

A Scoping Consultation on the New Build Heat Standard: Analysis of Responses

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Executive Summary

Scotland has one of the most ambitious climate targets in the world, with its Climate Change Bill¹ setting out a legally binding target of reaching net-zero emissions by 2045, and with an interim statutory reduction of 75% by 2030.

Given that homes and workplaces account for around 21%² of Scotland's total greenhouse gas emissions, it is important to reduce emissions from homes and buildings so they are warmer, greener and energy efficient. To achieve the required levels of energy efficiency, Scotland (and the rest of the UK) will need to adopt zero carbon heating technologies throughout the building stock.

One element which will also contribute to Scotland's climate change targets by reducing emissions from heating systems would be to ensure that all new build homes have heating systems that produce zero direct greenhouse gas emissions. In December 2020, the Scottish Government published a scoping consultation seeking views on a proposed New Build Heat Standard (NBHS)³, which would mean that all new build homes given consent from 2024 must have a heating system that produces zero direct greenhouse gas emissions at the point of use.

The scoping consultation closed at the beginning of March 2021 and received a total of 92 responses. Four consultation workshops were also held with key stakeholders (Business/ Industry, Consumers, Island Communities and Non-Domestic Buildings) during the consultation period.

Respondent Profile

In total, there were 92 responses to the consultation, of which 83 were from organisations and 9 from individuals.

¹ <https://www.legislation.gov.uk/asp/2019/15/contents/enacted>

² <https://www.gov.scot/publications/new-build-heat-standard-scoping-consultation>

³ <https://www.gov.scot/publications/new-build-heat-standard-scoping-consultation>

Table 1: Respondent Groups

	Number
Architect / Architect trade body	4
Energy sector	12
Housing association	4
Housing developer	3
Local authority	14
Manufacturer	10
NGO	7
Public sector	3
Trade Body - Energy	12
Trade Body - Housing	7
Other	7
Total organisations	83
Individual	9
Total respondents	92

Key Themes

A number of key themes were evident across questions as well as across respondent groups, although each was mentioned by a minority of respondents, and these are summarised below.

- There was general support for the proposals within the scoping consultation, albeit that many respondents look forward to receiving more detail within the follow-up Technical Consultation.
- There were many calls to adopt a whole building, fabric first approach, so as to take into account all factors that can lead to emissions. This approach would also allow for consideration of the embodied carbon of a building.
- Allied to this, there were some requests for the NBHS to align with low carbon rather than zero emissions as this would allow for a range of technologies to be used to meet the demands of different building types.
- There were suggestions for a technology agnostic approach which would allow for a range of different technologies to be considered in order to meet different needs. Often cited in relation to this point were differences between rural and remote areas and cities and urban areas; with the former often cited

as not being suitable for district heating systems which rely on large scale developments to make them economically viable for consumers.

- Concerns were noted over the likely additional demand on the electrical network and a lack of grid capacity to deal with the changes in heating systems being proposed. Allied to this there were concerns over the cost of changes that would be needed for the grid infrastructure.
- The need for a robust supply chain was cited, with some concerns that the current supply chain does not have the capacity to manufacture and install heat pumps in high volumes.
- Allied to the need for a robust supply chain, there were also a number of references to the need for education, training and upskilling of the existing workforce in order to meet the requirements of the Standard.
- There were some queries over operational issues, the lifespan of appliances and perceived high maintenance costs. These issues tied in with concerns over increased costs to consumers and increased levels of fuel poverty.
- As well as training for the workforce, increased consumer awareness was identified as a key issue, so that they understand proposed changes in heating systems and how these will impact on them. Ultimately, there is a perception that this change is likely to bring about reduced choice for consumers, which is very different to the present position. As such, awareness among consumers – and a positive attitude towards the changes being proposed – is seen as being imperative in bringing about behavioural change.
- The need to provide consumers with education and training on new technologies, how to operate these and how to achieve maximum efficiency was also mooted by respondents. Technologies to meet the Standard are perceived to be very different to existing technologies currently in use, and more difficult to understand and operate.
- Collaboration between all key stakeholders across the industry was cited as being important in order to ensure a smooth transition, with some respondents perceiving that the Scottish Government should be taking the lead on this.
- There were references to a need for financial incentives for both the industry and consumers, in order to ensure a robust supply chain, a skilled workforce and take-up of new technologies.
- There was a perception that some form of certification or quality assurance scheme would be beneficial, along with monitoring and evaluation for compliance with the Standard.
- Views were split on the Scottish Government's proposal to introduce this Standard in 2024, and on being brought into force for new buildings consented earlier than 2024; with requests for clear tailored guidance for various types of non-domestic builds.

- There were also requests for guidance to be provided in order to provide clarity on the Standard; along with a roadmap setting out clear timescales and targets.
- Finally, there were requests for this Standard to align with other policy areas, for example, with the Scottish Government's final [Fuel Poverty Strategy](#) or the [Heat in Buildings Strategy](#); as well as ensuring timescales are aligned.

Appendix 2 provides a summary of the key themes emerging at each consultation question.

Introduction

Background

1. Scotland has one of the most ambitious climate targets in the world, with its Climate Change Bill⁴ setting out a legally binding target of reaching net-zero emissions by 2045, and with an interim statutory reduction of 75% by 2030.
2. The Scottish Government published a scoping consultation seeking views on a proposed New Build Heat Standard (NBHS)⁵, which would mean that all new build homes given consent from 2024 must have a heating system that produces zero direct greenhouse gas emissions at the point of use. The scoping consultation closed at the beginning of March 2021. Four consultation workshops were also held with key stakeholders (Business/ Industry, Consumers, Island Communities and Non-Domestic Buildings).

Respondent Profile

3. In total, there were 92 responses to the consultation, of which 83 were from organisations and 9 from individuals. Respondents were assigned to respondent groupings in order to enable analysis of any differences or commonalities across or within the various different types of organisations and individuals that responded. Table 1 above shows the number of respondents in each organisational category.
4. A list of all those organisations that submitted a response to the consultation and agreed to have their name published is included in Appendix 1.

Methodology

5. Responses to the consultation were submitted using the Scottish Government consultation platform Citizen Space or by email. The findings from the four consultation events have been incorporated into this report at the relevant questions. In most instances, issues raised in workshop events mirrored those raised by individuals and organisations who responded to the consultation.
6. It should be borne in mind that the number responding at each question is not always the same as the number presented in the respondent group table. This is because not all respondents addressed all questions. This report indicates the number of respondents who commented at each question.
7. Some of the consultation questions were closed with specific options to choose from. Where respondents did not follow the questions but mentioned

⁴ <https://www.legislation.gov.uk/asp/2019/15/contents/enacted>

⁵ <https://www.gov.scot/publications/new-build-heat-standard-scoping-consultation>

clearly within their text that they supported one of the options, these have been included in the relevant counts.

8. The researchers examined all comments made by respondents and noted the range of issues mentioned in responses, including reasons for opinions, specific examples or explanations, alternative suggestions or other comments. Grouping these issues together into similar themes allowed the researchers to identify whether any particular theme was specific to any particular respondent group or groups.
9. When considering group differences however, it must also be recognised that where a specific opinion has been identified in relation to a particular group or groups, this does not indicate that other groups did not share this opinion, but rather that they simply did not comment on that particular point.
10. While the consultation gave all who wished to comment an opportunity to do so, given the self-selecting nature of this type of exercise, any figures quoted here cannot be extrapolated to a wider population outwith the respondent sample.

Key outcomes

Question 1

11. The consultation document outlined nine key outcomes supported by transitioning to zero direct emissions heating systems, from 2024, in new buildings. These were informed by, and will contribute towards, the wider outcomes for heat in buildings, in the Heat in Buildings Strategy for Scotland. Question 1 asked,

Q1: ‘Do you agree with the above key outcomes? Please explain your view’

12. As shown in table 2, of the respondents who gave a definitive response, almost all agreed with the key outcomes (72 agreed while only 1 disagreed).

Table 2: Q1

	Number		
	Yes	No	Not answered
Architect / Architect trade body (4)	2	-	2
Energy sector (12)	11	-	1
Housing association (4)	4	-	-
Housing developer (3)	2	-	1
Local authority (14)	11	1	2
Manufacturer (10)	9	-	1
NGO (7)	5	-	2
Public sector (3)	2	-	1
Trade Body - Energy (12)	10	-	2
Trade Body – Housing (7)	5	-	2
Other (7)	6	-	1
Total organisations (83)	67	1	15
Individual (9)	5	-	4
Total respondents (92)	72	1	19

13. Respondents were then invited to provide additional commentary in support of their initial response; and 83 opted to do so. To a large extent,

comments echoed the issues outlined in the consultation paper. The following paragraphs outline the key themes emerging in response to this question.

14. Many respondents, across all sub-groups, simply noted their agreement with each of the nine outcomes. Some respondents opted to provide general comments across all the nine outcomes, which others provided comments on some of the specific outcomes. The following paragraphs provide a brief summary of the key themes emerging for each outcome.

Outcome 1: Our new buildings no longer contribute to climate change

15. While most of those who commented on this outcome supported it, a number of concerns were outlined by these respondents. The key concern related to the **need for a fabric first approach**; points were made that the embodied carbon of a building can account for up to 75% of total emissions over a 60 year period or that net zero emissions do not allow for a holistic approach to new homes.

16. Other comments, each made by small numbers of respondents, included:

- Zero emissions at source may be restrictive.
- There will be a need to consider the optimal orientation of buildings and window placement for energy efficiency; a focus on air tightness will lead to mechanical ventilation which will require electric power.
- The outcome overestimates what the Standard can achieve; there is a need for a more realistic assessment as the Standard will not reduce emissions to the expected extent.

17. There were a few suggestions for changes to the wording of this outcome, and these included,

- Amend this to emphasise a fabric first approach; for example, '*In addition to fabric first approaches, the use of zero direct emissions heating systems ...*'.
- The wording needs to be more precise, for example, '*Our new building **when in use no longer** ...*'.

Outcome 2: Reduced demand for heating and cooling

18. Once again, a few respondents noted their support for a fabric first approach as this would help to reduce fuel poverty, reduce exposure to volatile energy prices and reduce energy demand. Linked to this, there were a small number of comments on the need for a Passivhaus approach.

19. Other comments made by small numbers of respondents included the need,
- To include appropriate ventilation systems (other respondents).
 - For the approach to be technology agnostic (manufacturer; Trade Body (Energy)).
 - To include outcome measures to address any performance gap, for example to have a Post Occupancy Evaluation (POE) of any new system (Trade Body (Housing); Individual).
 - To offer support and awareness-raising to consumers, particularly as there is an allied need for behavioural change (others).
 - To refer to domestic hot water as this is likely to be the largest energy use in new build homes. A public sector organisation commented that there is a need to introduce greater water efficiency measures to support this outcome by improving the efficiency of hot water use and thereby reducing household energy demand and energy bills; other measures referred to also included water reuse technologies and a mandatory water label for all water-using products linked to building and manufacturing standards (manufacturer; Trade Body (Energy)).

Outcome 3: The cost of heating our new homes and non-residential buildings is affordable

20. The key theme emerging in response to this specific outcome – albeit only mentioned by a few respondents – related to concerns over the **cost of electricity compared to gas**; and some requests to address the cost of electricity, particularly as this needs to be viewed in the context of fuel poverty and Scotland’s targets for fuel poverty.
21. Allied to this, there were a small number of calls to align lower energy costs with a review of energy providers’ tariffs to reduce fuel poverty.
22. Other points raised by small numbers of respondents included the need,
- To consider regional differences, for example, between rural and urban areas.
 - For a fabric first approach.
 - To align across different policy areas, for example, with the Scottish Government’s final Fuel Poverty Strategy.
 - To address the refurbishment of existing buildings as a priority to reduce fuel poverty.
 - To introduce greater water efficiency measures by improving the efficiency of hot water use and thereby reducing household energy demand and energy bills.

- For a good understanding of technologies being specified and / or installed, for example, to understand the limitations some technologies may have or the geographic areas to which they are best suited.
- To adopt a Passivhaus approach.

23. A small number of respondents highlighted amendments they would like to see to the text of the outcome. These included,

- Specific reference to rural energy consumers.
- Reference to the recognition of water use efficiency along the lines of *'high energy costs are a challenge for many households and, for many of our businesses and public services, energy and water inefficiency and high energy bills add unnecessary financial burdens'*.
- Reword to *'The cost of heating our new homes and non-residential buildings is affordable and does not contribute to fuel poverty'*.

Outcome 4: The systems we use in new buildings provide us with a reliable supply of heat

24. The two key themes emerging in response to this outcome were of a need for **reliability of supply** and a suitably **robust supply chain**; and the need for **training, retraining and upskilling** so as to ensure there is a skilled workforce.

25. There were also a few references to the need for regulation of installations and long term warranty schemes.

26. A small number of respondents felt there is a need for a diversified use of energy technologies so as to reduce reliance on a single technology and help to build resilience in communities.

27. One respondent suggested a change in the wording of this outcome to *'The systems we use in new buildings provide us with an adequate and reliable supply of heating, cooling and ventilation'*.

Outcome 5: Opportunities for retraining and upskilling of workforce across Scotland

28. Three key themes emerged in response to this specific outcome, although each was only cited by a few respondents. These were,

- The need to **encourage entrants to the sector** and offer training opportunities such as apprenticeships to new entrants.
- The need to **invest in provision of greatly increased training capacity**.
- To **include relevant trade bodies, key industry groups, professional organisations and supply chains**. This point was made primarily by local authorities.

29. One respondent in the energy sector suggested the wording of the outcome needs to include reference to *'the creation of supply chains, business and employment opportunities which decarbonise heat'*; and a private sector organisation felt the narrative should change from *'job losses'* to *'job opportunities'*.

Outcome 6: Informed, educated consumers

30. The key theme emerging in relation to this outcome was **agreement of the need to inform and educate consumers** in order to address consumer uncertainty, with some comments that this will be an important factor in achieving the predicted carbon reduction. Allied to this, there were some comments that consumers need to understand that they need to use zero direct emission heating systems differently from fossil fuel heating systems and will require access to advice and information on how to keep their homes warm while keeping bills as low as possible. There were a small number of comments that this will require a huge effort in a small timescale, given the need not only to educate consumers but also to bring about behavioural change.
31. Some respondents commented that in order to bring about informed, educated consumers, there is a need for the Scottish Government to run **public-facing awareness campaigns** about new green homes and the role of different technologies. In addition, consumers will need assurances about the reliability of alternative heat sources.
32. While most respondents focused on consumers, a small number also cited the need to **educate others involved in the industry** and these included valuers, mortgage lenders, surveyors and those working in other trade professions.
33. Two respondents highlighted amendments to this outcome. These were the inclusion of *'reassured'* in the outcome, and an additional bullet point to highlight that consumers need to know how to use their heating systems effectively.

Outcome 7: Our indoor and outdoor spaces are filled with cleaner air

34. The key comment emerging for this outcome – albeit only cited by a few respondents – was of a need to take a **holistic view of the whole building and adopt a fabric first approach**. Once again, there were a few references to the need for Passivhaus metrics for energy efficiency to be mandated as this would ensure adequate levels of insulation, minimisation of heat loss and maintain good fresh air ventilation via low input heat.
35. Allied to this, the issue of **ventilation** was raised by a few respondents who noted that the outcome needs to be revised to reflect the impact of Covid19 on ventilation practices and that there will need to be guidance on

how to manage and adapt ventilation systems and user behaviour in air-tight buildings.

36. There were a small number of requests to reword this outcome to more accurately reflect the potential opportunity the Standard has to further improve indoor and outdoor air quality specifically within the context of new build homes.

Outcome 8: Our heating systems are smart, enabling the flexible and stable operation of our energy networks

37. While there was broad support for this outcome, respondents outlined a number of concerns. The key concern, although only mentioned by a few respondents, was that **smart heat needs to be understood and delivered in the context of a whole system review**; with a whole building approach so that heating demand and controls are not considered in isolation.
38. There were also a few suggestions of a need for **flexibility across all policy initiatives** so they are agile enough to respond to more rapidly changing external forces, such as changes to primary energy costs.
39. Similarly, there were a small number of comments that heating systems will need to be flexible to keep up with technological changes; for example, as the National Grid increases its capacity for renewable energy, it is important that heating systems can mirror this change and are flexible to keep up with these changes.
40. There were a small number of references to the need for financial incentives and grant support for homeowners so they optimise energy use through smart tariffs, energy and heat storage and smart home appliances.
41. A similar number of respondents made suggestions to offer **training to consumers** on how to operate smart heating systems; this, in turn, would help to bring about the necessary consumer behaviour change to meet this outcome.
42. There were also a small number of references to the need for shared responsibilities across wider stakeholders and network delivery partners to enable the integration of technologies on their networks, along with Scottish Government collaboration with all stakeholders to achieve this outcome.
43. One amendment was suggested for the wording of this outcome; *'Our heating and cooling and ventilation systems are smart, enabling the flexible and stable operation of our energy network'*.

Outcome 9: There is a continued supply of high quality homes and non-residential buildings in line with requirements

44. Most comments made in relation to this specific outcome simply agreed with the need for a continued supply of high quality homes. Once again, a few other points were raised by respondents and these included a need for,

- A fabric first / holistic approach to new homes.
- The Scottish Government to support the sector directly to help support the delivery of housing as per this outcome.
- A move to Passivhaus to ensure this outcome is met.

45. In relation to specific amendments to this outcome wording, there was a request for this to read *'There is a continued supply of high-quality and truly affordable homes and non-residential buildings which are in line with identified requirements'*. There was also a request to reference water efficiency in the second bullet point to read *'Measures to reduce the demand for heat and hot water in new homes are essential for meeting this objective, helping to ensure that new homes are more affordable to heat'*.

General comments across all nine outcomes

46. As noted earlier, some respondents provided general comments that were relevant to all nine outcomes. These included the need for a **fabric first approach** and comments that the key outcomes are in line with improvements that are needed for new build housing; that these are appropriate and achieve a balance between national targets and the limitations of the construction industry.

47. However, there were some concerns raised by respondents. A key concern was **geographic differences** between city and urban and rural areas; for example that district heating systems rely on large scale developments to make them economically viable for consumers, or that developers may not have access to particular heating technologies in all areas.

48. Views from a workshop held among island respondents included the need to offer a range of technologies such that the most economically viable can be used. There was also a perception of a lack of capacity on the islands and a lack of willingness for some existing tradespeople to adapt their existing skillset to meet the demands of this Standard. Allied to this, there were some suggestions that there might be a lack of quality control over technologies being installed on island communities.

49. There were a number of **concerns over costs and the need to avoid fuel poverty**; for example, there could be high costs of energy generation, upgrading the power network, increased use of electricity as a heating source could prove much more expensive to consumers who are used to using gas as their primary heating source. There were a small number of comments

that changes to heating systems should not introduce additional costs for homeowners.

50. There were a few references to the need for a **technology agnostic** approach and for consideration to a range of different technologies which make use of all available forms of renewables.
51. The importance of **collaboration** was highlighted, across all stakeholders within the sector.
52. There were also a small number of perceptions from local authorities that the **proposed timescale is challenging**.

Question 2

53. Question 2 of the consultation paper then asked,

Q2: 'Are there any additional outcomes which should be embedded here?'

54. A total of 57 respondents, across all sub-groups, opted to answer this question. Some of these respondents provided additional outcomes they felt were necessary, while some others commented on other aspects of the proposed Standard.
55. A key comment was of a need for the **Standard to remain flexible, be technologically agnostic and make use of all technologies** – both existing and emerging. A few of these respondents referred to specific technologies they felt should be included in the mix and these included hydrogen boilers, wood pellet heating systems in rural areas and solar thermal energy.
56. Once again, there were some references to the need to consider the differences between **rural and urban areas**, with concerns that building homes in small schemes in rural areas could be unaffordable for many people. Linked to this, there were some references to the need to ensure that the Standard does not lead to increased levels of fuel poverty.
57. There were some suggestions for monitoring of buildings, the heating systems they use and the levels of energy used by each, so that developers adhere to the Standard. Alongside this, there were a small number of requests for independent verification and sign off of all new build housing.
58. Additional outcomes suggested by respondents included references to,
 - **The economy and economic development**; Scotland maintains a successful and diverse property industry that is able to build and deliver the homes and workspaces of the future.

- **Emissions;** Improvements on cost efficiency measures; Design of new build homes should support low demand for heating; include a fabric first approach; Building Standards should consider the total energy use of a property; The embodied carbon emissions generated by the manufacture of energy systems should not be greater than the potential operational emissions they can save; Inclusivity of access to zero emissions; All new build housing should have an EPC rating of B or C; Mitigation and prevention of overheating.
- **Buildings;** New build housing should complement the character of the existing area; Encourage the reuse of existing structures where possible.
- Creating a sufficient **infrastructure across all partners.**
- **Communities and the consumer;** Consumers need to use heating systems effectively; communities should be empowered; the promotion of health and wellbeing.
- **The systems installed;** No heating system should cost more to run than the present benchmark (mains gas); Requirements for POE for all installations; Consider the whole life of heat systems selected, to consider the running costs and carbon savings over the lifetime and the capital cost of installing heating systems; The demands of electric heating should not overburden grid connections and efforts to decarbonise electricity generation.

The Standard

Question 3

59. The consultation paper proposed that any reference to a ‘new building’ was aligned to that set out under existing building regulation, and would cover both a) any property built for the first time; and b) any property created by the conversion of an existing building. The next question went onto ask,

Q3: Do you agree with limiting this Standard to ‘new buildings’ as defined within section 2.2?’

60. As the following table demonstrates, there was widespread agreement with limiting this Standard to ‘new buildings’ as defined within section 2.2. Only a small number disagreed with this (68 respondents agreed compared to only 6 who disagreed).

Table 3: Q3

	Number		
	Yes	No	Not answered
Architect / Architect trade body (4)	2	1	1
Energy sector (12)	9	2	1
Housing association (4)	3	-	1
Housing developer (3)	1	-	2
Local authority (14)	11	-	3
Manufacturer (10)	10	-	-
NGO (7)	7	-	-
Public sector (3)	1	-	2
Trade Body - Energy (12)	9	2	1
Trade Body – Housing (7)	5	-	2
Other (7)	5	1	1
Total organisations (83)	63	6	14
Individual (9)	5	-	4
Total respondents (92)	68	6	18

61. A total of 64 respondents provided text in support of their initial answer. The key theme emerging at this question, and cited by respondents across all sub-groups, was of a **need for a similar approach for existing building stock** so as to help tackle the issues of climate change and fuel poverty.
62. There was some reference to the Scottish Government's Heat in Buildings Strategy, which will provide a pathway towards the decarbonisation of existing buildings, including any anticipated requirements for retrofitting along with timescales for carrying this out.
63. For a small number of respondents, it was felt that there is a need for a co-ordinated approach for new and existing buildings, with some reference to the levels of CO₂ generated by existing buildings.
64. Some respondents noted **concerns over the inclusion of conversions within this definition**. They felt that some conversions within existing buildings can be more complex than new build housing or that buildings created by conversion may need specialist retrofits depending on the age and fabric of the building.
65. A similar number of respondents felt this **Standard might cause a disincentive to retain or re-use traditional or historic buildings**. There were suggestions that there needs to be flexibility built into the Standard so that conversions of existing buildings can be considered on a case-by-case basis. Some respondents also noted that **modern standards cannot always be applied on a like-for-like basis to existing properties under conversion**, given that some requirements such as insulation cannot be applied equally across new build and existing properties. A small number of respondents queried whether significant extensions should be included within the scope of this Standard, particularly as implementing build requirements may make some conversions financially unviable.
66. A small number of these respondents also noted that the **cost implications of compliance with the Standard** for conversions could be considerable and that incentives should be offered to encourage compliance.
67. A small number of respondents also noted this could have a knock-on impact in **rural areas** where the **potentially high cost of conversion could impact on the supply of affordable housing**. There were a very small number of suggestions of a need to distinguish between rural and urban areas as not all heating solutions will be relevant in rural areas; also suggestions that individuals living in rural areas should have access to low emission alternatives.
68. Some respondents noted **queries over the definition**, with requests for clear guidance on which types of building will be included. As such, there were requests for renovations and conversions to be clearly defined. There were also a small number of queries as to whether the Standard would apply

only to conversions that are including a new heating system or to all conversions.

69. There were a few suggestions for **additional funding or incentives** to be available to encourage adherence to the Standard, particularly in relation to conversions.

70. Other points raised by small numbers of respondents included:

- A preference for a whole life carbon approach to regulate and reduce the levels of embodied energy within new buildings.
- Issues over the use of the Energy Efficiency Rating (EER) measure rather than the Environmental Impact (EI) measure within EPCs in rating energy efficiency, particularly as it was felt that using the EER measure would also help to reduce fuel poverty.

Question 4

71. The consultation paper proposed that the focus of the Standard will be on the emissions generated within the curtilage of the building for delivering a building's space and hot water heating and cooling requirements. So, in order to comply with the Standard, any installed heating system would produce no direct greenhouse gas emissions at the point of use. Question 4 went on to ask,

Q4: 'Do you agree with a) our approach taken to require future installed heating systems to be zero direct emissions only, and b) our approach taken to focus on direct / point of use emissions that a building owner has responsibility over only?'

72. As shown in table 4, a **higher number of respondents supported the approach taken to require future installed heating systems to be zero direct emissions only** (41 agreed compared to 21 who disagreed). This picture was **very similar in relation to the approach taken to focus on direct / point of use emissions that a building owner has responsibility over only**, with 43 in agreement and 20 disagreeing. Across both these questions, higher numbers of respondents within the energy sector and trade bodies (energy) and NGOs disagreed than agreed.

Table 4: Q4a & Q4b

	Number					
	Q4a			Q4b		
	Yes	No	Not answered	Yes	No	Not answered
Architect / Architect trade body (4)	3	-	1	3	-	1
Energy sector (12)	4	6	2	4	6	2
Housing association (4)	3	-	1	2	-	2
Housing developer (3)	2	-	1	2	-	1
Local authority (14)	7	2	5	8	2	4
Manufacturer (10)	8	1	1	7	2	1
NGO (7)	-	4	3	2	3	2
Public sector (3)	-	-	3	-	-	3
Trade Body - Energy (12)	5	6	1	5	6	1
Trade Body – Housing (7)	4	-	3	4	-	3
Other (7)	2	1	4	2	1	4
Total organisations (83)	38	20	25	39	20	24
Individual (9)	3	1	5	4	-	5
Total respondents (92)	41	21	30	43	20	29

73. 76 respondents, across all sub-groups, chose to make comments at this question.

74. The largest single comment, albeit only made by a small minority of respondents was that the **Standard should remain technologically agnostic and that a range of low carbon heat options would be needed** to meet the demands of different building types and individuals.

75. A number of respondents also noted their **support for various specific technologies** including hydrogen, biogas and electricity, although the electricity grid will need to use renewables and nuclear to replace fossil fuel.

76. There were a small number of concerns that the Standard would only allow direct electric solutions to be used in heating systems and a respondent in the trade body (energy) sector commented that some heating solutions with zero direct emissions at point of use have high carbon emissions.

77. There were also a small number of comments that the suggested approach could put too much strain on the national grid and that a robust infrastructure needs to be in place.
78. Some of the respondents who disagreed with this proposal felt that this would encourage developers to use fossil fuel fired district heating systems or favour the cheapest and simplest heating solutions which could place too much reliance on upstream decarbonisation; for example, one respondent noted that new homes built from 2024 onwards may not be able to access hydrogen as a fuel for heating in the future.
79. While there was broad support for this approach, a number of respondents highlighted concerns they had. The key concern was over the **feasibility of this approach in more rural settings**, given the need for high density developments – which tend to be focused in larger urban or city areas – in order to maximise efficiency and minimise costs.
80. A **restriction in consumer choice** was also cited by a few respondents, some of whom had concerns that this could lead to consumers being tied into an energy provider in a monopolistic situation and lead to increases in energy costs.
81. There were some **concerns about the embodied carbon in heating systems**; for example, one respondent commented that heat pumps need more maintenance than electric storage heaters and have a shorter working life; thus not only can the energy used cost more but the actual installation also costs more over its lifetime. One respondent noted their concerns over non-direct carbon emissions and wondered how responsibility for decarbonisation will be assigned upstream. As a local authority pointed out, where emissions to achieve connection are excessive, this will negate the benefits; and that net zero connections would be preferable. Perhaps not surprisingly, there were a few comments on the need to focus on the fabric of a building, with an organisation in the energy sector pointing out that energy efficiency and a fabric first approach are both essential elements in addressing heating in new build homes.
82. There were some **calls for clarity** across different aspects of this proposal, with the key focus being on clarity on the terms *‘curtilage’*, *‘none generated at the point of use’*, *‘emissions’* (from what?) and *‘emissions generated within the curtilage of the building’*.
83. There were a small number of comments that there is a **conflict between the Standard and the Draft Heat in Buildings Strategy** and that a more strategic overview should be undertaken. For example, one respondent noted that this Standard would require “zero greenhouse gas emissions at point of use” for a new technology to be compliant; however, in the Draft Heat in Buildings Strategy the Scottish Government states that “It will be important that the [decarbonisation of heat] happens in a planned way

so that piecemeal deployment of heat pumps and heat networks does not undermine the socio-economic case for converting parts of the gas network to 100% hydrogen in the future”. Another comment was that this Consultation notes that “any indirect or upstream greenhouse gas emissions that are produced during the generation or distribution of purchased thermal ... energy – which is delivered via a heat network ... would be considered out of scope”, which appears to allow the continued deployment of new fossil-fired heat networks after 2024; however, the Draft Heat in Buildings Strategy states that “new heat networks will need to be powered using renewables or other low or zero emissions sources of heat” from 2023 and that this will mean that gas CHP may not be used in new heat networks in Scotland.

Question 5

84. Question 5 then asked,

Q5: What evidence can you offer on ways of ensuring zero direct emissions from heating that could be compliant with this Standard?’

85. A total of 62 respondents, across all sub-groups, opted to answer this question.

86. A key theme emerging was that the Scottish Government should remain **technology agnostic and that all available technology options should be considered**; furthermore, that there will need to be flexibility within the Standard to allow for any emerging technologies to be adopted.

87. A large number of respondents cited specific technologies that would meet the requirements of the Standard, although most of these did not provide supporting evidence. The technologies mentioned by respondents included:

88. **Heat pumps** (air, ground or water source) as viable alternatives to gas boilers. A manufacturer noted this system delivers more heat capacity than they draw in electrical capacity and thus offer the best level of efficiency; they have zero direct emissions and produce three times as much heat as is needed to power it, and have the lowest impact on the grid. That said, there were some issues noted in relation to heat pumps, with one local authority commenting that air source heat pumps are not affordable at the current grant levels and that these are not effective below -5 degrees; a housing developer had concerns over the capacity of the supply chain to be able to manufacture and install heat pumps in high volumes; and a housing association noted concerns over operational issues, the lifespan of appliances and high maintenance costs. An energy company noted that heat pumps would be excluded by the Standard because of the refrigerant gases leaked by 10% of installations.

89. **Heat networks** were mentioned by some respondents as offering zero direct emissions, although one housing developer noted the need for high density developments in order to maximise efficiency and costs. As noted at earlier questions, these were not perceived to be effective heating systems for rural and remote areas or where there are small developments.
90. **Electricity** was cited by some respondents as offering zero direct emissions from heating, although this is seen to be an expensive option and one which could increase fuel poverty. Two of these respondents referred to direct electric heating specifically, while others referred to other technologies such as heat pumps.
91. **Hydrogen** was another option considered by respondents, although there were also comments that this is an immature market, that this is not a cost effective option, or that it is not produced in a sustainable way and that emissions are given off when hydrogen is created. Additionally, an energy company noted that hydrogen boilers would be excluded because of the ultra-low NOx emissions they produce.
92. A smaller number of respondents cited **solar PV** or **solar thermal** as options with zero direct emissions from heating.
93. A significant number of respondents, rather than offering evidence of ways of ensuring zero direct emissions from heating that would be compliant with the Standard, noted ways in which **compliance with the Standard** could be enforced. A key approach mentioned by respondents was for some form of certification / quality assurance scheme, with examples of Passivhaus, SAP, RdSAP or SBEM being used to measure building energy and the environmental performance of buildings.
94. A small number of respondents also suggested the use of accredited suppliers and products, or providing a list of approved products and systems that qualify as zero direct emission.
95. Another key approach cited by respondents was for **monitoring and evaluation** so that compliance has to be demonstrated. One local authority suggested enforcement via existing statutory duties, although additional resources would be required to undertake this additional role.

Question 6

96. The consultation paper noted that no definitive compliance methodology had been specified, although the Technical Consultation will contain proposals for a compliance methodology, taking into account input from this consultation. The consultation paper outlined two potential options that could be used to define compliance with this Standard. Option A would continue with an existing methodology and potentially change the emissions

factors to reflect a 'direct emissions' rating for different technologies. Option B would be to create an easily understood and enforceable stipulation about the types of heating systems that would be permissible under the new Standard (i.e. those which, if used, would not generate greenhouse gases at point of use). Question 6 then asked,

Q6: What are your views on section 2.6, specifically regarding what mechanism the Scottish Government could use to ensure compliance with the Standard?

97. A total of 75 respondents provided commentary to this specific question. Of those who provided a definitive response, roughly twice as many respondents supported Option B than Option A, although this support was by a minority of respondents. A higher number of respondents did not specify support for either of the two options outlined. There was support for both options across most respondent sub-groups, although no respondents in the housing developer or housing association groupings supported option A. For each of these options, a small number of respondents cited that it was the simplest approach to adopt.

Option A: continuing with an existing methodology and – potentially – change the emissions factors to reflect a 'direct emissions' rating for different technologies

98. The key advantages to option A were that it is perceived to be **technology agnostic**, that it **ensures a level playing field**, thereby encouraging investment in research and development; and **allows for new technologies to be incorporated as they emerge**.

99. The key disadvantage of this approach was that it would need lots of administration.

100. Some respondents commented on the need to update the SAP (Standard Assessment Procedure; the methodology for calculating the energy efficiency and carbon dioxide emissions of residential buildings and new homes), as it is no longer fit for purpose and it does not reflect the aspirations of the Standard; for example, it is seen to penalise heat pump technology. This issue was also raised by representatives from business and industry who attended a workshop event.

Option B: creating an easily understood and enforceable stipulation about the types of heating systems that would be permissible under the new Standard

101. Key advantages were that it would **be easier to enforce**, that it **offers clarity to the supply chain**, that manufacturers know what to work to and that it puts the **onus on technologies to innovate and demonstrate compliance** with the Standard and this can drive faster change.

102. A few respondents noted the need for a **definitive list of compliant heating technologies**, although concern was also noted that a technical list could create unfair exclusions and that it would need to be flexible to allow for future-proofing and inclusion of new technologies as they emerge.
103. Allied to this latter point, a small number of respondents felt this could limit the scope to include emerging technologies or that it could constrain investment and innovation. There were a small number of suggestions that Homes for Scotland could be involved in collaboration with the Scottish Government in producing and updating this list. A local authority summing up the advantages of this option noted:

“Option b) would appear to offer a simpler route to compliance, which may be easier to enforce as well as be clear to applicants and designers which options may be more suitable to them. Having a simpler approach would encourage buy in and make the process easier understood for all involved. Whilst a manufacturers appliance and model would unlikely be referred to, the type of appliance and efficiency rating could be something that demonstrates a minimum compliance point. Similar requirements of district heating systems could also be specified as minimum requirements.”

Other options

104. A small number of respondents suggested there could be a mix of these two approaches as it would provide building developers and homeowners with a list of approved technologies to meet the Standard, based on their direct emissions ratings.
105. There was a degree of support for **consistency across Scotland** as a whole. There were some suggestions – primarily from local authorities – that there is a need to integrate the Standard within existing Planning and Building Standard arrangements; and that the Standard could sit within revised versions of the Building Regulations.
106. Regardless of their preferred option, a few respondents noted the importance of having **clear guidance provided**, for example, guidance for developers around different types of heating systems that would not generate greenhouse gases at point of use.
107. Allied to this, there were a small number of calls for a **verified certifier scheme**, for example the use of Passivhaus to quality assure buildings at design, construction and post-completion stages. There were also a small number of requests for a monitoring and compliance mechanism.
108. A recurring theme, albeit only cited by a small number of respondents, was of a need to have different options for rural areas where some types of heating system may not be suitable.

Question 7

109. Question 7 of the consultation then asked,

Q7: What steps can the Scottish Government take to support industry to deliver this Standard, and how could we make compliance with this Standard easier?’

110. A total of 75 respondents – across all sub-groups – opted to provide commentary in response to this question. A number of key themes emerged. These are covered in the following paragraphs.

Financial / fiscal support

111. This theme was cited by around half the respondents, across all sub-groups. The key issue raised by respondents was of a need for investment in the infrastructure, workforce and supply chain across the sector. It was also noted that financial support is needed to bring about the necessary training, re-training and / or upskilling of the workforce; as well as support for the deployment of energy efficiency measures, low carbon and low emission heat sources; and for innovation in emerging technologies, options and opportunities and pilot projects.

112. A few respondents – local authorities and housing associations – suggested that grant funding should be offered. For example, a housing association noted that there is a need for a Housing Association Grant (HAG) for the social housing sector to reflect what will be an increase in costs to deliver the Standard.

113. Other suggestions made by small numbers of respondents included:

- Incentivised development to assist with the additional costs associated with providing alternative technologies.
- Additional support and resources for local authorities, for example, for the recruitment of dedicated Building Standards Officers who could oversee compliance at a local level.
- Heat standard weighting for rural and island housing funds where upfront capital costs are high.
- Prioritisation of funding streams such as the National Training Transition Fund or the Green Jobs Fund.

Engagement and collaboration

114. Engagement on the part of the Scottish Government is clearly perceived to be a key element, and a significant minority of respondents referred in some way to engagement across a wide range of audiences. These audiences included:

- Industry, including the housebuilding sector, housing developers, heat network developers, energy infrastructure providers and manufacturers.
- Suppliers.
- Social landlords.
- Local authorities.
- Housing associations.
- Professional bodies.
- The general public.

115. Engagement among the general public in particular was felt to be important to increase awareness of zero emissions heating systems and to help bring about cultural and behavioural change among consumers. Some respondents also suggested a need for energy literacy campaigns and / or information campaigns.

Education and training

116. This was another key theme cited by a significant minority of respondents, across all sub-groups, with some comments that a predicted skills shortage and skills gap could make it difficult for developers to be compliant with the Standard when it is introduced. In terms of targeting training and upskilling, respondents focused on all individuals involved within the building chain as recipients for training and skills development. A number of these respondents noted the need to upskill existing workers to ensure they have the necessary skills to be compliant with the Standard when it is introduced. There were also some specific references to installers, assessors and verifiers and the need to ensure they have relevant training and certification. There were also some suggestions for the introduction of apprenticeships, with a few references to the involvement of Skills Development Scotland.

Compliance with the Standard

117. There were some suggestions – mostly from local authorities – that compliance with the Standard should be linked to Building Standards and via Building Regulations. There were some recommendations that buildings should adhere to the Passivhaus or a similar standard. There were also small mentions of a need for properly trained assessors, to broaden the use of Approved Verifiers for different sections of the Building Standards.

118. There were a few comments on a need to revise the SAP mechanism, with requests for an extension or modification to SAP to recognise the efficiency benefits of Networked (Ground Source) Heat Pumps connected to shared ground loops, ambient or 5th generation heat networks; as well as allowing time for SAP software providers to develop and launch the tools

required to develop and test compliant housing designs with forthcoming standards.

119. Some respondents – primarily trade bodies (housing) and housing developers – also made specific reference to the need for any system of compliance to operate alongside the rest of the UK, as SAP does at present. These respondents suggested that policies should align with the wider UK targets, and the key implementation dates should be matched with those of other UK Governments (the Future Homes Standard was cited as an example).

Timescales

120. Some respondents referred specifically to the timescales for implementation of the Standard. A number of these requested a clear roadmap setting out when and how the Standard will be implemented, to include a routemap for net zero transition and changes to be made to Building Standards. This point also emerged during the workshops.
121. A number of these respondents noted concerns over the timescale and felt that more time is needed to plan for new build properties that are compliant with the Standard.
122. Allied to this, there were some queries over sites which already have consent but which could be subject to new requirements under the Standard, which would impact upon project viability. Not surprisingly, there were some requests for a longer lead-in to allow sufficient time for the industry to prepare; and some respondents felt the proposed timescale is too short. There were a small number of suggestions for a transition period and the phasing in of compliance and implementation.

The provision of guidance

123. Some respondents noted a need for **clear policy guidance**, with signposting to available services and support, as well as the inclusion of technical advice and / or examples of best practice in community engagement and / or ethical business practice. It was also felt that guidance needed to be provided as early as possible.
124. A number of respondents – primarily within the manufacturing sector – cited a need for the Scottish Government to produce clear **guidelines defining compliant technologies and stipulating specific technologies and standards** that would be suitable under the Standard. There would also need to be a mechanism by which this list could be updated to include new innovations. Once again, there were a small number of references to the need for a technologically-agnostic approach.

125. At a workshop held among representatives from business and industry, many of the above issues were raised.

Question 8

126. The consultation paper noted that, regardless of which system supplies a building's heating requirements, it is important that action is taken to limit the amount of energy that needs to be delivered to a new building to meet the heating demand to the best levels practicable. Question 8 went onto ask,

Q8: 'How do we ensure that consumers are protected from increased energy bills, while giving developers flexibility to comply with the Standard?'

127. A total of 77 respondents, across all sub-groups, commented at this question. The key theme which emerged was of a **need for a fabric first approach** as this allows for high energy efficiency levels and helps to ensure that homes have low energy demand, and minimise energy costs to the consumer. As noted by a manufacturer,

"Promoting thermal efficiency is essential, this will help protect consumers from increased energy bills. The Climate Change Committee has made recommendations that new homes must achieve 'ultra-high' levels of energy efficiency. We advocate for a fabric-first approach to building decarbonisation, such that the demand for heat is reduced with energy efficiency improvements, prior to or alongside, the installation of a low-carbon heating system. This has multiple benefits including lowering emissions, reducing capital investment required, helping with energy security as we move towards greater electrification of heating, cooking and transport and saving consumers money on their energy bills. Despite the benefits associated with domestic heat decarbonisation, particularly in terms of emissions reduction, if this approach is adopted without due consideration for the energy efficiency of buildings, there could be significant implications for fuel poverty and wider energy security."

128. Some respondents – often in the local authority or housing association sub-groups – noted the **need to ensure consumers understand the technology options** available to them and how to operate new heating systems. It was noted that new technologies are more complex to understand and operate than many that are currently available to consumers and that it is important for consumers to understand how to maximise efficiency and minimise running costs for different systems.
129. There were also some suggestions for **financial incentives** in the form of grants, loans or subsidies to consumers; these were seen to be beneficial in a number of different ways, including financial support to avoid fuel poverty, incentives built into tariffs for the use of zero direct emission fuel sources and incentives for using renewable energy. A few respondents suggested that a cap on costs could be implemented for consumers. That said, a few respondents commented that consumers will have to accept

higher energy bills, although new build homes should have low energy demand and low bills because of higher levels of energy efficiency.

130. Allied to this, there were a few calls for **underlying taxes and regulations on electricity to be addressed** to make electricity affordable for consumers; or for the cost of gas and electricity to be levelled, with suggestions for a carbon tax on gas and fossil fuels which could be used to subsidise the higher cost of electricity. An added advantage is that this would help to incentivise the take up of zero direct emissions heating systems.
131. Some respondents chose to focus their comments on the **responsibilities of developers**, with comments that developers should be prevented from installing heating products with more expensive heating costs simply because they are cheaper to install; and that developers need to install heating systems that are best for the end user. An organisation in the energy sector suggested that developers need to focus on customer-centric solutions that consider the lifetime costs of heating as well as the capital costs of installation. A local authority suggested that developers should have a duty to highlight maintenance costs as well as running costs.
132. As at some previous questions, there were comments from a few respondents of a **need for a mixed technology approach** so that there is flexibility within the system; two organisations (one energy and one trade body within the energy sector) felt that government policy should not drive solutions towards a single technology.
133. There were a few suggestions to **consider generation opportunities for local communities** which would help to meet an increased demand for electricity; this was felt to be particularly useful for rural communities where some technology options would not be available. Additionally, there were a small number of references to encouraging consumers to utilise onsite generation and reduce their reliance on the grid.
134. Some respondents focused specifically on the **Standard**. Comments included that the Standard should stipulate the use of specific technologies so as to avoid expense for the end user, for example, by looking at potential energy options and costs for all new build at the planning stage. One Trade Body (energy) suggested there should be an affordability target in the Standard based on the installation, maintenance and energy costs of a heating system; an NGO that the Standard should incorporate a heating system efficiency requirement.
135. There were also references to the **role of Building Standards or Building Regulations** to ensure energy use is reduced, as well as a small number of suggestions for developers to provide cost appraisals for their proposed heating systems early in the planning process. Other points raised in relation to Building Standards included:

- Introduction of a mandatory POE to ensure that ‘as designed’ is close to ‘as built’.
- Elimination of any option to use renewable energy as a route to offset against poorer fabric efficiency.
- The need to ensure that quality standards are met.

136. There were a small number of comments of a need to ensure that there is alignment between the Standard and the wider policy environment, with references to the forthcoming Fuel Poverty Strategy, Building Regulations and the implementation of Scottish Technical Standards.

137. Many of the issues raised in relation to this question were also mentioned during the workshop among consumers, with a key focus being on the costs of this technology and the need not to increase levels of fuel poverty. There were comments that consumers will focus more on the cost of their heating system than benefits to the climate or environment.

138. Another key focus for workshop attendees was on the need to increase consumer awareness, provide consumer education on technologies, bring about behavioural change and provide ongoing support.

139. A number of references were also made to the need to develop skills and capacity within the supply chain, to ensure network resilience, and provide incentives and government funding both to consumers and industry.

Question 9

140. The consultation paper proposed that developers should retain as much flexibility as possible to meet the Standard. It also proposed that new buildings be required to be designed and constructed so as to connect to an existing heat network, where that development takes place within a Heat Network Zone. If a developer can demonstrate that this is not an effective solution, an alternative zero direct emissions heating system would be permissible in complying with the Standard.

141. The Heat Networks (Scotland) Act 2021 allows local authorities or the Scottish Ministers to designate an area as particularly suitable for the development of district or communal heating. The expectation that proposals should seek to connect to existing or planned networks has been in place in London and The London Model is implemented through planning policy. At present in Scotland, the Scottish Planning Policy (SPP) sets out that Planning should support the development of heat networks and should help to reduce emissions and energy use in new buildings and from new infrastructure.

142. Question 9 asked,

Q9: 'What are your views on new buildings connecting to an existing heat network, where development takes place within a heat network zone? Do you envisage any unintended consequences as a result of this proposal?'

143. A total of 70 respondents opted to provide commentary in response to this question, and showed broad support for this approach. Advantages cited by respondents included that it is sensible as this would build economies of scale, that it would provide certainty and confidence in the delivery of heat networks, and that it will help to expand district heating.
144. Some of these respondents noted that this strategy has been implemented successfully elsewhere, with most of these noting their support for the London Model. That said, a very small number of respondents felt that while the London Model has been successful in London, it might not translate well to a Scottish context. There was also a reference to Denmark which introduced the first building standards containing energy requirements in 1961, since when the energy demand of new buildings has reduced by 95%.
145. A few respondents noted their disagreement with the proposal, the key reasons being that this removes flexibility in choice of energy supplier or that developers should be given the flexibility to decide on what is the best zero carbon heat solution in each development.
146. Despite the broad support shown for this proposal, a number of respondents also provided qualifying commentary and outlined a number of concerns with this approach.
147. A key concern related to consumers, with comments that **this approach is not economically viable in all situations and that it could lead to higher consumer energy costs and allied higher levels of fuel poverty**. There were also a small number of references to the driving up of house prices, entailing higher heat connection costs, or having long term fixed costs with the network provider.
148. Linked to this latter point, there were some comments that this is a non-competitive approach which **restricts consumer choice** and provides the heat networks with effective monopolies in their area, although two NGOs commented that this could open up opportunities for community ownership which would help counter any monopolistic arguments.
149. Some respondents noted concerns that **existing heat networks will need to have spare capacity** or that there may be a **potential lack of capacity to expand existing networks**. This, in turn, could cause delays to the delivery of new build homes. Other technical issues cited by respondents included that existing heat networks may need to have increased pipe sizing

or that existing networks may be designed on higher temperatures than is required by new build homes.

150. There were also some comments that there will be a need to build bigger than required heat networks in the first instance to allow for future additional connections, although this would entail higher upfront costs and might make establishing the network non-financially viable.
151. Other issues identified by respondents included the potential for disruption if there is a need to upgrade existing infrastructure to allow for new connections, a potential increase in construction costs because of necessary civil engineering works, or a potential mismatch between when access to a heat network is needed and when connection to the network is possible. A small number of respondents commented that other technologies may offer better upstream emission reductions than connection to a heat network that is powered by gas.
152. Once again, there were some references to **geography**, with a perception that heat networks are most suitable for city or urban areas with high density populations. These respondents felt that heat networks are not a viable option for more rural and / or remote areas where there could be high infrastructure costs; and noted the need for flexibility in these areas so that alternative technologies such as ground / air source heat pumps could be used. Linked to this, there were some calls for a full mix of technologies to be available, with a need to identify the most efficient and appropriate heat solutions on a site-by-site basis.
153. Other issues raised by small numbers of respondents included:
- The need to promote heat networks and raise awareness and understanding of these; these comments were mostly in relation to consumers.
 - Properties should be aligned to the Passivhaus standard.
 - There is a need to prioritise efforts to decarbonise heat networks and a need to consider emissions from heat networks as well as emissions at point of use.
 - There is a need to provide advice and support to local authorities, particularly as some do not have experience of heat networks in their area.
 - Concerns that some heat networks rely on fossil fuels, and what incentives there might be to move from gas to zero emissions systems.
 - It might be necessary to offer incentives to developers and energy companies; for example, the provision of funding to support the cost of connection for low carbon heat networks.
 - Concerns that for large heat networks, there are heat losses from transmission.

- LHEES (Local Heat and Energy Efficiency Strategies) should be considered as part of the approach; and prioritised and resourced.

Question 10

154. Question 10 then went onto ask,

Q10: ‘Do you agree with the Scottish Government’s proposal to introduce this Standard in 2024? What are your views on this Standard being brought into force for new buildings consented earlier than 2024?’

155. As shown in table 5, views were relatively split with slightly more respondents supporting than not supporting the Scottish Government’s proposal to introduce this Standard in 2024 (40 supported this compared to 38 who did not). The types of organisation offering least support to this proposal were those in architect / architect trade bodies, manufacturers and NGOs. Of those not supporting this proposal, more respondents felt this date should be sooner than later.

Table 5: Q10

	Number		
	Yes	No	Not answered
Architect / Architect trade body (4)	1	3	-
Energy sector (12)	5	5	2
Housing association (4)	2	1	1
Housing developer (3)	1	1	1
Local authority (14)	9	5	-
Manufacturer (10)	3	7	-
NGO (7)	2	4	1
Public sector (3)	1	-	2
Trade Body - Energy (12)	6	5	1
Trade Body – Housing (7)	4	2	1
Other (7)	2	3	2
Total organisations (83)	36	36	11
Individual (9)	4	2	3
Total respondents (92)	40	38	14

156. Eighty-five respondents opted to provide commentary in support of their initial response.
157. Of those who provided a response to this question, a **small majority were supportive of the 2024 date**, with comments that this allows sufficient time for the industry to adjust to the new Standard, and to ensure the supply chain and training is in place to support this. There were also some comments of a need to have time to increase awareness – both across the industry and the general public. A few respondents also commented that the date could not be earlier than 2024 because of the need to ensure the infrastructure is in place, to ensure there is a skilled workforce and suitable supply chain. A small number of respondents also noted that some planning authorities have already introduced, or plan to introduce, improved performance targets through the planning process.
158. A smaller number of respondents commented that the 2024 date is not realistically achievable, and again cited concerns over the lack of a suitably skilled workforce and supply chains not being in place by this date.
159. There were some comments about a **need to encourage developers** to adopt the Standard earlier, perhaps by offering some form of incentives to early adopters. A small number of these respondents suggested September 2022 as a suitable date for all homes built with public investment.
160. There were some comments that leaving it until 2024 to introduce the Standard would offer time to developers to build homes as late as 2027 which only meet the 2021 standards and will subsequently then need retrofitting.
161. Regardless of whether or not they supported a 2024 date, there were some references of a need for a **phased implementation** of the Standard and / or a **transitional period** which would allow for the development of supply chains, the provision of education and training to ensure a suitably skilled workforce, and awareness raising and information campaigns to the industry and the general public.
162. As at previous questions, there were a few comments on the need for this to **align with wider UK policy**, and there were some specific references to the Future Home Standard as this would encourage the development of a robust UK-wide supply chain and skills base. There was also some reference to the 2021 Building Standards Review being implemented in 2024 to sit alongside the new Standard.
163. Some respondents requested **clarity in the definitions used** or had issues in relation to the Standard. This included what is meant by '*commencement*', '*zero emissions*', and when a new build is regarded as '*consented*'.

164. There were also requests for a **clear roadmap** that is realistic and has flexibility to enable the design, development and implementation of robust viable heating solutions. In regards to commencement specifically, it was suggested that the commencement allowance of three years should be shortened to two years to speed up the implementation of building regulation changes. It was also suggested that at the same time, a five year limit for the completion of building projects should be put in place.

Key Challenges and Opportunities

Question 11

165. The consultation paper noted that the requirements proposed under this Standard would have an impact on the equipment, materials and skills needed to deliver modern homes and buildings from 2024 onwards. As such, there is a need to ensure there is a sufficiently skilled workforce and supply chain capacity available to successfully deliver the requirements of the Standard across Scotland. Question 11 asked,

Q11: 'How can opportunities be maximised for the supply chain involved in the delivery of new homes (ranging from product suppliers to on-site operatives) including skills?'

166. 68 respondents, consisting of 62 organisations and 6 individuals, made comments at this question. A number of the themes emerging at this question echoed issues raised at earlier questions.

167. A very large majority of respondents chose to comment on the **need for skills and training in the workforce**. The main focus of these remarks was a desire to put **training and skills programmes in place** so that a qualified workforce would be ready for the implementation of the Standard. Various facets of skills training were mooted, including the following:

- Upskilling or reskilling the existing workforce.
- Certification or qualification schemes to demonstrate competence.
- Apprenticeships.
- Modelling training to transition fossil fuel workers.
- College and/or university involvement.
- Establishment of a Renewable Energy Skills Centre of Excellence.

168. A large minority of respondents pinpointed **specific areas in which they perceived a skills shortage**, mostly in relation to technical areas concerning electric heating systems; these included engineering design, thermal bridging, hydraulic balancing, air permeability, service and maintenance, assessing and verifying work and board level / managerial skills. A particular issue, cited by a significant minority, was the **requirement for large numbers of qualified heat pump installers**; it was perceived these workers would mainly be trained up from the current boiler installer base and/or those with plumbing or electrical skills.

169. To facilitate skills training, a significant minority of respondents favoured **investment and other forms of support**, by way of government

incentives, stimulus or initiatives such as a green jobs task force, the Transition Training Fund, the Future Skills Action Plan or City Region deals.

170. The other necessity required by a large minority of respondents in order to maximise opportunities for the supply chain was that of **clarity regarding the Standard's regulations and framework**. Clear commitments, timescales, lead-in periods and pathways to compliance were regarded as essential in order to help organisations plan for the changes. A few respondents voiced doubts about the ability to meet the 2024 timescale and suggested phasing in the new Standard to give time to adapt. Similar numbers of respondents were eager for a definition of the allowable technology mix; concerns were raised about the closing off of long term alternative solutions (e.g. BioLPG, liquid fuels), while hopes were expressed that opportunities for other non-carbon technologies would be promoted, such as solar PV and ground source heat pumps.

171. **Collaboration, communication and joint working between stakeholders** (manufacturers, supply chains, skills development agencies, training providers, local authorities, utilities, developers, etc.) and a generally more holistic approach was needed, according to a significant minority of respondents.

172. A large minority of respondents wished to see various **parts of the supply chain scaled up** in order to maximise opportunities; these areas included heat networks, ground loops, design functions and heat pumps.

173. A significant minority of respondents wanted to ensure **market demand** would be in place for the ramp up of supply chains. To help create this, it was suggested demand should come from existing buildings, tax incentives and/or campaigns to raise awareness.

174. Other opportunities foreseen by small numbers of respondents were in job creation (particularly if they were fair and decent jobs) and innovation opportunities involving more research and data generation to help develop the industry.

Question 12

175. Question 12 of the consultation went on to ask,

Q12: 'What do you envisage the key challenges would be for developers, and the wider building industry, in meeting this proposed Standard? How could this sector be supported to address those challenges?'

176. 73 respondents, consisting of 68 organisations and 5 individuals, made comments at this question.

177. The highest number of respondents, a large minority, suggested the main challenge for developers centred around **cost issues**, especially additional raw material costs incurred throughout their supply chains (in particular because of the higher costs of heat pumps as compared to conventional gas boilers), and the resulting impact on their business models. This was regarded as being particularly a problem for affordable and public housing providers, especially if the knock-on effects were higher property prices; in this respect it was noted that the 5 year Affordable Housing Supply programme was due to end. Despite the large number of references to cost issues, no quantified estimates were provided of possible cost increases. Smaller numbers of respondents focused on concerns about the running costs of net zero systems, citing lengthy pay back periods and a need for efficient operations.
178. The perceived **lack of availability of expertise and skills amongst the workforce** was also cited by a large minority of respondents, especially in the areas of heating design, engineering and installation.
179. A significant minority of respondents also made related points about **quality control issues**; challenges were mentioned such as poor workmanship, a need for compliance assessors, the performance gap between design and built standards, product traceability requirements and developers being incentivised to maximise profits.
180. Concerns about **product supply and the availability of products** (e.g. components, materials and plant) were raised, also by a large minority of respondents.
181. Perceived **conservatism and resistance to change in building industry culture** were also mentioned by significant numbers of respondents as a challenge to overcome, amplified by complex engineering and technical challenges in terms of changes to housing design and build.
182. Significant numbers of respondents also had concerns about the **costs, timescales and the economic viability of works needed to reinforce the electricity network infrastructure in order to support energy growth**.
183. Other challenges reported by smaller numbers of respondents included the following:
- Concerns over potential or perceived restrictions over the range of technology choices permissible under the Standard (e.g. combustion technologies, hydrogen via the gas network).
 - Lack of consumer demand.

- The ambitiousness of the timescale to adapt, with suggestions that implementation by 2024 would be difficult, or that changes should be phased to allow the industry time to adapt.
- Local differences (e.g. inconsistency in local planning policies, local heat network zone availability).

184. Recommendations for **support of developers broadly mirrored the anticipated challenges**. However, a large minority of respondents made remarks citing the importance of **clarity of detail** concerning the Standard such that organisations could commit to new build investment decisions. These firmed-up details should include such factors as timescales, guidance, finalised strategies (e.g. Housing to 2040, the Fuel Poverty Strategy and the Heat in Buildings Strategy), incentive policies, routes to compliance and a definition of the technology mix allowed or desired in new builds. Mentions were also made about the importance of planning and building regulations being aligned to the Standard.

185. **Support for workforce education and training** was considered important by similar numbers of respondents; diversity of skills, digital skills and apprenticeships were specified along with support from Skills Development Scotland and the Construction Scotland Innovation Centre. Smaller numbers of respondents desired **consumer and industry education** to raise awareness and engagement of stakeholders, with suggested focuses on carbon literacy and the benefits of renewable energy.

186. **Investment and funding** was suggested as an aid for several diverse areas, including ambient heat networks, green jobs, retrofit programmes, new council housing and tax relief on low carbon homes.

187. Smaller but still significant minorities of respondents vouched for the following forms of support:

- Aid to help develop supply chains (e.g. providing market opportunities, establishing a national supplier / installer framework).
- Technology research (e.g. to test which solutions are best for certain situations, to improve current technologies' heating abilities in cold weather and to test emissions calculations' methodologies).
- Good communication and joined up thinking between stakeholders (developers, industry, government, etc.).
- Reduction of energy demand with suggested measures including fabric, Passivhaus standards and waste water heat recovery.

Question 13

188. The consultation paper noted that with the introduction of this Standard, one potential outcome is a substantial increase in electrical heating systems serving new buildings. Question 13 of the consultation focussed on challenges for the energy networks and asked,

Q13: ‘What are the key challenges for the energy networks regarding the deployment of zero emissions heating in new developments? How could this sector be supported to address those challenges?’

189. 71 respondents, consisting of 64 organisations and 7 individuals, made comments at this question.

190. With respect to the key challenges for energy networks, a majority of respondents focused on the **impact of additional electricity demand on grid capacity** resulting in the need for upgrades of the broader network. Similarly, a large minority of respondents cited the issue of **lack of network capacity at a local level**, with upgrades needed to infrastructure such as transformers, substations, cabling and district heating networks. Respondents pointed out that a failure to undertake these infrastructure works would adversely affect the viability of zero emissions heating.

191. A large minority of respondents made points about the perceived adverse knock-on effects of having to perform major infrastructure works on the electricity network. Most comments focused around the **capital costs incurred** and how these were to be funded, with remarks about the possible effects on house prices and a desire for consumer bills not to be impacted. Concerns about the availability of skilled electricians, engineers and other labour, and the disruption caused by infrastructure upgrades (in terms of works and environmental impact) were also raised.

192. Other challenges perceived, each by a significant minority of respondents, were as follows:

- Demand and supply management (dealing with peak demand times, etc.).
- Generation of sufficient electricity to cope with increased demand, because of the future prevalence of electric vehicles.
- Specific issues in electrical provision to rural and remote areas (including poor cost effectiveness in building infrastructure, lack of nearby heat or electrical networks, and the greater prevalence of fuel poverty amongst the rural population).

193. The most frequently cited type of support, suggested by a large minority of respondents, was the **promotion of technologies to mitigate the need for network reinforcement**. A variety of potential energy sources with a focus on domestic (onsite) energy production were put forward in this respect including CHP, hydrogen, electric vehicles (by smart EV charging or new V2G technology), heat pumps incorporating thermal storage units, and ambient heat sources. As the following respondents stated:

“...is currently running a trial installing around 250 heat pumps in homes ... together with thermal storage units. By moving the timing of when heat is generated to low demand periods, thermal storage not only helps reduce the

potential need for local electricity reinforcement but can also absorb surplus renewable generation.” (Energy Sector)

“...there is a major infrastructure challenge inherent to delivering the loads necessary to support electrified heating. This in turn implies major investment and engineering work to ensure the networks are ready, over a significant timeframe. However, the use of onsite generation such as solar PV provides a way to mitigate this. Co-locating electricity supply and demand would mean that zero-carbon heating in new Scottish buildings will be able to draw on electricity produced at the point of use. This would help alleviate pressure on high-voltage networks, reducing the need for heavy engineering, and ensure that existing capacity is used to support the Scottish government’s broader decarbonisation goals as effectively as possible.” (Trade Body – Energy)

194. Similar numbers of respondents thought the best way to alleviate strain on electrical infrastructure was to improve **home energy efficiency to reduce electrical demand**. The construction of Passivhaus or fabric energy-efficient buildings (such that no or little heating is required) was recommended to help achieve this; analysis of data such as heat maps, and modelling of energy use and load requirements was also suggested.
195. Similar numbers of respondents cited the importance of **coordinated working between stakeholders to upscale grid infrastructure and electricity networks**; local authorities, developers, National Grid, utilities, and the Scottish Government were mentioned in this respect. Engagement of, and support for, Distribution Network Owners (e.g. through trials and good planning) was a particular focus of a few respondents. Working to a common strategy with clear targets and timescales was highlighted as being vital, with a suggestion that the government should produce a roadmap in order to facilitate this task.
196. **Funding assistance** was recommended by smaller numbers of respondents, as well as more general support for energy network capacity upgrades including sustainable design, supply chain development and training to increase the number of workers.
197. A significant minority of respondents discussed support and encouragement for District Heating Systems and local heat networks; a standardised or holistic approach was favoured with heat storage being posited as more cost effective than electricity storage.
198. Other potential facilitators for energy networks were put forward, each by significant numbers of respondents, as follows:
- Promotion of, and support for, battery storage (either at large scale or domestically using electric vehicles).
 - Coordination or research help for other new zero carbon technologies, including EC+V charging / V2G and photoelectric cells.

- Smart energy management systems to help with flexibility (e.g. smart charging, smart heat pump control, active distribution network technologies, local smart grid systems).
- Support for lower power-consuming heat pump deployment.
- Support for specified renewable energy producers (e.g. wind, wave, hydrogen, solar PV).

Question 14

199. Question 14 of the consultation went on to ask,

Q14: “How do you see this Standard interacting with wider energy system changes, and what role do you see for flexibility and smart technologies?”

200. 68 respondents, consisting of 63 organisations and 5 individuals, made comments at this question.

201. A majority of comments about how the Standard might interact with wider energy changes centred around concerns about either how the **increased demand for electricity** emanating from new zero carbon infrastructure might overload or otherwise adversely impact network capacity, or the issue of balancing supply and demand at various times of day.

202. A very few respondents cited concerns about the variability of energy production from renewable sources with a resulting need for **energy redistribution**. As one respondent summarised:

“Smart technologies will be essential as the current electrical power networks will have to balance demand/supply during peaks in demand and potential surplus created by Low zero carbon technologies during off peak periods. There is huge opportunity for this however, once again, support and investment is key to the Standard.” (Local Authority)

203. Related comments by a significant minority of respondents cited the **problem of cost issues**, in terms of the necessity of upgrading distribution infrastructure, installing new electrical charging infrastructure, and heat pumps and other increased heating costs incurred by consumers.

204. A significant minority of respondents said that **flexibility was needed** in the Standard to allow for the advent of new technologies, such as CHP, ULEV charging points, and the possibility of hydrogen being pumped through the gas grid making the rule about banning new gas connections redundant.

205. It was perceived by slightly smaller numbers of respondents that the **Standard should overtly link to other regulations or legislation**, with the Energy Efficiency Directive and Performance of Building Regulation specified in this respect along with decarbonisation targets, transport legislation and

planning legislation. Similar numbers of respondents saw a need to align the Standard with the SAP.

206. A large minority of respondents stated that **flexibility and the use of smart technologies would be essential to deal with the increase in electrical demand** and to complement wider system changes. Many examples of new technology were espoused, each purporting to play a role in either mitigating the need for network upgrades or to help balance electrical supply and demand. Some respondents suggested the following:

- Electricity storage / onsite electricity generation (e.g. vehicle to grid charging with electric cars envisaged as part of the storage system for the grid).
- Battery storage.
- Thermal storage; from heat networks (thermal inertia in a residence's heating and hot water systems being hypothesised as being large enough to act as a thermal battery on the grid) with a few mentions of thermal storage from buildings themselves.
- Varying electricity tariffs / Time of Use tariffs to help balance electrical supply and demand.

207. Respondents also cited examples of smart technologies as useful tools in helping the energy system to be flexible; energy smart appliances, smart meters, environment sensors, smart monitoring and smart domestic heat pumps were all quoted in this respect. Very small numbers of respondents suggested other energy-balancing solutions including ground source heat pumps, micro CHP and photovoltaics.

208. A few respondents thought the focus should be on building low energy-use buildings via a fabric energy efficiency or Passivhaus approach.

209. The consultation paper highlighted that consumers have become accustomed to traditional heating systems, and many have had the comfort of knowing that there is a secure supply available at a comparatively low cost. Traditionally, direct electric heating is often perceived to be more complex and expensive to run. As such, the introduction of the Standard will need consumer awareness to be raised.

Question 15

210. Question 15 of the consultation went on to ask,

Q15: 'What can be done to encourage greater consumer awareness and understanding?'

211. 78 respondents, consisting of 71 organisations and 7 individuals, chose to make comments at this question.

212. The overwhelming majority of responses coalesced around the provision of education and information. The highest numbers of respondents, including a majority overall, specified **more education** as being the key to encouraging greater consumer awareness and understanding. Various tools were suggested as means to achieve this including:

- Educating the public (and developers) about decarbonisation, low carbon technologies and how low carbon buildings can be constructed.
- Providing clear instructions (by way of information packs, guides or manuals) as to how to efficiently operate low carbon systems (e.g. heat pumps) in the home.
- Providing an advice helpline.
- Detailing expected costs incurred and potential savings made by installing new systems, with small numbers of respondents recommending the use of real life examples or case studies to detail people's experiences and the real savings made.

213. A large minority of respondents commented more generally about the **benefits of spreading of knowledge and information in terms of climate change and changes to heating systems**. Similar numbers cited the importance of **effective communication campaigns and publicity**, via TV advertising, direct communication channels, from industry, through a variety of media and the targeting of young people – the latter being seen as the most likely grouping to respond positively to change. A few respondents suggested using COP26 as a vehicle for publicity.

214. Smaller numbers of respondents – but still a significant minority - thought that the **Scottish Government should take the main role in raising consumer awareness and understanding**, by pushing climate change higher up the agenda and detailing future actions and regulations. A few respondents emphasised the importance of a **joined up approach between stakeholders** including the government, local authorities, industry, heat suppliers and purchasers of new build properties. A small number of respondents desired a more bottom up approach including an enhanced role for community groups and more grassroots engagement (e.g. holding workshops).

215. The use of **financial incentives** was suggested by a large minority of respondents, in part because of the perceived high costs of new build heat systems, with some comments maintaining that these were currently poorly thought through. A variety of incentives were suggested, including:

- Council tax reductions on energy-efficient A-rated homes.
- Incentives to replace gas boilers.
- A Green Homes Grant.
- Energy-efficiency being a requirement for mortgage lenders.

- Increasing tariffs for peak time energy use.

216. More **training or upskilling of developers and tradespeople** was suggested by a significant minority of respondents, so that they can demonstrate the correct operation of new energy systems to consumers.

217. Other forms of encouragement, mainly in terms of accessing advice, were suggested by very small numbers of respondents.

218. Many of the points raised in consultation responses were also reiterated by individuals who attended the workshop events.

Question 16

219. Question 16 of the consultation went on to ask,

Q16: ‘What approach should be taken when considering new non-domestic buildings, and what are the specific challenges and opportunities relating to new non-domestic buildings?’

220. 68 respondents chose to comment at this question, consisting of 62 organisations and 6 individuals

221. Opinions were split fairly evenly on the approach to be taken with regard to new non-domestic buildings. **The numbers of respondents who thought the standards and principles applied should be broadly similar to those for domestic buildings, was roughly equal to the numbers who perceived they may need altering.** A few respondents thought there should be a more phased process for reduction of emissions or introductions of standards as compared to residential properties, without specifying particular sectors.

222. A very few respondents saw a need for **financial incentives** to facilitate new non-domestic buildings in meeting the standards: revisions to stamp duty, council tax or business rates were suggested as well as the introduction of low interest loans or penalties for non-compliance.

223. The main challenge perceived in relation to new non-domestic buildings (by a large minority of respondents) was their **differing uses**. It was pointed out that the heating, hot water and energy demands of buildings varied a great deal depending on whether the buildings concerned were used for office space, warehousing, leisure, education, etc. Sector specific guidance was therefore suggested as being necessary. In a related point, smaller numbers of respondents pointed out that it would be difficult to apply a single standard to the buildings due to a multitude of different designs. As illustrated below:

“There is a need to understand the complexity of non-domestic building designs, from a large open spaced warehouse, to the requirements of a multi-discipline hospital as well as hotels, schools, prisons and many more types of building. Each type of building requires a different approach to designing the space heating and DHW (Domestic Hot Water) supply. The use of heat pumps for space heating and point of use appliances for DHW is an acceptable solution for smaller buildings, however, when large amounts of domestic hot water are required for hotels, sports halls etc., then the need for large volumes of hot water at a higher temperature will cause issue of supply. In these cases, there is a need for an appliance which can provide large volumes of hot water and this is more suited for a boiler. There is the option of electric boilers, however, the increased electrical load to the building needs to be considered as to whether upgrades to the electric supply are needed, with the extra costs involved.” (Trade Body – Energy)

224. A significant minority of respondents foresaw challenges caused by the **larger scale of non-domestic buildings**. In particular, respondents focused on large heating and hot water demands making heat pumps unsuitable for use in sizeable buildings (albeit there was some disagreement here with small numbers of respondents vouching for the ability of commercially-sized heat pumps being able to meet the requirements of almost any size of building). Concerns about the capacity of electrical networks and the potential to overload existing infrastructure due to the demands of large buildings were voiced by a very few respondents.

225. Other challenges were foreseen by small numbers of respondents as follows:

- Problems arising from occupants of non-domestic buildings, often being tenants, having no vested interest in the operational performance of the buildings in terms of carbon emissions; changing tenants resulting in regular changes in use; or complex building ownership chains.
- Cost implications (e.g. given the bespoke construction of new non-domestic builds).
- Split responsibility (in some cases) for the installation and / or operation of heating systems.

226. The most frequently discussed opportunity afforded by non-domestic buildings, as mentioned by a significant minority of respondents, was the **potential to act as good baseloads, generation modes or heat sinks for District Heating Systems or other heat networks or sources of heat** (e.g. heat recovery). An important role in local heat and energy flexibility was thus envisaged. Small numbers of respondents proposed using non-domestic buildings as important anchor loads or as providing economies of scale (e.g. via their large roof areas) for other net zero infrastructure such as solar panels and community solar schemes.

227. Significant minorities of respondents saw value in **using new non-domestic buildings as case studies** in order to demonstrate new designs,

help upskill designers and installers and generally encourage new heat system take up. To this end they could play an important role in progressing net zero technologies such as hydrogen (replacing gas supply), air source heat pumps, bioLPG, LPG, hybrid systems and battery storage.

228. A significant minority of respondents viewed Passivhaus standards as being commercially possible to integrate into a wide range of non-domestic buildings.

229. A workshop was held among individuals within the non-domestic sector and similar themes to those seen above emerged in relation to non-domestic buildings. Other issues raised by workshop attendees included reference to:

- Covid19 ventilation requirements and the need to take these into account.
- A potential lack of skills within this sector; also a lack of capacity.
- A lack of clarity over incentives, for example, for the development of different technologies. One respondent also requested an RHI replacement.
- A need to hold contractors to design targets.
- The need to get buy-in across the industry and consumers, along with increased understanding and awareness.

Question 17

230. The final question in the consultation focused on the challenges or opportunities for households on low incomes and asked,

Q17: “By introducing this Standard, what challenges or opportunities might result for households on low incomes (for example, around affordability or access), and how can the Scottish Government best take account of these?”

231. 65 respondents chose to comment on this question, consisting of 62 organisations and 3 individuals.

232. Challenges and opportunities were voiced in equal measure regarding the impact of the Standard on low income households. Two worries in particular were pinpointed, both by significant minorities of respondents: firstly, **concerns about increased energy costs and bills with the resulting negative impact on affordability of energy**. It was pointed out in this respect that electricity’s running costs are currently more expensive than those of gas or ground source heat pumps – the latter perceived by one trade body respondent as being 3 or 4 times cheaper to run than direct electric heating, albeit with installation costs which are expected to be paid by the consumer and with limited application depending on ground space availability. Secondly, related points were made about the **negative effects**

of fuel poverty, in terms of encouraging inappropriate heating sources as these are cheaper, and the lack of access to new build properties by the fuel poor.

233. Other challenges postulated by small numbers of respondents were the possibility of **higher rents and other property costs** (e.g. as a result of landlords trying to cover their capital outlay on clean energy, or as a result of a hypothesised raise in council tax on new builds).
234. However, a majority of respondents foresaw that **lower energy use in housing would be a major benefit for low income households**. Greater efficiency was visualised as resulting in a reduction of costs, no future retrofitting being necessary and a reduction in fuel poverty as long as standards are implemented effectively. Additional points were made by small numbers of respondents about access to cheaper renewable energy reducing energy bills, and the perceived low running costs of ground source heat pumps. Passivhaus standards were also advocated as a means of reducing energy spend.
235. Other advantages cited for low income households by small numbers of respondents were an **improvement in health standards** (due to better air quality and thermal comfort) and the possibility of **local community ownership** via local heat networks or systems.
236. A variety of suggestions were made as to how the Scottish Government could take account of the challenges and opportunities facing low income households. The greatest numbers of respondents – a significant minority – saw the need for **protection of the most vulnerable** (e.g. social tenants) by means of policy drivers and /or financial support or subsidies. Low cost tariffs for those on benefits were specified by a very few respondents. Respondents also commented on a **perceived need to reduce the current imbalance in fuel pricing** (in terms of electricity versus gas) as a means to help ensure that no new heating system costs more than current systems. Several respondents suggested a change in environmental and social levies is required in order to achieve this, given perceptions that they do not reflect relative fuel emissions (i.e. promoting gas over electricity).
237. Similar numbers were in favour of **supporting customers with technology use and educating consumers**; keeping technology controls simple, handover packs, efficiency advice and remote monitoring for corrective advice were the various tools suggested to this end. A few respondents saw a need for helping people know what support is available, with suggestions that there should be a role for Home Energy Scotland in this respect.
238. Slightly smaller numbers reiterated that it would help if **developers were allowed flexibility to meet the Standard using various technologies** including: hydrogen, PV battery, solar, BioLPG, liquid fuels,

DHS, battery storage and Mechanical Ventilation Heat Recovery (MVHR). Similar numbers of respondents desired a fabric energy efficiency approach to be prioritised.

239. A few respondents desired a more joined up approach between policies, in particular between the fuel poverty strategy, the Standard, and environmental, energy and building regulations.

240. Tackling the capital costs of new installations was deemed a priority by a very few respondents.

APPENDIX 1: Respondent Organisations

Aberdeen City Council
Aberdeen Climate Action Group
Architects Climate Action Network (ACAN) Scotland
AvantiGas Ltd
Balcas Timber Limited
Barratt Developments PLC
BEAMA Ltd
Building Products Distributors Ltd
Calor Gas
Chartered Institute of Architectural Technologists
Chartered Institute of Housing Scotland
Citizens Advice Scotland
City of Edinburgh Council
Coast2Coast Architects
Community Energy Scotland
Danish Government
Development Services, Falkirk Council
Dumfries and Galloway Council
E.ON
East Ayrshire Council
East Dunbartonshire Council
EdF Energy
Elmhurst Energy
Energy and Utilities Alliance (EUA)
Energy Saving Trust
Existing Homes Alliance Scotland
Fife Communities Climate Action Network
Glasgow City Council
Ground Source Heat Pump Association
Hadden Homes
Heat Pump Association
Heat Pump Federation
Historic Environment Scotland
Homes for Scotland
Independent Networks Association (INA)
Kincardine Estate
Kingspan Insulation
LandEnergy Girvan Ltd

Last Mile Infrastructure
Liquid Gas UK
MCS Charitable Foundation and MCS Service Company Ltd (MCS Certified)
Mitsubishi
National House-Building Council (NHBC)
NIBE Energy Systems UK
North Ayrshire Council
North Lanarkshire Council
Oil Firing Technical Association (OFTEC)
Osprey Housing
Paper Igloo Ltd.
Perth & Kinross Council
Power Circle Projects Ltd
Quidos Ltd
Royal Incorporation of Architects in Scotland
Rural and Islands Housing Association Forum
Scottish Borders Council
Scottish Ecological Design Association
Scottish Federation of Housing Associations
Scottish Land & Estates (SLE)
Scottish Property Federation
Scottish Renewables
Scottish Water
SGN
Shetland Islands Council
Solar Energy Scotland
South Lanarkshire Council
Stewart Milne Group
Sunamp Ltd
Sustainable Cupar
Sustainable Energy Association
The Association for Decentralised Energy
The Energy Poverty Research initiative, 100% Renewable UK, & Common Weal (joint response)
The Kensa Group
The National Trust for Scotland
The UK and Ireland Fuel Distributors Association (UKIFDA)
Troup Bywaters + Anders
University of Edinburgh (Social Responsibility and Sustainability/Estates)
Vaillant Group UK LTD
Vattenfall Heat UK

Vent-Axia

Volution Group plc

West Dunbartonshire Council and Strategic Housing Partners

West Lothian Tenants Housing Network

Worcester Bosch

APPENDIX 2: Summary of responses to Consultation Questions

The following paragraphs summarise the main findings from each of the consultation questions.

Main Findings: Outcomes (Q1 & Q2)

There was widespread agreement with the key outcomes as outlined in the scoping consultation. Key issues raised were for the Standard to be flexible, technology agnostic and make use of all existing (and emerging) technologies, so that heating solutions can meet varying needs.

The need for a fabric-first, or whole building approach was cited, so that heating demand and controls are not considered in isolation. This approach is perceived to help reduce fuel poverty, exposure to volatile energy prices and energy demand. There were some concerns over the cost of electricity in comparison to gas. The issue of geography was raised by some respondents in that some technologies may not be financially or logistically viable in rural areas. While electricity was seen to be a key heating source, it can be expensive and there were references of the need to reduce fuel poverty rather than increase it.

There were comments on a need for reliability of supply, a robust supply chain and training, retraining and upskilling to ensure there is a skilled workforce, with some suggestions for apprenticeships to be offered in order to attract new entrants to the sector. A number of references were also made for the need for collaboration and shared responsibilities across all relevant trade bodies, key industry groups, professional organisations and supply chains.

There was widespread agreement of a need to increase awareness, inform and educate consumers, with some suggestions for awareness campaigns about new green homes, the role of different technologies and the provision of assurances on the reliability of alternative heat sources. In turn, it was perceived that this would help to bring about the necessary behaviour change among consumers.

Main findings: The Standard (Qs3-10)

There was widespread agreement with limiting this Standard to 'new buildings' as defined within section 2.2 of the scoping consultation, although there was significant reference of a need for a similar approach to the existing building stock so as to address issues of climate change and fuel poverty.

Some respondents had concerns over the inclusion of conversions within this definition, as some can be complex and may need specialist retrofits depending on the age and fabric of a building. There was a perception from some that modern

standards cannot always be applied on a like-for-like basis to existing properties under conversion. Allied to this, there were some requests on clear guidance as to which types of building will be included in the Standard or for renovations and conversions to be clearly defined.

When asked to state their agreement with the approach taken to require future installed heating systems to be zero direct emissions only and the approach taken to focus on direct / point of use emissions that a building owner has responsibility over only (Q4), higher numbers of respondents supported these approaches than did not. The key comment made was of a need for the Standard to be technology agnostic because a range of low carbon heat options would be needed to meet the demands of different building types. Some respondents noted their support for specific technologies, although there were also concerns about the embodied carbon in heating systems and the need to take this into account. A key concern was that this approach would not be suitable in rural settings, given the need for high density developments; allied to this, there were also some concerns over a lack of choice for consumers.

When asked what evidence could be offered on ways of ensuring zero direct emissions from heating that could be compliant with this Standard (Q5), a key theme was of the need to be technology agnostic and consider all available technology options. Specific support was noted for heat pumps, heat networks, electricity, hydrogen and solar PV. A significant number of respondents also focused on ways in which compliance could be enforced, with references to some form of certification or quality assurance scheme, such as Passivhaus, SAP, RdSAP or SBEM. Linked to this, there were calls for monitoring and evaluation so that compliance has to be demonstrated.

The consultation paper asked for views on two specific approaches that could be adopted to ensure compliance with the Standard (continuing with an existing methodology and – potentially – change the emissions factors to reflect a ‘direct emissions’ rating for different technologies; or creating an easily understood and enforceable stipulation about the types of heating systems that would be permissible under the new Standard) (Q6). Views were relatively split, with slightly more respondents supporting the latter approach as this would be the simplest option, easier to enforce and offer clarity to the supply chain. There were some requests for a definitive list of compliant technologies, albeit there would be a need for flexibility so as to include new technologies as they emerge. Regardless of preference, respondents requested clear guidance to be provided and noted a need for consistency across Scotland.

A number of steps were outlined as ways in which Scottish Government could support industry to deliver this Standard (Q7). These included; financial/fiscal support, engagement and collaboration, education and training, compliance mechanisms, timescales, the provision of guidance and the listing of compliant technologies.

When asked how the Scottish Government could ensure that consumers are protected from increased energy bills, while giving developers flexibility to comply with the Standard (Q8), the key theme that emerged was of a need for a fabric first approach as this would allow for high energy efficiency levels and ensure homes have low energy demand and thereby minimise energy costs to consumers. There were also some references of a need to ensure that consumers understand the technology options available. The option of offering financial incentives for consumers was raised by some respondents. Some respondents felt that developers need to understand their responsibilities and should be prevented from installing heating products with more expensive heating costs simply because they are cheaper to install.

There was broad support for new buildings connecting to an existing heat network, where development takes place within a heat network zone (Q9), albeit a key concern was that this approach is not economically viable in all situations and could lead to higher consumer energy costs and higher levels of fuel poverty. In relation to existing heat networks, there were some concerns that they will need to have spare capacity or there may be a potential lack of capacity to expand existing networks.

Views were split on the Scottish Government's proposal to introduce this Standard in 2024, and on being brought into force for new buildings consented earlier than 2024. A significant minority was supportive of the 2024 date, although there were some comments of a need to encourage developers to adopt the Standard earlier. A smaller number of respondents felt that 2024 is not realistically achievable, and noted concerns over a lack of a robust supply chain and skilled workforce. There were some references of a need for a phased implementation and / or the need for this to align with wider UK policy. Regardless of views on the 2024 date, there were some calls for clarity in the definitions used and for a clear roadmap.

Main Findings: Developing skills and supply chain capacity (Qs11-17)

When asked to outline ways in which opportunities can be maximised for the supply chain involved in the delivery of new homes (Q11), a large number of respondents focused on the need for skills and training for the workforce, with suggestions for investment and other forms of support being made. A large minority of respondents also asked for clarity regarding the Standard's regulations and framework and for collaboration, communication and joint working between stakeholders.

Key challenges envisaged for developers and the wider building industry in meeting the proposed Standard (Q12), were cost issues, the lack of availability of expertise and skills among the workforce, product supply and a perception of conservatism and resistance to change in the building sector culture; as well as timescales and the economic viability of work needed to reinforce the electricity network infrastructure in order to support energy growth.

Key challenges outlined for the energy networks in the deployment of zero emissions heating in new developments (Q13), included the impact of additional

demand on the grid and a lack of network capacity at a local level and the capital costs rectifying this would incur. The most frequently cited type of support was the promotion of technologies to mitigate the need for network reinforcement, with a variety of potential energy sources being cited.

Ways in which the Standard could interact with wider energy system changes (Q14) focused on an increased demand for electricity, and the costs associated with upgrading the infrastructure. Once again, there were references to a need for flexibility to allow for a range of technologies to be used. The role for flexibility and smart technologies was seen to be essential to deal with the increase in electrical demand.

Education was seen as being essential to encourage greater consumer awareness and understanding (Q15), alongside effective communication campaigns and publicity. This was perceived to be a key role for the Scottish Government, albeit there was also a need to ensure a joined up approach across stakeholders. There were also some suggestions for offering financial incentives; as well as for training and upskilling of developers and tradespeople so that they can demonstrate the correct operation of new energy systems to consumers.

When asked what approach should be taken when considering non-domestic buildings, and what are the specific challenges and opportunities relating to new non-domestic buildings (Q16), respondents were split roughly equally on whether the standards and principles should be broadly similar to those for domestic buildings, or whether they need altering. The main perceived challenges were in their differing uses and the larger scale of non-domestic buildings. Opportunities identified by respondents included the potential to act as baseloads, generation modes or heat sinks for district heating systems; there were also suggestions to use non-domestic buildings as case studies.

The final question (Q17) asked what challenges or opportunities might result for households on low income and how the Scottish Government can best take account of these. Two key challenges were concerns over increased energy costs and the negative impacts of fuel poverty. A key opportunity could be lower energy use in housing. Suggestions for ways in which the Scottish Government could best take account of these were in protection of the most vulnerable via policy drivers and / or financial support or subsidies, although there were also references of a need to reduce the current imbalance in fuel pricing. Again, there were references to the need for educating consumers or for developers being allowed flexibility in the technologies used.

APPENDIX 3: Bibliography

Below is a list of references made by respondents in their responses. Some links were provided which have since lapsed, but have been left in for completeness – these are highlighted in red.

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