Glasgow City Council

City Development Plan 2

Background Report

Infrastructure Audit: Energy and Heat

March 2024

Energy Supplies Infrastructure

Existing Energy Supplies Infrastructure

1. What is energy supplies infrastructure and how is it used? (consider local/strategic significance)

Energy supplies infrastructure includes electricity and heat networks, distribution and transmission electricity grid networks and gas supplies all of which contribute towards the basic requirements for the City to function and thrive.

With national and local net-zero targets to meet, the City requires an energy transformation that is supported by an energy infrastructure that has planned investment over the long term and is integrated across the electricity, heat, industry and transport sectors.

This will require the City's electricity grid infrastructure to be expanded to support an increased demand for electricity as electrification displaces fossil gas for heating and increased renewable energy generation and use within the City at both a strategic and a local level. This will require new and/or upgraded connections and sub-stations across the City which need to be planned for. This could also include strategically placed battery storage, subject to safety requirements being met, to support increased demand for electricity and increased generation within the City. As systems decarbonise, a mix of energy and heat solutions will require to be deployed across the City.

The City's strategic proposals such as doubling the population of the city centre, EV roll out, a building retrofit programme and delivery of LHEES will, in combination, lead to an increased need for electrification which brings energy infrastructure implications and where early dialogue with the Distribution Network Operator (DNO) is required to ensure that the network capacity can be built in.

The gas distribution network is currently widespread across the City, with some 82% of Glasgow's households using fossil gas to heat their homes and 53.8% of non-domestic properties using fossil gas for heating. As the City decarbonises and there is a switch away from fossil gas, the phase down in the use will have an impact on the gas distribution network which is likely to be required to undergo some form Network Transitioning: switching from fossil gas to hydrogen or permanent disconnection and/or Network Decommissioning.

Despite significant investment in energy efficiency measures in Glasgow properties over the last few decades, fuel poverty has not decreased. In fact, it has increased. For Glasgow, the most recent official measure of fuel poverty (in the Scottish House Condition Survey 2019) estimated 25% of all households (around 73,000) were in fuel poverty. Since then, the city has been significantly impacted by the effects of the COVID-19 pandemic alongside rising energy prices and inflationary pressures. In cognisance of these developments, it is justifiable to assume that fuel poverty rates for households in Glasgow is significantly higher than 25%.

Poor energy efficiency is a significant contributor to fuel poverty rates across the city. Our transition to a net zero carbon city must also act as a springboard to address socio-economic issues such as fuel poverty and energy resilience. The City's Local Heat and Energy Efficiency Strategy (LHEES) therefore takes a holistic approach to heating our built environment, one that seeks to reduce demand for heat in conjunction with decarbonising the city's heat supply as a means of ensuring Glasgow can benefit from affordable, secure and green heating.

2. Capacity and Condition

2.1 Capacity & Condition: Electricity Network

The Distribution Network Operator (DNO) for Glasgow is Scottish Power Energy Networks (SPEN). Discussions with SPEN reveal that all currently known network capacity shortfalls to 2030 have been identified for Glasgow and have been extensively tested to identify solutions to remedy those capacity shortfalls and network constraints.

This has been fed into the RIIO-ED2 price control agreed by the DNO with Ofgem which sets the outputs that the DNO needs to deliver for their consumers and the associated revenues that they are allowed to collect for the five-year period from 1 April 2023 to 31 March 2028. The current 5 year plan has an opportunity for review to re-prioritise work, or to add in new work, at 2025; early discussion with SPEN in that scenario is essential.

At the moment, it is difficult to say if the current 5 year plan will meet the requirements of LHEES or the City's forthcoming Retrofit Strategy as the detailed delivery plans for these pieces of work are not yet known and will only be known during the timeframe of the current SPEN 5 year plan. Ideally, any new requirements for energy upgrades or re-prioritisation of projects should be flagged for the 2025 window of opportunity to review the 5 year plan.

For now, it is assumed that the detailed study undertaken by SPEN to inform their current 5 year plan maintains sufficient capacity, condition and opportunity for growth of the electricity network in Glasgow to meet the known needs of the City.

Refer to Infrastructure First GIS mapping.

GIS Maps: Scottish Power Energy Networks Distribute Generation Heat Map (constrained areas shown in red): https://www.spenergynetworks.co.uk/pages/sp_distribution_heat_maps.aspx

GIS Maps: Scottish Power Energy Networks INTERACTIVE INVESTMENT MAP
https://www.spenergynetworks.co.uk/pages/interactive_investment_map_gis.aspx

2.2 Capacity & Condition: **Gas Network**

The gas network is operated and maintained by Scotland Gas Networks (SGN). There is an acknowledgement by SGN that fossil gas will require to be phased down in order to meet the Scottish & UK Government's Net Zero commitments. Uncertainty currently exists around whether the gas network should be transitioned to replace fossil gas with hydrogen for heating, or if the dominant move will be towards decommissioning.

SGN continue to invest in the safety and maintenance of the gas distribution network and large amounts of the existing network is suitable for hydrogen (Polyethylene (PE) pipe and low strength steel) however there is still some uncertainty over the high strength steel used in parts of the high-pressure network. The current assumption is that iron isn't suitable due to HSE safety concerns, however, by 2032 when the iron mains risk reduction programme is scheduled to complete, Glasgow's gas distribution network should be upgraded and suitable for hydrogen distribution if that is the Heat Policy decision made by the UK Government in 2026. The overall network is sized appropriately for hydrogen with little need for reinforcement despite the lower energy density of hydrogen. There is also an on-going programme of research to determine the suitability of hydrogen for a wide range of non-pipeline network assets.

Refer to Infrastructure First GIS mapping.

2.3 Heat Networks

Heat networks have been identified as a low-regret decarbonisation technology through the Heat in Buildings Strategy. Glasgow is a significantly heat dense urban area so heat networks will be a key mechanism in delivering net zero carbon and is a priority focus for the first iteration of Glasgow's Local Heat and Energy Efficiency Strategy (LHEES).

Glasgow currently has >8 large, stand-alone heat networks operating across the City and numerous smaller communal heating systems. These heat networks are owned and operated by a range of providers and it is not known if they share a common heat network specification which would allow them to be 'joined up' as and when heat networks roll out across the City at a later date. A map of the existing communal heating and heat networks is shown in Fig.1.

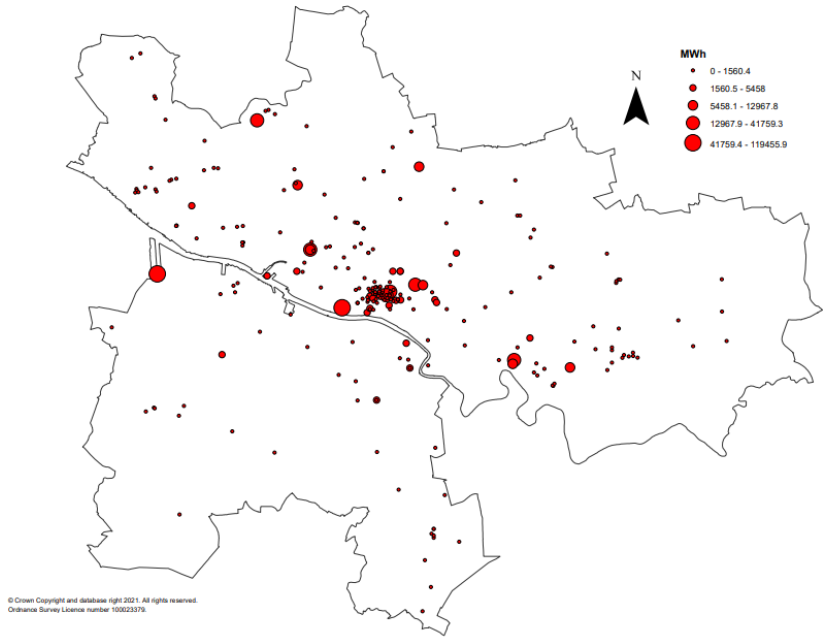

Fig.1. Existing communal heating and heat networks (Source: GCC LHEES 2023)

It is likely that there will be a need for a review of the existing heat network specifications to determine if there will be stranded assets as heat networks roll out across the City. At present there is no nationally agreed standard technical specification for heat networks but work is ongoing at the Scottish Government with the UK Government to develop the Heat Network Technical Assurance Standards (HNTAS). Once known, the HNTAS can be used to compare the specifications currently deployed across the City to determine opportunities for expansion of existing networks.

Refer to Infrastructure First GIS mapping.

3. Compatibility with Investment Hierarchies

Determine future need in light of net zero carbon priorities and population forecasts.

3.1 Electricity Network

The future investment in the electricity network is essential to achieving the Scottish & UK Government's Net Zero targets. It has been extensively modelled and tested by SPEN using their Engineering Net Zero Model which looks for the most economic combination alongside the timing of solutions to ensure network provision. The resulting programme of works is in line with the Scottish Government's Investment Hierarchy to determine future need, maximise useful life of existing assets, re-purpose and co-locate and replace, create or build new assets. It would also appear to meet the NTS2 Investment Hierarchy of maintaining and safely operating existing assets, making better use of existing capacity and targeted infrastructure improvements.

3.2 Gas Network

SGN has considered the role of the gas distribution network in relation to the Scottish and UK Government's Net Zero targets and this is reflected in their current investments. Uncertainties over the future of the fossil gas in the network means that current investment in the gas distribution network would appear to be primarily on safety and maintenance grounds whilst ensuring that the pipe network is suitable for a transition towards the delivery of hydrogen if required at a future date.

In the Scottish Government's Investment Hierarchy, the top-level requirement to determine future need presently poses an issue as SGN await UK Government level decision-making around the future of the gas distribution network, however, SGN continue to maximise the useful life of existing assets and are actively looking to diversify away from gas distribution to re-purpose and/or co-locate energy hubs and replace, create or build new non-fossil gas assets on their sites.

While there are uncertainties for the future of the gas network, there is a realism from SGN about the need to move towards net zero which is evident in discussions with SGN and would appear compatible with the Investment Hierarchies. This would also seem to meet the NTS2 Investment Hierarchy of maintaining and safely operating existing assets, and seeking to make better use of existing capacity while looking to pivot away from fossil gas to diversify their energy services offer and look for targeted infrastructure improvements.

3.3 Heat Networks

The expansion and installation of heat networks will be a crucial element in the decarbonisation of heat within the City. This will predominantly be new infrastructure for which an overarching need has been determined in order to meet the Scottish and UK Government's Net Zero targets which is in line with investment priorities. Once the Heat Network Regulations are finalised, this will allow heat network zones (HNZs) to be formally designated in Phase 1 of the LHEES Delivery Plan in accordance with the Heat Networks (Scotland) Act 2021.

Proposed Energy Supplies Infrastructure

4. Future Needs

The National Infrastructure Commission's Audit states that to tackle climate change and ensure energy security, the UK should move away from its reliance on fossil fuels which will require a fundamental change in the country's energy infrastructure. Over the next 30 years, the country will need a larger electricity system running mostly from renewable sources like wind and solar; heat pumps and heat networks to replace gas boilers in homes and business; and industry running on electricity where possible, but where it is not possible, new infrastructure to supply green hydrogen or carbon capture and transport to remove any carbon emitted from burning fossil fuels to underground stores.

4.1 Electricity Network

Distribution Future Energy Scenarios (DFES) are available on SPEN's website and include a full mix of uses, not only domestic users. The energy landscape is changing fast and SPEN's role is to plan the distribution network to facilitate decarbonisation objectives and choices, and to enable the journey to Net Zero.

To achieve this, SPEN develop Distribution Future Energy Scenarios (DFES) which are forecasts for a range of customer demand and generation metrics up until 2050.

Given the uncertainty and ever-changing policy landscape, SPEN has created forecasts for multiple scenarios, which reflect differing levels of consumer ambition, government/policy support, economic growth and technology development. They have engaged with a wide range of stakeholders to ensure that the forecasts reflect the plans and ambitions of the local communities they serve.

The DFES documents describe how electricity generation and demand may evolve over the next 30 years.

SPEN also publish map views for both SP Distribution which show our forecasts for customer demand and generation (peak demand, electric vehicles, heat pumps, generation capacity, etc.) for the selected combination of DFES scenario and year. All of these scenario forecasts inform the future spatial requirements needed to deliver the electricity network.

4.2 Gas Network

There is still a high degree of uncertainty about how the decarbonisation of the gas network away from fossil gas might progress. Whilst substantial investment has been made in reducing the uncertainty in the ability of assets to accept hydrogen and for the network to operate safely, there is a high degree of uncertainty regarding transition research to date, both in terms of technical assumptions and cost assumptions. Additionally, the mechanics of how the entire energy system transitions at a system level, the customer journey, experience and support in transition is largely unknown and is not considered in the current industry research.

While SGN await the UK Government's official Heat Policy decision in 2026 which will determine the future of fossil gas and whether the gas distribution network should be re-purposed for the supply of hydrogen for heating in the UK, the Second National Infrastructure Assessment (October 2023) suggests that Government should not pursue the use of hydrogen for home heating: *it will not be ready in time to meet climate goals and is far less efficient than electricity*. The economic, environmental and efficiency arguments may see green hydrogen reserved for heavy industrial uses which cannot easily be electrified and rule out the general roll out of hydrogen for home heating.

If hydrogen is not rolled out across the existing gas network, then there will be a need for decommissioning. Limited work has been done to investigate the best way to decommission large portions of the gas network and hence the costs associated with disconnecting customers, removing the fossil gas from the system, making the network safe and permanently decommissioning.

The recent report by Arup for the National Infrastructure Commission suggests that as per the offshore industry, specific guidance on the regulatory and safety aspects should be expected to be issued for the onshore gas system. There is a balance to be struck between upfront investment and on-going expenditure and liability. Some assets will need to be removed and others made safe to avoid issues such as road subsidence whilst others could be transferred to a publicly owned body who will retain liability for the assets and incur operational expenditure ensuring on-going public safety.

If green hydrogen was to be deployed within the City for heavy industrial process, analysis would need to be done to identify the location of these types of operations within the City, and the spatial and safety implications of the supply and storage of green hydrogen to ascertain it's impacts.

4.3 Heat Networks

The City's LHEES process will determine the future locations, the extent and the methods of delivery of heat networks in Glasgow. The LHEES has undertaken an extensive spatial analysis exercise to identify where in the city heat networks could be the most viable. This mapping has primarily sought to match heat demand with heat supply, identifying areas where there is sufficient demand density alongside potential low carbon or renewable heat supply opportunities. The map below of Indicative Heat Zones (fig.2) highlights the outputs of this work at city level.

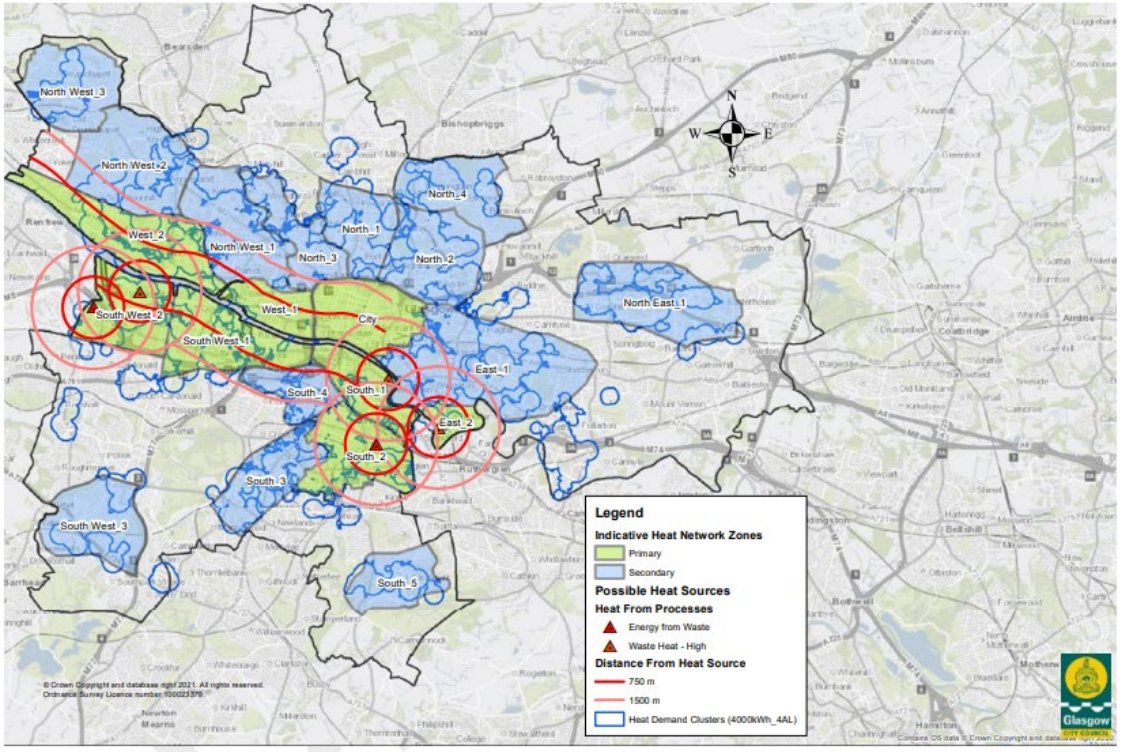

Figure 2. Indicative Heat Zones (Source: GCC LHEES 2023)

The opportunity for the expansion of heat networks across the City will be examined in greater spatial detail as the LHEES moves into its Phase 1 work on the Delivery Plan which should include the formal designation of HNZs. Green hydrogen could have a future role to play in the decarbonisation of existing fossil gas fired heat networks.

4.4 Individual or Communal Heat Pumps

Where larger-scale district heat networks do not present a viable decarbonisation pathway, the deployment of heat pumps at either individual scale or as part of smaller community heat networks may be the most appropriate intervention. Glasgow's LHEES has undertaken mapping work to identify concentrations of domestic properties that appear suitable for the installation of a heat pump. This has considered building thermal efficiency alongside potential planning restrictions that may impede delivery (such as listed buildings or conservation areas). The map below (Fig.3) identifies discrete zones of on-gas grid delivery areas where projects to deploy individual or communal heat pumps are the most feasible.

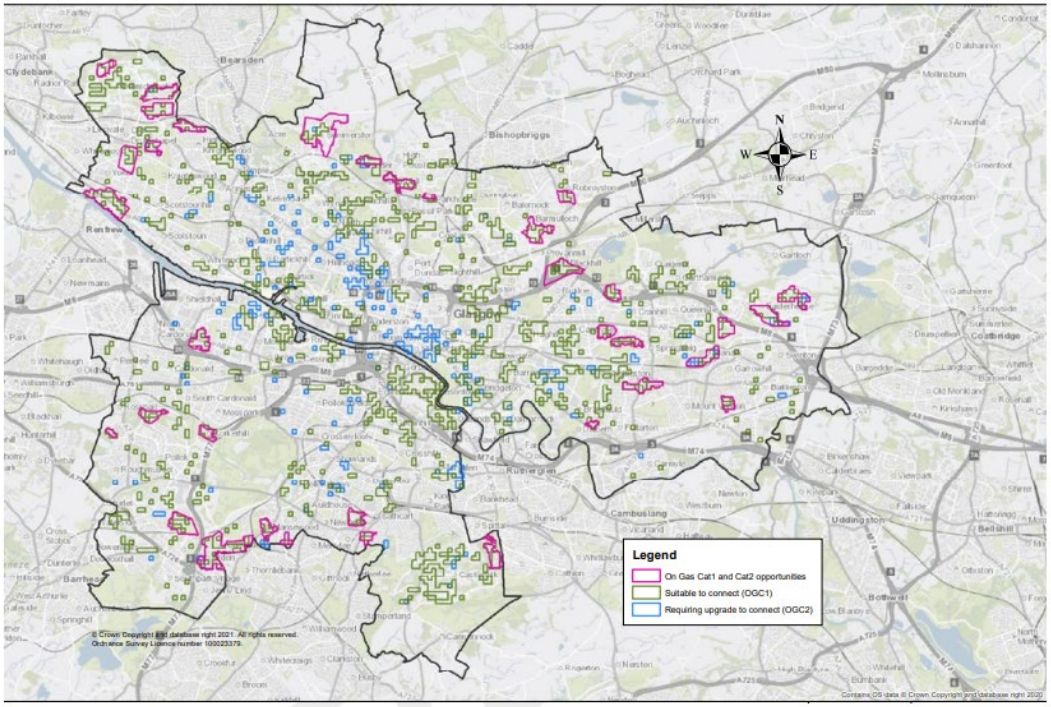

Figure 3. On Gas Grid Delivery Areas (Source: GCC LHEES 2023)

The national policy landscape around the rollout of heat pumps is evolving, as is the method of delivery. It is likely that new Utility Companies will enter the heat market as the provision of heat becomes decentralised e.g. heat networks based around shared loop array ground source

heat pumps. As such, the current iteration of the LHEES provides an evidence base for future project identification and will be used as a live tool to be updated in line with local progress and national developments. Delivery will therefore focus on engagement with residents in these areas to better understand the appetite for low-carbon heating and refining identified areas into potential projects. For this reason, mapping work at this stage has been kept broad. It is anticipated that future iterations of the LHEES will identify projects to a higher degree of granularity as the national landscape becomes clearer.

4.5 Battery Energy Storage Sites (BESS)

Battery Storage sites are currently regulated as generation, not storage or distribution. This means for example that to install a 50MW battery storage facility, there would need to be 50MW capacity available in the local network which would need to be reserved for the battery storage proposal which can create capacity constraints within the network. SPEN has highlighted this to the UK Government and are looking for a change in legislation. If/when this changes, there is likely to be an increase in applications for battery storage, strategic and local.

There is an urgent need for planning guidance on battery storage which has been highlighted via the Heads of Planning Scotland (HoPS) Energy Climate Change & Resources (ECCR) Sub-Group. The main area of concern is specifically around fire safety and the social, economic and environmental implications of a major incident occurring. At present, the Scottish Fire & Rescue Service (SFRS) are not statutory consultees in planning, however, there is a need for their involvement in BESS at the planning stage as there will be urban sites that are not suitable for BESS on fire safety grounds. SFRS have generally deferred to HSE (Health & Safety Exec) for guidance but HSE has not yet produced any guidance on BESS. It is likely that BESS sites should be considered under the COMAH (Control of Major Accident Hazards) Regs but they have not yet been formally incorporated into the Regs.

5. Programmed Improvements

The following improvements are programmed for Glasgow:

5.1 Electricity Network

5.1.1 NPF4

NPF4 identifies 18 National Developments. National developments are significant developments of national importance that will help to deliver our spatial strategy.

These national developments range from single large-scale projects or collections and networks of several smaller scale proposals. They are also intended to act as exemplars of the Place Principle and placemaking approaches.

National Development 3: Strategic Renewable Electricity Generation and Transmission Infrastructure. *Location: All Scotland.*

This national development supports renewable electricity generation, repowering, and expansion of the electricity grid.

A large and rapid increase in electricity generation from renewable sources will be essential for Scotland to meet its net zero emissions targets. Certain types of renewable electricity generation will also be required, which will include energy storage technology and capacity, to provide the vital services, including flexible response, that a zero carbon network will require. Generation is for domestic consumption as well as for export to the UK and beyond, with new capacity helping to decarbonise heat, transport and industrial energy demand. This has the potential to support jobs and business investment, with wider economic benefits.

The electricity transmission grid will need substantial reinforcement including the addition of new infrastructure to connect and transmit the output from new on and offshore capacity to consumers in Scotland, the rest of the UK and beyond. Delivery of this national development will be informed by market, policy and regulatory developments and decisions.

5.1.2 SPEN

SPEN has been awarded £33.9m of funding to support Scotland's transition to Net Zero and deliver a green economic recovery from Covid-19. They have worked with Ofgem, the Energy Networks Association (ENA) and stakeholders across our communities to identify shovel-ready green projects that can be delivered with the right investment in our distribution network.

In their SP Distribution area which covers Central and Southern Scotland, they are moving forward with 20 projects which will reinforce and upgrade the electricity network to allow the connection of low carbon technologies (LCTs) such as electric vehicles (EVs) and electric heat pumps. Over the next two years the delivery and completion of these projects will demonstrate the importance of accelerating investment in these areas if we are to drive a green economic recovery and achieve the Scottish Government's target of achieving Net Zero by 2045. The Green Recovery investment in Scotland will create sufficient new capacity on our electricity network to enable the connection of around 200 rapid or ultra-rapid EV chargers, and 1,500 electric heat pumps. Upgrades can be seen on the SPEN Green Recovery Investment Map (Scotland)

5.2 Gas Network

SGN is undertaking an Iron Mains Risk Reduction Programme funded by Ofgem and is due to complete by 2032. The Iron Mains Risk Replacement Programme switches ageing iron gas mains with new hydrogen- and biomethane-ready piping, reducing methane natural gas leakage.

5.3 Heat Networks

Glasgow's Local Heat and Energy Efficiency Strategy (LHEES) was approved by the City Administration Committee on 16th November 2023

The aim of Glasgow's LHEES is to provide affordable, reliable and low carbon heat that helps the city reach its net zero carbon target in a just and inclusive manner by 2030. Successful delivery of this ambition will be achieved by focusing on reducing demand, decarbonising supply, and decentralising systems.

Glasgow's LHEES has four key focus areas, these include: Heat Networks; Individual or Communal Heating Solutions; Poor Energy Efficiency as a Driver of Fuel Poverty; and Pre-1919 Tenemental Properties.

This first iteration of the LHEES will provide an evidence-base that will underpin the forthcoming Retrofit Strategy which is being developed by NRS Housing and has a focus on pre-1919 tenemental properties. LHEES are required to be updated five years from original publication. In this respect, the LHEES acts as a live document and will seek to incorporate outcomes from other strategies. The Retrofit Strategy may identify strategic actions to accelerate retrofit and at a scale larger than previously thought.

The LHEES has also outlined the City Council's intention to assess how an Energy Partnership may contribute to delivering on the ambition in the LHEES, particularly where high upfront capital costs may impede delivery in areas such as district heating.

The next steps for the delivery of the LHEES will:

- Explore options in relation to delivery of heat networks, pushing for clarity on zoning development from Scottish Government, and identify viable delivery structures for consideration by committee
- Progress indicative Heat Networks Zones (HNZs) into designated Heat Network Zones (HNZs). This will involve thorough engagement and consultation with stakeholders and residents in proposed zones alongside further work to clarify the social, commercial and climate opportunities presented by potential heat networks within proposed zones
- Support the development of the Retrofit Strategy to ensure strong alignment between NRS Sustainability and NRS Housing
- The Retrofit Strategy will provide the next step for certain elements of the LHEES

5.4 Overarching Infrastructure

An assessment of the United Kingdom's infrastructure needs to 2055 and beyond., the Second National Infrastructure Assessment was published by the UK National Infrastructure Commission on 18th October 2023.

The Commission is required to carry out an overall assessment of the UK's infrastructure requirements once every five years. The first Assessment was published in 2018 and has shaped many aspects of infrastructure policy, including the establishment of the UK Infrastructure Bank, increased support for renewables, committing to transition to electric vehicles, devolved budgets for local transport, deployment of gigabit capable broadband networks, and the long term direction for water resources policy.

This is the second Assessment. It covers all economic infrastructure sectors, setting out recommendations for transport, energy, water and wastewater, flood resilience, digital connectivity, and solid waste. The Assessment takes a 30 year view of the infrastructure needs within UK government competence and identifies the policies and funding to meet them.

The Assessment is guided by the Commission's objectives to support sustainable economic growth across all regions of the UK, improve competitiveness, improve quality of life, support climate resilience and transition to net zero carbon emissions by 2050. Government has given the Commission a long term funding envelope for its recommendations (the 'fiscal remit'). Where infrastructure is financed by the private sector, and the costs of any recommendations will ultimately be met by consumers, the Commission is also required to provide a transparent assessment of the overall impact on household costs (the 'economic remit').

Phasing out the use of fossil fuels to generate electricity, heat homes and power vehicles will reduce greenhouse gas emissions, and is essential for the UK to meet its legally binding climate targets. Action is now urgent with only 12 years left to meet the Sixth Carbon Budget. This shift will also bring significant economic benefits. Shocks to oil and gas prices will have a much smaller impact on the cost of living. If the UK can move fast, some businesses should be able to become leaders in new low carbon technologies. And, in the longer term, electrifying the energy system should lower energy costs for households and businesses, boosting productivity.

6. Further improvements required?

6.1 Negative emissions technologies (NETS)

The Scottish Government expects Carbon Capture & Storage (CCS) to contribute significantly to overall net zero. In the Scottish Climate Change plan update from 2020, 'negative emission technologies (NETs)' (a term capturing various process using CCS) are forecast to reduce overall GHG emissions by 24% in 2032 (the last year of the plan). In the Climate Change Plan update, it is CCS that largely permits the use of 'net' rather than absolute zero targeting, as all planned NETs include a form of CCS. The Climate Change Plan update also highlights the Climate Change Committee's (CCC) view that there is 'relatively greater potential' for NETs in Scotland than the rest of the UK.

In May 2023, the Scottish Government released the annual Climate change monitoring report. These reports are a statutory requirement under the 2019 Climate Change Act and assess progress in terms of emission reductions and various other indicators. In the section on Negative Emissions Technologies (NETs) the report states that with respect to CCS: '*Scotland can deliver at scale in due course but not at the pace assumed in the CCPu* (Climate Change Plan 2018-32 update)'.

This stated change in assumptions is important due to the implications it has for emission reduction planning in Scotland. Without this level of contribution, if the 2030 interim target is to be achieved, greater emission reductions will be needed in other sectors e.g., transport, agriculture, heating buildings etc.

The change in expectation for CCS is due to 'various shifts on the evidence' including:

- 'The UK Government's decision not to allocate the Scottish Cluster as a Track-1 cluster for delivery in the mid-2020s, impacting on when carbon storage underpinning NETs will be available, and industries' appetite to invest in NETs technologies' and
- 'No public commitment to date by a commercial operator to employ a NETs model for a single large power station in Scotland.'

There are no known proposals for NETS projects in Glasgow. A new Scottish draft Climate Change Plan is expected in 2024, delayed from 2023.

Definitions of NETS from SPICe Blog on CCS in Scotland (17/3/23):

Bioenergy CCS and Direct air capture CCS are sometimes termed as 'negative emissions technologies' as they either capture CO2 direct from the atmosphere or the carbon captured during the growth of the bioenergy, is then re-captured and stored by CCS.

Direct Air Capture CCS is where CCS is used solely for the purpose of capturing CO2 from the atmosphere as opposed to being used alongside an energy utilisation or conversion process. Bioenergy CCS is using bioproducts such as wood pellets to produce electricity with CCS.

7. Deliverability (consider environmental, operational and funding constraints)

There are issues of Just Transition around the delivery of a decarbonised energy and heat infrastructure which need to be considered in how the transformation is funded, the legal situation around connections and how affordable it will be for consumers.

7.1 Electricity Network

SPEN is delivering upfront investment in the electricity network which it recovers over 45 years via wholesale energy market suppliers. An expanded National Grid is a direct and inevitable consequence of decarbonising our energy supply to achieve net zero: it is a public good. The approach of seeking to match Grid capacity to current usage is now outdated as policy and SPEN's DFES' for Glasgow seek to move away from this. The Scottish Government's Net Zero, Energy and Transport Committee has made a call for the prudential investment in Grid capacity in anticipation of future need in order to meet the 2045 net zero target. Amongst other things, this would also increase long-term public and investor confidence in the renewables industry.

The current 5 year investment plan is RIIO-ED2 covers the period to 2028 and has an opportunity for review to re-prioritise or add in new work in 2025. At present, major reinforcements of the network can take up to 3-4 years so early engagement with SPEN is critical to ensure deliverability.

7.2 Gas Network

As previously outlined, the future of the gas network is currently uncertain and current investment reflects this whilst keeping options open.

The supply of green hydrogen could be an opportunity for existing fossil gas fired district heating schemes in the City to switch and for heavy industrial processes that cannot be electrified, but recent statements by the National Infrastructure Commission indicate that it is unlikely to be widely rolled out as a direct replacement for natural gas in individual homes.

7.3 Heat Networks

Once there is clarity around the Heat Network Regulations, the Delivery Plan for LHEES will be developed. Work is currently being undertaken by the LHEES team to evaluate the various delivery models available to bring forward heat networks within the City.

7.4 Individual or Communal Heat Pumps

There is currently Scottish Government financial support for individuals who wish to install heat pumps (and/or other renewable energy technologies) in their homes. The Home Energy Scotland Grant and Loan can help with the cost of installing both heat pumps and energy efficiency improvements. Grant funding for heat pumps is up to £7,500 or £9,000 for households which qualify for a rural uplift. The remainder of funding requested can be taken up as an optional interest-free loan.

In the case of Communal Heat Pumps, it is likely that new Utility Companies, such as Kensa Utilities backed by Legal and General, will enter the heat market as the provision of heat becomes decentralised e.g. heat networks based around shared loop array ground source heat pumps.

7.5 Battery Energy Storage Systems (BESS)

Battery storage within the City has not yet been planned strategically and at the moment, proposals within the City appear opportunistic. If there is a change in the law from generation to distribution, then they are more likely to be strategically planned across the City as part of a smart energy grid infrastructure, however, there is still the issue over the need for more targeted regulation and planning guidance for BESS.

7.6 Delivery considerations for City Development Plan 2 (CDP2)

In producing CDP2 the following will require consideration:

- Integration of the LHEES into CDP2, allocation of sites for district heating, identifying opportunities to co-locate developments with a high heat demand together with or alongside sources of heat supply. and policy required to deliver heat networks through development.
- Including energy and heat infrastructure as part of site appraisals for the allocation of sites – identifying any issues with capacity that require resolution for development to go ahead.