

REPORT TO SUSTAINABILITY COMMITTEE – 22 MAY 2019

ENERGY EFFICIENT SCOTLAND: THE FUTURE OF LOW CARBON HEAT FOR OFF GAS BUILDINGS - A CALL FOR EVIDENCE: MARCH 2019

1 Recommendations

The Committee is recommended to:

- 1.1 Consider and comment on the draft Aberdeenshire Council response to the Scottish Government call for evidence: 'Energy Efficient Scotland: The future of low carbon heat for off gas buildings: March 2019' (Appendix 1);
- 1.2 Note that the Communities Committee will also be asked to consider and comment on the response at its meeting on 6 June, 2019; and
- 1.3 Agree to delegate authority to the Director of Infrastructure Services to approve the final response following consultation with the Chairs, Vice-Chairs and main Opposition Spokespersons of both this Committee and the Communities Committee.

2 Background / Discussion

- 2.1 This Scottish Government call for evidence seeks evidence on the technologies and the actions necessary to support the decarbonisation of the heat supply of buildings that currently do not use mains gas as their primary heating fuel.
The call for evidence can be found here:
<https://www.gov.scot/publications/energy-efficient-scotland-future-low-carbon-heat-gas-buildings-call-evidence/>
- 2.2 The closing date for submission of the call for evidence response to the Scottish Government is 18 June, 2019, and a response on behalf of Aberdeenshire Council will be submitted. Two Council officers contributed to the draft response – the Sustainable Development Officer and Senior Environmental Health Officer.
- 2.3 This call for evidence will additionally be reported to the Communities Committee on 6 June, 2019, given that Committee's remit for housing matters. Given the involvement of both Committees, it is recommended that authority be delegated to the Director of Infrastructure Services, following consultation with the Chair, Vice-Chair and the main Opposition Spokespersons of both Committees to approve and submit the final response.
- 2.4 The Head of Finance and Monitoring Officer within Business Services have been consulted in the preparation of this report and had no comments to

make. They are satisfied that the report complies with the Scheme of Governance and relevant legislation.

3 Scheme of Governance

- 3.1 The Committee is able to consider this item in terms of Section S.1.1(b) of the List of Committee Powers in Part 2A of the Scheme of Governance: “To respond, on the Council’s behalf, to the Scottish Government and other relevant bodies regarding sustainable development and climate change issues, including reporting on Scotland’s Climate Change Duties Report and the Covenant of Mayors for Climate & Energy”.

4 Implications and Risk

- 4.1 An equality impact assessment is not required because the reason for the report is for the Committee to comment and consider. There will be no impact, as a result of the report, on people with protected characteristics and it does not have a differential impact on any of the protected characteristics.
- 4.2 There are no staffing and financial implications.
- 4.3 The following Risks have been identified as relevant to this matter on a Corporate Level - ACORP002- Changes in government policy, legislation and regulation. The following Risks have been identified as relevant to this matter on a Strategic Level - ISSR004- Climate Change.
- 4.4 This report, as a response to a consultation, will have no direct impact on town centres.

Stephen Archer
Director of Infrastructure Services

Report prepared by Eric Wells, Sustainable Development Officer (Climate Change) 26 April, 2019.

Appendix 1

Energy Efficient Scotland: The future of low carbon heat for off gas buildings: A call for evidence: March 2019

Draft Aberdeenshire Council Response

The following officers have contributed to the response:

SDO: Sustainable Development Officer
SEHO: Senior Environmental Health Officer

1 What evidence can you provide of low carbon heat technologies being taken up without government support?

SDO: The Renewable Heat Incentive (RHI) and its predecessor the SCHRI (Scottish Community and Householder Renewables Initiative) have been the main drivers by far for renewable heat installations for over ten years. In Aberdeenshire a number of community halls have installed air-source heat pumps (producing warm air) for which there is no RHI or other direct government support but these have largely been funded through external grants such as wind farm community benefit.

One of Aberdeenshire's local biomass installers (wood pellet/wood chip boilers) said that they cannot think of any systems that they have installed in recent years without RHI (also in some cases renewables loans). The market is very sensitive to cuts in support – the same biomass installer has dropped from installing around 5 boilers per month to about 1 per month due to successive reductions in RHI support for wood fuelled boilers.

A large number of Aberdeenshire farm based grain dryers have been converted from oil or LPG to wood fuelled boilers on the back of RHI payments (in some cases repaying the investment in under five years). A number of these have been extended to small scale district heating schemes providing heat to other farm buildings and nearby dwellings. It is hard to envisage farmers making these investments without some form of government support.

2 What other barriers may impede the uptake of low carbon heat in buildings not currently using mains gas?

SDO: The main barriers to uptake have been listed but perhaps the most important are lack of consumer and supply chain knowledge and lack of regulatory requirements.

SEHO: Some significant problems have occurred where domestic and non-domestic biomass plant has been installed (or maintained) incorrectly or in locations where there is poor dispersion of pollutants. Such problems have come to light post-installation and may have been minimised had there been consultation and engagement with Environmental Health at an early stage. This call for evidence should consider the policy objectives of Cleaner Air for Scotland and the ongoing review of that document in respect to biomass and domestic wood fuel burning and

the impacts on local air quality, particularly in respect of PM10 and PM2.5 pollutants. It is understood that our professional body, REHIS, have also submitted a paper to the Scottish Government (Building Standards Division) regarding the experiences of a number of local authority Environmental Health departments in dealing with smoke, fumes and odour problems arising from domestic wood fuel burning. This paper may also be useful to this present call for evidence.

3 What could we do to remove these barriers and support the uptake of low carbon heat? Can you give examples of successful low carbon heat implementation?

SDO: The hardest thing to resolve is dissemination of knowledge. Local Further Education colleges have a large part to play in providing additional skills and knowledge to both apprentices and time served plumbers and electricians. Some of this skills and knowledge gap is also met by local distributors and suppliers of heat pumps and biomass boilers running frequent boiler-specific training courses, often free of charge – additional support could be offered here.

The Energy Saving Trust / Home Energy Scotland provide long running advice to consumers but this is perhaps not sufficiently detailed.

From 2010 to 2014 Aberdeenshire Council supported and promoted The Natural Energy Show. This was an annual event promoting renewable energy and energy efficiency to home owners and small businesses, held at Thainstone Exhibition Centre near Inverurie. There were around twenty to twenty-five stall-holders, comprising local renewables installers (including biomass boilers, heat pumps and solar PV) and other agencies offering advice. There was also a lecture space offering talks on different technologies throughout the day. Exhibition costs were kept to a minimum and entry was free. In its first year it attracted over 900 visitors. It was clear that in the first year those interested in installing renewables were talking to installers to gain knowledge, and in subsequent years had the confidence to ask for quotes and timescales. It undoubtedly contributed greatly to increasing the uptake of renewable installations in Aberdeenshire, with good feedback from both visitors and exhibitors.

In 2007 Aberdeenshire Council installed its first biomass boiler, aided by a government grant. This was a 600kW Kohlbach wood chip boiler installed at Aboyne Academy, supplying the majority of heat to the academy, primary school, community centre and swimming school. The installation was designed to supply over 90% of the annual heat load, with back up and top up from the existing oil boilers. It was intended to both provide low carbon heat to the school and act as a demonstrator for the then fledgling biomass supply industry in and around Aberdeenshire. It has been in continuous operation since first installed, despite a few minor teething problems and has made the Council significant savings over the cost of the equivalent oil. A number of interested parties and regular academic groups have toured the facility over the years as an example of renewable heat supplied from local resources. (A case study providing further details is available).

In 2009 St Comb's community hall, near Fraserburgh in Aberdeenshire was destroyed by fire. In 2014, following a period of fundraising, the construction of a new hall was completed. The main hall has space for three badminton courts with lines for basketball and football. There is an additional smaller hall for meetings,

kitchen and changing rooms with showers. The hall has underfloor heating supplied by a ground source heat pump (grant supported by Scottish Power's Green Energy Trust). There is also a South facing Solar PV installation. Renewable Heat Incentive and Feed-in tariff payments help to keep running costs for the hall to a minimum.

4 How can complementary systems, such as solar PV and heat pump systems be deployed to overcome such barriers?

SDO: The Scottish (UK) electricity grid system is asymmetric in as much as it is designed to supply electricity from central generating plants outward to users. It is less able to support local generation being fed back, which in some cases may be constrained. Where possible it is beneficial to utilise locally generated electricity close to its source.

The increased uptake of electric vehicles may also place strains on the electricity grid, particularly in remote rural locations.

Solar PV can be used to supply renewable electricity and offset the running costs of electric heating systems including heat pumps. Electric and/or thermal storage systems will also help in supplying electricity and heat when required.

5 What do you consider to be the principal building-specific constraints on low carbon heat?

SDO: The most common constraint, particularly in off gas areas is a lack of a wet central heating system. Many buildings in off gas areas, both domestic and non-domestic, have electric storage heaters as the main or primary heating together with an immersion heater for domestic hot water. Even with night time tariffs such as Economy 7 this is still one of the most expensive forms of heating. Even with a major refurbishment of a building it may be impractical to install pipework with radiators or underfloor heating.

In Aberdeenshire we have a large number of older rural buildings which are stone built with lath and plaster walls, coombed ceilings (i.e. no loft space), often solid floors, and typically sash and case windows. This makes them expensive and difficult to insulate and draught-proof without undertaking major renovation work. This may limit the options for renewable/low carbon heat.

6 What can be done to overcome these constraints?

SDO: Historic Scotland (now Historic Environment Scotland) have done some excellent work with pilot project renovation of older buildings of different types. This work needs to be built on to provide guidance for best practice on renovations, with cost estimates, expected energy efficiency ratings and low carbon heat options.

7 What evidence can you provide on the limitations of low carbon heat technologies (e.g. heat pumps) in buildings with poor energy efficiency?

SDO: Heat pumps work best when supplying continuous low temperature heat. In this respect they work best in well insulated buildings with underfloor heating (working at a lower temperature than radiators). A number of studies have been

undertaken into the efficiency of heat pumps, including a pilot study by Aberdeen City Council renovating farmhouses with ground-source heat pumps in 2008 and a much wider study by the EST (Energy Saving Trust) which monitored the performance of domestic heat pumps installed between 2008 and 2013. The latter study showed that the COP (Coefficient of Performance) of installations varied markedly, was below that which would be expected and also depended upon the quality of the installation. Standards of installation have generally improved since then but the level of insulation and the method of heating (underfloor or oversized radiators) must be taken into consideration when specifying a heat pump, otherwise heating costs may be above those expected.

The EST study can be found here:

www.energysavingtrust.org.uk/sites/default/files/reports/TheHeatisOnweb%281%29.pdf

8 What low carbon heat solutions are appropriate for hard-to-treat properties where there are limited opportunities to improve energy efficiency of the building fabric?

SDO: In rural locations many buildings are heated by oil or LPG. These buildings will normally have a wet radiator heating system. The direct replacement for these would be a wood pellet boiler, provided there is space and access for a wood pellet store (oil/LPG tanks would be removed). As wood pellet boilers require an amount of regular maintenance (cleaning and removal of ash) they may not be suited to everyone.

Alternatively the oil or LPG boilers could be converted to run on renewable fuels (bio-diesel or bio-gas)

Another alternative may be a hybrid heat pump solution, supplying base load heat from a heat pump with top up when required in cold weather from a gas/LPG burner.

9 Please specify whether your evidence relates to domestic or non-domestic systems.

Regarding ground source, air source and water source heat pumps, what evidence can you provide on:

- a) The cost of the technology, including installation, maintenance and running costs and alignment with costs related in the RHI data in tables 2 and 3?*
- b) Customer satisfaction with the system?*
- c) Lifecycle and overall efficiency of the technology?*

SDO: The following provides a case study- the extensive renovation of an old mill in 2002, completed in 2004 as main dwelling. The building was largely derelict so the renovation included internal timber framing with insulation and underfloor heating.

An IVT 7.5kW ground source heat pump was installed using two 90m boreholes. .

- a) Installation costs were in line with those in Table 2 at around £14,000 although the cost of drilling boreholes has risen significantly in recent years. The installation qualified for a SCHRI grant of 30% (capped at £4,000). The installation has performed well, despite a couple of minor faults, and is very low maintenance. It provides continuous heat to the building at normal levels of comfort and electricity consumption is in line with expectations.
- b) Homeowner was very satisfied with the system and would recommend it for building developments of a similar nature.
- c) The system has been running for over 14 years and appears to be running efficiently with very low maintenance.

Aberdeenshire Council has provided advice to a number of village halls on appropriate low carbon heating. Air-source heat pumps providing blown warm air have been most commonly installed– providing heat to the main hall(s).

- a) Typical cost of these systems has been £5k to £10k, in line with table 3. Although these systems do not qualify for RHI.
- b) The village hall committee members involved have generally been very satisfied with the performance and running costs of the systems.
- c) The lifecycle and overall efficiency has been in line with expectations.

10 What factors might inhibit uptake of heat pumps?

SDO: Ground source heat pumps require space around the building to accommodate either boreholes or underground pipes (or proximity to a large body of water). Groundworks for these are easier in a new build, but cost of drilling boreholes may be a limiting factor.

Air source heat pumps are generally easier to install with lower capital cost, but are less efficient than ground source heat pumps especially in very cold weather. Noise may also be a factor if the building has close neighbours.

11 What do you propose as solutions to overcome any barriers to uptake?

SDO: Raising awareness of heat pump technologies and available loans, grants and subsidies such as the RHI, together with good independent advice.

Making architects more aware of these low carbon heating systems as solutions for renovations in particular.

12 What innovations could reduce the operational cost of heat pumps, i.e. higher performing heat pumps, new refrigerants, 'time-of-use' tariffs coupled with thermal storage, 'heat-as-a-service' business models, etc.?

SDO: Heat pump technologies are continuously developing with more efficient compressors in particular offering higher output temperatures. Thermal storage combined with lower tariffs such as economy 10 and timed usage would certainly help to reduce operating costs.

13 Please specify whether your evidence relates to domestic or non-domestic systems.

Regarding hybrid heat pumps, what evidence can you provide on:

- a) *The cost of the technology, including installation, maintenance and running costs?*
- b) *Customer satisfaction with the system?*
- c) *Lifecycle and overall efficiency of the technology?*
- d) *The ability of hybrid heat pumps to reduce peak demand for electricity whilst also reducing carbon emissions?*

SDO: These systems are becoming more common but we have no direct evidence to support their cost and efficiency.

14 What factors might inhibit uptake of hybrid heat pumps?

SDO: Space and accessibility may limit the viability of off gas systems – siting of LPG tanks for example.

15 What do you propose as solutions to overcome any barriers to uptake?

SDO: Consideration of this as an option at the very earliest stages of a new build development or renovation project. Make clear the benefits of the system and any subsidies if available.

16 Can you share any evidence on the types of buildings where hybrid heat pumps may best be deployed?

SDO: We have seen these proposed for new housing developments in rural locations where they would safeguard against very low winter temperatures.

17 Please specify whether your evidence relates to domestic or non-domestic systems.

Regarding electric storage heating, what evidence can you provide on:

- a) The cost of the technology, including installation, maintenance and running costs?*
- b) Customer satisfaction with the system?*
- c) Lifecycle and overall efficiency of the technology?*

SDO: Our Housing team has extensive experience of installing the new generation of electric storage heaters

18 What factors might inhibit uptake of electric storage heating?

SDO: N/A

19 What do you propose as solutions to overcome any barriers to uptake?

SDO: N/A

20 Can you provide any evidence of electric heating technologies not already described that should be considered as potential future heating solution?

SDO: N/A

21 Can you comment on the comparative installation, operating and maintenance costs of these technologies in relation to other electric heating sources? As well as their lifetime and efficiency?

SDO: N/A

22 Can you provide evidence on the performance of integrated systems such as heat pumps used in conjunction with battery storage and solar PV?

SDO: N/A

23 How could locally integrated systems, such as those mentioned above, help to overcome electrical grid constraints and what market mechanisms could be used to promote on site generation and use for low carbon heat?

SDO: Aberdeenshire Council is currently involved in a project utilising Solar PV together with battery storage on Council houses - using system wide controls to return electricity to the grid at peak times of high demand and high returns.

24 Please specify whether your evidence relates to domestic or non-domestic systems.

Regarding Bioenergy technologies, what evidence can you provide on:

- a) The cost of the technology, including installation, maintenance, fuel and other running costs, and the extent to which costs of biomass boilers are in line with those in tables 2 and 3 above?*
- b) Customer satisfaction with the system?*
- c) Lifecycle and overall efficiency of the technology?*
- d) Type of feedstock used, and whether this is grown in Scotland or imported?*

SDO: The Renewable Heat Incentive attracted a large number of new entrants into the field of biomass boiler installation, many of which had little or no experience. This unfortunately led to a number of 'sub-optimal' installations, and in some cases gave the industry a bad name. It was often left to the longer standing and experienced installers to pick up the pieces and re-install systems to the appropriate standard. This applies mainly to the domestic sector, but also the smaller non-domestic installations.

- a) The cost of the technology for smaller domestic boilers in table 2 appears to be on the low side from experience – this may reflect the inclusion of biomass stoves in this sector.
- b) Poor installation has often led to higher than expected fuel use and regular faults and failures resulting in very low customer satisfaction. Larger systems, particularly in the non-domestic sector (hotels for example), tend to be installed by experienced companies with good manufacturer support. Heat supply contracts tend to lead to better maintained and more efficient systems – easier for customers.
- c) Good quality, well installed and well maintained systems should have a lifetime expectancy similar to the equivalent oil boiler. Heat supply contracts tend to lead to better maintained and more efficient systems.
- d) There are a large number of farms in Aberdeenshire running grain dryers with locally supplied wood chips. Some farmers and other suppliers are also drying and supplying wood chips. The pellet manufacturer in Aberdeenshire (Puffin Pellets) supplies much of the local market including the Council's own wood pellet boilers in schools and care homes. We have one wood chip boiler (Aboyne Academy) which is run on a heat supply contract.

SEHO: Some significant problems have occurred where domestic and non-domestic biomass plant has been installed (or maintained) incorrectly or in locations where there is poor dispersion of pollutants. Such problems have come to light post-installation and may have been minimised had there been consultation and engagement with Environmental Health at an early stage. This call for evidence should consider the policy objectives of Cleaner Air for Scotland and the ongoing review of that document in respect to biomass and domestic wood fuel burning and the impacts on local air quality, particularly in respect of PM10 and PM2.5 pollutants. It is understood that our professional body, REHIS, have also submitted a paper to the Scottish Government (Building Standards Division) regarding the experiences of

a number of local authority Environmental Health departments in dealing with smoke, fumes and odour problems arising from domestic wood fuel burning. This paper may also be useful to this present call for evidence.

25 What factors might inhibit uptake of bioenergy technology?

SDO: A reduction in the RHI tariff for wood fuel boilers has already resulted in a significant reduction in new installations, particularly in the domestic sector. New regulations will restrict installations in urban areas but the main market is in rural areas. The cost of fuel will play a big part and last year's long winter put significant stress on the supply chain resulting in higher costs.

26 What do you propose as solutions to overcome any barriers to uptake?

SDO: Industry specific (e.g. hotel and leisure) awareness raising events have worked well in the past to encourage the take up of biomass boilers. Promotion of heat supply contracts will lead to better forward planning on fuel supply and ease customer worries. Ensure that the fuel supply chain is sufficient to cope with times of high demand. Ensure that RHI and other benefits/grants are sufficient to encourage a move away from fossil fuels.

27 What evidence can you provide to show whether there is a strong potential for growth of the biogas supply?

SDO: Scotland and the UK as a whole have a limited resource for the supply of bio-gas and bio-liquids and these would be better utilised (short term) in the transport sector than for supplying low grade heat. In Aberdeenshire we have 5 Anaerobic Digestion plants, the majority of which rely heavily on locally grown silage crops. This ties up significant areas of land in the long term and is perhaps not the best agricultural use. Other industries (brewing / distilling) may provide a source of bio-fuels if they are surplus to local energy requirements.

28 Can you provide evidence on the relative cost of using Scottish produced bioenergy feedstocks compared with conventional fossil fuels?

SDO: N/A

29 Can you provide any evidence on the potential to supply bio-liquid fuels sustainably at reasonable cost (with reference to specific fuels such as bio-LPG and different types of bio-diesel)?

SDO: There are a number of small companies producing bio-diesel from recycled cooking oils. This appears to be a limited but sustainable market.

30 Please specify whether your evidence relates to domestic or non-domestic systems;

Regarding heat networks, what evidence can you provide on:

- a) The cost of the technology, including installation, maintenance, fuel and other running costs?*
- b) Customer satisfaction with the system?*
- c) Lifecycle and overall efficiency of the technology?*

SDO: Aberdeen Heat and Power, a not-for-profit organisation, replaced high cost electric heating in blocks of flats with heat produced from Gas CHP boilers. This resulted in big reductions in heating costs for tenants. The company has increased its networks over the years and now includes business as well as domestic customers. <https://www.aberdeenheatandpower.co.uk/>

The largest district heating scheme in Aberdeenshire is the Hill of Banchory scheme run by Hobesco. This includes domestic and non-domestic customers. <http://www.hobesco.com/>

a) The cost of the technology, including installation, maintenance, fuel and other running costs?

The cost of heat provided by a retro-fitted district heating scheme has to compete with the cost of heat from the incumbent heat provider (be it gas, oil or LPG). The cost of installing an energy centre, district heating pipes and customer connections often means that the tariff required to recoup these costs is higher than customers are already paying for their existing heating, making the scheme unviable. There is also the added problem of persuading customers to take a leap of faith and connect to a district heating scheme, forsaking their existing tried and tested heating system. A number of feasibility studies have been undertaken with small Aberdeenshire communities over the last ten years which have proven the case. In 2015 the Inch Community (Energyzing Inch) were awarded money from the Local Energy Challenge Fund to develop a district heating scheme incorporating locally produced energy. Unfortunately restricted timescales, regulatory requirements and a slump in the oil price curtailed the project - <https://www.localenergy.scot/media/88951/Inch-case-study.pdf>

In new build houses the energy demand is often too low to justify the additional cost of district heating infrastructure. This heating demand may be better met from onsite renewables such as Solar PV and/or Solar thermal. There is probably scope for communal heating in high rise and dense urban housing both existing and new build.

In Aberdeenshire a number of farmers have extended biomass grain dryers to provide heat to farm buildings and nearby dwellings with small scale district heating. This has been motivated and achieved by increased RHI payments, extending the heating season beyond the short term grain drying demands.

Haddo Estate installed a small number of communal/district heating schemes when renovating/converting buildings on the Estate. These were originally undertaken with Scottish Government biomass development grants while later schemes such as the 23 house development at Cottonhillock in Methlick benefit from RHI payments. Heat is provided by wood chip boilers from wood grown on the estate.

b) Customer satisfaction with the system?

Not aware of any customer complaints although there have been difficulties with maintenance contracts for boilers.

c) Lifecycle and overall efficiency of the technology?

Systems appear to be performing to expectations.

31 What factors might inhibit uptake of the installation of heat networks?

SDO: The main inhibiting factor is the cost and difficulty of installing the infrastructure. Housing developers are unwilling to bear the extra costs, together with no clear path as to who would then take over operation of the network.

32 What could be done to further encourage the development of heat networks?

SDO: A default organisation to take over the running and maintenance of heat networks. This could be a pseudo-government agency or one managed by an energy provider. This would provide a safety net in the event of a locally managed heat network failing.

33 Where and in which circumstances are heat networks the most appropriate low carbon solution in areas not using mains gas?

SDO: Biomass Energy centres could typically replace oil boilers in buildings such as hospitals care homes and schools. These could be extended to provide heat to ancillary buildings and then to the local community, although there may be restrictions or constraints within the NHS or Local Authorities in how they are regulated in providing heat to external customers. In this case it may be possible for a third party to take over provision of heat under a heat supply contract.

34 What examples can be provided to show how readily heat networks can be moved to renewables – especially in those buildings with a high peak heat load?

SDO: Aberdeenshire Council has a small number of care homes with ancillary buildings that are heated from a biomass boiler with a gas boiler back up.

35 What is your view on the continued extension of gas networks before low carbon alternatives to natural gas (e.g. hydrogen) are proven?

SDO: As buildings become more energy efficient under the Scottish Energy Strategy heat demand will fall. If heat can be supplied through local renewables such as solar thermal this will further reduce heat demand. This may make sections of the gas network unviable or stranded assets. A long term view needs to be taken before investing in additional gas infrastructure.

36 How should wider decarbonisation demands, including for industrial processes, be factored in when considering gas grid extension?

SDO: N/A

37 What evidence can you provide on the economic and technical viability of the existing gas grid if it was maintained and operated with low gas flows?

SDO: N/A

38 What evidence can you provide on the further developments needed for future market readiness and deployment of the low carbon technologies covered above?

SDO: N/A

39 What evidence can you provide to show potential economies of scale and unit cost reductions that could be achieved through increases in annual levels of deployment of the low carbon heat technologies covered in this call for evidence?

SDO: N/A

40 What evidence can you provide of instances where installing a modern low carbon heating systems has also lifted households out of fuel poverty?

SDO: N/A

41 How should we phase in the policy framework in order to better support the decarbonisation of heat supply to off gas buildings? Please reflect on whether or not a similar approach to that proposed for energy efficiency remains the best option?

SDO: N/A

42 How could Local Heat & Energy Efficiency Strategies (LHEES) help to prioritise early phasing of uptake of low carbon heat in areas not currently using mains gas?

SDO: LHEES will help to identify areas of opportunity (low regrets) which can be developed early.

43 How should the deployment of low carbon heat be funded? i.e. what relative contribution should come from central public funding, energy consumer's bills and private recipient funding?

SDO: Placing additional burden on consumer bills will have the effect of pushing more people into fuel poverty, or driving people already in fuel poverty into extreme fuel poverty. Central Public Funding is the best option.

44 What is needed to encourage private investment in low carbon heat?

SDO: Programmes such as Low Carbon Infrastructure Transition Programme (LCITP) and the Local Energy Challenge Fund have been very effective in piloting schemes and proving business models. Many of the district heating schemes to date have been developed by relatively small companies. Larger companies will be needed to manage the scale of investment for large urban district heat networks, including the energy companies such as Scottish Gas and SSE, perhaps partnered with Local Authorities.

45 Of the current sources of finance which are currently available for low carbon heat, which are working well and which are not? Are there successful examples of attracting private sector finance to support low carbon heat deployment that should be explored?

SDO: The District Heating Loan Fund appears to work well and has been used by developers in Aberdeenshire. The size of the fund and the maximum loan however needs to meet the ambitions of larger networks. LCITP is a useful fund for large pilot projects. The Local Energy Challenge Fund has been used to develop district heating schemes but sufficient time needs to be made available to develop and complete projects – without onerous reporting and restrictive procurement requirements.

46 How should off gas buildings be assessed for their suitability for low carbon heat technologies?

SDO: EPCs are required at point of sale or let – these should be revised to give a much more detailed list of options for low carbon heat (proposed EES assessment?). If the building is not being sold or let then a Resource Efficient Scotland energy report would be recommended to provide best options for energy efficiency and low carbon heat in commercial buildings.

47 To what extent should the assessment of suitability for low carbon heat relate to the proposed Energy Efficient Scotland assessment?

SDO: This should be at the heart of the assessment, providing recommendations together with rough costs and estimated payback.

48 What wider information and advice should be supplied to inform consumers seeking to install low carbon heat supply in buildings that are off gas?

SDO: Signposting to agencies offering more detailed advice such as Resource Efficient Scotland, and signposting and advice on funding, subsidies and grants (e.g. RHI and low carbon loans).

49 What evidence can you provide on the role that regulation could play in helping to support uptake of low carbon heat in existing buildings (domestic and non-domestic)? What form should this regulation take?

SDO: Regulation requiring minimum EPC standards for non-domestic buildings should be in line with those for the private rented sector for domestic buildings, (with the proviso on technical feasibility). This is the simplest and best understood mechanism in the short term. CO2 emissions could be taken into account to provide more weighting toward low carbon heating. Aberdeenshire Council is currently undertaking a pilot LHEES study into the SME sector in Aberdeenshire with particular reference to off gas areas, working with Ramboll as consultants. The final report is due at the end of June 2019.

SEHO: This call for evidence should consider the policy objectives of Cleaner Air for Scotland and the ongoing review of that document in respect to biomass and domestic wood fuel burning and the impacts on local air quality, particularly in respect of PM10 and PM2.5 pollutants. It is understood that our professional body, REHIS, have also submitted a paper to the Scottish Government (Building Standards Division) regarding the experiences of a number of local authority Environmental Health departments in dealing with smoke, fumes and odour problems arising from

domestic wood fuel burning. This paper may also be useful to this present call for evidence.

50 To what extent could any regulation to support uptake of low carbon heat in existing buildings link to the already-proposed Energy Efficient Scotland energy performance standards? How could a link be made?

SDO: A standard for CO2 emissions per square metre of property could be part of the proposed standard. This would encourage the uptake of low carbon heat.

51 How should the Scottish Government respond to the CCC's advice and the UK Government announcement in the Spring Statement that new buildings constructed now should "accommodate low carbon heating from the start"?

SDO: Current building standards mean that both domestic and non-domestic new-build properties should have relatively low heat demand. It should be mandatory to meet this heat demand from low carbon heating sources. Buildings should be oriented to face south for maximum solar gain and should have solar panels (solar PV and/or thermal) to meet at least some of the energy demand. As a minimum the building should be built to accommodate easy retrofit of solar panels (PV and/or thermal). Developers will normally orientate buildings to accommodate the maximum number on a given site and will not incorporate, or even offer the option of, solar panels, unless that is the only way that they can meet the required building regulation. More pressure needs to come from consumers and through government regulation.

52 Have you encountered any specific examples of barriers to the installation of low carbon heating systems in new buildings?

SDO: You just need to look around any new housing or office development to see how few, if any, are equipped with solar panels. Developers indicate that it is too costly, and they would not see the return on investment. However consumers are unlikely to see the additional cost and it would be absorbed by the price of the property. They would benefit from much lower energy bills repaying the additional cost. Installing solar panels (preferably embedded forming part of the roof) as part of the build process would reduce costs compared to retrofitting, not least by scaling up the process.

53 Can you provide evidence on the comparative cost of installing low carbon heat solutions in new buildings rather than high carbon systems?

SDO: Low carbon heating solutions such as heat pumps are a higher cost compared to a domestic gas or oil boiler, but if you remove the need for a gas connection or an oil boiler and associated storage tank then this reduces the cost difference. In that case an air source heat pump would probably be comparable in cost although ground source heating would probably still be more expensive due to the cost of the ground loop or boreholes. In the longer term maintenance costs would be lower, especially when including regulatory checks required for rented or social housing.

54 Can you provide evidence on the comparative cost of installing low carbon heat solutions in new buildings compared to retrofitting to install low carbon heat at a later date?

SDO: It would be cheaper to design in a low carbon heating solution than retrofit, especially for a ground source heat pump where ground loop or boreholes could be installed as part of the groundworks. No comment on actual costs.

55 Are there particular actions that you would identify for consideration as part of any action to 'future proof' new buildings for low carbon heat retrofit?

SDO: Orienting buildings to be south facing to maximise passive heat and providing appropriate ducting and connections to enable easy retrofit of solar panels (PV and/or thermal) or other forms of low carbon heat (potentially a district heating connection where this may be a future consideration).

56 In light of the reservation of consumer protection powers, how else could the Scottish Government ensure consumer protection on a robust basis? For example, through commercial agreements?

SDO: Ensuring through regulation that providers (such as district heating companies) conform to the highest standards.

57 What actions should we undertake to ensure the Scottish supply chain has the skills and capacity to capitalise on the future increase in demand for the installation of low carbon heat?

SDO: There are already a number of colleges that offer training in the installation of renewable heat and power technologies (solar PV and thermal, heat pumps and biomass boilers for example) such as Dundee and Inverness Colleges, and they should be commended. Training in installation of renewable heat and power systems should be part of the core curriculum for apprentice electricians, plumbers and heating engineers. These competencies should also be made available as subsidised courses for experienced tradesmen wishing to extend their skills. Many distributors of systems such as biomass boilers and heat pumps offer their own manufacturer specific training. It may be possible to harmonise these courses to ensure that they are compatible and of a sufficiently high standard and possibly offer these in conjunction with further education and training colleges.