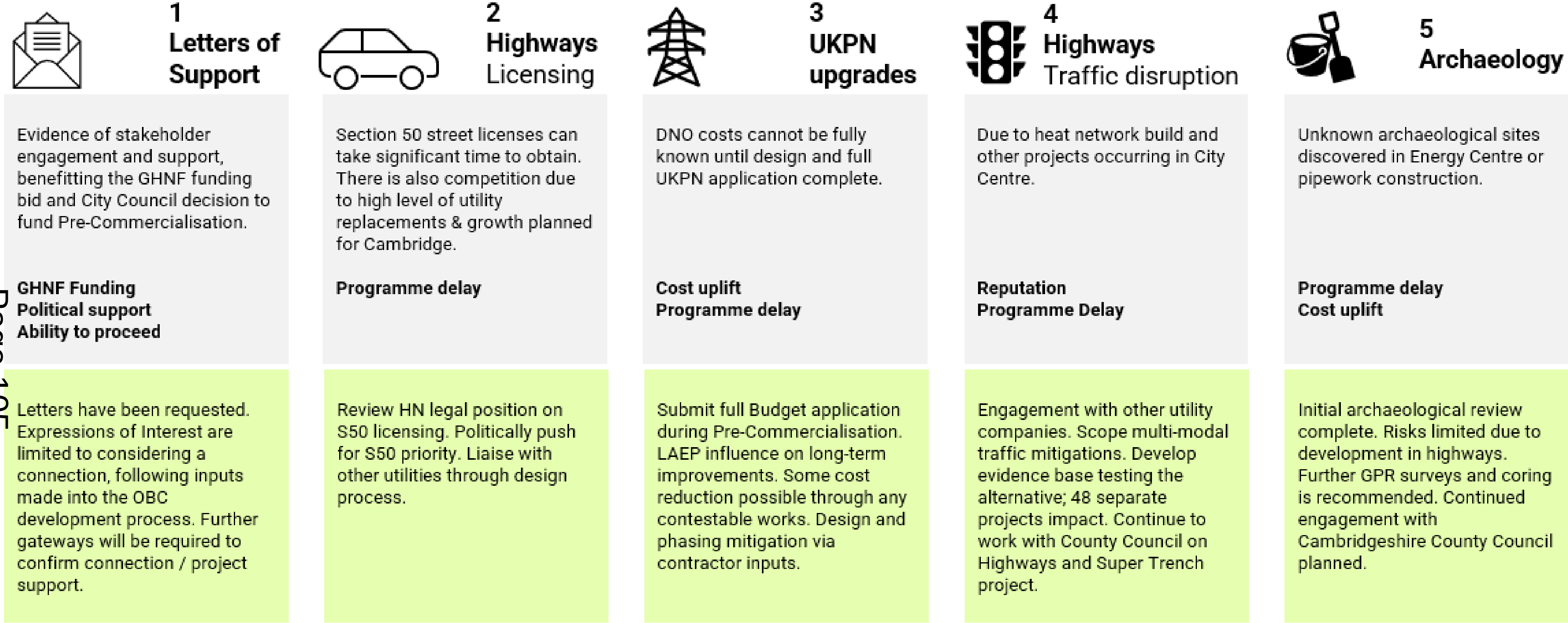


Figure 3—11 Top 5 Strategic Risks and Associated Mitigations

In addition to delivery risks, there are risks posed by Strategic Partners choosing an alternative to CCCHN. If insufficient Strategic Partners choose to connect, the viability and investor attractiveness of MVP Phase 1 & 2 is impaired.

It is important to highlight that there's also a **cost of doing nothing.** Sticking with gas as the main heating source in the interim isn't a risk-free option. As well as potentially contradicting individual Strategic Partner Decarbonisation Strategies, there's a reasonable likelihood that fossil fuels will be phased out in the short to medium term.

Although government has yet to legislate a ban on selling or installing gas boilers, the direction of travel is an energy transition, moving from fossil fuel dependency to the full electrification of heat. In addition, for heat loads over 100MWhr/year heat demand, Heat Zoning is likely to mandate heat network connections.

In situations where an on-site heat pump solutions are not deliverable (due to decarbonisation funding, space, planning, conservation and/or grid constraints), heat network connection is likely to be the only realistic decarbonisation option.

Even if the counterfactual solution is more cost effective, it should be considered in the context of the strategic risks in Table 3—12.

Table 3—12 Strategic Risks of Strategic Partners choosing not to connect CCCHN

Strategic Risks if CCCHN Doesn't Happen	Risk
Scale & Timing	Strategic Partners unable to individually and collectively balance ambition and practical delivery, preventing the efficient decarbonisation of buildings and campuses in the limited time available, noting that we're in a Climate Emergency. This prevents 'Heat On' by 2030 as per the project's Vision.
Common challenges of decarbonisation funding, electrical grid, conservation & planning constraints	Strategic Partners face common decarbonisation challenges of funding, conservation, planning, space and grid constraints, as they seek to electrify their building stock. Without CCCHN, Strategic Partners miss the unique opportunity for historic institutions to work together to develop a strategic and pooled decarbonisation solution in a timely manner, making best use of limited capital, revenue and resource. This prevents a strong and resource-efficient response to the Climate Emergency.
Low-Cost Finance	Gated metrics prevent Strategic Partners from individually bidding to access to zero and low-cost decarbonisation funding through both the Green Heat Network Fund (GHNF) and National Wealth Fund (NWF).
Hassle Factor	Without a centralised solution, the hassle factor of delivering and maintaining at least 48 individual and separate on-site heating and hot water degasification projects increases.
Active facilitation	Without CCCHN, Strategic Partners lose the City Council's facilitation role and work with Strategic Partners to: Convene the necessary funding and governance arrangements. Procure and client the existing heat network team, which has successfully taken CCCHN from Heat Mapping and Masterplanning Study to DPD. Maintain successful strategic partnerships with both DESNZ and NWF. Continue to strategically engage Greater Cambridge Partnership; Environment Agency, Historic England and UKPN. Continue strategic engagement with Cambridgeshire County Council to access specialist archaeological, highways and strategic energy masterplanning expertise. This includes ensuring strategic alignment coordination with the LAEP
Climate leadership	By not joining the MVP, Strategic Partners risk undermining a viable and strategic decarbonisation project. This creates a reputational risk and a delivery risk for stretching decarbonisation targets set by several Strategic Partners.
Significant heat demand and expansion opportunity	By not participating in a kickstart heat network in Cambridge City Centre, Strategic Partners remove the opportunity to connect commercial/research centres and residential areas outside of the city centre. This includes additional Strategic Partner sites.
Minimal visual impact in Cambridge City Centre Conservation Area	With little or no visual impact, a heat network is likely to be the best (and potentially only) way to fully decarbonise Cambridge's many historic Grade I, II* and II Listed Buildings at scale. The alternative of installing at least 48 heat pumps at building level is likely to be extremely difficult due to space, planning, conservation and decarbonisation funding challenges.
Clean air	Local level heat pump installations will still help deliver clean air by removing fossil fuels at point of use from the city-centre. However, the benefits are likely to be far less, due to the associated deliverability issues.
Strategic added value	Without CCCHN, Strategic Partners lose the opportunity to develop a Heat Network Digital Twin. For a university city such as Cambridge, which thrives on data, it loses the associated strategic, operational, academic, economic, environmental and social benefits.

In addition to strategic risk management, specific attention is drawn to technical and financial due diligence undertaken during DPD.

3.6.1.1 Technical Due Diligence

Recognising the world leading academic excellence at the University of Cambridge, Colleges and ARU, as well as the influential role of College Fellows in decision making, an Expert Advisory Group (EAG) for CCCHN was established in Spring 2024. The EAG has provided technical due diligence during Detailed Project Development:

1. **Formed of world-leading academic experts from the University of Cambridge and ARU:** it created the opportunity to use academic expertise to constructively challenge real world consultancy advice, providing clear recommendations, advice and technical assurance for review by the Core Group
2. **Specialist expertise:** in engineering, infrastructure, asset management, energy retrofit, demand side management, power networks, sustainability, land economy, digital innovation and community engagement. It is important that expert insights and views are captured, so that we deliver the best possible project and OBC.
3. **Provides the Strategic Partners and public with extra assurance on the OBC:** helps ensure that we create a 'Best in Class' evidence base for decision makers at the end of DPD. Strategic Partners have the final say through the project's Core Group and Steering Group.

Thank you to all academics that have participated in the group. Cambridge's heat network plans have significantly benefited from EAG input, which has been provided pro bono and ahead of confirmed project viability. EAG's recommendations have enhanced ultimate system performance, customer engagement and commercial viability.

Table 3—13 Expert Advisory Group, Key Recommendations

Date of EAG Meeting	Main Outcomes
18 April 2024	Use a high temperature heat network to maximise the number of connections, noting that the cost and practical constraints of improving the energy performance of so many Grade I, Grade II* and Grade II Listed Buildings Do not just present the project as a degasification strategy. It's not just about cost savings. Even if is slightly more expensive, a heat network might be the preferred option, if it helps Strategic Partners deliver greater carbon savings at scale and reduces their carbon emissions sooner. The carbon benefits need to be highlighted. Even if the heat network is only as cost effective as other options, it may still be beneficial for other reasons, especially in the Cambridge City Centre Conservation Area, where lots of individual heat pumps would be visually intrusive.
3 & 11 February 2025	Keep an open mind on the heat network solution and an evidence-based approach to test the viability of the proposed CCCHN Ask Bursars to sense check their counterfactuals for each bulk heat supply connection point Ask NWF if it's possible to help fund both the main heat network and on-site secondary heat network upgrades Remove the option for Strategic Partners to become Prosumers and sell heat into the heat network. This is because any waste heat from on-site heat networks wouldn't be able to commercially compete with the heat network supply and its likely lower electricity price.
12 May 2025	Maximise thermal storage capacity on the heat network

The project's Steering Group has accepted all EAG recommendations, with the heat network team implementing them within the OBC.

3.6.1.2 Strategic Engagement to Derisk the City Centre Heat Network

The 21 Strategic Partners are strategically aligned, providing influence in relevant policy, delivery, and geographical areas. Examples of this partnership working strategically together include:

1. **The University of Cambridge convened a thematic meeting of its Special Interest Group on the Built Environment in September 2024 focussed on heat network development:** chaired by Professor Ruchi Choudhary (Chair of the project's Expert Advisory Group), with a Q&A session facilitated by Tim Harvey-Samuel (College heat network project representative, Chair of Bursar's Planning Sub-Committee and Bursar of Trinity Hall). The Panel Session involved Emma Davies (Principal Sustainability Officer, Greater Cambridge Shared Planning), Christian Brady (Head of Conservation, Greater Cambridge Shared Planning) and Venus Tam (Net Zero Associate, UKPN). A series of practical recommendations were made and incorporated into the Economic Case.

2. **Planning Performance Agreement (PPA) for CCCHN:** this has enabled a strategic view and input from statutory consultees on the project's energy centre proposals, which are challenging in the space constrained Cambridge City Centre Conservation Area. Three formal PPA meetings have taken place,

3. **Separate early strategic discussions with statutory and non-statutory consultees:** positive discussions with the Environment Agency; Cambridgeshire County Council (Highways, Archaeology and Local Area Energy Plan); Historic England; Greater Cambridge Shared Planning; Greater Cambridge Partnership (GCP); the Cambridge Archaeological Unit; and UKPN.

   This has helped identify and mitigate strategic risks in project development, helping derisk the OBC. The design proposals are nevertheless still at a relatively early stage, with lots of detailed design work needed to develop cohesive designs that positively respond to multiple constraints, to ensure a good fit with Local Planning Policy. For the pipe network, a Local Development Order (LDO) has been deemed inappropriate, as areas of the proposal considered to be more sensitive (such as those close to heritage assets), will need to be responsive to these contexts. This cannot be achieved with an LDO.

4. **Strategic integration of the Cambridge City Centre Heat Network with the Local Area Energy Plan (LAEP):** the heat network team has worked in partnership with the County Council, providing heat network project information to support its development. The aim is for both the OBC and the wider Heat Zoning Study to directly inform and influence the LAEP's conclusions and recommendations, highlighting the need to work closely with UKPN to ensure a strategically coordinated approach to electrical grid upgrades in Cambridge.

5. **The Greater South-East Energy Hub:** funded by the Department of Energy Security and Net Zero (DESNZ), it has provided an independent voice, supporting the Heat Zoning Study by sharing best practice and lessons learned from other UK heat network projects.

3.6.1.3 Financial Funding & Due Diligence

In addition to seeking technical due diligence from the Expert Advisory Group, the heat network team has been working closely in partnership with both DESNZ; National Wealth Fund (NWF); Green Heat Network Fund (GHNF); and Green Finance Institute (GFI) to seek independent financial due diligence and support to help overcome project specific challenges:

1. **Strategic engagement and funding from government and its DESNZ team:** An active participant and enabler of the Cambridge City Centre Heat Network project since the start. It has provided £97,680 of grant Heat Network Delivery Unit (HNDU) funding contributions towards both a successful Heat Mapping & Masterplanning Study in May 2023; and a Feasibility Study for the Cambridge City Centre Heat Network in September 2023.

   HNDU also funded £167,500 for Detailed Project Development, matched by £720,000 of combined strategic partner contributions to bring forward DPD for the Cambridge City Centre Heat Network. In addition to funding, DESNZ has been a critical friend, attending the project's Core and Steering Group meetings, and actively contributing to the Scopes of Work for both DPD and the parallel Heat Zoning Study for Cambridge. See Appendix G.

2. **Service Level Agreement with National Wealth Fund (NWF):** An NWF funded Service Level Agreement with Cambridge City Council (as lead client), enabling its

heat network team to be a critical friend for CCCHN, offering a unique perspective of lessons learned from other UK heat network projects and associated financing options. NWF has supported Cambridge heat network project development by working to:

- Critique and add value to the DPD Scope of Works.
- Help Strategic Partners consider potential delivery models that best suit our Critical Success Factors, together with commercial implications. This was a complex consideration, which resulted in a uniquely deep engagement for NWF, with attendance at four in person workshops, three online workshops and many pre-meets.
- Support the second Delivery Model Workshop in November 2025, helping Strategic Partners determine the Preferred Delivery Option.
- Informally review both the Commercial and Financial Cases, ahead of a likely NWF low-cost loan application in Q1 2026.
- Support the heat network team with its soft market testing, understanding the pros and cons of market proposals.
- Spreading our Connection Charges: recognising potential difficulty in financing upfront Connection Charges, NWF seeks to address this market failure by providing capital to spread out this cost over up to 10 years, potentially including performance enhancing secondary upgrades. This gives Strategic Partners an alternative payment option.

Page 110

This product is under development, but could include additional local authority finance, which would be used to convert Partners' Connection Charges into Service Charges, or a NWF private loan facility stapled to a Patient Equity investment

If bundled with a local authority loan, it is likely that a gilts +40bps rate would be used. If a NWF private loan facility, the rate would be significantly higher to reflect commercial rates. In all cases, the loan would be c.10 years, can't exceed asset life / Heat Supply Agreement term & needs to be Subsidy Control compliant.

This independent review and support have been invaluable, helping strengthen the OBC. From NWF's perspective, it has also been a very positive long-term working relationship with the CCCHN project team, which is reflected in its conclusion below:

NATIONAL WEALTH FUND	**Conclusion** In NWF's view, CCC has a unique opportunity to develop an ambitious yet commercially viable heat network. The most challenging factor for most networks is securing customer buy-in prior to completion of construction. The demonstrable willingness of educational institutions to commit, which will all have a long-term presence in the city, reduces this risk more than on any other network NWF is supporting.

3. **Regular meetings with the Green Heat Network Fund's fund managers:** Managed by Triple Point. The heat network team has met several times with Triple Point's Relationship Manager, to maximise strategic alignment. GHNF is a highly competitive process, especially with government's withdrawal of Public Sector Decarbonisation Scheme (PSDS) funding.

Summary

This spending proposal benefits from a notable strategic partnership, which has resulted in a strong Minimum Viable Product and appropriate derisking. It fits with national, regional and local policies, strategies and plans.

The Strategic Case also provides the evidence-based case for change, demonstrating that the infrastructure investment delivers all primary and secondary Critical Success Factors agreed with 21 Strategic Partners.

4 Economic Case

4.1 Purpose

The purpose of the Economic Case is to summarise the available technical options for the Cambridge City Centre Heat Network. It uses an evidence-based assessment to consider the relative benefits and limitations of options and recommend a Preferred Option for implementation. Options are tested against the Strategic Objectives and appraised in line with the site's key characteristics and existing infrastructure, established Critical Success Factors (CSFs) and whole life financial viability parameters, as per the principals of the Green Book methodology.

Network design activities and detailed techno-economic modelling have been carried out to inform the Economic Case. This was an iterative process to optimise the design and operation, whilst minimising the carbon output of the Preferred Option and identifying other technical constraints including phasing and space availability.

The analysis presented in the Economic Case is based on the scheme definition at a point in time and was used to inform the decision making and the development of the Financial Model. The results are constrained by the assumptions made and sensitive to future fluctuations; they should be developed further in subsequent more detailed design stages.

4.2 Preferred Option Overview

The Preferred Option can be summarised as a high-temperature (85ºC flow / 65ºC return) district heating network consisting of three energy centres:

- Parkside Pools energy centre – the primary heat generation location, with 4.6MWth of Air Source Heat Pump (ASHP) and over time, 36MWth of high-voltage electrode boilers (including N+1 resilience) will replace transitionary peaking gas boilers
- Midsummer Common energy centre – a satellite heat generation location with 3.5MWth River Source Heat Pump (RSHP) – this high efficiency heat generation will provide baseload supply. This energy centre is accompanied by a pumping station adjacent to the River Cam to enable river water abstraction
- BT Exchange energy centre – a satellite heat generation location with 2.3MWth of ASHP that will support heat generation during the latter phases.

The network will span ~8.2km and provide 73GWh/year of low carbon heating to its 48 connections, [redacted]:

- [redacted]
- [redacted]
- [redacted]
- [redacted]

Connection locations have been reviewed through dialogue with Strategic Partners and targeted site visits to maintain accuracy of the technical proposal and de-risk future connection.

A phased build-up of connections across two main phases (Phase 1 2030-32 & Phase 2 2035) is proposed to target alignment with the Strategic Partner decarbonisation goals, allow synchronisation with existing gas boiler replacement dates and provide a realistic development timeframe for infrastructure build-out. This proposed phasing programme is subject to change through the design development programme.

Over the 40-year project life cycle the Preferred Option will enable customers to achieve an estimated 93% carbon emissions reduction versus their Business as Usual gas-driven heating systems.

The proposed network layout and phasing strategy is shown in

Figure 4—1.

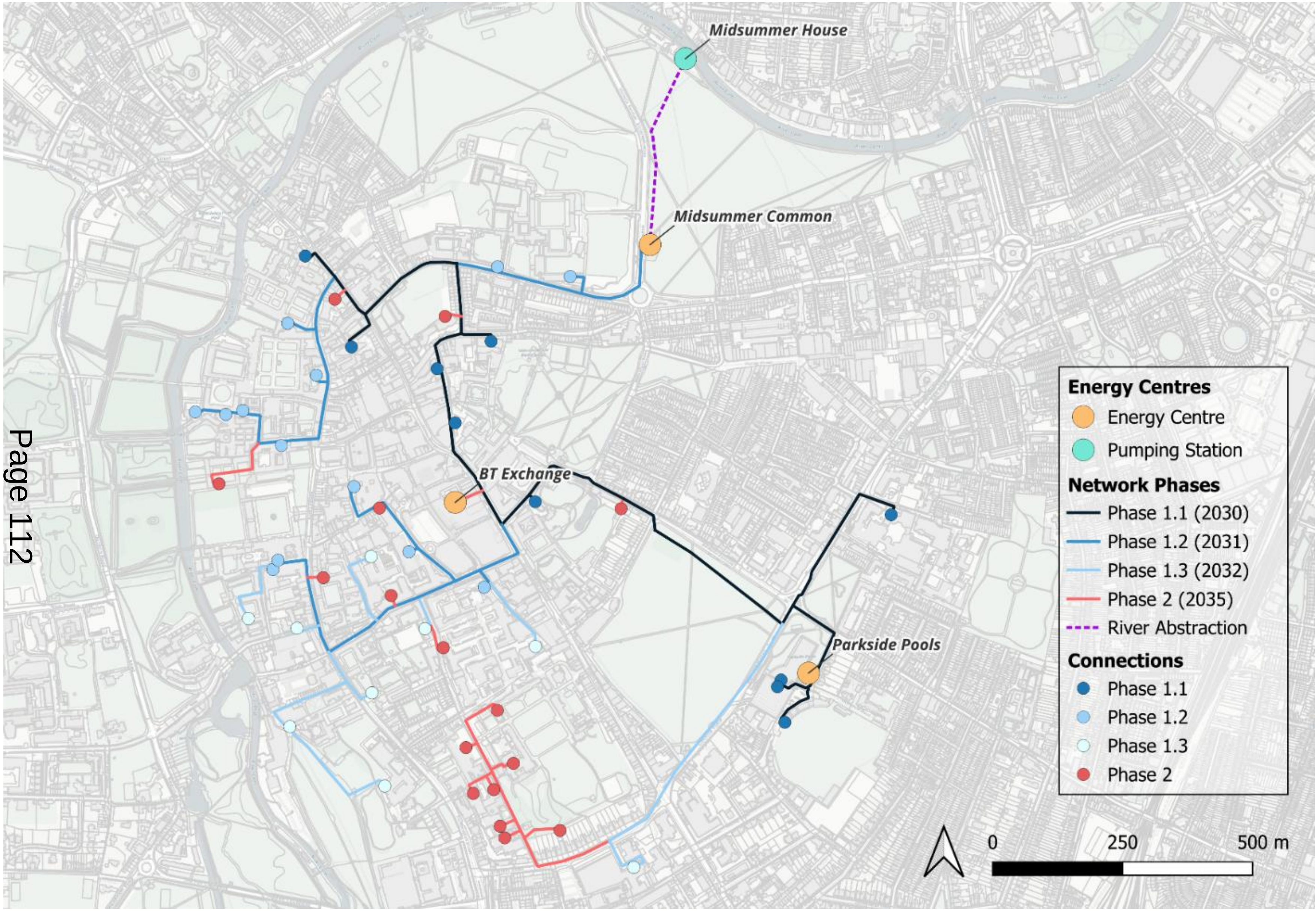


Figure 4—1 Preferred Option network layout & connections

4.3 Approach

To arrive at the Preferred Option, a methodology has been adopted based on the principals of Green Book guidance and the following process:

- **Definition of the 'Business as Usual'** i.e. the continued operation of the current energy systems if the proposals under consideration are not implemented. This provides a quantitative benchmark against which to compare carbon savings from the Preferred Option.
- **Definition of the 'Low Carbon Counterfactual'** i.e. the most likely low carbon alternative that customers would progress if the proposals under consideration are not implemented. This provides a quantitative benchmark against which to compare the financial performance of the Preferred Option. This scenario relies on the commitment of customers to decarbonising their energy systems in the future.
- **Longlist of options for new energy network** – based on the feasibility work undertaken in the developmental stages of the project. Includes comparison of network architecture, heat supply options and energy centre locations. Qualitative comparison against the defined CSFs. A shortlist of viable options is output from the assessment.
- **Shortlist of options for new energy network** – shortlisted options are refined and developed to consider key technical and economic factors. Quantitative life-cycle cost comparison and detailed risk assessment.
- **Refinement of Preferred Option** – the Preferred Option is developed in further technical detail, including energy centre and network design and cost and revenues modelling. Quantitative comparison against the Business as Usual (carbon) and Low Carbon Counterfactual (cost) cases. The Preferred Option acts as the basis for further financial analysis in the Financial Case.

4.4 Business as Usual

The Business as Usual (BAU) scenario reflects the existing heating systems at the proposed connection locations to act as a baseline for comparison. This scenario has been chosen to best represent the current carbon emissions and the benefits that could be achieved by implementing a new heat network solution. Emission savings of the Preferred Option versus the BAU are presented in Section 4.10.11.3.

The proposed connections fall into two broad categories in terms of existing heating systems:

- **Gas boilers:** For the majority of connections, gas boilers are currently supplying the Space Heating (SH) and Domestic Hot Water (DHW). Heat is supplied at a building or site-wide level depending on the existing heat distribution infrastructure. For boilers installed pre-2020, 80% heat generation efficiency is assumed, otherwise 90% is assumed for newer models.
- **CHP**: In the case where Combined Heat & Power (CHP) generation is present, a 35% heat / electrical generation efficiency is assumed. This case applies to two of the proposed connections only.

4.5 Low Carbon Counterfactual

The low carbon counterfactual reflects the most realistic or cost-effective low carbon alternative to decarbonise a connection's heating systems in the case the heat network proposal is not progressed. This scenario is used as a benchmark to determine tariffs and charges for connection to the CCCHN, thereby assessing whether the proposal Preferred Option provides customers with a competitive offer compared to their next-best alternative.

Low carbon counterfactuals have been determined on a case-by-case basis through coordination with Strategic Partners to understand the constraints and opportunities at their sites. They reflect an initial high-level estimation and should be caveated that there is significant uncertainty in their modelled costs, with more detailed design required to de-risk. For details on the low carbon counterfactual modelling and assumptions see Section 4.10.2.

4.6 Critical Success Factors

Critical Success Factors are the key attributes on which successful project delivery is dependent. A set of project specific CSFs have been determined for this business case through dialogue with the Strategic Partners, as presented within the Strategic Case. These CSFs are summarised as metrics to measure against in Table 3—7 in Section 3.3. They have been used to assess the long list of potential heating system scenarios, ruling out unsuitable options at an early stage, and are included as part of the benefits/risks appraisals to highlight key differentiators between options.

4.7 Longlist Optioneering

The CSFs have been utilised as an instrument to guide decision making throughout the project. The decision-making process has been subject to significant rigour and quantitative analysis carried out where possible. A set of decision gates have facilitated the generation of a single agreed network proposal, which has been tested within techno-economic and financial models. Decision making at each of these gates is presented in the following sections.

4.7.1 Options Framework

1. Project Scale:
    - Focused selection of connections and timelines based on:
        - Strategic partner decarbonisation ambitions
        - Heat cluster density & demand size
        - Plant replacement strategies
        - Spatial constraints
2. Network Architecture
    - Network type (3G/4G/5G/cascade) informed by:
        - Demand grade & scale
        - Decarbonisation & expansion potential
        - Spatial availability & utility needs
        - Revenue opportunities
3. Generation Technologies
    - Comparison of:
        - Low carbon electrified central plant
        - Business-as-usual (gas boilers)
        - Building-level low carbon alternatives
4. Energy Centre Locations
    - Assessed based on:
        - Timing & proximity of connections
        - Space availability
        - Ownership status
5. Preferred Option Selection
    - Integrated assessment of:
        - Network architecture
        - Generation technologies
        - Energy centre locations
        - Economic viability
6. Economic Appraisal
    - Cashflow analysis for feasibility
    - Comparison with low carbon counterfactual

4.7.2 Project Scale

4.7.2.1 Load Assessment

This section outlines the approach to estimating heating loads for potential connections as part of the Minimum Viable Product (MVP). An initial demand assessment was carried out as based on information gathered through Requests for Information (RFIs) issued to the Strategic Partners. This data has formed the basis of the longlist-shortlisting appraisal. Data sources are summarised in Table 4—1.

Table 4—1 Heating demand data sources

Strategic Partner	Data Source – Annual Heat	Data Source – Peak Heat
Colleges	Monthly metered gas invoice data (2021-2023) for each College as shared by College Sustainability Committee.	Existing gas boiler capacities, as reported in RFIs and later validated on site visits.
University of Cambridge	Where available, metered half-hourly (HH) gas consumption data shared for each building. For buildings without HH gas consumption data, annual gas consumption estimates provided by stakeholders as based on historical estimates / energy strategy reports.	Where available, metered half-hourly (HH) gas consumption data shared for each building. For buildings without HH gas consumption data, estimations from the university based on historic data.
Anglia Ruskin University	Metered half-hourly (HH) gas consumption data shared for each building.	Metered half-hourly (HH) gas consumption data shared for each building.
Cambridge City Council	Max Fordham Decarbonisation Study and previous AECOM Heat Network Feasibility Study.	Max Fordham Decarbonisation Study and previous AECOM Heat Network Feasibility Study.
Other	Several other organisations [redacted] have provided data and expressed interest in the project. These loads beyond the Strategic Partners are not incorporated into the MVP	

Having established the portfolio of Strategic Partner heat loads across Cambridge City Centre, an MVP Customer Connection Decision Tree was developed in conjunction with the client team to identify a set of heat loads most suitable for near term heat network connection, thereby prioritising these for inclusion as part of the Minimum Viable Product. The MVP Decision Tree is based on geospatial analysis of loads, prioritisation of larger loads which are likely to most economical to connect (and benefit the most from the carbon reduction impact) and where possible clustering of neighbouring loads to aggregate demand and simplify the connection strategy. The process flow is shown in Figure 4—2. The MVP Decision Tree is based on geospatial analysis of loads, prioritisation of larger loads which are likely to most economical to connect (and benefit the most from the carbon reduction impact) and where possible clustering of neighbouring loads to aggregate demand and simplify the connection strategy. The MVP Decision Tree is based on geospatial analysis of loads, prioritisation of larger loads which are likely to most economical to connect (and benefit the most from the carbon reduction impact) and where possible clustering of neighbouring loads to aggregate demand and simplify the connection strategy.

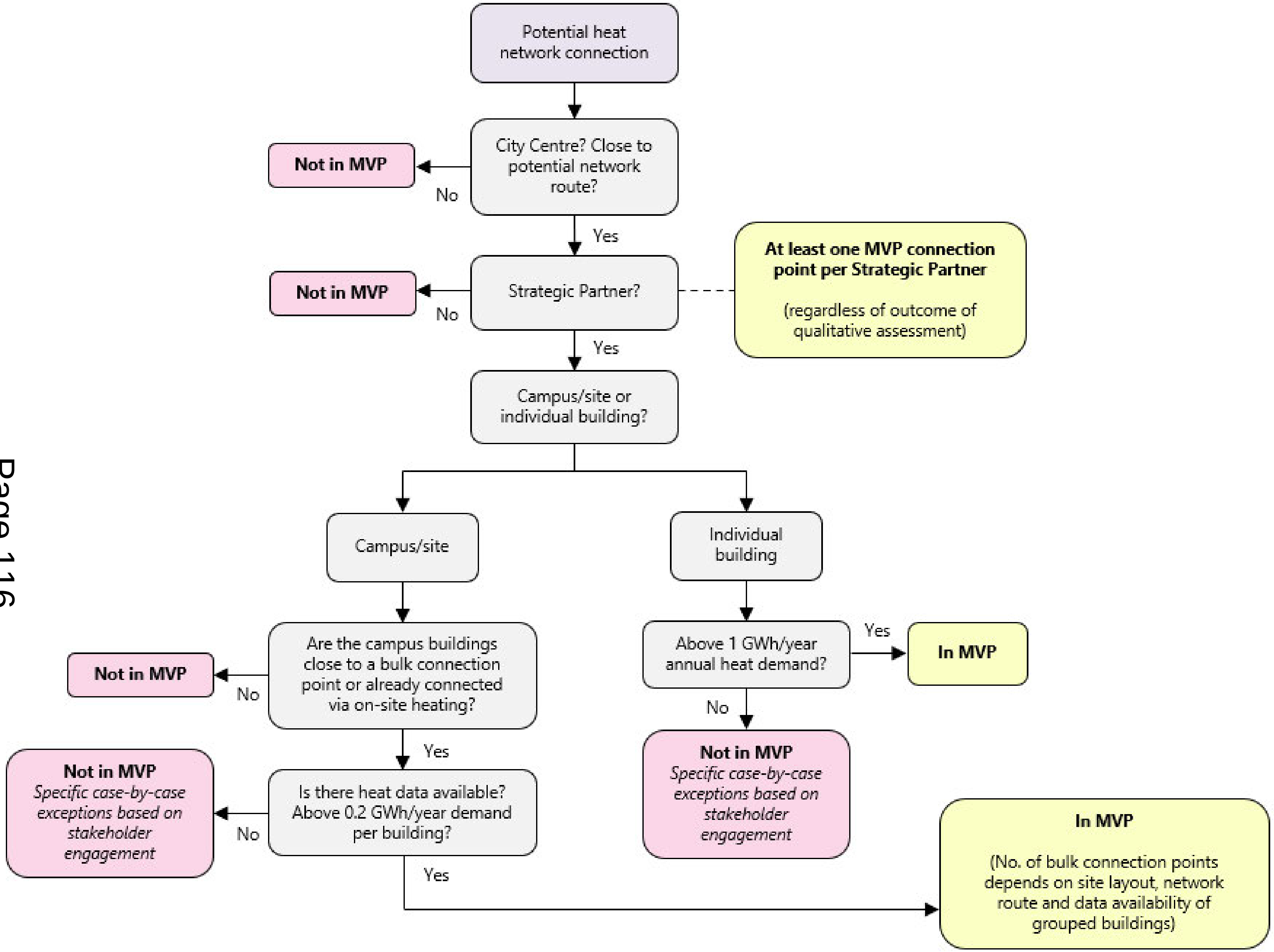


Figure 4—2 MVP Customer Connections Decision Tree

Following the MVP Customer Connection Decision Tree process, is shown in Figure 4—2. When assessing the heat loads, only demands >200MWh/year are included, noting connection of smaller loads is likely to be detrimental to the business case. The presented demand data is aggregated to protect Strategic Partner confidentiality agreements. Of the 66 potential customer connections assessed, 34 were proposed for inclusion as part of the initial MVP. This ~50% of the identified Strategic Partner connections represent 80% of the modelled heat load.

Table 4—2 Strategic Partner and proposed longlist stage MVP heat loads

Parameter	Unit	Strategic Partners	Longlisting stage - Minimum Viable Product
Number of connections	-	66	**34**
Total annual heat demand	GWh/year	85	**68**
Undiversified peak heat demand	MW	44	**37**

It should be noted that whilst at this stage the initial demand assessment has been utilised for heat network option development, at the Preferred Option stage the demand assessment was refined further following site visits to each potential College connection and additional University of Cambridge / Anglia Ruskin University sites and a more detailed data gathering exercise. The outcomes of this refined Preferred Option load assessment are provided later in Section 4.9.1, and supersedes the loads presented above in Table 4—2 and in this optioneering stage.

4.7.2.2 Future Demand

For the purposes of the baseline modelling in this business case, it is assumed that heat demand will remain constant over the project life. Whilst it is anticipated that the Strategic Partners will undergo retrofit / building efficiency projects over the coming years at many of the proposed connections, at this stage the timeline, scope and impact of such interventions is uncertain and therefore challenging to quantify. It is proposed that potential reductions in future heating demand are assessed in the sensitivity analysis in Section 4.10.12 rather than included in the base-case. Excess heat availability in the network due to any retrofit provides opportunity to extend the network to further customers to backfill demand and keep it constant.

4.7.2.3 Future Weather Conditions

It is expected that climate change will impact future space heating demands. Demand reduction over time due to anticipated increasing temperature conditions is not included in the baseline model, however, is assessed considering heating degree days (HDD) in the sensitivity analysis in Section 4.10.12.

4.7.2.4 Cooling Loads

Based on the RFI returns, limited cooling demand is understood to exist across the majority of stakeholders and where cooling is utilised limited in-use data is available. Cooling electrical consumption is generally not metered separately to general building consumption and therefore it is difficult to disaggregate the cooling load. Where there was found to be cooling, these were typically (but not exclusively) smaller local-scale cooling plant (<250kWth) distributed across the city at point-of-use.

The limited available cooling data indicates that the City Centre-wide consumption is generally low, with the exceptions being university labs / clinical buildings. For this reason, the potential for a combined heating and cooling network is low. Future expansion opportunities and interface with wider stakeholder groups (e.g. large commercial/retail spaces) may offer opportunity for integration of waste heat into the proposed network – this is viewed as an opportunity beyond the initial MVP proposal.

Many connections also have mostly smaller local-scale cooling plant distributed across the site at point-of-use.

4.7.3 Network Architecture

A traditional heat network distributes heat from a central energy centre(s) at temperatures that could be directly utilised for space heating and domestic hot water within connection buildings. Traditional heat network architecture options have been investigated for incorporation in the CCCHN:

- **High temperature (85/65ºC flow/return temperatures)** - A traditional high temperature heat network distributes heat from a central energy centre(s) at temperatures that could be directly utilised for space heating and domestic hot water within connection buildings
- **Cascade system (55/35ºC flow/return temperatures)** – A cascade network distributes at a lower temperature that would not be able to be directly utilised for space heating and domestic hot water within most connection buildings, however, would enable centralised heat to be generated at higher efficiencies. Whilst some connection buildings may be able to directly utilise the cascade system without further top-up, for buildings that require higher temperatures a local Water Source Heat Pump (WSHP) would be required to provide a 'cascade' uplift.
- **Ambient loop (25/10ºC flow/return temperatures)** – Ambient loop networks are most suitable for networks with a balanced heating / cooling load or where a waste heat source can be utilised. In these systems heat is distributed at ambient temperatures and uplifted by local WSHPs at connections. This network has the benefit of being able to provide both heating and cooling generation at connections via a single two-pipe loop.
- **Cooling network (6/12ºC flow/return temperatures)** – A two-pipe district cooling network could run parallel to the high temperature and cascade systems noted above, forming in total a four-pipe system, delivering coolth to end user customers from the central energy centre(s) in a similar (but inversed) manner to traditional heat networks.

Table 4—3 sets out the decision matrix for the proposed architecture, with a high temperature network (excluding cooling) the preferred configuration. In the case of the Cambridge City Centre, the building stock is for the most part old, poorly insulated and often of listed status. As such, most building heating systems require heat supply at 70-80ºC. In the case of the CCCHN a traditional two-pipe **high temperature heat network is proposed** with heat distribution at ~85/65ºC flow/return temperatures.

The ambition will be to reduce temperatures over time across connections – many proposed connections are known to operate weather compensation and for most of the year are operating at lower flow temperatures such as 60°C. The medium-term ambition would be to get all systems to operate on this basis to reduce temperatures for most of year – varying network temperatures through the year to minimise losses and maximise plant efficiency. In the long-term, as Strategic Partners go through building retrofit cycles, there may be opportunity for network temperatures to be reduced even in winter, reducing operating costs and therefore heat tariffs to customers.

For further detail of the network architecture appraisal, see Appendix J.

Table 4—3 Network architecture appraisal matrix

Network architecture	Decarbonisation potential	Capital cost	Operational cost	Technology risk	Security of supply	Local environmental impact	Space and works required	Compatibility with cooling	Taken forward?
High temperature network	High	Medium	Medium	Low	High	Low	Medium	Low	Yes – option best suited to Cambridge building stock and existing secondary heating system temperatures. Medium capital investment required, but least space intensive option at connections. Potential opportunity to decrease temperatures and improve efficiencies in the future as connections retrofit, although this would require aligned thinking.
Cascade system	High	High	Medium	High	Medium	Low	High	Low	No – demand assessment indicates the majority of connections require higher temperatures, therefore significant investment in cascade heat pumps and ancillaries would be required, This is both a capex and spatial risk.
Ambient loop	High	High	High	High	Low	Low	High	High	No – modelling indicates limited balance between heating and cooling loads and a lack of suitable waste heat sources. High capital and operational costs as well as spatial requirements are unlikely to make this option technically or economically feasible.
Cooling network	Low	High	Medium	Low	High	Low	High	N/A	No - limited cooling loads suggest poor payback on the infrastructure investment required to deliver a cooling network. Decentralised solutions are likely better value for money.

Page 119

4.7.4 Heat Generation Technologies

Several heating technologies could realistically be deployed to serve the CCCHN, as summarised in the heat generation technology appraisal matrix Table 4—4. In alignment with the CSFs, the key characteristics prioritised for the CCCHN are decarbonisation potential, economic impact and reliability. Based on the technology assessment, several options represent clear candidates for progression to the shortlist stage:

Primary heat generation:

- **Air-source heat pumps (ASHP)** – widely available heat source, capable of generating low carbon heat at fairly high efficiencies. Primary constraint is space intensity and acoustic/visual impact.
- **River-source heat pumps (RSHP)** – high efficiency low carbon heat generation, however output constrained by the available abstraction flow rate of the River Cam. Proximity requirement limits energy centre location options.

Peaking / resilience heat generation:

- **Electric boilers** – low carbon peaking heat generation option. Less capital intensive than heat pumps. Expensive to operate, therefore prioritised for peaking support only.
- Gas boilers to be explored as part of the sensitivity analysis. *Ultimately the economic performance of a top-up gas boiler transitional scenario (replacement with electric boilers at end of 15-year expected life) was re-baselined as the Preferred Option following sensitivity analysis.*

For further detail of the heat generation technologies appraisal, see Appendix K.

Note the heat generation technology appraisal should be caveated that the recommendations are in the context of CCCHN only – it may still be the case that technologies that are not recommended for a heat network are still viable locally as counterfactual options at a building or site-wide level.

Table 4—4 Heat generation technology appraisal matrix

Generation technology	Resource availability / seasonality	Decarbonisation potential	Capital cost	Operational cost	Modularity / scalability	Commercial complexity & technology risk	Local environmental impact	Spatial requirements	Planning considerations & consents	Taken forward?
Air Source Heat Pump	Medium	High	Medium	Medium	High	Low	Medium	High	Medium	Yes – widely available, scalable heat source. Limited by space availability and air-flow access.
Ground Source Heat Pump – Open Loop	Low	High	High	Low	Low	Medium	Medium	Low	Medium	No – unsuitable groundwater conditions for a large-scale heat network. Limited yield available.
Ground Source Heat Pump – Closed Loop	Medium	High	High	Medium	Medium	Medium	Low	High	High	No – lack of balanced heating/cooling loads will lead to ground temperature depletion over time, particularly at the scale of heat extraction required for a large heat network. Scale of borehole array required likely infeasible in terms of capex and installation rate. Thermal conductivity in local area is considered average-poor. Note this does not preclude individual heat consumers from developing smaller-scale local GSHP solutions which have better synergy with their heat consumption requirements.
Deep Geothermal	Low	High	High	Low	Low	High	Low	Medium	Medium	No - unsuitable geological conditions.
River Source Heat Pump	Medium	High	High	Low	Medium	Medium	Low	Medium	Medium	Yes – River Cam provides opportunity for high efficiency low carbon heat generation. Limited by abstraction flow rate permitted by the Environment Agency.
Data Centre Heat Recovery	Low	High	Medium	Low	Low	High	Low	Medium	Low	No - no suitable existing data centre locations in/close to the city centre. However, this option should be reviewed in the future as data centre deployment potentially ramps up in the local area.
Chiller Heat Recovery	Low	High	Medium	Low	Medium	Medium	Low	High	Low	No - limited large-scale chiller installations, poor seasonal synergy. Deliverability likely complicated by space availability and commercial arrangements.

Generation technology	Resource availability / seasonality	Decarbonisation potential	Capital cost	Operational cost	Modularity / scalability	Commercial complexity & technology risk	Local environmental impact	Spatial requirements	Planning considerations & consents	Taken forward?
Sewer Heat Recovery	Low	High	High	Low	Low	High	Low	Medium	Low	No - unsuitable sewer dimensions, limited information available.
Solar Thermal	Low	High	Medium	Low	Medium	Low	Low	High	Medium	No – limited roof space availability, particularly at the scales required to supply a large heat network. Poor seasonal synergy.
Solar PV	Low	High	High	Low	Medium	Low	Low	High	Medium	No – limited roof space availability, poor seasonal synergy. High costs at scale required to make meaningful impact.
Gas Boilers	High	Low	Low	Low	High	Low	High	Low	Medium	To be reviewed in sensitivity analysis – Preferred not to install new gas boilers, however they are typically more economical than the electric alternative, so may be required for project viability. Adoption of existing could provide transitional support to renewable heat generation. Note gas boilers could be adjusted to burn pure hydrogen in the future with new burners. Update post-sensitivity analysis/financial modelling – gas boilers to be incorporated in revised Preferred Option due to benefits as a transitionary technology.
Electric Boilers	Medium	High	Medium	High	Medium	Medium	Low	Low	Low	Yes – long-term solution to heat generation top-up / back-up. Limited by grid electrical supply and high operational costs.
Hydrogen Boilers	Low	Medium	Low	High	High	High	Low	Low	Low	No – lack of certainty in future hydrogen availability. Currently operational cost prohibitive.

4.7.5 Energy Centre Locations

A longlist of Energy Centre (EC) locations was developed based on discussions with the Core Group and RFI responses, shown in Figure 4—3. These locations have been assessed in line with the CSFs and Strategic Objectives.

The energy centre appraisal matrix is shown in Table 4—5. For brevity, only locations with at least an amber RAG rating are presented in this report. The assessment of the potential locations resulted in five opportunities to be taken forward to shortlist stage. These are the locations with the most realistic potential for development for the MVP, limiting deliverability risk:

- Parkside Pool/Kelsey Kerridge Sports Centre (one combined site)
- Midsummer Common toilet block
- [redacted]
- [redacted])
- Jesus Lock (later discounted)
- Midsummer House (as a potential RSHP abstraction pumping station).

Two additional options remain open as consideration for further upside at the Commercialisation stage of the project. These are:

- The Guildhall (to confirm whether space from the redevelopment can be set aside and used for the CCC DHN) – however it is anticipated that capacity will not be substantial in this location once considering planning limitations
- [redacted] this space was identified late in the DPD process but could have upsides due to proximity to river and the Colleges, notwithstanding some known constraints (in particular ecological considerations). [redacted]

For a more detailed breakdown of the energy centre locations assessment process see Appendix L.

[redacted]

Table 4—5 Energy Centre Appraisal Matrix

Location	Site details	Ownership / Lease status	Spatial availability	Planning risk	Local receptors	Local heat source availability	Proximity to heat connections	Power capacity	Development status risk	Taken forward?
Parkside Pools	Car parking area to the rear of the swimming pool. Possible option to extend utilized footprint on to grassy strip running along rear of building.	CCC	Medium	High	Medium	High	Medium	Medium	Low	Yes – reasonable space availability for plant and ASHPs, proximity to expected network route. Ownership within CCC jurisdiction. Adjacent to Kelsey Kerridge rooftop for additional capacity potential Sensitive area from a conservation standpoint.
Kelsey Kerridge Sports Centre	Rooftop space above the sports centre and potential access to an unused rooftop plantroom. Site likely to go through redevelopment in coming years.	CCC	Medium	Medium	Low	High	Medium	Medium	Medium	Yes – potential to provide space for additional heating plant capacity to support an energy centre located at Parkside Pools.
[redacted]	[redacted]	CCC	Medium	Medium	Medium	High	Medium	Medium	High	[redacted].
Midsummer Common Toilet Block	Existing toilet block – opportunity for demolition and replacement with new energy centre. Constrained by 200m^2 footprint limit for building on commons land.	CCC	Low	High	Low	High	High	Medium	Low	Yes – strong opportunity for heat abstraction from the nearby River Cam, enabling high efficiency WSHP heat generation. High planning risk due to public location and conservation area. High design risk due to spatial limitations.
Guildhall	One of a number of buildings within the ongoing Civic Quarter redevelopment.	CCC	Low	Medium	High	Low	High	Medium	Medium	No - limited opportunity due to spatial constraints, sensitive area and current redevelopment timelines.
[redacted]	[redacted]	CCC	High	Low	Low	Medium	Low	Medium	Medium	[redacted]
[redacted]	[redacted]	CCC	Low	High	High	High	Low	Medium	Low	[redacted] [redacted]

Location	Site details	Ownership / Lease status	Spatial availability	Planning risk	Local receptors	Local heat source availability	Proximity to heat connections	Power capacity	Development status risk	Taken forward?
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Midsummer House	CCC owned plot of unused land adjacent to Midsummer House Restaurant.	CCC	Low	Medium	Low	High	Medium	Medium	Low	Progressed for consideration as a RSHP pumping station only – insufficient space for heat generation, however proximity to river is strong opportunity for heat abstraction.

4.7.6 Longlisting Outcomes

The review of the longlist of heat and cooling demands, technology options, and network configurations led to a refined shortlist of viable options. This process was shaped by the overarching requirement to connect all Strategic Partners where feasible, alongside the need to define a minimum viable product that was both deliverable and lower risk. These criteria significantly constrained the number of feasible options at the shortlisting stage, particularly in relation to the location and potential capacities of the energy centres. Due to the limited range of viable options, the options longlist has been directly fed into the shortlist for further detailed appraisal.

Following workshops with the Strategic Partners and stakeholders, the resulting MVP options were proposed for shortlist:

Network Temperature: High temperature (85/65°C flow/return) heat network.

Two variations of the MVP were shortlisted for further testing and techno-economic modelling, with the heat pump generation supported by peaking electric boilers in each case:

1. ASHP & RSHP
2. ASHP only (assuming space for an extra energy centre can be found).

4.8 Shortlist Optioneering

The purpose of the DPD shortlisting stage is to carry out a quantitative analysis on the shortlist of viable heat network options to inform an initial comparison of the techno-economic performances, thus enabling a Preferred Option to be determined and progressed to more detailed RIBA Stage 2 design. As such, the shortlisted scenarios do not necessarily reflect the final proposed network design, but rather simplified designs that enable an emphasis on analysing the advantages and disadvantages between options.

4.8.1 Shortlisted Options

Following the longlisting appraisal process, two heat network options were proposed for progression to shortlisting stage as based on a qualitative assessment of their technical feasibility and alignment with the project CSFs. Each of these options represents an alternative heat generation technology mix to deliver decarbonisation to the MVP connections.

- **Option 0 – Do Nothing** – continued operation of the fossil-fuel driven Business as Usual heating systems, for carbon comparison purposes only
- **Option 1 – Desirable Solution** – high temperature city-centre wide heat network with RSHP & ASHP heat generation
- **Option 2 – Alternative Option** – high temperature city-centre wide heat network with ASHP heat generation only.

Both Option 1 and Option 2 are projected to serve MVP connections totalling 69GWh/year (noting this heat demand is revised post- shortlist stage) of the overall potential 91GWh/year heat demand identified during the initial demand assessment stage.

The modelling carried out at this shortlist stage is indicative only, with specific network connections and demands revised in the Preferred Option analysis through further refinement of the scheme Section 4.9. In each case, heat pumps have been sized to target 90% total annual heat fraction, whilst top-up heat generation will be supplied boilers; at this shortlisting stage full electric boiler top-up is assumed, however incorporation of gas boilers will be investigated as part of the sensitivity analysis in Section 4.10.12.

Following discussion with the Strategic Partners regarding the potential Option 1 energy centre locations, it was proposed that several 'sub-options' of Option 1 be reviewed to understand the technical, economic and risk impacts of progressing each option. As such Option 1 is split into a further four sub-options, as summarised in the following table.

Table 4—6 Shortlisted Options

Option	Heat pump technologies	ASHP energy centre locations	RSHP energy centre locations	Abstraction pumphouse location
1.1	RSHP + ASHP	Parkside Pools + BT Exchange	Midsummer Common	Midsummer Common / River Cam bank (Underground)
1.2	RSHP + ASHP		Midsummer Common	Midsummer Common / River Cam bank (Above-ground)
1.3	RSHP + ASHP		Jesus Lock	
1.4	RSHP + ASHP		Riverside Car Park	Riverside Car Pak / River Cam bank (Underground)
2	ASHP		N/a	

4.8.1.1 Option 1 – RSHP & ASHP

Shortlist Option 1 consists of four sub-options with alternative RSHP energy centre/pumping station locations, as shown in Figure 4—4. This option includes 10.4MW total heat pump capacity, with peaking/back-up boiler capacity located at Parkside Pools, and 6.5-7.3km of buried network.

A high-level technical configuration sketch for Option 1 is shown in Figure 4—6. Note this is a simplified single-energy centre diagram, and in practice multiple satellite energy centres will be required for each solution. Note also depending on the river abstraction location, Option 1 may have a separate abstraction pumphouse or it may be incorporated within the energy centre design.

It should be noted that when assessing Option 1.3 a small hydropower solution is included at Jesus Lock as per recommendation from the Client.

Table 4—7 Shortlist Option 1 - energy centre locations and heating plant capacities

Option	ASHP energy centres	ASHP / Electric boiler heating plant capacity	RSHP energy centres	RSHP heating plant capacity	RSHP abstraction location
1.1	Parkside Pool BT Exchange	Parkside Pool – 4.6MW ASHP + 36MW electric boilers BT Exchange – 2.3 MW ASHP	Midsummer Common	3.5MW RSHP	Underground pumphouse downstream of Midsummer House
1.2			Midsummer Common		Above ground pumphouse adjacent to Midsummer House
1.3			Jesus Lock		Within energy centre at Jesus Lock
1.4			Riverside Car Park		Underground pumphouse next to Elizabeth Way

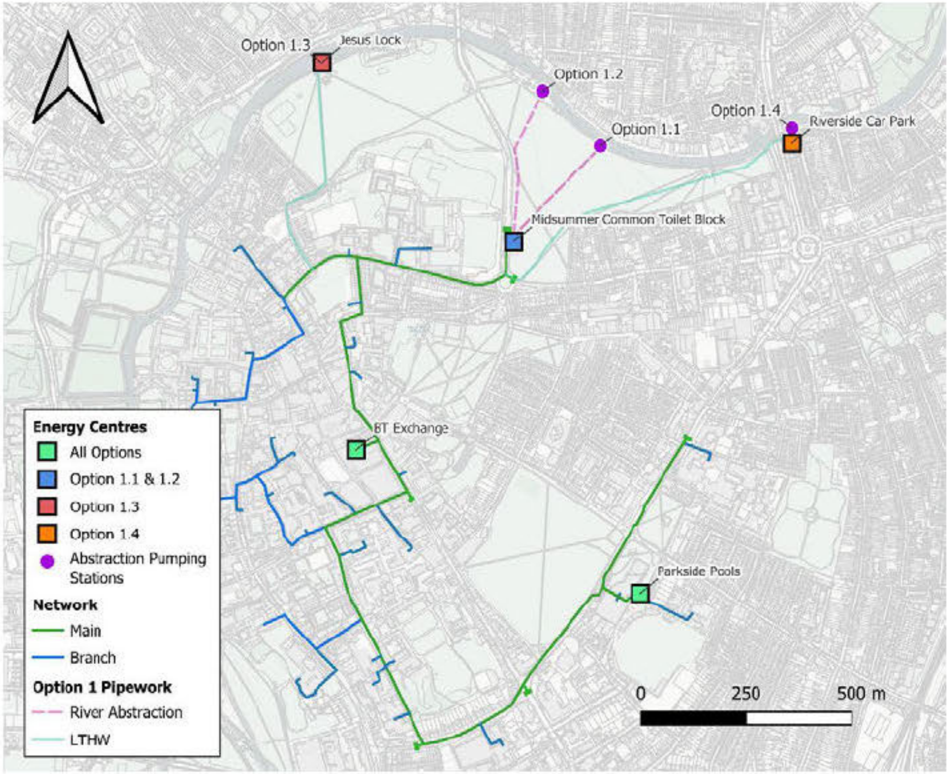


Figure 4—4 – Option 1 network layout

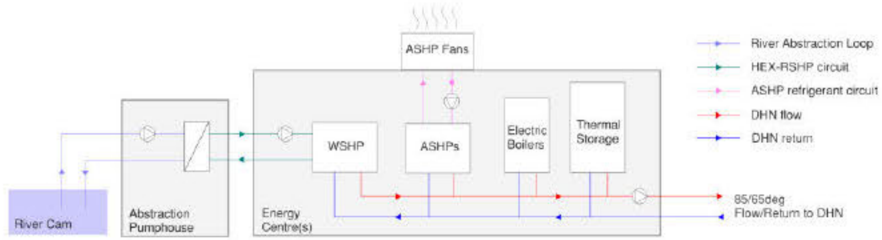


Figure 4—5 Option 1 technical configurations

4.8.1.2 Option 2 – ASHP Only

Shortlist Option 2 consists of only two ASHP driven energy centres as shown in Figure 4—. This option includes 9.0MW total heat pump capacity, with peaking/back-up boiler capacity located at Parkside Pools, and 6.1km of buried network.

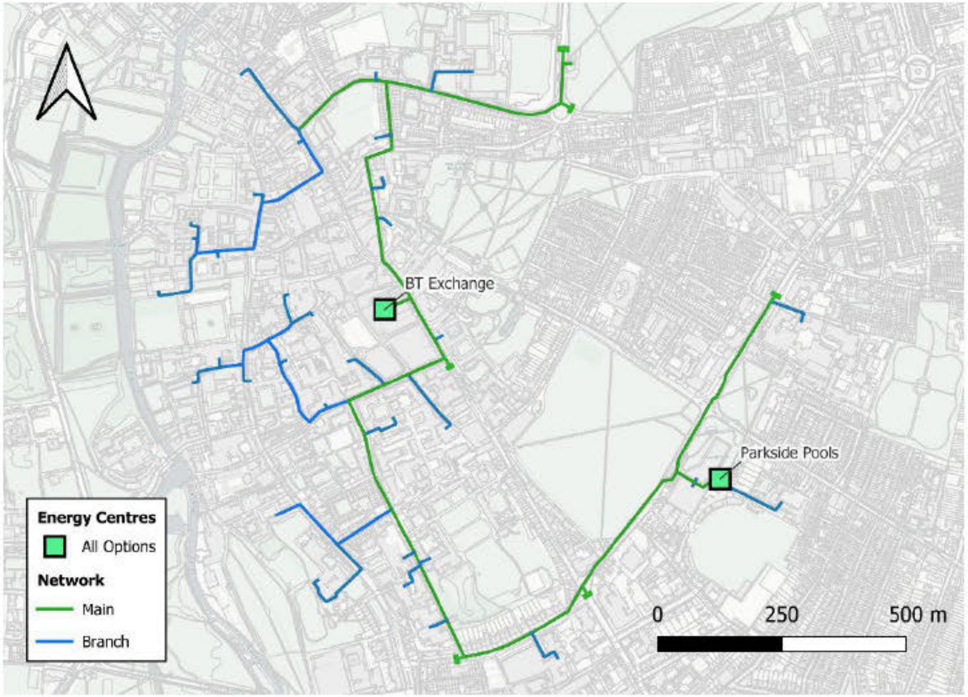
A high-level technical configuration sketch for Option 2 shown in Figure 4—7. Note this is a simplified single-energy centre diagram, and in practice multiple satellite energy centres will be required.

The Option 2 proposal assumes that the additional ASHP capacity required for the network to reach 90% heat pump heat fraction can be accommodated at Parkside Pools and BT Exchange, noting the spatial, commercial and planning constraints at each introduce a high risk to project feasibility. Alternative energy centres suitable for ASHP heat generation have not been identified at this stage.

Table 4—8 Option 2 energy centre locations and heating plant capacities

Energy Centre	Heating Plant
Parkside Pool	5.7MW ASHP 36MW Electric Boiler
BT Exchange	3.3MW ASHP

Page 129



[redacted]

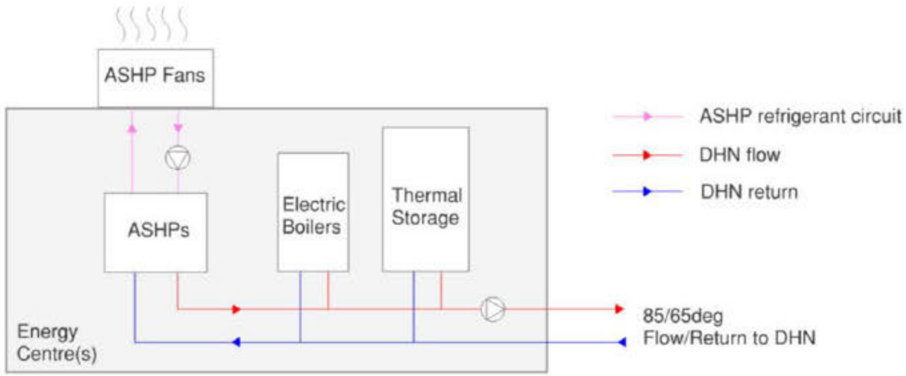


Figure 4—7 Option 2 technical configuration

4.8.2 Shortlist – Economic Appraisal

A whole-lifecycle approach to economic appraisal of the shortlisted options has been taken as an alternative to a full cashflow model. This was based on the understanding that the purpose of the shortlisting stage is to determine the most cost-effective heat network option to be carried forward for more detailed modelling. Given that in each of the shortlisted options the proposed connections and revenues are equivalent, a comparative cost model provides sufficient information to make this selection. Revenue streams were incorporated at Preferred Option assessment stage following further detailed engagement with Strategic Partners to understand their most-likely low carbon counterfactuals, see Section 0.

Inputs to the shortlisting economic appraisal are in general built on benchmarked data, industry guidance and previous project experience. Costs in the subsequent Preferred Option analysis make use of market quotes with input from cost consultant specialists.

4.8.2.1 Key Assumptions

Key modelling assumptions:

- 40-year project lifetime
- Costs modelled in real 2025 values (CPI used to inflate from previous projects where necessary)
- Costs discounted across project lifetime in line with Green Book guidance
- Heat network operation from 2030-2070
- During shortlisting modelling only, network modelled in a single phase.

For a detailed breakdown of inputs, assumptions, exclusions and results see the accompanying Technical Feasibility Report.

4.8.2.2 Whole Life-cycle Costs

Results from the whole life-cycle cost model comparison are shown in the following table and

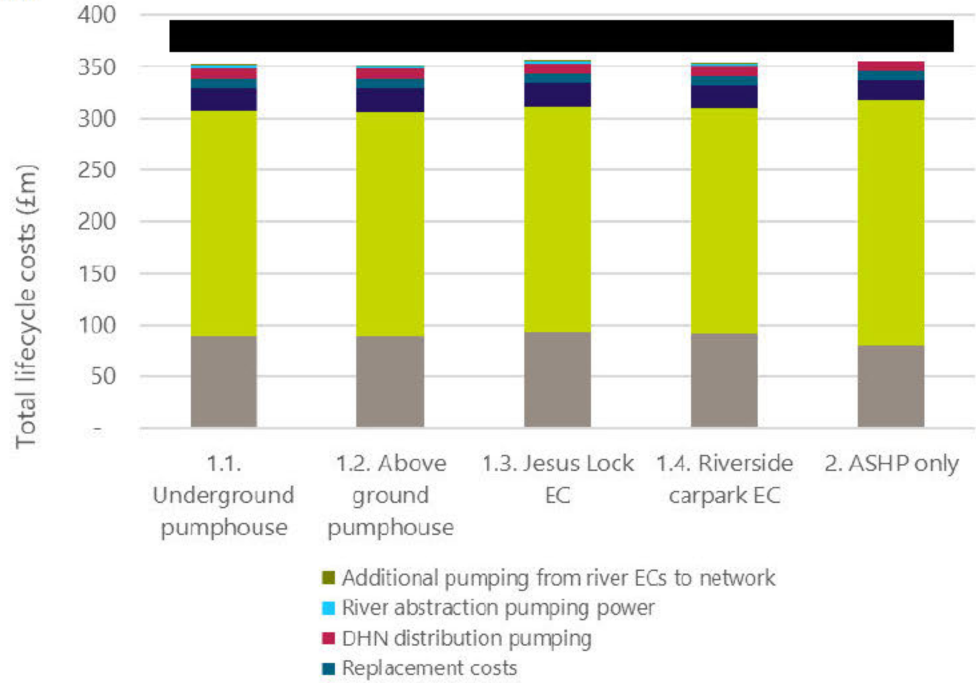


Figure 4—8. Note the presented costs are undiscounted.

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-

[redacted]					
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

The results in [redacted]

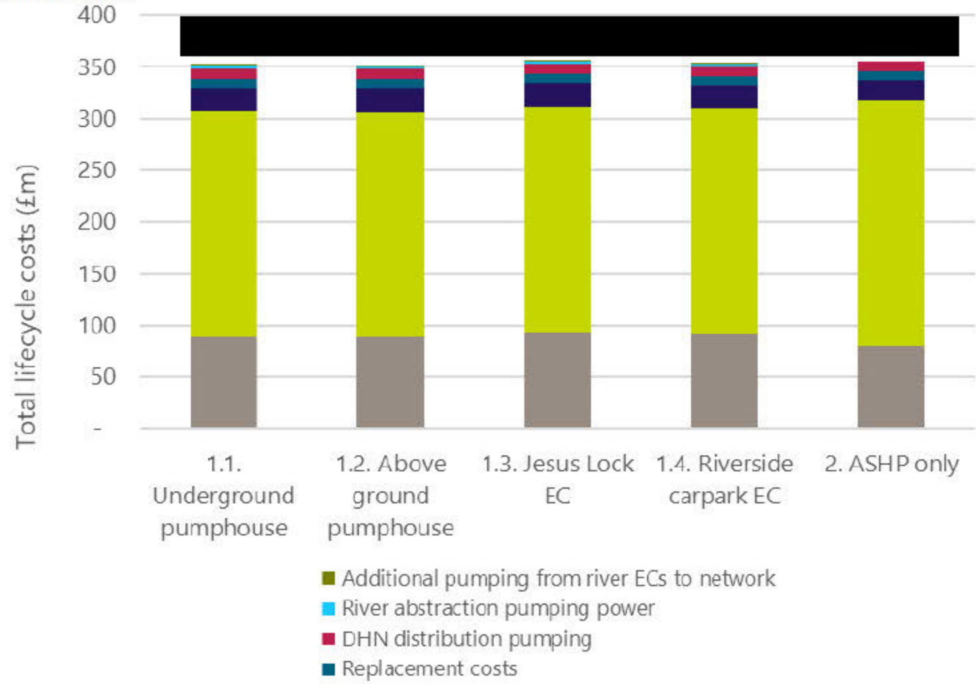


Figure 4—8 show very little variation between the undiscounted lifetime costs of each option. Although the Midsummer Common RSHP options have a higher capital cost and additional pumping power requirements vs. ASHP-only, this is outweighed by the improved efficiency of the ammonia RSHPs, resulting in balanced performances across the scenarios.

Table 4—10 Shortlisted options Levelised Cost of Heat

[redacted]

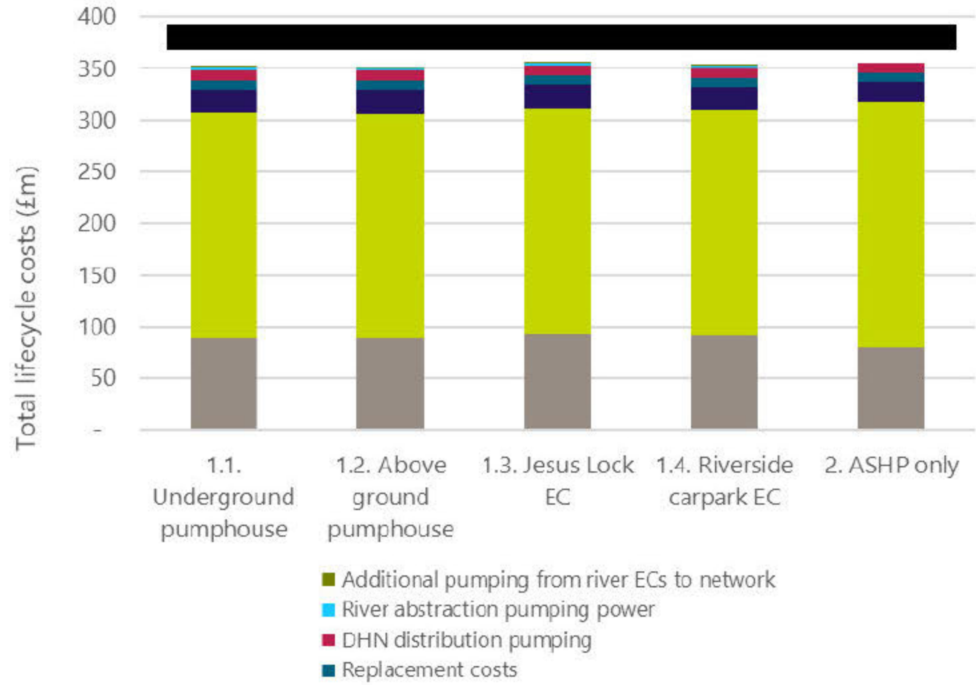


Figure 4—8 Shortlisted options undiscounted whole life-cycle costs

132

The shortlisted scenarios have also been compared in the context of Levelised Cost of Heat (LCOH) - LCOH is the cost per unit of useful heat delivered (p/kWh), including CapEx, OpEx & RepEx over the 40-year Business Plan. As the LCOH includes the discounting rate applied across project cashflows, it can offer a more contextualised method of comparison than just the whole life-cycle costs analysis. LCOH results for each of the shortlisted options are provided in Table 4—10.

When considering LCOH, Option 2 performs marginally better than Option 1 scenarios due to the shifting of capital costs into operational costs that are spread across the entire project life cycle.

4.8.3 Shortlist – Carbon Appraisal

Lifetime carbon emissions of each of the shortlisted scenarios have been assessed based on the Green Book long-run marginal grid electricity carbon projections, with the results summarised in Figure 4—9. Note that only operational carbon is presented, with embodied carbon assessment beyond the scope of this modelling stage.

Each of the district heating options save ~97% carbon emissions vs the business-as-usual gas-driven heating systems. More efficient heat generation from the RSHPs Option 1 in comparison to the ASHP-only solution in Option 2 results in slightly lower electrical consumption and therefore lower lifetime emissions.

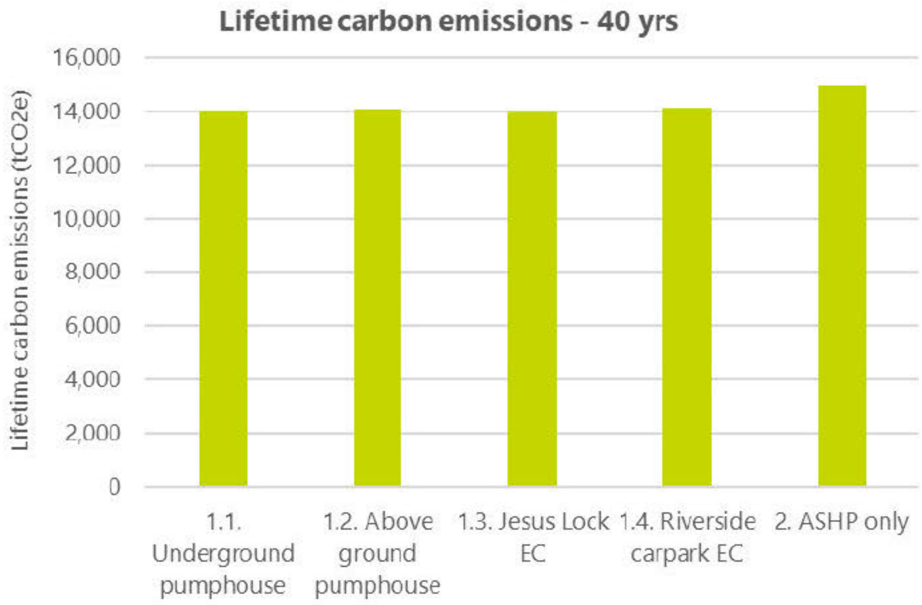


Figure 4—9 Shortlisted options lifetime carbon emissions

4.8.4 Shortlist – Risk Appraisal

Given that the economic and carbon performances of the shortlisted options are similar, qualitative appraisal of the key risks associated with each is key to selecting the Preferred Option. The key project risk categories that have been identified are described in Table 4—11. Each risk was rated for each shortlisted option on a scale of 1-5 for both likelihood and severity, with the product of these two numbers providing the total risk score with which to compare options. The detailed risk assessment evidence basis is provided in Appendix M, and a summary in Table 4—12.

Note that given that the Parkside Pools and BT Exchange energy centres are common across all options, many of the risks associated with these locations will apply mutually across each.

The risk appraisal shows that the Midsummer Common energy centre options (Options 1.1 and 1.2) are of significantly lower risk than the alternatives, in particular due to decreased risk associated with the design of the network.

Table 4—11 Shortlisted Options Risk Categories

Risk	Description
Planning	Risk associated with successfully achieving planning consent and the relevant permitting for the energy centres and abstraction pumphouse.
Land ownership	Risk relating to commercial agreements with the landowners for use of their land for energy centres/abstraction pumphouse.
Design	Risk associated with the complexity/constraints around the buried network design, including uncertainties and potential extra costs.
Flooding	Risk due to flooding, including possible damage to equipment and water displacement impact.
Construction	Challenges relating to the construction phase, including programme, access and disruption.
River Traffic	Potential to impact normal marine traffic operation on the River Cam.
Resilience	Reliability/vulnerability to failure during network operation.

Table 4—12 Shortlisted options risk appraisal matrix

Risk	Option 1.1 – Midsummer Common underground pumphouse	Option 1.2 – Midsummer common above ground pumphouse	Option 1.3 – Jesus Lock	Option 1.4 – Riverside Car Park	Option 2 – ASHP only
Planning	Likelihood: 3 Impact:5 **Risk: 15**	Likelihood: 3 Impact: 5 **Risk: 15**	Likelihood: 4 Impact: 5 **Risk: 20**	Likelihood: 3 Impact: 5 **Risk: 15**	Likelihood: 4 Impact: 5 **Risk: 20**
Land ownership	Likelihood: 2 Impact: 4 **Risk: 8**	Likelihood: 2 Impact: 4 **Risk: 8**	Likelihood: 2 Impact: 4 **Risk: 8**	Likelihood: 2 Impact: 4 **Risk: 8**	Likelihood: 2 Impact: 5 **Risk: 10**
Design	Likelihood: 3 Impact: 3 **Risk: 9**	Likelihood: 2 Impact: 3 **Risk: 6**	Likelihood: 4 Impact: 4 **Risk: 16**	Likelihood: 3 Impact: 3 **Risk: 9**	Likelihood: 4 Impact: 4 **Risk: 16**
Flooding	Likelihood: 3 Impact: 2 **Risk: 6**	Likelihood: 3 Impact: 2 **Risk: 6**	Likelihood: 3 Impact: 4 **Risk: 12**	Likelihood: 3 Impact: 4 **Risk: 12**	Likelihood: 0 Impact: 0 **Risk: 0**
Construction	Likelihood: 3 Impact: 4 **Risk: 12**	Likelihood: 3 Impact: 4 **Risk: 12**	Likelihood: 5 Impact: 4 **Risk: 20**	Likelihood: 3 Impact: 4 **Risk:16**	Likelihood: 3 Impact: 4 **Risk: 12**
River Traffic	Likelihood: 5 Impact: 1 **Risk: 5**	Likelihood: 5 Impact: 1 **Risk: 5**	Likelihood: 1 Impact: 5 **Risk: 5**	Likelihood: 5 Impact: 1 **Risk: 5**	Likelihood: 0 Impact: 0 **Risk: 0**
Resilience	Likelihood: 1 Impact: 3 **Risk: 3**	Likelihood: 1 Impact: 3 **Risk: 3**	Likelihood: 1 Impact: 3 **Risk: 3**	Likelihood: 1 Impact: 3 **Risk: 3**	Likelihood:2 Impact: 4 **Risk: 8**
Total Risk Assessment Scoring	**58 / 175**	**55 / 175**	**84 / 175**	**68 / 175**	**76 / 175**

4.8.5 Shortlisting Outcomes

Based on the analysis undertaken as part of the shortlist appraisal process, the recommendations for progression to Preferred Option are as summarised in Table 4—13.

Table 4—13 Shortlisted options outcomes matrix

Option	Primary CSF: LCOH (p/kWh)	Primary CSF: 40-year carbon emissions (tCO_{2e})	Overall Risk Score	Secondary CSF: Potential Social Value Add	Secondary CSF: Disruption Impact	Secondary CSF: Sustainability and Innovation	**Recommendation** - Note for all options there is a potential for margin of error at this stage of the cost modelling.
Option 1.1	**15.5**	14,060	**58**	Potential to incorporate a form of social value in energy centre design. RSHP installation a strong example for education purposes.	Moderate due to energy centre locations and scale	High – long term full electrification. Incorporation of RSHP demonstrates additional innovation.	Alternative to Preferred Option • Very similar to recommended option, providing a technical alternative if above ground pumphouse is unfeasible.
Option 1.2	**15.5**	14,070	**55**				Recommended for Preferred Option • Provides most cost-effective RSHP option • Least overall risk option and technical risk around river abstraction is limited • Could provide an innovative and visible project to demonstrate stakeholder's carbon reduction credentials
Option 1.3	**15.8**	14,010	**84**				Not Recommended for Preferred Option • Highest risk option, driven by the uncertainty around use of Jesus Lock • Costly option
Option 1.4	**15.7**	14,120	**68**				Not Recommended for Preferred Option • Most costly option • Excessive network extension • Planning risk in residential area very high
Option 2	**15.4**	14,960	**71**	Potential to incorporate a form of social value in energy centre design.	Moderate due to energy centre locations and scale. Lower than Option 1 as only two energy centres compared to three.	High – long term full electrification.	Not Recommended for Preferred Option • Presents high planning and design risks in terms of additional ASHP capacity at existing energy centre locations, an alternative location may be required • Marginally least carbon efficient

4.9 Preferred Option: Technical Development

Disclaimer: *The Preferred Option developed in Sections 4.9 and 4.10 reflects the scenario detailed in Table 4—13., specifically a fully electrified heating system including electric boiler top-up. The techno-economic modelling process reflects this. However, following the sensitivity analysis in Section 4.10.12 and further analysis in the Financial Case, a decision was made by the Core Group to pivot to an interim gas boiler transitionary scenario where for the first 15-years of network operation top-up is provided by gas and electrification is delayed until 2045. This decision was driven by the need for the project to present a competitive solution for both customers and investors whilst maintaining financial deliverability, which proved infeasible in the original Preferred option base-case. This also de-risked the availability of the updated grid capacity supply to the energy centre which is expected to trigger reinforcement upstream. Details of the new transitional Preferred Option are provided as an addendum at the end of the Preferred Option techno-economic modelling reporting in Section 4.10.13.*

The selected Preferred Option meets the Strategic Objectives and CSFs as set out by the Strategic Partners. The Preferred Option has undergone further development following the shortlisting stage in order to refine the design and more accurately model the business case. This Section details the Preferred Option design development, as well as the techno-economic modelling process including key economic and carbon performance metrics.

4.9.1 Updated Demand Assessment

As referenced in Section 4.7.2.1, an updated demand assessment was carried out at Preferred Option development stage to more accurately define the MVP customer connections and model the anticipated heat loads. The following further engagement was carried out with Strategic Partners to inform this demand assessment update:

- A site visit was conducted to 16 city centre colleges to assess the technical feasibility of heat network connection, most likely connection points, eligible building clusters, installed heating plant capacity, phasing strategy and most likely low carbon counterfactuals. Engagement with estates/facilities management personnel was used to inform assumptions, and connection summaries were validated with strategic management staff.
- Further detailed discussions with University of Cambridge to determine connection points, connected building clusters and associated peak demands. Site visit(s) were also carried out to specific connections to assess technical viability and discuss local constraints with on-site facilities management teams.
- Assumptions relating to Cambridge City Council and Anglia Ruskin University have remained consistent with the initial demand assessment exercise.

Table 4—14 shows a summary of the modelled heat loads on the network. Total network loads are shown to protect the confidentiality of individual Strategic Partner data.

Table 4—14 Preferred Option heat loads

Parameter	Unit	Preferred Option
Number of connections	-	48
Total annual heat demand	GWh/year	73.0
Undiversified peak heat demand	MW	43.6

4.9.2 Network Routing & Pipe Sizing

4.9.2.1 Utilities and Other Constraints

The initial network routing has been determined based on an analysis of load densities and constraints (including utilities, traffic management, archaeology), which has informed a proposed route through the city centre. An iterative process was followed with stakeholder engagement informing de-risking and optimisation of the proposed route.

Figure 4—10 summarises the outcomes of the desktop utilities search analysis carried out on the initial proposed route. Several existing utilities were identified alongside potential pinch points, as can be expected in the urbanised and historical Cambridge City Centre. The locations shown in the desktop C2 utility survey are however only an approximation and at varying levels of accuracy i.e. without depth information available and likely to omit some utilities (e.g. those abandoned by old utility providers, private drainage or buried obstructions).

Further investigations (i.e. a Ground Penetrating Radar (GPR) / Electromagnetic Location Survey, (EML)) are required to determine a more accurate position of utilities and obstructions.

Additional analysis has been carried out to determine network corridors likely to cause particularly disruption to traffic during the construction stage. Early engagement with Highways England has been initiated to begin de-risking future road-closure and permitting constraints. A high level summary of road segments that may represent particular risks in terms of closures and traffic management is presented in Appendix N.

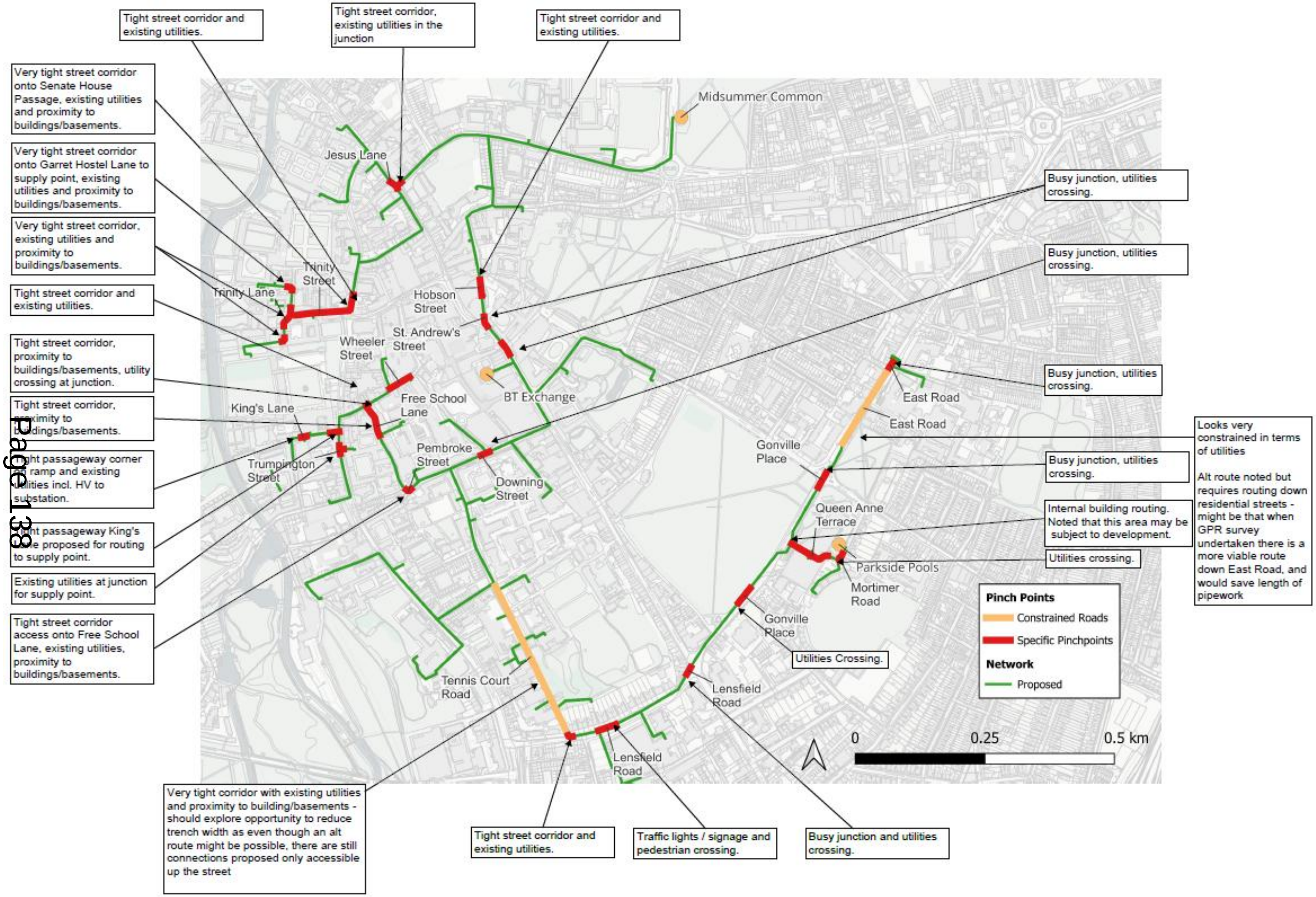


Figure 4—10 Infrastructure constraints analysis on initial proposed route

4.9.2.2 Developed Routing and Pipe Sizing

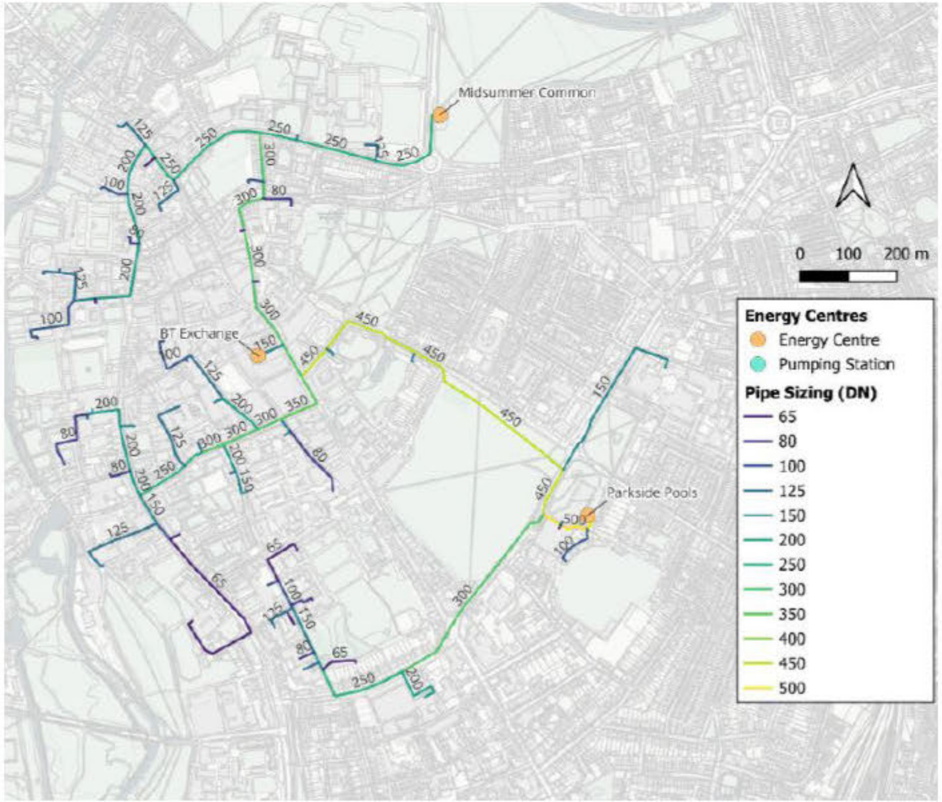
Based on this utilities constraints analysis, the network routing and pipe sizing was determined as detailed in Figure 4—11. The total proposed network length is 8,190m.

Due to the intention for the proposed MVP network to act as a first stage in a larger future network, additional upsizing of core pipework spines has been incorporated within the network design to safeguard future expansion of the network. This upsizing is included in Figure 4— and the impact described in further detail in the next section.

The majority of trenching for installation of the network runs through existing roads and highways, with an additional component of dig within hardstanding areas and a small proportion of soft dig (predominantly for the stretch of trunk mains that runs through Parker's Piece). The total required network length at each pipe capacity is summarised in Table 4—15.

Table 4—15 Preferred Option pipe sizing summary (includes expansion futureproofing beyond MVP)

Pipe DN	Highways	Hard Dig	Soft Dig	Total
65	43	229	335	607
80	273	300	-	573
100	110	403	-	513
125	501	379	-	880
150	557	159	-	716
200	1,155	129	-	1,284
250	1,290	-	-	1,290
300	1,239	-	-	1,239
350	154	-	-	145
400	-	-	-	-
450	397	-	305	702
500	54	187	-	241
Total	**5,764**	**1,786**	**640**	**8,190**

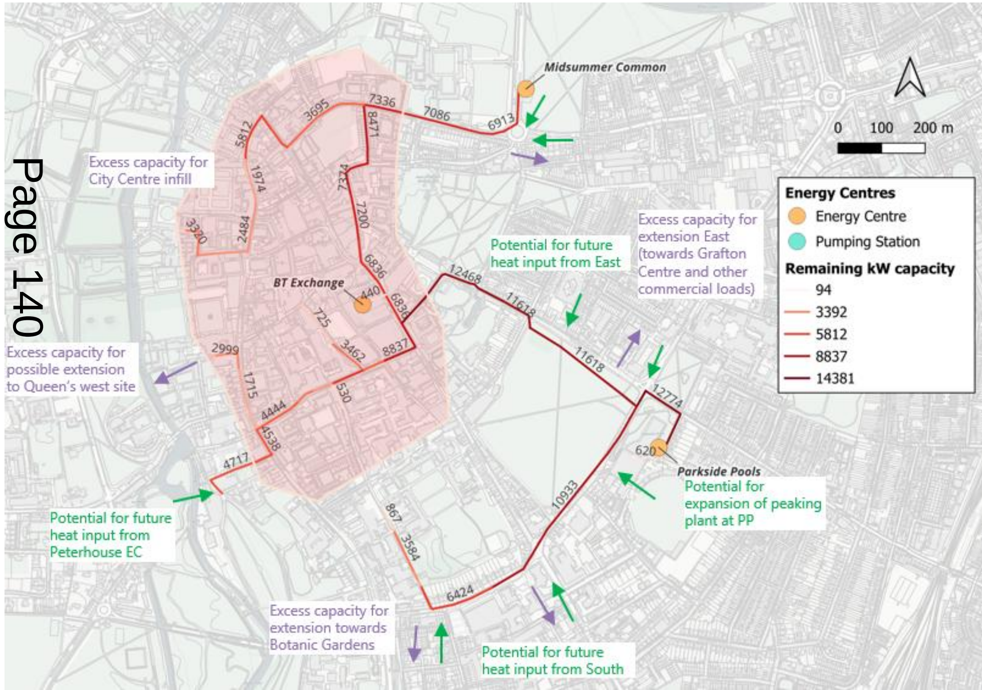


[redacted]

4.9.3 Network Expansion

Based on this strategic future-proofing exercise, the excess remaining capacity within the network trunk is shown in Figure 4—12, alongside the key directional opportunities for expansion / backfill beyond the MVP.

Initial zoning refinement in the city centre indicates a further >30GWh/year could be available within the MVP project area, with additional expansion opportunity zones to the south and west. In the future, this area is likely to become a Heat Network Zone which will mean that many of these connections are likely to be required to connect to the heat network.



[redacted]

4.9.4 Network Phasing

A network phasing strategy has been developed in coordination with the Strategic Partners to align proposed network build-out and building connections with customer boiler replacement programmes, site development plans and decarbonisation strategies. Based on these discussions the network delivery programme has been divided into two distinct phases:

- Phase 1 – Connection of heat loads from 2030-2032
- Phase 2 – Connection of heat loads in 2035

This proposed phasing programme is shown in Figure 4— The Phase 1 build-out has been spread across three years as a conservative measure to ensure that the construction timeline for the ~6.7km Phase 1 pipework is realistic, taking into consideration the highly constrained utilities corridors and the unique archaeological challenges Cambridge City Centre presents. Note that capital investments in the construction of the network will occur prior to 2030 (and therefore drawdown of GHNF grant funding if application is successful).

The phasing approach also enables sequencing of energy centre build-out, with commissioning of the energy centres staggered in order to delay capital requirement where possible whilst maintaining ~90% heat pump heat fraction (see Section 4.9.6 for plant sizing details). The energy centre build-out and year of commissioning is as summarised below:

- Parkside Pools – 2030-31; ASHPs installed across first two years of network operation, with top-up electric boilers installed across phases as required.
- Midsummer Common – 2031; RSHP installed to support heat generation in second year of network operation.
- BT Exchange – 2035; final ASHP energy centre only required upon connection of Phase 2 loads.

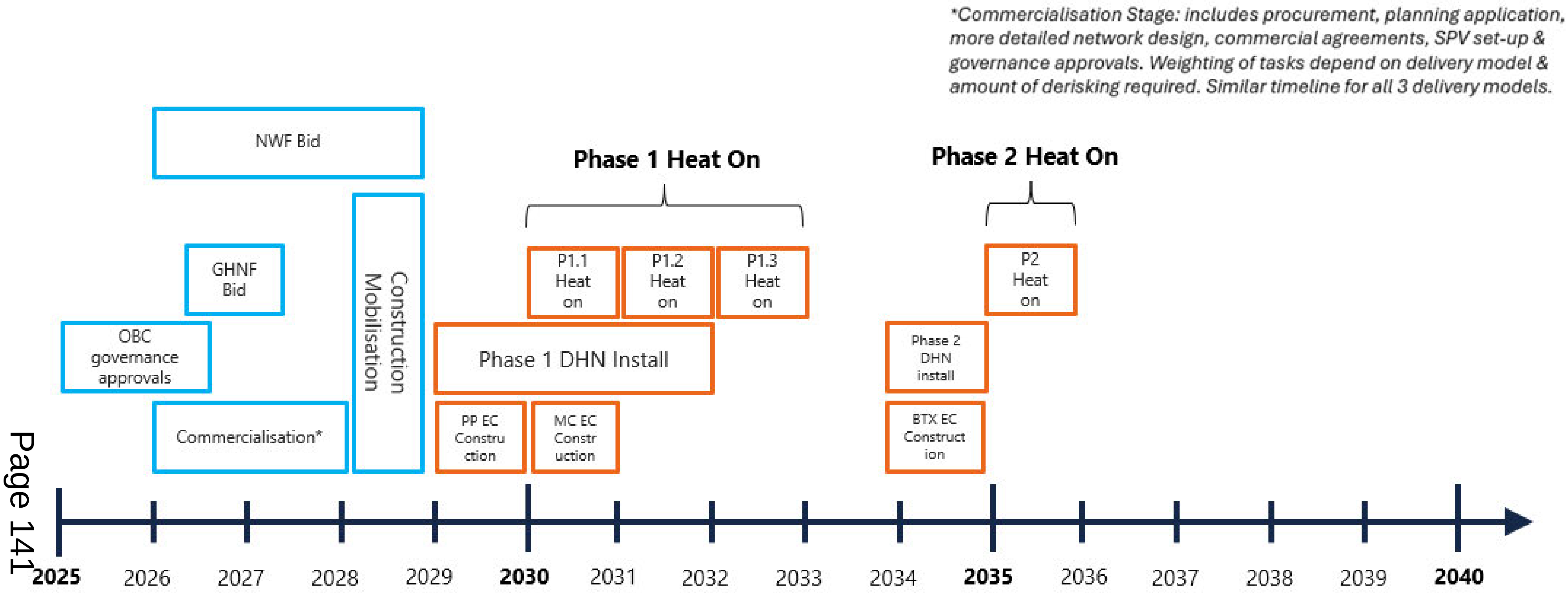


Figure 4—13 Proposed heat network phasing plan

4.9.5 Resilience Strategy

The CIBSE Heat Network Code of Practice (CP1) sets out requirements for redundancy, duty/standby arrangements, and operational protocols to ensure continuity of supply. Delivery partners will be expected to deliver to this guidance wherever practicable and HNTAS (Heat Networks Technical Assurance Scheme) provides additional guidance on resilience, measurement, and assurance for heat networks.

The resilience strategy addresses five key areas: energy centres, network, connections, operational and contractual:

Energy centres:

- N+1 peaking plant capacity (i.e. redundant boiler capacity such that if any individual heating unit fails, there is sufficient back up capacity to ensure full heat output is maintained)
- Distribution of heat pump capacity across three separate energy centre locations, thereby allowing for continued low carbon provision of heat in case of interruption of supply at an individual energy centre
- Both Air and River-Source Heat Pumps are proposed. This mitigates the impact of extreme weather conditions causing disruption to the heat source through either freezing of the River Cam or excessively low air temperatures, notwithstanding the risk that these conditions could occur simultaneously
- Provision of thermal energy storage at the energy centre(s) and across the network provides a thermal battery, allowing continued provision of heat for a short period in case of failure to heat generation plant
- The thermal capacity of the water within the network acts stores thermal energy throughout operation, in principle acting as a thermal battery in operation. This would enable a period of residual heat supply in case of short outages of generation or sudden demand spikes
- Primary distribution pumps to be arranged in a duty/duty/standby arrangement. Each pump will be sized to provide 50% of the peak diversified demand of the energy centre cluster, so that the full diversified demand can be met even if one pump is not operational. Pumps are also distributed across each energy centre
- Pressurisation and expansion units configured in a failsafe / auto-changeover arrangement. In the case of failure or scheduled maintenance of one unit, pressurisation and expansion duties can be passed on to the other unit
- Back-up power will be provided through a dual-circuit supply from UKPN, ensuring continuity of power supply in case of failure of one connection. The project is coordinating with the Local Area Energy Plan project to identify further opportunities with the city-wide power grid. Provision of diesel generators (temporary or permanent) for emergency power generation is an alternative option depending on cost and spatial implications that can be explored at later design stages
- Depending on space availability the project will aim to also include temporary plant connection points for bulk temporary heat generation at the energy centres.

Network:

- Potential allowance for temporary plant connections at critical points of the distribution pipework. To be coordinated with Strategic Partners at later design stages
- Isolation chambers at critical points of the distribution pipework for sectional isolation and maintenance
- Sensors for leak detection, enabling any defects to be identified and rectified quickly.

Connections:

- A twin plate heat exchanger configuration at each connection (unless too spatially constrained), typically sized at 50-60% of capacity each such that the maintenance strategy can be managed more effectively and ensuring that even if one were to fail a baseline heating supply can be maintained
- Strategic Partners can also choose to keep gas boilers as emergency back-up, if space is available and additional resilience is preferred (noting that, as per the next paragraph,

best practice is for heat networks to deliver >99% availability across the year). Whilst retention of gas boilers is not considered a necessity for a resilient supply, certain customers may seek to incorporate this within their planning.

Operational:

- A 24-hour 365-day operations team will be maintained, ready to respond in case of any emergency
- A robust emergency and disaster recovery plan will be developed to clearly define responsibilities, actions, key contacts and reporting in the case of unforeseen events impacting operation.

Contractual:

- Requirements to align with relevant industry standards and Good Practice, including the CIBSE Heat Network Code of Practice (CP1), which sets out essential technical guidance and standards for redundancy, duty/standby arrangements, and operational protocols to ensure continuity of supply. Delivery partners will be expected to deliver to this guidance wherever practicable, as well as the incoming HNTAS (Heat Networks Technical Assurance Scheme), which provides additional guidance on resilience, measurement, and assurance for heat networks
- Requirements for any delivery partner to deliver the network in accordance with strict Key Performance Indicators (KPIs). With the introduction of HNTAS in 2026 there will be the requirement to demonstrate compliance through an accredited certification scheme, with regular reporting of KPIs. Typical KPI's that could be set during the procurement could include Heat Availability KPIs with minimum response times for planned and unplanned heat supply interruptions; where the contractor may incur a points or cost penalty if heat supply is not restored within an agreed target period (typically 24hrs). Many contracts and technical standards for UK heat networks use 99% availability across a year as a benchmark for service reliability, aligning with best practice in district heating
- Heat network operation will shortly be regulated by Ofgem, becoming subject to the same service resilience requirements as gas and electricity supplies

4.9.6 Plant Sizing

The Preferred Option network's heat generation plant has been sized based on energy PRO proprietary software modelling. The sizing philosophy targets a ~90% heat pump heat fraction across all phases, with the remaining peak demands delivered by electric boilers (*noting the updated Preferred Option in Section 4.10.13 includes transitional gas boilers also*).

The demand modelling outcomes indicated a total heating requirement of 44MW across all MVP connections. Due to the range of building typologies and quantity of connections proposed, an 85% diversity factor has been applied when determining the total heat network demand, and therefore the electric boiler top-up requirement. This results in an estimated 37MW total heat generation capacity requirement. Future access to additional granular heat metering data may indicate diversification across the network is greater than modelled, reducing the peaking capacity requirement.

Thermal storage has been implemented as part of the energy centre heating systems as a cost-effective method of optimising heat pump heat fraction, reducing peak electrical capacity requirements, providing resilience and mitigating electricity price volatility risk. Due to spatial constraints at the proposed Parkside Pool Energy Centre location the capacity is limited to 2 x 80m^3 thermal storage units. However, potential additional satellite locations across the network are explored as part of the sensitivity analysis in Section 4.10.12.2.

The phased plant sizing requirement is shown in Figure 4—14 and Table 4—16. For further information on the energy modelling process and plant sizing constraints, see Figure 4—14.

Table 4—16 **Preferred Option phased plant sizing (includes N+1 boiler resilience)**

Energy Centre	Phase 1.1	Phase 1.2	Phase 1.3	Phase 2
Parkside Pools	1 * 2.3 MW ASHP 2 * 80 m^3 thermal storage 2 * 9 MW electric boiler (inc. N+1)	1 * 2.3 MW ASHP 1 * 9 MW electric boiler	1 * 9 MW electric boiler	
Midsummer Common		3.5 MW RSHP		
BT Exchange				1 * 2.3 MW ASHP

Page 144

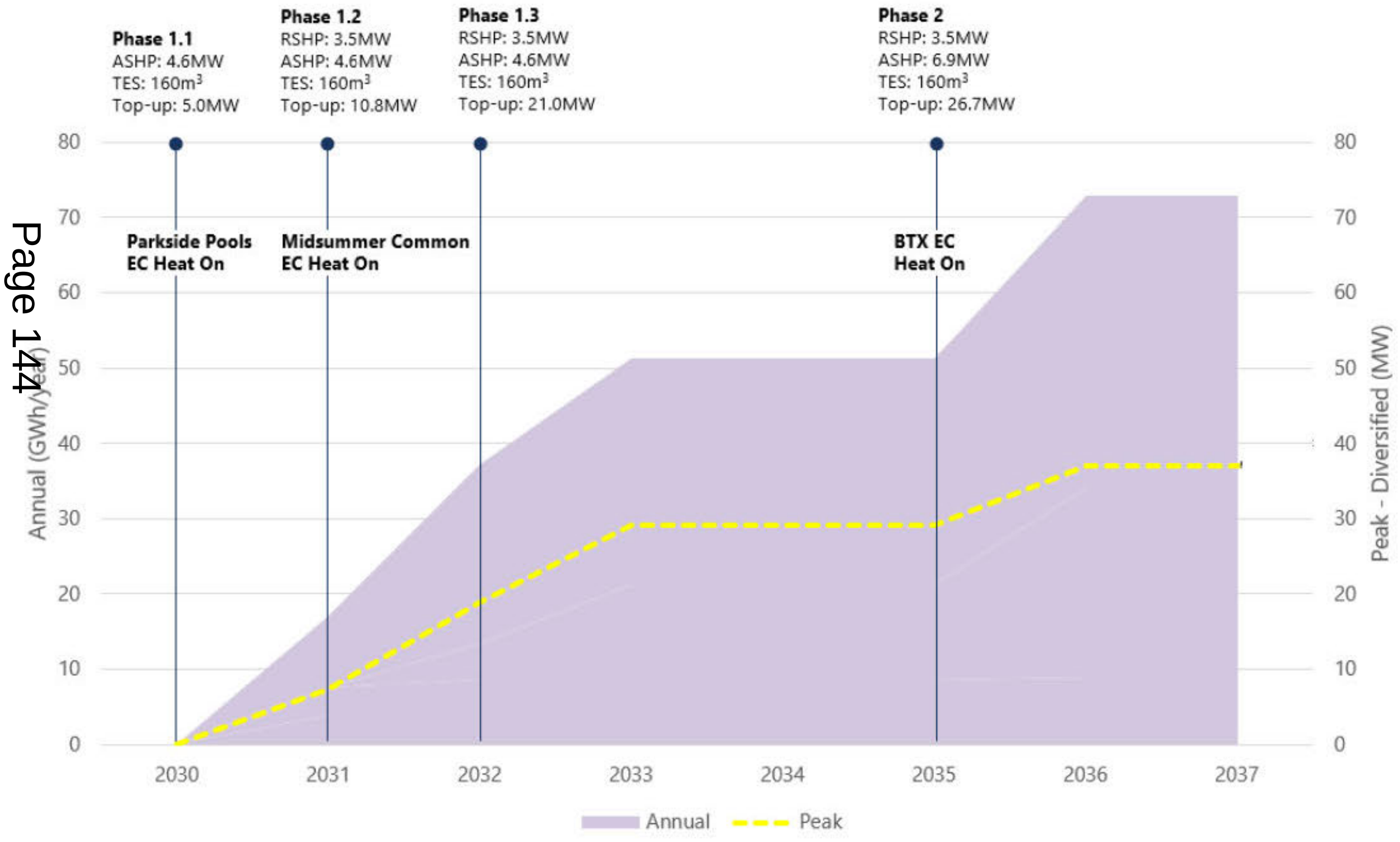


Figure 4—14 Preferred option phased plant sizing

4.9.7 Electrical Requirements & Impact on Power Grid

The proposed heat network solution will have a significant electrical capacity requirement from the local grid, particularly at the Parkside Pools energy centre which will house the electric boiler peaking plant. The electrical demand build-up of the network aligns with the phasing strategy, as shown in Figure 4—15. At full build-out with heat pumps and electric boilers operational, a total of 32.0 MVA is required across the energy centres.

Engagement with UKPN has been carried out to determine the capacity in local substations and feasibility of electrical connection. UKPN has provided a budget estimate for the cost of connecting each energy centre, noting that these are **non-binding estimates** intended to aid decision-making, and final costs at formal offer may differ. A summary of budget estimate costs at each energy centre location is provided below:

Page 145

- **Parkside Pools**: a new point of connection can be made to Fulbourn Grid (22.5 or 42.0 MVA) as a secure supply. Dual-ducted 33kV cables will run via an approximately 8km circuit, including horizontal directional drilling required for railway crossing. The initial budget estimate indicates a total £8.65m connection cost. However, it is noted that upstream 132kV reinforcement may also be required, the costs of which are not included within the budget estimate and would need to be assessed at formal stage. UKPN have also indicated that the earliest completion date would be 2034 – this does not align with the network programme and will need to be negotiated during formal stage (*note the gas boiler transition scenario presented later mitigates against this)*. However, it is noted that UKPN were not informed of the phasing strategy when making this budget estimate, which should reduce the requirements on the grid in the early stages of the network development and therefore may allow an alternative phased connection offer to be made. UKPN has already suggested that a smaller interim application—such as 10 MVA—could potentially be delivered by the 2030 target date. A formal application will provide greater certainty on scope, costs, and programme. In parallel, the ongoing Local Area Energy Planning (LAEP) work and a coordinated approach across Cambridge may create opportunities to bring forward delivery

- **Midsummer Common:** connection is feasible through an extension of the existing HV Ringed Network along Victoria avenue and establishment of a new 1.7 MVA HV Metered Supply and transformer on-site. This includes excess capacity beyond the 1.2 MVA required for the heat pump to supply seasonal events that utilise Midsummer Common. Cost of connection is estimated by UKPN at £175k

- **BT Exchange:** connection is feasible through connection to the HV network within the existing BT Exchange courtyard and establishment of a new 1.5 MVA transformer. Cost of connection is estimated by UKPN at £175k.

It may be possible to reduce the peak electrical requirement of the heat network through operation of the thermal stores in peak shaving mode, which aims to shift heating demand away from the peak, thereby flattening the daily consumption profile.

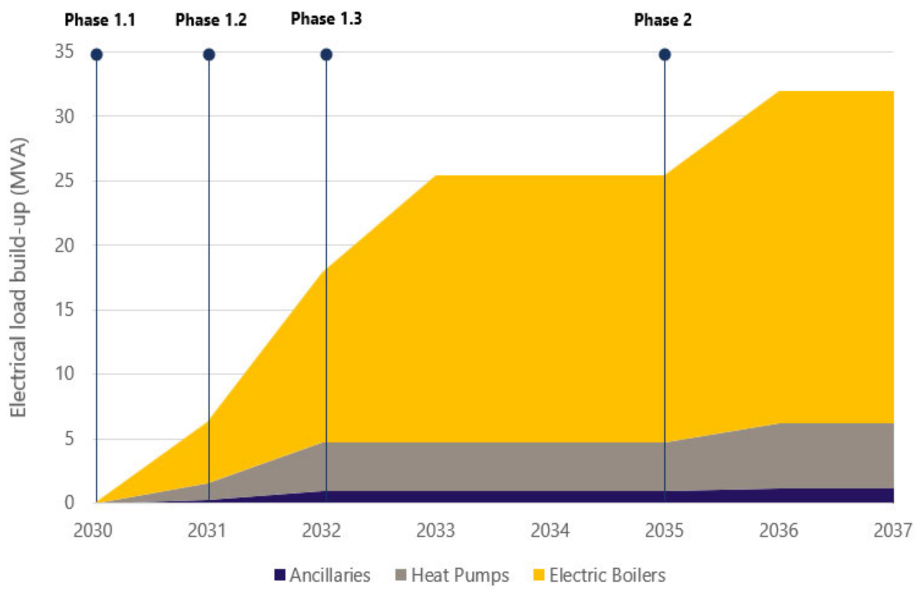


Figure 4—15 Preferred option electric load build-up

4.10 Preferred Option: Techno-Economic Appraisal

The Preferred Option has been subject to a techno-economic model assessment. This section outlines the Techno-Economic Model (TEM) analysis carried out to provide information on the capital and operational expenditure, costs to customers and carbon performance of the proposed CCCHN solution.

The TEM is a pre-tax model used to give an initial indication of costs, revenues and potential cash flows over time. This TEM is different to a financial model and is strictly pre-financing; it is not to be taken as financial advice. It is to be used as part of the OBC to identify project opportunities worth progressing to a deeper level of detail at the next project stage and provides inputs to the Financial Case modelling.

A bespoke techno-economic model was created to assess the economic performance and carbon emissions of the Preferred Option. The model produces the following key outputs:

Page 146

- Phased capital expenditure (CAPEX) of the technologies deployed
- Annual operational expenditure (OPEX) resulting from fuel imports (natural gas and electricity) and technology operation and maintenance (O&M)
- Replacement expenditure (REPEX) primarily of the energy generation technologies following the end of the equipment lifetime
- Revenues from connection charges, heat sales and standing charges
- Annual carbon emissions arising from primary energy consumption.

The model also evaluates the return on investment over the lifetime of the project (assumed at 40 years) using the Discounted Cash Flow (DCF) methodology. The key TEM metrics produced are the Net Present Value (NPV), the internal rate of return (IRR) and the Social Internal Rate of Return (SIRR) of the project:

- NPV is the difference between incoming and outgoing cash flows. The value of the net cash flow throughout the scheme's lifetime is discounted at a specific rate per year (using Green Book rates), as the future value of money is expected to be lower than its present-day value. Hence, the net cash flow considered in terms of present value of money is NPV. A positive NPV means the scheme is making a profit, whilst a negative NPV represents a loss on initial investment over the lifetime of the scheme
- IRR is a metric used to compare the commercial attractiveness of one scheme to another and is represented by a percentage. It is the discount rate required to deliver an NPV of zero over the scheme's lifetime
- SIRR evaluates the overall return value of a project to society, both economically and socially. The SIRR is calculated in much the same way as the financial IRR, except that it instead considers both the private and social costs and benefits over the lifetime of the project.

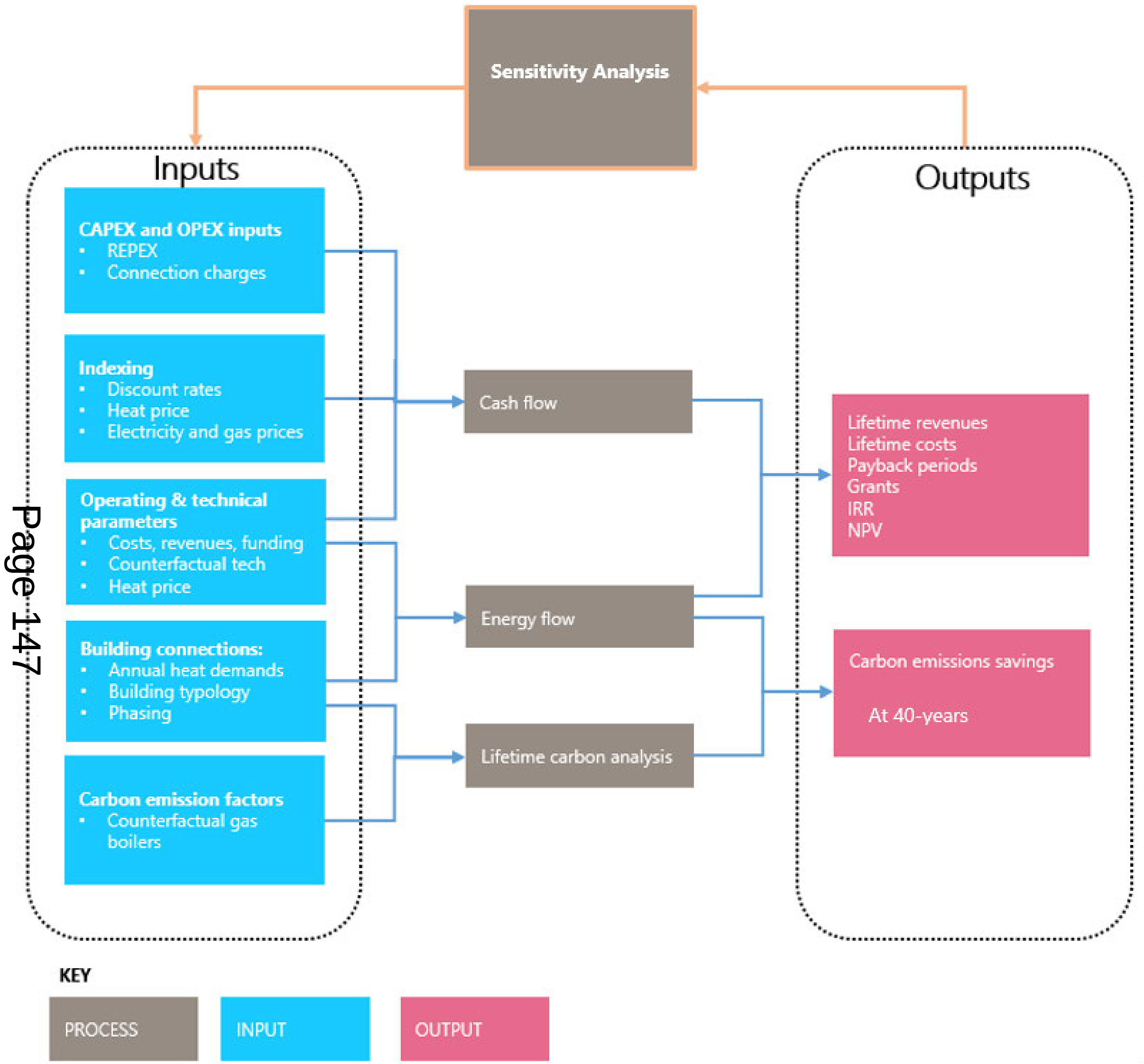
4.10.1 Modelling Approach

A techno-economic cash flow model was built in MS Excel combining the technical details of the scheme (capital and operational) with appropriate cost/price inputs to generate an annual cash flow. This enabled an assessment of viability (pre-tax) using Net Present Value (NPV) and Internal Rate of Return (IRR) as key indicators over a 40-year period.

Key assumptions are listed in Appendix O and include:

- All costs provided in 2025 real rates
- The network operator would act as a bulk heat supplier, owning and operating the energy centres and distribution networks up to and including the heating substations located at each customer connection. Any works beyond this point are within the scope of the customer
- Customers will pay an upfront connection charge upon connection to the network
- Heat is sold to each customer at a variable rate and standing charge
- Heat losses for a high temperature heating network are assumed at 10% as based on CIBSE CP1 guidance
- Pumping power and other ancillary plant power has been calculated for in addition to the electricity requirement for the main heating plant at the energy centres
- Customers are connected in a phased manner to the heat network as described in Section 4.9.4 of this report.

A process diagram for the techno-economic modelling approach is illustrated in Figure 4—16.



Page 147

Figure 4—16 Techo-economic modelling approach

4.10.2 Low Carbon Counterfactual

The low carbon counterfactual for each proposed MVP connection represents the most viable alternative low carbon heating solution if the CCCHN was not progressed. The counterfactual is used as a basis for establishing the heat sales price, standing charges and connection charges, with the intention being that the Preferred Option offers a cost-competitive alternative that would be attractive to potential customers.

The low carbon counterfactual solutions were developed through consultation with the stakeholders and agreement on the modelling conditions. They have been modelled using a bottom-up approach and benchmarked cost rates depending on the technologies agreed with the Strategic Partners.

Note that the counterfactuals are each modelled independently of one another. In practice if all Strategic Partners were to progress local decarbonisation solutions, the deliverability of each individual solution will likely be impacted due to backlogs in the supply chain and decreasing capacity on the grid, which may leave late movers with limited decarbonisation options.

For the purposes of this techno-economic analysis, the counterfactual scenario is considered the aggregation (or blend) of all individual counterfactuals. As such, network performance is compared against the 'blended' counterfactual – for a specific customer focussed comparison of connecting to the heat network versus the local counterfactuals, see the Customer Tariff Notes issued separately to each Strategic Partner.

Table 4—17 Modelled Counterfactual Technologies

Counterfactual Scenario	Description	Number of Connections
ASHP only	ASHPs provide the full heat load. Applicable to both centralised and decentralised systems.	**14**
ASHP / electric boiler – decentralised	A proportion of the site/building is heated by ASHPs, whilst the remaining is heated by electric boilers. No interconnection between the separate heating systems.	**7**
ASHP / electric boiler – centralised	ASHPs provide the baseload to a centralised heating system, with top-up heat provided by electric boilers. Requires on-site heating pipework to distribute the heat.	**19**
RSHP only	RSHPs provide the full heat load. Applicable to both centralised and decentralised systems.	**2**
RSHP / ASHP - centralised	RSHPs provide the baseload to a centralised heating system, with top-up heat provided by ASHP. Requires on-site heating pipework to distribute the heat.	**1**
Electric boiler only	Electric boilers provide the full heat load. Applicable to both centralised and decentralised systems.	**5**

4.10.2.2 Counterfactual Cost Estimate Key Assumptions

Low carbon counterfactual solutions have been modelled based on a similar methodology to the proposed network for fair comparison, noting the following inclusions:

Modelled cost items include:

- Heat pumps & electric boilers
- Mechanical and control systems
- Upgrades to on-site electrical equipment where required
- UKPN grid reinforcement costs (socialised across customers on the understanding that local grid infrastructure will require reinforcing in the case of widespread electrification of heat supply)
- Cost uplifts have been included, parallelling the on-costs and contingencies applied when modelling the CCCHN as described in Section 4.10.4. However, it should be noted that bespoke uplifts associated with specific deliverability risk at each connection are not included beyond a blanket 10% as aligned with the connection capital costs of the CCCHN. The unique challenges in Cambridge City Centre are likely to result in increased counterfactual costs due to a range of circumstances, including but not limited to working with listed buildings, bespoke solutions in tight spaces, archaeological risk and higher than expected grid upgrade costs. Whilst the 10% uplift is intended to capture this impact, the uncertainty within these risks is likely to result in increased practical counterfactual costs on a case-by-case basis, which it is important for customers to be aware of.
- Resilience included in heating plant sizing; 20% capacity uplift for decentralised systems, and full boiler top-up in centralised systems. Certain customers may desire an even more conservative resilience approach in practice, which would increase counterfactual costs.

The following key items have been excluded from the counterfactual analysis:

- **Energy efficiency measures / building fabric retrofit:** The CCCHN has been designed for high temperature heat supply to enable connection of poorly insulated buildings without the need for invasive/costly retrofit. The counterfactual scenarios have been similarly modelled with high temperature heat pumps (with case-by-case exceptions as discussed with individual Strategic Partners). Whilst it is noted that some customers would look to implement building efficiency improvements as part of their counterfactual, there is significant uncertainty in modelling costs for these interventions without carrying out building surveys and further design. Modelling of high temperature heat pumps therefore represents a fairer cost-comparison. It is noted that the costs associated with lower temperature systems plus building efficiency measures can vary significantly, and typically where parallel building fabric improvements are required tend to be more expensive than a high-temperature alternative
- **Capital cost of secondary networks:** whilst existing plant rooms may be reutilised, in many cases a new or extended secondary network is also required. New secondary networks are excluded from both the counterfactual and heat network cost calculations. Where required, customers will need to fund this separately. In some cases, this is like for like with the counterfactual, as Institutions intend to install centralised heating as part of the counterfactual regardless of heat network connection. In other cases, the counterfactuals propose decentralised heat generation (for example heat pumps in some buildings, electric boilers in others), which does not require investment in a new secondary network but is typically more costly in terms of heating plant. Any secondary network install is an individual Strategic Partner capital cost, which also needs to be budgeted for.

Counterfactual cost estimates represent the current understanding of realistic counterfactuals based on the limited information available. Only by undertaking detailed on-site analysis can accurate counterfactual costs be developed, accounting for specific local circumstance and deliverability. If Strategic Partners are willing to share more data, collective confidence in forecast counterfactuals will be improved. Initial indications show that practical counterfactual costs are likely to be higher, making the heat network more competitive.

It should be noted that design of the counterfactual systems has not been undertaken as part of the heat network development, and the proposed solutions considered a high-level *estimation based on consultation with potential customers. Costs associated with the counterfactual systems as presented in this business case should be considered as indicative for guidance in estimating customer tariffs only and are based on benchmarks and industry best-practice or previous project experience. Use of these figures beyond assessment of the CCCHN Business Case is not recommended. It is recommended that customers undertake their own due diligence on low carbon counterfactual solutions to accurately understand the cost and performance implications on their sites.*

4.10.2.3 Counterfactual Capital Costs

A capital cost schedule has been developed for each connection, estimating the cost of installing the counterfactual heating system. A summary of the total counterfactual capital costing is shown in Table 4—18. A bottom-up approach has been followed and costs benchmarked for each connection. Further detail in counterfactual CAPEX modelling assumptions is provided in Appendix O.

Table 4—18 Counterfactual capital costs summary

Counterfactual CAPEX item	Inclusions	Total cost (£m)
Air Source Heat Pumps	Heat pumps, acoustic enclosure	[redacted]
River Source Heat Pumps	Heat pumps and river abstraction plant	[redacted]
Electric Boilers	Boiler units	[redacted]
Mechanicals and Controls	Pipework between heat pumps and plant rooms, control systems, modifications to existing systems & decommissioning of boilers	[redacted]
Electrical Plant	On-site electrical infrastructure	[redacted]
Grid Connection Costs	Reinforcements to the local grid (assumed socialised between all connections)	[redacted]
Additional Costs	Heritage allowance, testing & commissioning, design fees, preliminaries, overheads & profits & contingencies	[redacted]
Total		[redacted]

4.10.2.4 Counterfactual O&M and Replacement Costs

The ongoing operational cost of the counterfactual has been determined as a % of capital cost spent on operation and maintenance each year. Replacement costs are determined based on the estimated life-expectancy of the main plant items, with the capital cost of replacing plant items annualised over their lifetime. All replacement costs are included and budgeted for within the 40-year Business Plan.

A metering cost of £500/building/year has also been assumed as based on typical rates seen in the market.

4.10.2.5 Counterfactual Fuel Costs

The low carbon counterfactual solution fuel costs have been calculated based on their total electricity consumption, multiplied by the electricity tariff. The electricity tariff matches the Green Book electricity retail price trajectory used in the techno-economic modelling of the CCCHN and includes both the standing and variable portions.

As electricity prices fluctuate over time, the heating tariffs are indexed to changes in electricity prices within the techno-economic modelling as per the Green Book price trajectory. This allows any reductions/increases in fuel costs over time to be passed on to customers through discounts/increased fees, helping to ensure fair heat pricing.

It should be noted that the Green Book retail rates provide a range (from 12.5p/kWh Low – 18.8p/kWh Medium – 42.7p/kWh High in 2022 terms). The medium price trajectory has been utilised when modelling the counterfactual and techno-economic modelling fuel costs, however the impact of fuel at the extremes of the range is explored in the sensitivity analysis.

4.10.2.6 Counterfactual Costs Summary

As based on the low carbon counterfactual costs described in this Section, the capital, variable and fixed costs each low carbon counterfactual solution have been estimated. A summary of the counterfactual technology life costs is shown in the following table. It should be noted that the cost structure will change on a case-by-case basis depending on the site-specific requirements and stakeholders have been provided with their individual site details in separate connection detail notes. Further information on the assumptions can be seen in Appendix P.

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

4.10.3 Revenues

Project revenues are made up of two streams; up-front connection charges for customers to connect to the heat network, and ongoing heat tariffs (both the variable heat sales rate and the fixed standing charge) which are paid over the project lifetime for continued supply of heat.

Customer connection charges and tariffs have been set with two key drivers in mind:

- Providing sufficient project revenues to maintain a positive cashflow and ultimately a 40-year IRR that is commercially attractive enough for project delivery
- Providing an offer to customers that is overall more cost-effective than pursuing the blended counterfactual solution across the modelling 40-year project life.

Revenues are closely linked with the counterfactual modelling results, with the counterfactual capital, fixed and fuel costs informing the development of heat tariffs.

4.10.3.1 Connection Charge

The customer connection charge is based on the size of the heating substation required to connect. It has been determined based on the avoided cost in joining the network compared to the low carbon counterfactual - [redacted]

[redacted]

4.10.3.2 Heat Tariff

The heat tariff is structured into two elements:

- **Variable heat sales rate (p/kWh)** – price paid per unit of heat consumed by the customer, reflecting the blended counterfactual fuel costs (as based on Green Book electricity price projections) and charged based on kWh/year annual heating demand
- **Fixed standing charge (£/kW)** – flat rate reflecting blended counterfactual operations & maintenance, metering & billing, replacement costs and utilities standing charges, charged based on kW peak heating demand.

It is important to note that these heat tariffs cannot be compared like for like with gas / electricity utilities tariffs.

A variable and fixed-rate heat tariff for use in the techno-economic model, has been derived from the operation, maintenance, constructions costs and overall heat demand, see Figure 4—17. The setting of charges has been guided by market trends, and customer expectations as informed by the blended counterfactual, see Table 4—20.

This tariff structure is only used for assessing the Business Case and is not intended to represent the tariff that the scheme operator will propose, but rather realistic rates to guide the modelling. Estimated connection costs are not a final offer: they are for 2025 real values (pre-inflation and pre-procurement).

A 15% discount on variable rate has been included within the Preferred Option modelling versus the blended counterfactual in order to ensure the cost of heat network connection.

It is noted that the forecast Connection Charges are at the top end of market ranges, in part due to the use of electric boilers to achieve full electrification from first Heat On in 2030 and likewise due to the unique decarbonisation challenges presented in Cambridge City Centre.

Partners may have local data to test projected costs against similar decarbonisation projects, whether delivered or planned. It is advised that Partners carry out this comparison to more accurately quantify the benefit of connection to the CCCHN as opposed to local decarbonisation solutions.

Note variable rates are indexed against the Green Book retail fuel price projections as based on the energy centre fuel mix (in this case 100% electric) in order to reflect expected fluctuations in fuel prices over the project lifetime and pass through expected reductions to customers.

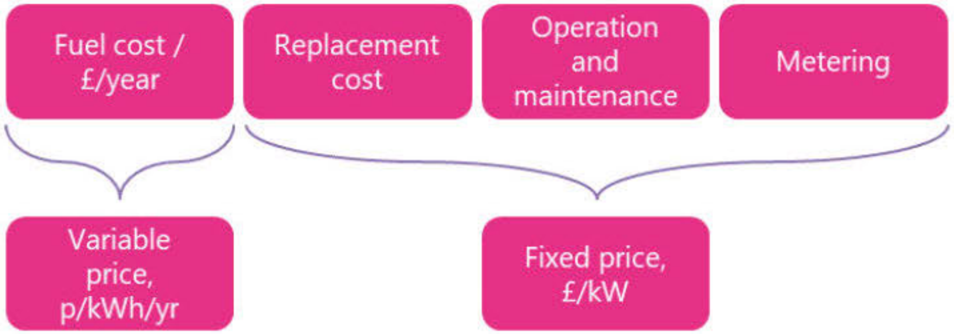


Figure 4—17 Variable and fixed rate tariff structures

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

4.10.4 Capital Costs

Capital costs for the proposed CCCHN scheme have been provided by Currie & Brown cost consultants, in combination with supplier quotations obtained by Buro Happold. Where possible the cost consultant has contacted the market to understand the latest prices for cost items, otherwise they are informed by industry experience and previous projects.

Additional costs have been applied to cost items to reflect the expected uplifts for testing, design fees, preliminaries, contract overheads & profits etc. These were informed by engagement with the cost consultant and are summarised in Table 4—21.

Note also that an additional uplift has been applied to certain cost items relating to project specific risks, such as possible archaeological constraints, heritage risks, complex design requirements or otherwise. These more specific risk-related cost uplifts are intended to reflect the unique challenges presented by installing a network in Cambridge City Centre and are broken down in detailed in the following Section 4.10.4.1. Each of these additional fees has been compounded against the cost totals to calculate the uplift.

An additional uplift of 15% for contingency has been applied to the total capital cost to allow for unforeseen circumstances and optimism bias – this rate is in line with contingency factors applied across other Green Heat Network Fund applications.

A total capital requirement of [redacted] has been identified for the Preferred Option. Table 4—22 summarises the costs, whilst Figure 4—18 shows the build up across phases.

Table 4—21 Additional cost uplifts applied to capital costs

Capital cost uplift category	Percentage uplift
Testing & Commissioning	2.5% - Applied to relevant plant and infrastructure only
Design fees	5%
Preliminaries	15%
Overheads & Profits	9%
Additional risk-related fees	5-12.5% - see Section 4.10.4.1
Contingency	15%

Table 4—22 Preferred Option capital costs summary

CAPEX item	Inclusions	Total cost (£m)
RSHP	High temperature ammonia heat pump	[redacted]
Other river abstraction plant	Abstraction equipment including strainers, filters, pumps, PHX etc.	[redacted]
ASHP	High temperature hydrocarbon heat pumps	[redacted]
Other mechanicals	Electric boilers, network ancillaries, pumps, water treatment, thermal stores etc.	[redacted]
Energy centre building	Structural and civils works, building services, includes allowance for architectural sensitivity	[redacted]
Electricals	Controls, transformers, LV/MV switchgear, electrical ancillaries	[redacted]
UKPN	Grid upgrade costs as quoted by UKPN via budget estimates. Note these costs are particularly conservative and should be considered at the top-end of likely cost.	[redacted]
Connections	Enabling works at connections, modifications to existing systems, heating substations, controls etc.	[redacted]
DHN	Buried network pipework and trench costs. Includes allowance for permitting and traffic management	[redacted]
Archaeology / Heritage / Design Risk	Uplifts for archaeological risk, heritage constraints, spatial constraints etc.	[redacted]
Additional Costs	Testing & commissioning, design fees, preliminaries, overheads & profits	[redacted]
Contingency	15% contingency rate	[redacted]
	Total	[redacted]

[redacted]

[redacted]

4.10.4.1 Optimism Bias

The unique challenges related to installing a heat network in the historic and space-constrained Cambridge City Centre create an additional factor of risk for the project. Whilst challenging to quantify exactly, discussions with cost consultants have enabled estimated cost uplifts to be applied to certain capital cost categories in order reflect the increased chance of cost overruns due to additional design requirements, programme delays, unexpected constraints or otherwise. Additional mark-ups in specific areas of risk have been applied as detailed in Table 4—23. A cautious approach has been taken in these assumptions to avoid optimism bias.

A baseline contingency of 15% has been included in the cost schedule as detailed in Section 4.10.4. In the experience of the project team this contingency alongside the additional risk-related cost uplifts provides a sufficient buffer and layering in further contingency through optimism bias would exceed realistic levels and likely render the project undeliverable.

Table 4—23 Preferred option capital costing additional risk factors

Network component	Design risk mark-up	Reasoning
Energy Centres	5%	Advised by Currie and Brown. Whilst we have RIBA Stage 2 designs for mechanical and electrical, there is also archaeological risk associated with the Midsummer Common and Parkside Pools energy centres, and BT Exchange is still pending structural review. Ongoing discussions with Planning for Parkside Pools energy centre may lead to specific heritage design treatments for Parkside which remain to be fully determined.
Network	12.5%	Advised by Currie and Brown given the high level of archaeological uncertainty in Cambridge. If a sensitive area is discovered the contractor will be required to pause construction and the relevant authorities notified. What might have been machine excavated in a day could take several days if not weeks to clear (by specialist archaeological team). The contractor will likely be entitled to an extension to the programme (at no extra cost to themselves) and the client / developer may have to fund the specialist dig. Additionally, GPR surveys are required particularly in areas known as highly constrained with utilities from C2 records, with many of the roads very narrow. The project may in some cases need to find alternative, potentially longer, routes.
Counterfactuals / Connections	10%	Advised by Currie and Brown given the uncertainties around archaeology (the Cambridge Archaeology Unit, responsible for 75% of the archaeological digs undertaken in the city-centre to date, identified that College land for the pipe routes should be limited as much as possible). In addition, this uplift incorporates some allowance for the challenges around working with highly constrained, listed buildings. The designs are also less developed on these sites as the project team have not had access to private utility plans for route proving or carried out RIBA 2 connection designs at this stage.
Midsummer Common Pump Station	10%	Estimated given the further design development and likely increased costs required for the civils works on the riverbank.

4.10.5 Fuel Costs

The quantity of fuel import has been determined based on an hourly energy balance model over four time slices. Table 4—24 and Table 4—19 summarise the network operation over these time slices. Network operation has been modelled to stay constant in the base-case following the Phase 2 time slice.

Fuel costs include allowances for primary network losses and parasitic (pumping) requirements.

Fuel import rates have been applied based on the Green Book Central forecast for Commercial/Public Sector, including Climate Change Levy (CCL). See Appendix O for more details. Due to this forecast fuel import rates are indexed over time in alignment with expected future electricity cost reductions. Note that as based on the Green Book forecasts the fuel costs also include associated standing charges.

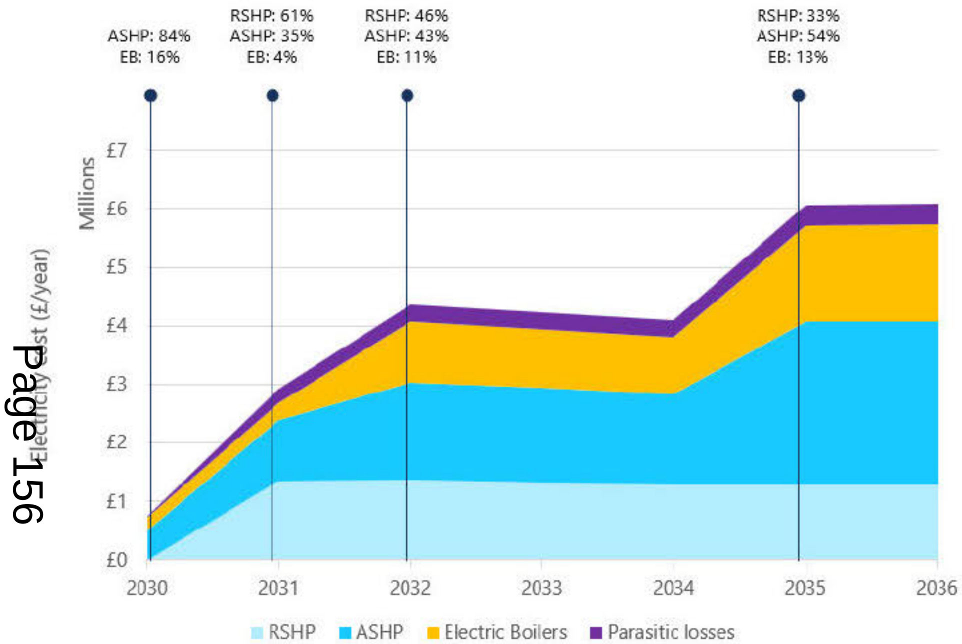


Figure 4—19 Preferred option fuel import cost trajectory, including heat fraction contribution from each heat generation technology

Table 4—24 Preferred Option electrical consumption and fuel import cost

Electrical consumption item	Unit	Phase 1.1 (2030)	Phase 1.2 (2031)	Phase 1.3 (2032)	Phase 2 (2035)
RSHP	*MWh/year*	0	8,058	8,429	8,442
ASHP	*MWh/year*	3,003	6,189	10,296	18,187
Electric Boilers	*MWh/year*	1,391	1,743	6,420	10,730
Parasitic losses	*MWh/year*	172	1,532	1,846	2,312
Total electrical consumption	*MWh/year*	4,566	9,464	18,562	39,670
Total electrical import cost	*£/year*	£759,000	£2,927,000	£4,364,000	£6,076,000

4.10.6 Operation & Maintenance

Operational costs include costs incurred for the operation and maintenance of the network and its associated plant. For plant and infrastructure these have been based on a combination of recommendations from suppliers, previous project experience and industry best practice. Additional costs have been included for metering & billing of the heat network and ongoing business admin/staffing expenditure. A more detailed breakdown of O&M cost assumptions is provided in Appendix O.

4.10.7 Replacement costs

Replacement costs are the costs incurred to replace equipment at the end of its operational life expectancy. Replacement costs have been assumed to reflect full replacement of the plant / infrastructure and are therefore assumed to be equal to the capital costs, excluding any additional fees and contingency. A summary of the assumed plant life expectancies and replacement costs over the project lifetime is provided in Appendix O. All replacement costs are included and budgeted for within the 40-year Business Plan.

4.10.8 Commercialisation

Commercialisation costs for the initial design and development of the project have been included in the TEM, with the model start date reflecting the first year of commercialisation. A [redacted] capital fee has been assumed based on previous experience from similar scale heat network projects. This cost is incurred over the first two-years of project development. [redacted] of this commercial funding requirement has been assumed available through the GHNF grant funding (see below) – the source of the remaining [redacted] will depend on the delivery model chosen and has been included in the model as a project cost.

4.10.9 GHNF

The Green Heat Network Fund (GHNF) is deemed a critical funding source for this project. As such, careful consideration of the GHNF gated metrics was made through the development of the Economic Case. Table 4—25 summarises the gated GHNF eligibility metrics that were considered and how the Business as Usual, low carbon counterfactual and Preferred Option perform against these. The assessment shows that the low carbon counterfactuals would be unlikely to be eligible for the Green Heat Network Fund, whilst the Preferred Option passes all eligibility criteria.

[redacted]

The project will target a formal application in the Spring 2026 window, which is expected to be highly competitive. Initial engagement with Triple Point (DESNZ appointed delivery partner for the current phases of the GHNF) has indicated that the uniquely diverse Strategic Partner group, very high decarbonisation potential and ambition and scale of the CCCHN project is expected to empower the bid and place the project in a strong position for application success.

Table 4—25 Core gated metrics for the GHNF

Metric	Description	Applicable to CCCHN	Business as Usual	Low carbon counterfactual	Preferred Option
Carbon gate	100gCO2e/kWh thermal energy delivered to customers	Yes	Fail – 215gCO2e/kWh	Pass – 57gCO2e/kWh in 2030, decreasing over time	Pass – 58gCO2e/kWh in 2030, decreasing over time
Customer detriment	Domestic and micro-businesses must not be offered a price of heat greater than a low carbon counterfactual for new buildings and a gas/oil counterfactual for existing buildings	Yes	Pass	Pass	Pass – heating price does not exceed the equivalent cost of low carbon counterfactual heating
Social IRR	Projects must demonstrate a Social IRR of 3.5% or greater over a 40-year period	Yes	N/A	Expected Pass	Pass – unfunded Social IRR of 15.5%
Minimum Demand	For urban networks, a minimum end customer demand of 2GWh/year. For rural (off-gas-grid) networks, a minimum number of 100 dwellings connected.	Yes	Fail - many connections below 2GWh/year annual demand	Fail - many connections below 2GWh/year annual demand	Pass – 7.7GWh/year heating demand in 2030, rising to 73.0GWh/year by 2035
Maximum CAPEX	Grant award requested up to but not including 50% of the combined total commercialisation + construction costs (with an upper limit of £1million for commercialisation)	Yes	N/A	N/A	Pass – [redacted]
Capped Award	The total 15-year kWh of heat/cooling forecast to be delivered will not exceed 4.5 pence of grant per kWh delivered	Yes	N/A	N/A	Pass – for the purposes of the TEM and FM [redacted]
Non-heat/cooling cost inclusion	For projects including wider energy infrastructure in their application, the value of income generated/costs saved/wider subsidy obtained should be greater than or equal to the costs included.	N/A	N/A	N/A	N/A

4.10.10 Social IRR

The Social Internal Rate of Return (SIRR) assesses at the overall return value of a project to society, both economically and socially. It considers the full range of costs and benefits, both private and social, associated with a project. The SIRR is calculated in much the same way as the financial IRR, except that it instead considers both the private and social costs and benefits over the lifetime of the project.

$$Social\ IRR = Economic\ IRR + Carbon\ Abatement\ Value + Air\ Quality\ Damage\ Cost$$

To calculate the SIRR the costs and benefits are measured against the counterfactual where the proposed project is not implemented. As with a financial IRR, the SIRR is expressed in monetary terms. Therefore, to calculate the SIRR, it is first necessary to put a monetary value on all the relevant costs and benefits. The social benefits included are:

- **Air quality damage costs** - The Green Book supplementary guidance1 provides air quality damage costs from primary fuel use in pence per kilowatt hour. These are used to evaluate the impact of the change in air quality of a proposed heat network
- **Carbon abatement value** - The Green Book supplementary guidance provides guidance on the value to society in saving one tonne of carbon. Therefore, the net social impact on carbon emissions can then be given a monetary value using DESNZ carbon prices. This can be used to compare the carbon emissions associated with supplying heat through the counterfactual heating technology and the proposed heat network.

4.10.11 TEM Results

Disclaimer: Prospective information for revenue, capital expenditure and operating costs have been derived from information provided by different sources. Buro Happold does not accept responsibility for such information. Buro Happold emphasises that the realisation of the prospective financial information is dependent upon the continued validity of the assumptions on which it is based. Buro Happold accepts no responsibility for the realisation of the prospective financial information; actual results are likely to be different from those shown in the prospective financial information because events and circumstances frequently do not occur as expected, and the difference may be material.

All results presented are pre-tax, pre-inflation, pre-funding and exclude business rates. Please refer to the Financial Case (Section 5) for a detailed breakdown of the project's financial performance.

4.10.11.1 Cash Flow

Table 4—26 shows a summary of the project cash-flow and key economic metrics as modelled in the TEM. Presented costs / revenues are undiscounted (excluding NPV)

Table 4—26 Preferred Option TEM cashflow summary

Parameter	Unit	Preferred Option – Pre-GHNF	Preferred Option – Post-GHNF
Commercialisation costs	£	[redacted]	
Capital costs	£	[redacted]	
Replacement costs	£	[redacted]	
Operation and maintenance costs	£	[redacted]	
Fuel costs	£	[redacted]	
Grant funding	£	-	[redacted]
Heat sales	£	[redacted]	
Connection charges	£	[redacted]	
Total costs	£	[redacted]	
Total revenues	£	[redacted]	[redacted]
NPV at 40-years	£	[redacted]	[redacted]
Discounted payback	£	[redacted]	[redacted]
IRR	%	**3.2%**	**10.2%**
LCOH	p/kWh	**18.0**	**16.4**

[redacted]

Figure 4—20 shows the cashflow of the project over its 40-year lifetime. The NPV of the network both with and without funding is also indicated. This indicates a positive cashflow over time and a return on investment over the project lifetime, with the funded option paying back within 12 years.

[redacted]

161

4.10.11.2 Costs Comparison versus Counterfactual

Table 4—27 compares the techno-economic costs of the heat network proposal versus the blended low carbon counterfactuals scenario. Costs are presented as real 2025 values and are linked to the programme dates.

Even prior to GHNF grant funding the cost of heat in the Preferred Option case is a discount on the modelled blended counterfactuals scenario.

Table 4—27 Preferred Option vs Counterfactual cost comparison

Scenario	Capex	Fuel Costs	Fixed Costs (OPEX & REPEX)	Levelised Cost of Heat (LCOH)
Description	The upfront expenditure required to design, procure, construct and commission the heat network and its associated assets before any revenue is generated. Undiscounted rate.	The average forecasted fuel costs associated with heat generation	The ongoing cost required to operate, maintain, and manage a heat network once it is built and commissioned. Also includes replacement costs for network components at expected end of useful life. Undiscounted rate	LCOH is the cost per unit of useful heat delivered (p/kWh), including CapEx, OpEx & RepEx over the 40-year Business Plan, using Green Book discount rates. Excludes Green Heat Network Fund (GHNF) grant.
Preferred Option	£117.5m	£5.5m per year (average rate over 40-years)	£1.2m per year	[redacted] [redacted]
Counterfactuals [1]	£88.1m	£6.2m per year	£3.7m per year	19.4 p/kWh[1]

[1] Total low carbon counterfactual costs incorporating alternative technologies agreed with partners per connection. Estimates are conservative, based on standardised build costs.

4.10.11.3 Carbon

The Preferred Option has been assessed for its carbon emissions against the low-carbon counterfactual case and the simplified Business as Usual scenario. Green Book long-run marginal commercial/public sector grid carbon factors have been assumed, in alignment with the GHNF assessment criteria.

The results indicate that over the project lifetime, the Preferred Option achieves a 96.8% carbon reduction versus the Business as Usual, a marginal improvement over the 96.6% reduction modelled in the low carbon counterfactual. This is based on 100% electrified solution and the scenario with transition gas is presented later in Section 2.11.13.

Table 4—28 Preferred Option TEM carbon summary

Parameter	Unit	BAU	Low Carbon Counterfactual	Preferred Option
40-year carbon emissions	*tonCO2e*	546,000	18,700	17,400
Emissions reduction vs BAU	*tonCO2e*	-	527,300	528,600
Emissions reduction vs BAU	*%*	-	96.6%	96.8%
Annualised carbon factor	*kgCO2e/kWh*	0.215	0.007	0.007

Figure 4—21 shows the emissions of the network over the lifetime of the project versus the low-carbon counterfactual and Business as Usual. Emissions of the Preferred Option ramps up early on as more loads connect to the network, then decrease over time in alignment with the expected decarbonisation of the grid. This is closely aligned with the low-carbon counterfactual scenario given the overall similarities in technology mix (heat pumps and electric boilers) and full electrification.

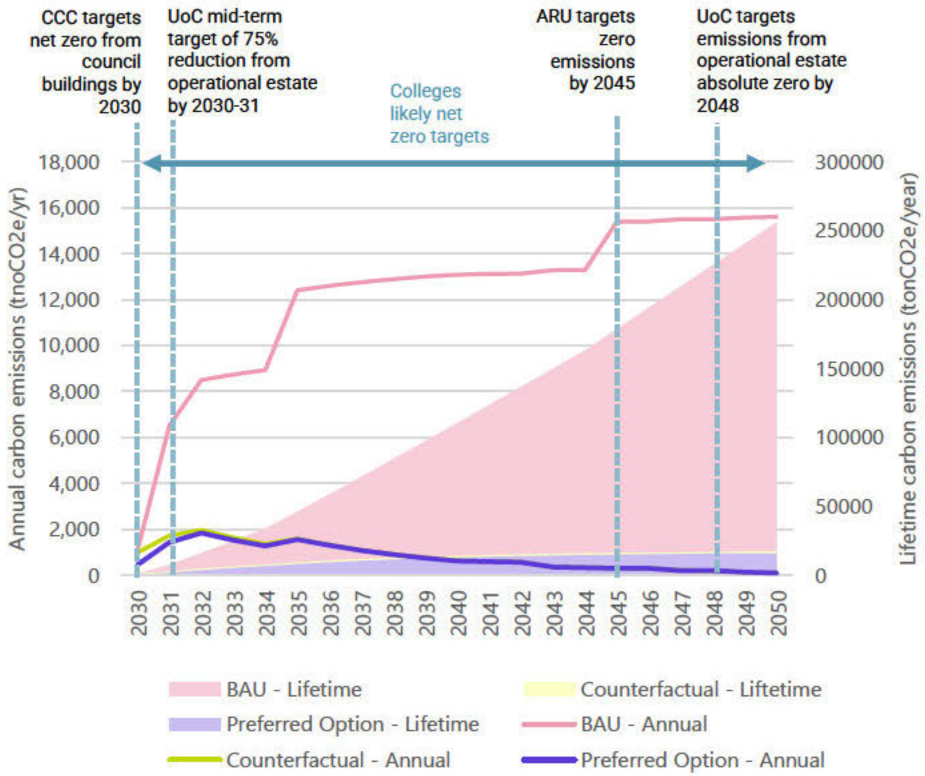


Figure 4—21 Preferred Option TEM carbon trajectory vs the BAU

As highlighted at the beginning of Section 4.10, the carbon savings detailed here reflect the original 'Ambition' Preferred Option scenario with full electrification of heat supply through electric boiler top-up. For details of the carbon reduction impact from the transitional gas-boiler-based updated Preferred Option see Section 4.10.13.

4.10.11.4 Social Impact

The 40-year social NPV and IRR of the Preferred Option are shown against the economic NPV and IRR in Table 4—29.

The social IRR comfortably exceeds the 3.5% threshold set in the GHNF eligibility criteria.

Table 4—29 Preferred Option TEM social impact

Parameter	Units	Preferred Option – Pre-GHNF	Preferred Option – Post-GHNF
NPV	*£m*	[redacted]	[redacted]
IRR	*%*	[redacted]	[redacted]
Social NPV	*£m*	[redacted]	[redacted]
Social IRR	*%*	**15.2%**	**25.2%**

4.10.12 Sensitivities

Sensitivity analysis has been carried out on a series of key input parameters and heat network scenarios in order to understand the key opportunities for both betterment and risk to the CCCHN. Based on the outcomes of the analysis the base-case can be refined at future development stages.

4.10.12.1 Key Input Sensitivities

Various sensitivities have been assessed to stress-test the proposed solution across key input parameters and understand the robustness of the business case. The following TEM input parameters have been modelled at ranges of +/- 10/20/30%:

- Capital costs
- Fuel costs
- Connection charges
- Variable heat tariff
- Fixed heat tariff
- Annual heat demand (inc. primary network losses)
- Primary network losses
- Heat pump efficiencies
- Variable heat tariff & Fuel costs (assuming increases or reductions in fuel costs are passed through to customers.

The sensitivity of the model to key inputs has been tested by changing each input in turn and assessing the impact on the NPV. The tornado chart shown in Figure 4—23 shows the impact on NPV of changing the key inputs listed above, for the Preferred Option scenario inc. GHNF contribution.

The purpose of undertaking this analysis is to establish which variables are key to project performance, and therefore which need particular management focus in order to mitigate future risk.

Table 4—30 provides comments on the impacts of each of the sensitivity changes and contextualises them with the expected heat network operation.

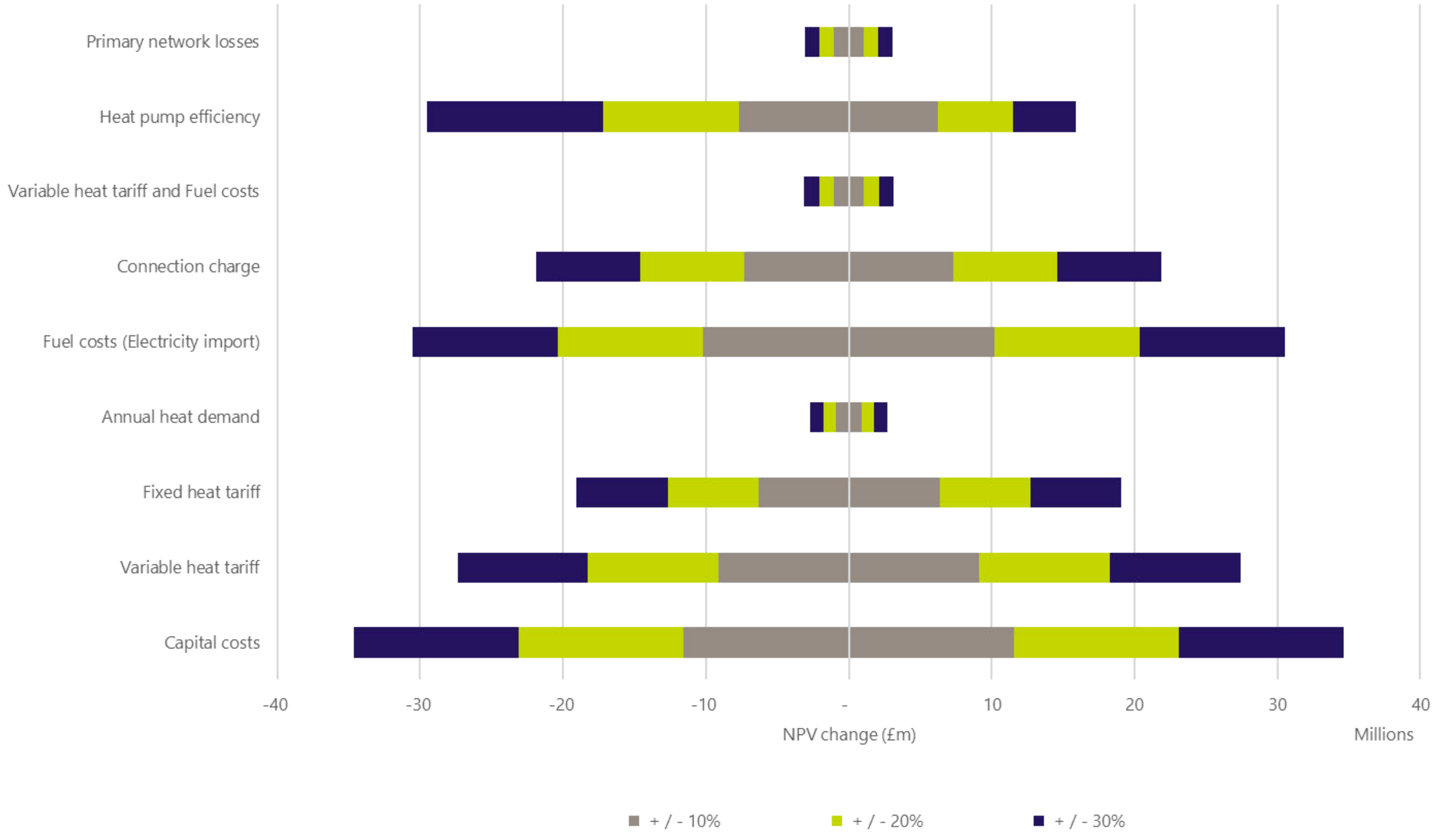


Figure 4—22 Techno-Economic modelling key input sensitivity testing – NPV impact

Table 4—30 Techno-Economic modelling key input sensitivity testing analysis – ordered in descending NPV impact

Input sensitivity	Variable change	NPV impact	IRR impact	Sensitivity IRR	Comment
Capital costs	+10%	-11.5	-4.7%	5.5%	Influential factor impacting the project economic performance. This is largely due to the high costs associated with three separate energy centre buildings. The model has aimed to include sufficient contingency to mitigate the risk of excess capital costs, whilst reductions may be identified through betterment opportunities.
	-10%	+11.6	+9.7%	19.9%	
Fuel costs	+10%	-10.2	-2.9%	7.3%	Very significant impact. In practice positive/negative impacts to electricity costs are likely to be passed through to customers, see 'Variable heat tariff and Fuel costs' sensitivity. However, although from a project perspective this mitigates cost impact, the reality is that the investors are likely to also be the customers and therefore will not be insulated from the impact of volatile fuel costs.
	-10%	+10.2	+2.5%	12.7%	
Heat pump efficiency	+10%	+6.3	+1.6%	11.8%	Reductions to heat pump SCoP has a very significant impact, whereas increases are less influential. Decreasing heat pump efficiency proportionally increases total electricity costs more than increasing efficiency reduces them due to the presence of the electric boilers.
	-10%	-7.6	-2.1%	8.1%	
Variable heat tariff	+10%	+9.2	+2.3%	12.5%	Significant impact. There is some discount in the variable tariff at present, however increasing tariffs beyond the low carbon counterfactual may impact GHNF eligibility criteria, whilst decreasing would likely result in insufficient IRRs.
	-10%	-9.1	-2.6%	7.6%	
Connection charge	+10%	+7.3	+5.1%	15.3%	Significant impact. Noting the base-case offers customers a 5% discount on the low carbon counterfactual, there may be scope to slightly increase the connection charges if customers are willing to commit to connection at a higher rate.
	-10%	-7.3	-3.3%	6.9%	
Fixed heat tariff	+10%	+6.4	+1.6%	11.8%	Fairly significant impact. Increasing tariffs beyond the low carbon counterfactual may result in break of GHNF eligibility criteria, whilst decreasing would likely result in insufficient IRRs.
	-10%	-6.3	-1.7%	8.5%	
Primary network losses	+10%	-1.0	-0.2%	10.0%	Very limited impact. Primary losses make up a very small contribution to network costs.
	-10%	+1.1	+0.3%	10.5%	
Variable heat tariff and Fuel costs	+10%	-1.0	-0.2%	10.0%	Limited impact due to the relative balance between heat sales and fuel costs. With fuel costs and heat tariffs coupled benefits/drawbacks are passed through to the customers. This suggests the network is not particularly susceptible to volatile energy markets provided that this is built into the final tariff structure. However, as referenced above the project investors are also likely to be customers themselves therefore any passed through cost will ultimately still have an impact on their energy costs.
	-10%	+1.1	+0.3%	10.5%	
Annual heat demand	+10%	+0.9	+1.2%	11.4%	Limited impact. This is due to the relative balance between heat sales revenue and fuel costs. However, it should be noted that this sensitivity models reduced annual demand of connections, however, does not reflect removal of connections – customers choosing not to join the network would also impact connection charges and fixed rates, which would make this impact grow much more significant.
	-10%	-0.9	-0.9%	9.3%	

4.10.12.2 Sensitivity Scenarios

Further standalone sensitivity scenarios have been modelled on the Preferred Option to understand the impact that specific modifications to the network design and modelling might have on the economic viability. These sensitivity scenarios can be either advantageous, offering opportunity for betterment of the Preferred Option, or disadvantages, representing a risk to project deliverability. Note all report NPVs and IRRs include GHNF grant at a 2.35p/kWh capped award rate.

Betterment

Sensitivity analysis outcomes for the defined betterment scenarios are summarised in the following table.

Table 4—31 Betterment sensitivity scenarios

Sensitivity scenario	Description	NPV impact	IRR impact	Sensitivity IRR	Comment
Energy centres phasing swap	Swapping the phasing of the Midsummer Common and BT Exchange energy centres, delaying the high efficiency RSHP heat generation in exchange for postponing capital expenditure.	-£0.2m	+1.0%	11.2%	Due to the applied discount rate, in terms of IRR, delaying the capital cost of the more expensive Midsummer Common energy centre and pumping station outweighs the efficiency impact of moving from RSHP to ASHP for several of the early years of operation. However, it should be noted that there is considered to be greater commercial risk of utilising the BT Exchange energy centre in Phase 1 compared to the Midsummer Common energy centre.
Ammonia ASHP	Replacement of lower efficiency natural refrigerant ASHPs with a higher efficiency ammonia counterpart (274% vs 241% efficiency), noting risk of toxic gas leakage.	+£5.6m	+1.4%	11.6%	This scenario offers a direct heat generation efficiency improvement vs the base-case. However, the modelling does not include any capital cost uplifts for more costly ASHPs or design to mitigate refrigerant leakage risk – in practice this would reduce the positive NPV impact. It would be recommended to investigate practicality of this technology further in the commercialisation stage.
UKPN grid connection cost reductions	Reduced primary reinforcement costs from £5.7m to £2m, noting a potentially conservative estimate was assumed in the base-case TEM.	+£4.3m	+3.3%	13.5%	Direct capital cost reduction in Phase 1.1 has significant IRR impact.
	Procurement of an Independent Distribution Network Operator (IDNO) to work with an Independent Connection Provider (ICP) to reduce connection costs and adopt power network infrastructure for an asset value.. Assumed 30% reduction in contestable works.	+£6.4m	+5.5%	15.7%	Direct capital cost reduction in Phase 1.1 has a significant IRR impact.

Sensitivity scenario	Description	NPV impact	IRR impact	Sensitivity IRR	Comment
	Postponement of primary grid reinforcement costs to Phase 2, assuming sufficient capacity is available to deliver Phase 1.	+£1.0m	+2.1%	12.3%	Postponement of primary grid reinforcement costs reduces the NPV cost of this capital outlay.
	All of the above betterment opportunities.	+£10.2m	+13.6%	23.8%	An ambitious cost reduction scenario for the UPKN connection costs has the potential to greatly improve lifetime IRR.
Thermal storage optimisation	Optimised thermal storage charging schedule, exploiting reduced spot prices overnight to offset more costly heat generation during peak demand hours – retained base-case 160m^3 thermal storage capacity.	+£1.6m	+0.5%	10.7%	Introduction of smart thermal storage control utilising Time of Use (ToU) electricity tariff fluctuations has the potential to reduce annual electricity costs by ~1.7% at full network build-out by prioritising thermal storage charging at times when grid import is cheapest and discharging when it is most costly. This does not require additional infrastructure beyond the base-case and is therefore a clear betterment opportunity, although the economic benefit is uncertain and relatively minor.
Additional thermal storage capacity – 2 potential locations identified	As above, optimised thermal storage with a total of 300m^3 capacity, with the additional located at a satellite location.	+£2.7m	+0.4%	10.6%	Expansion of thermal storage capacity through an additional satellite thermal storage location comes with an associated capital cost (~£0.9m uplift) for the additional infrastructure, however the optimised charging regime nevertheless provides an economic benefit over the base-case (~£6.8m electricity cost saving from a 3.7% reduction at full build-out). It should be noted that there is limited benefit from the additional thermal storage capacity beyond the 160m^3 scenario above in terms of IRR uplift. However, the lifetime NPV performance is marginally superior, and additional thermal storage capacity does come with further potential benefits to network resilience and peak shaving potential. As above, the economic benefit is uncertain as it relies on appropriate flexible tariff availability.
	As above, optimised thermal storage with a total of 500m^3 capacity, with the additional located at a satellite location.	+£3.3m	+0.2%	10.4%	Addition of a further satellite thermal storage location requires a total capital uplift of ~£1.9m beyond the base-case, however results in lifetime electricity import reductions of ~£9.3m (5.4% at full build-out) beyond the base-case. Again, there is limited benefit from the additional thermal storage capacity beyond the 160m^3 scenario above in terms of IRR uplift. - there may be opportunity to improve this through reducing number of satellite locations for combined storage site (thereby reducing capital uplift). The lifetime NPV performance is nonetheless improved, and additional thermal storage capacity comes with further potential benefits to network resilience and peak shaving

Sensitivity scenario	Description	NPV impact	IRR impact	Sensitivity IRR	Comment
					potential. As above, the economic benefit is uncertain as it relies on appropriate flexible tariff availability.
Gas boiler peaking-plant	Replacement of the proposed electric boiler plant with new gas boilers for entire project lifetime, noting this does not achieve full degasification ambitions of Strategic Partners.	+£30.3m	+27.0%	37.2%	Utilisation of new gas boilers as the peaking plant results in a significant capital cost reduction, in large part due to the avoided UKPN grid connection costs. Similarly, ongoing fuel costs are reduced by replacing the electric boiler contribution by much cheaper gas boiler generation. It should be noted that this scenario does however impact carbon reduction potential, reducing the emissions reduction from ~97% to ~84% vs the BAU.
	Replacement of the proposed electric boiler plant with new gas boilers for first 15-years of operation only, after which they are replaced by electric boilers at expected end of project life (noting that boilers used for peaking only may be able to have their operation extended beyond brochure life expectancy, however will be transitioned out regardless due to the importance of eventual electrification)	+£11.7m	+22.3%	32.5%	Utilisation of gas boilers as a transitional peaking technology has a significant positive impact on lifetime economic performance. Decreased fuel import costs in the first 15-years of operation from the relatively cheap gas consumption result in improved cashflow, whilst delaying major UKPN grid upgrade cost leads to discounting of the capital requirement and reduces risk associated with securing such a large grid connection in the early years of the project. It should be noted that incorporating gas may increase the risk associated with GHNF application. Incorporating gas boilers as a transitional technology does however slightly impact carbon reduction potential, reducing the lifetime emissions savings from ~97% to ~93% vs the BAU. This still represents a massive saving over the business as usual. The results of the Financial Case indicate that from a financial perspective the deliverability of the base-case electric boiler top-up scenario is marginal. In light of this and due to the comparatively favourable economic performance of this gas boiler transitional scenario, a **decision has been taken to re-baseline the Preferred Option to prioritise the development of this transitional option in subsequent sections of the business case**. The drivers behind this decision and analysis of the techno-economic impact are detailed further in Section 4.10.13.
Heat network infill	Connection 10% additional city centre heat loads without expansion of the heat generation infrastructure. Assumed cost uplift to buried network and connection costs relative to the	-£1.5m	+1.1%	11.3%	Heat network infill offers a betterment to project IRR at the cost of lifetime NPV. This is due to the increased early project revenue from additional connection charges, which outweighs capital cost from network expansion and the impact of higher boiler heat fractions over

Sensitivity scenario	Description	NPV impact	IRR impact	Sensitivity IRR	Comment
	increase in connected load, as well as additional connection charge revenue.				the project lifetime. This impact is exacerbated as more load is added across the sensitivity scenarios.
	As above, but 20% additional heat loads connected	-£4.0m	+2.4%	12.6%	In reality, infill connections should be looked at on a case-by-case basis as the impact will be a function of proximity to the network (i.e. capex) as well as the revenues through connection charges and heat sales, all of which will vary in each case. A more detailed study would be recommended – prioritising major heat demands identified through the zoning study.
	As above, but 30% additional heat load connected	-£7.0m	+4.1%	14.3%	
Electricity retail price	Utilising the High Green Book electricity retail price projection instead of Medium (42.7p/kWh vs 18.8p/kWh in 2022 rates). Impact applied to both fuel costs and heat sales rate.	+£13.9m	+3.1%	13.3%	Increase in electricity costs increases the fuel import costs to the network, however the costs are also passed through to the customers through an inflated heat sales rates (an increase from 10.9p/kWh to 28.5p/kWh in 2025 rates). The increase in revenues has a greater impact on the network's economic performance than the increase in fuel costs. Although the impact on economic performance is a betterment, the greatly increased tariffs to customers could make connection unappealing.

Risks

Sensitivity analysis outcomes for the defined project risk scenarios are summarised in Table 4—32.

Table 4—32 Risk sensitivity scenarios

Sensitivity scenario	Description	NPV impact	IRR impact	Sensitivity IRR	Comment
GHNF capped award	[redacted]	[redacted]	[redacted]	[redacted]	Direct reduction in capital grant revenue at start of construction.
	[redacted]	[redacted]	[redacted]	[redacted]	Direct reduction in capital grant revenue at start of construction.
Programme delay	Network operation start-date delayed by 2-years, Phase 1.1 begins 2032. Phase 2 remains 2035. Commercialisation remains in 2027/28, with delay	-£0.5m	1.7%	11.9%	Reduction in NPV due to reduced revenues, which outweigh reduced fuel import costs. However, delays in capital expenditure from construction of the network result in an improvement in IRR due to the discounting of costs.

Sensitivity scenario	Description	NPV impact	IRR impact	Sensitivity IRR	Comment
	assumed to occur between commercialisation and construction.				
Climate change impact	Annual heat load reduction over project lifetime as based on potential climate model temperature reduction forecasting.	-£0.2m	-0.4%	9.8%	Climate change impact has been modelled as a 0.9% annual year-on-year decrease in heat demand to 2050, at which point this reduction falls to 0.3%. The negative economic performance impact is a result of the decreased heat sales revenues over the project lifetime, which outweigh the decreased electricity import costs for running the network. Overall, the impact is relatively minor.
Alternative MVP connections scenarios	Project progresses to Phase 1.1 only	-£48.9m	Negative IRR	Negative IRR	Project performs very poorly due to high costs and low revenue. Reduced linear heat density (6.5 MWh/m) and high capital costs associated with the Parkside Pools energy centre, as well as low GHNF potential. Ongoing cashflow is only just positive.
	Project progresses to Phase 1.2 only	-£26.0m	-8.5%	1.7%	Project performs very poorly due to high costs and low revenue. Reduced linear heat density (7.4 MWh/m) and high capital costs associated with the Parkside Pools and Midsummer Common energy centres, as well as low GHNF potential.
	Project progresses to Phase 1.3 only	-£17.0m	-6.0%	4.2%	Project performs poorly due to high costs and low revenue. Reduced linear heat density (7.4 MWh/m). Much of the benefit of Phase 2 comes from infill of the network with high density heat loads, which drives linear heat density up to 8.9MWh/m and enables GHNF grant award to be maximised.
	[redacted]	[redacted]	[redacted]	[redacted]	Project performs very poorly due to the decreased load density and revenue opportunities. Costs dominated by Parkside Pools energy centre.
	[redacted]	[redacted]	[redacted]	[redacted]	Project performs poorly due to the decreased load density and revenue opportunities. Costs dominated by Parkside Pools energy centre.
More conservative CAPEX scenarios (noting base-case already accounts	Revisiting of capital costs to incorporate potential further risk associated network build-out in the Cambridge City Centre. This manifests through selection of 'high-risk' network segments to which is applied a dig-cost uplift, increase in	[redacted]	[redacted]	[redacted]	Project performs poorly due to the additional [redacted] capital costs. This could potentially be partially mitigated through additional revenues (e.g. tariffs, connection charges) or potentially additional funding request through GHNF.

Sensitivity scenario	Description	NPV impact	IRR impact	Sensitivity IRR	Comment
for significant project risk)	design risk associated with customer connections and an uplift in controls costs.				
	As above but applied to the 15-year interim gas boiler peaking plant scenario described in Table 4—31. *Economic impacts adjacent are relative to the base-case electric boiler scenario.*	+£3.9m	+8.5%	18.7%	Project performs strongly due to decreased electrical import costs during first 15-years of operation and delayed UKPN costs despite the £14.5m increase in capital costs compared to the base-case.
Electricity retail price	Utilising the Low Green Book electricity retail price projection instead of Medium (12.5p/kWh vs 18.8p/kWh in 2022 rates). Impact applied to both fuel costs and heat sales rate.	-£1.6m	-0.3%	9.8%	Reduction in electricity costs reduces the fuel import costs to the network, however the savings are also passed through to the customers through reduced heat sales rates (a reduction from 10.9p/kWh to 7.1p/kWh in 2025 rates). The reduction in revenues has a slightly greater impact on the network's economic performance than the reduction in fuel costs. Although the impact on economic performance is slightly negative, the reduction in tariffs to customers could result in a more attractive scheme and greater commercial interest.

4.10.13 Preferred Option: Update - Transitional Gas Boilers

This section outlines the key drivers for switching the Preferred Option from an electric-boiler only top-up scenario to an interim gas boiler top-up (first 15-years of network operation), as well as a comparison showing the techno-economic impact.

4.10.13.1 Ambitious vs Transitional Preferred Option

Following engagement with the Strategic Partners, consideration of delivery models, sensitivity testing and financial analysis of the Preferred Option, a decision has been taken to update the Preferred Option. The update is defined by a switch from the 'Ambitious Preferred Option' detailed in Sections **Error! Reference source not found.** and 0 to a ' Transitional Preferred Option', with the key adjustments being:

- Installation of gas boilers instead of electric boilers as the initial network peaking/back-up plant.
- Interim operation of these gas boilers for 15-years until expected end of life, following which they are replaced with electric boilers as per the original Ambitious Preferred Option scenario.

As referenced in the sensitivity analysis in Table 4—31, the Transitional Preferred Option benefits from reduced fuel costs over the first 15-years of the project (due to the lower relative cost of gas vs electricity), whilst delaying the capital intensive and time sensitive grid connection costs required for electric boiler peaking plant until later in the project life. This derisks the scheme from both a technical perspective (lower risk of delayed connection due to UKPN/National Grid lead-times) and an economic perspective (discounting of capital cost over time and potential cost savings from delayed grid connection).

The impact on carbon savings is marginal, with the Transitional Preferred Option still delivering 92.7% carbon savings (506,000 tonCO_2e) compared to the Business as Usual heating strategy of the proposed connections over the 40-year project life, which is comparable to the 96.8% carbon savings (529,000 tonCO_2e) from the original Ambitious Preferred Option.

The requirement to update the Preferred Option has been driven by the financial deliverability of the project, with the analysis in the Financial Case demonstrating the challenge in balancing both customer and investor viability in the Ambitions Preferred Option base-case.

4.10.13.2 Assumptions

The Transitional Preferred Option involves a direct swap of electric and gas boilers at initial project build-out. Technical changes to the proposed scheme are localised at the Parkside Pools Energy Centre.

For the purposes of the techno-economic modelling, the following assumptions have been made:

- Required boiler capacity & heat fractions does not change vs the base-case.
- The energy centre has sufficient space for interim gas boiler installation (£2.3m including flues and ancillaries), which is later replaced by electric boilers in 2045.
- £1.5m cost assumed for a local gas connection (requires validation with Cadent)
- The required electrical capacity is available (inc. grid upgrades) for transition to electric boiler top-up in 2045. Total cost is equivalent to base-case (£14.4m), but with proportion delayed until gas boiler replacement date.
- Gas import costs aligned with DESNZ Green Book retail price trajectory.
- **No changes to connection charges and heat tariffs vs the base-case –** costs to customers remains anchored to a full-electric counterfactual as per Section 4.10.3. It is recognised that a re-baselining may be required to set an alternative, lower heat tariff across the first 15-years of operation (2030-45) to reflect gas contribution in the counterfactuals. For this stage of analysis, revenues remain unchanged for a direct comparison of the economic impact on costs only, however in the Financial Case potential reductions in connection charges and heat tariffs are investigated.
- **GHNF funding remains at [redacted]/kWh** of 15-year delivered heat – in practice, IRR limitations may throttle the total funding available from the GHNF. This potential impact is assessed in the Financial Case where funding is reduced to 2.1p/kWh to ensure the project pre-grant IRR remains within an acceptable range.

4.10.13.3 TEM Results

Table 4—33 shows a comparison of the project cashflow and key economic metrics of the Transitional Preferred Option vs the Ambitious Preferred Option base-case. Presented costs / revenues and undiscounted (excluding NPV).

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]		
[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]		
[redacted]	[redacted]	[redacted]		
[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

In

Figure 4—23 it can be seen that despite the large capex requirement in 2045, the reduced early capex and fuel costs result in significantly greater cashflow over the first 15-years of network operation – this highlights the significant improvement in NPV vs the original electric boiler base-case scenario over the 40-year project lifetime.

[redacted]

4.10.13.4 Carbon Impact

The Transitional Preferred Option has been assessed for its carbon emissions against the Business as Usual and Ambitious Preferred Option base-case.

The results in Table 4—34 demonstrate that although the interim gas boiler operation results in more than double the operational carbon compared to the fully electrified counterpart, this is nevertheless a comprehensive reduction of 93%, or 506,000tonCO_2e, over the 40-year project lifetime vs. the Business as Usual.

The carbon factor of the project in the year 2030 is 76gCO_2e/kWh, which remains well within the 100gCO_2e/kWh GHNF carbon gate eligibility criteria.

Given the significant economic benefits detailed in Section 4.10.13.3, the relatively minor reduction in carbon savings is considered an acceptable trade-off in the Preferred Option whilst still satisfying the overarching long-term decarbonisation ambitions of the business case.

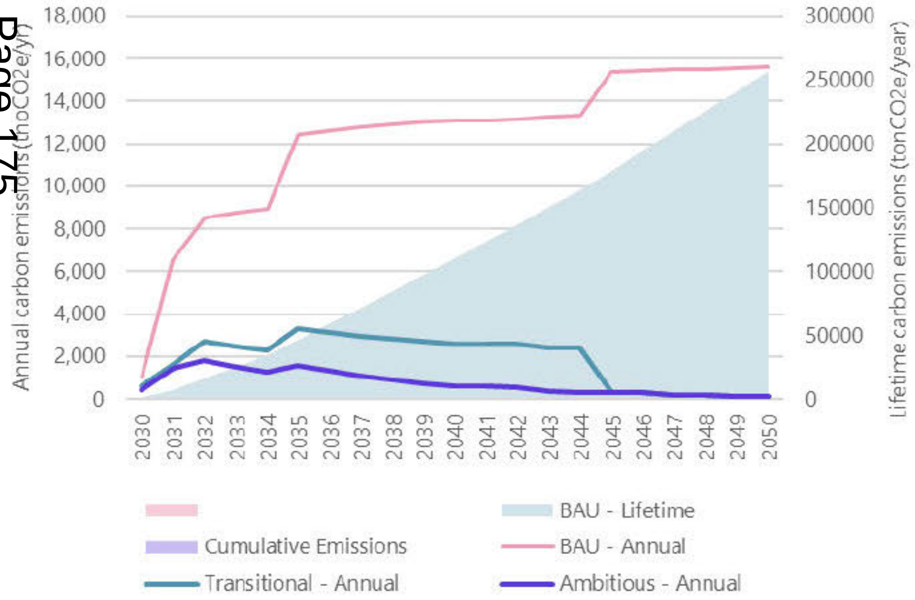


Figure 4—24 Ambitious vs Transitional vs BAU carbon trajectory for first 20 years

Table 4—34 Ambitious vs Transitional vs BAU carbon summary

Parameter	Unit	BAU	Ambitious Preferred Option	Transitional Preferred Option
40-year carbon emissions	*tonCO2e*	546,000	17,400	39,900
Emission reduction vs BAU	*tonCO2e*	-	528,600	506,100
Emissions reduction vs BAU	*%*	-	96.8%	92.7%
Annualised carbon factor	*kgCO2e/kWh*	0.215	0.007	0.016

4.10.13.5 Social Impact

The 40-year social NPV and IRR of the Transitional Preferred Option are shown against the economic NPV and IRR in Table 4—35 – the Social IRR remains well-within GHNF minimum thresholds of 3.5%, and actually represents an uplift vs the fully electrified case due to the improved economic performance of the scheme, which outweighs the decrease to carbon abatement/air quality improvement.

Table 4—35 Transitional Preferred Option TEM social impact

Parameter	Units	Transitional Preferred Option – Pre-GHNF	Transitional Preferred Option – Post-GHNF
NPV	*£m*	[redacted]	[redacted]
IRR	*%*	[redacted]	[redacted]
Social NPV	*£m*	[redacted]	[redacted]
Social IRR	*%*	**20.5%**	**47.9%**

5 Commercial Case

5.1 Procurement & Commercial Strategy

Amberside Advisors has developed a commercial case through several workshops with the Council and Strategic Partners, ascertaining the key drivers for the project. The aspects of the commercial case that have been developed through this process are the **commercial structure**; the ways in which the project can be structured for viability and to secure the procurement strategy necessary for delivery, the steps towards financial close. The **funding options** for the Council and Strategic Partners (both public sector and private sector), the **recommended procurement strategy** and next steps after the completion of the OBC.

The initial commercial workshop in February 2025 contextualised and explained the pros and cons of the range of commercial models available to the Council and Strategic Partners, exploring roles and responsibilities as well as understanding the impact of the different levels of control, risk and reward enabled by each commercial model. The first workshop agreed a short-list of commercial models which included a Concession, Co-investment Joint Venture, and a Local Authority-led model. The second commercial workshop in November 2025 brought together the conclusions of the work on the Techno-Economic Model and overview of potential funding options to determine the preferred structure. This was agreed to be a 51:49 Co-investment Joint Venture between Cambridge City Council (51%) and some Strategic Partners (49%), [redacted] This structure would be supported by a Design, Build, Operation and Maintenance (DBOM) partner to be procured from private sector specialist suppliers by the JV. The JV would also likely need to hire an experienced leadership team to manage the DBOM contract, discharge the duties of the Heat Network Company in line with Ofgem regulation and deliver the strategic aims of the investors through the operations of the Heat Network Company.

During these workshops and the surrounding work, extensive stakeholder engagement has been conducted with all Strategic Partners including: Cambridge City Council, the University of Cambridge, 17 City Centre University of Cambridge Colleges, and Anglia Ruskin University. The Strategic Partners have been involved throughout the development of the project, agreeing the Critical Success Factors of the project in January 2025 and feeding into the decision-making process. These Strategic Partners will form the initial group of customers of the heat network (and all customers envisaged in the Minimum Viable Product are Strategic Partners), and the recommended commercial structure divides this group into Investing Strategic Partners [redacted] and Non-Investing Strategic Partners [redacted]

5.1.1 Commercial Strategy

In recognition of the Council's role as lead facilitator, and ability to access public financing, the risks, reward and control have been evaluated primarily from the Local Authority's perspective, with recognition of prospective third-party investor and developer perspectives. In the first Commercial workshop, Amberside presented the spectrum of commercial structures available to the Council for a heat network project and discussed openly the Council's preferences with regards to risk and control. The relative risk, reward and control levels refer to those of the Council predominantly, and secondly to the other investing Strategic Partners in the Co-investment option. Figure 5—1 provides a high-level overview of these commercial models in relation to risk, reward and control, showing that typically as control increases so do the levels of risk and reward, though it should be clear that this is indicative, relative, and is ultimately dependent on contractual agreements. Other commercial models are sometimes used but were not raised in the commercial workshops and will not be covered here. The models exist on a spectrum and are not necessarily mutually exclusive – for example, a Joint Venture (JV) partnership is often procured under concession regulations and may include Concession Agreements (see below for a summary of Concession Agreements).

The six delivery models in Figure 5—1 can be grouped into three archetypes:

- Private Sector Led – the private sector typically designs, builds, finances, operates and maintains the project, with limited to no Council involvement during operations
- Public Private Partnership – the Council either tenders a Concession, has a "special/golden" share or ordinary shares in the project company and a seat on the board
- Public Sector Led – the Council independently delivers the project, either setting up a Special Purpose Vehicle (SPV) to own and operate the heat network or owning and operating the heat network in-house

Page 177

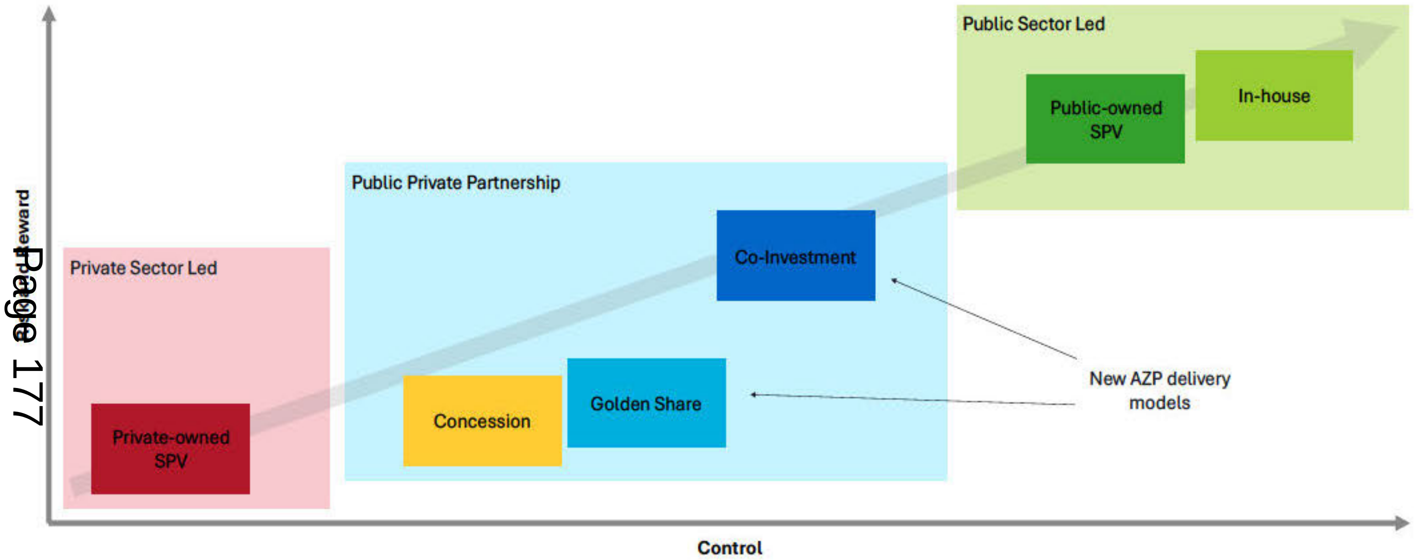


Figure 5—1 Commercial Delivery Model Overview in relation to risk, reward and control

Having discussed these commercial structures with Cambridge City Council and the Strategic Partners, the key takeaways and thus the Critical Success Factors (CSFs) for assessing the recommended commercial structure were as follows:

- Primary CSFs
    - Help decarbonise individual Estates whilst enabling potential future heat network expansion
    - Provide cost-competitive and reliable low carbon heat – offer low carbon energy that is better value over contract lifetime against counterfactual(s), provide long-term reliability and as a minimum, provide heat supply availability in line with industry standards
- Secondary CSFs
    - Maximise social value and education

    - Minimise disruption and share the benefit from construction across the city
    - Showcase sustainability leadership and innovation

The first commercial workshop in February 2025 established that the Strategic Partners were seeking a level of control in project delivery which ruled out the Private sector-owned SPV and Joint Venture Golden Share approaches. The three commercial models shortlisted after the first commercial workshop in February 2025 were as follows:

- Concession
    - Often an off-balance sheet option to mitigate capital expenditure limitations on public sector bodies through a Public Private Partnership
    - Such an agreement allows the Strategic Partners to hold a private sector developer to account on key contract requirements (e.g. cost competitive tariffs, resilience and futureproofing)
    - The Council can take ownership of the network at the end of the Concession period
    - The public sector brings the baseload (as a customer) but does not need to provide a shareholding
    - There can be limited control and restrictions as per agreed commercial arrangements
- Joint Venture: Co-investment
    - The Strategic Partners can take a more influential role in the development of the heat network to meet CSFs
    - Co-investment could reduce investment requirement from the Council and funded with support from NWF
    - The model also brings some potential financial returns for the Council and investing Strategic Partners but in return for taking risk (in normal commercial circumstances
- Public Sector-Led: Public Sector-Owned SPV
    - This gives the Council control but also all the risk and capital costs
    - This model requires the Council to have capacity to run an energy company (a regulated utility) with the commercial and operational management expertise, working capital, and administration and governance resources
    - It could be funded with support from NWF
    - An SPV provides an easier exit strategy, potentially following completion of Minimum Viable Product (MVP)
    - Ultimately, the Council expressed their concerns regarding full risk exposure, stating a preference for a shared risk model such as a Joint Venture. As such, the wholly Public Sector-led model was not taken forward beyond the workshops.

5.1.2 Shortlisted commercial delivery models

A: Concession

Under a concession delivery model, the project sponsor typically grants a private sector supplier (concessionaire) an exclusive right to provide services within a defined area and period (the Concession period) through a Concession Agreement. In return, the concessionaire usually designs, constructs, finances and operates the heat network according to the Agreement. Importantly, the concessionaire takes on the financial risk of generating an acceptable IRR.

In normal circumstances, Concession agreements are tendered by a Sponsor, typically the council (although an alternative approach could be applied to the CCCHN Strategic Partners). The sponsor may set out the extent of the heating services to be provided though the concession agreement, including performance standards, heat tariffs and heat offtakers. Meanwhile, the concessionaire finances the project, recouping its investment through income generated from customer connection charges (usually determined by the private sector supplier) and heat sales.

The concessionaire may source funding from third parties and/or public sector grant schemes but must take on the financial risk associated with developing the network. This approach may require the sponsor to undertake more development work prior to going to market to prove the viability of the scheme. This is because it is taken on by the private sector.

The Council can establish controls through the terms of the Concession Agreement, including a performance regime to ensure the concessionaire is delivering services to an appropriate standard, price controls and profit-share mechanisms. The Concession Agreement will also define the terms under which it may be renewed, extended or terminated. Upon expiration or early termination of the Concession Agreement, there can be mechanisms for step-in and/or asset hand-back procedures, with responsibility and ownership (depending on the structure) usually reverting back to the council. This process is usually subject to a retendering event.

This approach suits the Council in that it allows the Council a level of control over key matters through the Concession Agreement without the need to be actively involved in delivery, provide funding and take on risk for the project during the Concession period (though the assets typically revert to the Council upon expiration and there may be some profit share mechanism). However, it provides less control for the Council and Strategic Partners than a Joint Venture.

Indicative structure diagrams and pros and cons tables are included in Appendix U.

High-Level Case Study – Queen Elizabeth Olympic Park (QEOP) and Stratford City Community Energy Network

Structure: Concession Agreement between Olympic Delivery Authority (plus sponsoring real estate company(s)) as the Supervisory Body and ENGIE (nee GDF-Suez), under a 40-year agreement to design, finance, construct and operate the energy scheme.

Why was this structure chosen?

The structure allowed QEOP and Stratford City meet their heat demand by ENGIE's >£100m investment in time for London 2012, achieving competitive energy prices and facilitating carbon reduction targets.

Key Contracts and Agreements

Under a concession, there are several key agreements that the sponsor (assume the Council in this instance) will have to enter into with the incoming ESCo, as the project sponsor and as a major customer. The key contracts are detailed below:

- Concession Agreement – this lets the opportunity. It includes standard representations and warranties, concession obligations (i.e. details of the design, build, financing, operation and maintenance services to be provided), a performance regime and appropriate property rights and licences e.g. a form of lease for an energy centre and easements for networks with titleholders.
- Connection Agreement(s) – this would be between the ESCo and customers (e.g. colleges) for any given connection and will cover the physical connection of the heat network to a block requiring heat supply sometimes including adoption of internal Secondary.
- Supply Agreement(s) – energy and heat can be supplied to different types of customers through Supply Agreements, including commercial customers (e.g. colleges), and as the network grows extended to bulk customers (e.g. private student accommodation), domestic customers and Residential Social Landlords (RSL). Supply Agreements will typically include terms relating to the heat supply and ancillary services, such as the provision of heat to be made available within the operating parameters and typically aligned to Heat Trust Scheme Rules (to be replaced by Ofgem Regulations in 2026) for residential (and microbusiness) customers.

B: Joint Venture: Co-investment

Under a traditional Co-investment model, the sponsor partners with a delivery and funding partner (or partners) to develop the heat network proposed. The sponsor and delivery and funding partner(s) co-invest – either capital or contributions in kind – in a new Energy Services Company (ESCo), which may also take on third-party debt and/or seek grant funding to improve project economics. The new ESCo is the owner of the heat network assets and is responsible for the design, construction, financing and operation of the heat network. The financial returns (or losses) are shared according to the parties' respective equity investments.

The shareholders and ESCo will be governed by a Shareholders' Agreement which outlines rights and obligations of the parties involved. It will allocate voting rights and board representation, specify a list of Reserved Matters, detail rules for the transfer of shares and outline procedures for exiting or dissolving the Joint Venture.

Several alternative approaches have been explored by the project team under the Joint Venture Co-investment model. There are two key points of differentiation: 1) whether the Joint Venture partner has heat network development expertise and capability, 2) whether the Council has an overall majority (and therefore control). The specific Joint Venture Co-investment structures considered are:

- Joint Venture with private sector developer (funding and delivery Joint Venture)
- 50:50 Joint Venture between Council and Strategic Partners (funding Joint Venture)
- 51:49 Joint Venture between Council and Strategic Partners, with Council as majority shareholder (funding Joint Venture)

The Critical Success Factors determined that the lowest customer tariffs were preferred. The Strategic Partners agreed that in order to secure control on tariffs, the preferred Joint Venture structure would see a combination of Strategic Partners as equity investors. It was considered that a Developer-Investor would be motivated to offer competitive tariffs, not necessarily the lowest possible and may have a higher cost of capital. Council involvement could help the project to access alternative sources of capital including National Wealth Fund debt. As such the preferred Joint Venture structure would require the Council to have a simple majority ownership of the Joint Venture, to access the best terms from NWF, so a 51:49 Joint Venture with the Strategic Partners was selected for further analysis.

The Joint Venture model offers more control to the Council and Strategic Partners but requires greater buy-in of the expertise to deliver the project – from procurement through to operation. This can be framed as the cost of control and is explored further in the preferred option section.

Indicative structure diagrams and pros and cons tables are included in Appendix U.

Key Contracts and Agreements

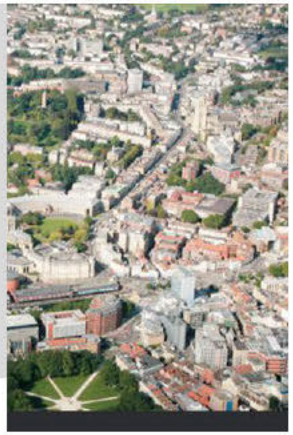
Under a Joint Venture, the joint venture partners need to create two entities, one responsible for the delivery of the network and an operating entity with which customers will contract. Under the proposed model, both Design & Build and Operation & Maintenance services would be sub-contracted, so separate contracts will be required under this model. The key contracts are detailed below:

- Joint Venture Agreement – to define the collaboration between two or more shareholder entities to lead the heat network project, share risks, and pool resources for the project. This is required for each legal entity established under the JV. Establishes the contract between a company's shareholders detailing their rights and obligations, ensuring clarity over long-term governance.
- Connection Agreement(s) – this would be between the project special purpose vehicle and individual customers for any given connection and will cover the physical connection of the heat network to a block requiring heat supply (as set out above under 'Concession')
- Supply Agreement(s) – as set out above under 'Concession'
- Services contracts with ESCo supply chain including design, build, operate, maintain and replace, metering and billing and any other specialist subcontractors (and relevant advisors) which will likely include a performance regime which will govern performance requirements (and KPIs). This may also include a specialist PMO function to provide management services.

High-Level Case Study – Bristol City Leap

Structure:

- City-wide Strategic Energy Partnership procured by Bristol City Council (BCC)
- 50/50 Joint Venture between Ameresco and BCC to deliver >£500m investment in energy infrastructure and efficiency projects
- Vattenfall Heat UK acquisition of Council-developed Bristol Heat Network assets (and staff transfer) with retained Golden Share
- 20-year Concession governing projects including expansion of heat network across BCC estate



Case Study – Newcastle Regenerate Partnership (2018 close)

- Transaction value: Up to £500m capital expenditure (40-year Partnership to develop)
- Newcastle City Council procured ENGIE Group as its strategic energy delivery partner. The procurement anticipated a wide range of services, primarily (but not limited to) district energy schemes, with the first scheme to be the development, delivery and operation of the Science Central (Helix) scheme. This is a circa £20m CHP-gas scheme supplying heat, cooling, and private wire to the surrounding Council, University, and L&G office developments for the initial phase (with further growth since).
- Helix was delivered pursuant to that partnership under an AssetCo SPV (majority owned by Council) to fund and own the assets, which then lets the services contracts through a SupplyCo SPV. This reflected the respective roles, risk allocation, and level of funding (including European Regional Development Funding, and Local Growth Deal funding through the NE LEP) provided by each of the parties.
- This is also an example of a multi (more than 2) party Joint Venture. The number of parties made governance and decision-making exponentially more challenging. The shareholders and the JV require separate advisors (e.g. legal) to avoid conflicts of interest. This means transaction time and costs are inevitably significantly higher, as well as the ongoing financial and commercial management of the SPV itself.
- This example also used an unbundled structure between Asset holder and the operational/supply vehicle. This has several ringfencing benefits including ultimately the ability for AssetCo to change the operational/supply provider.
- A key lesson learned is that simplified structures are more efficient – in this example, it would have more efficient for the AssetCo to contract to the 100% private ESCo (rather than JV SupplyCo SPV). It is also especially important to ensure that risk allocation is determined and agreed specifically between the parties, especially in relation to potential construction period overspend.

5.2 Funding options

5.2.1 Public Sector Funding Options

Inherently, heat network schemes require significant amounts of upfront capital costs. Thus, it is likely that, regardless of whether the Strategic Partners or a Third-Party ESCo would be financing the project, some public funding is likely to be needed to support the project to keep the cost of capital affordable to energy users. There are several different public sector-specific funding options available to the Council. However, the key schemes that will have the greatest chance of success and will have the greatest impact on the market attractiveness of the project are the Green Heat Network Fund (GHNF) and the National Wealth Fund (NWF).

5.2.2 Green Heat Network Fund (GHNF)

The GHNF is a multi-year £485 million capital grant fund (succeeding the £320m Heat Network Investment Project) that supports local authorities and energy companies with the construction and commercialisation costs associated with heat networks. It is designed for new low and zero carbon heat networks, as well as the retrofitting and expansion of existing heat networks. GHNF has several gated metrics to provide funding, the most relevant for this project to consider are:

- Carbon gate – The carbon intensity of the network must be no greater than 100gCO2e/kWh of thermal energy delivered. However, there is a 5-year grace period, and so phasing should be considered accordingly.
- Capped award –whilst the official guidance from GHNF states that 4.5p of grant/kWh delivered (over the first 15 years of operation) is the upper end of the total grant that can be received, the latest guidance indicates that due to significant competition for the scheme, [redacted]
- For the purposes of modelling the options in the Economic Case an assumed GHNF grant of [redacted]/kWh has been used – this was refined through later modelling to a capped award of 2.1p/kWh, as used in the Financial Case.

To make a competitive application, delivery risks should be mitigated and win themes clearly identified. Based on a thorough analysis of the guidance for Round 10 and the feedback at the round 10 application guidance webinar, the following actions can be taken to ensure the best chance of success (in order of importance):

- Thoroughly engage with heat sources and customers early and communicate expected tariff structures to secure Letters of Support or Heads of Terms. Early engagement demonstrates project deliverability and mitigates demand risk. This quality of stakeholder engagement is assessed on a 1 – 11 scale.
    - This is a strength of the proposed project as all customers are Strategic Partners who have been heavily involved in the development of the project up to its current stage. There is an opportunity to submit a very well supported GHNF application with extensive Letters of Support from Strategic Partners. This could be strengthened further by securing agreement to indicative Heat Supply Heads of Terms but this is not essential to a successful GHNF application.
- Know where funding for remaining capital costs comes from. Round 10 has introduced additional emphasis on where the funding for the remaining 50% of commercialisation and construction funding comes from, and there is an additional section in the Main Application Form that specifically asks for information on funding sources. Soft market testing can help to identify funding sources.
    - There has already been a high level of engagement with the NWF, and the building in of this funding source to financial modelling work is beneficial to this element of the application.
- Flag technical or commercial risks that may affect the development of the proposed network and take convincing steps to mitigate them. This should be fed into the GHNF risk register. Evidence of successful engagement with landowners/rights holders where pipe passes through can really help to mitigate risks (e.g. highways etc).
    - Again, engagement and support from the Strategic Partners, who will also be landowners of significant portions of the area the network covers, supports risk mitigation here, as does additional engagement undertaken
- Market Transformation Commitments are increasingly important to GHNF applications. Sharing the lessons learned during the commercialisation and development of the heat network is vital.
    - This is where integration of the CSF around maximising social value and education is particularly important, and this condition should be supported by the University of Cambridge's standing as an educational institution combined with its role as a Strategic Partner of the project.
    - Work already underway includes developing the Proof of Concept for a Heat Network Digital Twin as a strategic solution, which builds upon both the strength of the Strategic Partnership and Cambridge's academic prowess with two leading universities - University of Cambridge and Anglia Ruskin University.
- Understand the strategic and commercial value of your heat network. DESNZ are looking to fund ambitious projects with significant expansion opportunities and future connections that enable zonal-scale heat networks. It is recommended that the optional evidence "2.2 Future expansion potential note" is completed.
    - The separate Zoning Study has identified extensive growth opportunities for the network which align well with this part of the GHNF requirements, which is likely to help strengthen an application.

The Council could apply for the grant directly and pass it on to the development vehicle through a Provisional Award mechanism or allow a chosen investor to apply on their behalf. There are pros and cons of each approach, however given the potential time constraints for getting the application submitted, the Council applying themselves would be the preferred route. This amount could then be on-granted to the project vehicle.

5.2.3 National Wealth Fund (NWF)

Formerly UKIB, the National Wealth Fund has allocated £4 billion for local authority projects across 5 key areas including clean energy. This includes a specific District Heat Network strategy (published in 2023) seeking to address policy risk, revenue risk, market immaturity and project economics (especially in relation to the balance between electricity and gas prices). In the development of this Outline Business Case, the opportunities presented by National Wealth Fund loans to local authorities at concessional rates have been considered extensively. Additional products offered by NWF include a Connection Fee and Secondary Works facility and (for private-sector-led projects, patient equity).

The minimum ticket size for a loan from the National Wealth Fund is £15 million for Local Authorities, offered for up to 50 years, and £25 million for Private Sector entities.

Any Connection Fee facility would also require a minimum drawdown of £15 million but is based on a shorter-term tenor and associated gilt rate (understood to be 5-10 years).

An Early-Stage Debt Facility is also available which helps to overcome key barriers such as construction/ramp-up risk and reliance on connection charges by providing repayment flexibility until revenue streams are sufficiently stable to service the debt.

Page 184

In developing the outline business case, the concessional rate offered to local authorities to on-lend to projects in which they hold a majority equity stake has been assumed at Gilts + 40bps.

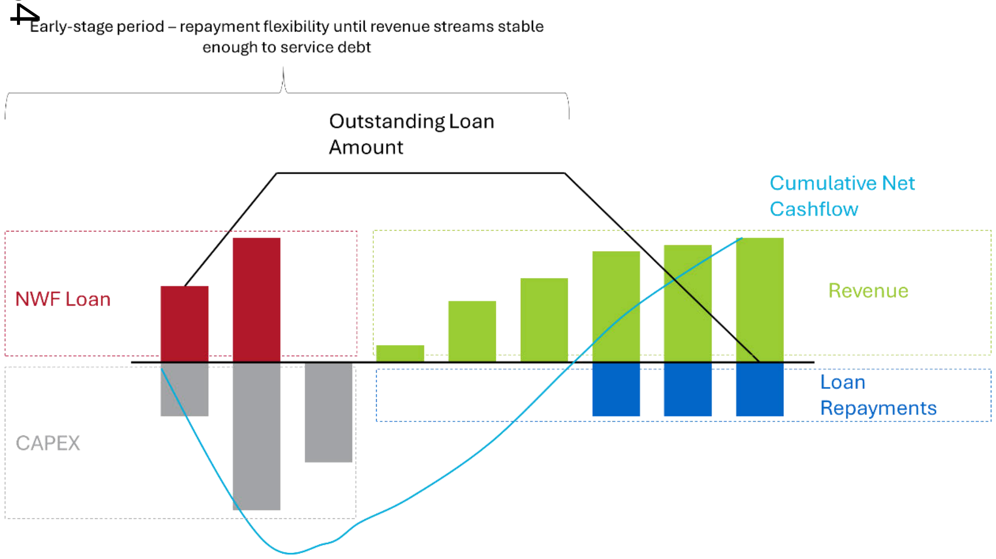


Figure 5—2 National Wealth Fund Flexible Debt Model

5.2.4 Private Sector Funding Options

Heat networks have traditionally been funded off the balance sheet of large industrials (e.g. ENGIE, E.ON, SSE, Veolia). However, heat networks have increasingly begun to attract different forms of equity-led project finance, including infrastructure fund-backed development platforms like DIF (via Hemiko), Asper (via 1Energy) and Partner Group (via Gren).

If the Strategic Partners decided ultimately to progress with a Concession structure, this would be targeted towards a 'utility' partner that can provide both investment, development and delivery capability such as those referred to above, which whilst there may be some overlap, is a different population to those who operate as contractors under D&B (and/or longer term O&M) arrangements.

5.3 Preferred Option Selection

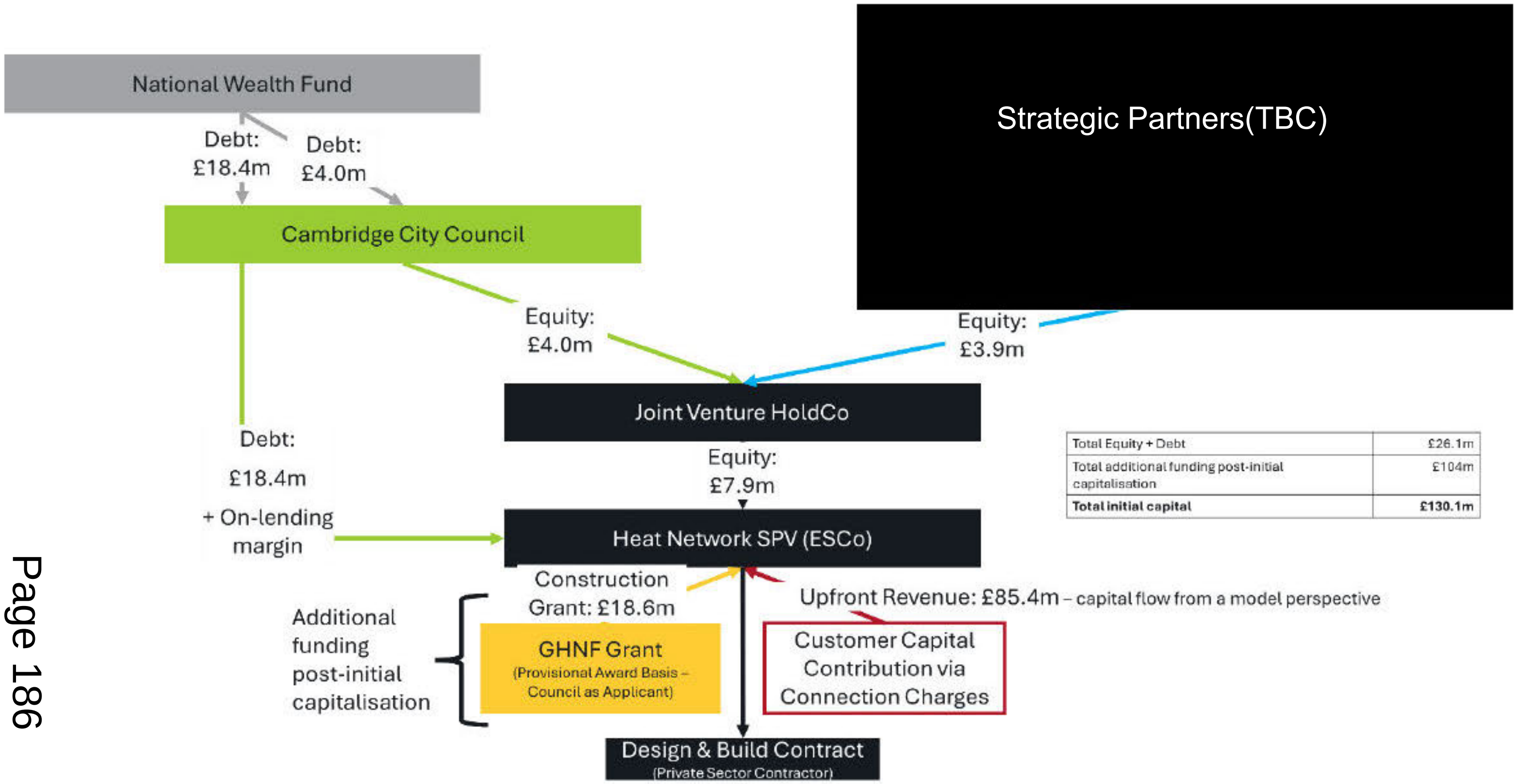
The recommended commercial approach to this project is a 51:49 Joint Venture between the Council (51%) and Strategic Partners (49%) for funding, with a developer procured through an open procurement process who will enter into an agreement with the Joint Venture to deliver the project.

A wholly Council-owned approach was ultimately ruled out as the Council would prefer not to bear sole risk and responsibility for the project, expressing a preference to share risk with Strategic Partners in particular. A Joint Venture approach is preferable to a Concession approach as it gives the Council (and Strategic Partners) more influence, by way of greater management oversight, over the project. The Joint Venture would be accountable for delivery and would transfer as much delivery risk as possible to contractors through the construction and operation of the network, however, not all delivery risks are transferable.

To secure National Wealth Fund (NWF) debt investment at Local Authority Rates, a 51:49 Joint Venture, with the Council taking the majority shareholding, is recommended – as confirmed by engagement with National Wealth Fund. It has been confirmed by the NWF that the Council would receive a loan from the NWF and the Council would have control over how it deploys that capital into the project. It is currently envisaged that part of the NWF loan would be invested by the Council as equity in the Joint Venture and the remainder on-lent (with a margin in line with subsidy control rules) directly to the SPV. It is understood that a Council majority is required in the project to enable the Council to on-lend NWF debt at public sector rates into the project. It has been established with the NWF that a 50:50 Joint Venture would not be able to secure the concessional debt rate, and a position of 'no overall control' is considered to be unhelpful to the operation of the network.

The deliverability of this structure is yet to be tested through a Soft Market Testing exercise, which is due to take place in February 2026, with results and feedback to be reported back separately. Soft Market Testing will help to increase understanding of the how the market would likely respond to the technical and commercial solution being put forward and also provide some feedback on the overall market attractiveness of the scheme. This would include feedback on the proposed contracting structure and management resource proposals.

[redacted]



Total Equity + Debt	£26.1m
Total additional funding post-initial capitalisation	£104m
Total initial capital	**£130.1m**

Figure 5—3 Indicative Capital Structure of Preferred Option

The debt funding risk is assumed to sit with the Council, which is reflected in the Council's on-lending premium.

A significant factor in considering the commercial case for the Cambridge City Centre Heat Network is the unique and differentiating involvement of the initial offtakers in the Detailed Project Development process. Regardless of the Strategic Partners' intention to invest in the project, the enabling role the Strategic Partners have played has the potential to make this project uniquely attractive to third-party investors, considering the longevity of the institutions which make up the initial offtakers and their associated creditworthiness. This is contingent however on the commitment of the Strategic Partners to be customers of the network in its initial Minimum Viable Product (MVP) stage. However, the success of the network depends on all customers connecting and therefore customer buy-in is essential. This has been expressed as an upfront capital contribution through the connection charge.

It is worth noting that regardless of structure, ultimately, the ability of the project to raise capital (equity and debt) will be largely dependent on the level of commitment of the offtakers to connect to the heat network. The strength of this commitment will support a GHNF application and make the case to prospective investors more compelling. Confidence in offtakers can enable investors to consider a reduced revenue risk, supported in this case by the long-established nature of the offtakers. There is a greater opportunity for lower connection charges and tariffs where confidence in the offtakers likelihood of connection is high.

In selecting the preferred option of a 51:49 Joint Venture, it has been noted that the project may also be deliverable through the Concession model solely by the private sector, who may approach this project differently if given the relative freedom of an output specification concession, taking into account the growth potential and level of commitment of offtakers (reduced risk to project revenues) – they may be able to reduce the capital cost requirements based on design optimisation, with a knock-on impact on the heat tariffs.

5.3.1 Potential for risk transfer

Risk transfer is applicable to all stages of project development. Each stage in project development is a point where residual risk is assessed and transferred. When allocating parties to undertake different roles of heat network project development, a key objective should be to allocate risk to those most able to manage that risk. Opportunities to manage risk include form of funding, project development time, design, operational risk.

The Design & Build Contract should include provisions to address the following categories of risk: ground conditions, consents and planning, inflation and force majeure events. The Operation and Maintenance Contract should include provisions to address operational resilience, continuity, energy procurement, management, trading and pricing strategy, disaster recovery plans, labour (and materials) inflation, lifecycle funding, energy supply, metering and billing, and customer services. There should be appropriate KPIs to assess performance and associated liquidated damages relevant to underperformance.

Commercial Risks and Opportunities

A more extensive assessment of project risks and mitigations is set out in the Management Case. The key commercial risks and opportunities identified below reflect the development work to date undertaken with Strategic Partners:

Customer Buy-in & Contributions	• The pool of customers identified are essential to the successful delivery of the project. Securing sufficient buy-in to progress the project is a key risk to the project. This buy-in is proposed in the form of the upfront capital contributions from customers (Advance Connection Charges). • There is a proposed pain/gain share structure for Connection Charges in the event of budget over/under spend to provide additional risk sharing, with some potential shared upside in the event that a managed underspend can be delivered on the construction budget. • Advance Estimated Connection Charges are positioned relative (with a discount from) the low carbon counterfactual solutions for each customer (detailed in the Economic Case). • As part of the customer buy-in balance between gas and electricity pricing must also be communicated and understood, to provide the full counterfactual costs with some context relative to the gas business as usual arrangements.
Capital Structure	• The proposed capital structure is reflective of the unique project opportunity and seeks to balance the needs of all Strategic Partners. • Concessional Rate debt investment in the project from National Wealth Fund via the Council is envisaged to reduced costs to customers. However, the risk to achieving low-cost debt in the project through this route is dependent on the on-lending margin agreed to ensure compliance with subsidy control regulations (for which further specific advice is required at the Commercialisation stage). • GHNF Grant also provides substantial funding during the construction phase, with success in securing this grant not guaranteed due to the competitiveness of the grant scheme.

Construction Budget Management	• There is a project risk of overspend, especially due to ground condition unknowns (such as archaeology). • This risk is greater as the proposed investors/sponsors are not experienced heat network developers, increasing the risk of contract management inefficiencies which would affect equity returns. • Additional costs have been included to cover expenditure on the team at an SPV level to include Non-Executive Director(s) (to provide strategic insight and guidance, a Company Director (experienced in contract management), a Contracts Manager, and an administrative and accounting team (to support both construction and operation phases). In addition, during construction, a team of consultants will support the SPV in contract specification and management, fulfilling roles such as the Employer's Engineer. • Alternative delivery models may see lower direct SPV costs for these services as developer-led equity investors bring more experience and capability to such a project. This is one aspect of the cost premium for securing long-term control of the heat network.
Contractor Risk Appetite	• Not all development risks are likely to be absorbed by the Design & Build (D&B) Contractor – unlike in a JV with an experienced Heat Network Developer where through the equity co-investment, the developer takes more risks than a contractor would usually accept. • There is a possibility that a contractor would accept additional risks, including through a pain/gain share but there would usually be a trade-off with the pricing of the contract. • The extent to which D&B contractors would be prepared to accept project risks through a fixed price contract will be further explored during the initial Soft Market Testing, and developed through the Pre-commercialisation phase
Growth Opportunities	• The Zoning Study highlights the considerable opportunities to expand the minimum viable product (MVP) network across the city and deliver increasingly strong returns to investors. This may also provide sufficient attractiveness in the market to support a partial divestment to bring in private sector expertise and capital to support a network expansion once the MVP is operational.

5.3.2 Procurement options

The preferred option requires a Design, Build, Operations & Maintenance (DBOM) contractor with provision for Metering and Billing. These contracts should be held and managed by the ESCo through the management team (FTE Director and 1 FTE Contracts Manager), supported by the consultancy team (legal, commercial, financial, technical) performing the Employer's Agent and Owner's Engineer functions (the costs for which are included in the project costs, set out in the Financial Case).

The next phase of the project (Pre-commercialisation) should establish the procurement strategy, but given the Council majority in the structure, this is likely to conform to existing Council procurement policies. The preparation of the procurement processes and subsequent contracts should consider the appropriate Key Performance Indicators (KPIs) against which the contractors work would be assessed and the milestones expected to be achieved.

5.4 Soft Market Testing Results

[redacted]

6 Financial Case

6.1 Introduction and overview

Amberside have produced a financial model in the DESNZ template to assess the affordability, funding and financial viability of the preferred project technical option and delivery model.

As the preferred technical solution included in the financial model relies on top-up heat to achieve peak heating requirements from gas boilers, the model includes the assumption that once these boilers reach the end of their useable life, they will be replaced with electric boilers to help to project reach the decarbonisation target. It is assumed through the modelling that the investment required to fully electrify the system will be delivered as a separate and lower risk equity investment (currently envisaged to be made in Year 18 of the project).

As configured, the model shows a Nominal Equity IRR of 12%, which assumes a GHNF grant is secured.

6.2 Financial Model Development

In preparation of the financial model, base assumptions were originally derived from the Techno-Economic Model (TEM) produced by Buro Happold. This provided inputs to the financial model including CapEx, RepEx, OpEx, phasing, initial tariff assumptions, demand and all technical assumptions such as Coefficients of Performance (CoPs) and efficiencies.

In developing the Financial Model, Amberside Advisors applied project-level assumptions through engagement with the Strategic Partners and macro-economic factors including SPV management costs, tax assumptions for an SPV, accounting, financing and indexation. Project revenues (fixed and variable tariffs and Connection Charges) and GHNF Grant have been revised through engagement with Strategic Partners to provide a full financial overview of the project and calculate return metrics and sensitivities.

To inform the selection of the preferred delivery model, several different options were assessed through the Financial Model (including a wholly council-owned, variations of JV structure and a Concession), for both a fully electrified solution and the gas top-up technical solution. The technical option and commercial delivery model set out in this Financial Case reflects the Preferred Options agreed with the Strategic Partners.

Key outputs from the TEM include the initial assumptions for project revenues (Connection Charges, Fixed and Variable Tariffs), GHNF grant funding, customer connections (including timing and heat demand), energy centre and network costs and useful lifetimes, heat generation and energy consumption. The TEM approach to CapEx estimates is conservative and has been supported by cost consultants. It has not yet been tested through a competitive process and therefore may not reflect fully the approach taken by a developer. The CapEx also includes a risk-related uplift on some items, and 15% base contingency applied to the total. The TEM uses counterfactuals to determine an initial benchmark for Connection Charges and tariffs.

The financial model applies macro-economic factors (such as inflation), a 4-year rolling RepEx Sinking Fund (to ensure future RepEx is paid from project revenues and supports a higher valuation at potential exit), financing scenarios and tax assumptions to derive post-tax and post-grant nominal IRR and NPV as the key return metrics for both the Council and third-party investors. It is assumed in the modelling that the project SPV will pay Corporation Tax on profits at 25% - it is recommended that specialist tax advice is taken during Commercialisation. The impact of these factors is that the Financial Model reports outputs in a different price base to the TEM, which is reflected in Table 6—1.

Table 6—1 Summary of impact of macro-economic factors and financial modelling assumptions on TEM Outputs, expressed over the 40-year project timeline

Key Metric	40-year TEM Value (Real 2025 prices, 3.5% Real Discount Rate)	40-year Inflated TEM Inputs (Nominal prices[2], 12% Nominal Discount Rate)	40-year Financial Case (Nominal Prices, 12% Nominal Discount Rate) incl. increase in OpEx per Table 6—2 and Revenues to target IRR
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]

In addition to macro-economic factors, through engagement with the Strategic Partners, the management costs for the Design, Build, Operation & Maintenance, and Metering and Billing contracts were also included in the Financial Model as show in Table 6—2 below.

Table 6—2 Additional Contract Management Costs Included in Financial Case

Construction Phase	Annual Cost (Real 2025)	Operational Phase	Annual Cost (Real 2025)
Director (FTE)	[redacted]	Director (FTE)	[redacted]
Contracts Manager (FTE)		Contracts Manager (FTE)	
Admin, Legal & Accountancy		Admin, Legal & Accountancy	
Consultant Advisors (incl. Employers' Agent, Owner's Engineer)	[redacted]	Non-Executive Director(s)	[redacted]
Non-Executive Director(s)	[redacted]		
Total (per annum)	[redacted]	**Total (per annum)**	[redacted]

The base scenario funding stack is shown in Figure 6—1 below, based on the project CapEx for the initial investment (i.e. not including the later equity investment in Year 18 to replace the gas boilers with electric boilers and associated grid upgrades). In this configuration, the project is sensitive to Connection Charge levels. Expressed as a proportion of total CapEx, the Connection

[2] The TEM outputs are produced in a Real, 2025 price base. This does not account for the impact of inflation but enables year to year comparison, based on "today's" terms. The Financial Model applies inflation as a macro-economic factor and reports outputs in a Nominal price base with values presented in absolute terms.

Charges account for [redacted] of the total, which is at the mid-high end of examples in the market, reflecting the complexities in Cambridge of conservation, planning and grid constraints and the counterfactuals.

The later investment required to cover the costs of the replacement of gas boilers with electric boilers and associated grid upgrades has been modelled to date as 100% equity. It is not possible to commit NWF to debt investment for an expenditure so far into the future, but it is likely that in delivery, any future investment would be delivered as a combination of equity and debt, subject to shareholder decisions at that time.

[redacted]

In developing an appropriate funding stack for each base scenario, it was agreed that a flexible debt product developed by the National Wealth Fund (NWF) should be included, as the Council is a potential majority investor and could enable the project to benefit from a concessional interest rate. In each base case scenario, the model uses the following key assumptions (developed through engagement with NWF representatives):

1. Debt-Equity Ratio of 70:30;
2. Loan term of 35 years;

[redacted]

4. A minimum debt service coverage ratio of 1.2, but which is optimised by scenario to 1.86 in the Financial Case;
5. Interest Rate to Council of 30-year Gilts + 40bps, in line with NWF guidance.

Within the funding stack, it is also assumed that Green Heat Network Fund (GHNF) grant is secured by the project in all base cases. The nature of low carbon heat network projects and wider project factors (cost of electricity) means that it is highly unlikely that market financial returns will be achievable without GHNF grant. Based on the experience of the project advisors and through engagement with TriplePoint, the GHNF grant assumption has been set at [redacted] pence per kWh of heat delivered over the first 15 years of the project life. This is within the gated metric cap of [redacted] pence per kWh and close to the average award value in Round 9 (2025).

The identified pool of anchor heat load customers is essential to the successful project delivery. Securing sufficient buy-in is a key project risk. This buy-in is proposed in the form of the upfront capital contributions from customers (Advanced Connection Charges). For this project, these would be payable ahead of receiving a connection, due to the unique project structure. Connection charges are usually paid on receipt of a connection. In this case, the financial model assumes they are paid ahead of the connections being provided (after Final Investment Decision, but before heat on) to balance working capital.

6.3 Financial resources & budgets

The key variable in each of the base scenarios was the deployment of NWF flexible debt. The terms of this vary depending on the ownership structure employed. In instances where the Local Authority retains a majority shareholding, a concessionary rate is available which is expressed as 30-year Gilts + 40bps. The Local Authority must comply with Subsidy Control regulations where it is on-lending to an SPV, applying an on-lending margin as necessary. Furthermore, the Council should also apply a risk premium to the debt in recognition of its perspective of the risks being taken. The Local Authority has been advised to seek separate, specialist advice as to the actual on-lending margin required to ensure compliance with Subsidy Control regulations.

For the purposes of developing model assumptions, Sharpe Pritchard shared guidance from the Subsidy Control Regulations 2022 and an on-lending margin of [redacted] has been applied to the NWF rate. The Local Authority is ultimately responsible for repaying the debt to NWF and therefore this arrangement carries some additional risk in the event the Heat Network Company (SPV) is unable to make debt repayments.

If the Local Authority does not hold a majority shareholding (>50%), NWF is prepared to lend to the project SPV at “Private Sector Rates,” which are “typically” expressed as 30-Year Gilts + 250-350bps.

The specific base scenario configurations and outputs are summarised in Table 6—3 below.

Table 6—3 Base Scenario Outputs

[redacted]	[redacted]
[redacted]	
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

The investment stack and tariff structure, alongside the targeted returns, in the base case of the Financial Model, are a result of the following revenues and costs over the project lifetime:

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

6.4 Financial risk

Extensive engagement with the Strategic Partners has identified a major risk to the CapEx overspend. The primary target of the sensitivities was to test the extent to which a Pain/Gain share could be implemented to share the costs of a CapEx overspend between the equity investors, the Design & Build Contractor and/or the customers (through the Connection Charge). This is a model which the Local Authority has deployed successfully in other capital projects. Table 6—4 below shows the proposed Pain/Gain share allocations between Key Stakeholders, and Figure 6—2 shows the likely cost implications and impact on Levelised Connection Charge for Customers.

Table 6—4 Summary of Pain/Gain Share Sensitivity Assumptions

Metric	Equal Share	Equity & Customers	Equity Only
Equity Investor Share	33.33%	50%	100%
DBOM Contractor Share	33.33%	0%	0%
Customer Share	33.33%	50%	0%
Total	**100%**	**100%**	**100%**

Table 6—5 Impact of Pain/Gain Sensitivities on Equity IRR

Metric	Financial Case	Equal Share	Equity & Customers	Equity Only
Equity IRR (40-year)	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

Figure 6—2 highlights the greater impact on the levelised heat price of the pain/gain share, if the overspend risk is shared with the customer. The impact of a maximal overspend, modelled at 30%, would potentially see an increase in Levelised Heat Price for customers in all cases, but the Equity IRR reduces significantly reflecting the shared risk. This risk sharing arrangement will be considered further in the Pre-Commercialisation Stage to refine the proposition.

6.5 Conclusions

The key findings from the financial modelling are as follows:

1. Project returns must reflect the risks taken by investors. The project revenues are the primary lever through which returns can be delivered. The Levelised Tariff has been increased through the financial modelling process to reflect the additional costs included (management team and financing) and to achieve the required investor returns.
2. The preferred option has been configured to meet the equity investors' target hurdle rate, taking account of project risk and delivering a 40-year Equity IRR of 12%.
3. Levelised Heat Price to customers remains below counterfactual equivalents as follows:

Levelised Heat Price (Nominal)	Counterfactual	Preferred Option	Variance
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
Total Levelised Heat Price (p/kWh)	[redacted]	[redacted]	[redacted]

4. Connection Charges account for a significant proportion of the capital costs (62%) – this is comparable with many heat networks (typically over 50%). Connection Charges are paid by customers without an expected return and should be compared to the upfront costs of installing a counterfactual option. The extensive pool of customers with anchor heat loads is essential to the successful delivery of the project. Securing sufficient buy-in from individual Strategic Partners to progress the project is a key project risk. Following Letters of Support at this stage, this buy-in is ultimately proposed to be the form of the upfront capital contributions from customers (Advanced Connection Charges). In this case, the financial model assumes they are paid ahead of the connections being provided (after Final Investment Decision, but before heat on) to balance working capital. Connection Charges have been set in the model to offer a reduction against counterfactual costs in the base case.
5. The funding stack includes NWF debt on-lent by the council with a margin of 3.1% to ensure compliance with the Subsidy Control regulations, also reflecting the risk to the Council as they are ultimately responsible for repaying the NWF debt.
6. A Pain/Gain share is considered by the prospective investors to offer the best risk sharing arrangement in the event of a capital cost overspend. Should a DBOM contractor be prepared to enter into this arrangement, this would offer the best compromise solution and risk sharing. [redacted]. This risk sharing arrangement will be considered further in Pre-Commercialisation Stage to help refine the proposition, to ensure it works for both investors, customers and the developer

7 Management Case

This Management Case:

1. Demonstrates the achievability of the Preferred Option and Final Business Case, ahead of Final Investment Decision in summer 2028.
2. Details how the project is being managed to ensure delivery of the forecast returns in the Financial and Economic Cases.
3. Provides a clear picture of governance and resourcing arrangements for
4. Pre-Commercialisation and Commercialisation Stages.
5. Shows how the change and stated benefits will be delivered.
6. Provides quality assurance appropriate to the project’s scope, scale and complexity.

7.1.1 Performance Overview to Date

Detailed Project Development (DPD) has produced this Outline Business Case (OBC), which summarises outputs from 18 months of work with all 21 Strategic Partners. Multiple workshops have been used to iteratively move this project forward, taking the longlist of both technical and commercial options through shortlisting, to confirm the Preferred Technical, Commercial and Funding options.

It has been a team effort, underpinned by ongoing and effective senior officer engagement. This is demonstrated by the end of year (2025) heat network survey:

- [redacted] **Strategic Partners are considering connection to the Cambridge City Centre Heat Network,** subject to formal governance approvals; local counterfactual comparisons; and Final Investment Decision.
- **Strategic Partners are willing to further consider equity investment in a** customer owned energy company. The Preferred Delivery Model is a local authority led 51/49 Joint Venture, in-principle with Cambridge City Council (lead partner), [redacted] [redacted] [redacted]

7.1.2 Current Governance Arrangements

The project has adopted the following Governance process since inception in 2023, with Cambridge City Council leading project facilitation and working closely with Strategic Partner representatives via both a Core Group (operational decision making) and a Steering Group (strategic decision making). Each Strategic Partner is responsible for their individual governance arrangements to confirm in-principle heat network connection(s) and/or equity investment in CCCHN.

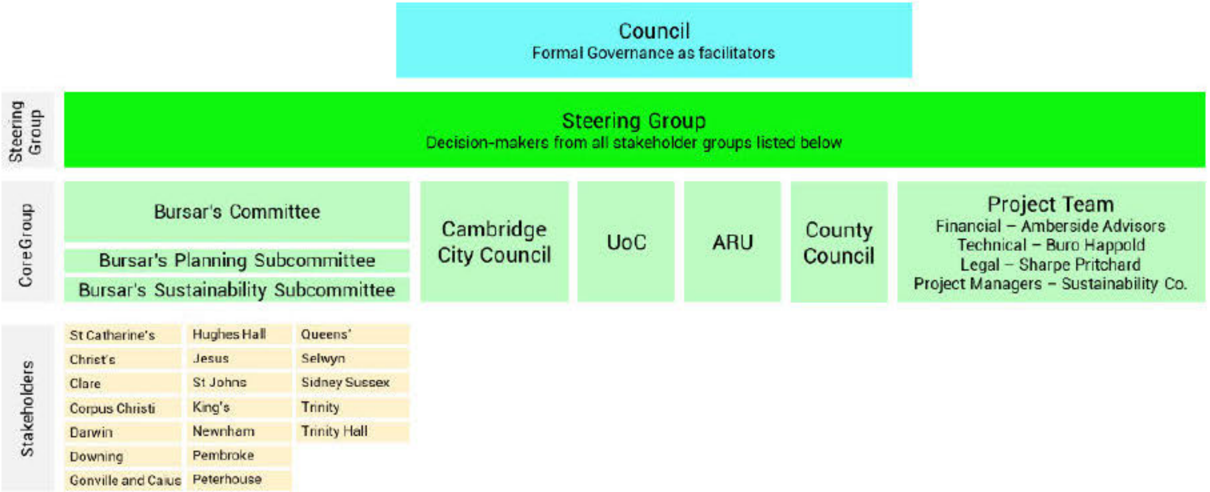


Figure 3 DPD Governance Structure

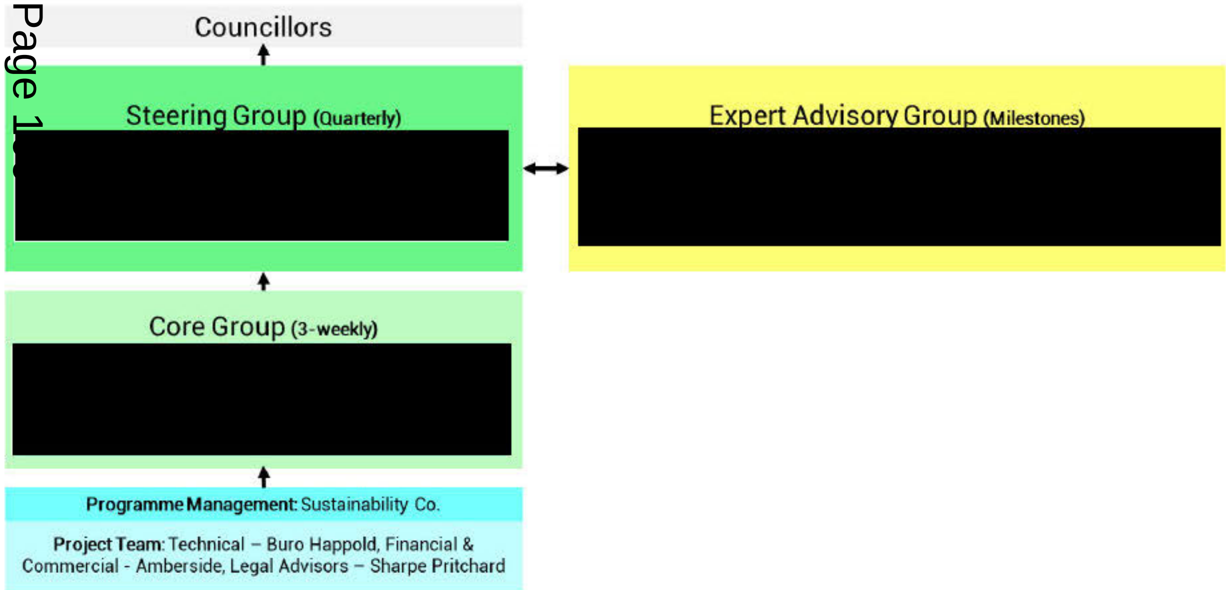


Figure 4 DPD Decision-Makers

Table 7—1 DPD Governance Meetings

	Role	Key Decisions	Reporting
Council Milestone	Project enabler, facilitation, procurement, contractor management and funding. Programme oversight and decision-making.	March 2026 – Outline Business Case Approval September 2025 – Feasibility study approval, and investment in Outline Business Case resourcing.	Formal Cabinet and Scrutiny papers. Informal Member and Ward Councillor briefing at key milestones.
Steering Group Quarterly	Strategic decision-making and approvals Formal feedback to heat network team	See Appendix D for list of decisions taken.	Quarterly report includes summary position on budget, risks and opportunities, programme, change log and benefits realisation.
Core Group 3-weekly	Operational decision making Informal feedback to heat network team on project development Provide recommendations to Steering Group		3-weekly report that includes budget, risks and programme update.
Stakeholder Consultation Milestone	Informal feedback from stakeholders and statutory consultees, with the aim of derisking the Minimum Viable Product.	OBC formal review by Strategic Partners in Q1 and Q2 2026	Minutes and Actions from five workshops informed development of the Outline Business Case: Technical Shortlisting workshop Technical Longlisting workshop Shortlisting delivery models Preferred Delivery Model workshop Funding Option workshop Formal response from Greater Cambridge Shared Planning Service to a series of three meetings with relevant statutory consultees via a Planning Performance Agreement (PPA)

7.1.3 Updated Governance Arrangements until Final Investment Decision

As the project moves from DPD into Pre-Commercialisation and Commercialisation, governance arrangements have been reviewed to align with the Preferred Delivery Model of a customer owned energy company.

This 51:49 Joint Venture between Cambridge City Council and up to 8 Strategic Partners, needs to be ready to go live at Final Investment Decision (FID) in summer 2028. Ahead of this, all potential customers and equity investors need to be given the opportunity to influence further project development through derisking and optimisation.

Strategic Partners may subsequently choose to update their customer and/or equity investment positions. The new governance arrangements need to be flexible enough to accommodate any such changes. It is for this reason that the following governance updates are recommended for Pre-Commercialisation and Commercialisation Stages:

1) **Cambridge City Council continues as lead partner**: facilitates project development, including development of the Joint Venture customer owned energy company; procurement of DBOM contractor; and securing public-financing for the project. Regular meetings will also be arranged with Council finance and procurement officers.
2) **Steering Group is replaced by a Shareholder Committee**, <u>which is open to all potential equity investors and customers</u>. This becomes the new strategic decision-making body until the Joint Venture is established. Councillors provide political input into the reports before they go the Steering Group to ensure ongoing political buy-in.
3) **Core Group is maintained** for operational decision making until the Heat Company is established. The Core Group takes operational decisions, monitors progress and provides recommendations to the Steering Group and then its replacement Shareholder Committee.
4) **Expert Advisory Group** continues to provide due diligence during Pre-Commercialisation and Commercialisation.
5) **Updated Memorandum of Agreement (MoA)** for all Strategic Partners to sign in Q1 2026, setting out the basis for individual and collective involvement during Pre-Commercialisation and Commercialisation Stages. All stakeholders will continue in their role as potential customers, noting that some customers have Expressed an Interest in becoming equity investors at the end of Commercialisation.
6) **Non-Disclosure Agreement (NDA)** for all Strategic Partners at the point at which the project moves into Commercialisation Stage.

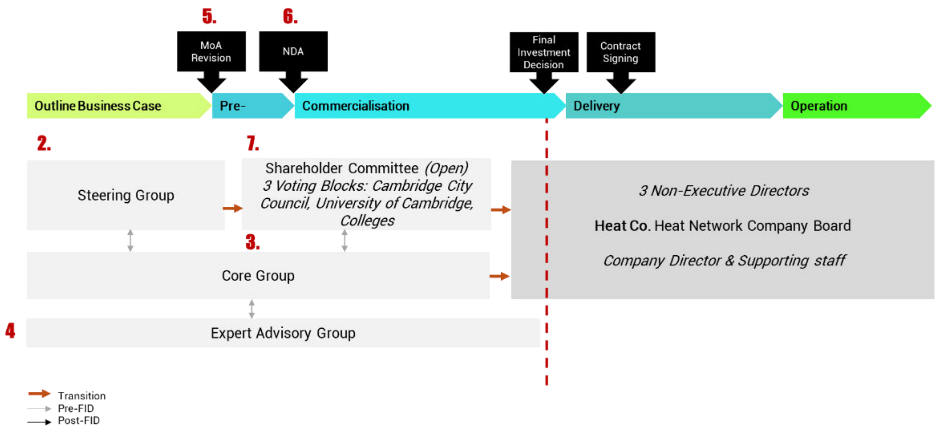


Figure 5 New Governance Arrangements until Final Investment Decision

- **Shareholder Committee:** provides overall strategic oversight and direction to the Project during Commercialisation Stage. Cambridge City Councillors provide political input into the reports before they go to Shareholder Committee, to ensure ongoing political buy-in.
- **Frequency of meetings:** Quarterly
  Chair: Cambridge City Council Senior Officer
  Vice Chair: University of Cambridge Senior Officer
- **Attendance:** The Committee is open to all potential equity investors and prospective heat network customers to promote transparency and fair participation. The Cambridgeshire County Council is invited to attend. Advisors/consultants may be invited to present updates and recommendations but will not have voting rights.

- **Voting Representatives:** To streamline decision-making, voting will be exercised through three voting blocks, with one voting representative each from (i) Cambridge City Council, (ii) the University of Cambridge, and (iii) the University Colleges.
- **Voting:** Decisions will be taken by simple majority of the voting representatives. Only the three voting representatives may vote. As lead partner, Cambridge City Council needs to support each decision.
- **Secretariat:** Minutes, actions and key decisions will be issued promptly after each meeting for review and agreement.
- **Transition to HeatCo:** The Shareholder Committee will stand down 6–12 months prior to Final Investment Decision, at which point governance will transfer to the HeatCo Board (replacing both the Shareholder Committee and Core Group). The respective roles of equity investors and customers will be set out in the HeatCo governance documentation at that time.

7.1.4 Heat Company (HeatCo)' Board

The Heat Company Board sets the strategic direction for its small Management Team and Employer's Agent. It becomes operational six to twelve months before FID, at which point the Shareholder Committee is no longer needed.

The same Board is responsible for both the HeatCo operating company (the regulated entity) and the JV Holding Company (HoldCo).

Resourcing: for the first 5 years through to the end of Phase 1 MVP construction and 'Heat On:'

- Council Programme Manager (already funded and HeatCo Board Member)
- 1 FTE Company Director - the sole Executive Director, with overall responsibility for the project and company. Produce the company's Business Plan that's reviewed annually by the Board; manages the Board meetings; engages Strategic Partners; and runs the company.
- 0.5 FTE Contract Manager to client the DBOM contract, supported by the Employer's Agent.
- 0.5 FTE Stakeholder Engagement Manager.
- 1 FTE Project Manager
- Employer's Agent consists of Owner's Engineer, Contract Administrator, Cost Consultant, Principal Designer, Clerk of Works and Bank Monitor

The respective roles of equity investors and customers will be set out in the HeatCo governance documentation at that time.

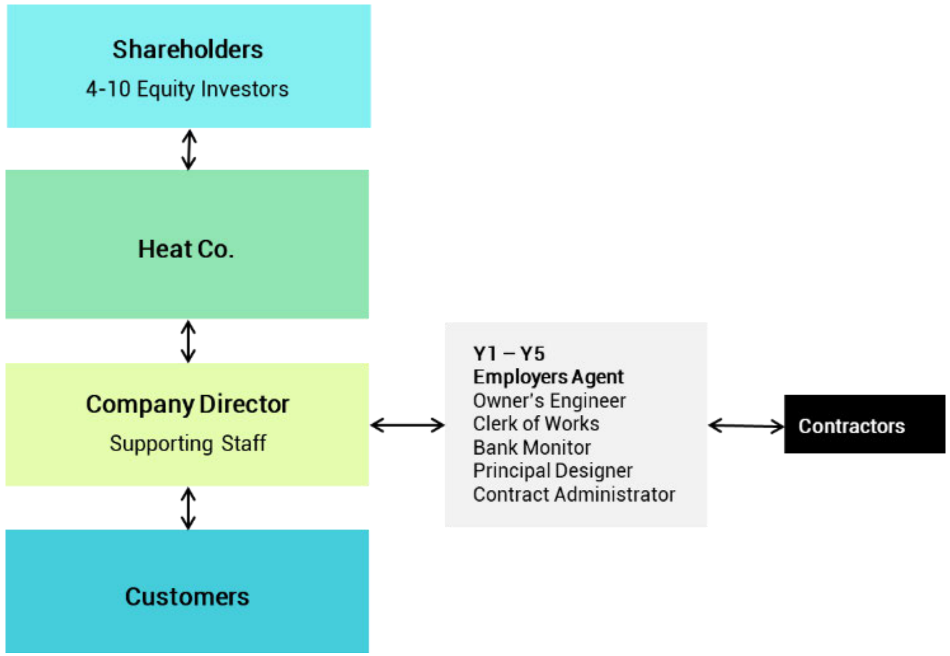


Figure 6 New Governance Arrangements from FID to Operations

7.2 Forward Programme

7.2.1 Workstreams

Table 7—2 summarises the key workstreams during Pre-Commercialisation, Commercialisation; Final Design and Construction; and Operations. Given the success achieved to date and to ensure project continuity on a tight timeline, it is recommended that the existing project team is retained for Pre-Commercialisation Stage.

Table 7—2 Future Workstreams

	Workstreams	DPD	Pre-Commercialisation	Commercialisation	Final Design & Construction	Operations
	Stage Gate	Completion March 2026	Steering Group decision to proceed at risk, ahead of GHNF grant	Shareholder Committee is formed Decision to proceed is dependent on GHNF funding & equity investors	Shareholder Committee decision on Financial Investment Decision, based on Final Business Case	From 'Heat On'
1	Programme Management	Outline Business Case Update Memorandum of Agreement, template Letter of Support and Non-Disclosure Agreement	Sustainability Co lead development and delivery of Workstreams 1 to 10 Regular programme, risk and budget reporting to Council lead, Core Group & Shareholder Committee.	Sustainability Co lead development of Final Business Case (FBC) for Final Investment Decision (FID) by Cabinet, equity investors and MVP customers. Regular programme, risk and budget reporting to Project Core Group & Shareholder Committee Manage Owner's Engineer and Project Team	Programme management to service HeatCo	
2	Strategic Partner Governance & Quality Assurance *(Key decision/ approval points that depend on new evidence collation will be subject to appropriate scrutiny via the regular cycle of Core Group, Shareholder Committee and/or Expert Advisory Group)*	Finalise DPD with Governance approvals and feedback Oversee and support individual governance approval processes x 20 Coordinate answers to related stakeholder OBC queries on OBC from 21 Strategic Partners.	Cambridge City Council governance (via Jaques van der Vyver, Ben Binns and Lynne Miles) Continue Core Group Continue Expert Advisory Group at key milestones. Establish Shareholder Committee	Cambridge City Council governance (via Jaques van der Vyver, Ben Binns and Lynne Miles) Continue Core Group until HeatCo is established Continue Expert Advisory Group at key milestones. Support Strategic Partner individual governance processes.	Cambridge City Council governance (FID decision by Cabinet + Scrutiny Committee) HeatCo Employer's Agent with Owner's Engineer, Contract Administrator, Cost Consultant, Principal Designer, Clerk of Works and Bank Monitor	

	Workstreams	DPD	Pre-Commercialisation	Commercialisation	Final Design & Construction	Operations
		University of Cambridge governance approvals Lead collective governance arrangements – Core Group, Steering Group and subsequent Shareholder Committee	Sustainability Co update OBC baseline and content to reflect formal Strategic Partner feedback ahead of GHNF application. Technoeconomic modelling update provided by Buro Happold. Financial modelling update provided by Amberside.	Shareholder Committee and Core Group transition into HeatCo 6 months before FID. Appointed by individual equity investor groups using Skills Matrix for strategic coordination. In parallel, Ensure Policy alignment e.g. national regulation, Heat Zoning, Local Plan and Council's Climate Change Strategy		
3	Stakeholder engagement & Communications	Early informal and formal engagement with Statutory Consultees Early engagement with energy centre neighbours Ongoing engagement with interdependent projects, including new heat networks & new developments Quarterly newsletter – targeting general stakeholder audience	Stakeholder updates Local residents Political engagement Local Stakeholder Groups Strategic Partners Public Relations Strategy/project positioning Quarterly newsletter	Sustainability Co & appointed contractors undertake local energy centre engagement Customer engagement Statutory consultee engagement, including Environment Agency and Cam Conservators Quarterly newsletter Press release following Final Investment Decision Construction Communications Strategy	Undertake stakeholder engagement to support planning application Customer engagement	Customer engagement
4	Technical derisking & betterment	Targeted heat meter installations to improve accuracy of heat demand data. Update Future Proofing Guidance Note	Buro Happold undertake: Budget application with UKPN Thermal store RIBA Stage 2 design for Downing College and ARU. Longlist potential roundabout thermal store options. Riverside Energy Centre RIBA Stage 2 design as betterment to MVP	Planning Application strategy: potential assessments, statutory consultee engagement and planning application preparation Engineers undertake technical derisking: EIA Screening Assessments GPRS surveys and/or trial pits at high-risk sections of pipe route e.g. Trinity Lane. We're	Work package tbc	Work package tbc

	Workstreams	DPD	Pre-Commercialisation	Commercialisation	Final Design & Construction	Operations
			Structural survey for BT Exchange River survey Technical scoping of procurement	going deeper than most existing utilities. Community energy centre codesign/ engagement Civil design of river offtake		
5	Planning and architectural derisking		Sustainability Co consider the following requirements: Transport consultancy Aboricultural consultancy Planning consultancy	Shareholder Committee decision – whether to undertake RIBA Stage 3 design client-side during Commercialisation, or by DBOM contractor once appointed. There may be value in focusing RIBA 3 on specific pipe sections, energy centres and College connection points to proportionally de-risk. Include within this RIBA 2 and 3 architectural designs for Energy Centres and thermal store. RIBA Stage 2-3 design – architectural 1 x PPA meeting	RIBA Stage 4-7 design undertaken by DBOM contractor after FID.	
6	Procurement	Soft market testing	Sustainability Co reprocure heat network team, with option for engineers to remain as Owner's Engineer Amberside and Sustainability Co develop Procurement Strategy for Shareholder Committee approval. If early contractor engagement is chosen, more work can be undertaken by the delivery partner. Amberside undertake additional soft market testing for DBOM procurement.	Commercial advisors procure DBOM contractor (potentially including Framework for secondary design, logistic modelling & Planning Agent to develop Planning Strategy and manage the planning application, including a Quality Design Review to help derisk the project. DBOM procurement includes competition preparation, evaluation prep, PIN, ITT, ISFT, evaluation, notifications and standstill periods	Contract Manager clients DBOM contractor, supported by Employer's Agent.	N/A

	Workstreams	DPD	Pre-Commercialisation	Commercialisation	Final Design & Construction	Operations
			Amberside prepare tender pack with support of Sustainability Co (coordination and governance), Buro Happold (technical scope) & Sharpe Pritchard (legal advice); scope of works, tender documents, KPIs & schedules for Commercialisation Stage. Contractor resident liaison is built into construction contract. Sustainability Co and Amberside procure Owner's Engineer	Sustainability Co procure PR company to help mitigate the risk of significant disruption. Sustainability Co and commercial advisors procure remainder of Employer's Agent (Contract Administrator, Cost Consultant, Principal Designer, Clerk of Works and Bank Monitor) Strategic Partners procure Company Director and company executives.		
7	Commercial derisking & betterment	Prepare & submit NWF and GHNF bids, including £1m Commercialisation grant Amberside undertake commercial derisking and further Sensitivity Analysis on back of formal Strategic Partner feedback, resetting the baseline to match.	Sustainability Co, Buro Happold and Amberside review government's Heat Zoning Consultation Response, with recommended action(s) Amberside define the principles and cost of Contributions in Kind, with a focus on the energy centres and thermal stores Sustainability Co and Buro Happold review the Local Plan Net Zero building review Sustainability Co and Amberside undertake a Benefits in Kind review	Commercial advisors develop Heat Supply Agreements for customers Commercial advisors establish commercial principles and Heads of Terms for 4 x energy centres and thermal stores. Commercial advisors ensure regulatory compliance, noting that this is a technically and commercially complex area, which is constantly evolving. Commercial advisors to develop financial model e.g. moving it from annual to monthly cashflows.	Work package tbc	Work package tbc
8	Financial Management	-	-	Sustainability Co produce GHNF grant and NWF loan reports.	Manage GHNF grant and NWF loan Manage local energy company's Profit & Loss account	
9	Joint Venture set-up	-	Sustainability Co develops partnership principles & associated governance arrangements	Sustainability Co leads work with Commercial Advisors and Legal Advisors to set up HeatCo. so that it's mobilised ready for FID.	Company evolves. Other equity investors and Non-Executive Directors join Joint	-

	Workstreams	DPD	Pre-Commercialisation	Commercialisation	Final Design & Construction	Operations
			Amberside develop JV principles. Sharpe Pritchard to draft.	Initially set it up as a wholly owned Council subsidiary, with all IPR vested within the SPV. Actions include HeatCo company registration to set up shell company; Joint Venture Agreement; Shareholder's Agreement, Articles of Association and Delegations Matrix; recruitment strategy; regulatory compliance; Communications Strategy; develop company policies and processes by adapting Council policies and processes; and company branding so it's future proofed for expansion.	Venture at Final Investment Decision (recruited by shareholders). Potential Feasibility Study for heat network expansion.	
	Heat Network Digital Twin (externally funded)	-	Sustainability Co prepare and submit Proof of Concept funding bid.	Subject to successful funding bid, develop procurement scope for Heat Network Digital Twin.	Procurement	Contract management

Assumptions

1. Technical derisking is mainly undertaken at Commercialisation Stage, once it is confirmed who's taking the delivery risk via OBC formal approval.
2. Commercial derisking is needed during Pre-Commercialisation Stage, to obtain a first assessment of commercial costs associated with all the energy centre locations and thermal stores.
3. Cambridge City Council facilitates procurement of the DBOM contractor, including the option for collective purchasing of energy consultancy services for secondary network designs.
4. Final Investment Decision takes place after tender award.

7.2.2 Timeline

Figure 7 provides the summary Heat Network Programme from Outline Business Case to Financial Investment Decision, which is scheduled for summer 2028. Interdependencies are highlighted and listed in Table 7—3 Heat Network Interdependencies below.

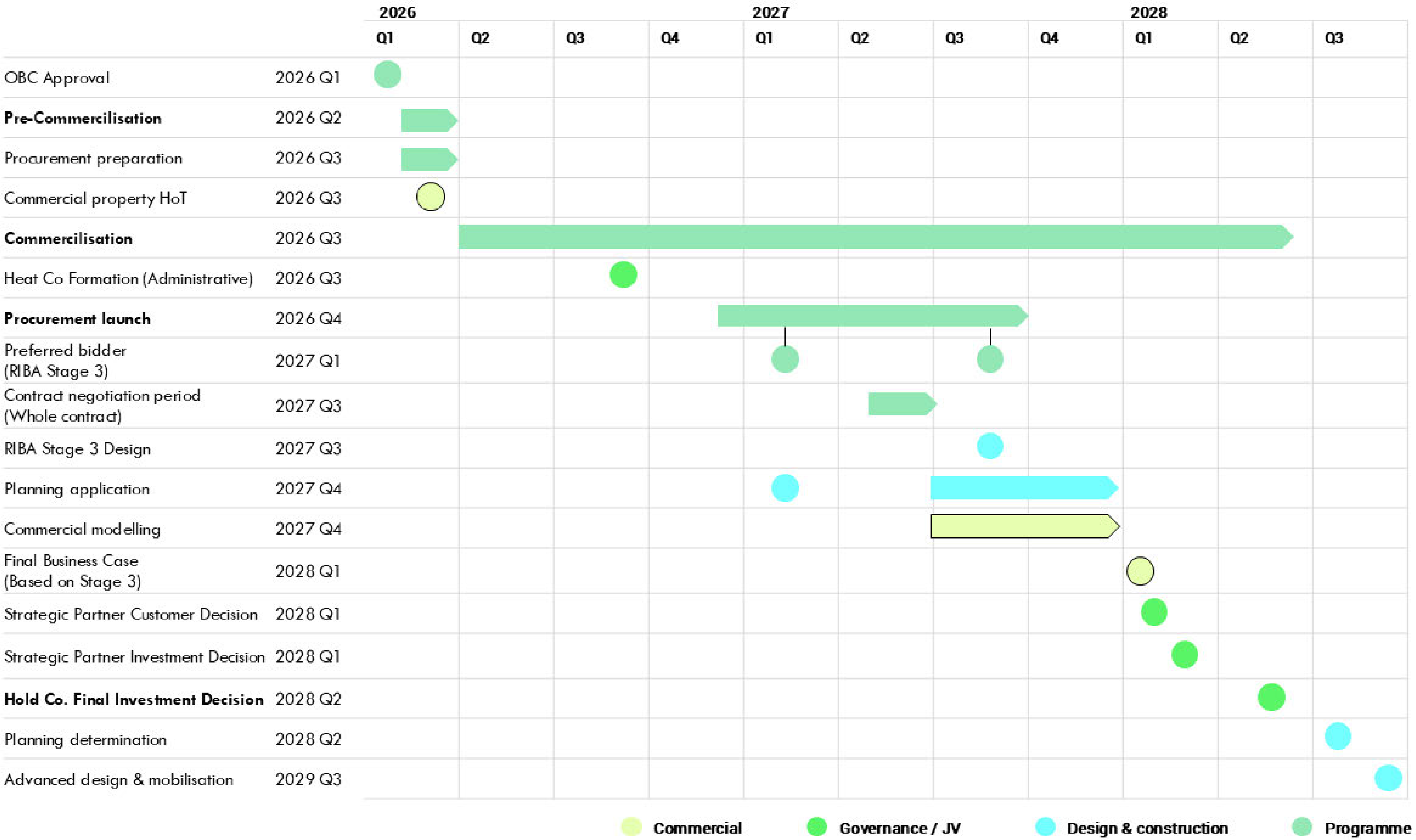


Figure 7 Pre-Commercialisation to Financial Investment Decision Programme

7.3 Heat Network Phasing

The heat network build-out is proposed in two Phases: Phase 1 2030-32, and Phase 2 2035. These phases have been derived from individual Strategic Partner development and decarbonisation plans, to allow synchronisation with existing gas boiler replacements. This proposed phasing programme is subject to change through further programme development.

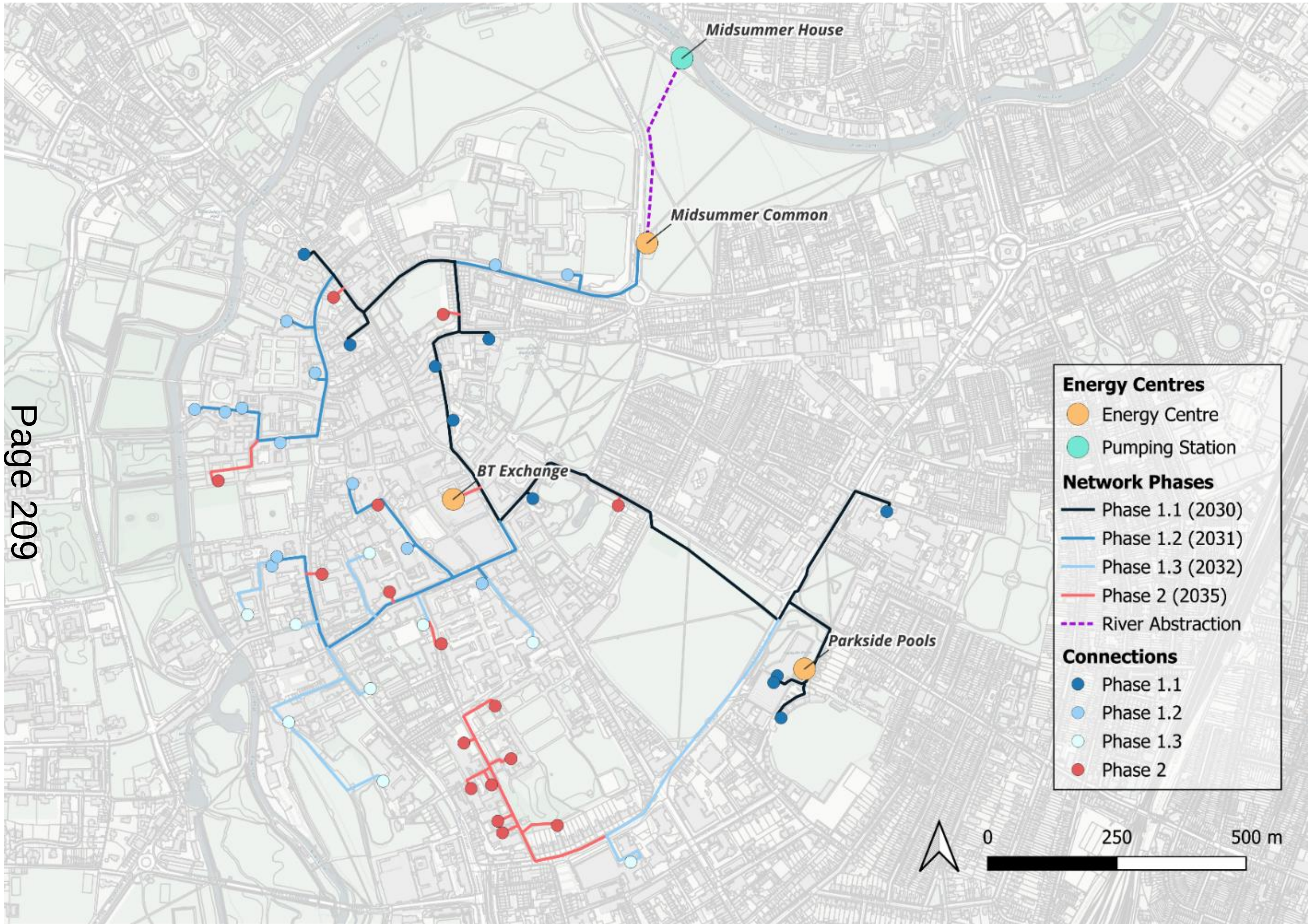


Figure 7—8 Heat Network Phasing

7.4 Heat Network Interdependencies

Initial stakeholder engagement has exposed several interdependent programmes happening in parallel to the City Heat Network development timeline. Ongoing engagement will monitor the development of these programmes and seek to manage emerging risks and opportunities. This engagement takes place through regular meeting series and participation in strategic County-wide meetings hosted by Cambridgeshire Highways (HAUC meetings).

Some of the interdependencies identified are strategic in nature, including Local Government reorganisation and Heat Network Zoning. Others have direct and indirect spatial impacts, such as the Local Plan consultation, University of Cambridge Reshaping Our Estate, and UKPN Grid Reinforcements. There are also several development projects being undertaken by individual colleges and stakeholders, which may present extra constraints or opportunities to heat network delivery.

Table 7—3 Heat Network Interdependencies

No.	Interdependency	Timeframe	Owner	Risks	Benefits
1	Local government reorganisation	Now – April 2028	Local Gov	Political risk that the project could be stalled by uncertainty created through governance transition period	Potential that City and County services fall under a single local authority
2	Cambridge City Council: Civic Quarter Redevelopment	2026 - 2028	Cambridge City Council	May require phasing of some highways elements to prevent re-delivery. There is no conflict according to current delivery programme.	Large-scale development going before heat network construction Opportunity for co-delivery of works
3	University of Cambridge: Reshaping our Estate	2024 - 2044	University of Cambridge	Heat network connections are delayed or deemed inappropriate	Optimum timing for the University to consider heat network development, as it in parallel reshapes its Estate. Connection opportunities can be refined.
4	Energy retrofit of Strategic Partner buildings	Ongoing	Strategic Partners	Capital constrained budgets and historic nature of buildings, make energy efficiency improvements too expensive to do quickly and at scale.	High temperature heat network solution enables the maximum number of connections, with many buildings able to connect. Possible co-delivery of projects, to prevent further disruption in city centre
5	Heat Network Zoning	Ongoing	Cambridge City Council	Mandating connection of large heat loads becomes contentious and leads to stakeholder push back & appeals using 'exemptions'	Mandating heat network connections is a game changer for heat network expansion, significantly derisking the Cambridge City Centre Heat Network project. Nonetheless, we're still focussing on the benefits and added value, to incentivise connection regardless of legislation.
6	Local Plan Consultation	2026 - 2027	Cambridge City Council	None	Heat network development has been included in the new Local Plan, offering an early consultation opportunity ahead of any specific heat network development.
7	UKPN Grid Reinforcements	Ongoing	UKPN via project team	If it's not coordinated at a strategic level, electrical grid reinforcements could become prohibitively expensive to on-site and heat network decarbonisation solutions.	The new Local Area Energy Plan (LAEP) for Cambridgeshire enables co-ordination of long-term electrical grid development for Cambridge and its heat network project. In addition, the heat network team's UKPN Budget Application minimises the risk and maximises strategic alignment. Long lead in periods are common for both power grid upgrades and heat network infrastructure delivery.

No.	Interdependency	Timeframe	Owner	Risks	Benefits
8	Greenways Development (Hills Road)	2027-2027	GCP	Hills Road is a major arterial to the City Centre. It does not feature in the heat network route. However, co-ordination will be required to prevent compounded traffic disruption.	Optimise timing and co-ordination with stakeholders.
9	Business As Usual activity	Ongoing	All stakeholders	Many of the colleges and universities have a range of business functions, throughout the year. Planning access and installation of the heat network will need to minimise disruption and require coordination with individual stakeholders.	Optimise timing and co-ordination with stakeholders.
10	Major Developments	Ongoing	Colleges, Grafton Centre, Addenbrookes	Potential programme impacts, if works affect access or connection points.	Potential to co-deliver aspects of the heat network may be possible depending on project programming.

7.5 Stakeholder Management and Communications

7.5.1 Current Stakeholder Engagement – Outline Business Case

The Outline Business Case has required engagement stakeholders to secure project support, identify adjacent programmes, and provide information for the design development. The following stakeholders have been identified at this stage:

Strategic Partners
MVP Customers

- Cambridge City Council
- University of Cambridge

Christ's	Hughes Hall	Sidney Sussex
Clare	Jesus	St Catharine's
Corpus Christi	King's	St Johns
Downing	Pembroke	Trinity
Emmanuel	Peterhouse	Trinity Hall
Gonville and Caius	Queens'	

Potential Additional Customers
MVP Customers

Major Developments

- Cambridge Growth Company
- Old Mill Press
- Grafton Centre
- Addenbrookes
- Fulbourn Innovation Hub
- Beehive Centre
- Marshalls
- North East Cambridge
- GCP: Greenways
- County: LAEP & Super Trench
- City: Civic Quarter

Heat Networks

- Addenbrookes
- Eddington

Funding

- HNDU
- GHNF
- NWF
- Section 151

Digital Twin

- Cambridge Zero
- CISL
- ARU
- UoC

Consents

- City Council
- UoC
- ARU
- Colleges

Statutory Consents

- Highways
- HSE
- Historic England
- Environment Agency
- Planning
- Heat Trust
- UKPN
- Ofgem

7.5.2 Proposed Stakeholder Engagement - Commercialisation

Engagement with stakeholders will continue through commercialisation, the stakeholder engagement goals are:

	Goal	Lead	Audience	Engagement methods
1	Secure governance support and approval for the project	City Council	Political Strategic Partners	Councillor Briefings, Newsletter Newsletter
2	Build industry relationships and project profile	Sustainability Co.	Industry	Industry articles, Newsletter, Tender Contractor engagement day
3	Gain wider 'City' support for project, identify further development potential	Sustainability Co.	City Climate Leaders Local Councillors Public	Newsletter, event attendance Newsletter Press, magazine, project exhibition
4	Manage customer inputs, agree terms, conditions and contracts	Sustainability Co.	Customers, Strategic Partners	Workshops
5	Manage investor inputs, agree investor terms, conditions and contracts	Sustainability Co.	Equity investors, Strategic Partners	Workshops
6	De-risk energy centre and heat network development	Sustainability Co.	Local community Planners Statutory Consultees	Workshops, 1:1s, exhibition PPA meeting PPA meeting / informal engagement
7	De-risk financial and technical development of project	Sustainability Co.	Project funders Expert Advisory Group	Regular 1:1 Meetings
8	Identify and manage interdependencies / opportunities	Sustainability Co.	Cambridgeshire County Council Cambridge City Council Greater Cambridge Partnership Cambridge Growth Company New developments Eddington Heat Network Addenbrookes Heat Network	Regular 1:1 Meetings

7.5.3 Key Communications Timeline

The timeline below indicates key communication periods from Pre-Commercialisation to FID. The project team will work with specialists to develop strong key messaging to clearly position the project, including the resultant challenges and benefits.

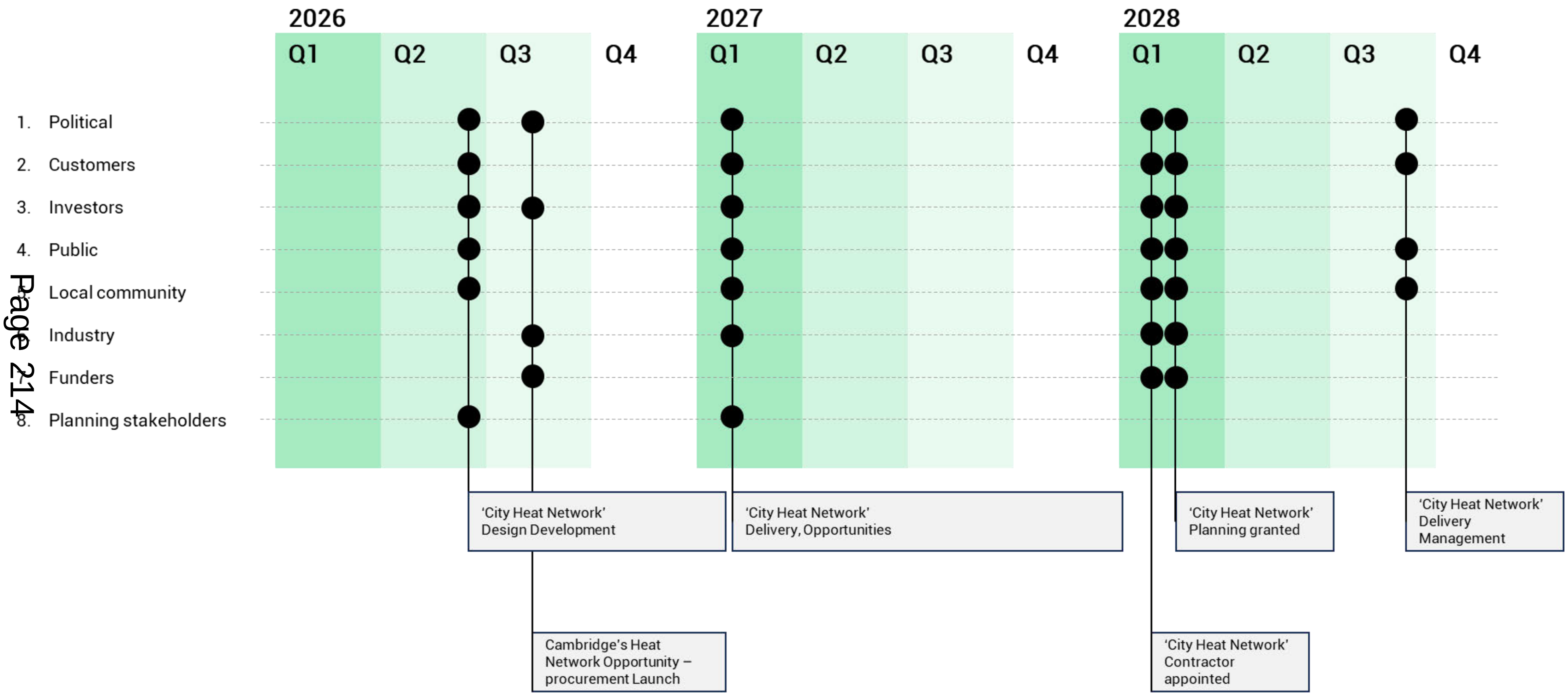


Figure 9 Key Communications Timeline - Commercialisation

7.6 Resourcing

7.6.1 Project organisation & resources – team members, roles & capability

The existing client-side heat network team is highly experienced in heat network project development, with over 100 years collective experience. Given the success achieved to date and to ensure project continuity on a tight timeline, it is recommended that the existing project team is retained for Pre-Commercialisation Stage. The furthest column in Table 7—4 provides a recommended Procurement Strategy for the heat network team.

Table 7—4 Proposed Commercialisation Project Team

Who	Company	Role	Procurement for Pre-Commercialisation *(subject to Steering Group agreement to proceed at risk with associated budget requirement)*
Ben Binns Jaques van der Vyver	Cambridge City Council	Project Sponsor and Client-lead	Existing Council employees. No procurement required.
Jeff Laidler Janet Hall	Sustainability Co	Heat Network Programme Managers Programme management Strategic Partner and stakeholder engagement Expert Advisory Group Statutory consultations, including PPA Strategic and Management Cases	Existing long-term contract for up to 10 years, with option for contract variation at each Stage Gate, including Pre-Commercialisation and Commercialisation.
Alasdair Young Bill Wilson Matthew Whiting	Buro Happold	Technical engineers RIBA Stage 2 design Technoeconomic model Heat Zoning Study Economic Case	Contract variation (tbc)
Mark Easter James Derbyshire	Amberside Advisors	Commercial and financial advisors Financial model Financial and Commercial Cases	Contract variation (tbc)
Steve Gummmer	Sharpe Pritchard	Project's legal advisors	Framework (tbc)

7.6.2 Resourcing Budget

The resourcing budget is split across two project phases of Pre-Commercialisation and Commercialisation.

Pre-Commercialisation

A forecast of **up to £0.6 million** of additional funding is required to deliver the Pre-Commercialisation Stage between March and October 2026, supported by DPD underspend project roll forwards from the City Council and many Strategic Partners. Cambridge City Council has in principle committed to cover this budget gap, with DPD underspend rolled forward to make up the remainder. The Council has made this 'Bridge Funding' proposal on the basis that it does so at risk, with full financial return at Final Investment Decision.

Table 5 Pre-Commercialisation Resource and Budget Estimates: April to October 2026

	Workstreams	**Forecast Resource**	**Forecast Budget**
1	Programme Management	Sustainability Co: o 0.6 FTE Programme Manager o 0.6 FTE Senior Project Manager o 0.5 FTE Project Manager Buro Happold Amberside Sharpe Pritchard	[redacted] [redacted] [redacted] [redacted]
2	Strategic Partner Governance & Quality Assurance		
3	Stakeholder Engagement & Communications		
4	Joint Venture principles		
5	Technical derisking & betterment		
6	Pre-Commercialisation Procurement, including Procurement Strategy and tender pack preparation		
7	Commercial derisking & betterment		
8	Heat Network Digital Twin	Excluded from existing budget considerations	Funded by Proof-of-Concept bid (tbc)
			Total Forecast Budget £525-625k

Table 6 Commercialisation Resource and Budget Estimates: November 2026 to June 2028

	Workstreams	**Forecast Resource**	**Forecast Budget**
1	Programme Management	Tbc once the scope is better defined through Pre-Commercialisation activity, accounting for the need to both maintain programme, derisk, optimise and avoid duplication of costs with the DBOM contractor.	Tbc once the scope is confirmed, noting that it's highly likely to be >£1m, so will require additional gap funding, even with a successful GHNF bid with £1m Commercialisation grant funding.
2	Strategic Partner Governance & Quality Assurance		
3	**Set-up Joint Venture delivery vehicle**		
4	Wider stakeholder engagement & Communications		
5	Technical derisking & betterment		
6	Commercialisation Procurement		
7	Commercial derisking & betterment		
8	Heat Network Digital Twin	Excluded from Commercialisation budget considerations	Externally funded (tbc)
			Total Forecast Budget £tbc

Assumptions:

- *A decision is needed whether to procced with RIBA Stage 3 and/or planning as part of DBOM contract or client side. This has a big impact on the Commercialisation costs. Currently assumed no Stage 3 design.*
- *Strategic Partners proceed with the Preferred Option of a Joint Venture.*
- *Planning application/architectural designs are prepared during Commercialisation*
- *Commercialisation is 18 months and no longer*
- *Minimum of 1 College, University of Cambridge and City Council invest, with a maximum of 9 investors. The cost then depends on the number of additional Colleges and the associated due diligence, which the heat network team support.*
- *Forecast project legal costs have been included. To avoid Conflicts of Interest, individual Strategic Partners need to cover their own legal costs.*

7.7 Customers

7.7.1 Heat Network Customers

CCCHN’s Minimum Viable Product is centred on provision of heat to [redacted] Strategic Partners as initial anchor customers. Opportunities to extend to a wider customer base will be reviewed if heat capacity is available at latter stages of the project. Potential future customers were engaged at feasibility stage and kept informed by a regular project newsletter. [redacted]. At DPD an equal funding contribution and voting representation of 33% was agreed. This formation has been updated for Pre-Commercialisation.

[redacted]

7.7.2 Customer Impacts

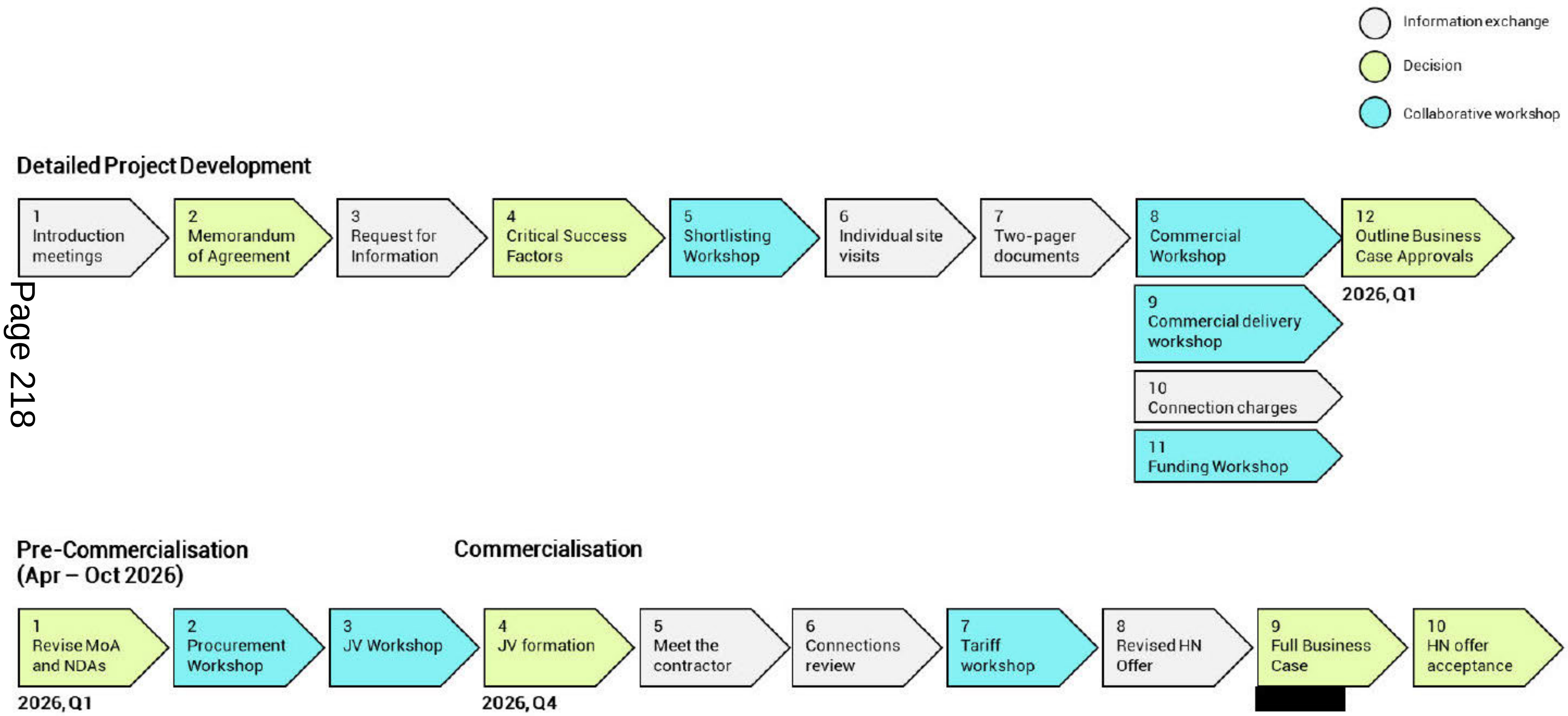
A list of ten reasons to connect to the heat network, the customer benefits are listed in the Strategic Case, Table 3—10. Previous workshops with customers have highlighted key impacts that customers wish to manage throughout the development process, these include:

- **Connection costs**
- **Heat tariffs, annualised costs**
- **Connection phasing and location**
- **Disruption to ‘Business as Usual’ activities**
- **Reputational damage if delivery is not smooth as planned**

The management structure proposed in the OBC will maximise the potential of customers and investors to influence control in all these aspects. A combination of workshops, individual meetings, and information supplied to support key decisions is mapped out in the next section.

7.8 Customer Journey

CCCHN customers have been extensively engaged in the heat network development process. They have influenced all major decisions from provision of sites for the energy centre location, to the commercial, delivery and funding models proposed. This level of engagement will continue into Pre-Commercialisation and Commercialisation. To date, the level of information supplied to customers has been greater than what's typically level issued at this stage. Strategic Partners are aware that information is likely to change and require review at decision points.



7.9 Customer Barriers

The main customer barriers that may inhibit connection to the heat network are:

Barrier	Mitigation
Governance processes: extensive due diligence	Future project governance is to be agreed at Outline Business Case, including ongoing representation of the three main customer groups: Universities, Colleges, and Council.
Project timing, interdependencies of other major projects and funding requirements underway by Strategic Partners	A first review for phasing of heat network connections has been undertaken with Customers. Customers are requested to inform the heat network project team of any changes to their proposed phasing.
Ability to deliver a secondary heat network: in time, and to specification for heat network connection	The heat network project will provide support to customers for the procurement of expertise to design and install secondary heat networks. This will take the form of a framework, through which services may be accessed.
Cost competitiveness: current counterfactual comparisons show that some Strategic Partners will benefit from the heat network more so than others, due to alternative renewable heating system availability	Whilst customers have requested cost competitive heating, they also highlight the need for specialist experts present within the heat network company, to provide assure decision-making. The final commercial and economic models will be refined through Commercialisation and must hold these different aspects in balance.
Heating resilience, guarantees, and control	Customers are accustomed to being in full control of their heating system, with business activities, which can't tolerate heating outages or bad services. At DPD a note on the full resilience measures offered by a heat network were shared. These include; regulation requirements for attending heating issues and outages, physical heat network design, and back-up systems. The full resilience note is available in Appendix R.

7.10 Assurance & Approvals

7.10.1 Detailed Project Development Approvals

During DPD, project assurance was successfully obtained from the Expert Advisory Group (EAG); Strategic Engagement with statutory consultees; and a strategic relationship with the National Wealth Fund. This is described in the Strategic Case. In addition, there were 3-weekly Project Sponsor meetings, 3-weekly Core Group meetings and Steering Group meetings at key project milestones. An overview of the key decision and assurance meetings is listed below, further details can be found in the Strategic Case, Appendices D and E.

Table 7—7 DPD Approvals Roles

Group	Role	Overview	Meetings
Steering Group	Decision-making	Strategy, programme, budget and key decisions	Quarterly
Expert Advisory Group	Assurance	Technical and commercial due diligence	During DPD
Special Interest Group	Assurance	Approach to retrofit, conservation & power upgrades	24 September 2024
National Wealth Fund	Assurance	Financial due diligence	Commercial Delivery workshop City Council internal workshops
Greater Cambridge Shared Planning Service	Assurance	Planning Performance Agreement	Planning Performance Agreement
UKPN	Assurance	Planning major electrical requirements	Initial budget application

Quality assurance has been designed to be appropriate to the scope, scale and complexity of Pre-Commercialisation and Commercialisation.

7.10.2 Commercialisation Approvals Required

Table 7—8 Commercialisation Approvals Required

Date	Key Decision	Decision Maker
2026 Q3	Pre-commercialisation completion	Shareholder Committee
2026 Q3	Procurement strategy	Shareholder Committee
2026 Q2	JV draft terms	Shareholder Committee
2026 Q3	HeatCo formation	Shareholder Committee
2026 Q4	Digital twin feasibility study & next steps	Shareholder Committee
2026 Q4	Budget Review 1 – JV	Shareholder Committee
2026 Q4	Procurement scope, including RIBA stages, architectural scope and betterment options	Shareholder Committee
2027 Q1	Preferred Bidder	Heat Co.
2028 Q3	Budget Review 2 – Full cost estimate	Heat Co.
2028 Q2/3	Full Business Case & Final Investment Decision	Individual Equity Investors and HeatCo

7.11 Risk Management

7.11.1 Approach

Project risks are regularly managed, monitored and reviewed. Mitigations and risk ratings are updated as the project is derisked and optimised. Risk Register updates are reported to and reviewed by both the Core and Steering Group. The full Project Risk Register is included as Appendix C.

7.11.2 Project closure fallback scenarios

Table 7—9 Project closure scenarios

Project Stage	DPD	Commercialisation
Customer	Alternative local decarbonisation solution	
Investor		MoA clarifies position, including: Commercial arrangement – the return of any unspent funds goes directly back to Cambridge City Council, as the sole funder of Pre-Commercialisation Stage Legal – dissolution of SPV (if already formed)
Developer		Subject to commercial arrangement with developer, if appointed to time of project closure.

8 References

- Cambridge City Council 2018, Cambridge Local Plan
- Cambridge City Council 2021, Climate Change Strategy 2021-2026
- Cambridge City Council 2023, Cambridge City Centre Heat Network Guidance
- Capper 2023, Full Business Case Green Heat Network Fund
- COMEAP Committee on the Medical Effects of Air Pollutants 2015, Statement on the Evidence for the Effects of Nitrogen Dioxide on Health
- DENZ 2024, UK Heat Networks Market Overview
- DESNZ 2024a, Heat Network Zoning Consultation Response
- Energie Lab Zuidoost 2025, Life ArenAPoort – Energie Lab Zuidoost (accessed on 20 October 2025)
- Energie Nederland 2021, Facts & figures energy transition - Energie Nederland (accessed on 18 November 2025)
- Energy Catapult 2025, Heat Decarbonisation Guide | Energy Systems Catapult (accessed on 18 November 2025)
- Energy Saving Trust 2025, UK heating market to face changes - Energy Saving Trust (accessed on 18 November 2025)
- Energy Security Net Zero Committee 2025, Retrofitting homes for net zero (accessed on 18 November 2025)
- Eon 2024, E.ON presents status of heat transition in major German cities (accessed on 18 November 2025)
- Greater Cambridge Shared Planning 2020, Sustainable Design and Construction SPD

Report to:	Performance, Assets and Strategy Overview and Scrutiny Committee – 3 March 2026
Lead Cabinet Member:	Councillor Simon Smith, Cabinet Member for Finance and Resources
Lead Officer:	Simon Oliver, Chief Digital and Information Officer

3C ICT Year One Audit

Executive Summary

1. The 3C ICT service is a joint service provided to Cambridge City Council (CCity), Huntingdonshire District Council (HDC) and South Cambridgeshire District Council (SCDC).

2. The service is 'sponsored' by HDC, with all staffing arrangements delivered under HDC terms and conditions, and to a Partnership Agreement, which was renewed in 2025.

3. The 3C ICT service was subject to external review in 2024. Several shortcomings were identified, and Year One Success Criteria were established against which the service would be re-evaluated against.

4. The Chief Information Digital Officer (CDIO) role was established and recruited to in December 2024, to deliver the remediation activity and improve digital innovation within the Partner Councils.

5. A CDIO360 review was undertaken in November 2025, to review the impact of the introduction of the CDIO role and performance of the postholder. Key statements from this review are included within this report.

6. As part of the ICT Remediation Programme, also known as the CDIO Programme, an internal audit was scheduled for the end of the first year, to be undertaken by HDC's external audit partner, RSM.

7. The audit report has now been released and contains two Management Actions, for which activity has been established to address.

8. This report is to be presented to each Partner Council's Oversight and Scrutiny function for awareness and comment, and ongoing review of Management Actions will be undertaken by HDC as the 'sponsor' Council for the 3C ICT service.

Recommendations

8. It is recommended that the Scrutiny Committee acknowledge the report and its contents, the Management Actions committed to, and to provide any feedback.

Details

9. During 2024, a review of the 3C ICT service was undertaken by an external professional consultancy.

10. This review identified several shortcomings with the ICT service, which were identified through independent technical and culture reviews, a customer survey, and interviews with key stakeholders.

11. Whilst a number of potential options as to how to address or remediate the ICT service were discussed across the Partner Councils, including potential change of 'sponsor' council or disaggregation/repatriation, it was agreed that the service would be set a target of one year to remediate against agreed Year One Success Criteria.

12. As part of the external review, a recommendation was the introduction of a CDIO role, to work directly as a Chief Officer to each of the Partner Councils, and to take responsibility for the 3C ICT service.

13. To support the remediation required, several activities were cost estimated. The Partner Councils committed to a £241k budget for remediation activities, and a £300k establishment budget (to include the uplift of the CDIO role), which was to be shared on an equal proportional basis between the Partner Councils.

14. The CDIO role was recruited to in December 2024.

15. The CDIO undertook a full review of the external report and conducted their own in-depth investigations during the December to January period. As a result, the CDIO Programme (Remediation Programme) was developed and agreed with the Partner Council Chief Executives (CX).

16. The CDIO Programme amalgamated all feedback, the service improvement programme activities, response to the 2024 customer survey and the Year One Success Criteria.

17. The CDIO Programme sought to deliver a much more complex, ambitious and beneficial programme of work than that originally envisioned by the external consultancy, but within the same budget envelope provisioned.

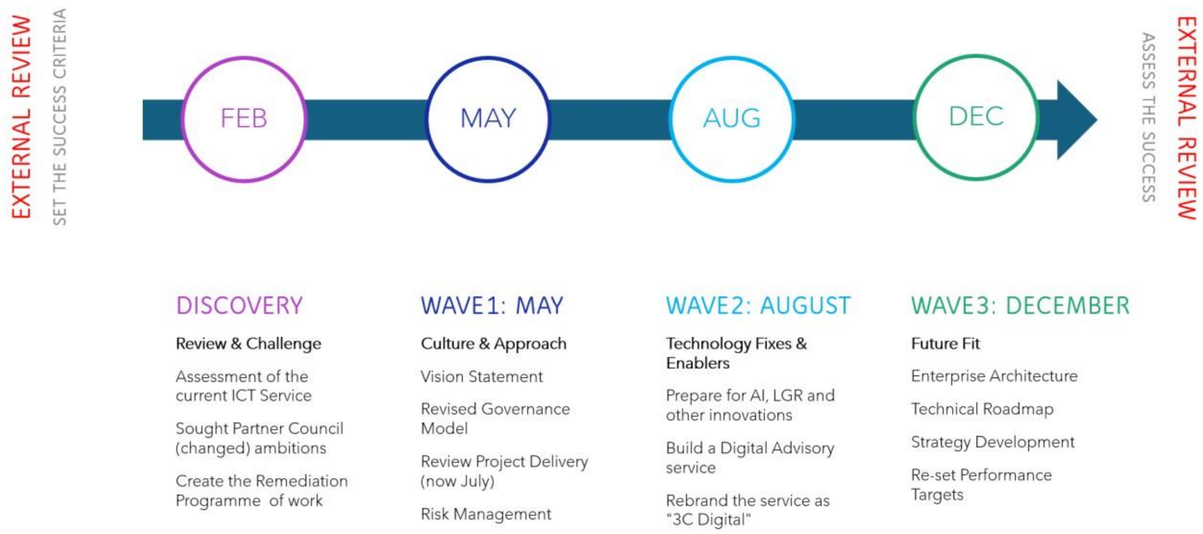
18. The ambitious nature of the CDIO Programme was always recognised, and all parties were aware that it may not be achievable based on the scale and complexity of the challenge, and the significant culture and delivery issues that were apparent.

19. However, all parties agreed that achievement of most of an ambitious programme of work was more advantageous than a full achievement of a simpler programme of work that would require further significant activity into a second year.

20. To oversee the progress of the CDIO Programme, CDIO/CX Forums were established where the CDIO and three Partner Council Chief Executives would meet to discuss the programme of work and assess successes and blockers to success. These Forums occurred in February, May, September of 2025, and January 2026.

21. In addition, all three 3C Service Directors were provided full access to the CDIO/CX Forum reports, as well as ongoing dialogue and agreement on the details of the activities within the CDIO Programme at an operational level. A Microsoft Teams Channel was used to ensure consistent communications and sharing of supporting information.

22. The CDIO Programme was split into three waves of activity to be undertaken during 2025. The first two being three months in duration, followed by one of four months duration. These were broadly split into focus areas as below;



23. As part of the CDIO Programme, an audit was to be undertaken within December 2025 to independently assess the delivery of the Year One Success Criteria.

24. The scope of the audit report, as agreed with the Partner Council Chief Executives, was to assess the Success of the CDIO Programme and achievement of the Year One Success Criteria

25. HDC's external audit partner, RSM, were provided more than 50 documents by the CDIO to support the review of the CDIO Programme. This audit was an intensive undertaking.

26. To support the audit a Customer Survey was undertaken. This was an all-staff survey repeating the questions from the 2024 survey, which was used to assess the perception of the service pre-remediation, to enable a comparison of responses.

27. The audit has identified two Management Actions to be addressed;

    - Create a revised plan for the outstanding CDIO Programme deliverables

    - Address the outputs from the 2025 ICT Customer Survey

28. A CDIO/CX Forum took place on the 2 February 2025, and the Management Actions and proposed approach was discussed.

29. The options available to the Partner Councils on the 3C ICT service have been significantly impacted by the release of the English Devolution Whitepaper (LGR) as disaggregation, repatriation and/or a change of 'sponsor' Council would introduce risk to the LGR preparation and delivery activity underway.

30. However, the overall opinion of the 3C ICT service is one of significant improvement and it is likely that the current arrangements for the 3C ICT service would have been continued regardless of the impact of LGR considerations.

31. The CDIO is keen to move the 3C ICT service out of a perception of continuing to require substantial remediation. Significant progress has been made across all functions, and as reflected in the ICT Customer Survey. The positive foundations that have been laid for future success, as reflected in the review of the CDIO Programme and the ICT Customer Survey feedback, suggest it would be appropriate to remove this term from future activity.

32. As a result, the focus of the Management Action will be to undertake as much of the continued activity within the operational 'business as usual' activity, albeit these outcomes will remain a focus for communications between the CDIO and the 3C Service Directors, and Chief Executives.

33. The Customer Survey, while a reduced number of responses in the most recent survey, has shown significant improvements across all categories and has met the Year One Success Criteria target for improvement.

34. However, reviewing the written responses to the Customer Survey question has identified key areas for improvement. These include performance issues across the Wi-Fi network, laptops and some Line of Business Applications. Also noted are the booking and usability of the Meeting Room technology, and the reliability of the provisioned docking stations in 'hot desk' areas (mostly due to cables being removed). All these issues are already within projects to address the issues which were underway prior to the Customer Survey results being released.

35. The Customer Survey also identified opportunities for further strengthening Change Delivery and Digital Delivery both within the 3C ICT team and within the Partner Councils. Work on these areas has already started and is directly under 3C Service Director review to ensure appropriate focus, with the CDIO being accountable for its delivery. Progress will be reported to this committee in a future update report.

36. The need for continued User Training has been identified as a key issue to be addressed in response to the Customer Survey. There is uncertainty as to which applications should be used, and for which purpose, and/or the full capability of the software that has been provisioned by the 3C ICT service.

37. The CDIO has provided a lunchtime learning session on using Generative AI to each Partner Council which was well received and has increased usage of tools provided; feedback is that this has raised colleague confidence. How this can be built upon across the other systems in use will be discussed with colleagues within the Partner Council Learning and Development Teams.

38. Progress with the CDIO Programme has been overall successful, despite the scope being extended within the delivery year, in response to changed ambitions and the needs of LGR. The flexibility and proactiveness of the approach have enabled LGR readiness to be accelerated where possible.

39. Some aspects of the CDIO Programme have been delayed due to unforeseen circumstances or the pragmatic scheduling of activities around evidence gathering and/or capacity constraints. An example of this is the restructure of the ICT Leadership team, which was envisioned to commence in May, but did not start until September 2025. This has now been completed with new roles being advertised, two roles being made redundant, during January 2026.

40. The CDIO Programme has been delivered on budget, with £55k being allocated prior to commencement of the CDIO. The CDIO has utilised in-year efficiency savings to offset additional license costs, and utilised Microsoft grant funding to deliver training and consultancy services. The establishment budgets have enabled redundancy costs to be covered, and to provide the necessary budgets for a revised leadership structure which was out for recruitment during January 2026.

41. The benefits of the CDIO Programme include a significant uplift in the perception of the 3C ICT service, greater preparedness for LGR and the implementation of solid technology foundations which can be built upon.

42. However, the CDIO Programme also has some missed opportunities in relation to some cultural issues that remain within some of the operational and delivery teams, and support services still receive a mixed user perception. This aligns with the 3C ICT Customer Survey outcomes and indicates there is still work to do.

43. The remaining activities of the CDIO Programme will be allocated either to Operational Activities ("Business as Usual") or the developing LGR Readiness Programme.

44. In November 2025, a CDIO360 was conducted to determine the impact of the introduction of the CDIO role, and the performance of the postholder. Feedback was sought from stakeholders within each 3C Partner Council, including the Chief Executive, the 3C Shared Service Director, a non-ICT Director, and the Transformation/PMO Lead.

45. The CDIO360 summarised that the CDIO role is already providing substantial value, particularly in alignment, communication, and leadership in digital matters.

> “The creation of the role has been very positive and a step-change in the delivery of the service to the Council”

> “The CDIO role has brought greater stability, structure and transparency to how digital and technology decisions are made across the partnership. It’s reassuring to have a senior lead who actively removes barriers and advocates for digital progress”

46. Respondents highlighted the CDIO’s strong blend of strategic, technical, and people leadership skills, as well as their ability to simplify complex issues and foster collaboration

> “[The CDIO’s] ability to simplify complex issues, communicate with clarity, and create a sense of shared purpose across the partnership councils has added real value. He’s shown a proactive and supportive leadership style, which has helped strengthen confidence and collaboration across digital and transformation teams”

> “I welcome [the CDIO’s] approach to challenging the partnership. He does it well, and I would encourage that to continue”

> “I am very glad [the CDIO] has joined us, and I can see the practical differences it has already made”

> “[The CDIO’s] ability to bridge the gap between technical and strategic is very apparent”

47. The CDIO360 report found that the CDIO’s broader experience in Unitary Councils has been demonstrated, and there was a broad recognition that this will be a critical leadership capability needed to support each council with their LGR journey.

48. LGR digital leadership will be an increasingly essential and time-consuming role, and survey respondents indicated that the CDIO would require increased support and capacity to provide this LGR leadership in the future.

> “[The CDIO’s] proven ability to operate at the Unitary/County level has shone brightly”

"The work towards LGR will become a significant programme for us all, I welcome [the CDIO's] work on this already and have a lot of confidence he will develop this further"

"[The CDIO] is doing an incredibly difficult, but much-needed job. He is challenging at all levels and brings balance and humour to that. He is seeking to embed Digital as a core consideration of LGR and Transformation"

49. A particular success over the past year has been the significant uplift in the relationship between the councils and the 3C ICT Shared Service. This has been driven by a change in the individuals, a new CDIO, and a reset of the 'intelligent client' function to the Chief Operating Officer, along with a more open and transparent approach to service remediation.

50. The evolution of the 3C ICT Shared Service from being a back-office function to a digital enabler has commenced. The CDIO has provisioned senior digital leadership into the Councils and provided a set of skills that have improved the strategic approach and also in how the council manages its vendors and contracts, as well as providing strategic advice to the council's leadership team. This is particularly evident in the Housing Improvement Board.

51. The move to a more open, collaborative and strategic approach has also led to a culture change across the organisations. Whilst service delivery issues remain, and remediation activity continues, there is a more positive attitude towards the ICT service from council colleagues, which has improved morale considerably, and is driving results as seen in the ICT Customer Survey.

Background Papers

Appendices

Appendix A: 3C ICT Audit Report

Appendix B: 3C ICT Customer Survey Outcome Report

Appendix C: 3C ICT Performance Metrics

Report Author:

Simon Oliver – Chief Digital and Information Officer

This page is intentionally left blank

HUNTINGDONSHIRE DISTRICT COUNCIL

IT Remediation Review – Huntingdonshire District Council Arrangements

FINAL Internal Audit Report 2025/26

12 February 2026

THE POWER OF BEING UNDERSTOOD
AUDIT | TAX | CONSULTING

RSM

CONTENTS

Appendices

AUDIT OUTCOME OVERVIEW

In line with our scope, included at Appendix B, the overview of our findings is detailed below.

Background: As part of the 2025/26 Internal Audit plan, we have reviewed Huntingdonshire District Council's (HDC) arrangements for the Chief Digital and Information Officer (CDIO) role. Triple Value Impact (TVI), a third party, performed an ICT review which identified a need for the CDIO role and sets out the context for the CDIO programme, highlighting the need for improved digital leadership, governance, and operational ICT services. It recommended evolving the 3C ICT service into a "3C Digital" model, led by a CDIO delivering a CDIO programme, supported by a digital projects team and an operational ICT team. Our review focused on the CDIO role in delivering the intended outcomes of the CDIO programme and associated remediation activities, including governance, leadership impact, delivery against Year 1 success criteria, and measured improvements in customer satisfaction. The objective was to assess whether the role, as designed and implemented, has provided the expected uplift in stability, transparency, cultural change and strategic alignment across digital and ICT services.

The scope of this review considered:

i. Year 1 success criteria and the underlying three-wave delivery framework;
ii. CDIO forum reporting and internal ICT presentations;
iii. Year-on-year customer satisfaction survey results (2024 vs 2025); and
iv. 360-degree feedback and stakeholder interviews.

We also met with key stakeholders to obtain feedback on the CDIO's impact, recognising that testing was undertaken on a sample basis and did not extend to a comprehensive review of all aspects of IT governance or verification of reported data.

HDC, along with its partner Councils, Cambridge City Council (CCC) and South Cambridgeshire District Council (SCDC), have introduced the CDIO role with transition funding and establishment uplift to strengthen digital leadership and delivery discipline. Evidence from programme materials and the 360 satisfaction survey indicates that the role has driven improved stability, transparency, cultural interventions, and stronger alignment across digital and ICT. These improvements sit alongside a structured three-wave plan sequencing initiatives, budgets, dependencies and timelines, and a consolidated customer satisfaction instrument enabling robust comparison between 2024 and 2025 to evidence progress.

This assessment was therefore designed to evaluate the extent to which outcomes to date align to the original CDIO programme intent and Year 1 success criteria, while acknowledging scope limitations and ongoing transformation dependencies, such as operating model changes, capacity uplift, and cross-council governance alignment.

Conclusion: Our assessment indicates that the introduction of the CDIO role has enabled HDC to deliver improvements as set out by the CDIO programme and has accelerated foundations for long-term improvement. Programme evidence and 360-degree feedback as part of the employee satisfaction survey for HDC point to a step change in leadership presence and alignment across digital and ICT, alongside a governance reset, improved transparency, cultural interventions, and measurable gains in user sentiment across key service attributes. The three-wave delivery framework has strengthened sequencing and dependency management, and a consolidated survey instrument evidence's year-on-year improvement in overall satisfaction and core service dimensions. Taken together, these outcomes demonstrate clear positive impact against the intent of the CDIO programme.

Nevertheless, we identified areas where further action is needed to fully realise and sustain benefits. The operating model uplift is incomplete, with delays to recruitment (such as Enterprise Architect and Business Partnering) sustaining a single-point dependency on the CDIO.

We have agreed two medium priority actions in relation to the above. Furthermore, while year-on-year satisfaction scores have improved, the survey results confirm that several user-level service gaps remain unresolved. Until the Council completes the planned Wave 2 - 3 activities to address these gaps, there is a continued risk that improvements delivered to date will not fully translate into a sustained uplift in user experience.

Audit themes:

Management or performance information

Customer satisfaction results demonstrate clear year-on-year improvement; however, survey feedback highlights persistent service gaps that align with Wave 2–3 deliverables not yet completed. To ensure benefits are realised at user level, these gaps require targeted close-out supported by defined KPIs, ownership and ongoing performance reporting. **(Medium)**

Design of the control framework

While the three-wave delivery framework has strengthened discipline and structure, several Year One success criteria remain in progress due to dependencies on governance restructuring, operating-model uplift and organisational maturity. Without re-baselining success measures to realistic timelines and ownership, the programme risks being unable to demonstrate delivery progress despite meaningful advances. **(Medium)**

Programme design and delivery discipline

The CDIO translated Year-One success criteria into a three-wave delivery framework that sequences initiatives, clarifies dependencies, and ties spend to outcomes; this re-baselining improved transparency while delivering more within the same overall timeline and budget envelope, evidenced by wave-based progress tables and cost trackers presented to leadership throughout the year. Programme packs show Wave 1 substantially completed early, strong progression of Wave 2 enablers, and an itemised budget position that remained within allocation while absorbing limited re-prioritisations (such as Applications Rationalisation) to maximise value delivery.

Structured, consistent leadership communication

Regular “CDIO/CX” forum and All-Staff briefings provided a consistent, traceable line of sight from objectives to delivery, with progress percentages, outstanding actions, and cost trackers reported across May, September and December 2025. This cadence strengthened stakeholder confidence and alignment by showing what was complete, what was in train, and where structural dependencies remained, culminating in clear messaging on audit readiness and next steps.

Outcome-focused performance evidence

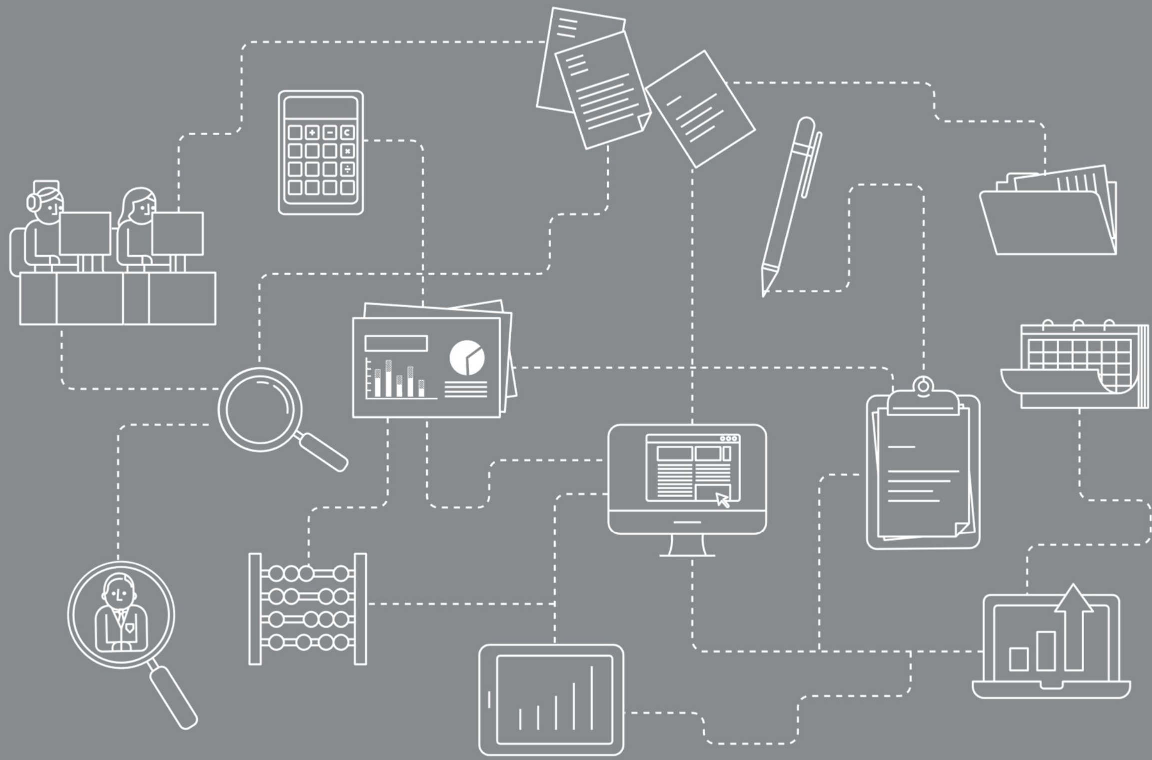
The programme used a consolidated customer-satisfaction instrument and a KPI/SLA refresh to evidence improvements, with results confirming the 10%+ uplift target and documenting progress on metrics that matter to users and governance alike. This outcome-orientation demonstrates a credible benefits narrative linking governance reset and service interventions to measurable user-level improvements.

Satisfaction Uplift with Lower Participation

The 360 degree satisfaction report, developed by TVI, in 2025 records a significantly lower response volume (552 in 2024 vs 183 in 2025), and a higher proportion of respondents who were at least somewhat satisfied (62% in 2024 vs 76% in 2025), alongside positive movements on reliability (+15% “somewhat reliable or above”), support effectiveness (+14% positive; +19% “very effective”), and remote/flexible working (+6% positive).

Summary of Actions for Management

01



SUMMARY OF MANAGEMENT ACTIONS

The action priorities are defined as*:

High	Medium	Low
Immediate management attention is necessary.	Timely management attention is necessary.	There is scope for enhancing control or improving efficiency.

Ref	Action	Priority	Responsible Owner	Date
1	A revised, realistic plan for completing or re-baselining the remaining Year One success criteria will be agreed and documented. This will include clear timelines, ownership, and governance reporting to evidence progress and maintain confidence in programme delivery. Where criteria are no longer achievable due to maturity constraints, success measures will be formally updated to reflect agreed priorities and dependencies.	Medium	Simon Oliver, Chief Digital and Information Officer	30 April 2026
	A concise close-out plan will be agreed and documented that will: 1. Ensure the recruitment of the customer experience manager; 2. Assign ownership, timelines, and reporting for survey-identified service gaps (Hornbill Phase Two, Applications Support review, device/meeting-room upgrades); and 3. Re-baseline success measures where capacity or maturity constraints require staged delivery.	Medium	Simon Oliver, Chief Digital and Information Officer	30 April 2026

* Refer to Appendix A for more detail

Detailed Findings and Actions

02

DETAILED FINDINGS AND ACTIONS

This report has been prepared by exception. Therefore, we have included in this section, only those areas of weakness in control or examples of lapses in control identified from our testing and not the outcome of all audit testing undertaken.

<table>
<tr><th colspan="5">Year One Success Criteria Achievement</th></tr>
<tr><td>Control</td><td colspan="2">A CDIO-led programme is in place with Year One success criteria defined across five key outcomes, supported by transition plans and governance expectations.
Delivery discipline has been strengthened through a three-wave framework that sequences initiatives, allocates budgets, and provides visibility of dependencies and timelines.</td><td colspan="2">Assessment:
Design ✓
Compliance ×</td></tr>
<tr><td>Findings / Implications</td><td colspan="4">The Partner Councils have a CDIO programme established in direct response to the Triple Value Impact (TVI) review, with clearly defined Year One success criteria across five outcomes (effective joint governance, collaborative digital leadership, organisational restructure, CSIP led improvements, and a reliable operational ICT service) and supporting transition plans and governance expectations.

These outcomes have been supported by the £241k transition funding and the commencement of the £300k establishment uplift. The CDIO role has strengthened delivery discipline by reworking these outcomes into a three-wave framework with a revised timeline, detailed initiatives and budgeted workstreams, which has improved transparency of sequencing and dependencies. The scale and depth of work delivered through this three-wave approach have exceeded the initial expectations and budgeted effort associated with the original success criteria plan, reflecting the significant remediation and foundational change required to support long term improvement.

However, assessed against the original TVI success criteria at year end, the current status is:
• collaborative digital leadership complete;
• CSIP/improvement actions complete;
• effective joint governance in progress, with governance restructure and cost apportionment methodology not yet fully implemented;
• organisational restructure in progress, with delays in recruiting the Enterprise Architect and Business Partner; and
• reliable operational ICT service in progress, with full service redesign dependent on Target Operating Model changes, cultural change and additional delivery capacity beneath the CDIO.

If the remaining Year One success criteria are not completed within a realistic and formally agreed revised timeframe, there is a risk that overall programme success cannot be evidenced to governance bodies, with benefits realisation delayed and the CDIO’s impact under recognised despite substantial progress to date. This may undermine confidence in the sustainability of improvements and constrain planning for subsequent phases, highlighting the need to formally re baseline expectations where original criteria are no longer achievable due to maturity constraints.</td></tr>
<tr><td>Management Action 1</td><td>A revised, realistic plan for completing or re-baselining the remaining Year One success criteria will be agreed and documented. This will include clear timelines, ownership, and governance reporting to evidence progress and maintain confidence in programme delivery. Where criteria are no longer achievable due to maturity constraints, success measures will be formally updated to reflect agreed priorities and dependencies.</td><td>Responsible Owner:
Simon Oliver, Chief Digital and Information Officer</td><td>Date:
30 April 2026</td><td>Priority:
Medium</td></tr>
</table>

Customer Satisfaction Surveys

Control

The Partner Councils operate a consolidated customer satisfaction survey using a consistent methodology across 2024 and 2025, enabling clear year-on-year comparison.

Assessment:

Design	✓
Compliance	×

Findings / Implications

The Partner Councils have implemented a structured customer satisfaction survey, consolidating 2024 and 2025 results into a single instrument with consistent scales and side-by-side analysis. Year-on-year improvements are evidenced:

- overall satisfaction increased from 62% to 76%;
- reliability is rated “somewhat reliable or above” by 75% of respondents; and
- support effectiveness reached 87%, with a notable uplift in “very effective” responses.

Positive movement is also observed in communication, remote/flexible working, and confidence in cyber capability, aligning to Year One objectives and CDIO-led foundations (culture reset, Hornbill Phase One, Microsoft platform work).

However, survey responses highlight persistent service gaps; clarity of application support pathways remains mixed (61% clear), and users continue to report practical issues across connectivity/network, meeting-room equipment, laptops, and helpdesk/ticketing. These themes map to planned Wave 2–3 deliverables (e.g. Hornbill Phase Two, Applications Support & Development Review, device and meeting-room upgrades) that are not yet fully implemented.

If these survey-identified service gaps are not closed within an agreed and realistic timeframe, there is a risk that benefits realisation at the user level will stall and the programme will be unable to fully evidence sustained improvement, under-representing the impact of Year One activities.

Management Action 2

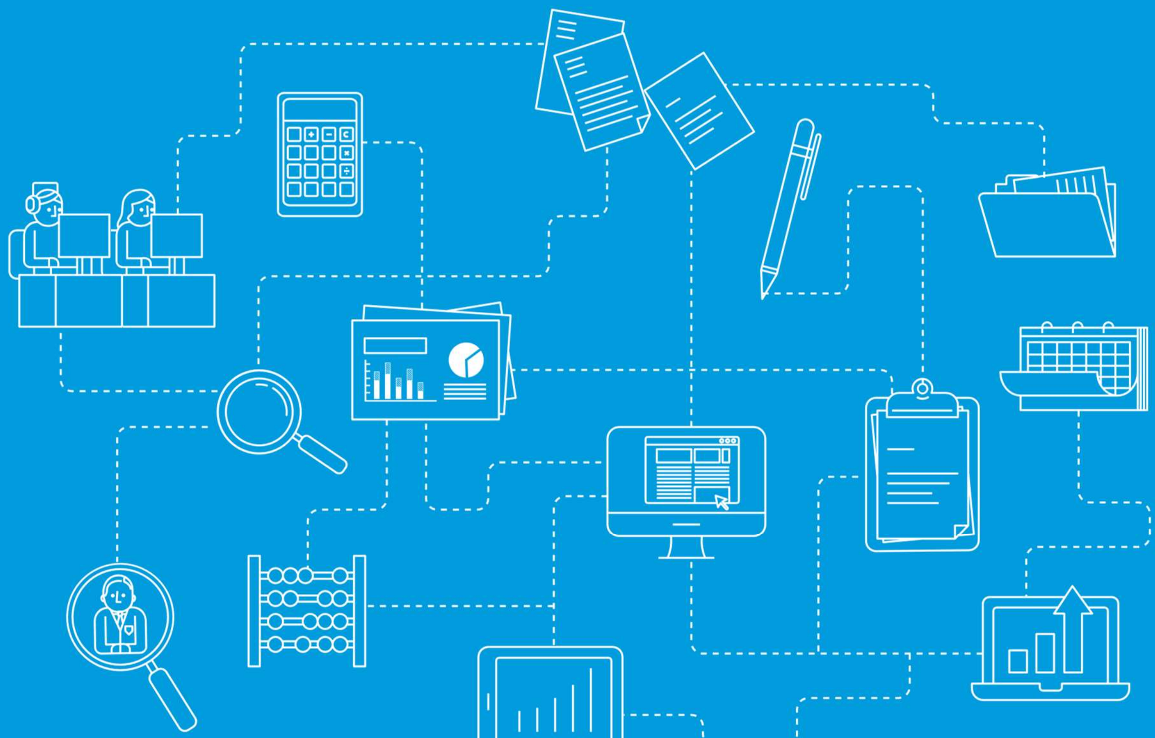
A concise close-out plan will be agreed and documented that will:

1. Ensure recruitment of the customer experience manager;
2. Assign ownership, timelines, and reporting for survey-identified service gaps (Hornbill Phase Two, Applications Support review, device/meeting-room upgrades); and
3. Re-baseline success measures where capacity or maturity constraints require staged delivery.

Responsible Owner:	Date:	Priority:
Simon Oliver, Chief Digital and Information Officer	30 April 2026	Medium

Appendices

03



APPENDIX A: CATEGORISATION OF FINDINGS

Categorisation of internal audit findings
Low There is scope for enhancing control or improving efficiency.
Medium Timely management attention is necessary. This is an internal control risk management issue that could lead to: Financial losses which could affect the effective function of a department, loss of controls or process being audited or possible reputational damage, negative publicity in local or regional media.
High Immediate management attention is necessary. This is a serious internal control or risk management issue that may lead to: Substantial losses, violation of corporate strategies, policies or values, reputational damage, negative publicity in national or international media or adverse regulatory impact, such as loss of operating licences or material fines.

The following table highlights the number and categories of management actions made as a result of this audit.

Area	Control design not effective*	Non-compliance with controls*	Agreed actions		
			Low	Medium	High
Year One Success Criteria	0	1	0	1	0
CDIO Programme	0	0	0	0	0
CDIO Forum Reports	0	0	0	0	0
CDIO Presentations to Council	0	0	0	0	0
Customer Satisfaction Surveys	0	1	0	1	0
Key Stakeholders Feedback	0	0	0	0	0
Total			**0**	**2**	**0**

* Shows the number of controls not adequately designed or not complied with.

APPENDIX B: SCOPE

The scope below is a copy of the original document issued.

Scope of the review

The scope was planned to provide assurance on the controls and mitigations in place relating to the following objective:

Objective of the review	Risks relevant to the scope of the review	Risk source
Undertake a review to assess the success of the Chief Digital and Information Officer (CDIO) role against expected outcomes per the CDIO programme and delivering remedial activities.	The remediation plan for 2025 has not been implemented as required.	CDIO

When planning the audit, the following were agreed:

Areas for consideration:

- Review the objectives and activities including year one success criteria
- Review the CDIO programme and other CDIO led activity
- Review the CDIO Forum reports
- Review the CDIO internal ICT presentations to the council
- Compare the results of the customer satisfaction surveys between 2024 and 2025
- Review the results of the CDIO role and post holder survey
- Meet with key stakeholders to obtain feedback on the CDIO programme

Limitations to the scope of the audit assignment:

- The scope of our work will be limited only to those areas that have been examined and reported and is not to be considered as a comprehensive review of all aspects of IT governance.
- This review was carried out in an advisory capacity.
- This review will focus on the IT remediation performed within HDC and not directly on the Partner Councils.
- We will not consider ICT budget management, overtime spend or efficiency savings in this review.
- Testing will be undertaken on a sample basis only, limited to the areas set out above.
- We will not provide assurance that the programme will allow the organisation to achieve its objectives.
- The review will not ensure compliance with data protection regulations and ethical standards for data use.
- The results of our work are reliant on the quality and completeness of the information provided to us. We will not confirm the accuracy of the data reported.
- Our work will not provide an absolute assurance that material errors, loss or fraud do not exist.

Debrief held	15 January & 5 February 2026	**Internal audit Contacts**	Daniel.Harris@rsmuk.com / +44 1908 687915
Draft report issued	9 February 2026		Alastair.Foster@rsmuk.com / +44 1908 687915
Responses received	12 February 2026		Anna.O'Keeffe@rsmuk.com / +44 1908 689969
			Joseph.Webb@rsmuk.com / +44 1908 689965
			Jordan.Watson@rsmuk.com / +44 (20) 32018065
Final report issued	12 February 2026	**Client sponsor**	Simon Oliver / Chief Digital and Information Officer
		Distribution	Simon Oliver / Chief Digital and Information Officer Michelle Sacks / Huntingdonshire District Council Chief Executive

We are committed to delivering an excellent client experience every time we work with you. If you have any comments or suggestions on the quality of our service and would be happy to complete a short feedback questionnaire, please contact your RSM client manager or email admin.south.rm@rsmuk.com.

FOR FURTHER INFORMATION CONTACT

Dan Harris, Partner & Head of Internal Audit

Email: Dan.Harris@rsmuk.com

Telephone: +44 1098 687915

Alastair Foster, Associate Director

Email: Alastair.Foster@rsmuk.com

Telephone: +44 1098 687915

rsmuk.com

3C ICT
ICT satisfaction survey

November 2025

Total Number of Respondents

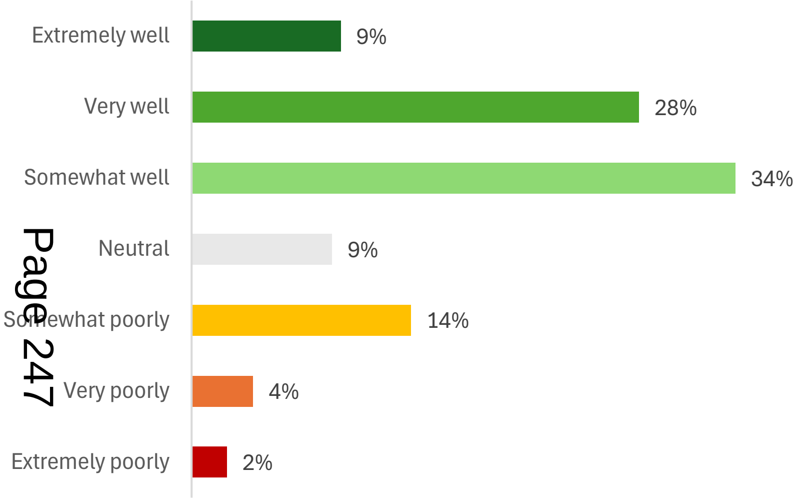
	2024	2025
Cambridge City Council	202 / 800 (25%)	**50 / 800 (6%)**
Huntingdonshire District Council	211 / 626 (34%)	**42 / 626 (7%)**
South Cambridgeshire District Council	139 / 690 (20%)	**91 / 690 (13%)**
	552 Total responses	**183** Total responses

While total responses were lower in 2025, this still represents a statistically significant number of respondents – and a lower response rate could indicate a less opinionated view of the service

Cambridge City Council
Huntingdonshire District Council
South Cambridgeshire District Council
Triple Value Impact

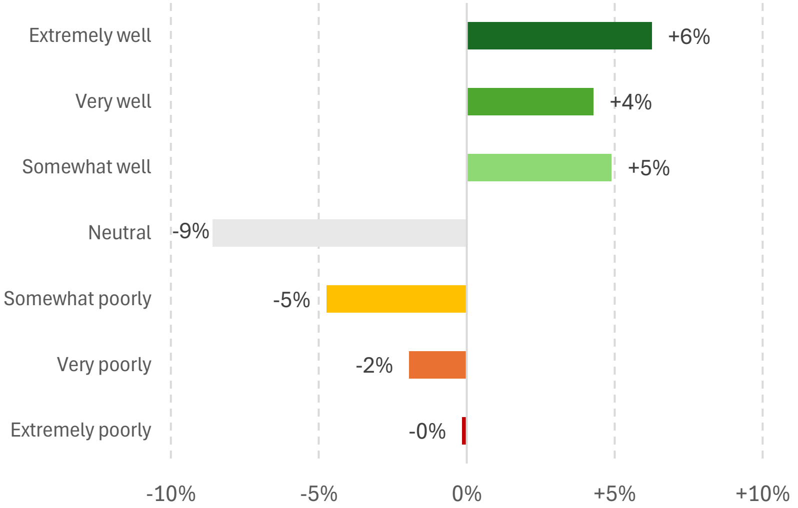
Q1. How well do the current IT solutions and applications enable you to perform your role?

All Service Users, 2025



IT solutions and applications are generally viewed positively, with approximately 2 in 3 (61%) of respondents rating them Somewhat well or better

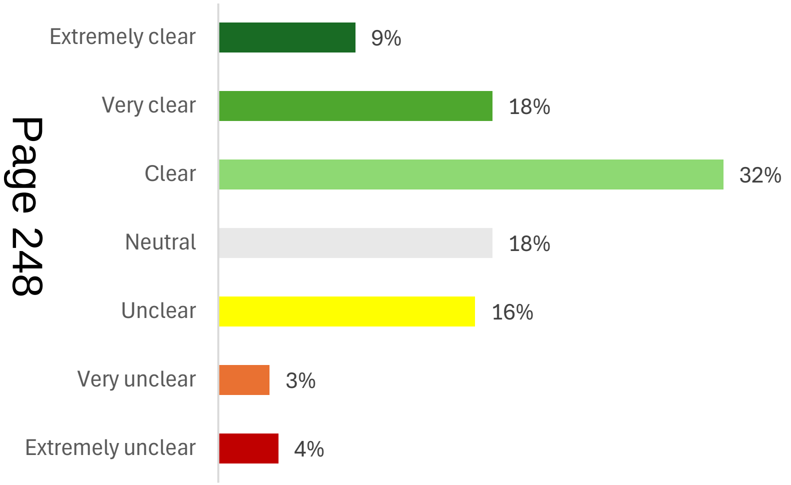
Change from June 2024



There has been a significant positive shift in the last year, with an additional 15% of people now stating services enable them to do their role at least somewhat well

Q2. Is it clear which ICT services are supported by 3C ICT versus other council teams?

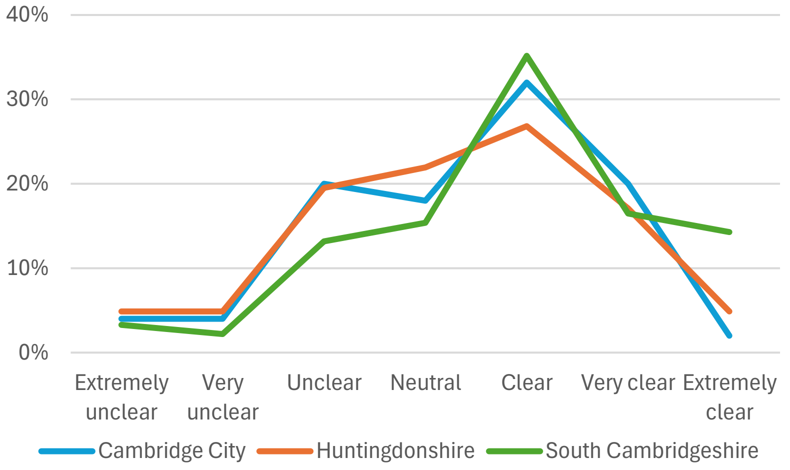
All Service Users



Page 248

The majority of service users rated the service as neutral or above (78%)

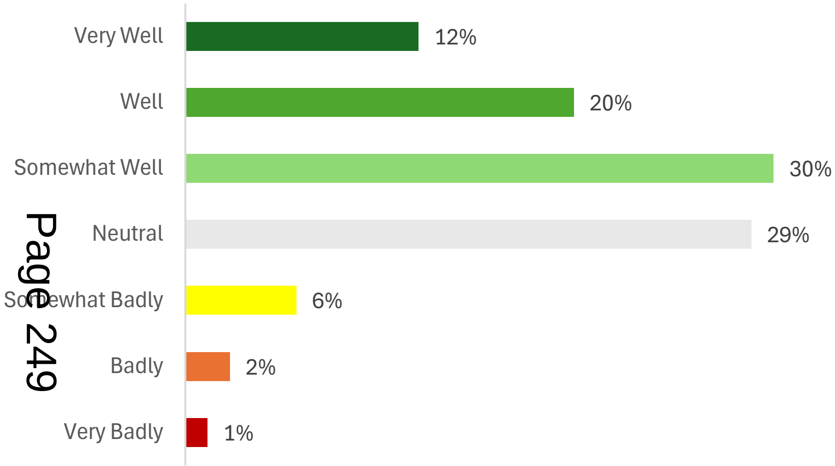
Individual Council Results



Results are highly aligned between the different councils

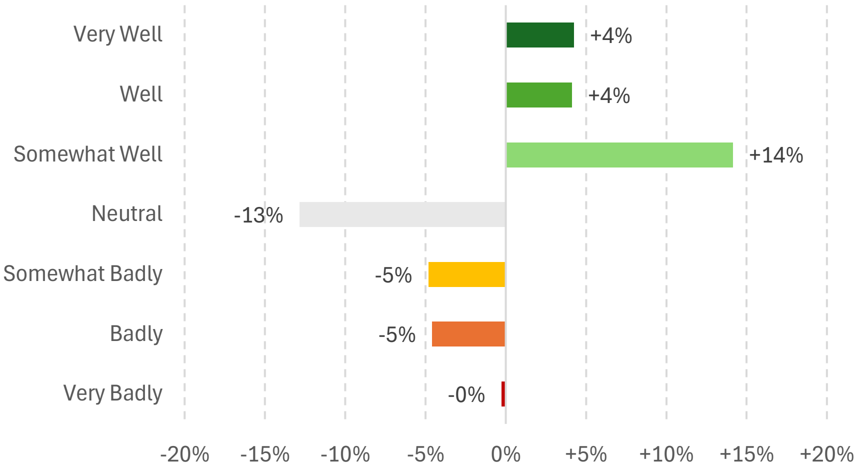
Q3. How has the quality of service from your ICT Service changed over the two years?

All Service Users



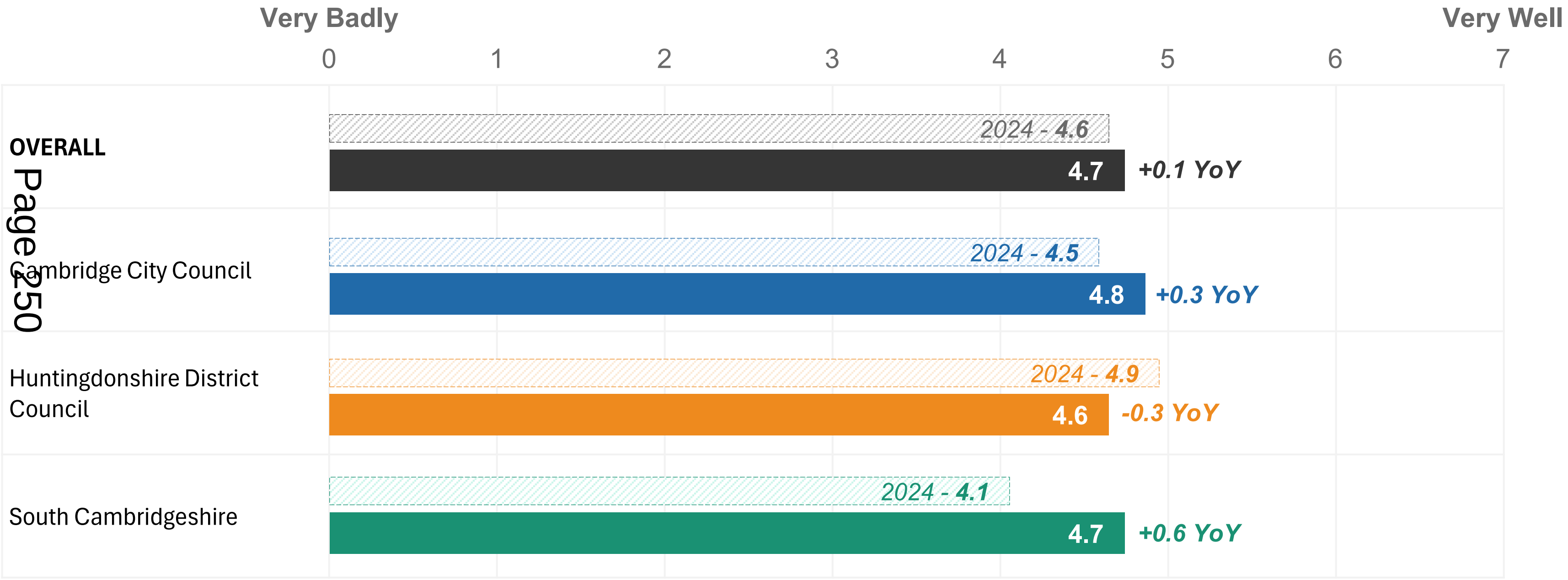
The majority of service users rated the service as neutral or above (91%, compared to 78% in June 2024)

Change from June 2024



There has been a significant shift since June 2024, with an additional 25% of respondents stating there has been a positive increase in service quality over the last 2 years

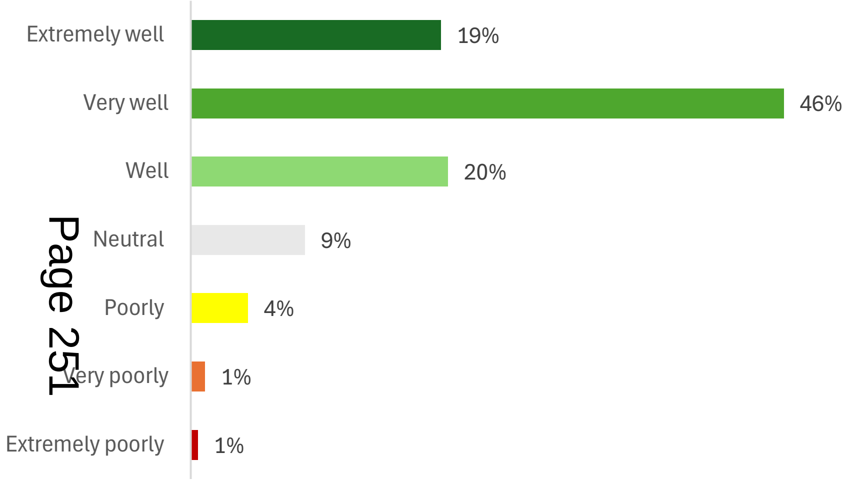
Q4. How well are you kept informed by your ICT service? (e.g. about issues, changes and new functionality)



Page 250

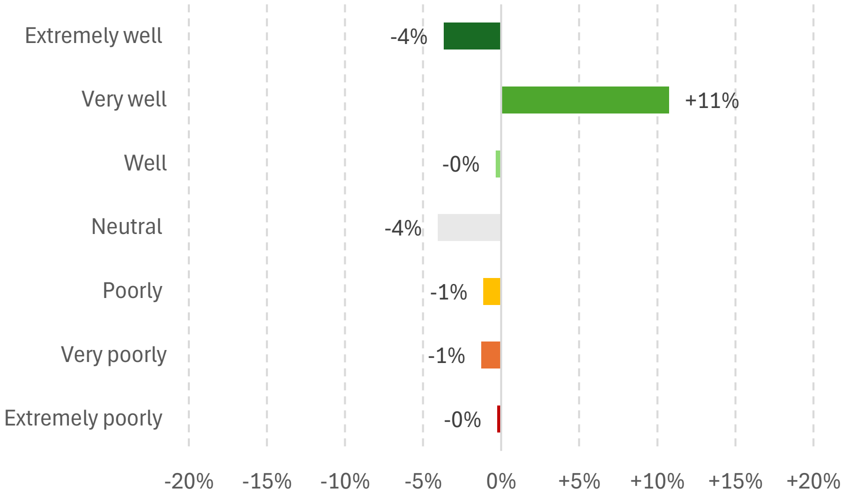
Q5. How well do you think the ICT systems support remote or flexible working arrangements?

All Service Users



There is a strong perception of how IT systems support remote or flexible working, with **85% of respondents** indicating systems support them **well, very well or extremely well**

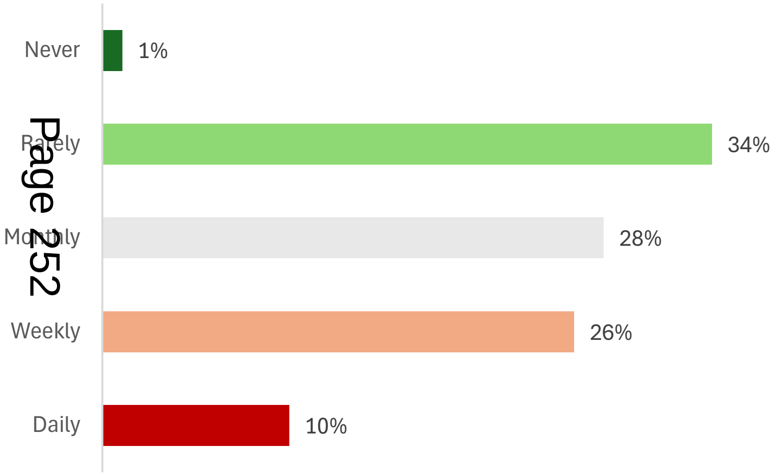
Change from June 2024



There has been a significant positive shift, with 6% of respondents who were either neutral or negative now providing a positive response

Q6. How often do you encounter technical issues with ICT systems in your daily operations?

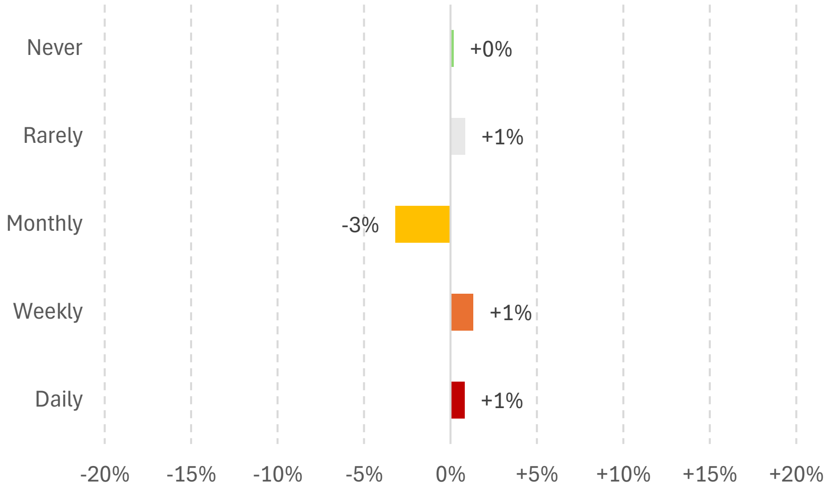
All Service Users



Page 252

2 in 3 respondents encounter issues on a no more than monthly basis – a very similar result to the previous survey in June 2024

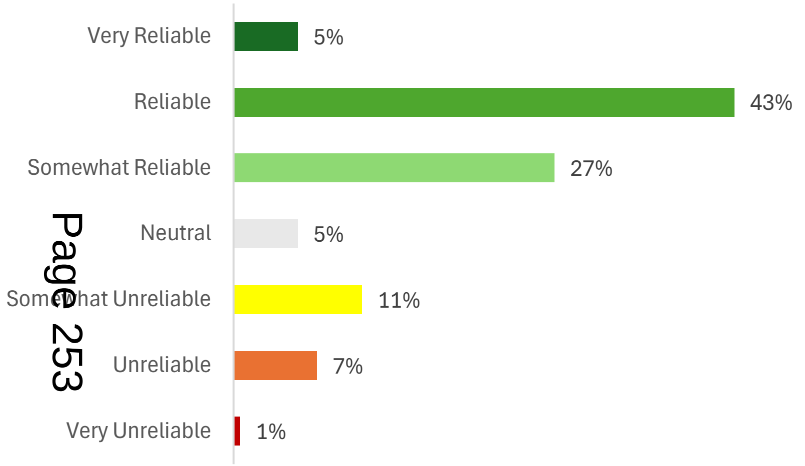
Change from June 2024



There has been a small change in the distribution of answers, with respondents reporting increased weekly / daily issues as well as rarely or never reporting issues.

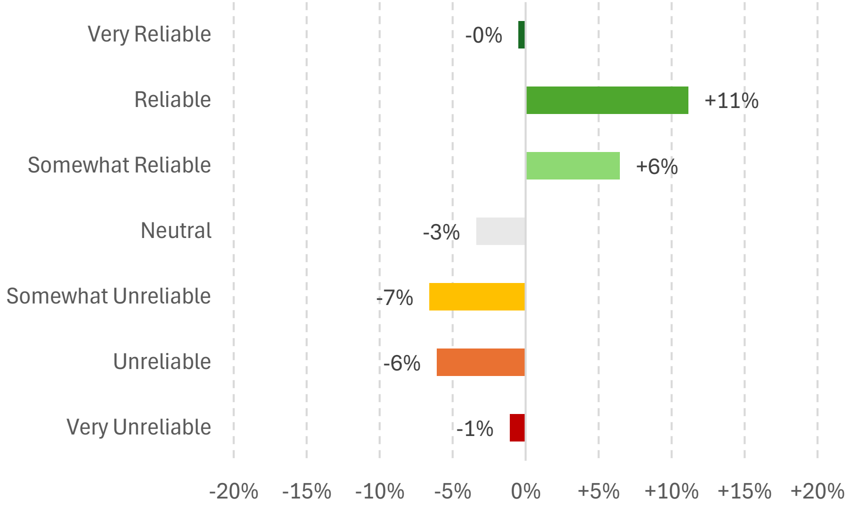
Q7. On a scale of 1 to 7, how would you rate the reliability of your organisation's ICT systems?

All Service Users



There was a positive response to ICT's perceived reliability, with **75%** of respondents rating services **somewhat reliable or above**

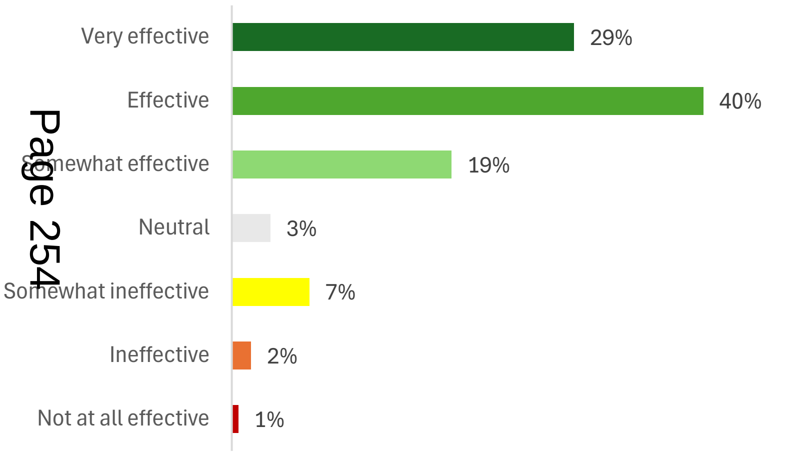
Change from June 2024



This has seen a significant positive shift since the previous survey, with an **additional 15% of respondents indicating a positive response**

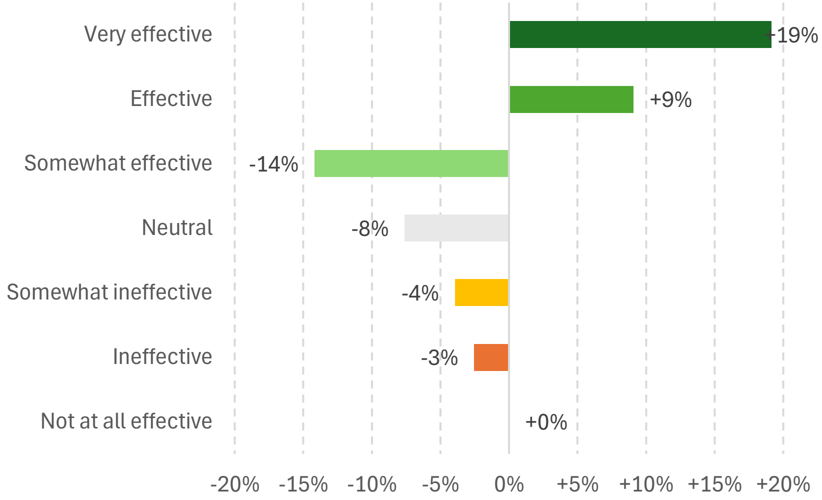
Q8. How effective do you find the current ICT support team in resolving issues?

All Service Users



Most users (87%) believe that the ICT support team is effective at resolving issues

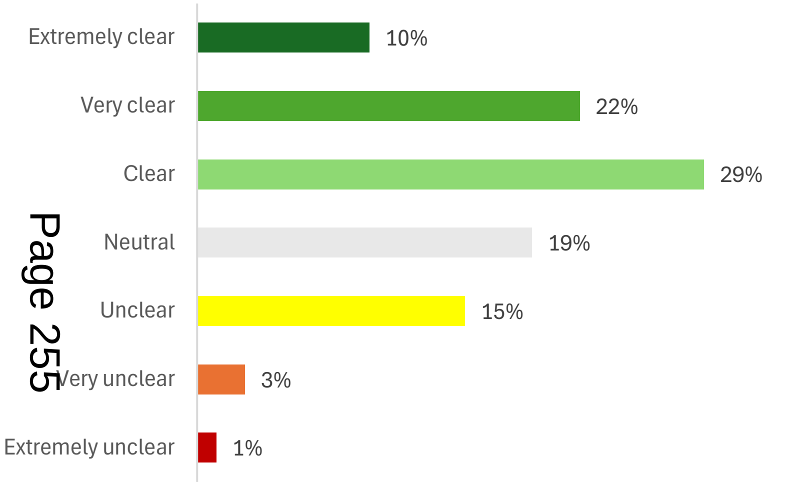
Change from June 2024



An **additional 14%** of respondents now **view the service positively**. Additionally, the **strength of response has increased**, with an **additional 19%** indicating the team are **very effective**

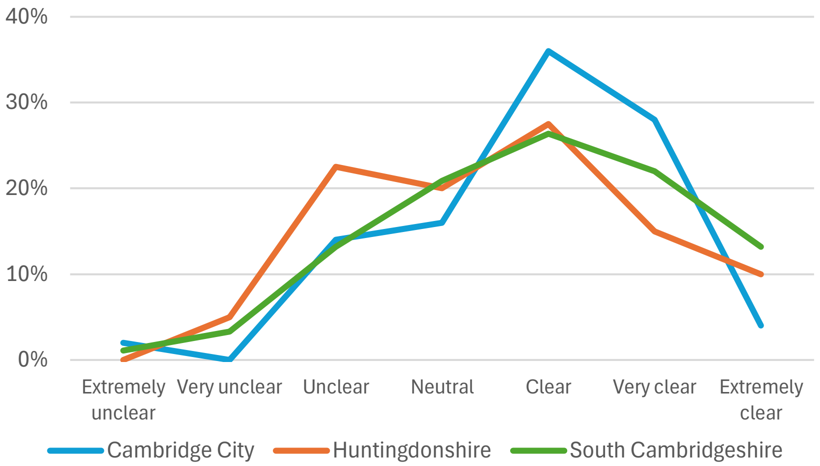
Q9. Are you clear on who supports your applications and how to get support?

All Service Users



2 in 3 respondents (61%) were clear, very clear or extremely clear about how to get support on their applications

Individual Council Results

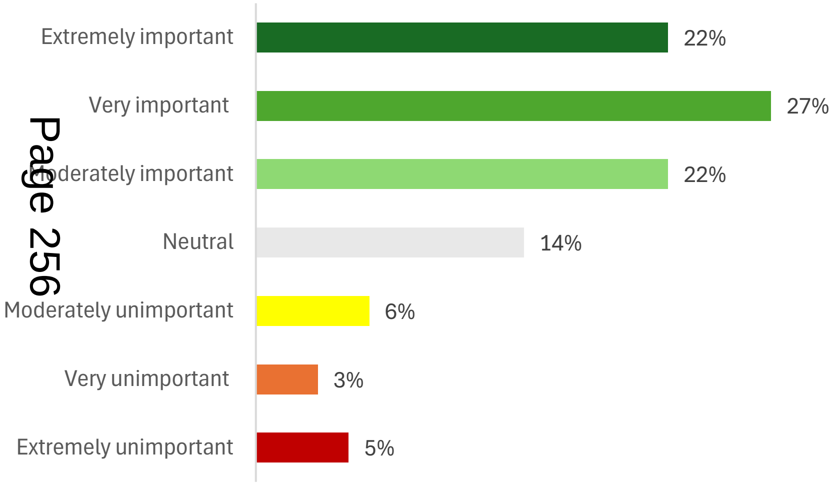


Councils were broadly similar, with Huntingdonshire colleagues indicating they were slightly more unclear on who supports their applications

Page 255

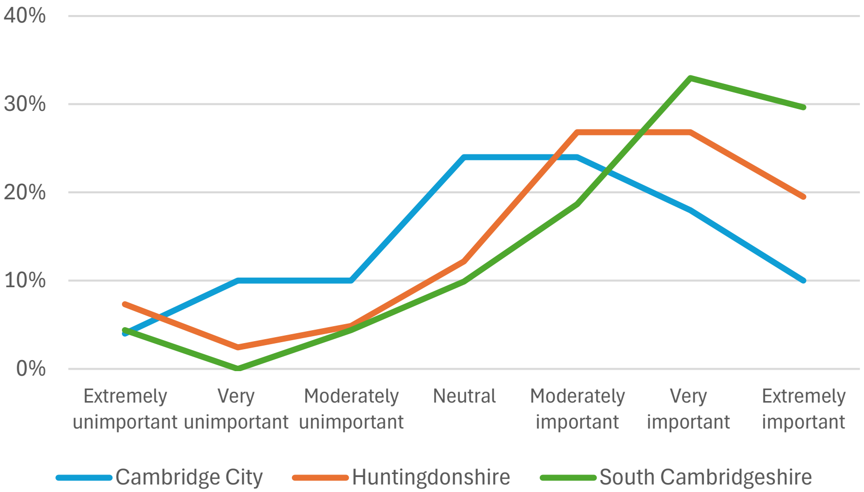
Q10. How important is it for you to see ICT staff present at your office location?

All Service Users



The majority of respondents (71%) indicated it was **at least moderately important** to see ICT staff present in the office

Individual Council Results

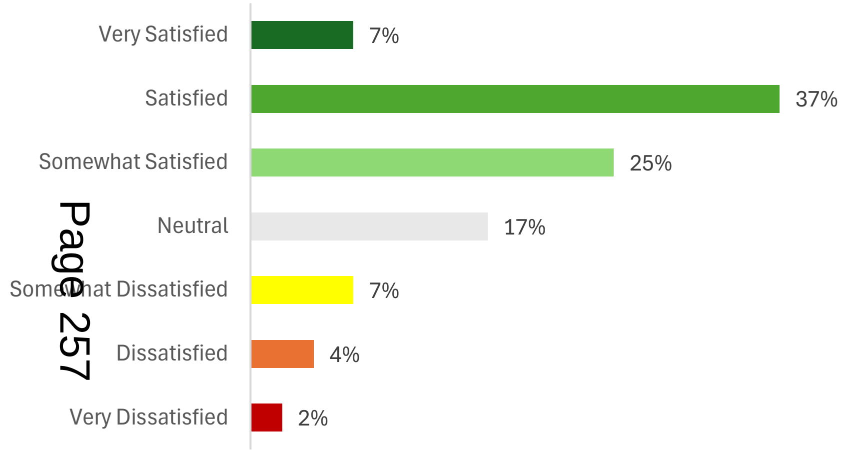


Councils were broadly similar, with Cambridge City Council indicating it was relatively less important for them to see ICT staff present in the office, compared to the other authorities

Page 256

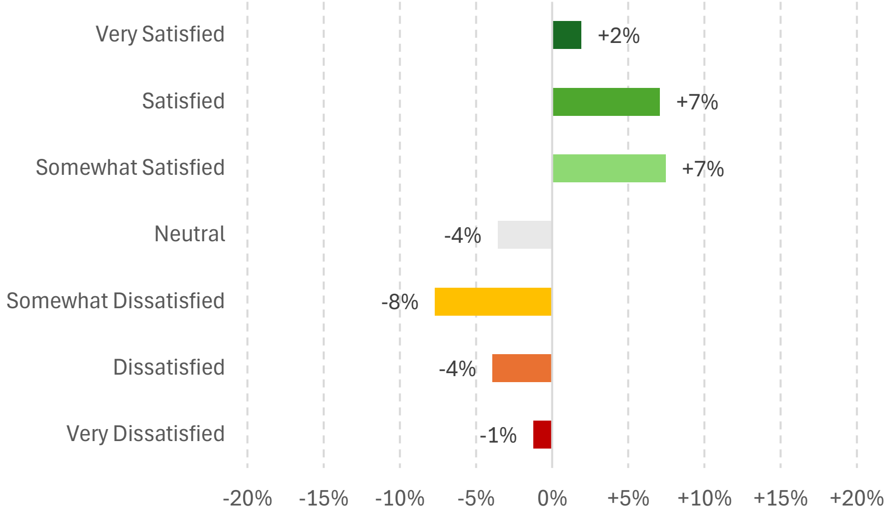
Q11. How satisfied are you that ICT understands your business area?

All Service Users



The majority of respondents (86%) were neutral or positive about ICT's understanding of their business area

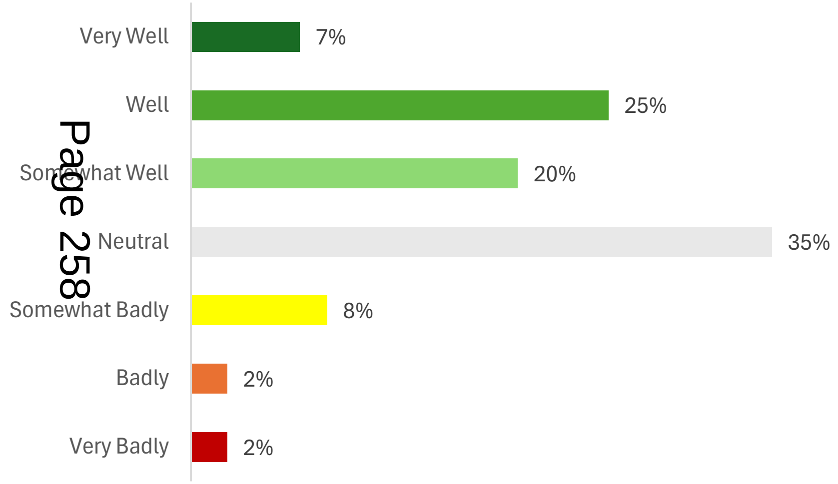
Change from June 2024



The number of respondents rating services **neutral or above** has risen from **74% to 86%** since June 2024

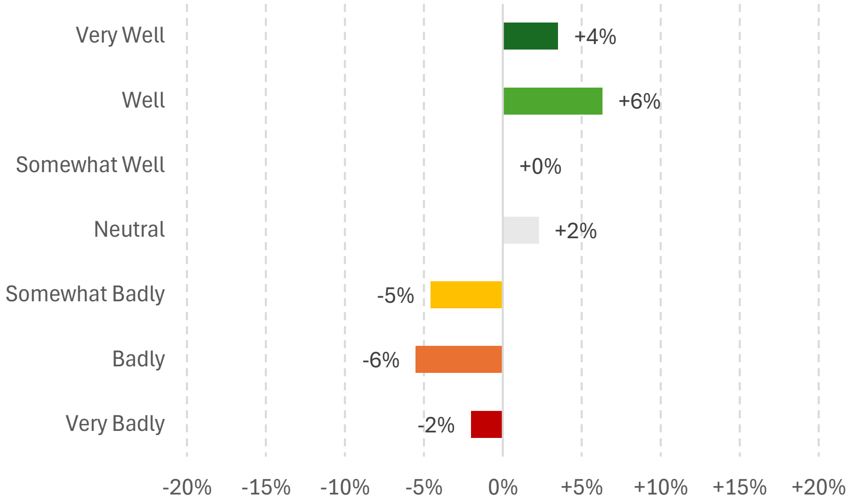
Q12. How well does the ICT service provide innovative solutions to changing business needs?

All Service Users



The majority of respondents (87%) rated this as neutral or above, but it should be noted there is a large minority (35%) who were only neutral in this regard

Change from June 2024



There has been a **significant increase (10%)** of respondents indicating **Well or Very Well** as their response. There remains a significant proportion of neutral responses

Page 258

Q13. On a scale of 1 to 5, what is your satisfaction with the following technical or support capabilities. (1/2 - Actual, 2025)

	Devices and laptops	Collaboration tools (e.g. Teams, SharePoint) & e-mail	Meeting Rooms / Hybrid Meetings	E-mail	Telephony	Corporate and business applications	Connectivity (e.g. Wi-Fi, VPN, etc)	Service desk	Field engineering / onsite desktop support	Application support	Website and Intranet, including e-forms	ICT Consultancy and ICT Projects	Average
Overall	**3.8**	**3.9**	**3.6**	**4.1**	**3.7**	**3.5**	**3.4**	**3.9**	**3.8**	**3.6**	**3.5**	**3.3**	**3.7**
Cambridge City Council	4.1	3.9	3.8	4.2	3.7	3.7	3.5	4.1	4.1	3.8	3.5	3.4	3.8
Huntingdonshire District Council	3.7	3.9	3.3	4.0	3.6	3.4	3.3	3.8	3.5	3.4	3.7	3.2	3.6
South Cambridgeshire	3.7	3.9	3.7	4.0	3.8	3.5	3.5	4.0	3.8	3.6	3.4	3.4	3.7

Key: Score >= 3.5 | 3 < score < 3.5 | 2 < score <= 3 | score < 2

Q13. On a scale of 1 to 5, what is your satisfaction with the following technical or support capabilities. (2/2 – YoY change)

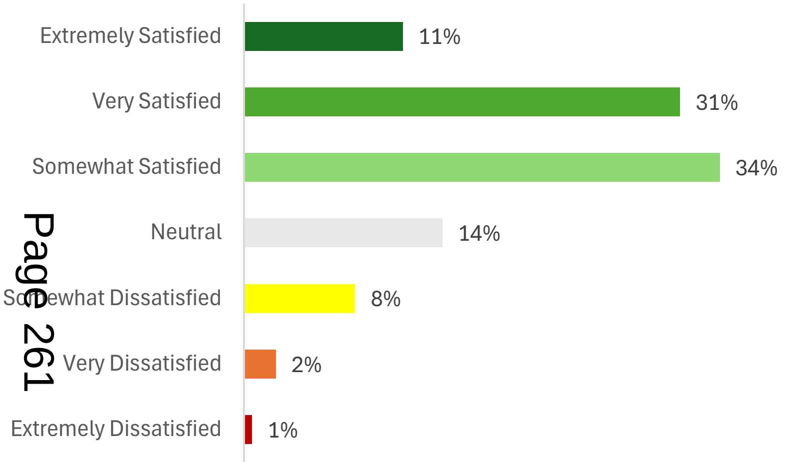
	Devices and laptops	Collaboration tools (e.g. Teams, SharePoint) & e-mail	Meeting Rooms / Hybrid Meetings	E-mail	Telephony	Corporate and business applications	Connectivity (e.g. Wi-Fi, VPN, etc)	Service desk	Field engineering / onsite desktop support	Application support	Website and Intranet, including e-forms	ICT Consultancy and ICT Projects	**Average**
OVERALL	**+0.2**	**+0.2**	**+0.0**	**+0.2**	**+0.3**	**+0.1**	**-0.1**	**+0.4**	**+0.3**	**+0.2**	**+0.0**	**+0.1**	**+0.2**
Cambridge City Council	+0.7	+0.1	+0.2	+0.2	+0.2	+0.3	+0.1	+0.8	+0.4	+0.5	+0.0	+0.4	+0.3
Huntingdonshire District Council	-0.2	-0.1	-0.4	-0.3	-0.1	-0.1	-0.4	-0.0	-0.1	-0.2	+0.0	-0.2	-0.1
South Cambridgeshire	+0.5	+0.4	+0.3	+0.2	+0.4	+0.4	+0.1	+0.5	+0.6	+0.4	+0.2	+0.4	+0.4

Key: Change >= 0.5 | 0 < Change < 0.5 | Change = 0 | -0.5 < Change < 0 | Change < -0.5

Note: The reduction in HDC score is likely due to excluding 3C ICT staff from participating in the survey (3C ICT staff were included in the survey in 2024 as HDC staff members)

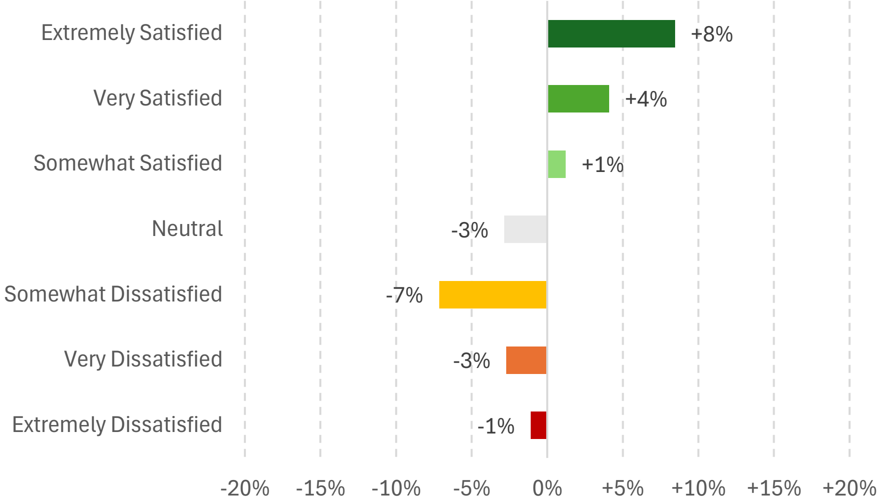
Q14. How satisfied are you with the overall Information and Communication Technology (ICT) service?

All Service Users



Overall, the majority of users (76%) are satisfied with the IT service.

Change from June 2024



The proportion of respondents indicating they are **at least somewhat satisfied** with their IT service has risen from 62% to 76% - **an increase of 14%**

Cambridge City Council · Huntingdonshire District Council · South Cambridgeshire District Council · Triple Value Impact

Q16. In your opinion, what are the top three challenges you face with the current ICT systems?

6 themes emerged from the respondent's answers. See separate word doc for full list of responses

Network – 18%

Wifi and connection, particularly in the office

Applications – 17%

Complaints about the number of applications, that they run slow in the office and that there's a long approval process for new apps

Desk equipment – 10%

Meeting rooms and docking into desks, particularly in Huntingdonshire and South Cambridgeshire

Laptops – 9%

Outdated or running slow and perceived need of an upgrade, particularly in Huntingdonshire and South Cambridgeshire

Helpdesk – 7%

Online request portal for when laptops aren't working, closing issues before being fixed, performing simple fixes quickly

IT support – 7%

Understanding IT language, completing service requests or long waits for small updates

Q17. What improvements, if any, would you like to see in the ICT services provided?

There were 4 key themes that were mentioned by multiple respondents

IT support – 17%

Request to simplify ticketing categories and to continue to focus on the problem being presented to ensure suitable solution

Communication to non-IT staff – 14%

Speaking in non-IT language. Communicating project capacity and progress – increasing transparency

Training and advice – 12%

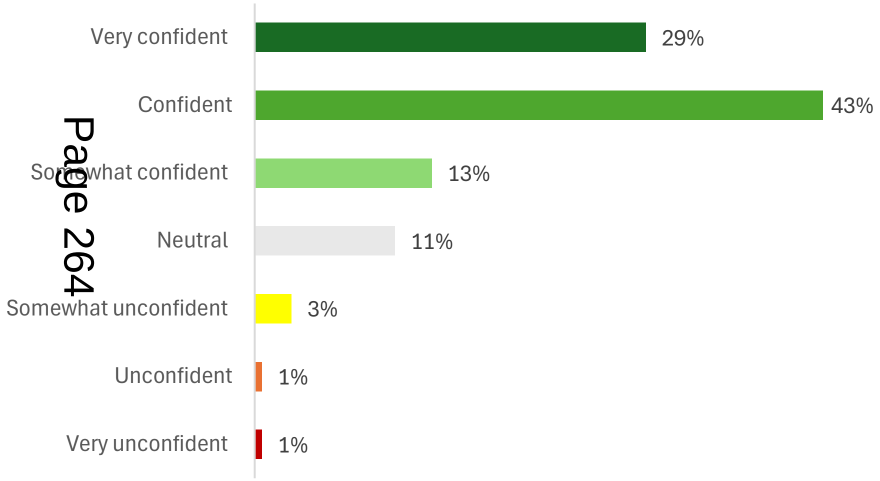
Help with already licensed tools (e.g. MS apps and SharePoint), lunch and learns / interactive sessions, sharing knowledge across the org

Desk equipment / Laptops – 13% each (26% total)

Office hardware enabling hybrid meetings and laptop upgrades

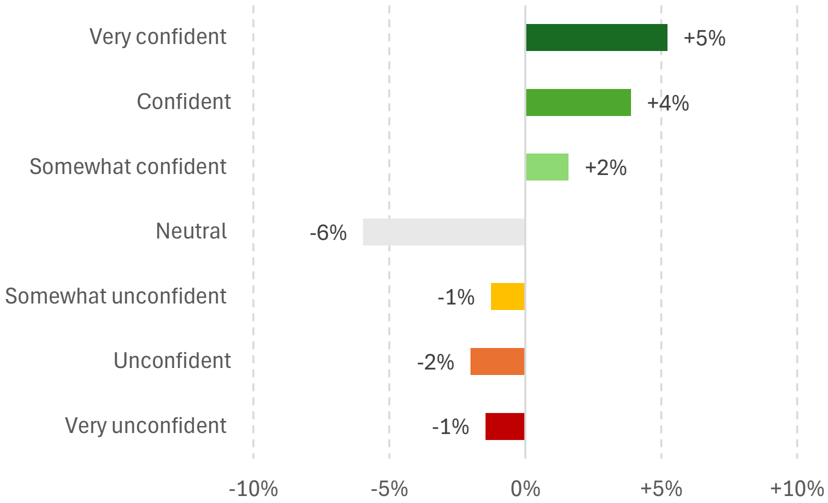
Q18. How confident are you in the ability of the ICT service to protect against and respond to cyber threats?

By council



A significant majority (85%) of respondents were confident in ICT's ability to protect against and respond to cyber threats

Change on previous year



There has been a significant positive shift, with an additional **11% of staff now expressing confidence** in the ability of the service to protect against and respond to cyber threats

Thank You

This page is intentionally left blank

Report to:	Performance, Assets and Strategy Overview and Scrutiny Committee – 3 March 2026
Lead Cabinet Member:	Councillor Simon Smith, Cabinet Member for Finance and Resources
Lead Officer:	Simon Oliver, Chief Digital and Information Officer
Key Decision:	No

3C ICT Year One – Appendix C – Performance Metrics

Executive Summary

1. Status reports regarding the 3C ICT Shared Service are shared with the nominated 3C Service Directors (Intelligent Clients) on a quarterly basis.

2. The 3C Service Director for Cambridge City Council is the Chief Operating Officer

3. Detail from the previous two status reports is presented to enable a transparent view of the current service to Members.

KPIs

Measure	Target	Q2 Score	Q3 Score
Customer satisfaction	90%	82.67%	84.6%
Service Availability		100%	100%
Service Desk Resolution		98.9%	99.8%
Incident Resolution		90.6%	90.3%
Service Requests		100%	95.1%

Future KPIs

The following are the proposed KPIs to be introduced as of April 2026. These are better aligned to Colleague Experience and will provide a better understanding of how the service feels to our user community, and any impacts on their work due to ICT issues.

KPI Name	Definition	Formula	Target	Purpose / Value
First Contact Resolution (FCR)	Measures the proportion of incidents resolved at first point of contact by the Service Desk without escalation.	(Incidents resolved at first contact ÷ Total incidents) × 100	**85%-90%**	Improves user experience, reduces backlog, lowers cost-to-serve.
Recurring Incident Reduction	Measures the number of high-impact or high-volume recurring issues eliminated through problem management each month/quarter.	Count of recurring incident categories eliminated or mitigated	**2-3** issues/incidents eliminated per quarter/month	Reduces avoidable demand; improves stability and productivity.
Self-Service Adoption Rate	Measures the percentage of tickets logged via the self-service portal vs. phone/email.	(Portal tickets ÷ Total tickets) × 100	Increase by **3–5%** per quarter (or hold at **65-70%**)	Demonstrates effective digital channel shift and improves efficiency.
Demand Deflection Rate	Measures the number of contacts avoided due to successful self-help, knowledge articles, or automated digital workflows.	(Self-help resolutions ÷ Total potential contacts) × 100 or estimated deflection from article usage	**2–3%** reduction in demand per quarter	Shows improvement in automation, knowledge management, user empowerment.
Critical Service Availability	Measures the uptime of the Council's most critical business systems during core hours.	(Total available time ÷ Total planned operating time) × 100 (+ lost productivity hours)	99.5% (core hours)	Ensures continuity of citizen-facing and staff-facing services.
Customer Satisfaction (net CSAT score)	Measures the number of colleagues receiving a positive, neutral or negative experience	(Total number of positive CSAT engagements) – (Total number of negative CSA) engagements x 100	90%+	Demonstrates user satisfaction in how they engage with and experience ICT services

Financials Q2

Budget position	
What is the budget for the service area for the current financial year?	***£9,097,446***
What is the forecast outturn for the current financial year?	***£9,286,994***
Variance	***£189,548***
Budget Position by Authority	

	BUDGET	**FORECAST**	**VARIANCE**
CCC	3,296,386	3,264,722	(31,664)
HDC	3,089,816	3,194,588	104,772
SCDC	2,711,244	2,827,684	116,440
	9,097,446	**9,286,994**	**189,548**

Financials Q3

Budget position (Q3)	
What is the budget for the service area for the current financial year?	***£9,097,446***
What is the forecast outturn for the current financial year?	***£9,087,697***
Variance	***(£9,749)***
Budget Position by Authority	

	BUDGET	**FORECAST**	**VARIANCE**
CCC	3,296,386	3,252,715	(43,671)
HDC	3,089,816	3,118,378	28,562
SCDC	2,711,244	2,716,604	5,361
	9,097,446	**9,087,697**	**(9,749)**

If a budget overspend is predicted, please provide a commentary below on the situation and the actions being taken to recover it. If there is variance, does it reflect a trend? If so, please provide further analysis.

Figures above were updated to reflect Q3 forecast.

- The service managed to secure efficiencies that decreased HDC’s forecast by £76k since Q2. Forecast has moved from £104.8k overspend to £28.6k overspend (improvement of £76.2k).
- City’s forecast has improved by £12k, underspend increased from £31.7k to £43.7k.
- SCDC’s forecast improved by moving from £116.4k overspend to £5.4k overspend.

This page is intentionally left blank

Report to:	Performance, Assets and Strategy Overview and Scrutiny Committee – 3 March 2026
Lead Cabinet Member:	Councillor Simon Smith, Cabinet Member for Finance and Resources
Lead Officer:	Simon Oliver, Chief Digital and Information Officer

Cybersecurity Update

Executive Summary

1. Cybersecurity remains a key risk for the Council. It is rated Amber on the Corporate Risk Register and is therefore reported individually within the Quarterly Performance Report.

2. Several activities have been instigated following the commencement of the Chief Digital and Information Officer (CDIO) role in December 2024.

3. The new approach to Risk Management enables a simpler approach to identifying risks and ownership.

4. The new approach to Risk Mitigation enables a simpler approach to identifying the benefit of such activity and investments.

5. Investments in new capabilities have had a positive impact, which will be built upon during 2026.

Details

6. The Shared Services nature of the Council's ICT infrastructure and Operational IT approach means that any of the 3C Partner Council's approach to Cybersecurity is only as strong as the weakest Partner. As a result, a joint approach to ownership and mitigation is essential.

7. Ensuring visibility and ownership of risks and mitigations is essential. It cannot be ascertained that all risks are to be managed by "the ICT Service", or that risk mitigation decisions can be left to Service Managers. Effective risk ownership has been a key area for improvement in 2025 and will continue into 2026.

8. The National Cyber Security Centre has produced sector-wide guidance on the threat landscape for councils, with risks broken down into the 6 key areas:

    a. Ransomware

b. Supply Chain Attack

c. Privileged Access Management

d. Known Vulnerabilities

e. Unsupported Software

f. Staff Awareness

9. The CDIO has recently sought to align all activity under three new headings to provide Members with greater detail as to the purpose of activities, where the technical nature of the changes may not be immediately apparent to those without a technical background:

   a. PREVENT: Activities that seek to prevent a Cybersecurity incident/breach.

   b. REDUCE: Activities that reduce the impact of an incident/breach.

   c. RECOVER: Activities that will improve the ability of the Council to restore Services after an incident/breach.

10. The Council's preparedness is underpinned by an approach which addresses risks and mitigations across the following considerations;

   a. PEOPLE: Implementing training and controls which are aligned with the wider users of the IT and Digital services, so they can work safely and within policy. Where process and controls are not possible, or users can operate outside of these due to operational reasons, the risks and 'best practice' approaches are known through training. Knowledge of which processes are available to utilise is essential. Ensure colleagues are comfortable raising potential breaches, and how, and are not fearful of consequences.

   b. PROCESS: Ensuring that 'best practice' and statutory obligations are met through processes which align to these and prevent activity which would pose a risk. These are updated to stay aligned with the changing threat, legislative and regulatory landscapes.

   c. SYSTEMS/TECHNOLOGY: Ensuring that the systems and technologies used are up to date and align with legislative requirements and adhere to policies and approved processes. Seeking to remove utilisation of non-approved solutions and ensure any risks regarding solutions in use are known, monitored, and have mitigation plans.

11. The ownership of the risks and mitigations regarding Cybersecurity has been reviewed to ensure that each individual risk has an identified owner, agreed mitigation, and an agreed mitigation delivery date. The ownership of risks has been updated to reflect the following responsibilities:

   a. Senior Information Risk Owner (SIRO): The Director-level Officer who is responsible for keeping the Leadership informed on all risks and ensuring that risks are responded to in line with the Corporate Plan. The SIRO may accept risks on behalf of the Council via formal exception reporting.

b. Chief Digital and Information Officer: Responsible for strategic advice to the 3C Partner Councils, regarding the current state and optimal future state for Cybersecurity. Acting as the Director lead of technical mitigations within the 3C Shared Service.

c. Data Protection Officer: A statutory role under GDPR, responsible for advising the SIROs on Information Risks and ensuring that risks in relation to personal data are correctly identified and escalated in line with appropriate governance routes. Responsible for ensuring adherence to the organisational aspects of cybersecurity, such as policies and training, and ownership of the Cybersecurity Risk Register.

d. Cyber Security Lead Officer: Responsible for the technical implementation of cyber security measures and ensuring the council's adherence to standards set by Government, such as PSN, and other ‘best practice’ frameworks adopted by the Council.

12. Cybersecurity oversight is undertaken by several governance boards:

a. Information Assurance Board: A quarterly board chaired by the 3C Partner Council SIROs, responsible for oversight of Information Security risks, approval of policies relating to personal data and information security and a strategic approach to information risks.

b. ICT Software Review Group: An operational meeting to ensure that new software adheres to appropriate standards of compliance

c. ICT Change Approval Board: An Internal ICT operational meeting where changes are approved to ensure consistency and resilience

13. During 2025, the 3C ICT Service has adopted a new approach to policies by ensuring alignment with the ISO27001 framework. This work is on schedule for completion by April 2026.

14. During 2025, the 3C ICT Service has adopted a new approach to the Information Security Risk Register by ensuring alignment with the ISO27005 framework. This work is ongoing.

15. In addition, several other activities were undertaken during 2025 that have contributed to the maturing approach to Cybersecurity;

Workstream	**Implementation**	**Purpose**	**Type**
ISO27005 Standard Adoption	April 2025	PREVENT	Processes
Phishing Simulations	Quarterly Ongoing	PREVENT	People
E5 Adoption	October 2025	PREVENT	Systems

Microsoft Security Workshops	October – December 2025	PREVENT	Systems
CyberSecurity Exercise	June 2025	REDUCE/RECOVER	Processes
Cyber Essentials Audit	June 2025	PREVENT	Processes
ISO27001 Policy Review	April 2025	PREVENT	Processes
SIRO Training	August 2025	REDUCE	People
Trend Review	December 2025	PREVENT	Systems
CIS 5.0 Benchmark	September 2025	PREVENT	Systems
Staff Information Security Training	Ongoing	PREVENT	People
Applications Rationalisation	December 2025	REDUCE	Processes
OAuth Application Control	November 2025	REDUCE	Systems
Multi Factor Authentication	January2026	PREVENT	Systems

16. The investment made to adopt Microsoft E5 licensing has led to several new capabilities being made available, and work continues to adopt the new capabilities and remove legacy systems. This has been a significant undertaking to date.

17. While starting with a solid foundation of cybersecurity systems in place, the progress made during 2025 has been significant.

18. Although 2025 activity has been focused on Systems and Processes, the most important improvement has been the changes implemented towards the PEOPLE aspect. With SIRO training in place to support leadership on Cyber Security, the ongoing phishing and mandatory training have led to a sentiment among staff where 85% are confident in ICT's ability to protect and respond to cyber threats. This confidence does not preclude continued vigilance and awareness being advocated with staff.

19. The CDIO continues to champion Cybersecurity improvements, and these will continue throughout 2026.

20. Further implementation of the benefits of the investment into the Microsoft E5 capabilities will be made, which will provide improved centralised insight into technical risks, potential breach activity, non-conformant user activity, assessments against ‘best practice’ configurations, anti-virus, etc.

21. The investment into the E5 Capabilities also extends into Information Management, and will enable improved Data Retention, Data Loss Prevention (document sharing and through external AI adoption), and GDPR adherence.

22. At the time of writing a budget bid has been recommended to Full Council to move to an external Security Operations Centre (SOC) approach via an external

Managed Service. This will enable the Council to benefit from a 24/7/365 service that continuously monitors potential vulnerabilities and breaches. In the event of an incident, the capability and capacity needed to act and remediate will be immediately available. This will be a significant improvement, enabled by adopting Microsoft E5 licensing.

Report Author:

Simon Oliver - Chief Digital and Information Officer

This page is intentionally left blank

CAMBRIDGE CITY COUNCIL

Report to:	Performance, Assets and Strategy Overview and Scrutiny Committee – 3 March 2026
Lead Cabinet Member:	Councillor Simon Smith, Cabinet Member for Finance and Resources
Lead Officer:	Simon Oliver, Chief Digital and Information Officer

Members ICT Update

Executive Summary

1. A change to the way Members are provisioned ICT services, the support received, and the capabilities available is being proposed.

2. The change to the approach is supported by budget bids, which have been submitted. The proposed approach requires agreement from all three 3C Partner Councils to make it viable.

3. Further detail is to be provided once the final solution has been agreed, once confirmation of budgets being available is made.

Details

4. The 3C Partner Councils have differing approaches to the way Members are provisioned ICT Services and the options for the equipment they can utilise

5. The differing approaches, alongside the significant difference between Members and Officer solutions, mean that support can often be unsatisfactory due to engineers being unfamiliar with the solutions in place

6. The utilisation of differing licencing models, and treatment of Members as 'guests' of the Offer network and enterprise applications (such as Teams and SharePoint) leads to challenges with utilisation of office audio visual equipment, collaboration and sharing of documents, amongst other constraints

7. There is a variance in IT skills across Member groups and across the Partner Councils. Historically, decisions in relation to the solutions provisioned have been made by those with good IT knowledge, and may not have been aligned with those without comparable skills, impacting the ability of some Members to fulfil their duties

8. The model in place does not align with solutions utilised elsewhere within Local Government, and whilst there are some advantages to the current model from a

governance perspective, the downsides outweigh these, and these are managed effectively elsewhere

9. Whilst the 3C ICT Shared Service has invested in new technologies and continues to improve capabilities, training and cybersecurity for Officers, Members currently do not benefit from these

10. The establishment of a CDIO role across the councils, and with accountability for the 3C ICT Shared Service, provides a new opportunity to coalesce approaches

11. Elections in May 2026 provide an ideal opportunity for the introduction of a new approach to Members' ICT, and enable training to ensure a common understanding of the solution available

12. The proposal is for 3C ICT Shared Services to create a complete end-to-end set of solutions for Members, which caters for all usage needs and Council preferences for devices and budget management. All these options will be aligned with Officer technology capabilities and be fully supported.

13. Each council will be able to determine which solutions they wish to promote from the wider options available and make available to their Members.

14. If devices are to be provisioned, these will be aligned with those provisioned to Officers, and 'locked down' and managed as per an Officer device, with all applications available, and with support available from the 3C ICT Service Desk

15. Where devices are not provisioned, several access methods will be presented to Members. It is intended that this will include access to Teams (virtual meetings, SharePoint documents and chat) and Outlook (email) via any mobile device utilising BYOD (Bring Your Own Device) methods. In addition, a new 'virtual desktop' solution is proposed whereby Members can click on a link and a desktop, similar to a laptop, is available, mimicking using a council laptop. All of these will be standardised solutions that can be fully supported remotely, using standard support methods and supporting colleagues' knowledge.

16. Members will be provided with the same licences and access to Microsoft M365 solutions as per the Officers. Whilst there is a cost uplift for this licensing, the benefits are considerable, especially when considering the cybersecurity and data loss prevention improvements that will now be possible.

17. Security and access controls will be implemented so that access to documentation, address books, SharePoint, etc., is appropriate to meet governance controls. However, Members will have individual access to these solutions for shared use. Where appropriate, Members and Officers will have access to the same document repositories and systems for data sharing and collaboration. The discovery of these requirements is underway with colleagues in the democratic service.

18. However, the review does not intend to seek to remediate issues with Member-specific applications.

19. Most Local Authorities utilise a version of the modern.gov solution, either in its locally hosted or web-hosted versions. Both versions are different and have

distinct pros and cons, so the choice is based on the 'best fit' rather than full functionality. The CDIO continues to champion the much-needed improvements to this platform with the vendor and will work with democratic service officers to assist with issue remediation.

20. The utilisation of the council's officer-based technology solutions may now offer new opportunities to develop improved solutions based on technologies that will now become available to Members.

21. The CDIO will seek to develop potential solutions and opportunities for improvements post-election, although it is recognised that this may be hampered by the prioritisation of LGR, and limited return on investment opportunities pre-vestment day.

Report Author:

Simon Oliver - Chief Digital and Information Officer

This page is intentionally left blank

Work Programme: Performance, Assets and Strategy Overview and Scrutiny Committee

Items and dates are provisional and will be confirmed on the agenda for each meeting.

Business previously considered by the Performance, Assets and Strategy Overview and Scrutiny Committee can be found on the council's website:

Committee details - Performance, Assets and Strategy Overview and Scrutiny Committee - Cambridge Council

Name of Item	Description of Item	Suggested Meeting Date	Service Area	Lead Officer
Update on 3C ICT improvement programme and external review	To provide an update on the shared ICT service improvement plan.	Tuesday 3 March 2026	3C ICT	Simon Oliver, Chief Digital Information Officer (CDIO)
City Centre Heat Network	Pre-scrutiny ahead of report to Cabinet on 24 March 2026. Issue details - City Centre Heat Network - Cambridge Council	Tuesday 3 March	Economy and Place	Ben Binns, Assistant Director of Development
Update on Budget 2026/27 consultation	To provide an update to the Committee on the progress of developing the 2027-28 budget consultation.	TBC	Corporate Hub	Jody Etherington, Chief Finance Officer (S151 Officer)
WATCHING: Outcome of Housing Review	To follow report of Regulator of Social Housing in autumn 2025 with establishment of Task and Finish Group likely to follow.	TBC	Communities	Samantha Shimmon, Assistant Director of Housing and Homelessness
WATCHING: Civic Quarter	To consider plans as they develop	TBC	Economy and Place	Ben Binns, Assistant Director for Development

WATCHING: Local Government Reform	To discuss the latest update on Local Government Reform in Cambridgeshire as it relates to the City Council and the remit of the committee.	TBC	TBC	TBC