scottish renewables

PIPING HOT

BUILDING HEAT NETWORKS TO TACKLE THE CLIMATE EMERGENCY

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The Scottish Government has declared a climate emergency. With heat accounting for half of Scotland's emissions, cutting pollution from buildings will be crucial to ending our contribution to climate change by 2045.

District heat networks are a proven and low-regrets solution that can scale up our use of low-carbon heat. They can access heat from a variety of sources, including heat pumps extracting energy from water, biomass and geothermal, providing a flexible approach to decarbonisation. Heat networks can also provide lower cost and reliable heat and are often used to address fuel poverty.

In 2019 the Scottish Government announced a 'Heat Networks Bill' to regulate and accelerate the roll-out of heat networks. This and other support will be required to enable the sector to grow to its full potential. Research conducted for this report shows that with the right policies, **heat networks could supply nearly 10% of Scotland's heat by 2030**, helping to cut emissions and providing opportunities for new, future-proofed investment. In this report we set out the scale of the opportunity and what steps the Scottish Government should take to unlock it.

What's the Size of the Potential Prize?

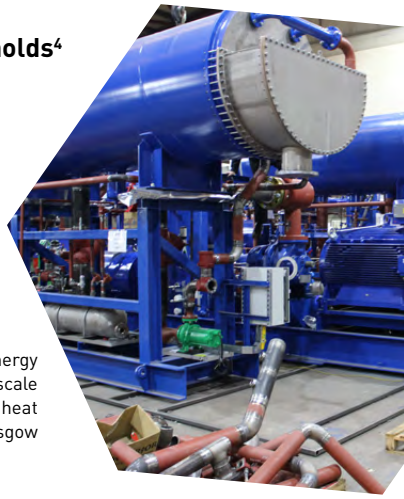
Today, Scotland has 113 heat networks which supply around 1,000 GWh of heat per year, the equivalent to one per cent of Scotland's total heat demand[1]. This will need to increase if we're to hit net zero emissions by 2045 and the Committee on Climate Change recommends that heat networks supply half of all non-domestic buildings and 20% of homes by mid century[2].

To understand the scale of activity that could be stimulated with the right policy support, Scottish Renewables surveyed[3] potential heat network projects in Scotland's seven cities: Glasgow, Edinburgh, Aberdeen, Dundee, Stirling, Inverness and Perth.

We found a total of 46 potential projects which could:

- **Deliver 600 GWh of heat per year, the equivalent to 45,000 households**
- **Save 100,000 tonnes of carbon per year, if using low-carbon sources from day one**
- **Grow to serve 8% of Scotland's heat demand by 2030, the equivalent to 460,000 households[4]**

The projects range from firm prospects with detailed information to more notional areas of opportunity, mostly identified by local authorities. These figures have been estimated based on available project data – please see our briefing[3] for more detail. The survey provides only a small snapshot of potential in Scotland, with many areas yet to be assessed for their heat network potential.



Star Renewable Energy manufacture large scale heat pumps for use with heat networks in Glasgow

1 BEIS, 2018, Energy Trends
2 CCC, 2019, Net Zero Technical Report
3 www.scottishrenewables.com/publications/research-heat-networks-scotlands-cities/
4 Assumed to be 80 TWh (domestic & commercial sectors), see Scottish Government, Energy of Scotland 2018

What potential could these projects unlock?

The majority of the projects identified in our survey would serve existing buildings in city centres, with potential to connect to surrounding areas of high heat demand. We modelled the potential growth to 2030 that could be achieved by the projects using the real-world experience of Aberdeen Heat & Power, one the best examples of an expanding district energy scheme in the UK. We found that with the right policy and funding support, the projects could expand to serve 6,000 GWh of heat per year, equivalent to 8% of Scotland's annual heat demand.

Heat Network Growth to 2030 - Scenarios

	Aberdeen Case Study	SR Scenario	Policy	Results
Low		No growth assumed – Aberdeen is an exception as today, most heat networks rarely seek or struggle to expand.	Assumes no additional policy support is forthcoming from Scottish Government.	600 GWh served by the projects in total per year. This equates to 0.7% of total Scottish heat demand
Medium	Heat served by the network grew twenty-fold in 17 years (3 to 60 GWh/yr).	Networks in the surveyed cities grow five-fold[1], roughly equivalent to the growth achieved to date in Aberdeen.	Most policy & economic barriers addressed but difficulties remain securing customers.	3,000 GWh/yr **4% of heat demand** Equivalent to 230,000 households
High	Expects to grow five-fold compared to today (60 GWh/yr to 300 GWh/yr) based on known opportunities. Connection of nearby buildings to the expanding network could further double this growth leading to a total ten-fold increase on today (600 GWh/yr).	The growth assumed in our medium scenario is doubled. This is lower than potential future growth in Aberdeen but reflects the more advanced starting point in that city.	All policy & economic barriers are addressed, including connection of anchor loads and new customers, with a focus and drive from Government.	6,000 GWh/yr **8% of heat demand** Equivalent to 460,000 households

1 We have adjusted the growth rate downwards (five-fold rather than twenty-fold as in Aberdeen) to reflect the larger average starting size of the potential projects (16 GWh/year compared to Aberdeen's starting point of 3 GWh/year) and the fact that the figures for Aberdeen are city-wide.

Economic Benefits

Local economies can receive a boost from heat network investment. Civil engineering (the digging of trenches and the laying of pipes) accounts for roughly 40% of a network's capital costs[6], often using skills that are sourced locally. Scotland also has several UK leading companies at the forefront of large-scale heat pump design, manufacture and installation. Heat networks provide a vital means to expand the use of these technologies.

What's happening today?

Despite the excellent potential, heat network investment in Scotland is slowing as key support schemes come to an end (Low Carbon Infrastructure Transition Programme, LCITP, and the Renewable Heat Incentive, RHI) and as local authorities await new legislation. It is vitally important that the Scottish Government put in place policies and support to enable continued growth in the sector. The UK Government has launched a £320m capital fund for heat networks in England and Wales (the Heat Network Investment Program, HNIP) that is seeking to leverage over £1bn of investment over the next five years. Without funding and the right regulatory environment in Scotland, existing skills and expertise risks moving elsewhere and driving up supply chain costs.

6 Energy Technologies Institute, 2018, Heat Networks In the UK: Potential, Barriers & Opportunities

Case Study: Aberdeen Heat & Power

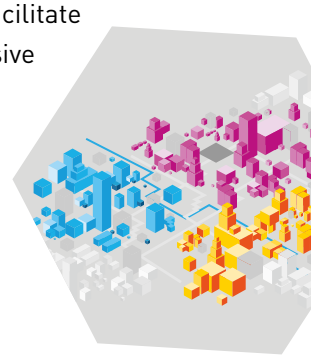
Aberdeen Heat and Power (AH&P) began in 2002 by serving 288 flats in four multi storey blocks. Today the not for profit company operates four schemes serving 2600 flats in 48 blocks. It plans to expand and develop a fully integrated heat network throughout the city using a potential connection to the new Aberdeen Energy from Waste (EfW) centre and CHP heat generation.

Development in Aberdeen has taken place largely in the absence of supportive policy. Two key factors behind this success are: the creation of an arms-length body dedicated to operating and expanding a heat network, and close working with the city council which provided access to customers. These are some of the conditions that the proposals in this report are seeking to re-create.

How do we make it happen?

Like other renewable heat technologies, low-carbon heat networks are not yet mainstream and require policies to level the playing field with fossil fuels. The Scottish Government deserves praise for taking an early lead in encouraging and supporting local authorities to explore the potential for heat networks, with pioneering low-carbon schemes recently completed in Glenrothes, Stirling, and Clydebank. Some of the key policy tools are being assembled in Scotland that should help address the barriers holding back development:

- **Heat Networks Bill:** regulation will help drive up standards and confidence in the industry and facilitate construction. If measures to de-risk demand (such as facilitated building connections and exclusive zones) are included they would initiate a transformational and innovative new approach to heat networks in the UK.



- **Local Heat & Energy Efficiency Strategies (LHEES):** these could play a vital role in identifying and zoning areas of potential heat network development, as part of a holistic approach to energy efficiency and heat decarbonisation at a local level.

Key policy gaps must be filled

Whilst some policy solutions are being developed, other key issues remain to be addressed. The Energy Efficient Scotland programme is an opportunity to take a holistic approach to solving these. With the right policies and vision, the Scottish Government could unlock millions of pounds of investment in future-proofed, climate friendly infrastructure. Here's how:

Support strategic development: Heat Network Zones

- LHEES should stimulate development in a strategic way by designating exclusive Heat Network Zones. Rights to operate new projects within the zones should be awarded to a single, licensed, organisation through a competitive tender. This will ensure that only organisations wishing to expand and interconnect networks are running them, whilst creating a natural incentive for them to do so.

- Policies to de-risk demand, such as measures to secure connections to anchor load buildings, should apply within the zone. This will help secure initial projects and aid their expansion.

Help make projects viable

- LHEES and exclusive Heat Network Zones should provide a pipeline of new projects, but these will need to take place within a context of supportive regulation, funding and policy to lower the cost of capital and make more projects economically viable.

- Public funding will be particularly key to overcome the costs and barriers facing retrofit projects, and to allow low-carbon networks to compete against natural gas.

Delivering projects: public & private combined

- Successful delivery of heat networks identified through LHEES will require collaboration between local authorities and the private sector. Local authorities are best placed to secure connections to public buildings, can borrow at lower cost and provide strategic direction regarding carbon, fuel poverty and planning objectives. The private sector has the expertise and resource to help local authorities deliver at a scale beyond that which they are currently able to achieve.

How would this work in practice?

Building more heat networks can increase use of low-carbon heat and help cut emissions. These proposals are intended to strengthen the various routes by which new heat networks are developed to encourage the construction of city-wide networks.

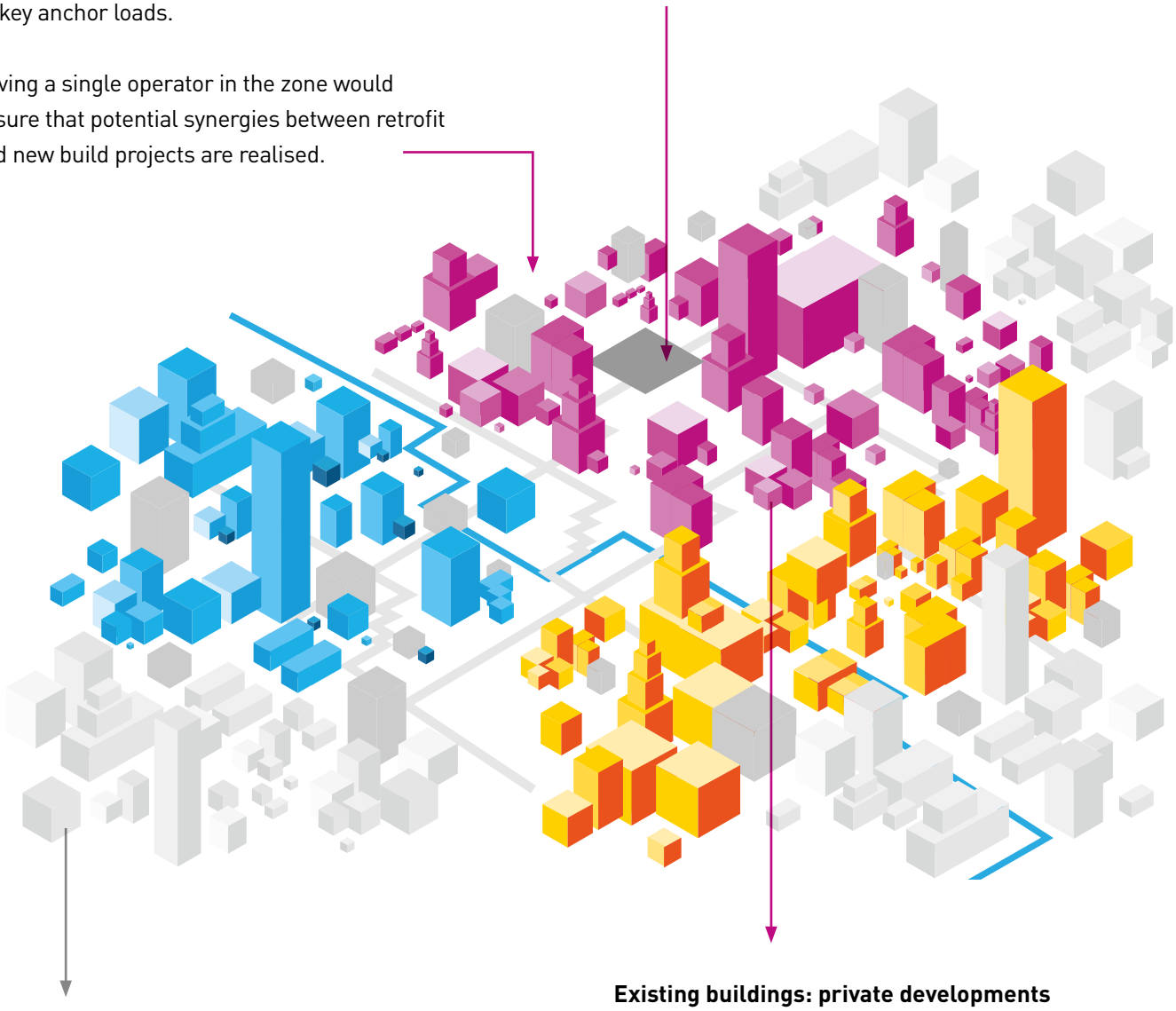
LHEES identified projects

It is the opportunity for LHEES to deliver projects serving existing buildings that could have the greatest impact on the scale of the heat network market. Once a Heat Network Zone has been created, an exclusive operator would be appointed to identify and progress network opportunities, using large public sector buildings as key anchor loads.

Having a single operator in the zone would ensure that potential synergies between retrofit and new build projects are realised.

New-build developments

Scottish Planning Policy and Building Regulations should be revised to encourage the use of heat networks in new-build developments or during major renovations. Where these occur in Heat Network Zones, operation of the network should fall to the exclusive operator. As well as de-risking demand, this would ensure a single operator across large new-build areas.



What happens outside the Heat Network Zones?

New projects are free to come forward and are regulated in the same way as other heat networks across Scotland. Some policies (such as facilitated building connections) would not apply outside of Heat Network Zones.

Existing buildings: private developments

Owners of existing buildings within a Heat Network Zone may decide to procure a heat network themselves or connect an existing network. The operation of such networks should fall to the exclusive operator, or legislation could require collaboration (such as heat sales) with neighbouring networks. This could help drive connections to existing networks and encourage expansion within the zone.

Key Actions for Scottish Government

Scaling up the deployment of heat networks in Scotland will require a holistic package of policy support. The Scottish Government has begun to assemble many aspects (in green below) but other issues remain to be tackled (in red).

Heat Networks Bill

It is important that the Heat Networks Bill includes measures to de-risk demand and encourage investment in the sector, to avoid regulation aggravating the recent slow-down in activity.

- **License:** to enforce standards and improve quality in the industry, and to provide statutory undertaker rights such as wayleaves.The Scottish and UK Governments should work together to ensure that their proposals are aligned.
- **De-risk demand:** it will need to include measures to de-risk future demand such as facilitated connections to key buildings. This will enable more networks to be built.
- **Exclusivity:** the Government should explore mechanisms to grant exclusivity to a licensed organisation for heat network operation within designated Heat Network Zones, to de-risk investment and enable strategic development.

Produce a Heat Networks Action Plan

Not all the barriers facing heat network development can be resolved through legislation. It will be vital that the Scottish Government accompanies the Bill with a programme of work to ensure that all relevant policies are aligned. A 'Heat Networks Action Plan' should address the following issues:

- **Planning policy:** the forthcoming Scottish Planning Policy (SPP) should tighten requirements for heat network appraisal and use (where appropriate) in new developments.
- **Building regulations:** the forthcoming review should tighten carbon and energy requirements to ensure that new buildings and major renovations use heat networks, where appropriate.
- **Business rates:** the forthcoming review should address the way that rates penalise some heat networks and create a level playing field with individual gas boilers.
- **Funding:** the LCITP and RHI provide key elements of funding required to make heat networks and low-carbon heat inputs (like heat pumps) economically viable. Public funding will be required to enable strategic and low-carbon projects to happen, in the absence of taxes or limits on the use of fossil-fuel heating in existing buildings.
- **Finance:** the Government should also explore how the Scottish National Investment Bank (SNIB) can make more low cost capital available to long-term infrastructure projects like heat networks.

Integrate with the Energy Efficient Scotland Programme

This programme will provide important building blocks such as LHEES. It will be important that a clear plan and ambition for the role of heat networks within it is accompanied by supportive measures:

- **Make LHEES a statutory duty:** LHEES will play a key role in delivering a transformational boost to the sector. A statutory duty to produce such plans should therefore be placed on local authorities.
- **Heat network project appraisal:** LHEES should be designed such that detailed heat network project appraisal (within designated zones) takes place once a local authority has identified and agreed a delivery partner. This will ensure that cost estimates are robust and avoid ruling out schemes too early in the process.
- **Resource LHEES:** each local authority should be adequately staffed with an LHEES officer and a Heat Networks officer, mirroring the successful introduction of new Zero Waste Legislation.
- **Provide clear direction and support to local authorities:** regarding the scale and speed of heat network development expected through LHEES. A well-resourced unit within central Government should play this role, complementing the work of the Heat Networks Partnership.
- **Raise public awareness:** of the benefits of heat networks and ambitions to increase their use.

Scottish Renewables
6th Floor, Tara House
46 Bath Street, Glasgow
G2 1HG

t. 0141 353 4980
e. info@scottishrenewables.com
w. www.scottishrenewables.com