

TITLE OF REPORT: Zero Carbon Heat Strategy for Gateshead

REPORT OF: Peter Udall, Strategic Director, Economy, Innovation and Growth

Purpose of the report

1. This report presents a Strategy for Cabinet approval, to work towards reducing carbon emissions from Council homes and buildings to zero by 2030, in line with the Council's Climate Emergency declaration.

Background

2. Nationally, the UK Government is aiming that the UK achieves zero carbon emission by 2050. It recognises, in the Clean Growth Strategy, that decarbonisation of heat is essential to achieve this goal, and at present is lagging behind in efforts to decarbonise power.
3. Currently, heat is the largest component of the Council's carbon footprint, accounting for 45% of the Council's measured carbon emissions. This largely comes from using gas boilers to heat premises. In addition, ca. 17,500 Council homes still operate on gas boilers, which equates to 92% of the Council's total housing stock which is 18,995 homes.

Proposal

4. This reports sets out a Zero Carbon Heat Strategy, which aspires to achieving zero carbon heating for Council buildings and Council homes by 2030, as a key element of the council's Climate Emergency Action Plan. Where possible, the strategy also supports deployment of zero carbon heat in the wider community.
5. The strategy has three main objectives, listed in order of priority / impact up to 2030:
 - i. **Deployment of Heat Networks** – large scale deployment of heat networks, requiring up to £240m of investment, to deliver heat to up to 15,000 Council homes, and 68% of Council Buildings;
 - ii. **Decarbonising the gas grid** – strategic support for hydrogen deployment in the gas grid, with the ambition to convert the gas network to hydrogen in Gateshead by 2030; and
 - iii. **Installation of Heat Pumps** – small scale pilot installations in existing homes until impact on fuel poverty is confirmed, and support for installation in new build homes from 2025.

6. The strategy has significant outcomes and challenges beyond just delivering zero carbon heat:
 - Potential to lever in significant external grant funding for locally owned infrastructure, to support community wealth building,
 - Removes gas boilers from Council homes, and their risks / maintenance / repair liability, replacing instead by “heat as a service” from heat network providers,
 - Requires new financing mechanisms, to achieve delivery of heat networks at scale, and
 - Supports local and regional economic development strategies, by creating conditions for skills / jobs growth in heat networks and hydrogen, and supporting the North East of England as the UK’s High Potential Opportunity for Heat Networks, to attract overseas investment

Recommendations

7. Cabinet is asked to:
 - i. Recommend Council to adopt the Zero Carbon Heat Strategy and accept annual reports on progress within the reporting framework of the Climate Emergency Action Plan.
 - ii. Approve the continued exploration and development of zero carbon heat actions and schemes, as set out in the appendices, which would be brought forward for approval if proven viable.
 - iii. Publicise the ambitions contained within the Zero Carbon Heat Strategy, directly, and through partners, including Northern Gas Networks, North East LEP, and Department for Investment and Trade, in relation to the North East of England High Potential Opportunity for Heat Networks

For the following reasons:

- i. To support the Thrive Agenda, as outlined in Appendix 1
- ii. To support the Council’s Climate Emergency, and targets to reduce Council carbon emissions to zero by 2030, and
- iii. To reduce, or avoid increase, in energy costs and fuel poverty for Gateshead residents

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Policy Context

1. On a local level, the strategy will directly deliver many objectives within the Thrive agenda, as follows
 - a. *Tackle inequalities / Put People and Families first.* By providing a Zero Carbon heat solution at no additional cost to all residents, not just those that can afford to, and which reduces cases of fuel poverty
 - b. *Invest in our economy.* Investing in major energy infrastructure, which increases external grant spend in Gateshead, to then increase local generation and sale of energy, which can be reinvested in Gateshead.
 - c. *Opportunities for employment, innovation and growth.* To further support business case and attractiveness of new development in Gateshead with a low carbon energy offer.
2. In addition, the scheme will contribute to other key priority areas for the Council, as follows:
 - i. Climate Emergency – the proposals seek to reduce the carbon emissions of the Gateshead District Energy Scheme, supporting the Council’s ambition to work toward net zero emissions by 2030
 - ii. Air quality – the proposals seek to reduce reliance of Gateshead Energy Centre’s combustion of natural gas, which will reduce emissions of air pollutants in Gateshead town centre.
 - iii. Green Economy - to stimulate growth in jobs / skills in the Green Economy, as part of Gateshead Economic Development Strategy

Background to Zero Carbon Heat

3. Nationally, the UK Government is aiming for the UK to achieve zero carbon emission by 2050. It recognises, in the Clean Growth Strategy, that decarbonisation of heat is essential to achieve this goal, and at present is lagging behind in efforts to decarbonise power.
4. Locally, the Council declared a Climate Emergency in May 2019, and earlier in 2021 published its Action Plan which aims to reduce emissions from Council operations to zero by 2030.
5. Currently heat is the largest component of the Council’s carbon footprint, accounting for 45% of the Council’s measured carbon emissions. This largely comes from using gas boilers to heat premises.
6. In addition, ca. 17,500 Council homes still operate on gas boilers, which equates to 92% of the Council’s total housing stock which is 18,995 homes.
7. The Climate Emergency commitment also seeks to support the wider community – homes, businesses and transport - in working towards zero emissions in the same timescale. Like the Council, gas use for heat accounts

for 35% of the borough's carbon emissions. In total, ca 90% of the total stock (c 94,800), rely on gas boilers for heat, and the majority of businesses do too. It is expected that community solutions will emerge from this strategy, which currently focuses on council homes and buildings

8. It is noted that the Council continues to progress other strategies to improve energy efficiency and reduce the amount of heat used by Council buildings and homes.
 - a. The Council's Carbon Management Plan has seen gas usage drop by 44% over the past 10 years, and will continue to progress this to 2030, but at best, gas use can only be reduced by up to 50% through energy efficiency measures.
 - b. The Council's Home Energy Conservation Act (HECA) Strategy sets out how the Council delivers energy savings in Council homes and other housing. Since 2003, the percentage of homes deemed energy efficient has increased from 14% to 55%, and the target is 100% by 2030.
9. These strategies will continue and are not considered in the Zero Carbon Heat Strategy. Rather, this report sets out the options and strategy for the Council to move away from using natural gas as the main source of heat, to low or zero carbon alternatives by 2030.

Pathways to Zero Carbon Heat

10. There are three main pathways to zero carbon heat, that are supported by national policy and these are considered in turn. The table below outlines the main pathways, and their pros and cons.

Zero Carbon Pathway	Pros	Cons
Heat networks	<ul style="list-style-type: none"> • Deliverable now • Cost neutral or income generating over lifetime • £0.6bn grant funding available to 2025 • Provides heat at lower cost than gas • Can access waste heat sources 	<ul style="list-style-type: none"> • Not suitable for all locations • High capital cost and risk to develop • Rely on available source of renewable heat
Heat pumps (Electrification of Heat)	<ul style="list-style-type: none"> • Deliverable now • Offers the greatest carbon savings now • Likely to become the norm for new housing 	<ul style="list-style-type: none"> • High cost to install • Likely to increase fuel bills and fuel poverty • Needs upgrade to internal heating systems • Refrigerants used in heat pumps have high emissions themselves
Decarbonising	<ul style="list-style-type: none"> • Simplest route, least 	<ul style="list-style-type: none"> • Will not reach net zero

the gas network - biogas and hydrogen	change to customers <ul style="list-style-type: none"> • Low cost change to gas boiler required • Option of last resort, for homes that can't use heat pumps or heat networks • First Hydrogen town planned by 2030 	until 2050 <ul style="list-style-type: none"> • Cost of hydrogen could be much higher than gas • Massive investment in gas network needed • Hydrogen production industry needs to develop
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Heat Networks

11. Heat networks form a strong element in the UK's Clean Growth Strategy. Presently, the UK Government is supporting the deployment of heat networks through the £300m Heat Network Investment Programme, which runs from 2019 – 2022. In March 2020, it was announced a new grant programme, the Green Heat Network Fund, of £260m, will follow HNIP, from 2022 – 2025.
12. Already, Gateshead is a leading authority in the delivery and operation of heat networks, running the Gateshead District Energy Network since 2018, and 3 smaller heat networks for high rise council housing, in the Gateshead HEIGHTS project, since 2019.
13. Key features of heat networks include:
 - Delivery of low-zero carbon heat at scale, at no extra cost to customers
 - Large capital investment required, but recouped in full over scheme lifetime
 - Major financial support from UK government, and
 - North East England promoted at the UK's leading region for heat network development
14. The main constraint for heat networks is that they are only viable in dense development areas, e.g. town centre, high rise housing, or dense housing (such as terraces). They can never be a total solution for all heat users. The action plan below outlines the potential areas that may benefit from a heat network in Gateshead, which could amount to 20% of the housing stock.

Electrification of heat / Heat Pumps

15. By 2030, it is forecast that 80% of the UK's electricity will be generated by renewable power, which will mean that power has up to 50% lower carbon emissions per unit than gas. For this reason, switching to efficient electric forms of heating will reduce carbon emissions now and this reduction will increase as the carbon intensity of electricity decreases.
16. For new developments, with the expected ban on gas boilers in new developments from 2025, it is expected that heat pumps will become the norm for new build.
17. However, heat pumps for existing homes / buildings have some constraints

- a. Higher installation cost, 3-4 times the cost of a gas boiler, and similar lifespans
 - b. Higher running costs - as power is ca. 5 times the cost of gas, even with greater efficiency, running costs increase, which could increase fuel poverty.
 - c. Refrigerants – domestic heat pumps have refrigerants that themselves, if leaking, have a huge impact on global warming. Proliferation of domestic heat pumps will increase the risk of emissions arising from poorly maintained refrigerant systems.
18. Many of these issues can be resolved by using larger, centralised heat pumps, in conjunction with heat networks, where different, more inert refrigerants (e.g. ammonia) can be used, and costs lowered through economies of scale.

Decarbonising the gas network

19. There are plans nationally to gradually decarbonise the natural gas network in the UK. This is from two sources:
- a. Biomethane injection – generated through anaerobic digestion of organic matter, (usually food waste or agricultural waste). However, there is a limit to how much biomethane can be generated sustainably.
 - b. Green Hydrogen production - the UK Government, supported by the gas distribution companies, are seeking to upgrade the gas network, to allow the distribution of hydrogen, in place of methane.
20. Hydrogen offers the prospect to fully decarbonise the gas network, however the current roadmap to zero carbon hydrogen will take 30 years, with the following key stages required:
- a. By 2023 – the UK regulations need to be revised, to allow 20% hydrogen into the current gas network
 - b. By 2025 – first UK pilot of 100% hydrogen supply, industry requesting that all new boilers be hydrogen ready
 - c. By 2030 – first 100% Hydrogen Town in place, and 20% hydrogen widespread across UK gas network
 - d. Between 2030 – 2050 – a new industry around green hydrogen generation and supply needs to be developed and grow
21. For these reasons, hydrogen represents a longer-term goal to the UK's 2050 target to reach zero carbon, but will have a smaller impact before 2030. However, due to the reach of the current network, hydrogen has the potential to offer a zero carbon heat source, for almost all users.

22. Taking into consideration the pros and cons of the pathways to zero carbon heat, and existing and future opportunities in Gateshead, we are proposing a Zero Carbon Heat Strategy that follows all three pathways.

23. **Objective 1. Deploy Heat networks** to their fullest extent, supported by available capital grants between 2020 – 2025. Target areas for heat networks include:

- a. Expanding existing heat networks (Gateshead District Energy Scheme, Gateshead HEIGHTs)
- b. Confirm Gateshead renewable heat resources for heat networks, including minewater and geothermal
- c. Using Government Grants, investigate the feasibility of remaining heat network opportunities in the borough by June 2022.
- d. Develop, fund and build new heat networks, targeting:
 - i. Council housing estates and high-rise block
 - ii. Clusters of Council buildings / Schools
 - iii. Areas of solid wall housing, predominantly in the urban centres
 - iv. Housing development sites, which are in proximity to the above
- e. Outcomes
 - i. Deliver large scale investment in locally owned infrastructure
 - ii. Stimulate green economy and growth in ca 200km of heat networks
 - iii. Support the NE Regions status as High Potential Opportunity for Heat Networks
 - iv. Grow the Council as a heat supplier, serving up to 20,000 domestic customers.
 - v. Create framework for further expansion of network without grant support beyond 2025.

24. **Objective 2. Continue to develop and deploy heat pumps**, where cost effective and without increasing fuel poverty. Target areas are:

- a. Pilot heat pump installations in Council-owned housing, with robust evaluation process from both the customer and HRA perspective
- b. Pilot heat pump installations in new-build Council-led developments
- c. Support new build development to install heat pumps, ahead of gas boiler ban, through pilot schemes
- d. Deploy large scale heat pumps in Heat Networks
- e. Outcomes
 - i. Develop Council experience in small scale heat pump trials
 - ii. Inform future larger scale deployment of heat pumps without impacting on fuel poverty, particularly for new build

25. **Objective 3. Support the hydrogen economy.** Target areas will be:

- a. Supporting the development of InTEGReL, a unique UK facility focusing on the decarbonisation of gas, electricity and transport, lead by Northern Gas Networks
- b. Supporting Northern Gas Network's Hydeploy2 project, which is the UK's first trial of using 20% hydrogen in a public gas network
- c. Supporting further trials of 100% hydrogen, supporting path to capitalise on early rollout of hydrogen conversion
- d. Outcomes
 - i. Placing Gateshead at the heart of growing Hydrogen for decarbonising heat and transport
 - ii. Setting conditions for green economy / skills growth around hydrogen, for Gateshead and the region
 - iii. Putting Gateshead and the wider region in position to become a primary adopter of hydrogen for heat in the UK accelerating the decarbonisation of the economy and driving new opportunities for growth, with ambitions to become a hydrogen based community by 2030

26. The potential impact of the above strategy is summarised below. This is the sum of the action plan below, assuming all opportunities are realised. It is noted that not all actions are likely to progress, investment in projects would need consideration and approval for the Capital Programme, and equally new actions may arise, that are not yet accounted for. Headline outcomes that will deliver carbon savings by 2030 are:

- a. Up to 15,000 Council homes connected to heat networks by 2030, or 85% of the total stock
- b. Up to 2,300 new build housing units connected to heat networks, 33% of total new build between 2020 – 2030
- c. Up to 68% of heat use in Council buildings provided by heat networks by 2030
- d. Up to £240m investment in ca. 200km of heat networks required, leveraging in up to £120m in capital grants, for 5-6 major heat networks, plus more smaller networks
- e. Up to 18MW of large-scale heat pumps installed in heat networks
- f. Estimated 4,000 individual heat pumps installed in new build housing, post 2025
- g. UKs First 20% and 100% hydrogen public trials in Gateshead

Zero Carbon Council homes - Heat Networks vs. Heat pumps

27. One of the largest challenges is how to fund the replacement of 17,400 gas boilers within Council homes, moving to a Zero Carbon source of heat.

28. Currently, the Housing Revenue Account replaces. ca. 1000 gas boilers per year, at a cost of £2,500 per unit, for a 15+ year working life. Up to 2030, an expected £25m will be required for works to support the provision of boiler replacements and a further £36m on heating systems, as business as usual.

29. Replacing gas boilers with individual heat pumps (at £10k per unit), the cost to the HRA would increase by a further £45m to 2030 alone, which is currently

unbudgeted for. In addition, these properties would potentially see increased fuel costs, and incidences of fuel poverty.

30. By connecting homes to Heat Networks, many of these challenges are addressed:
- a. The cost of the heat networks is also ca. £10k per property, but can be reduced through grants
 - b. The remaining cost can be recovered through heat sales and standing charges.
 - c. For the HRA, instead of paying for boiler replacement, servicing and gas safety check, the HRA could switch to receiving heat as a service from the heat network operator, at a cost of around £250 - £300 per home per year – which is no greater than current cost.
 - d. Residents are protected from rising heat costs. The network operator would be responsible for all ongoing maintenance and replacement, further reducing the administrative burden on the HRA.
 - e. Gas supplies could be fully disconnected, reducing risks and hazards to residents and the property.
31. For this reason, where technically and commercially viable, heat networks offer the most sustainable, and cost-effective means of converting Council-owned homes to zero carbon heat in the short term.

Financing options

32. The proposed strategy could require up to £240m of capital investment over 5 years. From the experience to date, and assessing national support for heat networks, a number of financing options exist.
33. *Match / grant funding* – the Council could access the following sources, to reduce the funding gap by £97 - £145m
- a. £0.5bn in capital grant support between 2020 – 2025, through the Heat Network Investment Programme to 2022, and Green Heat Network Fund thereafter. Grant funding can range from 30 – 49%, or £72 - 120m, of capital costs
 - b. Diverting HRA investment. If required, an estimated £25m earmarked for 10,000 boiler replacements, could be reallocated.
34. *Capital finance* - a number of options exist to raise finance for the funding gap
- a. the Council could fund via prudential borrowing, and retain all the risk/reward for these schemes, on the basis that all schemes will seek to have returns sufficient to recover finance costs. But this large investment would be subject to affordability, at a time when major capital investment is already committed
 - b. The Council could seek external debt finance – current advice indicates a maturing investment market for heat network, with funders offering debt at 3-5% interest, much lower than in recent years.
 - c. The Council could seek a finance / delivery partner, to fund the balance of costs and deliver schemes. This is a lower risk approach, but loses strategic control over social and environmental objectives, including

heat pricing and carbon savings. Also higher shareholder returns for the partner, can reduce the number of schemes that can be delivered.

35. In terms of some 'middle ground' approaches, the following offer compromises of both the above:
- a. Council funds and delivers schemes one by one, to make them operational, and greatly de-risk them from an investment perspective. Once operational, schemes could be sold in full or part, to raise capital for following schemes.
 - b. The Council could package its portfolio of existing heat networks and future plans to seek a 50/50% finance/delivery partner now, or at a suitable point, to share risk / reward, but still retain strategic control over scheme development going forward.
 - c. It is worth noting that by 2022, the Gateshead District Energy Scheme will represent a £40m asset value at least, which could increase further if the Council progresses other developed schemes in the next 2 years (e.g. Chopwell, Birtley/Kibblesworth) . These could provide equity in any joint venture arrangement, to further reduce capital cost to the Council.
36. It is worth noting similar approaches from other Councils:
- a. Bristol, supported by Dept of International Trade, tendered for a 50/50 JV partner, to deliver a £1bn programme of clean growth for their Green New Deal programme. This included a package of energy assets already operated by Bristol.
 - b. Aberdeen similarly tendered for an £0.85bn investment package, and delivery partner, for hydrogen economy infrastructure, to support their transition from oil/gas industries, to low carbon employment.
37. The financial information included in the report is based on estimates and a financing strategy will need to be developed looking at funding and delivery options, informed by the emerging programme of opportunities, over the next 12 months. This would need to then be assessed against the Council's wider Investment Strategy / Delivery Plan.

Delivery and Service development

38. The Energy Services Teams will look to co-ordinate the Zero Carbon Heat Strategy, supported by relevant services where required. A significant resource requirement will arise from planning, design, delivery and operation of heat networks. For a programme of £240m of heat network schemes, delivered over 5-10 years, this has the potential to:
- a. Generate up to £19m of fees during design / construction, or £3.8m / year over 5 years, funded from capital financing of schemes. .
 - b. Support growth of traded Energy services, to manage and operate heat network, potentially funding a further 5-6FTEs through SLA income
 - c. Improve the status of Council heat supply services, through better branding, communications, marketing and online presence, to put the service on a par with market competitors.
 - d. Wider opportunities would also exist to upskill or employ staff to take on more of the regular maintenance of the heat network, and customer connections.

39. The outcome after 5 years could be an Energy Service that has doubled in size, that would manage a portfolio of assets of ca. £300m that generated income sufficient to repay financing costs, and could expand further, managing further networks, for the Council or other third parties.

Local and regional economic strategies

40. As well as the outcomes above, Zero Carbon Heat Strategy could have significant contributions to local and regional economic strategies.

41. *Gateshead Economic Development Strategy* has a strong element supporting the green economy. A strong pipeline of heat networks, and hydrogen innovation will set the conditions for supply chain growth locally and regionally, particularly in developing skills and experience within the sector and workforce, to create jobs growth, and potentially inward investment.

42. *North East England High Potential Opportunity for Heat Networks* – the Dept for International Trade, with North East and Tees Valley LEPs will launch the North East as the UK’s target region for inward investment in heat networks. The HPO wishes to include Gateshead’s ambitions for heat network, within a potential £500m pipeline of heat network projects in the North east.

43. *North East LEP – Heat Decarbonisation Cluster* - our strategy will support the LEPs ambition to create a region of excellence around heat decarbonisation research, development and delivery – out of which has come the recent White Paper on Mine Energy, which is lobbying for greater support to exploit both the NE and UK’s heat resource in minewater

44. This report seeks approval for the Zero Carbon Heat Strategy and its ambitions to form part of the regional offer on heat networks and zero carbon heat.

Consultation

45. Cabinet members for Housing, Economy and Environment & Transport have been consulted

Alternative Options

46. The other option considered, and discounted, is as follows

To not publish a strategy at this time. The report notes the exact costs and schemes are to be confirmed, as are the financing mechanisms, and there is an option to wait for these to be confirmed. But its proposed the publishing this strategy, as an ambition, is an important element of creating the conditions to these objectives to be met

Implications of Recommended Option

47. Resources:

- a. **Financial Implications** – The Strategic Director, Resources and Digital confirms that the Strategy does not contain commitments to capital investment, and investment decisions in schemes will be subject to ongoing technical and commercial viability, for future consideration
- b. **Human Resources Implications** – none.
- c. **Property Implications** – as described, council land and building will benefit from the infrastructure installed. Should sites be disposed of in future, the infrastructure would support energy supply to those sites under different ownership or use.

48. **Risk Management Implications** – Main risk is reputational, in setting out an aspirational strategy, which is yet to be delivered, but the Council has previously set our similar energy ambitions over the past decade, and made good progress, which is expected to continue. The Strategy will act as a catalyst for the next decade of progress on decarbonising heat.

49. **Equality and Diversity Implications** – none.

50. **Crime and Disorder Implications** - none.

51. **Climate Emergency and Sustainability Implications** – the scheme directly supports the Council and GEC in achieving its objectives from the Climate Emergency, to move Council operations towards becoming Zero Carbon by 2030.

52. **Human Rights Implications** - There are no human rights implications

53. **Ward Implications** - The proposals are borough wide

Background Information. None

Appendix 2. Zero Carbon Heat Action Plan

54. We are proposing an action plan of projects, listed here, to progress the strategy above. The action plan is expected to evolve and grow, with annual updates reported back to CMT and members.

55. Key actions in the objective areas are summarised below:

Objective 1: Heat Networks

56. Please refer to Appendix 1, for summary of all current heat network opportunities, showing scale, costs and scope. Also, Appendix 5 maps these opportunities across Gateshead, to illustrate the spread of schemes

57. **H1 - Expand Gateshead District Heat Network.** This network is still only serving 30 – 40% of its total capacity. Various extensions are planned (see Appendix 2) to see this continue to grow

- a. East Extension. 5km heat network extension to Gateshead Stadium, including Freight Depot Housing. Cost - £8m, grant secured, Completion due Dec 2022,
- b. Gateshead Quays. 0.3km heat network, to be completed by Spring 2024, to serve Arena, Conference Centre and Hotel
- c. West Extension. An £9.5m extension, to connect 350 Council housing units, and Askew Rd development site. In feasibility, next step to seek agreement to submit funding application
- d. Brandling Extension. A £8.6m extension, to serve the Brandling housing site, and potentially 600 Council Homes in nearby estates.
- e. Baltic Quarter. Longer term ability to connect new development on Baltic Quarter, as it comes forward.

58. **HN2 - Expand Gateshead HEIGHTs.** This scheme comprises 3 small networks in Harlow Green, which spare capacity. Currently in feasibility, to explore extension of network to ca. 1000 low rise Council homes surrounding.

59. **HN3 – Chopwell Heat Network.** Detailed feasibility ongoing. Having discounted individual heat pumps as a viable solution, studies are showing a £28m heat network could supply 2000 homes, including all 800 solid wall homes, Chopwell Heartlands new-build site, and other Council housing from an Air Source Heat Pump energy centre, with solar PV farm and potential wind turbine (see appendix 4 for an outline network) The scheme has already bid unsuccessfully for £12m in grant / loan support from the Heat Network Investment Programme, with feedback provided to address risk in key areas, before preparing a resubmission.

60. **HN4 – suburban heat network feasibility.** The Chopwell and Birtley / Kibblesworth projects demonstrate for the first time that heat networks to low-rise housing estates are becoming viable. We have mapped existing Council housing estates, which tend to cluster around community hubs, with public buildings and schools, and identified 5-6 potential heat network clusters. We have secured £65k grant to fund feasibility on these networks, from the Heat

Network Delivery Unit (HNDU). This scope would cover 13,000 Council Homes, and up to 35 public buildings and schools. Results would be received by Dec 2021, to inform future capital grant applications.

61. **HN5 – geothermal heat sources.** The North East region has been confirmed to have some of the shallowest and highest levels of deep geothermal heat sources at around 2km depth, from boreholes drilled in Eastgate (Durham) and Science Central (Newcastle). Using HNDU grants above, and support from Newcastle University / North East LEP, we will explore commercial viability of these sources in two locations – West Gateshead (Chopwell / Rowlands Gill) and central Gateshead (Gateshead Town Centre to Metrocentre)
62. **HN6 – Birtley / Kibblesworth Heat Network.** Detailed feasibility ongoing, showing potential heat network to connect North Birtley and Kibblesworth village to a mine-water energy centre. using minewater from the existing Kibblesworth minewater pumping station – see Appendix 3 for outline network plan. Scheme could supply up to 2700 homes, both new build and Council homes. Scheme phasing is being revised, aiming to optimise a scheme around £40m cost, which could secure up to 50% grant funding to support construction between 2022 – 2025. The business case would achieve a rate of return of around 4% over 40 years.
63. **HN7 – heat network supply chain development.** If a strategic programme of heat network development is progressed, there is an opportunity to seek better value from the supply chain, to drive down development costs, whilst increasing potential for local skills and job development. We aim to progress this by:
- a. Driving cost reduction and innovation in specifications and procurement of heat network installers, supported by an ongoing Mentoring programme with the Danish Embassy and Gladsaxe (a Danish heat supplier, near Copenhagen, that serves over 6,000 customers).
 - b. Exploring larger scale, strategic contracts with installers to maximise value for money, and secure commitments around community wealth building from local skills and job creation
 - c. Developing internal services to potential support construction / installation / maintenance of heat networks.
64. **HN8 – supporting regional heat network collaboration.** The NE LEP is developing proposal for a Heat Decarbonisation Cluster around Tyne and Wear, which Gateshead is supporting. In addition, we will support proposals from Dept of Investment and Trade, which seek to establish the North East region as a “High Potential Opportunity (HPO)” for inward investment around heat networks

Objective 2. Heat Pumps

65. **HP1 – Gateshead Town Centre Minewater Heat Pump.** The Council has secured HNIP grant funding to install a 6MW ammonia heat pump, extracting heat from mineworking 140m below the surface. This aims to be operational by

Dec 2021, and will supply low carbon heat to extensions of the district energy network.

66. **HP2 – integrating heat pumps into heat networks.** Linked to heat network development, install centralised heat pumps (minewater, air source) into heat networks, such as Chopwell and Birtley / Kibblesworth, where possible supported by low carbon power generation (solar PV).
67. **HP3 – Barlow village domestic heat pump trial.** Eight (off gas) Council properties will be installed with air source heat pumps, in 2021, as well as insulation and new heating systems, (potentially solar) and monitoring systems. Customers will be offered smart meters, which provide extra income by allowing energy companies to control how/when heat pumps come on. These aim to avoid heat pumps increasing fuel costs. Learning will inform further rollouts of heat pumps.
68. **HP4 – Clasper apartment blocks.** Air Source Heat pumps have been specified for 40 apartment block units in the Clasper development, potentially with additional solar PV and private wire electricity distribution and supply, to allow additional costs to be recovered. The scheme is still subject to viability issues, but the design concept has been proven to use elsewhere.
69. **HP5 – define heat pump strategy for new-build housing sites.** Heat network feasibility will confirm areas and new build sites that are likely to be viable for heat networks. Where sites are not viable for heat networks, either due to size or phasing, these can be then designated for individual heat pump developments – e.g. Metrogreen is potential challenging for a heat network, where long development timescales for the phases would make heat network development challenging financially in the early stages.
70. **HP6 – Electrification of Heat Demonstration project.** The Council was not able to bid for this government scheme, but Newcastle City Council, in partnership with Eon, were successful in securing £3.9m of funding to install heat pumps at no cost in 250 homes in Newcastle. The Council will seek to learn from this, and 2 other national pilots, to inform technology options and benefits for the Council going forward.
71. **HP7 – National Minewater Research Hub.** The Coal Authority are seeking to install a network of minewater monitoring boreholes in and around Gateshead, to research, model and predict how minewater can be used for large scale heat pumps. The combination of Gateshead's 6MW heat pump, Lanchester Wines 2No. x 2.4MW heat pumps, plus a minewater pumping station at Kibblesworth, makes this the largest concentration of minewater heat pump schemes nationally and globally. The Council will support the CA to realise this research project.

Objective 3. Hydrogen Economy

72. **HY1 – support InTEGReL.** Provide support to steering group of Northern Gas Network and other partners (Northern Powergrid, Northumbrian Water,

Siemens, Three and Newcastle University) at this national research hub for integrating hydrogen into energy systems. The site includes many projects, including:

- a. **Customer Energy Village** - creating representative housing stock to test solutions for decarbonising heat and piloting energy system innovation. (£1.8m set aside from NELEP's allocation of £47 million – full business case development due September to begin work in early 2021
- b. **ESHIE** - Development of 4,000m² research and innovation building with world class labs and facilities at the heart of the InTEGReL site. Led by Newcastle University, this project would deliver breakthroughs in the decarbonisation of heat, energy storage and transport. Partners are seeking further funding opportunities to the tune of £18.5m
- c. **InTEGReL Business Incubator** – Council to support a project to establish a new SME (Small and Medium Enterprise) incubator ecosystem at InTREGReL, providing space for start-ups and spinouts, capitalising on the specialist research and digital connectivity, including the Internet of Things (IoT) comms

73. **HY2 – Hydeploy 2.** Council has included 650 Council homes in Northern Gas Network's Hydeploy2 project, in Winlaton, Gateshead, which in 2021 will become the first on a public UK gas network to use 20% blended hydrogen for heating and cooking. (Fully funded and in progress). Its success could stimulate roll out of blended gas supply to homes and businesses in Gateshead by the end of 2023.

74. **HY3 – 100% Hydrogen Conversion.** Northern Gas Networks are developing a strategy that would seek to convert the HyDeploy / Winlaton network to 100% hydrogen and gradually expand across Gateshead by 2030

75. **HY4 – Energy Skills Academy.** Support the North East LEP in developing a regional skills academy including education providers (e.g. Gateshead College, Newcastle College) to support skills growth in hydrogen and other energy sectors.

Appendix 1a – Heat Network – potential schemes – house numbers / sites

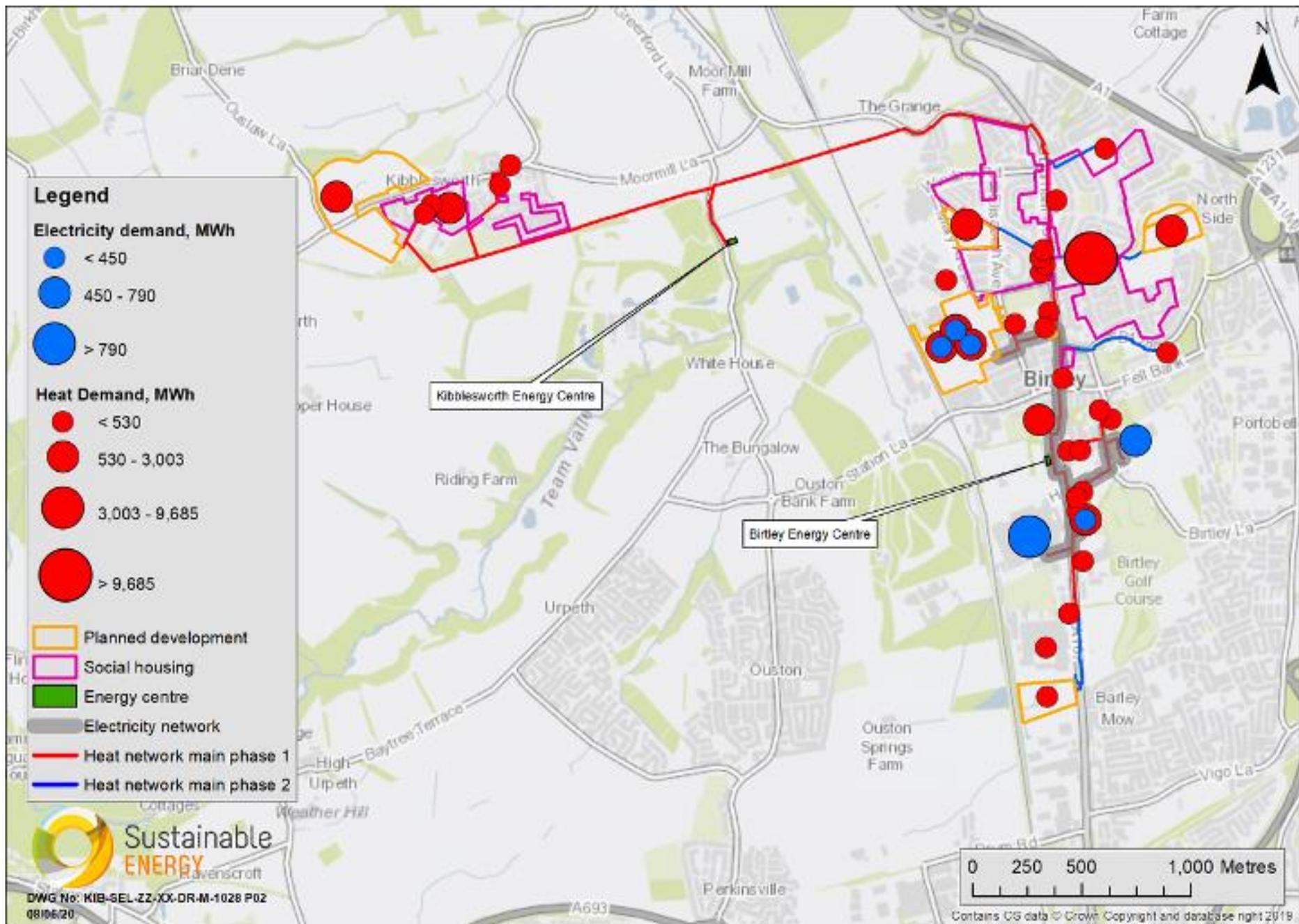
Location	Total Homes	Council homes	Private solid wall homes	New Build homes	New build sites
GDES	1,400	400	-	1,000	Freight Depot, Chandless
HEIGHTs	500	500	-	-	-
West Extension	500	300	-	200	Askew Rd
Old Fold	800	600	-	200	Brandling
Birtley / Kibblesworth	3,000	1,800	300	900	BAE, Kibblesworth, Elizabethville
Chopwell	1,500	400	800	400	Heartlands, North Chopwell
Whickham	1,500	1,500	200	-	-
Heworth	4,100	4,100	-	-	-
Wardley	1,200	1,200	-	-	-
Beacon Lough	2,800	2,800	-	-	-
Leisure Centre network	400	400	-	-	-
Bensham / Saltwell	900	900	-	-	-
Blaydon	700	700	300	-	-
Ryton / Crawcrook	1,200	1,200	-	-	-
Dunston Hill	1,900	1,300	-	600	Dunston Hill
TOTAL	22,400	18,100	1,600	3,300	-

Appendix 1b – Heat Network – potential schemes continued,

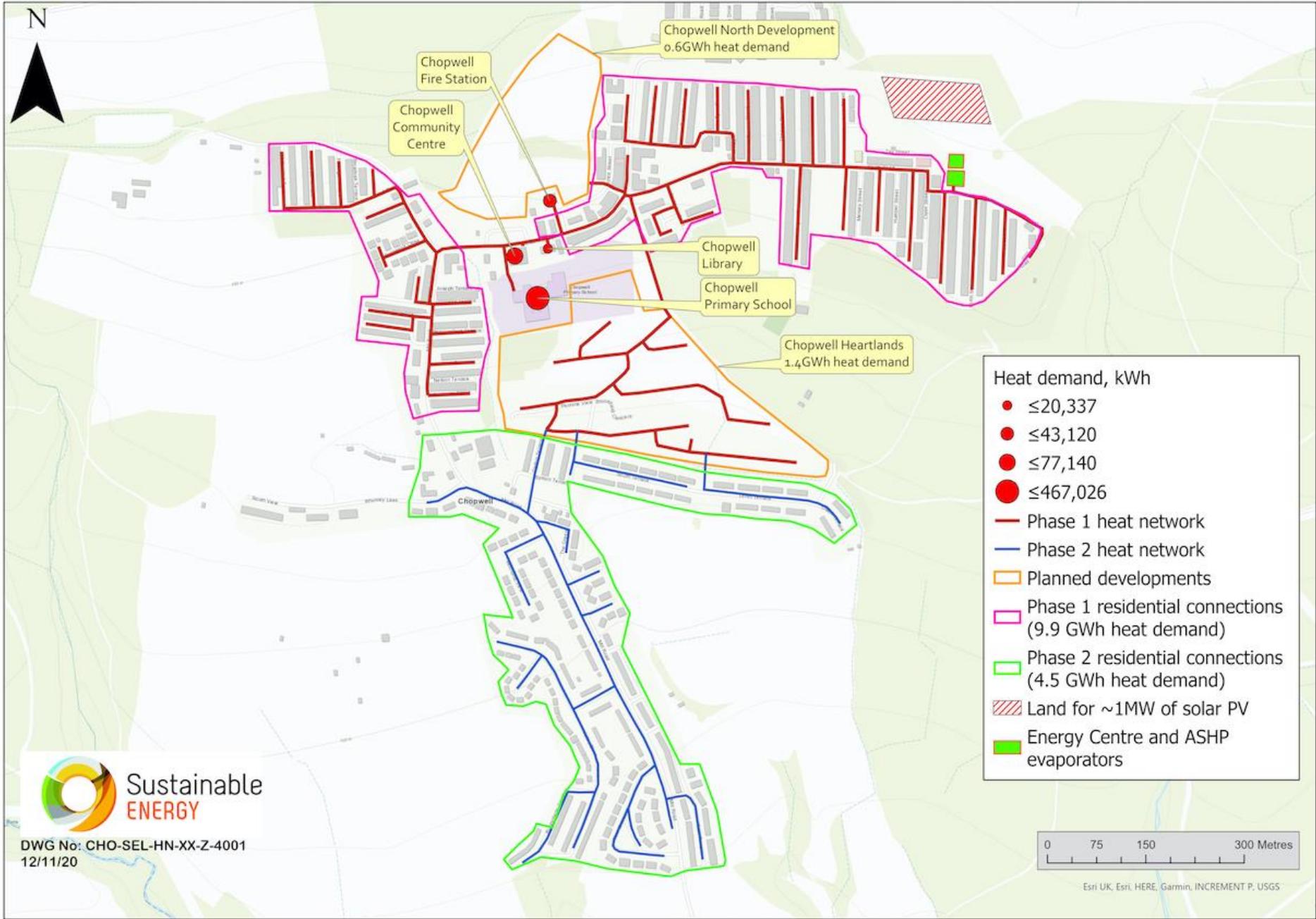
Location	Total Homes	Council Buildings / schools	Heat demand, GWh/yr	Capex, £m	Capex / home, £	Heat pump capacity, MW
GDES	1,400	4	3.8	Already built	Mixed scheme	6
HEIGHTs	500	1	0.4	Already built	High Rise	1.3
West Extension	500	3	6.8	11.4	24,255 (includes High Rise)	N/A
Old Fold	800	3	3.5	9.3	12,012	N/A
Birtley / Kibblesworth	3,000	10	41.3	66.5	Mixed scheme	4.5
Chopwell	1,500	4	17.3	20.5	13,667	1
Whickham	1,500	4	11.1	15.6	10,226	0.6
Heworth	4,100	8	24.7	34.6	8,525	1.4
Wardley	1,200	3	6.9	9.6	7,728	0.4
Beacon Lough	2,800	6	16.6	23.3	8,457	1
Leisure Centre network	400	-	2.1	2.9	8,350	0.1
Bensham / Saltwell	900	3	6.3	8.8	9,852	0.4
Blaydon	700	5	6.7	9.4	13,547	0.4
Ryton / Crawcrook	1,200	4	7.7	10.8	8,880	0.4
Dunston Hill	1,900	3	12.1	17.0	8,774	0.7
Location	22,400	61	167	240		18.2

Appendix 2 – Gateshead District Energy Scheme overall network plan

Appendix 3 - Indicative heat network layout for Birtley / Kibblesworth scheme.



Appendix 4 - Indicative heat network layout for Chopwell scheme



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 12/11/20

