Appendix 1B

Buildings and Heat Strategy

Net Zero Aberdeen

1. Purpose

1.1 How is the Buildings and Heat Strategy relevant to Net Zero Aberdeen?

This strategy describes the role that Buildings and Heat have in our Net Zero Aberdeen journey. It covers the responsible use of materials in construction of buildings and energy use within properties.

2. Context

2.1 What is the context for the Mobility theme

The built environment accounts for 19% of Aberdeen's emissions, the vast majority of which are residential. Almost 90% of all homes use fossil fuels for heating, cooking and hot water and majority are connected to gas grid.

The material and architecture for which Aberdeen is known compounds some of these challenges. Significant areas of flatted tenements and the widespread use of granite result in significant levels of energy use within these buildings. Heat loss through the fabric of these often-uninsulated properties, results in both a significant level of unnecessary emissions and in some cases, residents falling into fuel poverty. Even where people on the margins do not fall within the fuel poverty classification, they will be spending more than is required to heat their homes.

This was identified in thermal imaging surveys commissioned by Aberdeen City Council in 2014, which demonstrated the thermal inefficiency of many properties in Aberdeen. It is not predicted there has been a significant change in recent years.

Many of our commercial and public buildings, especially those of a historic nature, will also suffer from these challenges. While in these cases the cost of energy may not be as acute an issue, the resulting carbon emissions will be significant. Tackling commercial properties, while a smaller percentage of the overall target, may represent an opportunity for some quick wins.

In October 2021, the Scottish Government published its Heat in Buildings Strategy, which sets out the following key targets:

- From 2024, new homes will use zero direct emissions heating and high levels of fabric energy efficiency to reduce overall heat demand and avoid future retrofit
- By 2030 the vast majority of the 170,000 off-gas homes that currently use high emissions oil, LPG, and solid fuels, as well as at least one million on-gas homes, must convert to zero emissions heating
- The key strategic technologies which will be prioritised in the immediate term includes energy efficiency measures, heat pumps and heat networks
- The statutory fuel poverty target requires no more than 5% of households in Scotland to be in fuel poverty by 2040

- By 2045 all homes and buildings in Scotland must have significantly reduced their energy use, and almost all must be using a zero-emissions heating system

The Heat in Buildings Strategy recognises that the path to net zero will require significant improvements in the energy efficiency of both new and existing homes. For new homes improvements will be driven through revisions to the Building Regulations with some interim changes expected in 2022 ahead of the New Build Zero Emissions from Heat Standard coming into force in 2024. All existing homes are expected to achieve an EPC energy efficiency rating of band C by 2033. It is proposed that a zero emissions standard across all tenures will be introduced, with compliance date of 2045, subject to technological developments and decisions by the UK Government in reserved areas. Targets are also included for non-domestic buildings with standards expected to be introduced from 2025 to ensure they reduce demand for heat and install or connect to zero emissions heating systems.

Several levers are also available at a local level which can be used to advance the journey to net zero. Through the planning system there are opportunities within the emerging Aberdeen Local Development Plan to identify Heat Network Zones. There are also improved energy standards required for new buildings and support for Low and Zero Generating Technology. The emerging National Planning Framework 4 also includes strong support for carbon assessment and energy efficiency.

Emerging Local Heat and Energy Efficiency Strategy (LHEES) Implementation Plans provide area wide opportunities to help identify, data and skills gaps.

The UK electricity generation mix has changed considerably in recent years with renewables contribution to low carbon generation providing increasing proportions of the national electricity needs, resulting in low carbon generation from renewables and nuclear now accounting for 54.4% of all electricity generated in 2019.[1] It is expected that the proportion of electricity generated by low carbon systems will continue to increase.

2.2 Key challenges for Buildings and Heat

How do we:

1. **Reduce energy demand** of all types in the built environment.
2. **Phase out fossil-fuel** based energy sources while maintaining a just transition.
3. **Encourage fabric first** approach in all types of new builds and retrofits.
4. **Encourage energy efficiency** across our energy systems to reduce waste.
5. **Incentivise replacement heating** with low carbon alternatives.
6. **Improve public engagement** to understand issues and deliver better advice.
8. **Collaborate to promote net zero** with partner organisations.
9. **Encourage higher standards** from Aberdeen's development industry.
10. **Expand district heating** across domestic and commercial properties.
11. **Develop new energy** opportunities in partnership with industry.
12. **Avoid further fuel poverty** from our drive to net zero buildings and heat

[1] www.gov.uk/government/statistics/digest-of-uk-energy-statistics-dukes-2020).

2.3 What is already happening

Project DORIC (Domestic Optimised Retrofit Innovation Concept) is a Department for Business, Energy and Industrial Strategy (UK BEIS) match funded project to carry out whole house retrofit to PAS 2035:2019 Retrofitting standard and demonstrating decarbonisation of heat. New build Council social housing to a 'Gold Standard' specification of energy performance. Expansion of our district heating networks, including some new build housing connecting to new and existing heat network.

Feasibility study of hydrogen for heat as a decarbonisation solution for district heating energy centres.

3. Strategic drivers

UK	Powering our Net Zero Future
	Heat and Buildings Strategy
	Future Homes Standard aims to ensure all new builds are zero carbon Ready; a road map is expected to be published.
	Heat Network Metering and Billing Regulations 2020
Scotland	Fuel Poverty (Targets, Definitions and Strategy) (Scotland) Act 2019
	The Future of Energy in Scotland: Scottish Energy Strategy
	Heat Networks (Scotland) Act 2021 – covering regulatory powers.
	Heat in Buildings Strategy – achieving net zero in Scotland's buildings
	Local Energy Policy Statement
	Scottish Government target for 6TWh of heat to be supplied through heat networks by 2030 using low carbon means
Aberdeen	Secondary legislation to be introduced on a duty for Local Heat and Energy Efficiency Strategies (LHEES), working in partnership with councils and aiming to have area wide plans in place across all areas by the end of 2022[2]

[2] Refer to page 88: https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/

4. Approach

4.1 Overview

Strategic Aim: Reduce greenhouse gas emissions to net zero by 2045, through rapid decarbonisation across all sectors with many changes to the ways in which both power and heat is generated and used.

Key Outcomes	Strategic objectives	Measures
Improved energy performance data	Improve energy performance data to more accurately identify existing building performance and heat use.	Capturing energy data for all buildings within LHEES Plans
Improved plans, policies, and standards	Developing Local Heat & Energy Efficiency Strategy (LHEES) Implementation Plans across areas	Number of LHEES Plans produced
Improved energy efficiency of buildings	Fabric first approach to improve insulation of the building envelope to reduce the requirement for heat.	Property heat performance, as shown by heat map
Improve energy management controls	Use energy audits as a tool to identify and deliver better, energy smart equipment and controls	Number of properties audited
Expand low and zero emissions heating	Use feasibility studies to accelerate the switch to low or zero carbon heating and hot water systems	Number of properties being feasibility assessed
Increased connections to decentralised energy	Expand district and communal heating connections in the city	Number of district heating connections
Reduced fuel poverty	Provide support to those in fuel poverty and identify tangible community benefits	Percentage of households in fuel poverty

4.2 About the approach

Improve energy performance data

Energy Performance Certificates (EPC's) remain by far the most common data available for buildings. EPCs are limited in terms of the detailed energy information required and the relative accuracy of "as built" data over period of 10 years presents a challenge. Address data gaps from the building and energy sectors.

- Engage with the Universities, Scottish Government, Scottish Futures Trust, energy sector and others improve data and accuracy; and to innovate and explore solutions for real time data.
- Make use of data from Aberdeen's Heat Map and the Scottish Government's Heat Map for more granularity and to better inform decision making.

Strengthen plans, policies, and standards

Through the Local Development Plan and use of the Local Heat and Energy Efficiency Strategy (LHEES) Plans methodology to set higher energy requirements from our built environment.

- Engage with the developers and house builders to explore barriers to improving energy standards.
- Engage with other stakeholders in the city to develop the LHEES Plans including expansion of district heating network.

Local Heat and Energy Efficiency Strategy (LHEES)

All Local Authorities in Scotland must produce LHEES Plans for the Council area by 2023 to set long term plans for local energy efficiency and heat decarbonisation. The LHEES methodology supports planning at local area level on the approach to achieve net zero by 2045.

Area Plans will consider the local heat demand and building assessment, developing a local energy plan of the energy infrastructure to meet the energy demand and retrofit requirements for each building and helping to identify, data and skills gaps.

The LHEES Plans can also overlay other datasets such as heat maps and electricity distribution networks, including electric vehicle charging networks.

Develop a fabric first approach

A "fabric first" approach through insulation upgrades or deep retrofit measures to ensure that the building is thermally efficient. Reducing heat demand will make it easier and more cost effective to install and operate low carbon heating systems such as ground or air source heat pumps.

- Drive a "fabric first" approach by improving insulation of the envelope of the building, to reduce the demand for heat irrespective of the type of fuel used.
- As demand for heat in homes is significantly reduced, poor energy efficiency will no longer be a driver of fuel poverty.

Improve energy efficiency – controls and management

Energy efficiency improvement through better, energy smart equipment and controls, as well as behavioural change on how energy is used in buildings.

- Optimise controls, balancing demand, and supply of energy to achieve better energy efficiencies within buildings considering its operations and occupancy.

- Make use of smart metering and controllers for improved monitoring of heat and power distribution networks, to maximise efficiencies.

Low or Zero Carbon Heat

Accelerate the switch to low or zero carbon heating and hot water systems, including district heating or zero emissions heating, such as communal ground source heat pumps and air source heat pumps.

Hydrogen

Hydrogen could potentially displace natural gas – this is largely dependent on successful demonstration and positive decisions on the future of hydrogen in the gas grid from the UK Government. There are multiple methods for producing and distributing hydrogen; studies are ongoing into the safety of using higher concentrations of hydrogen in the gas system, including the potential to introduce this to some district heat networks in Aberdeen.[3]

The prospect of using hydrogen as a fuel for combined heat and power (CHP) plants presents opportunities for new technologies, such as fuel cells and hydrogen-fuelled reciprocating engine CHPs, to play a part of the future technology mix. The counterfactual position being gas heating means that there is a significant challenge in affordable heating when considering hydrogen.

Decentralised and Community Energy

There are a range of technologies which have the potential to be low carbon heating sources and there is a need to identify the most appropriate, effective, economically viable and scalable routes for building types in the city. Heat networks are in place in the city operated by Aberdeen Heat and Power, the NHS and both Universities.

- Assess and identify the complexities of decarbonising city district heating.
- Plan expansion in infrastructure for existing and new heating networks, such as the Aberdeen Heat & Power (AHP) model. Expanding connections to different property types and to privately owned domestic and commercial properties.
- Where possible, adapting current equipment or integrating measures to reduce carbon, such as the introduction of hydrogen to heat networks, capture of waste heat, use of energy storage.
- Investigate opportunities to capture and store currently unused heat, either as stand-alone prospects or for areas where the energy can be fed to heat networks.
- Plan use of technologies for buildings outside the reach of heat networks, such as heat pumps for individual and communal heat production.
- Use of technologies, such as heat pumps integrated within a heat network.
- Explore opportunities to support local communities in developing decentralised and community-based energy projects.

[3] https://www.gov.uk/government/publications/heat-decarbonisation-overview-of-current-evidence-base

Providing support to those in fuel poverty

Supporting disadvantaged and vulnerable people is critical to a just transition. Affordable energy is not only impacted by energy costs and the thermal efficiency of the property, but also behaviour and the efficiencies of the equipment used. Changes in technology incurs costs and it is important to ensure there is a Just Transition so these are not passed to those least able to afford changes. Linking to wider actions under this theme, people should have support to live in properties in which the fabric and heat source is optimised for efficiency.

- Assess energy proposals to ensure a Just Transition and that any changes introduced do not disproportionately affect those in or at risk of fuel poverty.
- Provide advice and support for those currently in or at risk from fuel poverty.
- Raise awareness of measures to improve the thermal efficiencies of properties.
- Use technology, e.g. smart metering, to assist residents to reduce costs.

5. Risks for this theme

Financial

- Gas alternatives for heating are currently expensive. Supply will be determined by capital investment and scale of production and distribution in Aberdeen.
- Zero emissions heating systems are currently more expensive to operate and risk putting more people into fuel poverty.
- Low financial assistance for property owners to retrofit homes to improve thermal efficiencies and to invest in zero emissions heating.
- High costs to connect to district heating may impact heat network expansion.

Operational

- Capacity and expertise in construction and energy sectors to deliver improvements.
- Lack of certainty on low carbon fuel and technology.
- Developing local energy systems can be complex and off putting for communities.
- Low capacity and expertise to cost and undertake LHEES Plans for each local area.
- Limited detailed data for existing building stock and energy use.

6. Theme synergies

Mobility	Buildings should strive to incorporate future electric vehicle demands and opportunities, e.g. charging and energy storage.
Energy Supply	Local renewable energy generation and low carbon fuels such as hydrogen requires energy supplier engagement and investment.
Circular Economy	Energy retrofit programmes can build in circular construction.
Natural Environment	Retrofitting to include green infrastructure to improve thermal efficiency and save energy and water use
Empowerment	Societal level behavioural change to how energy is generated and used needs to be part of local community empowerment.