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Elmhurst Energy's Response to:

'Energy Efficient Scotland: the future of low carbon heat for off gas buildings'

Prepared for: Scottish Government



1. Introduction

Elmhurst Energy are pleased that Scottish Government are seeking a call for evidence on 'the future of low carbon heat for off gas buildings' and as such we are delighted to respond to each question in turn.

The Call for Evidence asked 57 questions and we have answered them all below. We hope you find the responses considered and useful for taking Energy Efficient Scotland forward in a progressive manner.

Elmhurst have answered the questions from a whole building approach; we are independent of fuels and technologies and therefore have abstained from direct question relating to evidence on particular technologies. We believe that all good proven technologies have a place to play in making Scotland's Buildings more energy efferent and using cleaner fuels.

2. Questions and Answers

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

For any agency with full access to the EPC data in the Scottish register for domestic and non-domestic buildings it would be a a relatively simple exercise to derive main heating system fuels on lodged data, against any changes in that home/building over the 10 years of the registers existence. This would highlight any home/building which has changed heating fuel to a low carbon heat technology. In some situations the data may also contain the information on why the EPC was lodged e.g. for FITs or RHI etc. The data is a rich source of evidence and information.

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

We concur with the barriers indicated in the document. We do however suggest that advice and understanding of people's homes/buildings must be the start of the journey. This is in our opinion is the major flaw with the current solutions around heating systems. See the answer to Q3 how we believe the situation can be remedied for the good of consumers, building owners, installers and Scottish Government.

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?

The whole focus in this sector has always been about the heating and hot water system in isolation.

This is where it goes wrong, the key to success is to ensure that the solution is to put the right measure(s) into the right home/building appropriate to the occupants. The key must be about reducing the 'demand' of energy in the first instance.

This specific example is a good example of 'silo' thinking. This industry is keen to install new boilers that are, in our opinion, rarely sized correctly for the home, radiators, that are often not sized per room, often modern technological controls are overlooked. Enforcement of this sector is challenging!

The real saver is to improve the fabric first (thus reducing demand), so that the new heating system doesn't have to use as much energy! Simple. But unless an independent expert can give this advice based on the asset (home/building) and occupation then the current installer /product led situation will continue.

We would advocate therefore that at all material alterations, the Scottish Assessment, as supported by the SLWG and PAS2035 should kick in at the start. Better installers will buy-in to a quality framework, realising that there are opportunities and benefits for all. Initially some may perceive this as a barrier but once they understand that actually the data collected will become their 'leads' in the future, the better installers will engage. The funding mechanisms and drivers can then all take place around independent advice.

If the home/building owner still only wants the heating system improved, this is fine, but the independent energy advisor has informed them of the goals of the Scottish Government, advised them of the other opportunities that would make the home/building warmer, cheaper to run etc. Then this is fair enough.

Scotland should look at funding mechanisms/policies for example if Council Tax was based in some way on this, then further incentives would make sense and drive action. Reducing energy demand is vital, not continuing to simple paper over the cracks!



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

All complimentary systems that generate or save energy must be part of the mix. They must be understood and proven in terms of likely impact in the home; they can then be placed inside the tools (methodologies) that energy advisors can use to give independent advice to owners/tenants of homes and building in Scotland. It is vital that the whole building approach is used, and that the 'complimentary systems' calculate correctly and give the persons whose home/building is being improved the correct and independent information.

Any person can say a new 'widget' saves 'x' amount of energy or 'x' amount of cost. These claims must be proven through quality assurance regimes, and quickly implemented in the tools used by

By utilising independent Energy Advisors, they will protect consumers and ensures that good proven innovation can be used to help drive energy efficiency savings in Scottish buildings.

During the independent assessment of the home/building, there needs to be a decision point, this will be when modelling potentially different solutions (scenarios) for improving the energy efficiency of the building with the potential outcomes being explained, which then allows the owners/occupiers to make good decisions based on their own aspirations and financial standing.

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

The principal building constrain in our opinion is that the building is often not understood in the first place. Any good management theory tells us, if you can't measure it, you can't manage it. The building must be first understood, and then the aim is to maximise the potential of the building. If you don't measure and use the current national calculation methodologies then everything else is simple guess work.

The first goal should be about reducing demand in the building and this is a combination of asset and occupation assessments. Again the good news is that both these calculations are well known and used for both domestic and non-domestic buildings. Using these tools with Energy Advisors in an independent way, will give vital information about potential options for the owners/occupiers.



This is the missing gap. Without this, the silo solutions will continue, and no measurement will exist for improvements of the 'whole building'

Some great work has been done through Each Home Counts, PAS2035 and SLWG in Scotland, and Elmhurst would encourage Scottish Government to start all policies and regulations surrounding energy efficiency improvements with a building assessment.

Retrofit co-coordinators will not look at these as 'constraints' but look at these as 'opportunities'. For Scottish homes/buildings that are off grid, Scotland offers lots of potential opportunities with hydro, wind, and space (land) which with the right solutions can be utilised to help Scottish Buildings use less energy in a cleaner way. We must start turning these negatives into positives.

6. What can be done to overcome these constraints?

See answer to 5.

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

No strong opinion

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?

This is a particular bug bear of Elmhurst at the moment, certain constructions have been labelled 'hard to treat' this is normal where cavities are narrow, or indeed there is poor access to enable drilling for cavity fill.

Fundamentally the question has been driven by cost, most previous policies attempted to capture the low hanging fruit, and therefore derived mechanisms that incentivised easy and cheaper installs. The fact is that there are many technologies and solutions that can be utilised in buildings which may be costlier and maybe in some instances only be designed and installed by a small(er) number of installers. The first question needs to be 'can the asset use less energy?' once the answer is firstly understood, the next question is 'how', and only then, finally 'who' could install it. Don't go to the 'who' first!

'Hard to treat' by definition is not that the wall is not treatable, but that it is potential harder to treat! The current policies mean that the mass retrofit industry tends to walk away from these buildings, this needs to stop occurring and Scotland needs to build a quality process linking the right solutions to the right buildings.

The answer to this again is to assess the asset, and capture the goals of the owners/tenants, then to give independent good advice on what is best for the asset. The information and data can then be centrally collated – so that if a particular situation indeed does need specific professional guidance then it is available. For too long the driver in energy efficiency has been low cost. This has to change to good quality, ensuring the right measure(s) for the right asset (building/home) for the right occupants.

Another good example is listed buildings, guidance around these from an energy efficiency point of view is poor. They are all assets, they are all unique, and they all have items that can be improved to make them more energy efficient, without compromising the unique historical value of the building. For example loft insulation, low energy lighting or cylinder insulation would in most cases be good for the building and occupants. Again Elmhurst would advocate that the same approach exists for all buildings in Scotland – assess, advice, plan, do and act. The advice in these situation is to seek guidance of the appropriate responsible person who can guide the appropriateness of energy efficiency improvements. A mind shift is required in this particular sector, unless we are to simple label some buildings in Scotland as untouchable, which is not in the best interest of the buildings, owners or occupiers.

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**

No strong opinion.



10. What factors might inhibit uptake of heat pumps?

No strong opinion.

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

No strong opinion.

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.

No strong opinion.

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**

No strong opinion.

14. What factors might inhibit uptake of hybrid heat pumps?

No strong opinion.

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

No strong opinion.

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

No strong opinion.

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**

No strong opinion.

18. What factors might inhibit uptake of electric storage heating?

No strong opinion.

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

No strong opinion.

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

No strong opinion.

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?

No strong opinion.

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

No strong opinion.



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?

No strong opinion.

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**

No strong opinion.

25. What factors might inhibit uptake of bioenergy technology?

No strong opinion.

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

No strong opinion

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

No strong opinion.

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

No strong opinion.



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

No strong opinion.

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**

No strong opinion.

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

No strong opinion.

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

No strong opinion.

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

No strong opinion.

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

No strong opinion.



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

No strong opinion.

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

No strong opinion.

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?

No strong opinion.

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

No strong opinion.

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?

No strong opinion.

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

Elmhurst has long advocated for the eradication of fuel poverty. The statistics in the document only highlight the size of the problem in Scotland.

- 43% of rural homes in Scotland are in fuel poverty.
- 52% of all homes with electric heating, and 40% with oil heating are in fuel poverty.



Fuel Poverty is a very complex issue, which everyone agrees needs to be eradicated. Accelerating the ambition will help the issue, but only if a clear goal is understood; what do we mean by reducing fuel poverty; keeping this simple is key:

- a) Reducing the 'fuel bill' of the home is priority #1
- b) Reducing the 'emissions' of the home must be priority #2

This could become the classic catch 22 scenario, whereby the home has a more modern 'cleaner' carbon heating/DHW/lighting system installed, but that it costs more to run – pushing them further into fuel poverty. It is therefore essential that this is not the case.

A domestic EPC is based on the cost efficient use of the home, and therefore this is the only indicator of a potential fuel bill for the home. It can be tailored more with an occupancy assessment, but the metric used to measure success must be the 'cost'.

We all agree that a balancing act is required so that emissions (carbon) are managed across all Scottish homes, and this needs careful consideration in any future framework.

Keeping the same infrastructure for all sectors (owner occupiers, private/social rental/fuel poverty) is vital, not having a whole new process and rules around this sector will help, keep it simple. But ensuring for these people that the 'goal' is about removing them from fuel poverty, not any of the other matrices.

All people who could be in 'fuel poverty' need to have an assessment of the home, the occupation, energy advice by an energy advisor. This in itself may solve some of the people's issues. We trust that the Scottish Assessment SLWG will look to provide a solution to action a plan for the right measure(s) in the right home for the occupiers. The links to funding mechanisms (incentives) is vital for the fuel poor sector.

A short/medium term plan needs to be created in an independent manner. Links to appropriate funding can be created to help these people make the home warmer and cheaper to run. The organisation of the installs needs to be co-ordinated, and ongoing monitoring of the home is vital.

Elmhurst also suggest that the current measurement of a fuel poor household is too simple. It needs to be linked to the RdSAP/Occupancy Assessment target for the home, not just 10% of disposable income; the reason that this is vital to understand is that the outcome must be about getting the home to the 'appropriate' levels of heat so that the occupants can live in a healthy home.



The methodologies calculate how much it would cost to heat the home to the right temperatures at the right times for the occupant, this is the 'true' level that the occupants need to spend!

Don't build different process for the 'fuel poor' sector; just link the 'funding' incentives for this sector to the right homes and people.

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.

Elmhurst always advocate for a framework that incentivises early adopters and effectively penalises those that ignore. If the framework is well known in advance and enough 'noise' is created by all including industry then the policies will work.

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?

Scotland could use the national infrastructure precedent, and choose particular geographic areas and start from the bottom up, deep retrofitting homes, so they are using less energy and have a very clear set of goals set out; it is about engagement with the home owners, and ensuring that clear objectives are set out for the property at the end of the project. When this model proves successful in one area, it can be rolled out to other specific regions.

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?

See answer to 44

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

A 'simple' process that encompasses an assessment of the property, an occupational assessment, following by a medium term plan for the building, all done in an independent manner and for the good of the asset and the owners/tenants. Building upon this a quality framework around the installation of measures.

If a Quality Assurance regime exists to cover all the above the banks and lending organisations have already stated in EHC deployment, that they are willing to lend in this sector; but do not want their brands connected to poor quality. The working group on finance on EHC have concluded as such.

Government need to incentivise through this quality framework, the goals that they wish Scotland to meet. As answered earlier during the assessment, at the decision point. The Energy Advisor needs to be able to set some buildings/occupants towards the public funding options, and push others towards the private sector financing options.

If the ultimate goal for all Scottish buildings is that they are using electricity in the future, then the supply networks and generation companies have a vested interest to significantly invest in the reduction of demand from buildings; therefore reducing the spend on bigger and newer supply infrastructure. Therefore we would suggest that these types of organisations need to be involved in the options surrounding finance.

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?

No strong opinion.

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

See answer below (47)

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

It is fundamental that the Scotland Assessment must fill the gap between an asset assessment (the EPC), and independent advice based on the asset and the occupation. People need to know what is best for themselves and their building; giving Energy Advisors the ability to give this advice, and for there to be a medium term plan created, that can then see action from finance, incentives, installers etc.

The key is to keep it simple, build upon currently available tools, and start putting the occupants first. If the Scottish Government want to drive people towards 'low carbon heat' there needs to be incentives and appropriate penalties to encourage and demand this course of action.

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?

As above

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?

Without regulation the market will not drive this course of action, the key in our opinion is about 'enforcement'. If there are loop holes and easy ways out, and lack of enforcement, then the policy will not work. Better to have good local/national enforcement, backed up by other professionals such as solicitors, surveyors, agents, lenders/banks etc.

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?

As before, set the standards and the goals, and then incentivise early adopters, and penalise effectively those who ignore the standards. Giving a clear and concise road map allows industry confidence to get on with it.

There needs to be joined up thinking across different departments in Scottish Government so that any policies and regulations work together and do not conflict. Good examples that Elmhurst have given in many previous consultations and calls for evidence surround ideas to encourage energy efficiency via Council Tax, Green Taxes, Green Mortgages, appropriate ECO funding etc.



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"?

This is an area being discussed through new Part L (E&W) and will also come under the radar of Section 6 in Scotland. The concept is well liked and understood; however Elmhurst would draw attention to be careful in this area of future proofing as any unintended consequences need to be fully understood and mitigated against. For example, one of the options given regularly is to provide larger radiators to accommodate lower flow temperature systems of the future. The consequence could be that the radiators can no longer be positioned underneath windows and may be moved to internal walls. Research has shown that this may then cause issues with condensation and cold air movement within homes, that otherwise wouldn't have occurred.

Elmhurst therefore welcome the intent of the request, but solutions must ensure that any unintended consequences are mitigated against.

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

No strong opinion.

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

No strong opinion.

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?

No strong opinion.

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?

No strong opinion.



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.

As prices can't be affected, Scottish Government must build consumer protection in the entire quality assurance processes surrounding assessment, advice, planning, design, install and monitoring. By following the outcome of the Each Home Counts review, the Government can ensure that consumers are put back at the heart of energy efficient policy. Consumers must get warranties, receipts, outcomes, plans, people and organisations must be accountable for all parts of the retrofit journey.

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?

Build upon the great work of the PAS2035 and SLWGs, and build quality assurance mechanisms around the entire process of 'whole buildings'. By giving the market the confidence that this is going to happen, and a clear pathway for competent skilled people/organisations will become involved.

In terms of supply chain, the message needs to be about education, training, advice, upskilling. These will occur if the 'bar' is set appropriately for all the parts of the retrofit process. Elmhurst truly believe that all the parts of the jigsaw are there, they just need bringing together. The tools and people exist to undertake whole building assessment and occupational assessments. Co-ordinators exist to create medium term plans. Designers exist to ensure that multiple measures can be installed paying particular interest to junctions and unintended consequences of bad installs. Installers exist to put good quality kit into buildings. The will needs to exist to build a framework for this to occur, but it must be clear that the consumer is put at the heart of the process.

The first port of call for the owner/occupier should be an independent expert who can advocate for a whole building approach, not always just the local plumber, who is very capable of installing his/her current technologies; this is essentially where we as an industry learn the lessons explained in Each Home Counts report, and deliver a infrastructure that educates and empowers consumers to make better decisions around making their home/building warmer, cheaper and greener.



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