

# **Scottish Building Regulations: Proposed Changes to Energy Standards Including Ventilation, Overheating and Electric Vehicle Charging Provision**

**Consultation analysis report**

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# Executive Summary

## Background

The Scottish Government's 'Heat in Buildings Strategy' (2021)<sup>1</sup> sets out its vision for decarbonising heat and reducing energy demand across all buildings in Scotland, setting out the scale of the investment opportunity and supporting our green recovery from the Covid-19 pandemic.

Reviews of the energy standards within building regulations undertaken in 2002, 2007, 2010 and most recently in October 2015 has resulted in a stepped reduction in carbon emissions associated with the use of new buildings.

This consultation sought to deliver further improvement to the energy efficiency of new buildings and new building work, in line with the Scottish Government's wider net zero ambitions. It also sought views on additional areas: ventilation; overheating risk; compliance and electric vehicle charging.

Seven draft guidance documents were issued in support of the consultation.

The consultation opened 26<sup>th</sup> July 2021 and closed on 28<sup>th</sup> November 2021. The consultation was originally due to close on 29<sup>th</sup> October 2021, but the deadline was extended in response to requests from key stakeholders.

The consultation paper included 79 questions, the majority of which were closed questions. Respondents were also asked to add commentary to provide context to their answers. There was no word or page limit, enabling respondents to provide as much detail as they chose. In total, 176 responses to the consultation were received, via an online survey hosted on the platform 'Citizen Space'. Most of the responses (89%) were received from organisations and the remainder (11%) from individuals. Most of the respondents were 'industry associations/manufacturers' (24%) followed by 'contractor/developer' (14%). The base number of responses varies by question.

The response to the consultation was generally positive. Key messages are presented below, grouped by the separate parts of the consultation.

## Overview: Part 2 – Energy, new buildings

This section of the consultation covered the process of demonstrating compliance of a new building with standard 6.1 of Building Regulations via the application of the SAP or SBEM calculation methodology. It addressed the process of setting and meeting performance targets under that standard.

### Key messages: Energy, new buildings

There is strong support for the introduction of an energy target for new buildings in addition to current emissions targets, notably for a primary energy target. This is underpinned by strong emphasis on the adoption of a fabric first approach. However, it was also noted that basing the target on a SAP will be strongly reliant on the provision of adequate SAP software to calculate and cost effectively.

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<sup>1</sup> [Heat in Buildings Strategy - achieving net zero emissions in Scotland's buildings \(2021\)](#)

There is clear support for an uplift to the 2015 standard for new dwellings, with slightly more respondents (42%) in favour of Option 2 – an ‘advanced’ standard equating to a 57% emissions reduction than those respondents in favour of Option 1 (38%) – an ‘improved’ standard equating to a 32% emissions reduction.

The improved standard is considered to be adequate and more achievable than the advanced standard. Those in support of the advanced standard welcome the concept of a ‘more aggressive’ target to tackle climate change and a transition towards low and zero carbon. However, some concerns were flagged in relation to capacity to achieve an advanced standard, which on a positive note was deemed ambitious, but on the basis of that ambition, potentially unviable.

There is strong support for the overarching concept of an uplift to the 2015 standard for new non-domestic buildings. Nearly two-thirds of respondents (63%) support a ‘high’ standard, equating to 25% emissions reduction. A fifth of respondents are in support of a ‘medium’ standard, equating to 16% emissions reduction. More respondents are in favour of the high standard as they deem it to be achievable, while remaining an ambitious target. Again, the importance of a fabric first approach is emphasised.

A range of comments were made about values identified for the elements which make up the Domestic Notional Building Specification. These mostly relate to meeting the proposed values in practice and any unintended consequences of doing so. More time was requested to both develop and test technical solutions to address the challenges.

In relation to the values identified for the elements which make up the Non-domestic Notional Building Specification, most considerations related to glazing, with some concerns flagged around the achievability of the proposed changes in the timescales. However, it was also suggested that the proposed standards were not sufficiently ambitious and could go further, i.e., there is a lack of consensus.

Respondents in support of a simplified two-specification approach to defining the domestic notional building point to increased flexibility and a transition away from fossil fuel heating systems. Many respondents found it difficult to comment, stating that this was because of perceived issues they associate with the currently available SAP software.

There is also support for the simplified two-specification approach for non-domestic notional buildings. Where respondents were not in favour, several reasons were cited including a preference for all buildings to be assessed against the same heating systems.

In relation to the proposal to provide a more demand-based approach to assignment of domestic hot water heating within the non-domestic notional building specification, there is support on the basis that this is appropriate where there is low demand. More clarity is requested on water consumption figures.

There is strong support for a change in the application of targets for supplied heat connections for new buildings, with 86% of respondents in favour.



The vast majority of respondents (81%) agree that benefits from on-site generation within the compliance calculation should be limited by a practical assessment of the extent that generated energy can be used on site. Over half of the respondents (55%) report no concerns about the approach to limited benefit from on-site generation of power, with regard to particular technologies or solutions.

Nearly two-thirds of respondents (61%) agree with a proposed approach for new buildings to be exempt from the need for a calculation to demonstrate compliance with the Target Emissions Rate - where heat demand is met only by 'zero direct emissions' sources. Those in support of the proposal commonly refer to benefits they perceive from simplification of the design and assessment processes.

There is clear support for the need for new buildings to be designed to enable future adaptation relating to use of zero direct emissions heat sources (where not initially installed), with 81% of respondents agreeing. There is a desire for clarity as to what exactly constitutes simple future adaptation, which would help to inform the type and level of detail of information required to be made available to homeowners seeking to action the change.

Substantial support (91% of respondents in agreement) was expressed for the proposal to retain the current elemental approach to setting minimum standards for fabric performance in new dwellings. Where required, there will be an option to take an alternative approach via calculation of the total space heating demand for the dwelling. Those in support commonly refer to simplicity, flexibility, and familiarity in terms of their reasoning.

Respondents were asked to make comments on the maximum U-values proposed for elements of fabric, in relation to their level of challenge and achievability at a national level. The availability of products, product development and potential related safety issues were flagged in response. Specific concerns were raised on behalf of the aluminium fenestration industry and in relation to the requirements for windows and doors and, triple glazing.

There is considerable support for the proposal to move to airtightness testing of all new dwellings, by registered members of an appropriate testing organisation (86% of respondents in agreement).

There is also substantial support for the adoption of CIBSE TM23 as the basis for airtightness testing in Scotland (93% of respondents in agreement). Many comments highlight that it would be practical for Scotland to adopt the same principles and standards to align with the rest of the UK.

There is strong support for the introduction of the pulse test method of airtightness testing as a further means to testing and reporting on the performance of new buildings, with 83% of respondents in agreement. Again, respondents pointed to the advantages of a consistent approach across the UK.

Respondents were asked to comment on the amended provision for modular buildings (non-domestic). The majority of respondents (89%) state they believe that this provides an appropriate balance between multiple requirements relating to

improvement of building energy performance, reuse of modular elements and use of small units for short-term use at short notice.

### **Overview: Part 3 – Energy, all buildings**

This section of the consultation introduced proposed changes to provisions which apply to new buildings and to new work to existing buildings. This included proposals for improved minimum standards for building fabric and a simplification of how these are applied across new and existing buildings.

#### **Key messages: Energy, all buildings**

There is clear support for the proposed introduction of the term ‘major renovation’ as further means of identifying when aspects of building regulations should apply to existing buildings – 89% of respondents are in agreement, stating renovation is an appropriate point to consider what types of energy performance improvements can be made.

The proposed improvement in maximum U-values for elements of building fabric for domestic buildings is supported by 70% of respondents. Most respondents emphasise the need for fabric first approach as a critical enabler in reducing greenhouse emissions.

There is also strong support for this proposal in relation to non-domestic buildings (80% of respondents in favour). Respondents note that non-domestic and domestic standards should be similar. Although some respondents note that proposed U-values are ambitious, they believe them to be achievable in light of current technology and skills.

There is considerable support for the standardisation of values and approach for conversions, extensions, and shell buildings (81% of respondents in favour). Respondent comments refer to such standardisation as sensible, providing clarity and a better understanding of requirements.

Respondents were asked to comment on the presentation of information on compliance of building services. Nearly half (44% of respondents) express a preference for re-integration of guidance into the relevant standard. Around a quarter of respondents (24%) suggest Compliance Guides should move to Section 6 as an Annex. Just over a fifth of respondents (22%) propose retention of separate Compliance Guides. While there is no one clear consensus on the presentation, there is a common desire for having information easily accessible from the same place.

There is very strong support for continued alignment of minimum provisions for fixed building services at a UK level within the Domestic Building Services Compliance Guide (92% of respondents in agreement).

There is further support for changes to the Non-domestic Building Services Compliance Guidance (89% of respondents agree with proposed changes).

Support was also expressed for the proposal to limit distribution temperatures in wet central heating systems to support effective implementation of low and zero carbon

heat solutions and optimise the efficiency of heat generation and use. Respondents described this as a sensible approach, given its scope to provide energy and cost savings - with 88% of respondents in agreement with the proposal.

The majority of respondents support extension of provision of self-regulating devices to include installation (where absent) at the point a heat generator is replaced. Respondents described these measures as reasonable and proportionate, with 94% of respondents in favour.

There is further support for the proposal to introduce a requirement for building automation control systems, of the type specified, in larger non-domestic buildings with systems with an effective rated output over 290 kW. Most respondents felt this could result in greater energy efficiency, user benefits and cost savings (87% of respondents in agreement). It should be noted that there was notable divergence on the 290 kW threshold, with questions raised as to how the threshold had been determined and why it was high.

## **Overview: Part 4 - Ventilation**

Following the commissioning of research into the impact of previous 2015 ventilation amendments to ventilation standards for new homes in 2021, it is the intent of BSD to undertake a fuller review of ventilation provision for both domestic and non-domestic buildings from 2022. Accordingly, changes proposed are focused on domestic ventilation and are limited to those which are considered to be directly relevant to the introduction of improved energy standards or (in response to published research) can better address the delivery of expected levels of ventilation and good indoor air quality.

### **Key messages – ventilation**

There is considerable support for proposed revisions to presentations of guidance on ventilation and incorporation of the 'domestic ventilation guide' into the Technical Handbooks. Respondents note that this will provide greater clarity with improved accessibility and awareness (93% of respondents in favour).

There is also very strong support to revise guidance in order to clarify the function of purge ventilation and increase provision to align with that applied elsewhere in the UK. Respondents believe alignment with the rest of the UK would enhance simplification and reduce confusion (97% of respondents in favour of the proposal).

Three-quarters of respondents agreed with reference to a single option for continuous mechanical extract ventilation which can have centralised or decentralised fans, with the same design parameters being applied to the system in each case. There is further support for proposed guidance on default minimum size of background ventilator for continuous mechanical extract systems (89% of respondents in agreement).

Nearly two-thirds (60%) of respondents agree that continuous mechanical extract systems be considered a viable solution in very low infiltration dwellings. Most respondents felt this would be a viable option for low infiltration dwellings.

Respondents who did not agree most commonly pointed to the consequences of failure when reliant on a single fan.

Seventy per cent of respondents were in favour of mandating heat recovery systems, pointing to benefits of a reduction in energy consumption and subsequent carbon emissions.

There is overwhelming support for the proposed incorporation of a revised version of the current 'domestic ventilation guide' as an annex to section 3 (environment) of the Domestic Technical Handbook (95% of respondents in agreement). Respondents emphasised the need for documents to be electronic, fully indexed and referenced.

Respondents invited to provide additional comments referred to the necessity to harmonise energy and ventilation standards.

## **Overview: Part 5 – Overheating risk in new dwellings and other new residential buildings**

In the consultation document, the BSD proposed that any new provision to assess and mitigate against the risk of summertime overheating should apply to all new dwellings, subject to the application of a set of trigger criterion that determine the need to consider the design and specification of the dwelling further to mitigate such risk.

It was also proposed that the same assessment be applied to non-domestic residential buildings where the built form and occupancy is similar to dwellings (e.g., self-contained student flats accessed off a common area).

Key messages – Overheating risk in new dwellings and other new residential buildings

The majority of respondents (85%) agree with the proposed introduction of a requirement to assess and mitigate summertime overheating risk in new homes and new non-domestic residential buildings offering similar accommodation. The main reason cited was climate change, with many respondents also flagging risks to health and welfare associated with overheating.

There is very strong support (96% of respondents in agreement) for an initial assessment of dwelling characteristics to be undertaken to help inform design choices and the delivery of new homes which provide better thermal comfort in the summer months.

Respondents broadly agree with assessment proposals as a suitable means of mitigating summertime overheating in new homes through prescriptive actions. Overheating risks are clearly a key consideration, 79% of respondents agree with the proposal.

Respondents were asked whether the proposed standard and guidance will provide adequate assurance that ventilation measures provided to mitigate summer overheating can be used safely and conveniently in practice. While the majority of respondents (83%) stated their agreement, a number of factors were cited that might limit the extent to which building occupants use the mitigation measures.

## **Overview: Part 6 – Improving and demonstrating compliance**

In late 2019, BSD commissioned a short research project to assist in understanding the issues that arise in the delivery of low energy buildings and how greater assurance of process could be delivered, focusing primarily on building fabric issues. The output of the project was not intended to be a guide for designers and contractors but to inform the later development of such a resource.

BSD stated its intention in the consultation to progress this agenda, extending scope to include the design, installation, and commissioning of building services, in the context of the Compliance Plan approach. BSD will commission the development of a 'compliance manual' to support effective delivery of compliance with Section 6 (energy) in a format which would be compatible with the Compliance Plan approach and supporting core guidance.

### **Key messages – Improving and demonstrating compliance**

Respondents gave details of processes for National House Building Council (NHBC), Passivhaus and the Structural Timber Association, alongside references to technical guidance documents, that they felt would be useful for the development of a Compliance Plan manual. Respondents broadly acknowledged difficulties associated with assurance of compliance, and made further reference to the need for competence and skills requirements for various roles involved in the compliance process, from Compliance Manager to tradespeople.

## **Overview: Part 7 – Electric vehicle charging infrastructure**

The Scottish Government is committed to the decarbonisation of transport and with demand for Electric Vehicles (EVs) expected to grow rapidly, enabling people to switch to zero emission vehicles, will require ready access to convenient and reliable EV charging infrastructure.

This part of the consultation sought views on the Scottish Government's preferred policy options relating to the installation of EV charge points and enabling infrastructure (namely accessible trunking, conduits, or cable trays for electricity cabling) to facilitate the future installation of EV charge points in the car parks of residential and non-residential buildings.

### **Key messages – Electric vehicle charging infrastructure**

Overall, respondents were supportive of the proposals to enable the installation of electric vehicle (EV) charge points and ducting infrastructure (to facilitate the future installation of EV charge points) for parking spaces in new residential and non-residential buildings parking. However, concerns were cited in relation to the costs of installation of the charging points and associated infrastructure.

Respondents are largely positive about preferred options for EV provision in new and existing buildings, but there are concerns as to the level of ambition of the proposal, with costs again being the primary issue. Respondents questioned who will be liable for upfront and future maintenance costs. Most respondents requested more detail and clarification as to how the preferred options would operate in practice.

There is clear support for the Scottish Government's preferred options for the exemptions as set out in section 7.6.1 (82% of respondents in agreement). Again, however, respondents are seeking greater clarification as to how this would work in practice, as is also the case for the preferred option relating to existing non-residential buildings with car parks with more than 20 spaces.

Overall, respondents are supportive of proposed provision for charge points for accessible parking spaces.

Final comments in relation to EV charging provision re-iterated questions raised about costs, notably a lack of clarity as to what the costs would be and liability for payment.

# 1 Introduction

Scottish building regulations set minimum standards applicable to new buildings and to new work to existing buildings.

The Scottish Government's 'Heat in Buildings Strategy' (2021)<sup>2</sup> sets out its vision for decarbonising heat and reducing energy demand across all buildings in Scotland, setting out the scale of the investment opportunity and supporting our green recovery from the Covid-19 pandemic.

Reviews of the energy standards within building regulations undertaken in 2002, 2007, 2010 and most recently in October 2015 has resulted in a stepped reduction in carbon emissions associated with the use of new buildings.

This consultation sought to deliver further improvement to the energy efficiency of new buildings and new building work, in line with the Scottish Government's wider net zero ambitions.

It considered changes to the energy standards that will further improve the energy performance of all new buildings. Proposals (for mid-2022) also addressed consequential changes to ventilation provision arising from improved energy standards, set out plans for assessment and mitigation of overheating risk in new dwellings and residential buildings, improved compliance with energy standards and sought views on separate proposals (for later implementation) for electric vehicle charging provision in new buildings and those subject to major renovation.

Seven draft guidance documents were issued in support of the consultation which were available for download via links in the consultation document or on the consultation webpage.

The consultation opened on 26<sup>th</sup> July 2021 and closed on 28<sup>th</sup> November 2021. The consultation was originally due to close on 29<sup>th</sup> October 2021, but the deadline was extended in response to requests from key stakeholders.

The consultation paper included 79 questions, the majority of which were closed questions. Respondents were also asked to add commentary to provide context to their answers. There was no word or page limit, enabling respondents to provide as much detail as they chose. Harlow Consulting was commissioned to independently analyse all of the responses to the consultation.

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<sup>2</sup> [Heat in Buildings Strategy - achieving net zero emissions in Scotland's buildings \(2021\)](#)

## 2 Methodology and respondent profile

### 2.1.1 Methodology

In total, 176 responses to the consultation were received.

All responses were checked for duplicates: one duplicate was identified and removed before analysis was undertaken.

Qualitative analysis of open questions was undertaken manually, with responses coded to identify the main themes for reporting. All responses to the open questions were weighted equally in the analysis. This report presents the main themes evident in the responses to each question, together with the number of respondents raising each respective theme. The following convention has been used to indicate the frequency of particular themes:

- Few: up to three responses
- Several: four to nine responses
- Many: 10 or more responses

Closed questions were analysed using SNAP software and reported by respondent type (organisation type and 'individual'). A profile of respondents is provided in section 2.3.

### 2.1.2 Campaign responses

Identical responses were checked, and 'standard' and 'non-standard' responses were identified.

- **Standard campaign responses** were counted, and the numbers reported and all but one response excluded from the master database for analysis. This report includes one standard campaign response. A standard campaign response is where all responses are identical.
- **Non-standard campaign responses** were counted, and numbers reported but **all** non-standard campaign responses are included in the master database for analysis. This report includes one non-standard campaign response. Non-standard campaign responses are similar, but not identical.

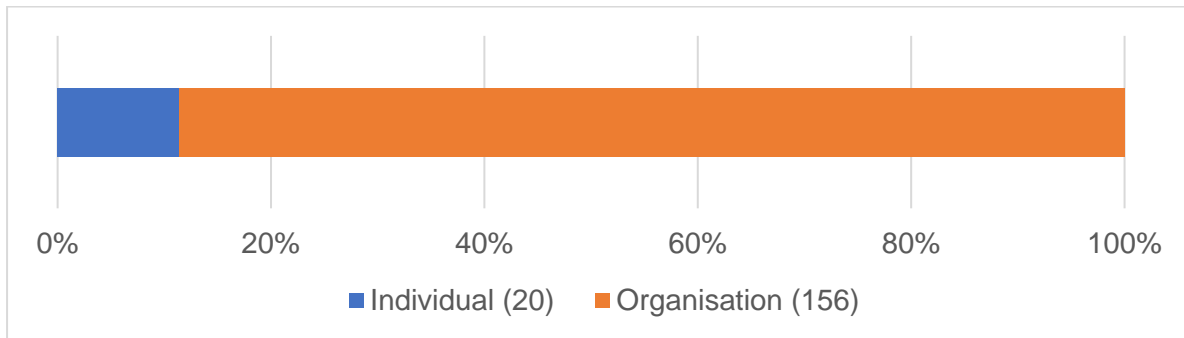
### 2.1.3 Respondents

One hundred and forty-two of the responses were received via the government consultation platform 'Citizen Space'. Thirty-four additional responses were received via ministerial correspondence and emails. These were inputted manually into Citizen Space. The Scottish Government received, acknowledged, and logged all written responses.

'Individuals' account for 11% of the total respondents, and 89% were organisations (Figure 1).



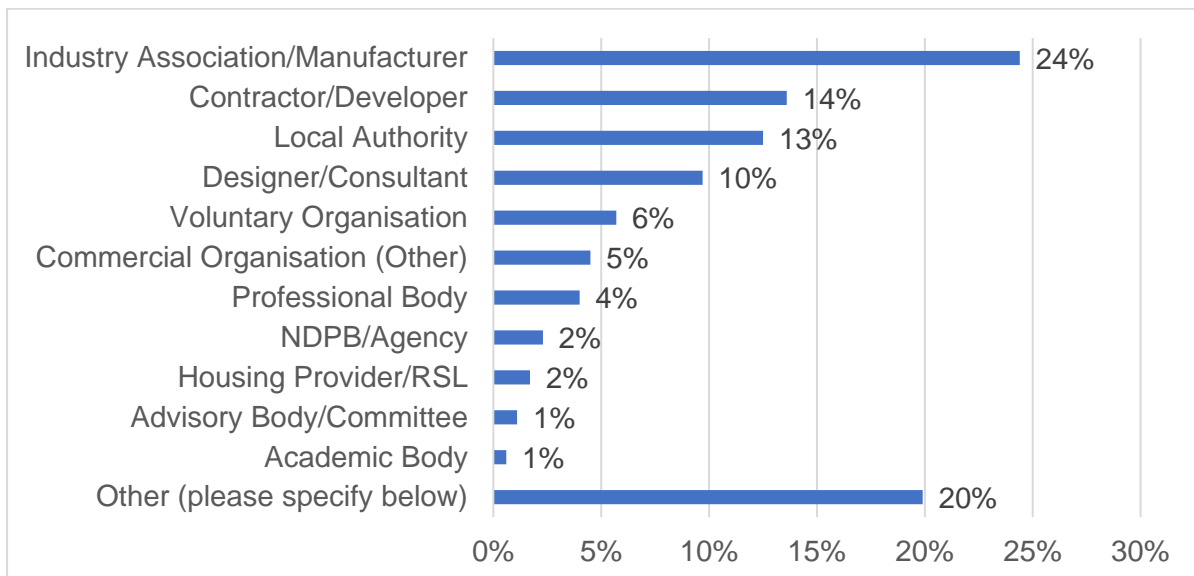
Figure 1: Respondent profile: individual or organisation



Base: 176 respondents

The types of organisations that responded to the survey are illustrated in Figure 2. Industry Association/Manufacturer was the most common type of organisation to respond, followed by Contractor/Developer.

Figure 2: Respondent profile – organisation type



Base: 176 respondents

Note: individuals are double counted in the respondent profile above as, within the questionnaire, individuals responding were asked to select an organisation type. All 20 individuals who responded to the consultation answered the question: ‘If responding on behalf of an organisation please select the most relevant type of organisation from the list below’.

Of these 20 individuals, 13 selected ‘other’, four selected ‘designer/consultant’, and one each selected ‘local authority’, ‘voluntary organisation’ and ‘academic body’.

Of the 22 organisations who selected ‘other’ the responses included:

- Charities
- A ‘collaboration between Local Authority, Academic Body, Housing Provider/RSL & Contractor/Developer’

- Landowner
- Competent person scheme
- Advocacy organisation
- Fire and Rescue Service
- Independent Chairman and Technical Committee Chairman
- Industry Trade Federation
- Membership Body
- Non-governmental organisation (NGO)
- Professional Body, Industry association/manufacturer and Advisory body/committee
- Regulated electricity network
- Trade Body or Association

This report presents a full numerical description of the types of responses received, confirming total number of responses received and numbers by different categories of response. This includes the total number of responses by individuals, by organisations and combined total number of campaign responses (including how many responses were received per campaign).

Responses from 'individuals' are also counted amongst some organisation types. Base numbers beneath charts include all respondents, regardless of whether they are from an individual, or from an organisation.

#### **2.1.4 Satisfaction with the consultation**

Overall, respondents were satisfied with the consultation, with 58% stating they were either 'very satisfied' or 'slightly satisfied'. Just under a third (32%) were neutral. Most respondents were also satisfied with using Citizen Space to respond to the consultation: 68% stating they were 'very satisfied' or 'satisfied'. Note: there was an error in the response options for this question. There were two 'slightly satisfied' options and no 'slightly dissatisfied' option.

Seventy-six per cent of respondents gave permission for their response to be published. The majority of respondents (95%) were happy for their response to be shared internally with other Scottish Government departments.

#### **2.1.5 Report structure**

The rest of this report is organised to reflect the structure of the consultation document:

- Section 3 reports on Part 2: Energy, new buildings
- Section 4 reports on Part 3: Energy, all buildings
- Section 5 reports on Part 4: Ventilation

- Section 6 reports on Part 5: Overheating risk in new dwellings and other new residential buildings
- Section 7 reports on Part 6: Improving and demonstrating compliance
- Section 8 reports on Part 7: Electric vehicle charging infrastructure

## 3 Part 2 – Energy, new buildings

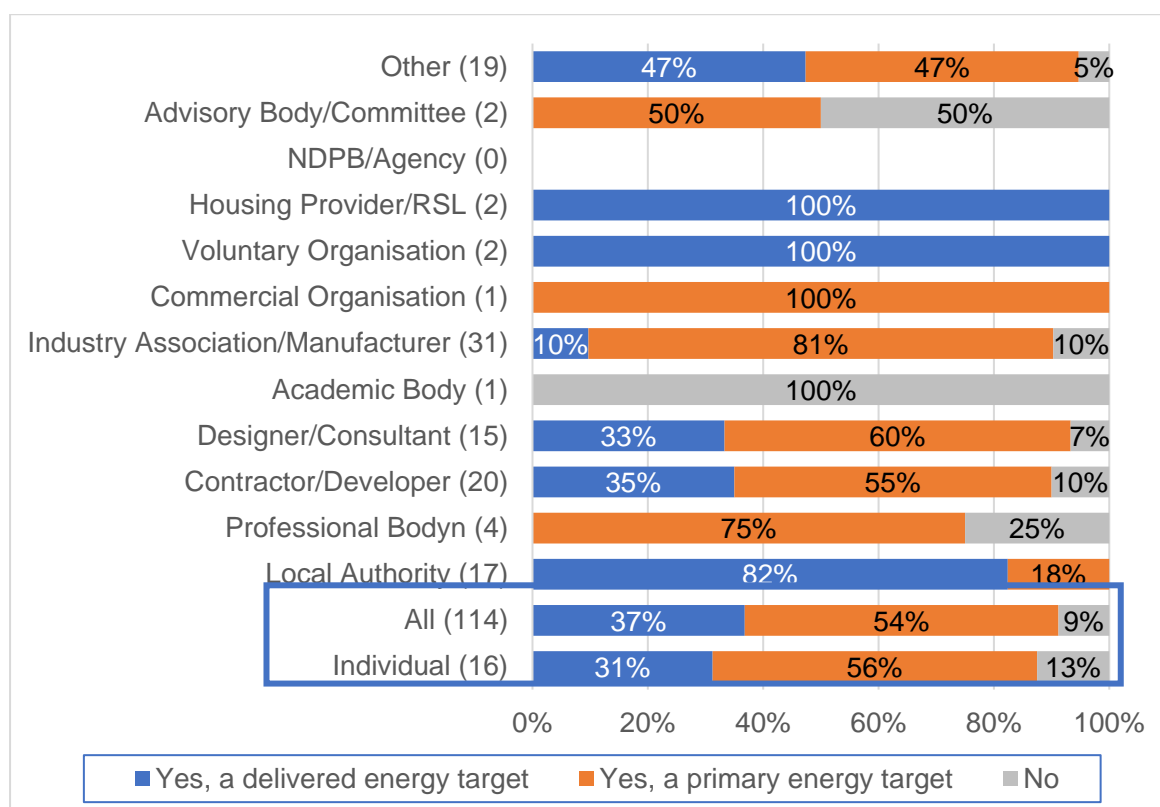
This section of the consultation covers the process of demonstrating compliance of a new building with standard 6.1 of Building Regulations via the application of the SAP or SBEM calculation methodology. It addresses the process of setting and meeting performance targets under that standard. Analysis of responses to proposed revisions applicable to both new buildings and work to existing buildings is provided within Section 4 of this report.

### 3.1 Introduction of an energy target for new buildings

#### 3.1.1 Question 1 - Do you support the extension of standard 6.1 to introduce an energy target in addition to the current emissions target?

In total, 114 responses were received to this question and 105 responses to the accompanying open question where respondents were asked to provide more detail to support their answer. Nine respondents provided an open response but did not answer the multiple-choice question.

Figure 3: Introduction of an energy target for new buildings



Base: 114 respondents (62 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

#### 3.1.2 Analysis

Overall, there is support for the introduction of an energy target in addition to the current emissions target, with 91% of respondents being in favour (Figure 3). There

is substantially more support for a primary energy target (54% of all respondents), than a delivered energy target (37%).

### 3.1.3 A primary energy target

A recurrent theme in the consultation responses highlights the importance of adopting a **fabric first approach**. Several respondents suggest that a primary target might lead to more focus on fabric first and therefore reduce energy demand. Linked to this point, a few respondents specifically suggested that the overall energy needs of a building should firstly be addressed to reduce energy/heat demand.

Several respondents suggest that primary energy should be the principal metric, with CO<sub>2</sub> as the secondary, or prominent performance metric. The importance of CO<sub>2</sub> was raised by these respondents as a means to combat a risk that high carbon solutions will be installed, and that properties achieving high primary energy performance could also have high carbon emissions.

Amongst respondents in favour of a primary energy target, several expressed concerns that basing the target on SAP could present issues, for example in terms of having the right SAP software to calculate and cost accurately. A campaign response from house builders suggested that in the absence of adequate software, some members of an industry body are undertaking independent analysis with the risk of inaccuracy and assumptions made on potential impacts.

Conversely, a few respondents felt that a primary energy metric will show heat demand of a dwelling and allow for better comparison between SAP and other energy assessment schemes as well as allowing for more accurate analysis of energy demand before renewables are taken into account.

Another theme in a few responses is a perceived danger of focusing on renewables to offset or mask inefficient buildings and emissions.

Insulation was specifically mentioned by a few respondents as being a major consideration in improving building efficiency.

Other positive features of a primary energy target were identified (by at least three respondents in each case):

- The proposal corresponds with provisions in the EU Directive 'Energy Performance of Buildings Directive', in part because the primary energy sources use electricity, 'which is already decarbonised'
- A primary target is more accurate in terms of overall environmental impacts because it takes account of energy loss in delivery
- The introduction of a primary target could be used to support Committee on Climate Change recommendations that new dwellings should be consistent with a space heat demand of 15-20 kWh/m<sup>2</sup>/yr

### **3.1.4 A delivered energy target**

The responses in favour of a delivered energy target were very mixed and tended to focus on the benefits of a delivered target over a primary target.

A set of campaign responses from house builders drew attention primarily to concerns over SAP software, which they suggest makes it challenging to understand the impact of the proposals, as current analysis carries the risk of inaccuracy and assumptions made on potential impacts. These responses highlight a perceived risk that a standardised primary energy target may not fully consider individual home types.

The second most common theme amongst those who support a delivered energy target, is that such a target would provide a more accurate indication of what a dwelling requires, that is not offset by renewable sources onsite.

The third most common theme is that a delivered energy target is more straightforward because it is based on the metered energy that the building receives but, in contrast, there are many different ways of measuring primary energy.

These are the three main themes to emerge from the analysis; many other reasons were put forward as to why a delivered energy target is more appropriate than a primary target. Each of these were put forward by one respondent, so it is not possible to discern trends.

### **3.1.5 No support for an energy target**

There are no major themes amongst the nine responses. However, two respondents each highlighted the following points:

- More definitive information is needed to make a decision on a preferred option.
- The importance of reducing carbon emissions must be considered - 1) the introduction of an energy target should not take priority over carbon emissions, and 2) carbon emissions are arguably more important to address.
- The current proposals utilising primary energy targets allow for non-renewable installations to fare better against known renewable "nearly zero" technologies, meaning renewables would not be achievable if both the CO<sub>2</sub> and primary energy factors are required to be lower than the existing system.

Three other points were raised:

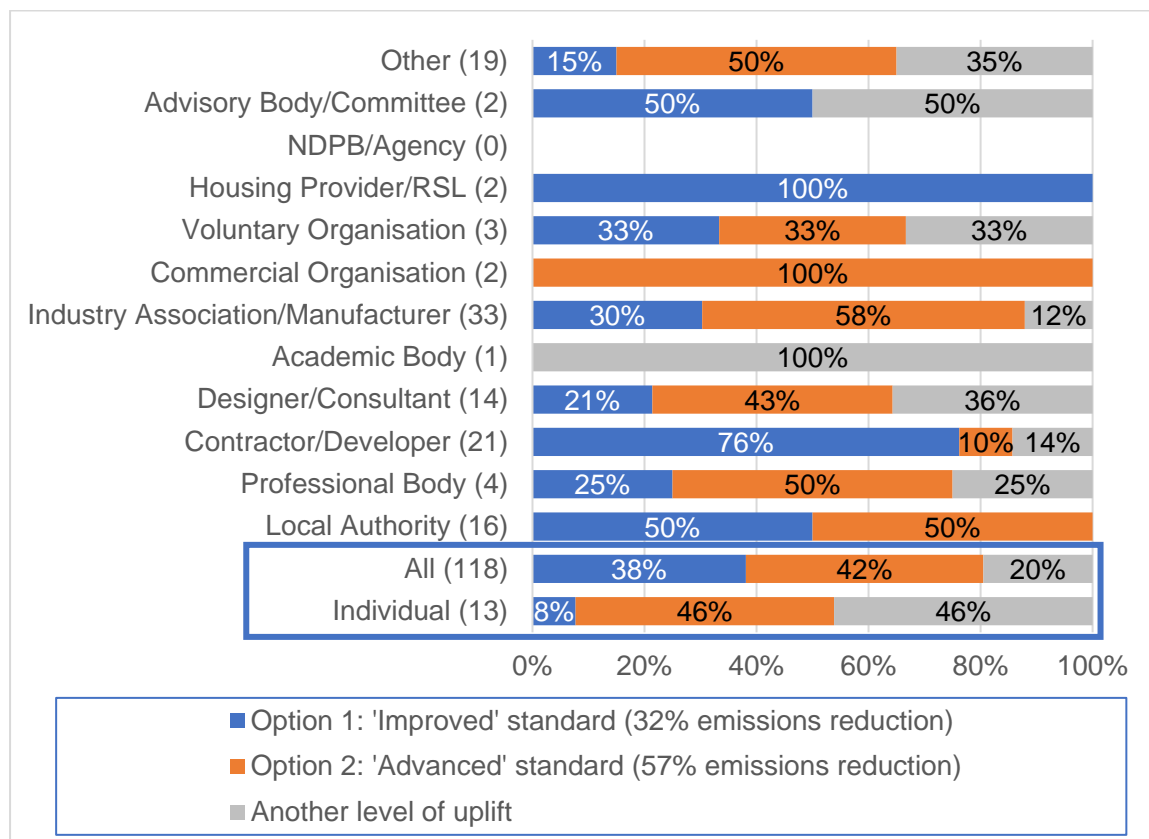
- If primary energy targets are used, these should be updated frequently without the need for a full update of the building standards.
- The proposals risk permitting switches from an older lower carbon system (such as LPG) to a more efficient, higher carbon system, such as oil rather than replacement with a new, more efficient boiler using the lower carbon fuel.
- Embodied carbon needs to be considered.

### 3.2 Options for uplift in standard for new dwellings

#### 3.2.1 Question 2 - What level of uplift to the 2015 standard for new dwellings do you consider should be introduced as an outcome of this review?

In total, 118 responses were received to this question and 117 responses to the accompanying open question where respondents were asked to provide more detail to support their answer.

Figure 4: Options for uplift in standards for new dwellings



Base: 118 respondents (58 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

#### 3.2.2 Analysis

Overall, respondents support the two options presented, with 80% of respondents selecting either Option 1 or Option 2 (Figure 4). There is slightly more support for Option 2 (42%) than for Option 1 (38%).

#### 3.2.3 Option 1: 'Improved' standard (32% emissions reduction)

The main theme in the responses in support of this option is that it is 'adequate' and more achievable than Option 2, although it is deemed to be a very challenging proposal. The majority of summary responses to this question then went on to explain where, in their view, Option 2 is inappropriate:

- It would lead to significant increases in design and build costs.

- It would have an adverse effect on the construction industry which is still recovering from the pandemic.
- It would be impossible to achieve as full electrification of heating and hot water will be required and should only be considered from 2024 at the earliest.
- Concerns were expressed about grid capacity: under the requirements of Option 2, boilers will no longer be a viable heating solution, meaning a move to electrical air source heat pumps and other currently unproved technologies, and placing increased pressure on the grid.
- 'Smaller steps' are required towards the Option 2 target.
- It would require the use of systems that are currently not in use in Scotland in any volume and that the manufacturing process is complex, requiring significant investment and machinery.
- The level of insulation required to meet Option 2 may present challenges.

Although those who selected Option 1 felt it was more achievable than Option 2, a number of challenges and considerations regarding Option 1 were identified:

- The most common theme, raised in campaign responses, is that the route will be ambitious and disruptive and potentially unviable for a range of house types. Another campaign response suggested that, using the current available SAP software tool, 32% reduction is possible via Gas Boilers but this would require maximum roof coverage of PV, flu gas heat recovery and waste water heat recovery. A campaign response highlighted concerns over the availability of power provision in the grid to achieve compliance.
- Other themes relate to the competence of installers, potential costs being considerable and that these might be passed onto consumers. Additionally, concerns were raised that the proposals only consider operational carbon and should include embodied carbon as well. A few responses also requested support/funding and collaboration from Scottish Government to help meet the target.

Positive comments regarding Option 1 point to the proposal being rightly ambitious and necessary to achieve net zero carbon emissions. A few respondents specifically mentioned alignment with the Future Home Standard and the Scottish Government's 2045 target.

A few respondents suggested that Option 1 was a good interim step towards tighter restrictions, allowing manufacturers and installers to upskill largely because the national infrastructure and supply chain is not yet sufficiently mature to implement Option 2.

### **3.2.4 Option 2: 'Advanced' standard (57% emissions reduction)**

The main theme amongst those in support of Option 2 is that an 'aggressive target' is needed in order to address climate change targets (specifically the Scottish



Government's 2045 target) and move towards low, or zero, carbon. Many respondents made this point, with a few respondents suggesting the target is comparable to Passivhaus. A common theme amongst several respondents was that setting a high target now, requiring the highest possible thermal efficiency standards, will negate the need for costly and disruptive retrofit at a later date.

A few respondents felt the target should be higher. For example, some Local Authorities which have set ambitious net zero targets (i.e., before the Scottish Government target of 2045) welcome a 'radical approach'.

The theme of a fabric first approach was also common amongst the responses. General comments include:

- Higher levels of fabric performance help to alleviate fuel poverty (in the wake of increasing energy prices).
- A campaign response also pointed out that a fabric first approach must not be forgotten in place of renewable heating 'which may reduce emissions, but also allows leaky buildings to waste energy'.
- Renewables installed in 'better insulated' dwellings will operate more efficiently and at lower cost.
- Energy demand should be reduced first along with a strong building fabric in combination with better services and efficiencies.

Although they deemed that the target is challenging, a few respondents felt it is achievable in part because products to help meet the advanced standard are already commonly available such as high-performance glass and glazing products to achieve low U-values and solar control.

A few respondents also suggested the proposal will help 'prime the market for wider uptake of heat pumps', saying that where a heat pump is installed it has the potential for emissions reductions to go beyond the 'advanced' standard.

### **3.2.5 Alternative solutions to Option 2 proposed:**

- A need to consider mechanical ventilation with heat recovery.
- An even higher standard to meet zero carbon target.
- An emissions target followed by primary energy.

### **3.2.6 Other considerations raised in relation to Option 2:**

- Product manufacturers (e.g., glazing) must be able to meet demand.
- More information is needed about the financial and resource implications.
- Although some rural areas developments are already moving towards this (with use of renewables due to the lack of a mains gas supply) waste water recovery in Shetland is not always possible due to the 'perishable effect of copper pipe technology used for this'.

- The move towards air source heat pumps may mean that solar ‘may disappear from new homes as the transition to heat pumps is made’ and the benefits of solar are lost.
- Implement a transition process – plus, by implementing a 57% reduction now, ‘the step change for 2025 will not be as great’.

### **3.2.7 Another level of uplift**

Several respondents felt that neither the ‘improved’ nor the ‘advanced’ standard go far enough. A few respondents felt the proposals were ‘too high’, with one being ‘neutral’ on the amount of uplift.

### **3.2.8 Concerns and alternative solutions raised in relation to another level of uplift**

- Embodied carbon needs to be considered as well as operational carbon to avoid unintended consequences.
- The viability of proposals at a time of significant upheaval in industry (i.e., market uncertainty, Brexit and COVID) and concerns that early adoption of mechanical ventilation and heat pumps could create supply chain issues.
- The ‘advanced’ level provides insufficient flexibility for developers given current technology performance and achieved standards.
- The review should preclude the use of fossil fuels.
- Sea source heat pumps or district heating should be included.
- Challenges in developing commercially available SAP 10 software for assessing compliance.
- The highest possible insulation standards should be adopted to reduce the heat load and avoid further fabric upgrades being necessary.
- Client understanding of new technologies all being introduced at once needs to be managed.
- The readiness of the grid with challenges regarding infrastructure capacity for import and export across Scotland.

A small number of alternative solutions were proposed by those who suggested another level of uplift:

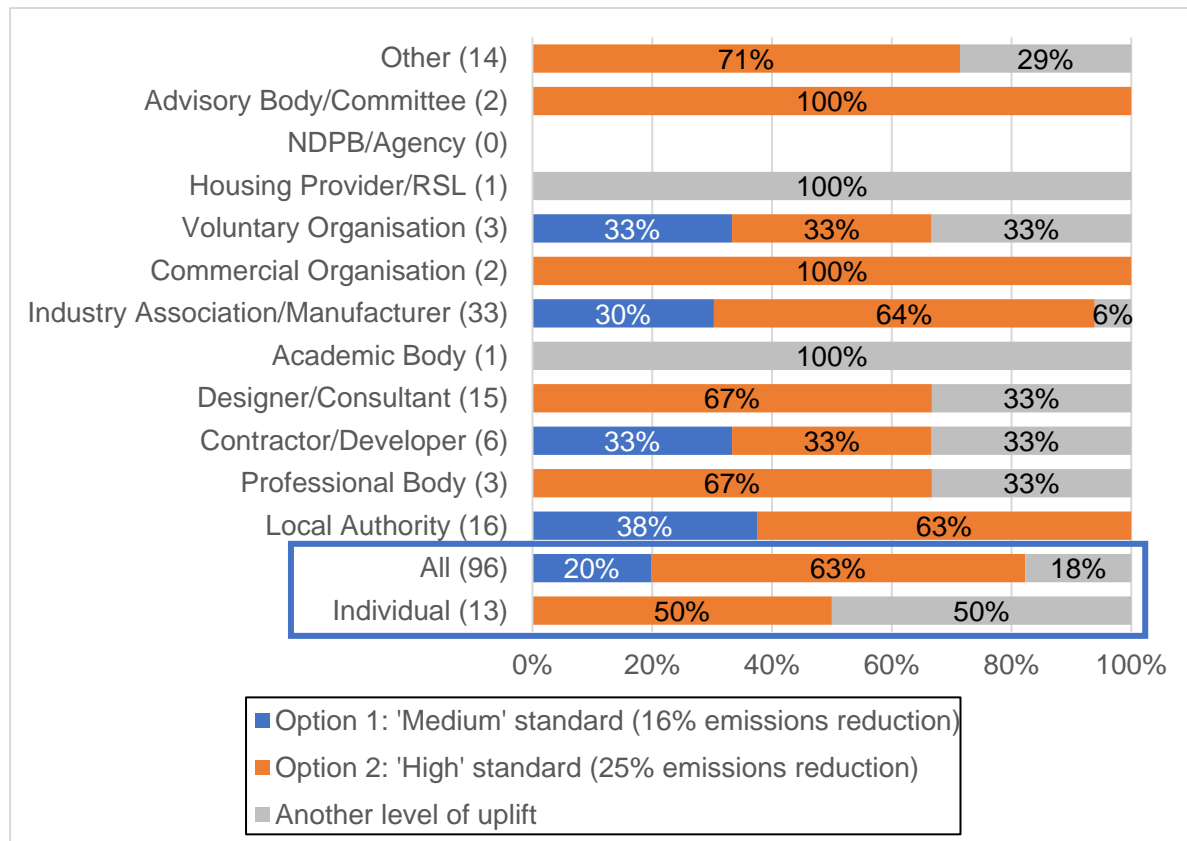
- A few respondents suggested that an uplift of around 20% is more realistic because a higher level is difficult to achieve across all house types.
- A few respondents suggest there are better measures such as <15kWh/m<sup>2</sup>/yr.

### 3.3 Options for uplift in standards for new non-domestic buildings

#### 3.3.1 Question 3 - What level of uplift to the 2015 standard for new non-domestic buildings do you consider should be introduced as an outcome of this review?

In total, 96 responses were received to this question and 91 responses to the accompanying open question where respondents were asked to provide more detail to support their answer.

Figure 5: Options for uplift in standards for new non-domestic buildings



Base: 96 respondents (80 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

#### 3.3.2 Analysis

Overall, respondents support the two options presented, with 82% of respondents selecting either Option 1 or Option 2 (Figure 5). There is substantially more support for Option 2 (63%) than for Option 1 (20%).

#### 3.3.3 Option 1: 'Medium' standard (16% emissions reduction)

Several respondents chose this option because it is more achievable than the higher target, although a few respondents suggest it is still challenging and ambitious.

Other respondents felt that Option 2 was too drastic a change, for various reasons.

Examples are provided below, in order of their frequency:

- A fabric first approach is necessary to ensure buildings are energy efficient as we're already behind 'where we need to be in decarbonising our building stock' and it will avoid later retrofitting.
- The high standard is unachievable because of its impact on skills, infrastructure, and supply and cost of materials.
- The proposal should be considered an interim step, ahead of tighter restrictions.

### **3.3.4 Option 2: 'High' standard (25% emissions reduction)**

Many respondents suggest that a 25% emissions reduction is an achievable target, so there is no reason why it shouldn't be adopted. Many respondents also stated that products and technologies already exist which could be used to achieve the same, through insulation, air tightness, ventilation, and heat recovery as well as high performance glass and glazing products.

Several respondents each highlighted the following:

- By introducing a higher standard of 25% reduction in emissions, the 'step change' needed by 2025 will be less onerous.
- A higher target is justified when balanced against the severity of the climate emergency.
- A more robust fabric first approach is needed.
- Emissions should be reduced as much as possible, but no indication was given from these respondents whether the 'high' standard or another target would be more appropriate to achieve this.
- The higher target of 25% emissions reduction is in line with Local Authorities' position on emissions reduction.

A few respondents stated that, while the 'high' standard goes beyond the 'medium', neither are 'very good'. A greater step change is needed to mitigate climate change.

### **3.3.5 Caveats and observations**

A range of other general comments and observations were made by those who supported Option 2:

- It is appropriate as long as it discourages use of fossil fuels.
- Owners of new or altered buildings have a responsibility and role to play in helping achieve a more sustainable future.
- The 'higher' standard for domestic buildings sets quite strict notional values, for example for air permeability for windows, however non-domestic buildings appear to comply with greater margins between TER/BER.
- Agreement with the 'higher' standard as long as the capital cost of construction (1-5%) is accurate and product manufacturers can meet demand.

- There is potentially more of an opportunity for a non-domestic building to become 'nearly zero' or, generally depending on processes, a net generator as opposed to a consumer.
- Commercial units should have a higher emission reduction standard given the energy consumption for non-domestic dwellings can be very high.
- On-site use and storage of renewable energy should be encouraged to minimise impacts on grid stability.

### **3.3.6 Another level of uplift**

Fourteen responses were received to this question. The main theme – amongst nine respondents – is that the two options are too limited.

Other comments made in response to this question include:

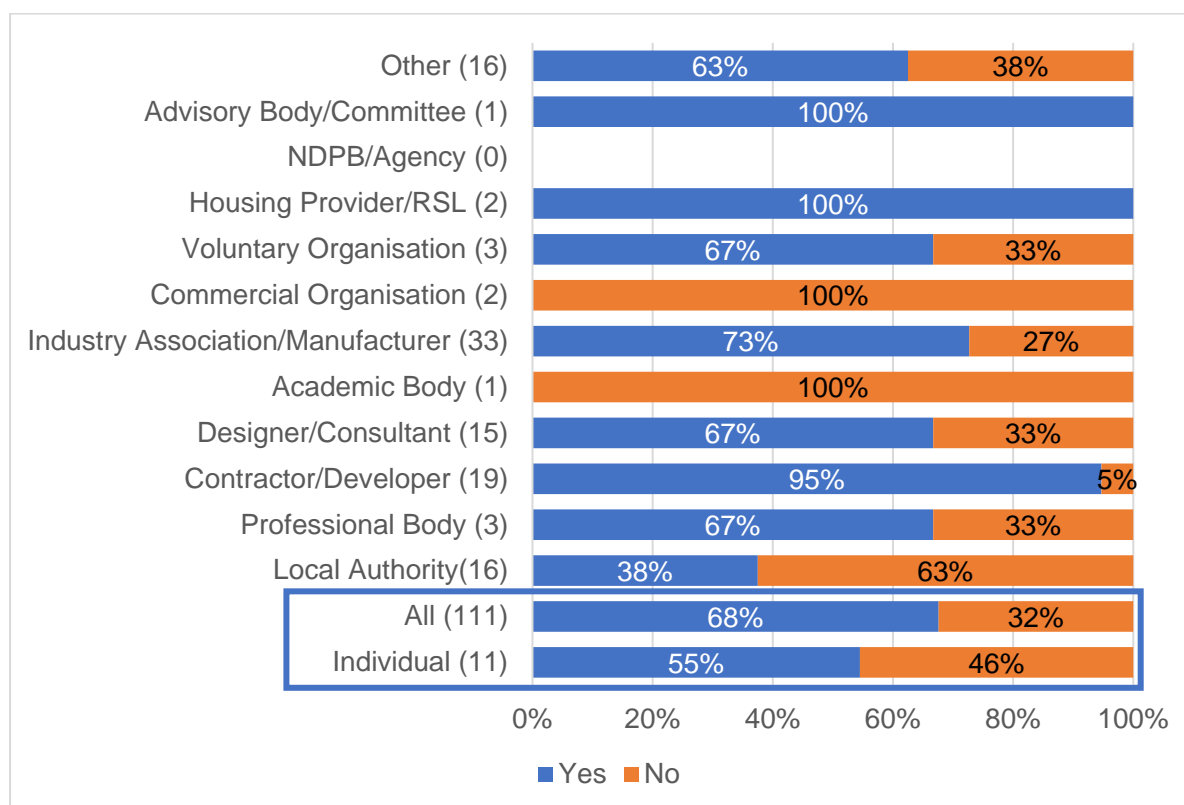
- Fabric first should be prioritised to first reduce emissions, supplemented by renewable energy technologies.
- Concern whether there is sufficient time for the supply chain to embed the necessary changes.
- There is a wide range between Options 1 and 2, and a 'middle ground' is needed.

## **3.4 Elements forming the Domestic Notional Building Specification**

### **3.4.1 Question 4 - Do you have any comments or concerns on the values identified for the elements which make up the domestic notional building specification for either option, e.g., in terms of their viability/level of challenge?**

In total, 111 responses were received to this question and 92 responses to the accompanying open question where respondents were asked to provide more detail to support their answer. Nine respondents who answered the open question did not answer the preceding closed 'yes/no' question.

Figure 6: Elements forming the Domestic Notional Building Specification



Base: 111 respondents (65 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### 3.4.2 Analysis

Just over two thirds (68%) of respondents stated that they had comments on the proposal (Figure 6).

Respondents generally were concerned with how the proposed values could be met in practice, and any unintended consequences of achieving them, e.g., increases in embodied carbon. Respondents suggested more time would be required to develop and test technical solutions to meet the challenges posed, and also that upskilling of the construction workforce would be necessary.

### 3.4.3 Insulation U-values

Several responses (including a campaign response) expressed concerns that lowering acceptable U-Values would be likely to lead to an increase in new building materials being required to support the new systems and technologies resulting in the unintended consequence of increasing embodied carbon as a result of manufacturing the new building materials, undermining the Scottish Government's aspirations for a net zero transition.

A few respondents expressed a concern that U-values of 0.13 and 0.15 would lead to cavity widths of greater than 200 mm.

A few respondents suggested alternative U-values of 0.16, 0.18 or 0.18 – 0.19. The lower U-values were identified as potentially presenting an issue with the wall build up for timber frame and that it would necessitate the use of PIR insulation, thus increasing both the embodied carbon content of the homes and the fire loading within the frame.

Lower U-values necessitating larger house footprints and increased land take was another concern expressed by a few respondents.

#### **3.4.4 Windows and doors**

A small number of specific comments were made in regard to windows and doors:

- Option 1 will be a challenge for the aluminium fenestration industry within the timescales and option 2 will require massive investment in product development. Introducing these too soon could severely restrict consumer choice.
- Option 2 U-values would be difficult to achieve for glass rooflights, likely requiring triple glazing. The weight of triple glazing was mentioned in three responses, one going on to note subsequent operational issues for the elderly and disabled.
- A lack of window products meeting the proposed specification.
- It may be difficult to meet the proposed targets considering other performance requirements such as fire rating or fire performance, as well as openable windows for free cooling.
- With respect to doors, a concern was expressed that the U-value for doors has the potential to greatly reduce the amount of door designs available on the market, leading to loss of visually interesting streetscapes.

#### **3.4.5 Solar PV**

The need for extensive modelling was expressed by several respondents (a campaign response) in part to understand the amount of roof space that would be required to install the PVs. There is a concern that small homes will not have sufficient roof space to accommodate the number of PVs required in order to meet the proposed specification.

#### **3.4.6 Waste Water Heat Recovery (WWHR)**

A few respondents expressed concern around the practical challenges of achieving the specified WWHR efficiency of 55% (proposed for gas notional dwelling) in flats. These were raised on the grounds that components may need to be housed in flats below (vertical units) and developers would be reluctant to do this.

#### **3.4.7 Skills and competence**

Several respondents (a campaign response) had concerns around the supply chain and the lack of qualified and trained installers and testers, who are needed to cope

with the installation and maintenance of the new technologies. Specific points include:

- Training events for designers and installers are needed to make them aware of the requirements.
- Early engagement with industry is required.
- Checks and balances to be put in place over the installations and the competence of installers.
- Achievement of airtightness targets would be hit by skills shortages.

#### **3.4.8 Heat pumps**

A few respondents identified supply chain issues which would be caused by a wholesale shift to heat pump technology in terms installation, testing and competency.

A technical point regarding the Proposed Values for Hot Water Cylinder Declared Loss Factor was raised, with concerns that the proposed declared loss factor associated with the Hot Water Cylinder is low and quite strict, and that many heat pump specific cylinder manufacturers would find this difficult to achieve.

#### **3.4.9 Mechanical Ventilation with Heat Recovery (MVHR)**

A few respondents highlighted concerns:

- In the affordable market users switch the system off because of perceived running costs, resulting in poor ventilation and damp problems”.
- The systems are not always robust and reliable and may need to be replaced a number of times.

#### **3.4.10 Space heating**

Concerns regarding adequacy of generating capacity to achieve the switch to electrification of heat were expressed by several respondents. Other points related to a need for greater flexibility; allowing innovation to support Modern Methods of Construction; space heating demand targets should be part of the Energy Demand criteria for compliance in section 6.

#### **3.4.11 Fabric first**

Promoting a fabric first approach was identified by a few respondents as the most important and necessary step to help reduce capital and operational costs, improve energy efficiency, and reduce carbon emissions.

#### **3.4.12 Costs**

Where costs were referenced by respondents, they were generally mentioned as a challenge rather than as a barrier to achieving the specifications.

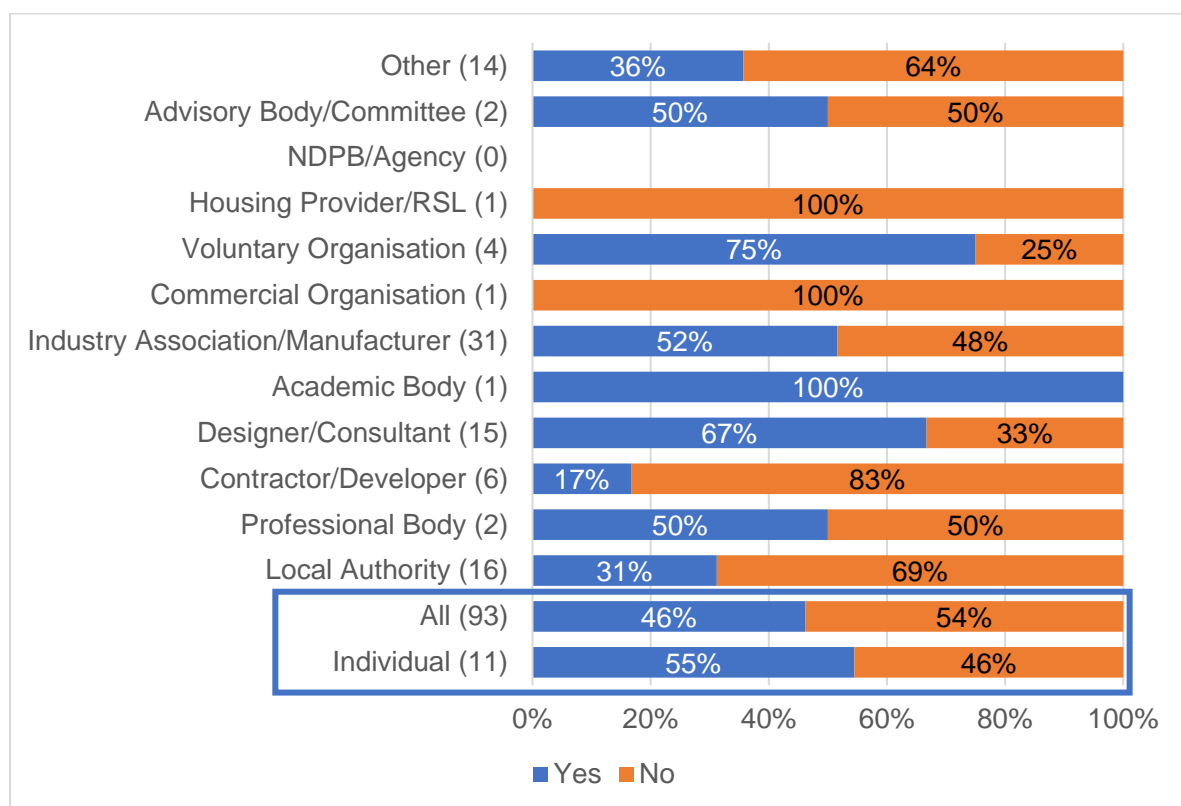


### 3.5 Elements forming the non-domestic Notional Building Specification

#### 3.5.1 Question 5 - Do you have any comments or concerns on the values identified for the elements which make up the non-domestic notional building specification for either option, e.g., in terms of their viability/level of challenge? - If yes, please provide your comments below:

In total, 93 responses were received to this question and 32 responses to the accompanying open question where respondents were asked to provide more detail to support their answer. Three respondents provided an open response but did not answer the preceding closed 'yes/no' question.

Figure 7: Elements forming the Non-domestic Notional Building Specification



Base: 93 respondents (83 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

#### 3.5.2 Analysis

Fewer than half of respondents to this question (46%) stated that they had comments to make on the proposal (Figure 7).

Technical considerations highlighted were most numerous for glazing, with some respondents expressing doubts about the achievability of the proposal in the timescales. Detailed technical responses from some organisations suggested standards could be more ambitious and gave targets for these. There was some signposting to information that respondents thought could inform the standards.

### **3.5.3 Glazing**

A few respondents highlighted the challenges they face in achieving improved standards, such as financial implications. More specific challenges particularly relating to glazing and timescales for change were detailed by a few industry association/manufacturer respondents due to product development investment; a phased approach being needed to allow time for upskilling installers; Option 2 presenting too big a step in the time available.

A concern was expressed by a few respondents about the use of triple glazing for option 2 being difficult and costly to achieve, particularly in retail. Also, a possible unintended consequence of setting the G-value of glazing will at 0.30, in that 70% of solar gains through glazing will be lost.

### **3.5.4 More ambitious standards**

A few respondents with no concerns about achieving the standards, went on to state that products are available in the commercial sector in Scotland to meet the higher standard. Also, with investment, the more challenging U-values could also be achieved within a reasonable time scale and that, for certain buildings, such as large industrial units, the proposed minimum level of airtightness could be strengthened much further.

A few respondents believed the Standards could go further.

A few respondents identified information that they felt should inform the Standards including: The LETI Climate Emergency Design Guide, the AECB Standard/Passivhaus Standard and Scottish Futures Trust Net Zero Carbon for Public Buildings Standard.

### **3.5.5 Unintended consequences**

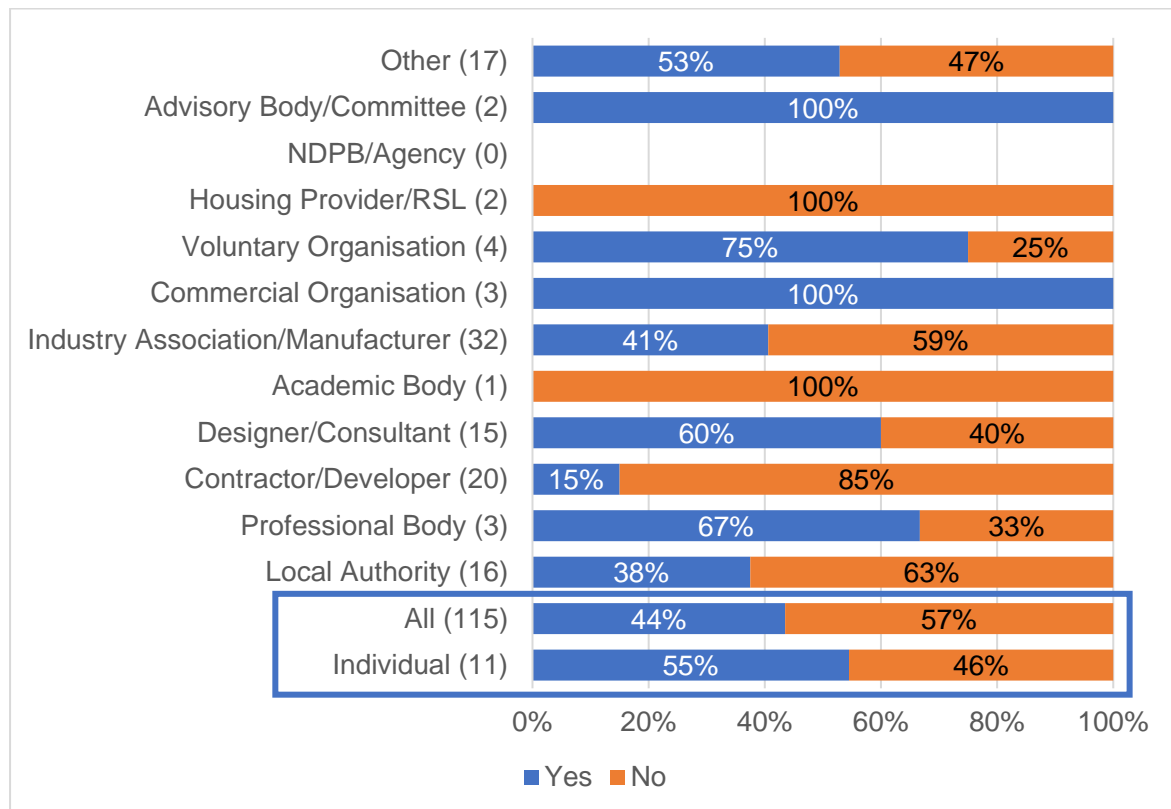
An industry association reported members' concerns that the proposals could in effect bring the New Build Heat Standard forward from 2024. Here, concerns were raised about the capacity of electricity networks to meet the increased demands from the electrification of heat, combined with the added pressures from greater use of electric vehicles.

## **3.6 Change to fuel assignment of the notional building - Domestic**

### **3.6.1 Question 6 - Do you have any comments on the simplified two-specification approach to defining the domestic notional building from 2022?**

In total 115 respondents answered the closed 'yes'/'no' question (Figure 8), with just under half (44%) stating that they have comments to make. Of the 115, 69 went on to provide comments in response to this question. Four respondents provided an open response but did not answer the preceding closed 'yes/no' question.

Figure 8: Change to fuel assignment of the notional building - Domestic



Base: 115 respondents (61 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### 3.6.2 Support for the proposal

Various comments were received in support of the proposal including that a 'simplified approach' is welcomed', it gives a degree of flexibility and that the approach should result in a progressive move away from fossil fuel heating systems. These are reported in further detail below.

Several respondents raise challenges that this approach will bring to housing in rural areas.

A few respondents pointed to the move away from fossil fuels, with the notional building specification making it more challenging to install oil or gas; and that the fabric requirements should be more onerous for new homes with gas boilers.

A campaign response suggests that the alternative approach of calculation of the total space heating demand for the building should become the default, rather than the elemental (notional building) methodology. Also, the Passivhaus Planning Package (PHPP) should be considered as an acceptable calculation methodology.

A concern was raised by a few respondents about the appropriateness of considering natural gas/oil as the alternative fuel source for non-heat pump solutions.

### **3.6.3 Not in support of the proposal**

A few respondents were explicitly not in favour of the simplified two-specification approach. Reasons given are as follows:

- All buildings should be assessed against the same heating system (an ASHP) so that the TER is fixed and unaffected by the heating system.
- Concerns over the use of a different heat pump in a notional building (when heat pumps are specified in SAP or SBEM). This is felt to penalise a technology vital to reducing carbon emissions
- Should be based on a performance target - the notional building approach will disadvantage smaller builders.

### **3.6.4 Unclear or other comments**

The main theme to the other comments received was that many respondents found it difficult to comment due to the issues associated with the currently available SAP software.

Other, general responses:

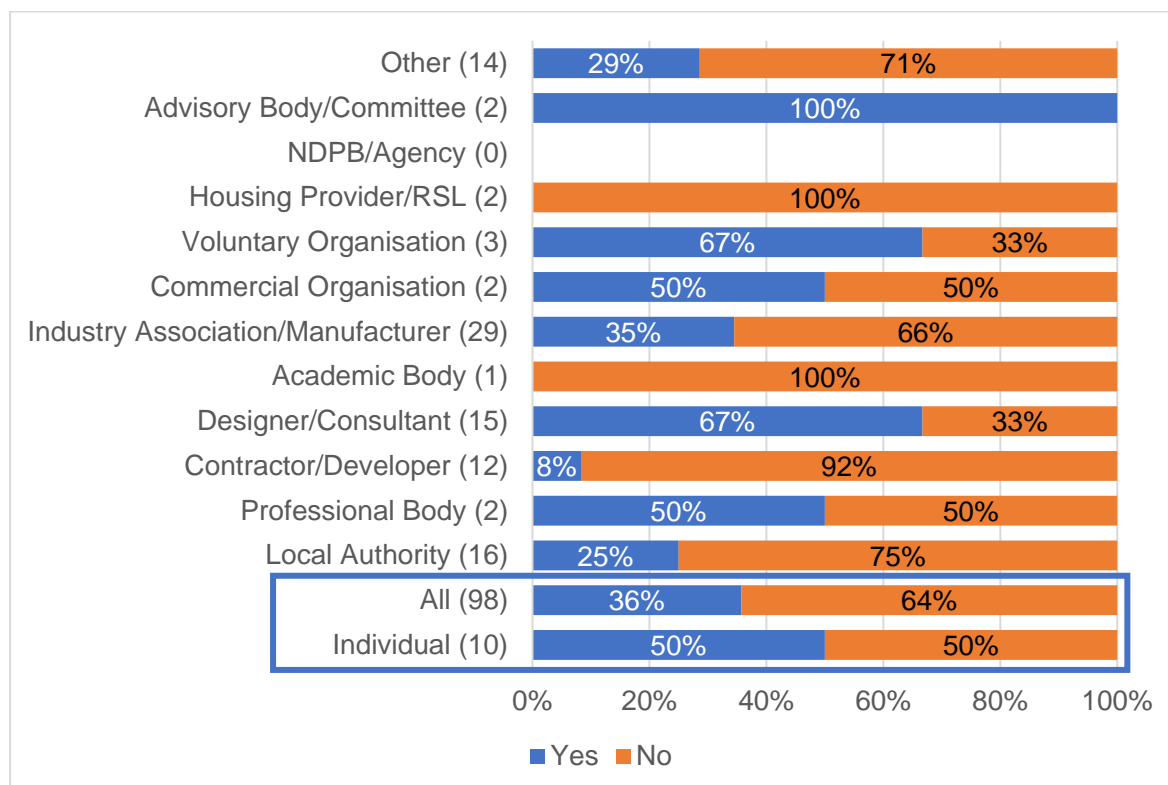
- Note the general reference to PV solar panels and question why there is no reference to solar thermal.
- Mandate the use of WWHR systems as part of the fabric.
- If notional building approach is retained, a fabric first approach should be adopted.
- Call for the inclusion of solar PV with air source heat pumps under the air source heat pump specification.
- High efficiency electric storage heaters can be the most suitable solution in certain circumstances.
- Further justification for the continued use of gas boilers is needed.

## **3.7 Changes to fuel assignment of the notional building – Non-domestic**

### **3.7.1 Question 7 - Do you have any comments on the simplified two-specification approach to defining the non-domestic notional building from 2022?**

In total, 98 responses were received to this question. Forty-six responses were to the accompanying open question where respondents were asked to provide more detail to support their answer. Four respondents provided an open response but did not answer the preceding closed 'yes/no' question.

Figure 9: Changes to fuel assignment of the notional building – Non-domestic



Base: 98 respondents (78 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### 3.7.2 Analysis

Of those who responded to this question, just over a third (36%) said that they had specific comments on the simplified two-specification approach to defining the domestic non-domestic notional building from 2022 (Figure 9).

Ten respondents stated that their response is ‘as per Question 6’, meaning that their views on the proposals as they apply to domestic and non-domestic buildings are the same. These responses have therefore been included here as part of the summary below.

### 3.7.3 Support for the proposal

Various comments were made in support of a simplified approach and a similar approach across the domestic and non-domestic buildings was considered ‘preferable’. These are summarised below.

A campaign response stated that emphasis should be on improving the thermal performance of buildings to reduce the amount of energy required in the first instance, allowing for low carbon technologies to meet the ‘residual heat load’ and phase out gas boilers.

It was suggested in a campaign response the need to consider the fabric of non-domestic buildings that are similar to domestic buildings.

A campaign response suggested that the alternative approach of calculation of the total space heating demand for the building should become the default, and that the Passivhaus Planning Package (PHPP) should be considered as an acceptable calculation methodology.

A few respondents made comments relating to technologies: over-reliance on PV is not always suitable; a need to ensure that the carbon emissions from the property are not higher if including gas boilers; and heat pumps being the only viable option until further research is available.

#### **3.7.4 Not in support of the proposal**

A few respondents were explicitly not in favour of the simplified two-specification approach for the following reasons:

- All buildings should be assessed against the same heating system (an ASHP) so that the TER is fixed and unaffected by the heating system.
- The approach penalises a technology which will be vital in efforts to reducing carbon emissions and the impact our building have on climate change.
- Removal of a notional building specification for LPG doesn't allow for rural off-grid businesses and new non-domestic premises being able to benefit from bio-LPG.
- Building fabric and air tightness targets should not be the same for each notional building type.

#### **3.7.5 Unclear or other comments**

The main theme in other comments – from several respondents – questions the suitability of natural gas and the decision to continue the use of gas boilers as the alternative fuel force for the non-heat pump solution.

#### **3.7.6 Other responses**

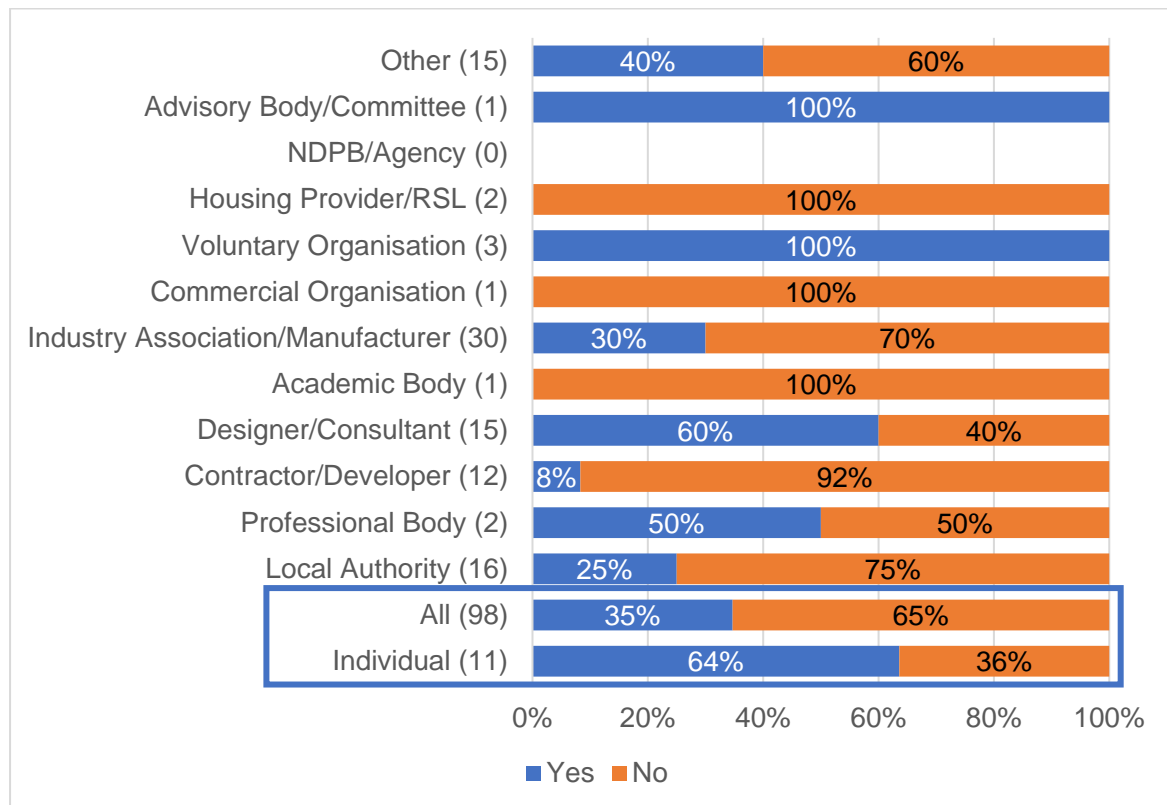
- The simplified approach will be a challenge to reduce the energy demand.
- Consideration should be given to the impact of proposals on rural and semi-rural development.
- Upskilling will be required to ensure a competent design process and that cost-effective and relevant solutions are used.
- If the notional building approach is retained a fabric first approach should be adopted.

### **3.8 Change to assignment of Domestic Hot Water (DHW) – Non-domestic**

#### **3.8.1 Question 8 - Do you have any comments on the proposal to separate and provide a more demand-based approach to assignment of domestic hot water heating within the non-domestic notional building specification from 2022?**

In total, 98 responses were received to this question and 45 responses to the accompanying open question where respondents were asked to provide more detail to support their answer. Four respondents provided an open response but did not answer the preceding closed 'yes/no' question.

Figure 10: Change to assignment of Domestic Hot Water (DHW) – Non-domestic



Base: 98 respondents (78 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### 3.8.2 Analysis

Of those who responded to this question, almost two thirds (65%) said that they had no specific comments on the proposal to separate and provide a more demand-based approach to assignment of domestic hot water heating within the non-domestic notional building specification from 2022 (Figure 10).

The vast majority of respondents expressed support for the proposal in their comments; some were unclear whether they were in favour or not.

### 3.8.3 Support for the proposal

The main theme amongst several respondents in favour of this proposal is that it is appropriate where there is low demand, therefore a demand-based approach seems sensible and understandable. This is because DHW use could vary across different non-domestic building types and therefore this allows for flexibility. A few respondents requested that 'low' and 'high' demand are defined.

A few respondents felt that the separation of water heating and space heating more accurately reflects the real-world situation.

The following were suggested by a few respondents:

- For building zones with high demand, the notional building should use a centralised domestic hot water system.
- Incentivising instantaneous electric water heating in situations where domestic hot water demand is low is sensible.
- Criteria need to be developed to ensure that DHW is generated in a low carbon and efficient manner.

#### **3.8.4 3.8.4 Not in support of the proposal**

It was suggested that calculation methods for heating and hot water demand should be used to select the relevant technology.

#### **3.8.5 3.8.5 Unclear or other comments**

A few respondents suggested more clarity is needed on the water consumption figures and a campaign response raised the that point system losses can be greater for DHW than for space heating and can contribute to summer overheating.

Other, general comments:

- Clarity needed on what can be done to provide domestic and non-domestic heating in the future, for a realistic price.
- As healthcare developments require a central hot water storage system, the notional building for healthcare should be based on a central hot water storage system.
- There is no specific provision for the use of solar thermal heating or solar PV.
- In modelling software, flow rates for showers and taps should be entered accurately.

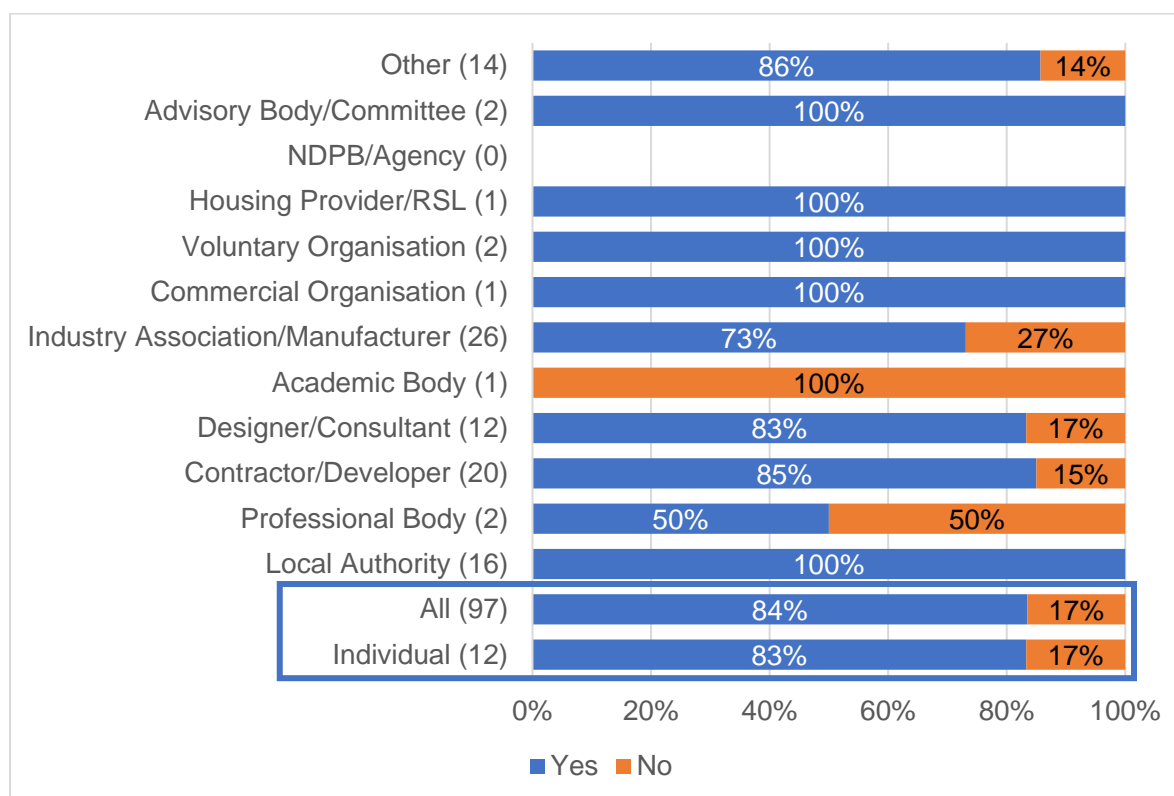
### **3.9 Supplied heat connections**

#### **3.9.1 Question 9 - Do you support the change in application of targets for supplied heat connections to new buildings, focused on delivering a consistent high level of energy performance at a building level?**

In total, 97 responses were received to this question. Seventy-six responses were received to the accompanying questions which asked for a summary of the reasons for the respondent's view. Ten respondents provided an open response but did not answer the preceding closed 'yes/no' question.



Figure 11: Supplied heat connections



Base: 97 respondents (79 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### 3.9.2 Analysis

Eighty-four per cent of respondents favoured the proposal and the remaining 17% did not support it (Figure 11).

### 3.9.3 3.9.3 Support for the proposal

Of those who supported the proposal, 60 provided additional comments. The majority stated their agreement and provided further justification for their support such as:

- Energy performance at a building level will provide more accuracy and consistency for comparison purposes.
- Allows the energy performance of new buildings to be addressed consistently, regardless of the heat source.
- Supports connection to a wide variety of existing heat networks.
- Simplifies the understanding, promotes the use of and recognises the benefits of supplying heat to a building from external networks.

A few respondents in support of the change in application of targets for supplied heat connections to new buildings gave caveats:

- SAP software must work correctly.
- Backstop should be introduced to prevent new buildings being connected to antiquated district heating schemes.
- Only support heat networks that utilise renewable sources.

Some respondents in support of the change raised concerns:

- May create complexity within the building warrant and compliance reporting process.
- The approach to HIU heat losses (6.1.6) diverges from the approach being taken in England and Wales.
- The assumption that the heat network is carbon free could act as a loophole in regulation.
- Networks are typically private and are not obliged to provide a connection.
- Connection cost levels and that these are neither competitive nor regulated.
- No competition of energy rates once connected to the heating network.
- Not possible to change supplier.
- Potential risk of heating systems being the focus of reducing emissions (fabric first approach with air-tight, well-ventilated dwellings should be the main ambition).

#### **3.9.4 Not in support of the proposal**

Several substantive comments focused on delivering a consistent high level of energy performance at a building level. Areas of concerns included:

- Proposed change may lead to complexity within the building warrant and compliance reporting process.
- Reliance on undefined regulations (Heat Networks (Scotland) Act).
- Suitability of heat networks.

#### **3.9.5 3.9.5 Non-responders**

Of several substantive comments received, the only common theme is the need to adopt a fabric first approach. Other areas of comment:

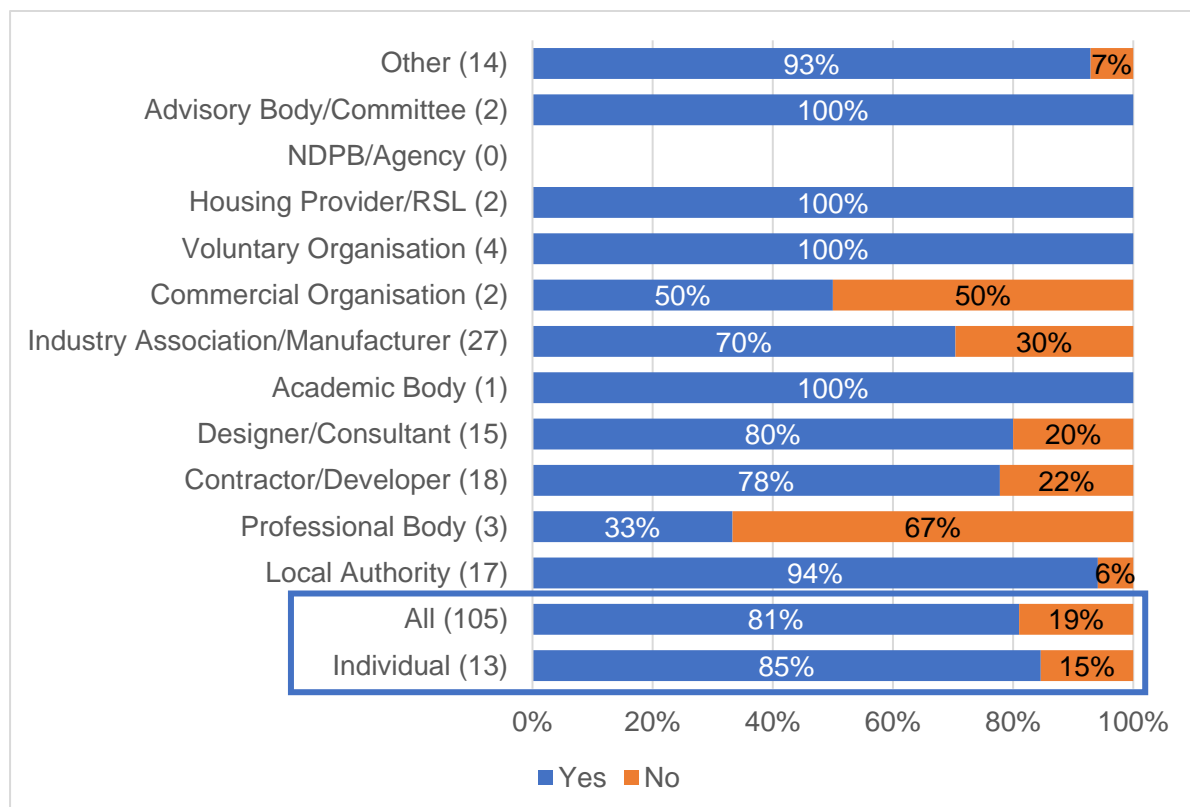
- Lack of opportunity to shop around for more competitive energy prices.
- Heat Distribution Networks will require considerable lead in time and investment.
- Need for monitoring of distribution losses through heat networks.
- Proposal relies on future implementation of policies (including the Heat Networks Act).
- Delivery of SAP software to become more complex.

### 3.10 Limited benefit from on-site generation of power

#### 3.10.1 Question 10 - Do you agree with the principle set out, that the benefit from on-site generation within the compliance calculation should be limited by a practical assessment of the extent that generated energy can be used on-site?

In total, 105 responses were received to the closed 'yes/no' question and 85 responses setting out the reason for their view. Twelve respondents provided an open response but did not answer the preceding closed 'yes/no' response; about half of these simply stated 'no comment'.

Figure 12: Limited benefit from on-site generation of power



Base: 105 respondents (71 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

#### 3.10.2 Analysis

In total, just over four fifths of respondents (81%) agreed that the benefits from on-site generation within the compliance calculation should be limited by a practical assessment of the extent that generated energy can be used on site (Figure 12).

#### 3.10.3 Support for the proposal

Of the 85 respondents in support of the proposal, 60 chose to provide further comment.

Significant supportive comments were received which include:

- Will promote improvement in the fabric performance of buildings.

- Avoids the possibility of poor fabric performance being 'offset' by claims of excess energy being generated.
- Accuracy and consistency are limited to the building in question and not to external factors out with the control of the designer.
- Provides a truer representation of actual usage/performance.
- Acts as an enabler for innovation.

Several respondents submitting a campaign response stated that whilst they are in general agreement with the provision, they feel it may make the process of fabric improvement more challenging. In addition, it is suggested that it also potentially creates difficulties in smaller dwelling types which utilise combi boilers for heat and water, where there is insufficient space to locate a DWH hot water cylinder.

A few concerns were raised about the outcome of the final SAP software.

#### **3.10.4 Not in support of the proposal**

Twenty respondents stated that they do not agree with the principle set out, many provided substantive further comment, as follows:

Several respondents raised concerns relating to power from PV installations. For example, because it will discourage the installation of solar PV on new buildings and may not give credit to any building that generates its own electrical supply.

Contractor Developer views vary. One considered the existing methodology fit for purpose whilst another stated that the principle proposed will make fabric improvements more challenging. A third Contractor/Developer acknowledged the complexity of the subject and suggested that SAP should recognise any benefit coming from extra electricity supplied through PV panels.

#### **3.10.5 Non-responders**

A few respondents raised concern that the use of PV will be limited as a result of the proposal.

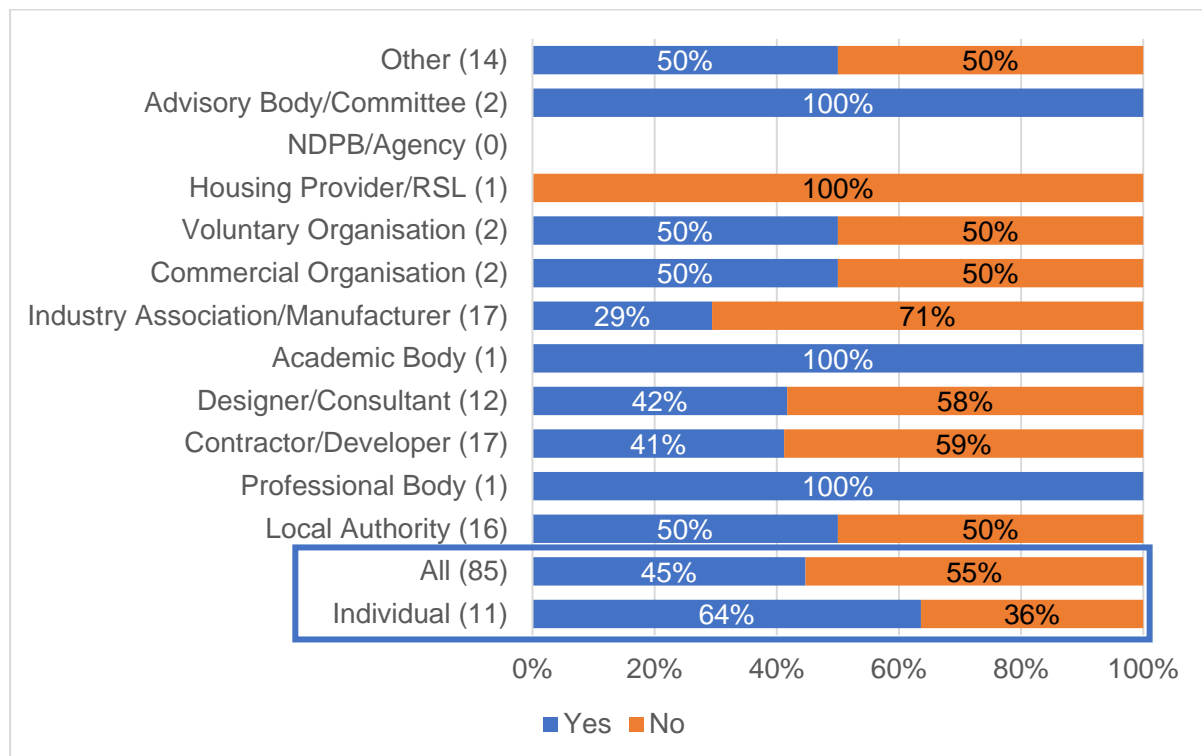
A few respondents focused on the storage of on-site generated energy, suggesting it should be factored into the compliance methodology. They suggest that for larger applications, on-site district generation and storage models which prioritise direct energy use over grid surplus should be considered. Furthermore, it was suggested that on-site generation should also be used for mixed-use developments as well as multi-unit domestic.

A few respondents questioned whether SAP methodology is the appropriate tool for assessing how much generated energy is used onsite. In addition, they point out that SAP does not account for Electric Vehicle (EV) charging despite these now becoming a requirement.

### 3.10.6 Are there any particular concerns you have over this approach (per Question 10), e.g., with regards particular technologies or solutions?

In total, 85 responses were received to this question and 58 responses to the accompanying open question where respondents were asked to provide more detail to support their answer. Five respondents provided an open response but did not answer the multiple-choice question.

Figure 13: Are there any particular concerns you have over this approach?



Base: 85 respondents (96 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### 3.10.7 Analysis

Overall, 55% of respondents stated that they had no concerns over the approach with regards to particular technologies or solutions (Figure 13). The remaining 45% stated they had concerns and offered comments relating to same.

The dangers and disadvantages of backing a single solution were discussed and linked to the need to encourage future innovation relating to onsite generation by several respondents.

A few respondents highlighted the importance of adopting a fabric first approach to reducing energy demand in the first instance. They suggested that offsetting on-site generation against heating demand does not incentivise a fabric first approach and too much focus on onsite renewable may make urban development more difficult, potentially increasing urban sprawl and generating negative environmental impacts.

The excessive reliance on heat pumps was a focus for a few, with calls for other methods to be taken into consideration.

Concerns were also raised by a few respondents relating to the omission of the use of PV (photovoltaic) which may discourage developers from including PV in proposals.

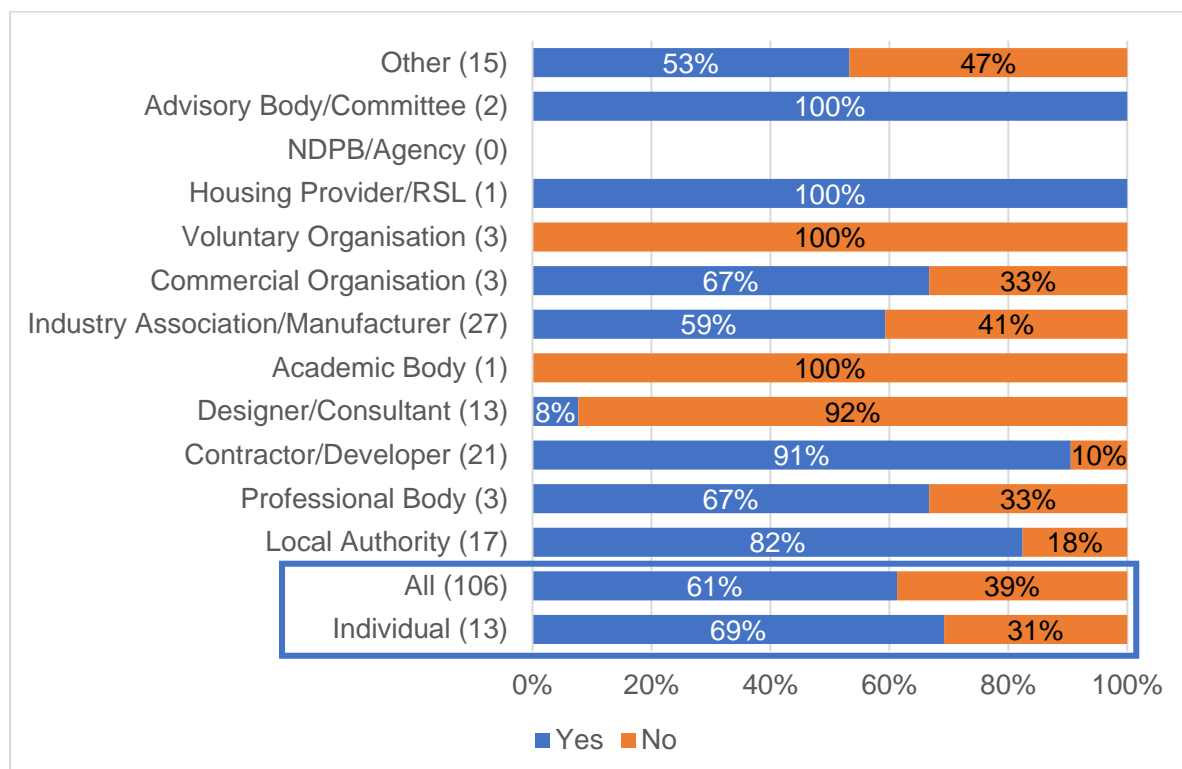
A few respondents raised concerns over the impact the proposals are likely to have on the time required to verify proposals and in relation to compliance on site and how to achieve verification cost-effectively.

### 3.11 Applying standard 6.1 to buildings with low and zero emission heating

#### 3.11.1 Question 11 - Do you agree with the proposal that new buildings where heat demand is met only by 'zero direct emissions' sources should be exempt from the need for a calculation to demonstrate compliance with the Target Emissions Rate?

There were 106 responses received in total to this question and 95 responses to the following open question where respondents were asked to provide more detail to support their answer. Seven respondents provided an open response but did not answer the multiple-choice question.

Figure 14: Applying standard 6.1 to buildings with Low & Zero Emissions Heating



Base: 106 respondents (70 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

#### 3.11.2 Analysis

Overall, there is support for the proposal (61%), with the remaining 39% of respondents stating they do not support the proposal (Figure 14).

### **3.11.3 Support for the proposal**

Those who support the proposal most commonly refer to the beneficial simplification of the design and assessment processes.

A few respondents call for further clarification around generating EPC certification on completion. Concerns were raised by a few respondents who support the proposal:

- The proposal would not cover future changes to the heating supply.
- Homes that have invested in zero emissions heat sources should also benefit from the exemption.
- If delivered energy is adopted as the energy target metric, this change could allow direct electrically heated homes to have comparatively high energy use and energy bills.
- New buildings should be designed to enable ease of retrofit to zero carbon heating.

### **3.11.4 Not in support of the proposal**

Several respondents raised a perceived issue with downstream emissions associated with 'zero direct emissions' source not being counted. Several respondents felt there should be a fabric first approach to reducing energy demand in the first instance.

Several respondents refer specifically to the importance of calculating the emissions rate for the property regardless of the technology deployed and highlight that carbon intensity of heat pumps can vary depending on localised carbon emission intensity of the grid. Similarly, the carbon intensity of hydrogen can vary.

Several respondents expressed concern that the proposal may encourage the use of systems with lower up-front costs (such as direct electric heating) but with higher running costs resulting in comparatively high future energy bills. A clearer definition was felt to be needed of 'zero emissions' to ensure heat sources such as direct electric heating would need to be powered from onsite renewably generated electricity alone.

Comments relating to EPCs were made by several respondents. They highlight that EPC ratings are important for leasing buildings and raise concerns about the potential creation of a barrier to the deployment of heat networks if EPC emissions compliance is needed (i.e., for social landlords). There is a call from this group for 'nearly zero' technologies to be considered as part of exemption calculations.

### **3.11.5 Non-responders**

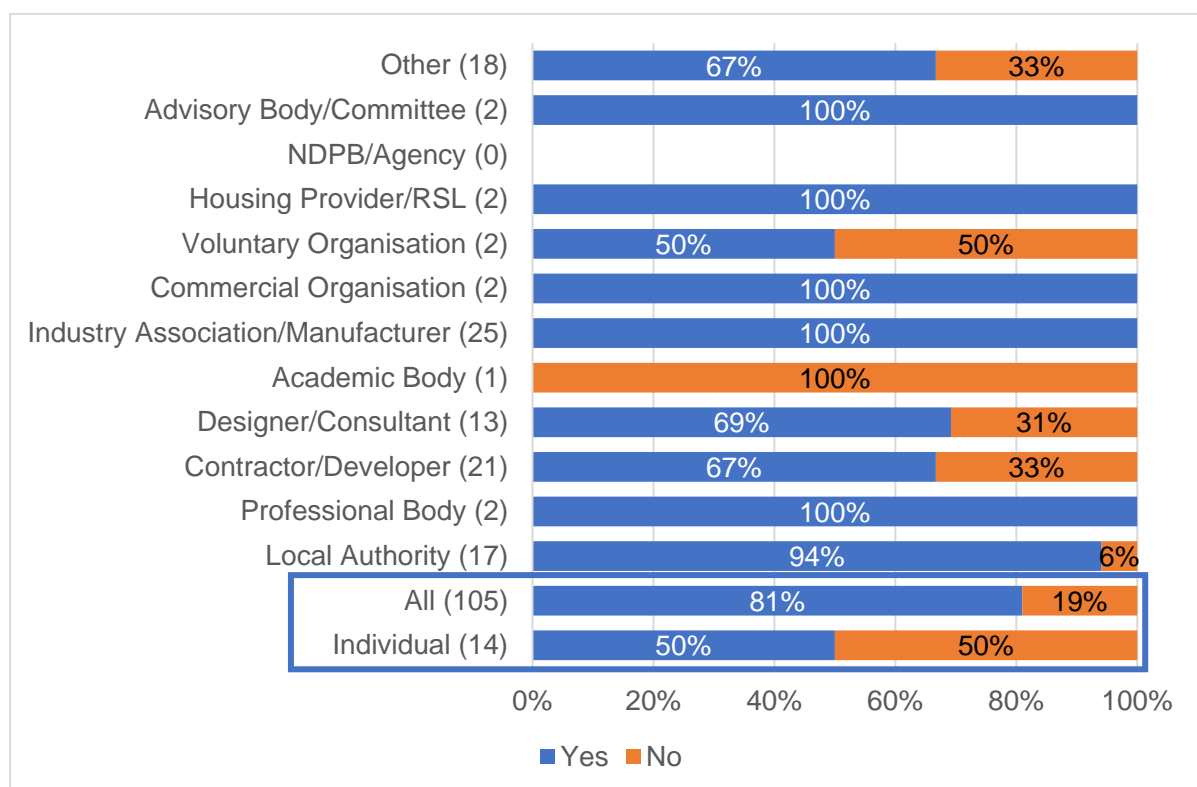
Of those who did not answer the multiple-choice question but provided a comment, a few respondents' comments focus on direct electrically heated homes (not generated via on-site renewably generated electricity alone) and raise concerns that the proposal could allow them to have comparatively high energy use and energy bills.

### 3.12 Designing for future retrofit of zero direct emissions heat solutions

#### 3.12.1 Question 12 – Do you support the need for new buildings to be designed to enable simple future adaptation to use of a zero direct emissions heat source where one is not installed on construction. And for information setting out the work necessary for such change to be provided to the building owner?

There were 106 responses received in total to this question and 88 responses to the following open question where respondents were asked to provide more detail to support their answer. A further eight respondents provided an open response but did not answer the multiple-choice question.

Figure 15: Designing for future retrofit of Zero Direct Emissions heat solutions



Base: 105 respondents (71 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

#### 3.12.2 Analysis

Significant support was expressed by respondents with 81% of those who responded to the multiple-choice question (Figure 15) stating that they support the need outlined. Only 19% did not support it.

#### 3.12.3 Support for the proposal

Of those in support of the proposal, several respondent comments focused on information for building owners and highlighted the need for this to be 'straightforward', 'clear' and 'non-biased towards a particular technology'.



Several respondents felt there was a need for greater clarity of what constitutes 'simple future adaptation'.

In their comments, several respondents discussed the need for adequate consideration to be given to design and planning at the outset. Failure to do so may risk the infrastructure not being at a scale where it can cope with new, additional technology. Future adaptations may also impact fabric and fire performance. These respondents also felt that the proposal would likely introduce another layer of work for developers and verifiers.

Several respondents suggested that different property types can present different levels of complexity, with smaller homes and high-rise dwellings being identified as less straightforward. It was suggested that space requirements may be too onerous in smaller properties, and, in flats, it was suggested that developers may resort to the installation of systems which would currently be very expensive to run.

A few respondents commented on the need for flexibility of design in areas where there is a skill or material shortage – something which has been brought to the fore in the post pandemic climate.

A few respondents felt the ability to quickly adapt was a key priority. A few further respondents referred specifically to hydrogen.

#### **3.12.4 Not in support of the proposal**

Of those respondents not in support of the need for new buildings to be designed to enable simple future adaptation, and for information setting out the work necessary for such change to be provided to the building owner, their comments focused on the following three key areas:

- Concern over the creation of a 'loophole'.
- Fabric first approach.
- Consideration of external factors and future technological advances.

Several respondents shared the view that there is a risk that future installations will never take place if developers are only required to provide information setting out the work necessary regarding future adaptation. A few respondents suggest the use of a zero direct emissions heat source should be made mandatory.

Several respondents pointed to the need to adopt a fabric first approach to achieve nZEB, thereby eliminating the need for future adaptation.

Several respondents felt that asking developers to account for future adaptations now, beyond that of primary pipework within the dwelling, is unrealistic as there are too many external factors to consider. In addition, advancements in new products and innovations may occur which may change the way in which we look at delivering zero direct emission heat sources.

### 3.12.5 Non-responders

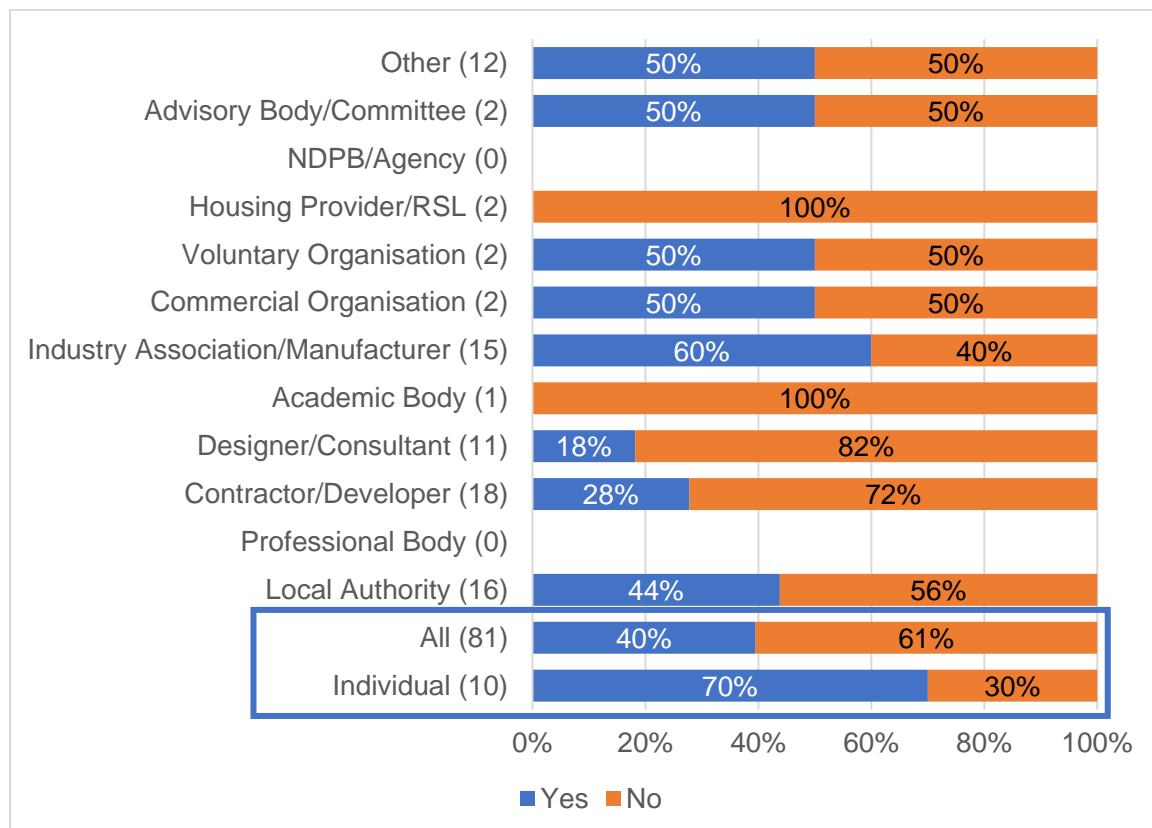
A few of those who did not respond to the multiple-choice question but offered comments focused on the need for a fabric first approach to energy efficiency measures. They called for this to be implemented as a priority at the outset and that the design needs to accommodate for any future adaptation via an allowance plan.

A few respondents stressed that it is considerably more challenging to bring an existing building to zero direct emissions after it has been constructed than it is to achieve this during its initial construction and as such the revised standards should be designed in such a way as to minimise the need for further retrofit by setting the highest possible standards in the short term.

### 3.12.6 Do you have any comments on the level of information needed to support such action (as asked in Question 12) in practice and on the extent to which alterations other than at, or very close to, the heat generator can be justified?

There were 81 responses received in total to this question (Figure 16) and 48 responses to the following open question where respondents were asked to provide more detail to support their answer. Five respondents provided an open response but did not answer the multiple-choice question.

Figure 16: Information needs on justification for alterations



Base: 81 respondents (95 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### 3.12.7 Analysis

Comment was provided by a total of 48 respondents. The comments vary in focus, but there are six emerging themes.

Several respondents highlight that what constitutes “simple future adaption” needs to be clarified before they go on to discuss the level of detail of the information which should be made available to homeowners. Various individual comments were made in support of this point.

A few respondents list the information which they feel should be provided in relation to heat pumps.

A few respondents highlight the considerable burden which will impact on design work, testing and verification.

The need for airtightness and airtightness testing was raised by a few respondents.

A few respondents also requested an evaluation on the impact on infrastructure should be carried out and consultation with energy providers to ensure national and localised grid networks can accommodate the required energy loadings. They suggest consultation with energy providers is also recommended to ensure localised grid networks can accommodate the required energy loadings.

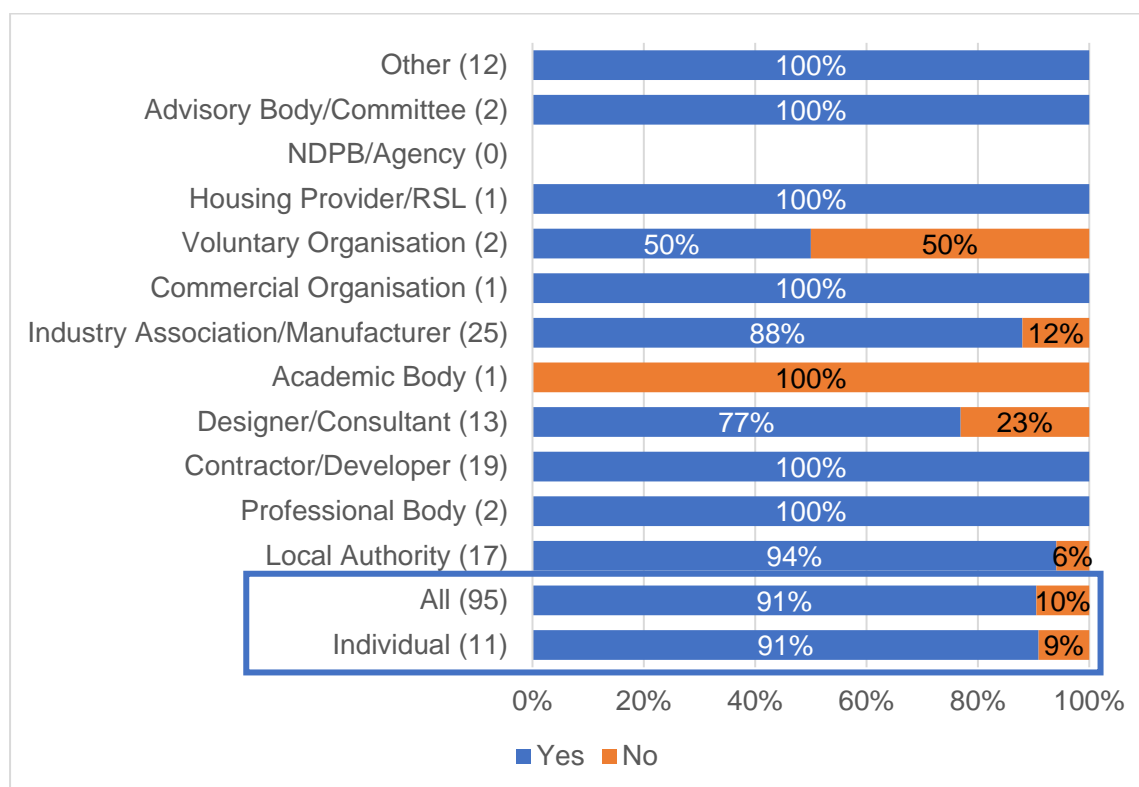
A few respondents suggest that fabric first should be the focus for all new-builds in order to achieve nZEB, thereby eliminating the need for future adaptation.

### 3.13 Fabric performance of new dwellings - Domestic

#### 3.13.1 Question 13 - Do you support the retention of the current elemental approach to setting minimum standards for fabric performance in new dwellings, supported by the option to take an alternate approach via calculation of the total space heating demand for the dwelling (as described)?

There were 95 responses received in total to this question and 82 responses to the following open question where respondents were asked to provide more detail to support their answer. Three respondents provided an open response but did not answer the preceding closed ‘yes/no’ question.

Figure 17: Fabric performance of new dwellings - Domestic



Base: 95 respondents (81 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### 3.13.2 Analysis

There is considerable support (91%) for the retention of the current elemental approach (Figure 17). Of these respondents, 66 provided further comments.

### 3.13.3 Support for the proposal

Positive comments are themed around, simplicity, flexibility, and familiarity.

Many respondents provided comments which highlight areas of concern, implication, or suggestions for further improvement.

A few respondents highlighted potential implications of the changes on design, typical construction, and provision of appropriate guidance to achieve the safe construction of these elements in line with other sections of the Scottish Building Standards (e.g., structure, fire, etc.).

A holistic and long-term approach is felt to be needed by a few respondents who suggested that total space heating demand calculations for new dwellings should achieve nZEB levels now. Linked to this, a response submitted by an industry association on behalf of their members suggests that a more effective way of defining emissions and energy efficiency targets to drive a step change in performance (whilst ensuring design flexibility and encouraging innovation) may be a space heating demand target (kWh/m<sup>2</sup>/yr).

### **3.13.4 Not in support of the proposal**

Eight comments were received from the 10% of respondents who opposed the proposal. Each highlighted what they viewed to be perceived risks to the approach. No common themes were apparent.

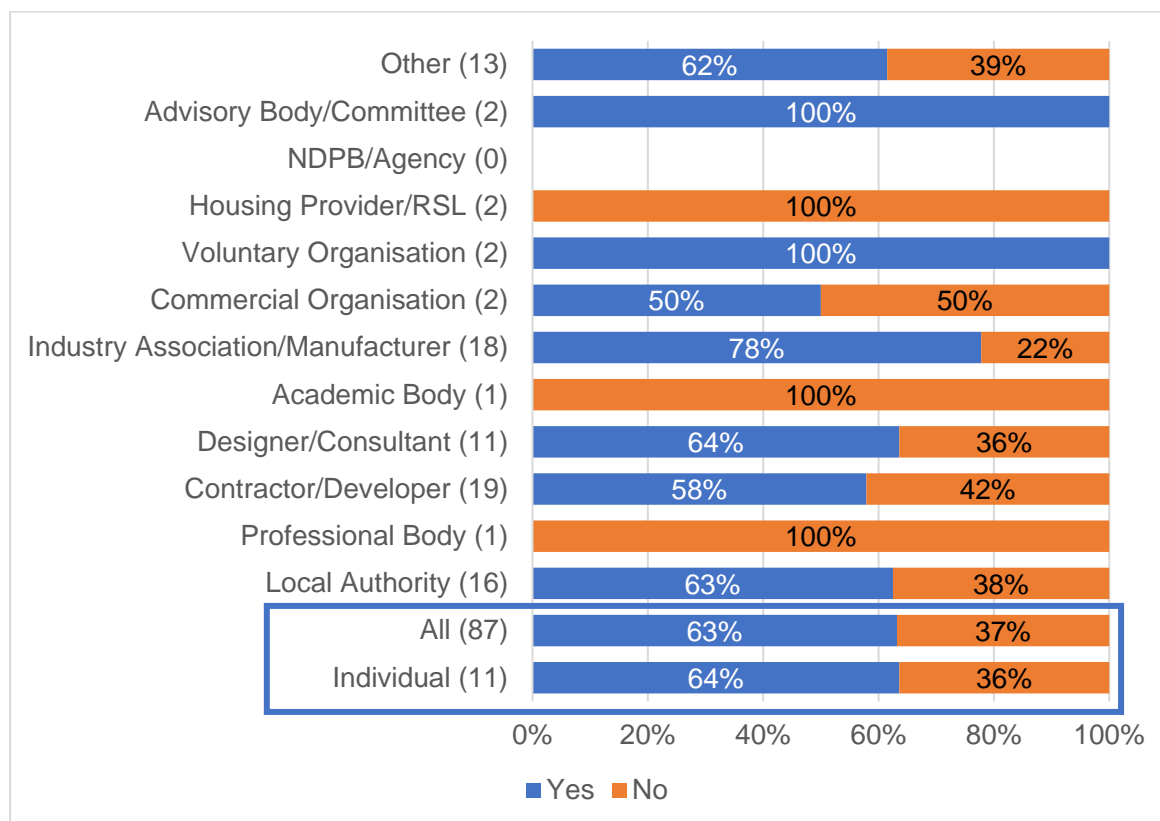
### **3.13.5 Non-responders**

A few comments were received from respondents who elected not to respond to the multiple-choice question. Two highlighted their agreement that minimum standards to drive further improvements in fabric performance are needed, and that flexibility is being retained through the alternative calculation. The third stated that if a delivered energy target is adopted and ZDE (zero direct emission) homes are exempted from an emission target, then direct electric heated homes may need a higher fabric standard.

### **3.13.6 In the context of the proposed approach (noted in Question 13), do you have any comments on the maximum U-values proposed for elements of fabric, in relation to their level of challenge and achievability at a national level?**

There were 87 responses received in total to this question (Figure 18) and 63 responses to the following open question where respondents were asked to provide more detail to support their answer. Five respondents provided an open response but did not answer the multiple-choice question.

Figure 18: Comments on the maximum U-values proposed for elements of fabric



Base: 87 respondents (91 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### 3.13.7 Analysis

Of the 55 who stated they had further comment, general statements were provided in support of the proposed approach.

Several respondents raised concerns over the availability of products, product development and potential related safety issues. Specific concerns were raised on behalf of the aluminium fenestration industry and in relation to the requirements for windows and doors and, triple glazing.

The subject of embodied carbon was raised by several respondents with three making the point that the insulation required to meet very low u-values are usually from non-renewable sources, therefore being counterproductive in terms of reducing embodied carbon.

Concerns were raised in a campaign response about achieving backstop U-Values of 0.16 and 0.17 for those involved in timber frame manufacturing. Similarly, this was a concern raised in relation to the manufacturing of windows and doors. One industry association respondent sharing the views of their members, states that whilst some feel the values proposed are ambitious but attainable, others are concerned that they are too stringent. As such, they suggest a staggered approach to tightening standards to allow industry time to adapt.

A few respondents had concerns about the increase in costs as a result of the proposal and referred to the ongoing materials shortages.

Of those who elected not to answer the multiple-choice question, several comments were received relating to aspects of glazing. For example:

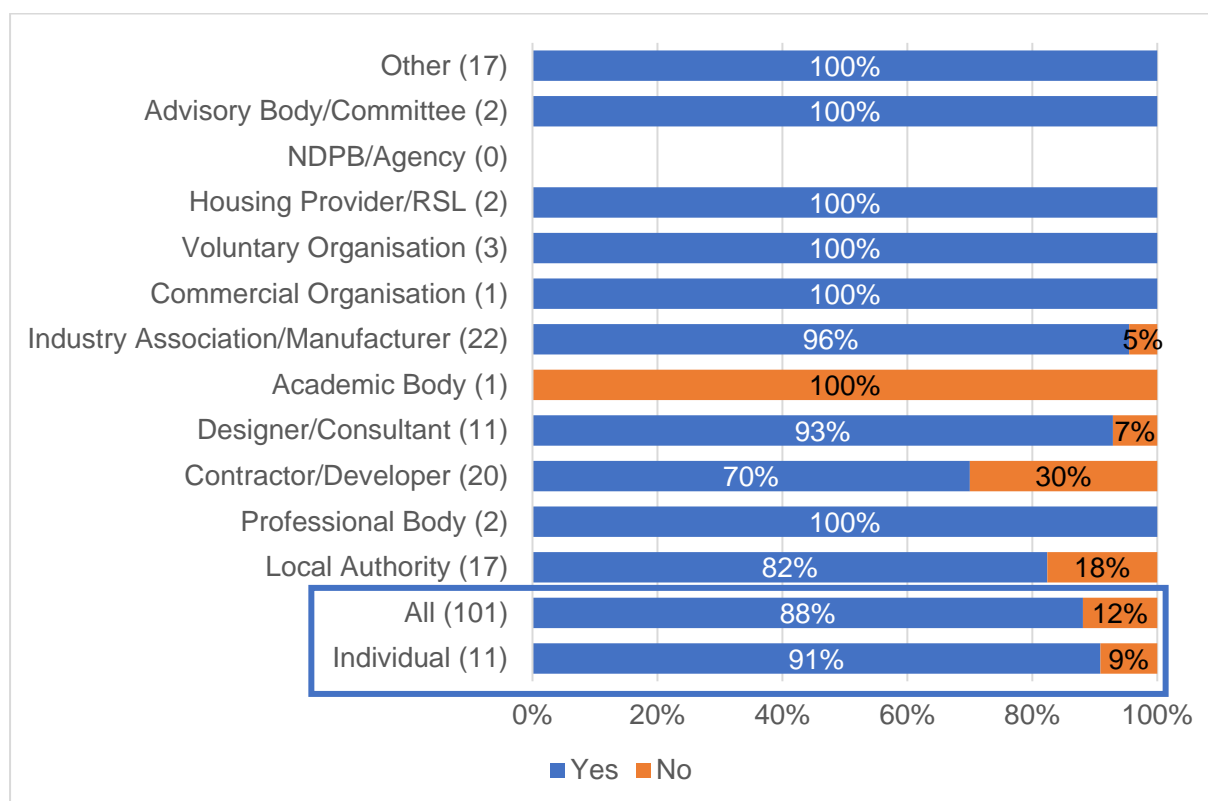
- Concerns relating to the minimum allowable U-values under the 'Advanced' option, for doors and windows which may be difficult to achieve when also taking into consideration other performance requirements such as fire rating or fire performance, as well as openable windows for free cooling.
- The higher specification may pose a challenge for window installers who will need more time to prepare products for market that can meet the challenges set by improved U value performance while still meeting the other specifications required.
- The inclusion of triple glazing to the 'Advanced' option presents practical issues in handling heavy elements on site and compromises solar gains.

### **3.14 Increase in airtightness testing - Domestic**

#### **3.14.1 Question 14 - Do you support the move to airtightness testing of all new dwellings, by registered members of an appropriate testing organisation?**

There were 101 responses received in total to this question and 91 responses to the following open question where respondents were asked to provide more detail to support their answer. Three respondents provided an open response but did not answer the multiple-choice question.

Figure 19: Increase in airtightness testing - Domestic



Base: 101 respondents (75 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### 3.14.2 Analysis

There is considerable support for the proposal to the move to airtightness testing of all new dwellings, by registered members of an appropriate testing organisation. Eighty-eight per cent of respondents stated they agree with the proposal (Figure 19).

### 3.14.3 Support for the proposal

Many respondents suggested that sample testing is not robust enough and that the standard of workmanship and site supervision on large sites cannot, or should not, be relied upon. Whilst a few respondents raised concerns in relation to cost, others suggested that 100% testing is cheap, effective and avoids confusion.

Several respondents also felt strongly that testing should be carried out by registered members of an appropriate testing organisation.

Several respondents highlighted that 100% testing will also produce accurate full market performance data.

Several respondents raised concerns and sought reassurances about the capacity of the airtightness testing industry to support the proposed change. They questioned the availability of equipment and approved assessors. A few respondents felt that early engagement with the airtightness testing industry will be critical.



### **3.14.4 Not in support of the proposal**

Twelve respondents (12%) stated they do not agree with the proposal, eleven of whom provided a supporting comment.

All comments suggested that in certain circumstances, testing ALL new dwellings is felt to be unnecessary and excessive. Contractor/Developer respondents typically drew attention to multiplot sites and apartments where many of the same size and form are constructed and as such, a representative sample is suggested to be more appropriate. Related to this point, one respondent also drew attention to localised weather conditions which do not always permit testing to be carried out due to windspeeds which exceed the maximum permitted, potentially causing significant delays.

Several respondents expressed concerns that the air testing industry will fall significantly short in resource and capacity to cope with what will be a considerable rise in testing.

A few respondents also highlighted the cost impact for what they see as an unnecessary change.

### **3.14.5 Non-responders**

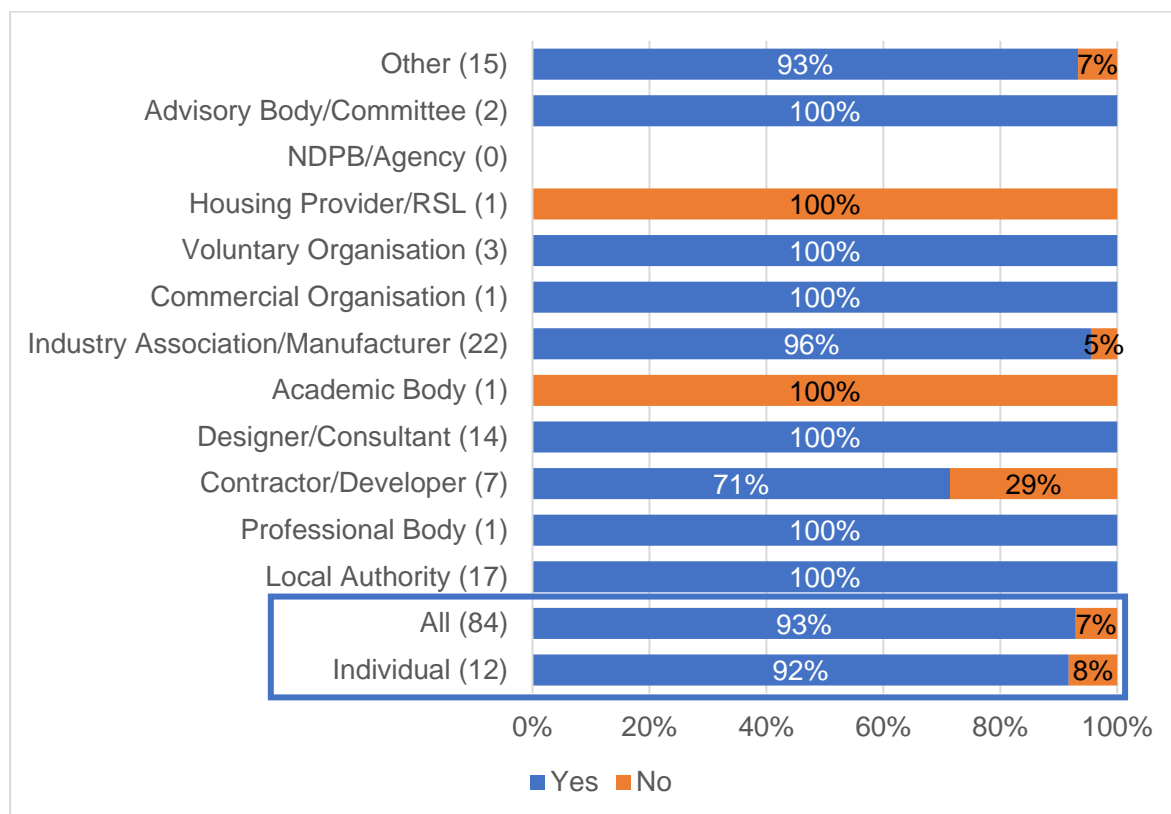
The respondents who did not answer the multiple-choice question indicated their agreement with the proposal and its potential to raise standards. Concerns were expressed relating to weather conditions required for testing and that this may create a barrier to the achievement of the proposal.

## **3.15 Increase in airtightness testing – Non-domestic**

### **3.15.1 Question 15 - Do you support the move to increased airtightness testing of all new non-domestic buildings, by registered members of an appropriate testing organisation?**

There were 84 responses received in total to this question (Figure 20) and 67 responses to the following open question where respondents were asked to provide more detail to support their answer. One respondent provided an open response but did not answer the multiple-choice question.

Figure 20: Increase in airtightness testing – Non-domestic



Base: 84 respondents (92 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### 3.15.2 Analysis

The majority of respondents (93%) support the proposal to move to increased airtightness testing of all new non-domestic buildings, by registered members of an appropriate testing organisation. Just 7% of respondents rejected the proposal.

### 3.15.3 Support for the proposal

General comments from those in support suggest that the proposal is proportionate and that airtightness tests are felt to provide a good measure of the construction quality of a building. It was suggested that the proposal will bring consistency across the UK which will be beneficial, and more jobs will be created to cope with increased demand.

The requirement for the testing to be carried out by a registered member of an appropriate testing organisation is also supported by a few respondents, comments highlight that this will provide impartiality.

Exceptions to the requirements were raised by a few respondents. Modular buildings are the focus for one Industry Association/Manufacturer respondent who calls for relaxation of the testing for small modular buildings with a floor area of <200 m<sup>2</sup>. A further respondent focused on shell and core projects which they believed are not always re-tested post-fitout when potentially the fabric of the building has changed.

### 3.15.4 Not in support of the proposal

Of the six respondents who stated they did not agree with the proposal, no substantive comments were received.

### 3.15.5 Non-responders

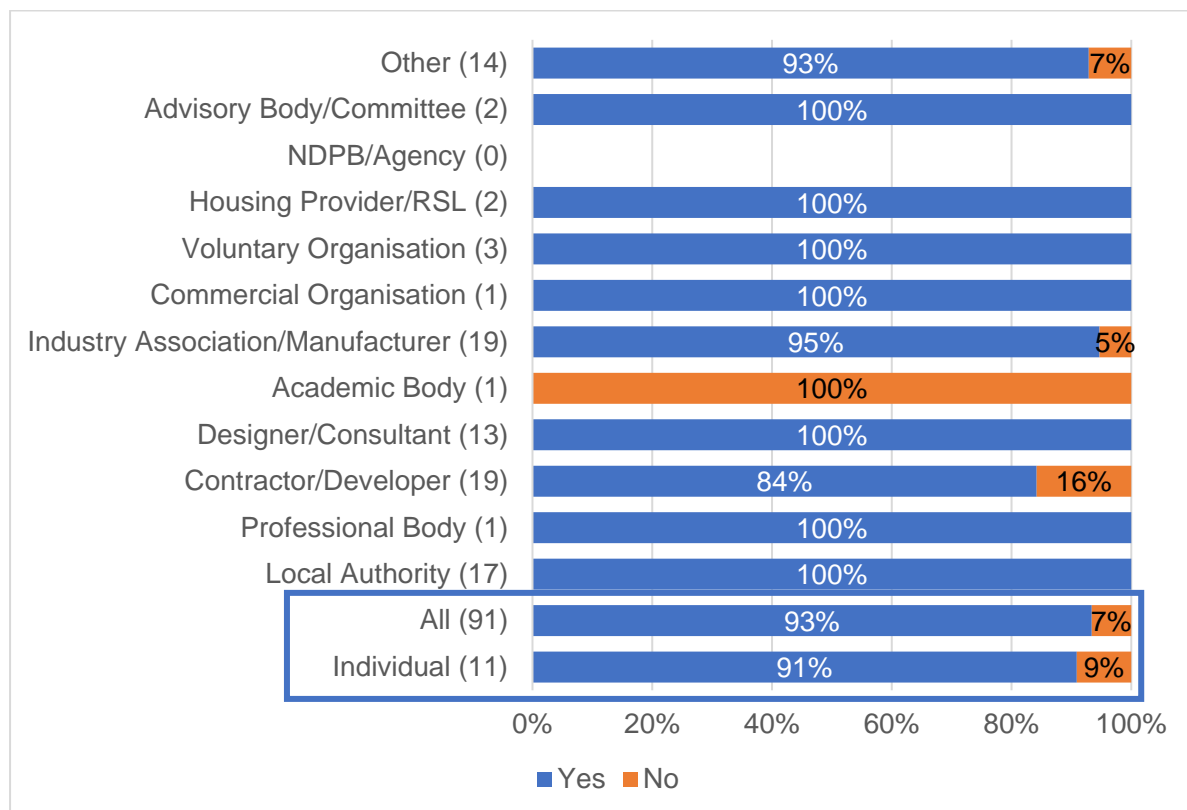
The open response comment provided by the respondent who elected not to answer the multiple-choice question highlights that, in their view, the proposal will ensure build quality and energy performance targets are met at completion.

## 3.16 Adoption of CIBSE testing methodology

### 3.16.1 Question 16 - Do you support the adoption of CIBSE TM23 as the basis for airtightness testing in Scotland?

There were 91 responses received in total to this question and 77 responses to the following open question where respondents were asked to provide more detail to support their answer. Twelve respondents provided an open response but did not answer the preceding closed 'yes/no' question.

Figure 21: Adoption of CIBSE test methodology



Base: 91 respondents (85 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### **3.16.2 Analysis**

There is significant support for the adoption of CIBSE TM23 as the basis for airtightness testing in Scotland. Ninety-three per cent of respondents stated their support for the proposal and just 7% reject it (Figure 21).

### **3.16.3 Support for the proposal**

Of those who agree with the adoption of CIBSE TM23 as the basis for airtightness testing in Scotland, 60 provide further comment. The main theme emerging in the comments relates to consistency across nations. Many comments highlight that CIBSE TM23 is the current standard across many parts of the UK for the testing of buildings for air leakage and that it would be practical for Scotland to adopt the same principles and standards to align with the rest of the UK.

Several respondents expressed the view that the adoption of the CIBSE guide will enhance the guidance given to airtightness testing technicians and will create a more robust testing methodology. However, there was a call for the refinement of the testing methodology document to tackle industry queries and ensure it includes all the information required for airtightness testers. Another respondent called for further versions of the guidance to incorporate input from cross-industry working groups to ensure quality and relevance.

Several respondents suggested that buildings should be tested at a range of air pressures up to 50Pa, by both pressurising and depressurising the building envelope.

### **3.16.4 Not in support of the proposal**

Of the six respondents who stated they do not agree with the adoption of CIBSE TM23 as the basis for airtightness testing in Scotland, one provided no comment, and three felt they are not in a position to provide comment due to either insufficient information or a lack of specialist knowledge.

The other two respondents raised concern about the adoption of the CIBSE TM23 stating that the CIBSE TM23 is out of date and draw attention to the ATTMA Technical Standards TS L1, L2, L3 and now TSL4 for energy efficient (Low energy) buildings which is the named test standard in Scotland. They raised concerns about the unnecessary replacement of the standard (and associated cost to the taxpayer) when the methodology has never been questioned and no formal complaint about the independence of the standard has ever been raised (FOI request 4530647).

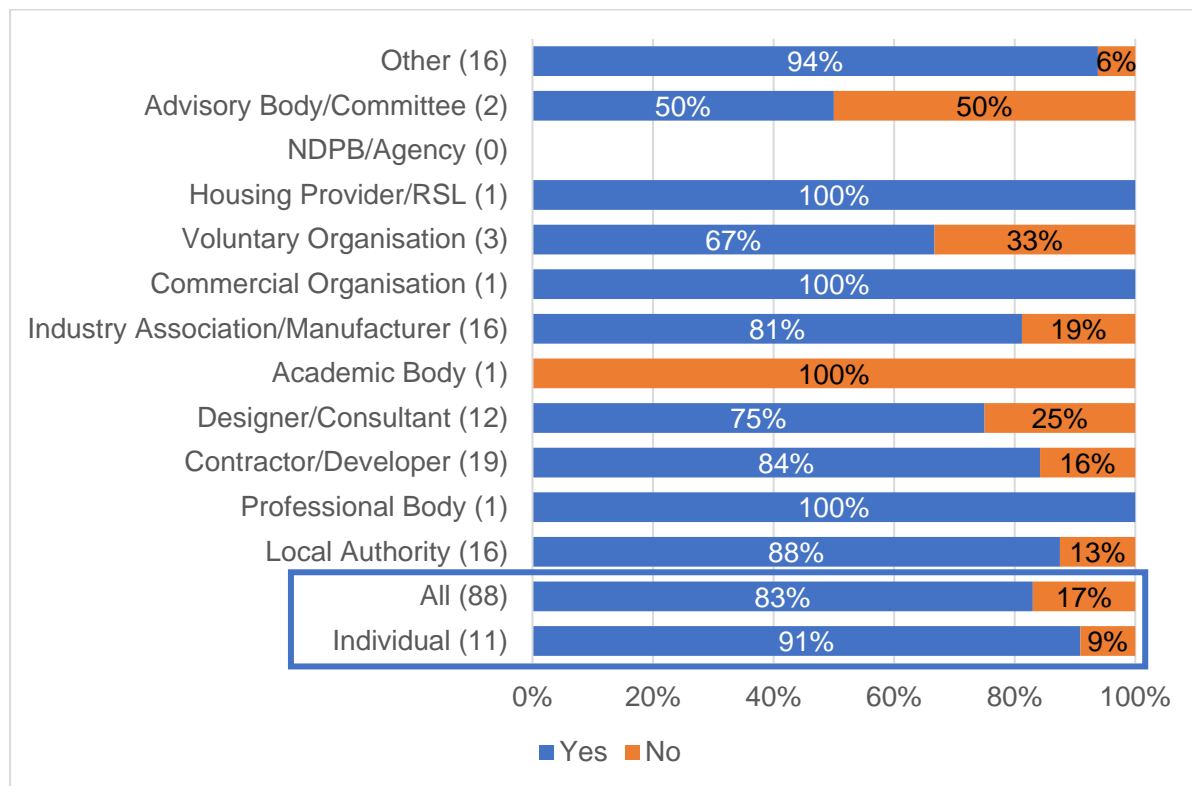
## **3.17 Adoption of option to apply 'pulse' test**

### **3.17.1 Question 17 - Do you support the introduction of the pulse test method of airtightness testing as a further means to testing and reporting on the performance of new buildings?**

There were 88 responses received in total to this question and 82 responses to the following open question where respondents were asked to provide more detail to

support their answer. Fourteen respondents provided an open response but did not answer the preceding closed 'yes/no' question.

Figure 22: Adoption of option to apply 'pulse' test



Base: 88 respondents (88 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### 3.17.2 Analysis

The majority of respondents (83%) support the introduction of the pulse test method of airtightness testing as a further means to testing and reporting on the performance of new buildings (Figure 22). Seventeen per cent reject the proposal.

### 3.17.3 Support for the proposal

Several respondents in favour of the proposal discussed the advantages of consistency across the nations. They pointed out that this methodology has already been adopted by England and Wales, and its adoption by Scotland is seen as advantageous.

Several respondents also raised concerns around whether the apparatus will work on a timber kit, and if the vapour barrier would give incorrect readings.

Several respondents stressed that they do not feel the pulse test method should be the sole method used but as a further means to test and report on the performance of new buildings. Its use is encouraged alongside the blower door test.

Additionally, several respondents, whilst recognising the positive contribution the pulse test method will make, felt that the proposals should go further and advocate for both positive and negative pressurisation testing to properly assess the

construction and ascertain where remedial action is required. Two further respondents highlighted that pulse testing cannot assist with fault finding.

Several respondents discussed how the speed, portability, and ease of operation of pulse testing will increase capacity and create a competitive market.

A few respondents stressed that they would only support the introduction of the pulse test method of airtightness testing if it is proven to be a direct equivalent of the current air tightness testing principals and call for evidence of its effectiveness.

In addition, a few respondents suggested that the pulse testing provides a cost-effective method of meeting the increase in the level of airtightness testing required.

A few respondents considered the pulse test method to be more representative of the conditions buildings are likely to experience once occupied with another stating it is less intrusive and less reliant on external weather.

A few respondents questioned if the pulse test method is sufficiently effective for low energy buildings, with one respondent noting that the pulse test method is only applicable for airtightness down to 1.5 m<sup>3</sup>/m<sup>2</sup>.h and another raised concerns about its effectiveness in larger buildings.

#### **3.17.4 Not in support of the proposal**

Of the 14 comments made by respondents who stated that they did not support the introduction of the pulse test method of airtightness testing as a further means to testing and reporting on the performance of new buildings; several stated they had no comment or felt they were not in a position to comment.

A few respondents felt the introduction of the pulse test method would cause confusion in the industry by providing two sets of results one at 4 Pa and the other 50Pa.

A few other respondents raised concerns that there is currently only one supplier of pulse air testing equipment and, as such, Building Regulations should not be promoting the use of that method.

A few respondents questioned whether the pulse test has yet been proven to be consistently accurate, particularly for very airtight buildings. Similarly, a further respondent questioned its effectiveness for large scale or complex buildings.

#### **3.17.5 Non-responders**

Of the 14 comments made by the respondents who elected not to answer the multiple-choice question, the majority either stated they had no comment or, explained they did not feel qualified to provide a response. Two substantive comments were made.

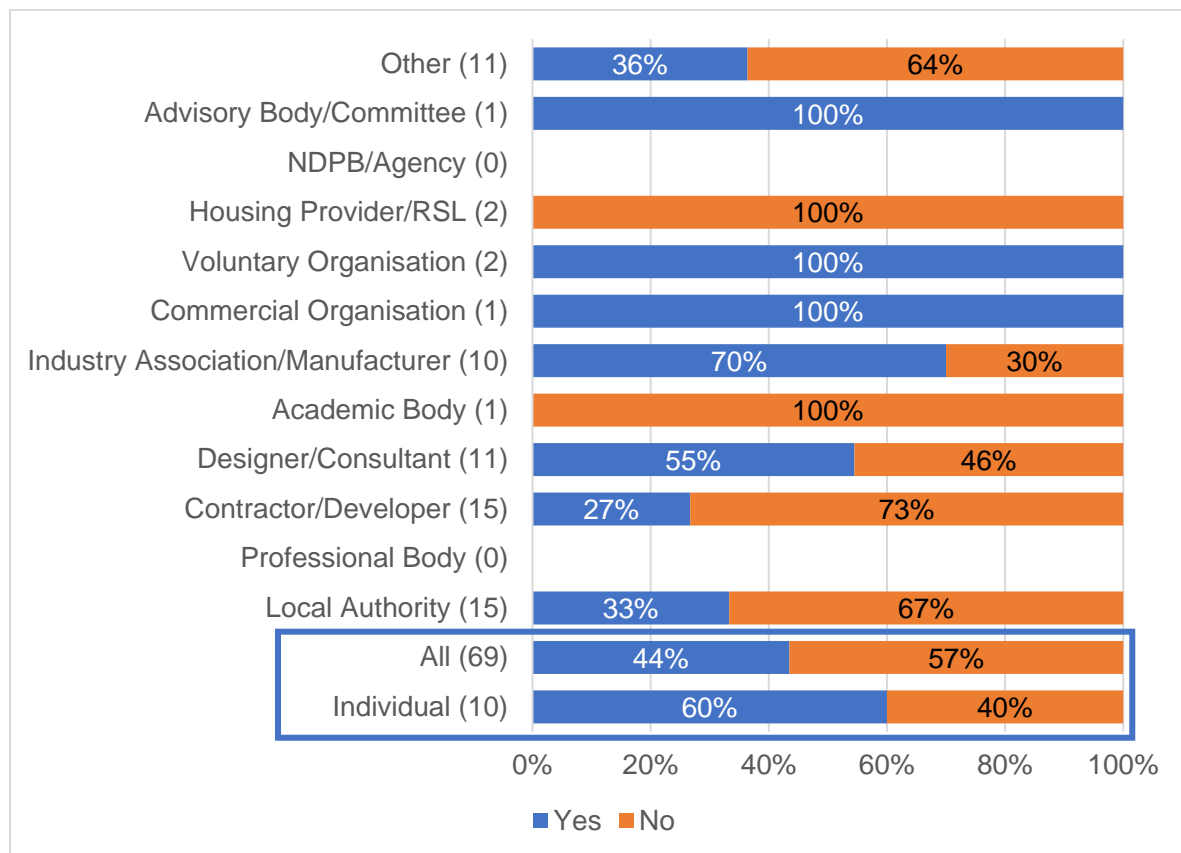
- The first stated support for the introduction of the pulse test method as it is better than testing once at 50Pa.

- Conversely, the other respondent stated that they do not support the proposal as they feel it would create confusion in the industry giving results at 4 Pa rather than 50Pa.

### 3.17.6 (in relation to Question 17) Are there any particular benefits, risks, or limitations you would seek to identify?

There were 69 responses received in total to this question and 52 responses to the following open question where respondents were asked to provide more detail to support their answer. Sixteen respondents provided an open response but did not answer the multiple-choice question.

Figure 23: Benefits, risks, or limitations to applying 'pulse' test?



Base: 69 respondents (107 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### 3.17.7 Analysis

A marginal majority of respondents (57%) state there are no particular benefits, risks, or limitations they would seek to identify (Figure 23).

The majority of those stating there were no particular benefits, risks, or limitations they would identify, provided no further comment.

Of those who stated there were particular benefits, risks, or limitations they would seek to identify, 29 provided further comment.

Benefits were specified by several respondents and include: a greater scope of choice of tests (and testers); pulse testing possible in adverse weather conditions; and that the pulse testing is easier to undertake allowing it to be completed more often throughout the construction process.

### **3.17.8 Risks identified by respondents**

- An increased use of MVHR use as a result of the requirement for air tightness and focus on increased fabric performance.
- Developers must identify the risk(s) of using alternative test method, especially with regard to the absence of fault diagnosis.
- Ventilation & airtightness - consideration required as to how the airtightness and ventilation requirements are met (and balanced) so as to not impact to on the health and safety of occupants.
- Standards are considered in isolation - other aspects such as thermal bridging should be considered.
- Shortage of suitably trained and competent operatives.
- Lack of awareness in Scotland.

### **3.17.9 Limitations identified by respondents**

- The capability of pulse testing to produce detailed diagnostics to identify any weak points in the building fabric.
- Accuracy and/or reliability of pulse.
- Training - current level of knowledge will need to be increased in order to deliver the net zero and higher standard in an affordable market.
- Equipment availability and/or supply.
- The effectiveness of pulse testing in a large scale or complex building requires further research.
- Maximum permeability rates need improved to Passivhaus level.
- Weight of kit and length of time to set up and charge.

### **3.17.10 Additional points from respondents who did not answer the multiple-choice question**

Sixteen comments were received from those respondents who did not provide a response to the multiple-choice question; however, 11 stated they had no comment or that they did not feel qualified to answer the question.

The remaining five respondents highlighted what they view to be the benefits, risks, and limitations:



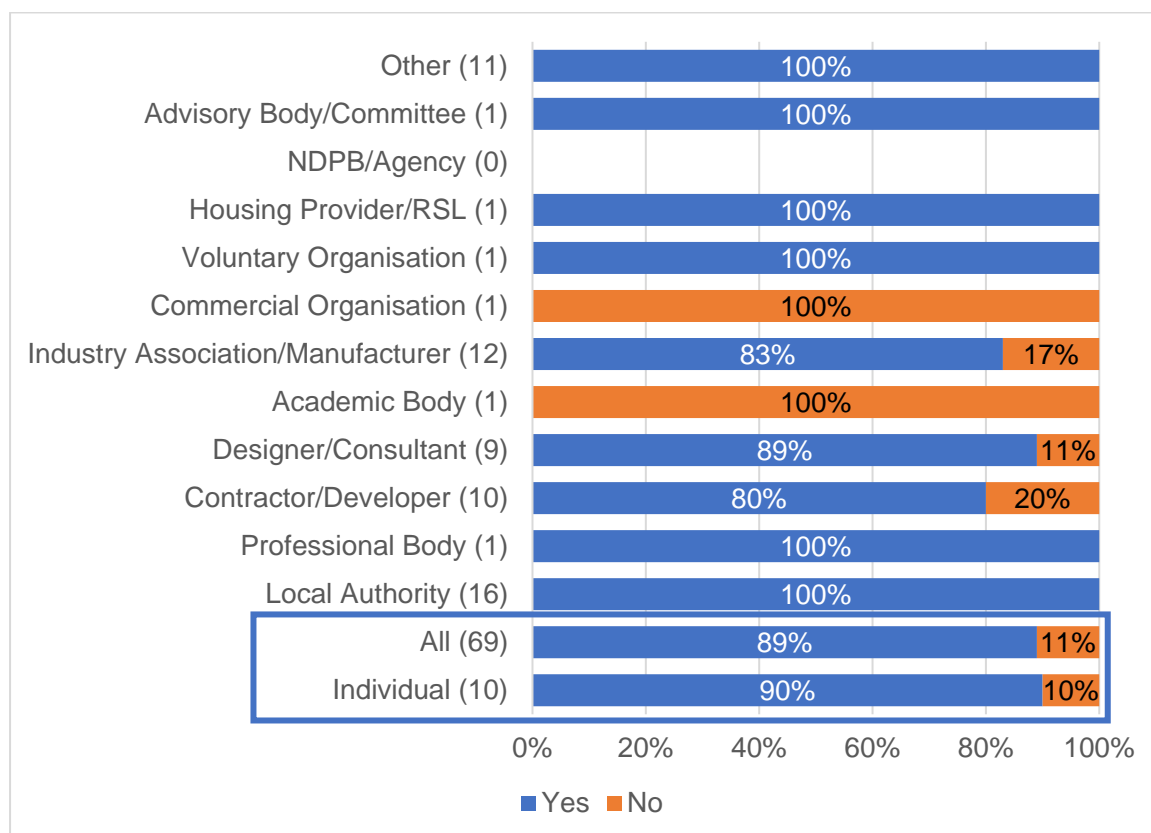
| Benefits  | Risks and/or limitations   |
|---|--|
| <ul style="list-style-type: none"> <li>• Greater consistency</li> <li>• Less reliance on external factors/weather</li> <li>• Speed of deployment</li> <li>• Cost of deployment</li> </ul> | <ul style="list-style-type: none"> <li>• Introduction of further method adds complexity (and comparability of the two methods is unknown)</li> <li>• Effectiveness for testing timber frame buildings</li> <li>• Doesn't support diagnosis of building defects</li> <li>• Higher cost</li> </ul> |

### 3.18 Modular buildings – Non-domestic

#### 3.18.1 Question 18 - Do you consider the amended provision provides an appropriate balance between: the requirement to improve building energy performance in new buildings; enabling the reuse of better performing modular elements; and enabling use of small units for short term use at short notice?

There were 64 responses received in total to this question and 56 responses to the following open question where respondents were asked to provide more detail to support their answer. Eighteen respondents provided an open response but did not answer the multiple-choice question.

Figure 24: Modular buildings – Non-domestic



Base: 69 respondents (107 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### **3.18.2 Analysis**

The majority of responses to the question were positive with 89% of respondents stating they do consider the amended provision provides an appropriate balance between: the requirement to improve building energy performance in new buildings; enabling the reuse of better performing modular elements; and enabling use of small units for short term use at short notice (Figure 24). Eleven per cent of respondents did not support the proposal.

### **3.18.3 Support for the proposal**

Further comments made by several respondents focused on modular, stating that amended provision to Modular Non-Domestic Buildings does enable the continued use of existing stocks of building modules and sub-assemblies, subject to the fabric insulation meeting limiting U-values. Respondents predominantly believed the proposal strikes an appropriate balance between reuse of modules and sub-assemblies, and the need to reduce energy use.

Three respondents submitting a campaign response stated that they would welcome the Scottish Government's views on the proposed simplification achieved by setting of a single set of values for all building work to new and existing buildings.

A few additional comments were made: consideration should be given to a restriction on the oversize of limited life modular buildings; building owners should commit to reuse and recycling at the outset (it is an important driver for a circular economy); material availability is an important limiting factor.

### **3.18.4 Not in support of the proposal**

Seven respondents state they do not consider the amended provision provides an appropriate balance between: the requirement to improve building energy performance in new buildings; enabling the reuse of better performing modular elements; and enabling use of small units for short term use at short notice. Four respondents did not provide any comment to support their view.

### **3.18.5 Non-responders**

Those who provided further comment without offering a response to the multiple-choice question, primarily stated they had no comment or felt they were not in a position to comment. Where comments were made, these were largely in support of the amended provision.

## **3.19 Further comments on setting performance targets for new buildings**

**3.19.1 Question 19 - We welcome any other comments you may wish to make on the proposed changes to the setting of performance targets for new buildings or the application of other amended provisions within Section 6 (energy) of the Technical Handbooks which apply to the delivery of new buildings.**

There were 88 responses received in total to this open question where respondents were asked to provide their comments.

### **3.19.2 Analysis**

Twenty-seven of those who provided comment in fact stated that they had 'no comment', 59 substantial comments were made by respondents. Points made commonly reinforce, repeat, and add emphasis to comments made in response to previous questions.

Many respondents refer to SAP and Passivhaus PHPP in their comments. Several state the need to move away from SAP as a measure of energy performance and the need to consider the use of Passivhaus PHPP (or an equivalent).

The timescales for the programme were commented on by several respondents.

Comments included:

- Clarification of what is expected to happen in 2024.
- Meeting the requirements within the timescales will be a challenge.
- A forward look would be helpful on future changes to building standards.
- The programme should be accelerated and a high as possible target set.

A few respondents suggest that the impact on and use of verifiers and certifiers should be considered.

A few respondents state that they would welcome further guidance that could be incorporated into the Technical Handbooks that will help inform designers and contractors on how to achieve net zero carbon.

A concise definition of zero direct emissions was requested by a few respondents.

### **3.19.3 Technical observations**

- The notional specification for doors in non-domestic buildings is shown as 2.0, however, the limiting maximum U value for doors is 1.4 and 1.0.
- Allowance for not specifying an infiltration rate should be removed from the domestic handbook (6.2.4), and a design value made mandatory.
- The option to not have an air pressure test carried out if the default value of 15 was assigned should be removed (6.2.5).

## 4 Part 3 – Energy, all buildings

This section of the consultation introduces proposed changes to provisions which apply to new buildings and to new work to existing buildings. These are the provisions sought when demonstrating compliance with Standards 6.2 to 6.8 and 6.10 within section 6 (Energy).

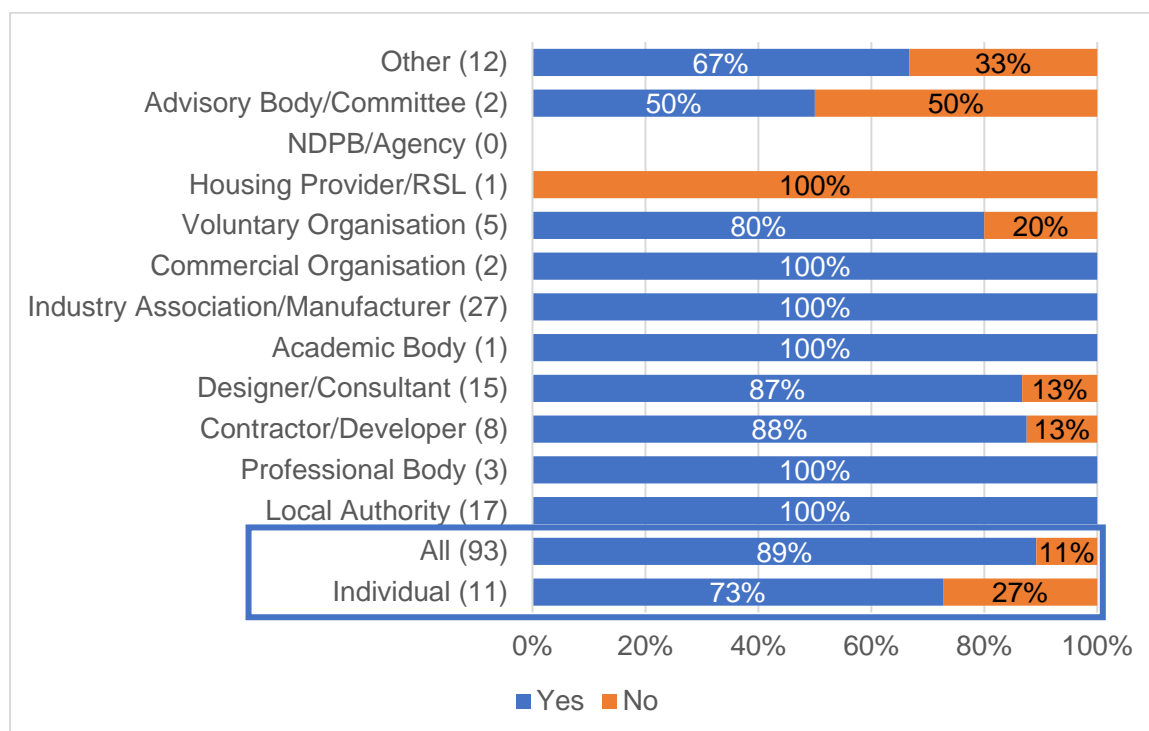
This includes proposals for improved minimum standards for building fabric and a simplification of how these are applied across new and existing buildings.

### 4.1 Introduction of the term ‘Major Renovation’

#### 4.1.1 Question 20 – The term ‘major renovation’ means the renovation of a building where more than 25% of the surface of the building envelope undergoes renovation. Do you agree with the proposed introduction of this term as an additional means of identifying when aspects of building regulations shall be applied to an existing building?

There were 93 responses received in total to this question and 79 responses to the following open question where respondents were asked to provide more detail to support their answer. Eight respondents provided an open response but did not answer the multiple-choice question.

Figure 25: Introduction of the term ‘Major Renovation’



Base: 93 respondents (83 no response) NB Individual respondents are listed separately at the bottom for information – as they are included in organisation responses (per Section 2.3)

### **4.1.2 Analysis**

There is support for the proposal with 89% of respondents in agreement and 11% rejecting the proposal (Figure 25).

### **4.1.3 Support for the proposal**

The detailed comments vary, with many simply stating that renovation is a good time to consider energy performance improvements. Others state that the trigger point of 25% is both needed and appropriate.

Several respondents feel that the proposal will support action on the provision of electric vehicle charging infrastructure or facilities, at least initially.

Several respondents focus on the breadth of application and would like to see this expanded. Respondents suggest that a major renovation should be a trigger to deliver energy performance improvements across ALL aspects and not just EVs.

A few respondents question why the definition only applies to the building surface with one suggesting that the installation of a heat pump, with new heat emitters, should be classed as a 'major renovation'.

There is a call for regulations to be carefully drafted to avoid conflict with the PAS2035 whole house retrofit approach.

Several respondents draw attention to the fact that this proposal will bring Scotland into alignment with the rest of the UK.

Caution when drafting the proposals is advised by a few respondents who suggest that the regulations need to be drafted carefully to avoid conflict with the PAS2035 whole house retrofit approach.

### **4.1.4 Alternative metrics were proposed by a few respondents:**

- Percentage of property value, especially in the domestic sector (10%).
- Where an element such as a roof is being upgraded, the upgrade must include improvements to the thermal performance, or else 25% of each individual element rather than the whole building envelope.

### **4.1.5 Not in support of the proposal**

Of the 10 respondents who did not agree with the introduction of the term 'major renovation' as an additional means of identifying when aspects of building regulations shall be applied to an existing building, two made no further comment.

Several respondents raised concerns with the clarity of the term or alternative definitions. For example:

- Whether the replacement of 25% of the tiles on a roof would be classed as a major renovation.
- The definition should be based on the level of disruption for the occupants.

#### 4.1.6 Non-responders

Six respondents who elected not to answer the multiple question offered a significant comment. Further discussion is sought in relation to small houses, e.g., will there be a minimum size of home to which the regulations will apply?

There is a call for clarity on what is meant by the ‘surface of the building envelope’.

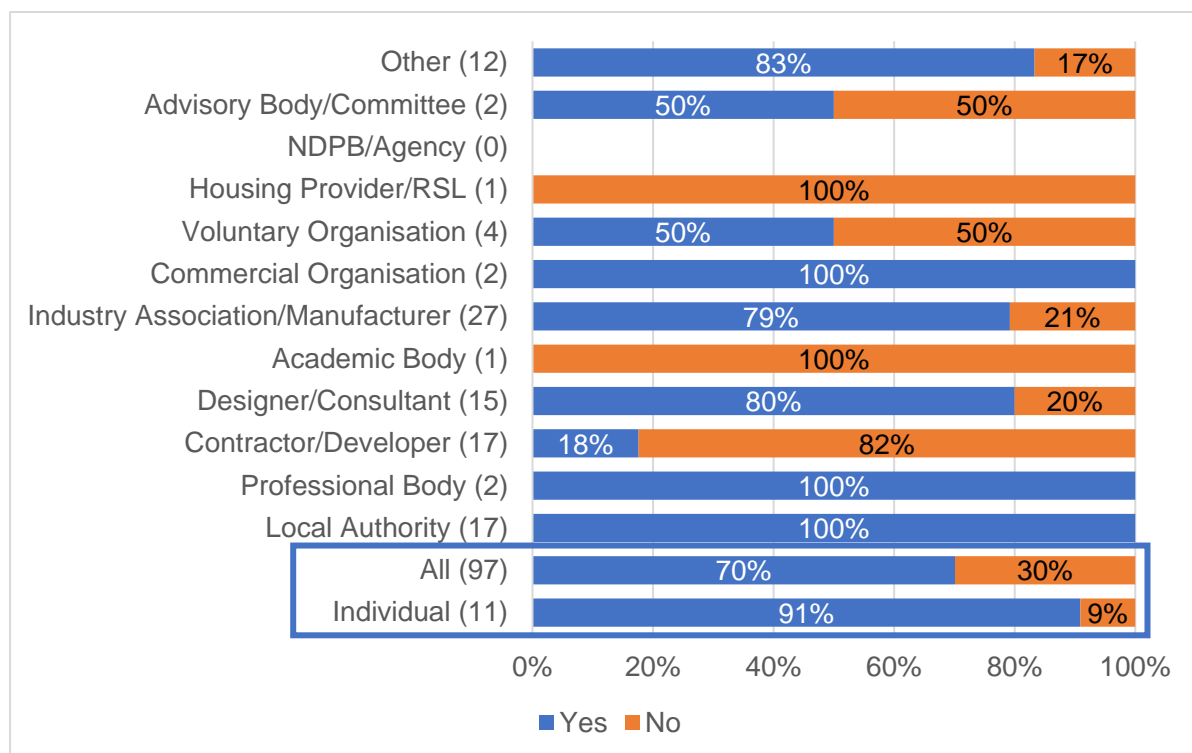
One respondent drew attention to two scenarios which would not currently require a building warrant at present but may be classed as ‘major renovation’ moving forward - rendering a building and internal wall insulation

### 4.2 Revision of minimum performance for building fabric - Domestic

#### 4.2.1 Question 21 - Do you support the proposed improvement in maximum U-values for elements of building fabric for domestic buildings?

There were 97 responses received in total to this question and 88 responses to the following open question where respondents were asked to provide more detail to support their answer. Ten respondents provided an open response but did not answer the multiple-choice question.

Figure 26: Revision of minimum performance for building fabric - Domestic



Base: 97 respondents (79 respondents) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

#### 4.2.2 Analysis

Seventy per cent of respondents support and 30% of respondents reject the proposed improvement in maximum U-values for elements of building fabric for domestic buildings (Figure 26).

### **4.2.3 Support for the proposal**

The majority of respondents advocate a fabric first approach and expressed the view that this action is key to cutting greenhouse emissions.

A few respondents felt the maximum U-Values of building fabric of Domestic buildings could be improved upon, particularly for new build properties.

### **4.2.4 Not in support of the proposal**

Those who stated they did not support the proposed improvement in maximum U-values for elements of building fabric for domestic buildings provided explanatory comments in the following areas:

- Several respondents stated that further changes to backstop U values could impact on design and construction methods.
- Risk of unintended consequences was raised by several respondents – such as increased costs for triple glazing to achieve the proposed U values, knock-on effects of heat recovery and vents or potential damage to building fabric.
- Viability of option 2 in relation to the U value of doors was raised by several respondents.

### **4.2.5 Non-responders**

Of those who choose not to answer the multiple-choice question, ten provided comment. The main theme to those comments is agreement that improving the energy performance of ALL dwellings is essential to mitigate climate change, however, respondents stress that the requirements for retrofit of existing and traditional buildings must be proportionate and consider unintended consequences.

The need for the supply chain to be adequately prepared to deliver to these standards at the pace and scale required was also raised.

One technical response was received in relation to roofs and roof lights:

- $U=0.11$  for roofs means over 450 mm roof insulation; this might be technically problematic.
- For rooflights,  $U=1.9$  and  $1.7$  are not realistic.  $U=2.2$  (as adopted by DLUHC in England) may be the reasonable maximum.

### **4.2.6 We would also welcome your views on the proposed simplification (in Question 21) achieved by the setting of a single set of values for all building work to new and existing domestic buildings**

There were 61 responses received in total to this open question.

### **4.2.7 Analysis**

Eleven respondents stated they had no comment, however, 21 respondents felt that the proposed simplification achieved by the setting of a single set of values for all building work to new and existing domestic buildings would avoid confusion, remove

complexity, and provide benefits of consistency. It is felt to be beneficial for both designers and verifiers.

Many respondents raised concerns in relation to existing buildings. They highlighted that achieving the values is more challenging in the context of the existing buildings warn against a broad-brush approach. Flexibility in approach when dealing with buildings of traditional construction (e.g., stone, and slate properties; pre-1919; listed; within conservation area) is called for.

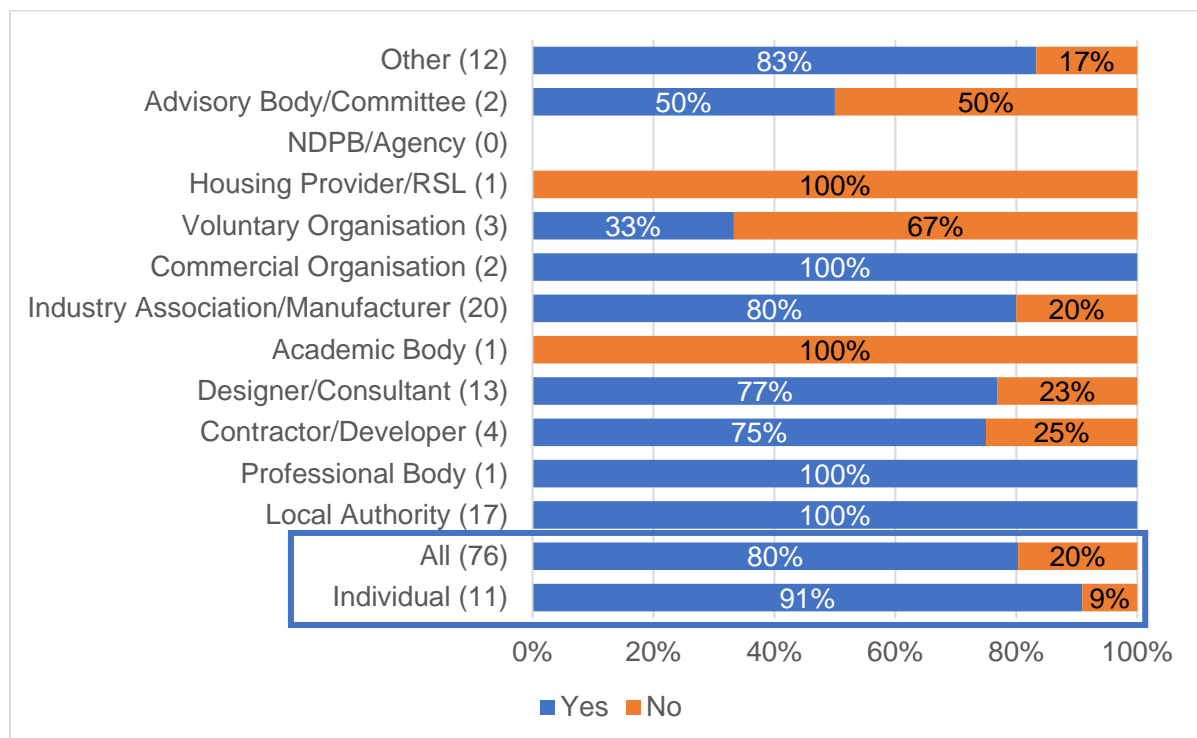
The omission of Window Energy Ratings as a compliance route is suggested to be an error by a few respondents.

### 4.3 Revision of minimum performance for building fabric – Non-domestic

#### 4.3.1 Question 22 – Do you support the proposed improvement in maximum U-values for elements of building fabric for non-domestic buildings?

There were 76 responses received in total to this question and 68 responses to the following open question where respondents were asked to provide more detail to support their answer. Thirteen respondents provided an open response but did not answer the multiple-choice question.

Figure 27: Revision of minimum performance for building fabric – Non-domestic



Base: 76 respondents (100 no response) NB Individual respondents are listed separately at the bottom for information – as they are included in organisation responses (per Section 2.3)

#### 4.3.2 Analysis

There is significant support for the proposed improvement in maximum U-values for elements of building fabric for non-domestic buildings with 80% of respondents stating their support (Figure 27). The remaining 20% rejected the proposal.



### **4.3.3 Support for the proposal**

A total of 41 comments were provided although seven simply stated they had no comment, or no view.

Substantive comments include:

- Non-domestic & domestic should be similar in standard.
- Advocate fabric first approach.
- Proposed u-values are ambitious but achievable with current technology and skills.
- Other aspects should be considered: thermal bridging, fenestration, air tightness, ventilation, air quality, heating systems & the use of heat recovery.
- Delivers improved consistency across the building stock, however, consideration is needed regarding the heterogeneous nature of building stocks.
- A whole building approach should be considered.
- Industrial developments can suffer from risk of overheating (where processes emit notable heat gains) – this should be considered.
- Window Energy Ratings (WER) and Door Set Energy Ratings (DSER) route to compliance should be retained in the regulations for non-domestic building that are domestic in nature.

### **4.3.4 Not in support of the proposal**

Of the 15 who stated they do not support the proposal, several offered substantive comments:

- Two Industry Association/Manufacturer respondents raised concerns about achievement of u-values within the timescales specified and with specific reference to glass rooflights.
- Another Industry Association/Manufacturer respondent focused their comment on cavity widths, which they suggested should aim to not exceed 150 mm which equates to a U-value of 0.18.
- One Designer/Consultant respondent asked for clarity in relation to the target values for roof-lights which they believe have been relaxed from the current 2015 guidance.

### **4.3.5 Non-responders**

Of those who provided a comment but did not answer the multiple-choice question, the majority stated that they have no comment or are not in a position to comment.

Four substantive comments were made each by one respondent:

- Supportive of a move to improve the fabric of the building although some concerns around the level at which this will be.

- Concern raised about possible unintended consequences as a result of the proposed standards.
- Requirements for retrofit of existing and traditional buildings must be included and must be proportionate.
- Suggest consideration should be given to the setting of a single set of values for ALL building work to new and existing buildings.

#### **4.3.6 We would also welcome your views on the proposed simplification (in Question 22) achieved by setting a single set of values for all building work to new and existing non-domestic buildings.**

There were 54 responses received in total to this open question.

#### **4.3.7 Analysis**

A substantial number of comments provide a limited response, offering either 'no comment' or simply confirming their support of the proposal.

Of the respondents who provided additional substantive commentary, three themes are apparent.

Several respondents cited the ease of understanding of the proposed simplification as a real benefit for the avoidance of confusion and one which will improve the efficiency of assessing the compliance of a proposal.

Several respondents noted that the proposed simplification will be more challenging in the context of some buildings for example, existing non-domestic and shell buildings.

The reinstatement of Window and Door Energy Ratings was cited by a few respondents, with two suggesting it should be retained for non-domestic buildings that are domestic in character, for example student accommodation

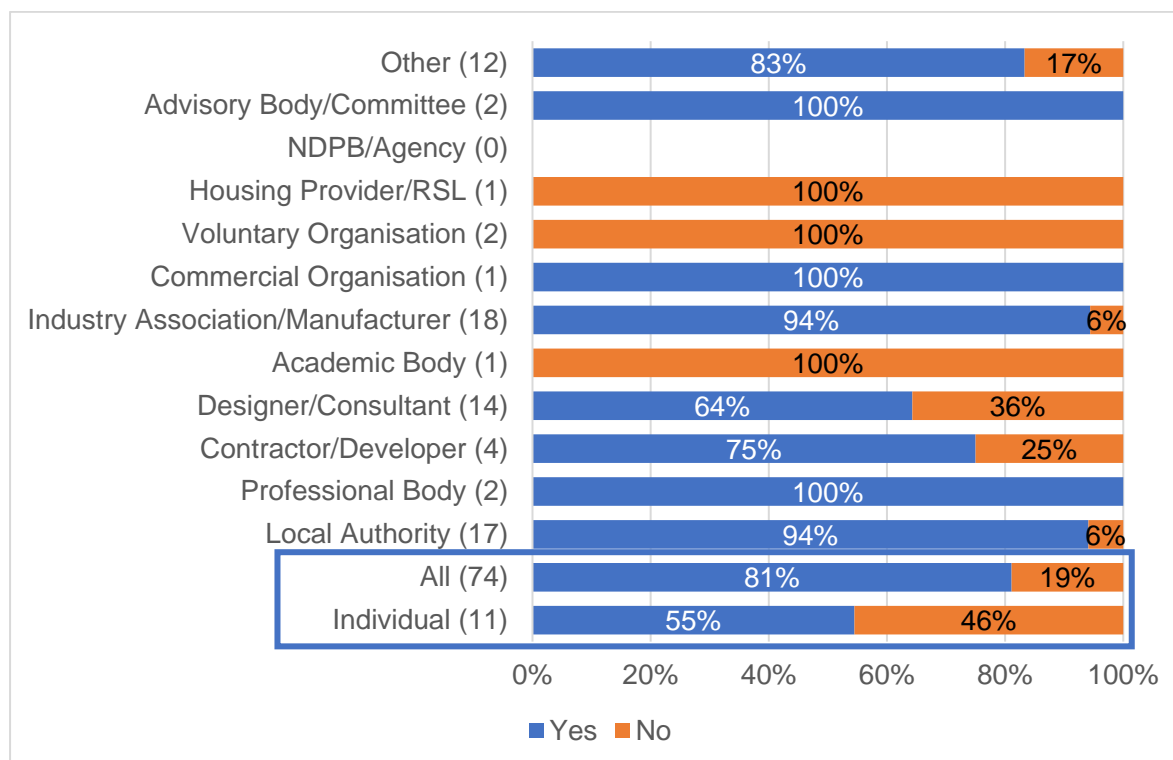
In addition to these themes a couple of other views were shared: one reiterating the benefits of standardisation across the UK. The other suggested that whilst a single set of U-Values would deliver improved productivity and economies of scale, the results for different dwelling typologies are likely to differ, resulting in variation of compliance levels.

### **4.4 Conversions, extensions, and shell buildings**

#### **4.4.1 Question 23 – Do you support the proposed standardisation of values and approach for conversions, extensions, and shell buildings?**

There were 74 responses received in total to this question and 63 responses to the following open question where respondents were asked to provide more detail to support their answer. Twelve respondents provided an open response but did not answer the multiple-choice question.

Figure 28: Conversions, extensions, and shell buildings



Base: 74 respondents (102 no response) NB Individual respondents are listed separately at the bottom for information – as they are included in organisation responses (per Section 2.3)

#### 4.4.2 Analysis

Considerable support is apparent for the standardisation of values and approach for conversions, extensions, and shell buildings with 81% of respondents stating they support the proposal (Figure 28). Nineteen per cent of respondents reject the proposal.

#### 4.4.3 Support for the proposal

Of the 60 respondents in support of the proposed standardisation of values and approach for conversions, extensions, and shell buildings, 40 provided comment. These comments offer general justification for their agreement stating it is sensible, provides clarity and, a better understanding of requirements. Several comments reinforce points made in relation to previous questions:

- Window and door energy ratings should be reinstated as a compliance route.
- The removal of the requirement to provide the more challenging fabric values in the shell, will lead to a reduction in the U values.
- Clarification needed as to what is ‘reasonably practicable’.

Of those who provide further comment but did not respond to the multiple-choice question, six offered substantive technical comment, largely in support of the proposed standardisation with some caveats:

#### Conversions

- Exemption process must be robustly defined, enforced, and monitored by BSD on an ongoing basis to reveal the extent to which this exemption is used.
- Not every conversion of an existing building is environmentally sustainable: where planning permission is required for a change of use, consent should be linked to the regulatory requirements.
- A compensatory approach must be retained for more difficult typologies (converted or upgraded historical buildings).
- For works to existing buildings additional regulatory requirements are recommended to support the demonstration of overall thermal compliance.
- Proper design detailing is of great importance when improving fabric efficiency to minimise the risk of unintended consequences.
- Area weighted values should follow those set out by the AECB retrofit standard and /or Passivhaus EnerPHit Standard.

### **Extensions**

- An extension should be used as an additional trigger for 'major renovation'.
- A step-by-step retrofit approach is beneficial, whereby the existing building is incrementally improved over time and once complete the extension typically contributes as a higher performing part of the overall building.
- Standards need to be as stringent as possible, whilst minimising the risk of unintended consequences.
- Area weighted values should follow those set out by the AECB retrofit standard and /or Passivhaus EnerPHit Standard.

### **Shell buildings**

- The weakening of fabric efficiency standards relative to 2015 standards goes against the principle that a fabric first approach is the first energy efficiency measure.

#### **4.4.4 Not in support of the proposal**

Eleven comments were made by respondents who do not support the proposal, however, seven respondents provided details:

### **Conversions**

- Such standardisation could discourage conversions.
- Not every conversion of an existing building is environmentally sustainable.
- A compensatory approach must be retained for more difficult typologies (converted or upgraded historical buildings).
- For works to existing buildings additional regulatory requirements are recommended to support the demonstration of overall thermal compliance.

## Extensions

- An extension should be used as an additional trigger for ‘major renovation’.
- A step-by-step retrofit approach is beneficial, whereby the existing building is incrementally improved over time and once complete the extension typically contributes as a higher performing part of the overall building.

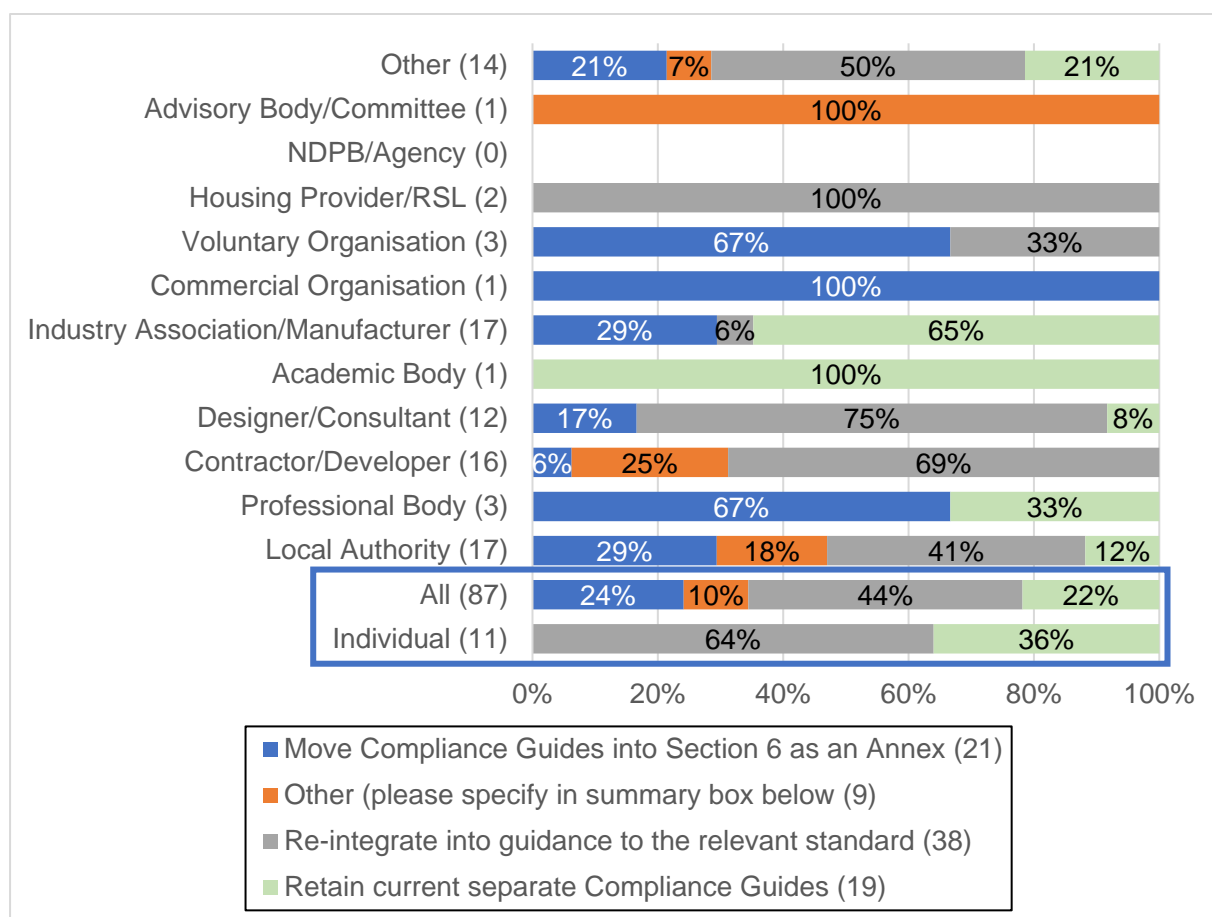
## Shell Buildings

- Shell buildings should still comply with the regulations, to avoid cutting corners at the time at which the shell building is constructed.

## 4.5 Presentation of information on building services

### 4.5.1 Question 24 - If you have a view on the preferred format for presentation of information on compliance of building services, what would be your preference?

Figure 29: Presentation of information on building services



Base: 87 respondents (89 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

There were 87 responses received in total to this open question and 75 responses to the following open question where respondents were asked to provide more detail to support their answer. Eleven respondents provided an open response but did not answer the multiple-choice question.

#### **4.5.2 Analysis**

The majority of respondents (44%) favour the re-integration into guidance to the relevant standard. 24% opt for the movement of Compliance Guides into Section 6 as an Annex and 22% feel they should be retained as separate Compliance Guides. The minority (10%) responded to the question by stating 'other' (Figure 29).

#### **4.5.3 Re-integrate into guidance to the relevant standard**

Of the 38 respondents who were in favour of reintegrating into guidance to the relevant standard, 29 provided further comment. Several respondent comments – including a campaign response – reveal that it is seen as advantageous to have all the information in one place, making it easily accessible which avoids having to review separate documents simultaneously. It is suggested this will avoid or at least reduce the likelihood of a requirement being overlooked.

#### **4.5.4 Move Compliance Guides into Section 6 as an Annex**

Of the 21 respondents in favour of moving the Compliance Guides into Section 6 as an Annex, 16 provided further comment. Several noted the logic and ease of having all the information in one place and highlight that by locating the guides in an annex, separate annex the main text will not be 'clogged up' and the annex can be accessed easily as an when needed.

#### **4.5.5 Retain current separate Compliance Guides**

Of the 19 respondents who feel the format of the current separate compliance guides should be retained, 11 provided further comment. These respondents warned against change when change is not needed, particularly for the relatively short period of time (2022-24). They stated that re-integrating the information or adding as annexes would result in a large, difficult to navigate document.

#### **4.5.6 Other**

All nine of the respondents who selected 'other' in response to the question provided further comment. Four respondents stated they have no preference for the format. The only common theme to emerge is the importance of the information being in a fully searchable, electronic format.

#### **4.5.7 Non-responders**

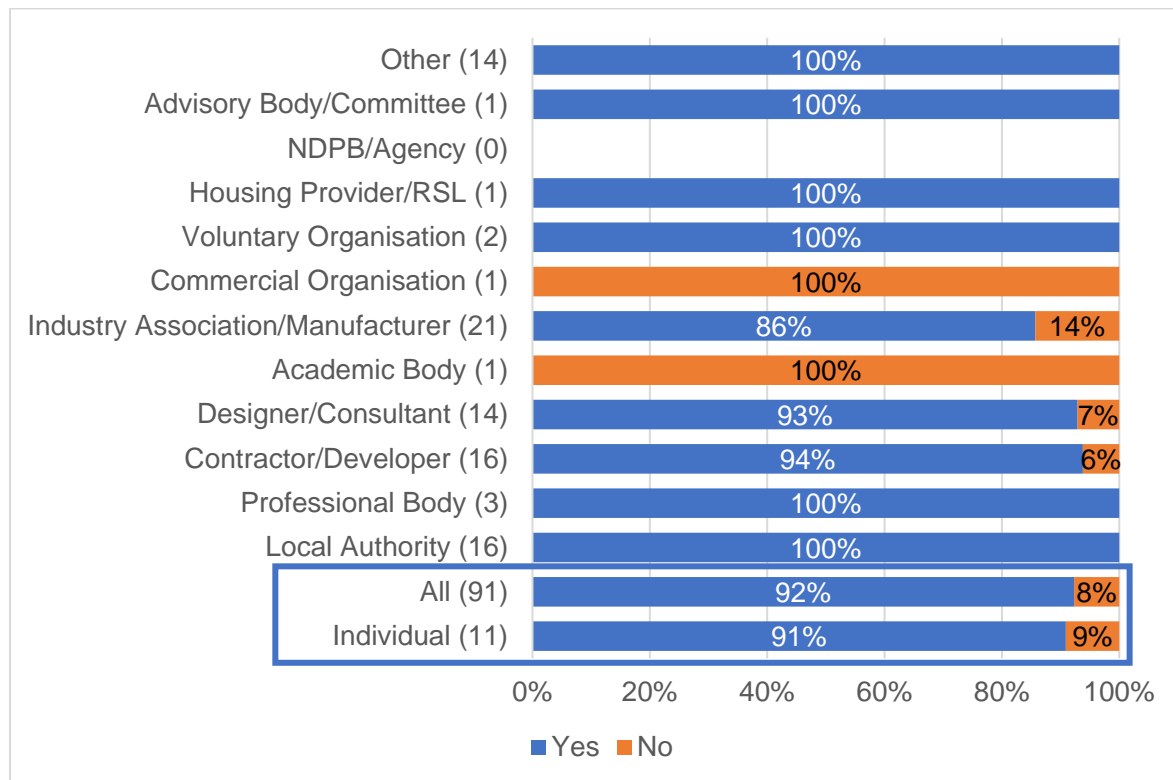
Of the eleven respondents who chose not to answer the multiple-choice question but provide further comment, seven stated they had no comment or view, one stated they have no preference and another that Compliance Guides should be included in the Section 6 document.

### **4.6 Changes to minimum standards for building services - Domestic**

#### **4.6.1 Question 25 - Do you support the continued alignment of minimum provisions for fixed building services at a UK level within the Domestic Building Services Compliance Guide?**

There were 91 responses received in total to this question and 76 responses to the following open question where respondents were asked to provide more detail to support their answer. Thirteen respondents provided an open response but did not answer the multiple-choice question.

Figure 30: Changes to minimum standards for building services - Domestic



Base: 91 respondents (85 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

#### 4.6.2 Analysis

Ninety-two per cent of respondents support the continued alignment of minimum provisions for fixed building services at a UK level within the Domestic Building Services Compliance Guide (Figure 30). Just 8% of respondents rejected the continued alignment of minimum provisions.

#### 4.6.3 Support for the proposal

Fifty-seven of the respondents supportive of a UK wide approach offered a further comment to support their view, these followed a number of key themes:

- Promotes consistency and simplifies compliance.
- Beneficial for contractors who work across the UK.
- Provides a consistent Standard for the manufacture of components.
- Makes it easier to source equipment and fittings which meet standards if these are aligned nationally.
- Facilitates supply chain development.

#### **4.6.4 Not in support of the proposal**

Of the seven respondents who do not support the continued alignment of minimum provisions for fixed building services at a UK level within the Domestic Building Services Compliance Guide, four offered substantive further comment.

Three respondents (Commercial Organisation and two Industry Association/Manufacturers) submitting a campaign response noted that the use of compliance guides in England and Wales is no longer being supported and, only requirements are being retained within the approved documents. Furthermore, they state that the Compliance Guides provide essential information to developers and installers and are widely used by industry. As such, they suggested the Scottish Government should not adopt this approach.

#### **4.6.5 Non-responders**

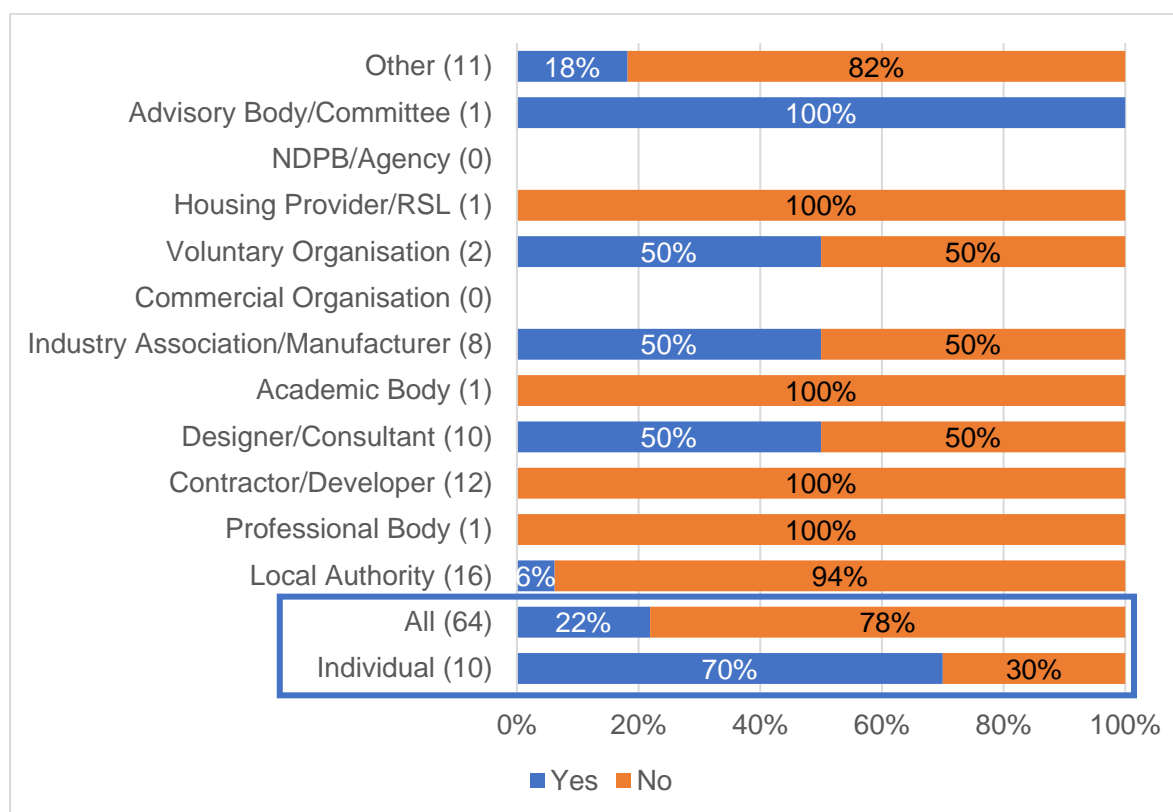
Whilst 13 comments were made by those who did not answer the multiple-choice question, the majority of these respondents simply stated that they had no comment or no view. Five substantive comments were made, three referred to an opportunity for Scotland to raise the bar and to go beyond the standards being set elsewhere in the UK.

#### **4.6.6 Are there any issues you wish to raise in relation to the amended specifications set out in the draft Guide?**

There were 64 responses received in total to this question and 31 responses to the following open question where respondents were asked to provide more detail to support their answer. Twelve respondents provided an open response but did not answer the multiple-choice question.



Figure 31: Issues in relation to the amended specifications (domestic)



Base: 64 respondents (112 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

#### 4.6.7 Analysis

Only 22% of respondents stated that they wished to raise any issues in relation to the amended specifications set out in the draft Guide (Figure 31).

Of the 14 respondents who stated they wished to raise an issue in relation to the amended specifications set out in the draft Guide, all provided further comment with varying levels of detail and technicality.

A few respondents stated that all clarifications and additional details are welcome in terms of increasing compliance.

Other responses include (provided by separate respondents):

- In all situations there should be a focus on a 'fabric first' approach: we should disincentivise the addition of on-site micro-generation equipment until the building fabric has been sufficiently improved to reduce the overall energy demand and performance of the whole building.
- Insisting on 'zero energy' buildings could encourage lower density construction which has other negative impacts on the environment in relation to land and resource efficiency. Instead, a holistic approach should be adopted.
- Legislation should be developed and introduced to adequately address the extensive levels of retrofit necessary to combat carbon emissions relating to

all aspects of construction, in conjunction with adequate training and financial support.

- Regulations should introduce metrics that are absolute rather than relative to notional targets.
- Regulation should incentivise a longer lifespan approach.
- Compliance methodologies should be improved to reduce the difference between predicted energy use and actual.
- The PHPP (Passivhaus Planning Package) software is a proven whole building energy efficiency calculation tool – this could be introduced as an alternative to the SAP methodology. This could be regulated through the existing Section 6 Certifiers scheme.
- PAS 2035 could be utilised as a management framework system to implement these ideas, however due consideration must be given in the first instance to the design and detailing of all works to buildings to ensure the predicted performance benchmarks match those delivered in reality.

The content of the remaining responses was of a highly technical nature.

#### **4.6.8 Non-responders**

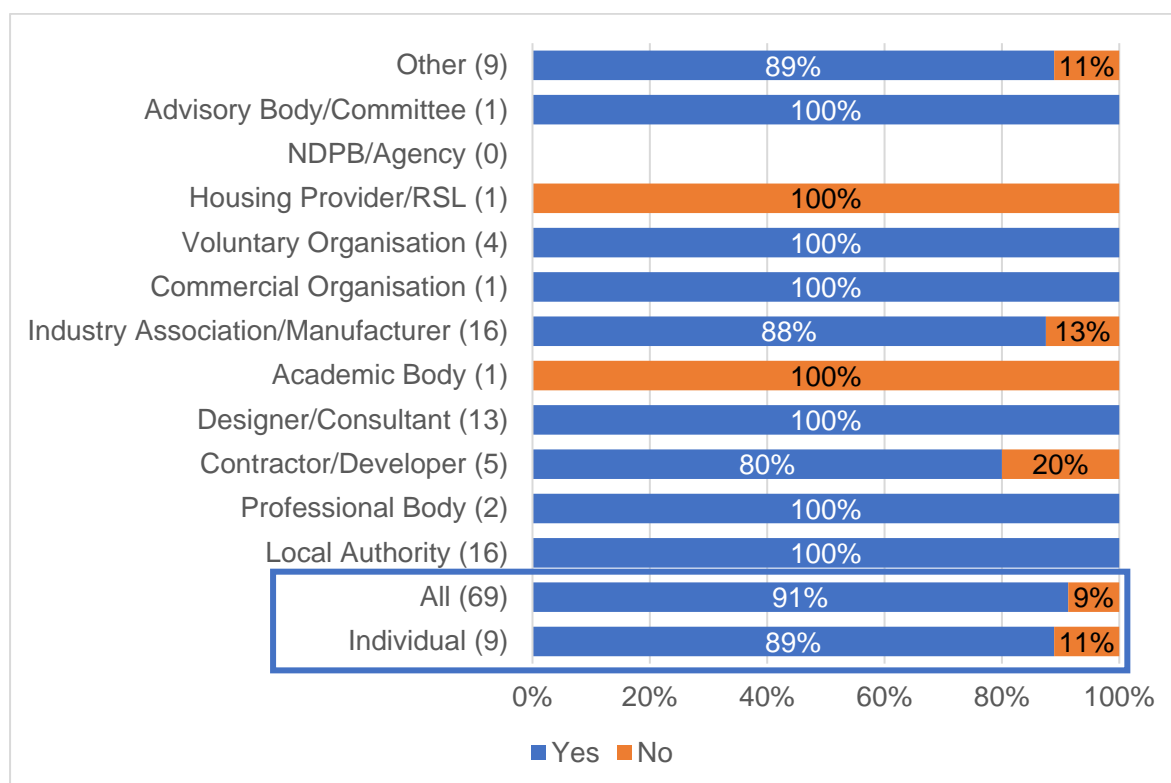
Of the twelve who did not answer the multiple-choice question but provided a comment, two of these were substantive and technical in nature.

### **4.7 Changes to minimum standards for building services – Non-domestic**

#### **4.7.1 Question 26 - Do you support the continued alignment of minimum provisions for fixed building services at a UK level within the Non-domestic Building Services Compliance Guide?**

There were 69 responses received in total to this question and 55 responses to the following open question where respondents were asked to provide more detail to support their answer. Thirteen respondents provided an open response but did not answer the multiple-choice question.

Figure 32: Changes to minimum standards for building services – Non-domestic



Base: 69 respondents (107 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

#### 4.7.2 Analysis

There is considerable support for the continued alignment of minimum provisions for fixed building services at a UK level within the Non-domestic Building Services Compliance Guide – 91% of respondents support the proposal and just 9% reject it (Figure 32).

#### 4.7.3 Support for the proposal

Those 63 respondents in favour of the proposal primarily drew attention to the ease of implementation, clarity, and consistency the continued alignment will bring. Respondents felt it would be simpler for building services designers and contractors, working across the UK. In addition, respondents noted the benefits to manufacturers who can apply the same strategy across a range of products, leading to greater efficiency, cost savings and consistency with spare parts.

#### 4.7.4 Not in support of the proposal

Only two substantive comments were received from the six respondents who stated they do not support the continued alignment of minimum provisions for fixed building services at a UK level within the Non-domestic Building Services Compliance Guide. One suggested the Scottish Government should not remove information guidance and good practice recommendations; the other pointed to a need to prepare for the transition in relation to water heating systems.

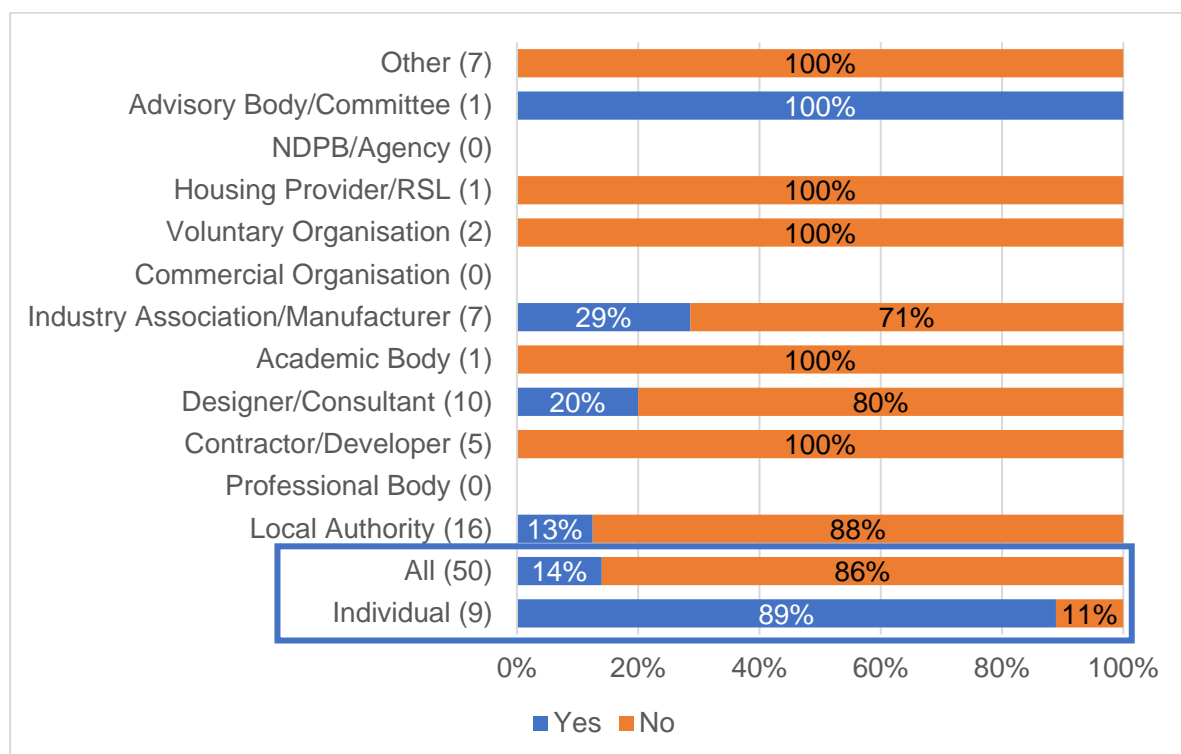
#### 4.7.5 Non-responders

Only four of the thirteen comments made by those who did not respond to the multiple-choice question offered substantive comment, predominantly in support of the proposal deemed to 'encourage consistency' and 'reduce confusion'.

#### 4.7.6 Are there any issues you wish to raise in relation to the amended specifications set out within the draft Guide?

There were 50 responses received in total to this question and 26 responses to the following open question where respondents were asked to provide more detail to support their answer. Fourteen respondents provided an open response but did not answer the multiple-choice question.

Figure 33: Issues in relation to the amended specifications (non-domestic)



Base: 50 respondents (126 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

#### 4.7.7 Analysis

The majority of respondents (86%) stated that they did not wish to raise any issues in relation to the amended specifications set out within the draft Guide (Figure 33). Whilst 14% of respondents (7) stated they wished to raise an issue, the majority of these referred to issues already raised in relation to previous questions.

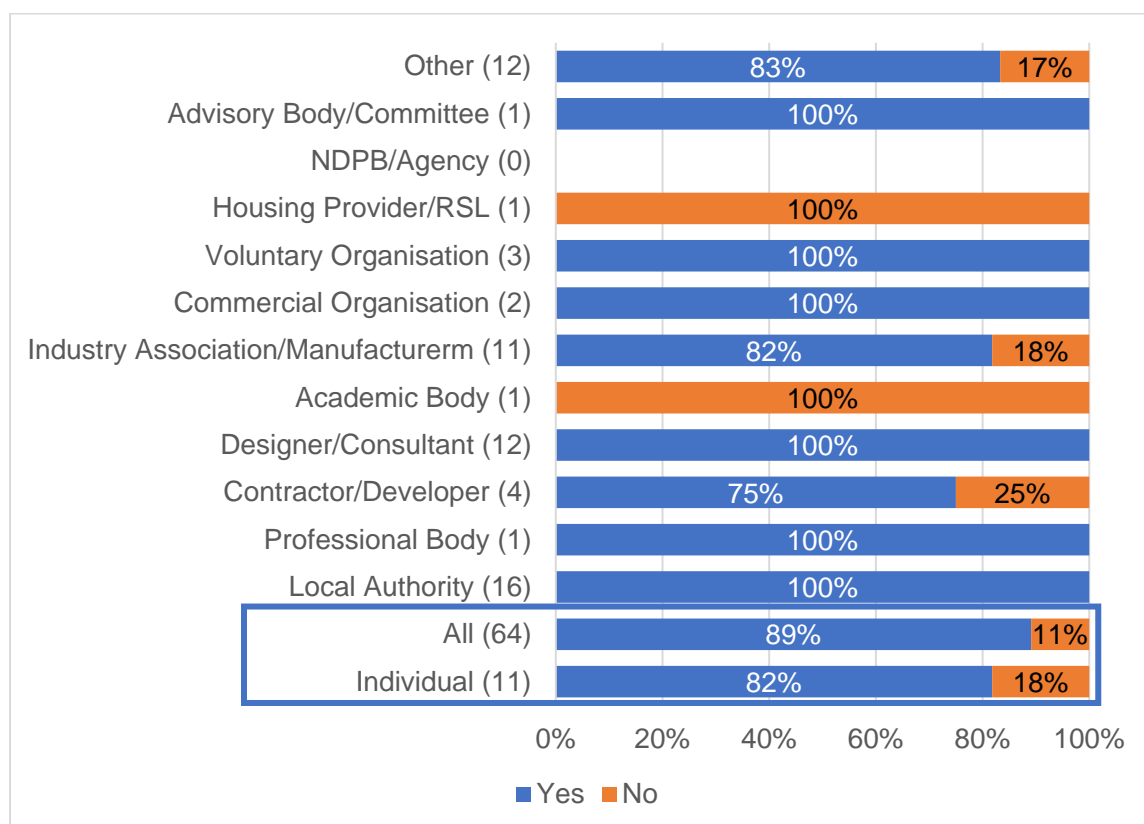
Of the 26 open responses, the majority stated they have no further comment or issues to raise. The four substantive comments received have no commonality in their content.

## 4.8 Removal of heating efficiency credits – Non-domestic

### 4.8.1 Question 27 - Do you agree with the proposal that the option of installing a less efficient heat generator and compensating for this using heating efficiency credits in existing buildings should be withdrawn from the Non-domestic Buildings Services Compliance Guidance?

There were 64 responses received in total to this question and 55 responses to the following open question where respondents were asked to provide more detail to support their answer. Ten respondents provided an open response but did not answer the multiple-choice question.

Figure 34: Removal of heating efficiency credits – Non-domestic



Base: 64 respondents (112 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### 4.8.2 Analysis

The proposal gained significant support - 89% (57) of respondents stated they agree that the option of installing a less efficient heat generator and compensating for this using heating efficiency credits in existing buildings should be withdrawn from the Non-domestic Buildings Services Compliance Guidance (Figure 34).

### 4.8.3 Support for the proposal

There are two common themes in the responses:

- This ‘trade off’ is no longer justified or necessary due to significant improvements in the energy efficiency of appliances.
- Compensation should be avoided (allowing it to remain risks allowing inefficient heat generators to be deliberately installed).

In general, those in support highlight that the current guidance was complicated for the occasional user of the guide and that the change will encourage system upgrading and innovation.

#### **4.8.4 Not in support of the proposal**

Only 11% (7) of respondents to this question stated they don’t agree that the option of installing a less efficient heat generator and compensating for this using heating efficiency credits in existing buildings should be withdrawn from the Non-domestic Buildings Services Compliance Guidance. Only two of these respondents offered substantive comments in support of their view, pointing to:

- Technological and economic considerations from a consumer perspective that need to be addressed, and;
- The potential to encourage the potential deployment of higher carbon and not fit-for-purpose technology, rather than low carbon solutions.

#### **4.8.5 Non-responders**

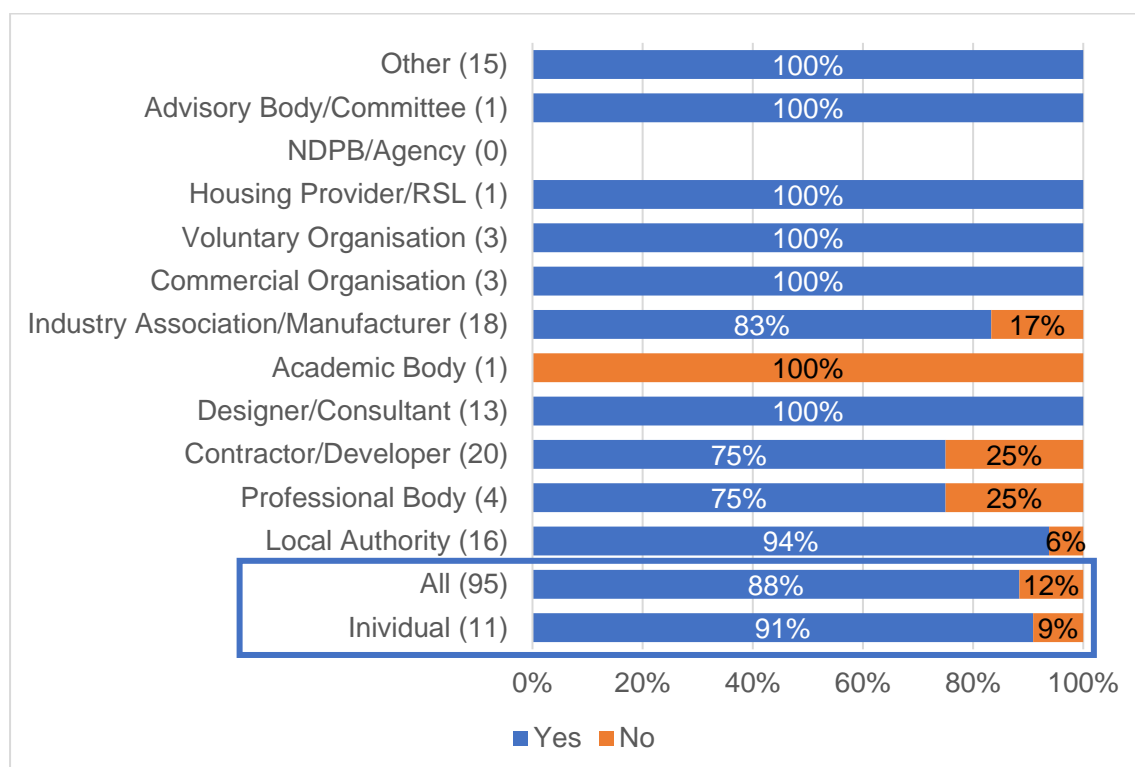
Of the 10 comments received from respondents who did not respond to the multiple-choice question, the majority (eight) stated they have no view or no comment. One respondent felt that there is no longer a need for this measure due to the improvement in energy efficiency of appliances over recent years. The other respondent stated that it is now easier to install efficient heat generators due to improvements in heat generator efficiency.

### **4.9 Limiting distribution temperature for wet heating systems**

#### **4.9.1 Question 28 - Do you agree with the proposal to limit distribution temperatures in wet central heating systems to support effective implementation of low and zero carbon heat solutions and optimise the efficiency of heat generation and use?**

In total, 105 responses were received to this question. Ninety-five gave answers to the multiple choice yes/no question and 67 responses were provided to the accompanying open question, where respondents were asked to provide more detail to support their answer. An additional ten open responses were given without the respondent answering the multiple-choice question.

Figure 35: Limiting distribution temperature for wet heating systems



Base: 95 respondents (81 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

#### 4.9.2 Analysis

Eighty-eight per cent of respondents answered ‘yes’ to the question posed, while 12% answered ‘no’ (Figure 35). Of the 84 respondents who answered ‘yes’, 57 provided extra comment in the open question. Of the 11 who disagreed with the proposal, nine provided additional comment.

The majority of respondents showed support for the proposal to limit distribution temperature in wet central heating systems (to support effective implementation of low and zero carbon heat solutions and optimise the efficiency of heat generation and use).

Of the overall 84 positive responses to the proposal, 79% broadly agreed, with either minimal or no additional comment offered. Twenty-one per cent agreed with the proposal and provided additional insight and opinions. Nine (of 11) respondents who did not support the proposal also provided additional information.

#### 4.9.3 Support for the proposal

Overall, respondents agreed that limiting distribution temperatures in wet central heating systems would be reasonable to optimise energy efficiency and help meet targets. It was felt that this seemed a “sensible approach”, which would provide both energy and costs savings, future-proofing building and reducing the need to retrofit decarbonised heat sources in coming years.

Recurrent themes presented by those in favour of the proposal to limit distribution temperatures in wet central systems:

- Several respondents called for additional guides and explanation, including tightening of wording to avoid any ambiguity. A part of this a few respondents suggested that the implications of moving from other methods of heating to a low carbon heating method should be explained to the end-user upon completion of the installation.
- Several respondents pointed to challenges with the uptake of the proposal for older or traditional buildings.
- A few respondents were of the opinion that the standard be set lower than 55 degrees.

Additionally, a few respondents who did not answer the multiple-choice question provided additional information. While they agreed with the proposal, they raised concerns with retrofitting existing buildings; if existing homes needed radiators to be replaced, consideration should be given to the embodied carbon of current radiators in good condition within buildings, compared with the carbon saving by replacing them.

#### **4.9.4 Not in support of the proposal**

Those who answered that they did not support the proposal to limit distribution temperatures, did so for largely the same reasons that are already discussed above. Additional information provided centred mainly on the fitness of this proposal for pre-existing buildings. As already noted, there was concern that while this proposal may be viable in new and modern buildings, it could be problematic in older buildings. One respondent noted that this is because of the way older building have been designed and constructed, which may make the cost benefit ratio unattractive.

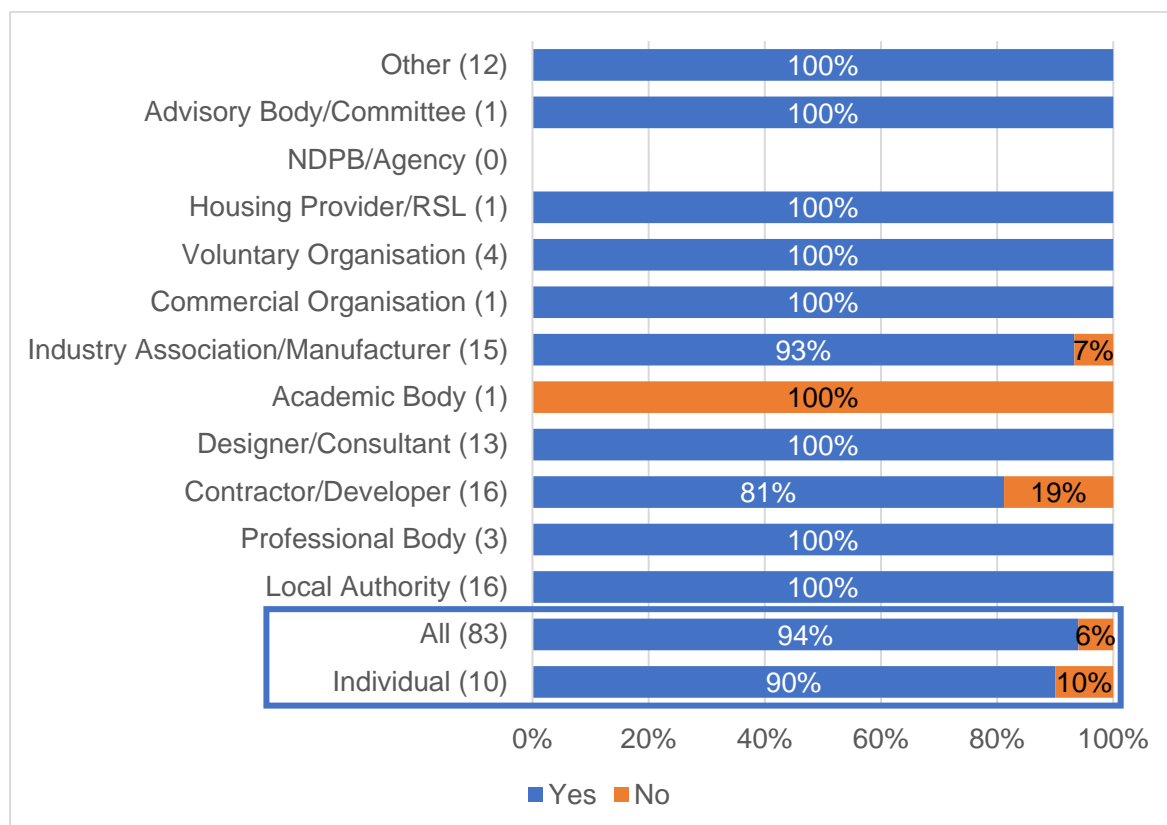
#### **4.10 Self-regulating devices**

##### **4.10.1 Question 29 - Do you agree with the proposed extension to the provision of self-regulating devices to include when replacing a heat generator?**

In total, 95 responses were received for this question. Eighty-three responses were received to the yes/no portion of this question, of which 10 were from individuals and 73 from organisations. Forty-seven responses were provided to the accompanying open question where respondents were asked to provide a summary of the reason for their view. Only three of the open-text responses were from individuals. Twelve respondents did not answer the yes/no section but did provide additional comment in the open question.



Figure 36: Self-regulating devices



Base: 83 respondents (93 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

#### 4.10.2 Analysis

Overall, most respondents supported extending the provision of self-regulating devices to include installation (where absent) at the point a heat generator is replaced, with 94% of respondents being in favour (Figure 36).

Twenty-nine per cent of respondents agreed with the proposal and provided additional insight and opinions. Two (of five) respondents who did not support the proposal also provided supporting reasons.

#### 4.10.3 Support for the proposal

Of the 78 respondents (94%) who agreed with the extension of the provision, 34 (41%) provided no further responses and 20 (24%) provided limited responses confirming their support of the proposal. Twenty-four respondents (29%) agreed and provided additional commentary.

Among these 20 respondents who gave limited answers to this question, it was generally felt that the measures were reasonable and proportionate, with the heat generator being an appropriate intervention point. One contractor/developer noted “this is sensible and is already an industry standard”.

Of the 24 respondents (29%) who agreed and provided additional commentary, two main themes appeared:

- Many respondents felt that the proposal will provide building occupants with increased energy efficiency and control over energy bills.
- Several respondents also noted that the proposal has the potential to increase occupant comfort by providing control and flexibility to adjust the temperature in different heating zones or rooms. A few respondents stated how further technological advances in smart thermostat controls should help occupants realise this benefit, in addition to mitigating instances of overheating.

In addition to these two main themes, a few respondents reiterated the importance of understanding challenges pertaining to older and traditional buildings in the consultation process. There was consensus that older heating systems may provide technical challenges in the installation of self-regulation devices. There was also an appreciation of how the layout and design of older and traditional buildings may cause specific challenges, in addition to unique energy saving opportunities.

#### **4.10.4 Not in support of the proposal**

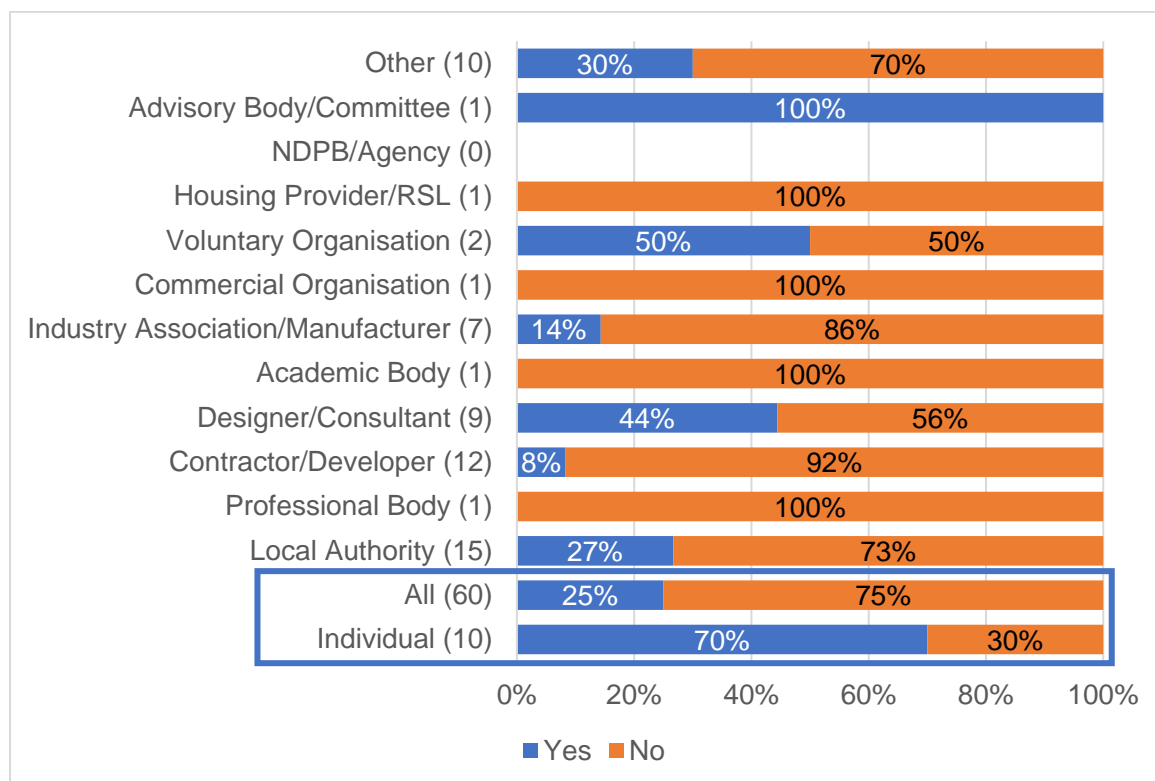
Five respondents did not agree with extending the provision. One contractor/developer respondent suggested the proposal should be investigated further with heat pump engineers, believing that “flow should not be restricted and that heat pumps work best with a large volume continuous low temperature flow throughout the home.” Similarly, an industry association/manufacturer respondent held the view that extending the provision should be an engineering design decision, rather than a regulatory requirement.

### **4.11 Issues on technical feasibility of self-regulating devices**

#### **4.11.1 Do you have any comment on issues of technical feasibility or determining when installation (per Question 29) should be at a room/zone level?**

Sixty responses to this question were received (Figure 37) and thirty-seven to the open question which asked for comments on issues of technical feasibility or determining when installation should be at a room/zone level. Seventeen respondents provided an open response but did not answer the preceding closed ‘yes/no’ question. Most of these respondents stated ‘no comment’.

Figure 37: Issues on technical feasibility of self-regulating devices



Base: 60 respondents (116 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

#### 4.11.2 Analysis

Out of the 15 'yes' responses, 14 respondents supported their answer by providing commentary on issues of the feasibility and installation of self-regulating devices at a room/zone level. Of these 14 responses, two were from individuals and 12 were from organisations.

The general sentiment among the respondents was that technical feasibility should be considered on a case-by-case basis, dependant on the building and the expertise of the installer / engineer.

Several respondents did not answer the yes/no question but provided substantial open-text responses in favour of the proposal:

- Training requirements need to be addressed as part of implementing the proposal.
- More information is needed, for example, how the system could be incorporated within a plot.
- A study on the number of occupants in the various rooms and the hourly and daily usage of the spaces.
- The provision should mirror the current installation and the practicality of adding self-regulating devices.

A few respondents noted the considerable cost and time impact for existing building alongside the dependency on existing infrastructure.

A few other respondents supported this point, confirming that the answer could depend on the way the buildings heating system had been piped-up.

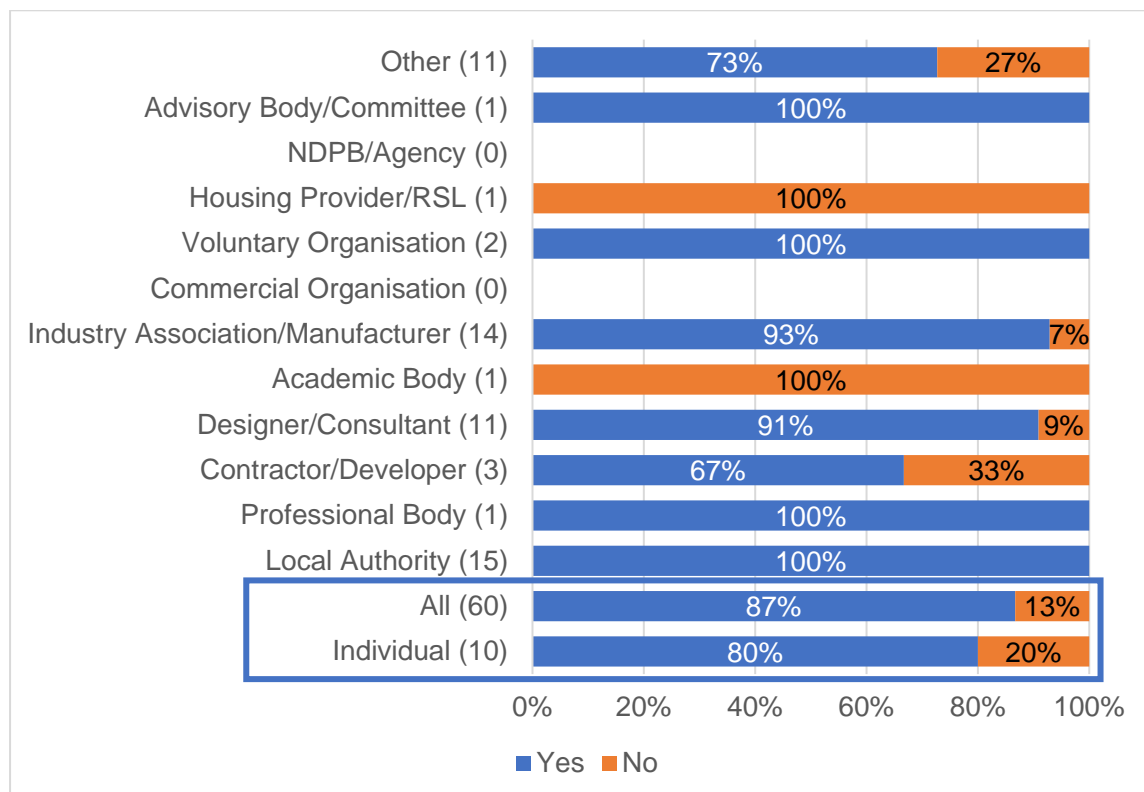
A few respondents cautioned the challenging nature of retrofitting existing buildings.

#### 4.12 Building Automation and Control Systems – Non-domestic

##### 4.12.1 Question 30 - Do you agree with the proposed introduction of a requirement for building automation control systems, of the type specified, in larger non-domestic buildings with systems with an effective rated output over 290 kW?

Sixty respondents answered this question and 53 responses to the accompanying open question. Sixteen respondents answered the open question but did not respond to the preceding closed ‘yes/no’ question.

Figure 38: Building Automation and Control Systems – Non-domestic



Base: 60 respondents (116 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

##### 4.12.2 Analysis

Overall, 87% agree with the proposal and 13% disagree (Figure 38). Eight ‘no’ responses were received to this question, three of which contained substantial text.

Out of the 52 'yes' responses, 28 were very short statements confirming support with language such as "reasonable", "sensible" and "necessary" in reference to the proposal.

#### **4.12.3 Support for the proposal**

The general sentiment of responses was positive, with a consensus among respondents that correctly configuring and utilising building automation control systems leads to greater energy efficiency, user benefits and cost savings.

There was notable divergence on the 290 kW threshold, as summarised below with a few respondents were curious over how the threshold had been derived, with two questioning why it was so high.

A few respondents commented on the importance of the way in which the system is controlled.

A few other respondents highlighted the cost of installing building automation control systems.

Additionally, two respondents did not answer the yes/no question but provided substantial open-text responses in favour of the proposal.

#### **4.12.4 Not in support of the proposal**

Three of the eight 'no' responses to this question, contained text with opinions and insights:

- The proposal should be optional due to the associated costs of building automation and control systems.
- The 290 kW threshold level was felt to be too high or, should rather be set proportionally with the building floor size.
- Non-residential buildings of over 400 m<sup>2</sup> to be equipped with automatic lighting control systems, where technically and economically feasible.

### **4.13 Further comments on setting minimum standards for all buildings**

#### **4.13.1 Question 31 - We welcome any other comments you may wish to make on these topics and broader changes to the setting of minimum standards for all buildings.**

#### **4.13.2 Analysis**

While a total of 61 responses were received to this open question, only 28 gave substantive additional information, with 33 responses reading as variations of "no further comment". A number of clear themes are discernible from this open response question.

The main theme highlights the need for a fabric first approach. Many respondents put forward this idea that a whole-building fabric first approach should be the considered in the very beginning of any plans to reduce carbon emissions. An

additional three respondents noted that the performance gap must be addressed where it related to both services as well as building fabric.

A few respondents stated a desire for more information, notably guidance in the Technical Handbooks and supplementary guidance with examples to aid verifiers and designers. Specifically, this should cover efficiency of services and installation.

The role of certifiers and verifiers was mentioned by a few respondents: considering the impact on their time and a concern that exempt work under Regulation 5 could be unchecked.

A few respondents highlighted retrofitting, ensuring this is not discouraged if regulations become too onerous, and can be achieved in a sustainable way.

A few respondents raised concerns about older buildings vs new builds, notably that balance needs to be achieved between improving energy performance and efficiency and avoiding damage to both the significance of the building and its fabric.

#### **4.13.3 Other considerations**

Six other points were raised:

- Embodied carbon and operational energy performance should be considered.
- The difference between domestic and non-domestic builds should be made clear, as not all non-domestic buildings are suited towards low-carbon heating and hot water (especially low-temperature heating systems).
- Existing housing stock is likely to be largely inefficient. For this reason, grants should be provided to help improvements, on the provision that work is approved by verifiers.
- Three responses discussed the use of hydrogen as a source of future clean energy. They noted that a huge investment infrastructure is needed for the building industry to make the shift to completely green hydrogen.
- Further guidance and support should be directed toward on-site green storage.

## 5 Part 4 – Ventilation

Following the commissioning of research into the impact of previous 2015 ventilation amendments to ventilation standards for new homes in 2021, it is the intent of BSD to undertake a fuller review of ventilation provision for both domestic and non-domestic buildings from 2022.

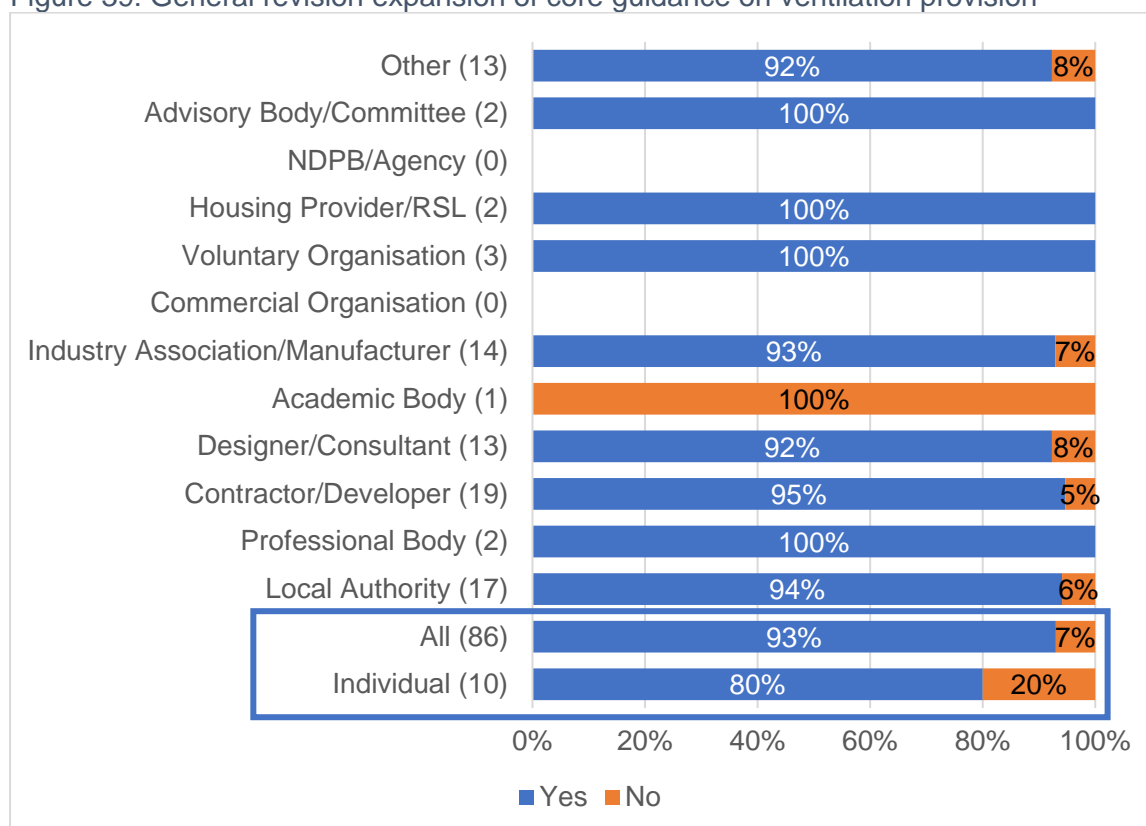
Accordingly, changes proposed at this time are focused on domestic ventilation and are limited to those which are considered to be directly relevant to the introduction of improved energy standards or (in response to published research) can better address the delivery of expected levels of ventilation and good indoor air quality.

### 5.1 General revision expansion of core guidance on ventilation provision

#### 5.1.1 Question 32 - Do you support the proposed revisions to the presentation of guidance on ventilation and the incorporation of the 'domestic ventilation guide' into the Technical Handbooks?

In total, 86 responses were received to this question and 71 responses to the accompanying open question where respondents were asked to provide more detail to support their answer. Eleven respondents provided an open response but did not answer the preceding open 'yes/no' question. Most of the responses received stated 'no comment'.

Figure 39: General revision expansion of core guidance on ventilation provision



Base: 86 respondents (90 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### **5.1.2 Analysis**

Overall, 93% of respondents to this question were supportive of the proposed revisions and incorporation of the 'domestic ventilation guide' into the Technical Handbooks (Figure 39).

### **5.1.3 Support for the proposal**

The predominant themes across all respondents were that incorporation of the 'domestic ventilation guide' into the Technical Handbooks would provide greater clarity and improve accessibility and awareness. Several respondents mentioned the benefits of having a 'single point of reference'. Alongside this, a few respondents stated that revisions to the guidelines would also improve clarity.

Several respondents state that the revisions would be consistent with normal practice.

A few other respondents who supported the proposed revisions felt that compliance might be improved as a result.

A few respondents welcomed the new approach because they believe it aligns with the rest of the UK.

### **5.1.4 Technical considerations**

A few respondents mentioned technical considerations in their responses:

- One respondent perceived there was an error regarding continuous ventilation.
- One Contractor/Developer highlighted a need to consider sufficiency of openable window casements to meet the increase of 1/30th to 1/20th floor area.
- One research organisation commented that the level of technical detail must be sufficient to ensure that system design can be effectively undertaken.
- One Local Authority respondent suggested that guidance might be improved by highlighting issues involving an incorrect ventilation strategy, in particular with remedial work needed after better than anticipated air tightness test results.
- An architect called for more focus on air quality.

Only one respondent supported the proposed revisions but was opposed to their inclusion in the Technical Handbooks, stating that it would be more helpful to keep a clear distinction between guidance, including best practice, and regulation (the minimum legal standards).

### **5.1.5 Not in support of the proposal**

Four of the six respondents who were not supportive of the proposals chose to give reasons.

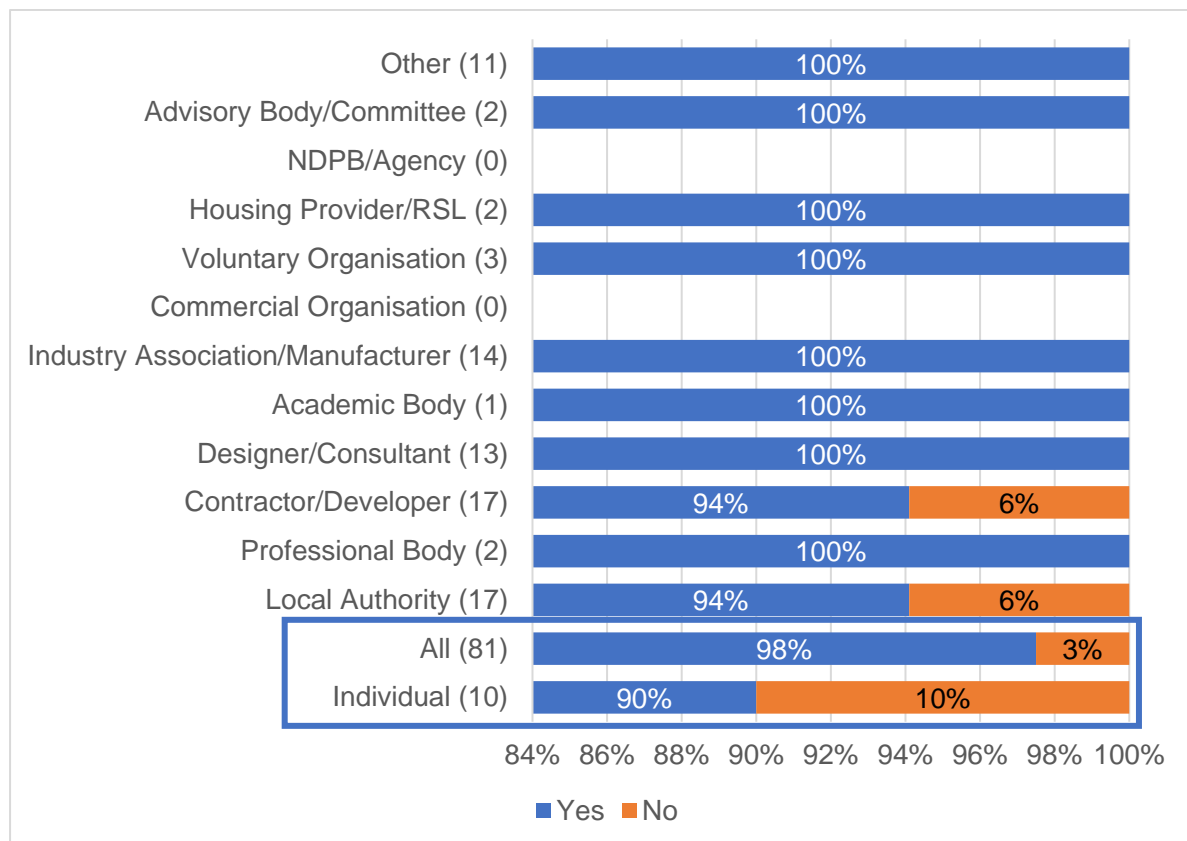


- Preference for the Guidance to be in a separate document with hyperlinks from the 'Technical Handbook'.
- Keeping guidance separate would allow the industry to collaborate on updates to supplementary information as technologies develop and provide an opportunity for industry to feed back to the Scottish Government on matters concerning Building Regulations.
- The guidance would require a full house design
- The proposals were suggested to contain an error regarding continuous and intermittent ventilation.

## 5.2 Revision of guidance on purge ventilation

### 5.2.1 Question 33 - Do you agree with the revision of guidance to clarify the function of purge ventilation and increase provision to align with that applied elsewhere in the UK?

Figure 40: Revision of guidance on purge ventilation



Base: 81 respondents (95 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

In total, 81 responses were received to this question (Figure 40) and 61 responses to the accompanying open question where respondents were asked to provide more detail to support their answer. Ten respondents provided an open response but did not answer the preceding open 'yes/no' question. Most of these were 'no comment'.

### **5.2.2 Analysis**

Of the 81 respondents to this question, 98% were in agreement with the proposal.

### **5.2.3 Support for the proposal**

The main theme among respondents was that alignment with the rest of the UK would be a positive outcome, reducing confusion and aiding simplification. Related comments on this point were raised:

- Challenges for developers and supply chains caused by the different guidance for Scotland would be addressed.
- Caution should be observed because of the variations in climate across the UK and within Scotland.

A specific section of guidance recommending increase in provision from 1/30th to 1/20th of floor area for purge ventilation was referenced by several respondents who agreed with the proposal.

A few respondents highlighted how the guidance is particularly relevant considering the increased importance of ventilation due to the pandemic.

Seven respondents made suggestions to improve the guidance:

- dMEV was felt to be suboptimal to MVHR, so MVHR should be applied to all situations.
- Due to designed and tested airtightness often being significantly different, it would be beneficial to require sample testing throughout the Building Warrant process in order to avoid abortive work and re-design of ventilation strategies.
- Consideration of the suitability of external noise levels to allow the opening of windows for “normal” ventilation conditions through the principles of good acoustic design should be made at Planning Stage.
- Possible difficulties for verifiers in determining if windows meet opening requirements.
- Designers should be alerted to the fact the figures in Table 3.6a may need to be increased in order to comply with the overheating requirements.
- Where mechanical purge is required, it is appropriate to require this to be extracted directly to the outside and that clarity should be provided on the requirement for whole house purge.

### **5.2.4 Not in support of the proposal**

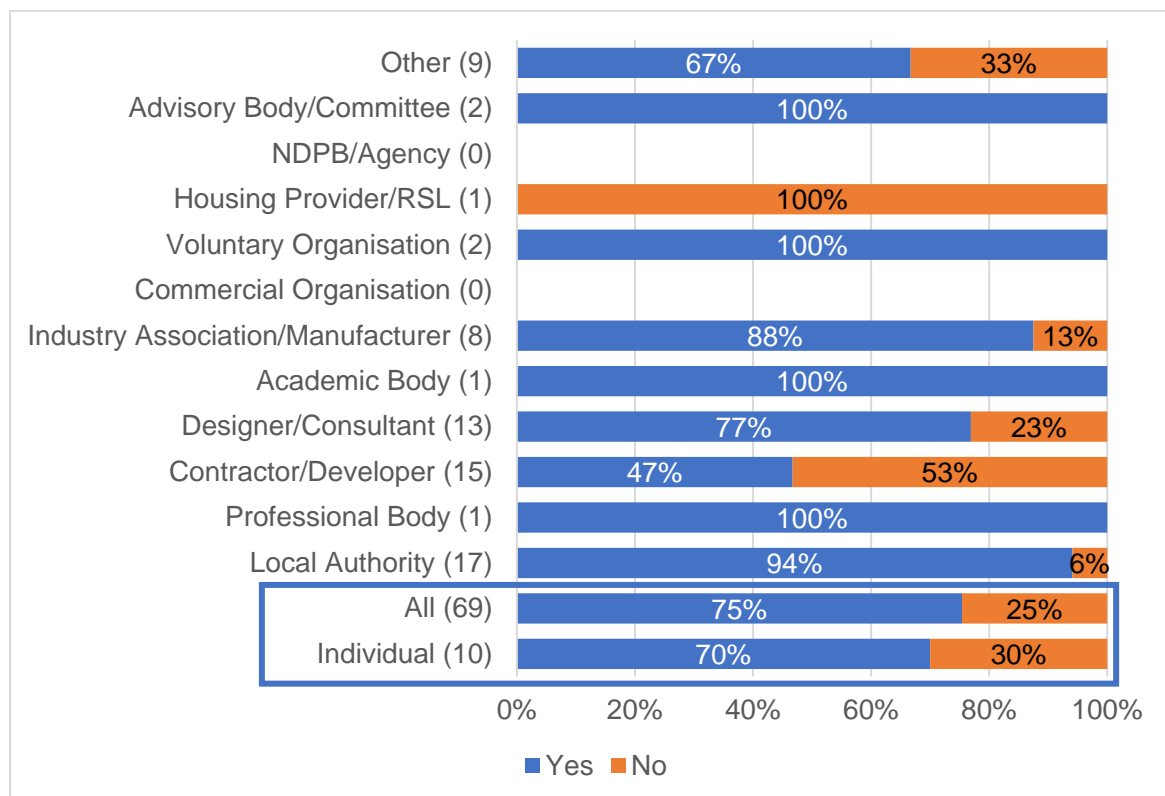
One of the two respondents who were not in favour of this revision to the guidance – a Contractor/Developer – made the comment that it does not provide flexibility within design. The other respondent did not provide further comment.

### 5.3 Clarification on ventilation solutions in low infiltration new dwellings

#### 5.3.1 Question 34 - Do you support reference to a single option for continuous mechanical extract ventilation which can have centralised or decentralised fans, with the same design parameters being applied to the system in each case?

In total, 69 responses were received to this question and 63 responses to the accompanying open question where respondents were asked to provide more detail to support their answer.

Figure 41: Clarification on ventilation solutions in low infiltration new dwellings



Base: 69 respondents (107 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

#### 5.3.2 Analysis

Overall, 75% of respondents to this question were supportive of the proposal, with 25% against it (Figure 41).

#### 5.3.3 Support for the proposal

Several respondents who agreed with the proposal and went on to stress the importance of careful consideration at the design and installation stage. Several stated that the proposed way of working removes confusion, with one Contractor/Developer going on to say that they have been working in this way for a while.

A campaign response repeated by several respondents, agreed that a single option for continuous mechanical extract ventilation should have the same design

parameters regardless of fan position as this would aid in limiting the malfunction or sub-optimal performance of DMEV systems where supply air paths are convoluted.

A few respondents advocated a mechanical supply and extract ventilation system with heat recovery; an additional respondent also expressed a preference for systems to include some form of meaningful heat recovery.

#### **5.3.4 Not in support of the proposal**

Respondents who were unsupportive of the proposal expressed a variety of concerns.

Several respondents repeated a campaign response which raised concerns surrounding the use of centralised Mechanical Ventilation with Heat Recovery (MVHR), flagging the operation of MVHR as a bigger issue as they perceive that ongoing maintenance required to ensure efficient and safe working could cause problems. Respondents stated that MVHR systems are normally located in loft spaces and will require regular checks and maintenance regimes such as the replacement of filters etc. which could lead to significant increase in annual costs for homeowners.

A few Contractor/Developer respondents repeated concerns about maintenance of centralised MHVR.

#### **5.3.5 If you have any further views (re Question 34) on the use of continuous mechanical extract to deliver effective ventilation in both low infiltration (3-5 m<sup>3</sup>) or higher infiltration (>5 m<sup>3</sup>) buildings, we would also welcome your comments.**

In total, 32 respondents provided comments in response to this open question.

#### **5.3.6 Analysis**

Several respondents, mainly from Local Authorities highlighted the need for guidance for those verifying and commissioning installations. These respondents asked for guidance to cover the following specific issues; the undercut of fire doors to aid air pathways; non-domestic buildings, which are empty for extended periods of time; and on how to deal with a situation where the continuous extract system is designed to suit a higher infiltration rate than what is actually achieved.

Several respondents stressed that for systems to work well in practice there needs to be guidance for end users.

A few respondents stated that MVHR systems should be mandatory in new buildings while a Contractor/Developer called for cMEV or dMEV to be mandatory with design airtightness below 5 m<sup>3</sup>. Reasons centred on benefits to indoor air quality in a climate where it is not often possible to open windows for adequate ventilation due to inclement weather.

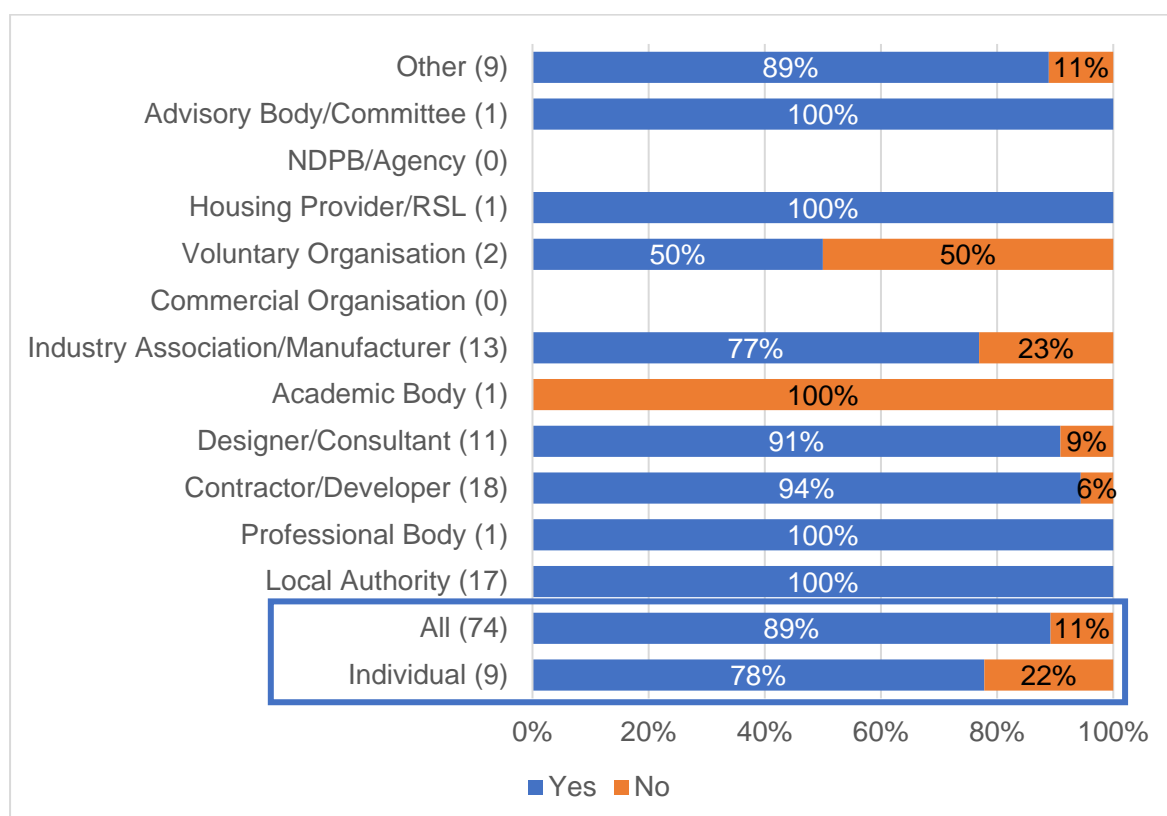
Various technical considerations were highlighted:

- The impact of breakdowns in centralised systems and requirements for maintenance and periodic servicing.
- The advantages of intermittent extraction in terms of heat recovery not being required and any fan noise nuisance experienced by occupants is of short duration.
- Using larger sizes of dMEV products (125 mm diameter) provide a good solution to ensure higher ventilation rates can be used where needed at lower noise levels.
- Extraction and supply rates should be balanced so the humidity within the building does not drop to levels that are detrimental to human health.

## 5.4 Background ventilators in continuous mechanical extract solutions

### 5.4.1 Question 35 - Do you support introduction of proposed guidance on default minimum size of background ventilator for continuous mechanical extract systems?

Figure 42: Background ventilators in continuous mechanical extract solutions



Base: 74 respondents (102 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

In total, 74 responses were received to this question and 59 responses to the accompanying open question where respondents were asked to provide a summary of the reason for their view, including any specific concerns they consider may arise

from the proposed level of background ventilation or its application in the design of systems. Fourteen respondents provided an open response but did not answer the preceding open 'yes/no' question. Most of these were 'no comment'.

#### **5.4.2 Analysis**

Overall, 89% of respondents to this question were in support of the proposal (Figure 42).

Around a quarter of the 59 respondents choosing to expand on their answer to the first part of the question simply stated that the proposals would add simplification, consistency, or clarity.

A campaign response from several organisations highlighted a perceived need to consider the size of ventilators to improve air quality, going on to state that current practice may result in levels of air pollution and CO in new buildings, which although will remain within limitations will be closer to the upper threshold. Similarly, a few respondents (two of whom supported the proposal) repeated a campaign response drawing attention to the potential problems if background ventilation requirements are set too low.

These respondents acknowledged that background ventilation is difficult to control and went on to state having a demand-controlled ventilation system as a localised option could aid in the ventilation performance where other solutions are not viable, as this could provide better control of indoor air quality than a continuous extract system.

Contrasting with this was the view of several respondents who welcomed the proposal of guidance for minimum size for background ventilators but do not agree that it should be 5000 mm<sup>2</sup>. These respondents highlighted equivalent guidance in the proposed Part F in England (which is 4000 mm<sup>2</sup>). It was suggested this may cause some confusion where developers are working across the border and also cause difficulties because standard products on the market correspond to the 4000 mm<sup>2</sup> requirement. These views were supported by a few other respondents who would prefer recommended size to be 4000 mm<sup>2</sup>, stating that there is a risk that larger ventilators may lead occupants to block them to limit unwanted draughts.

A few respondents repeated a campaign response agreeing that for financial or operational reasons some buildings will need to utilise natural ventilation or a mixed mode of natural ventilation with continuous mechanical extract. But they recommended that regulations for new buildings should be to Passivhaus Standard.

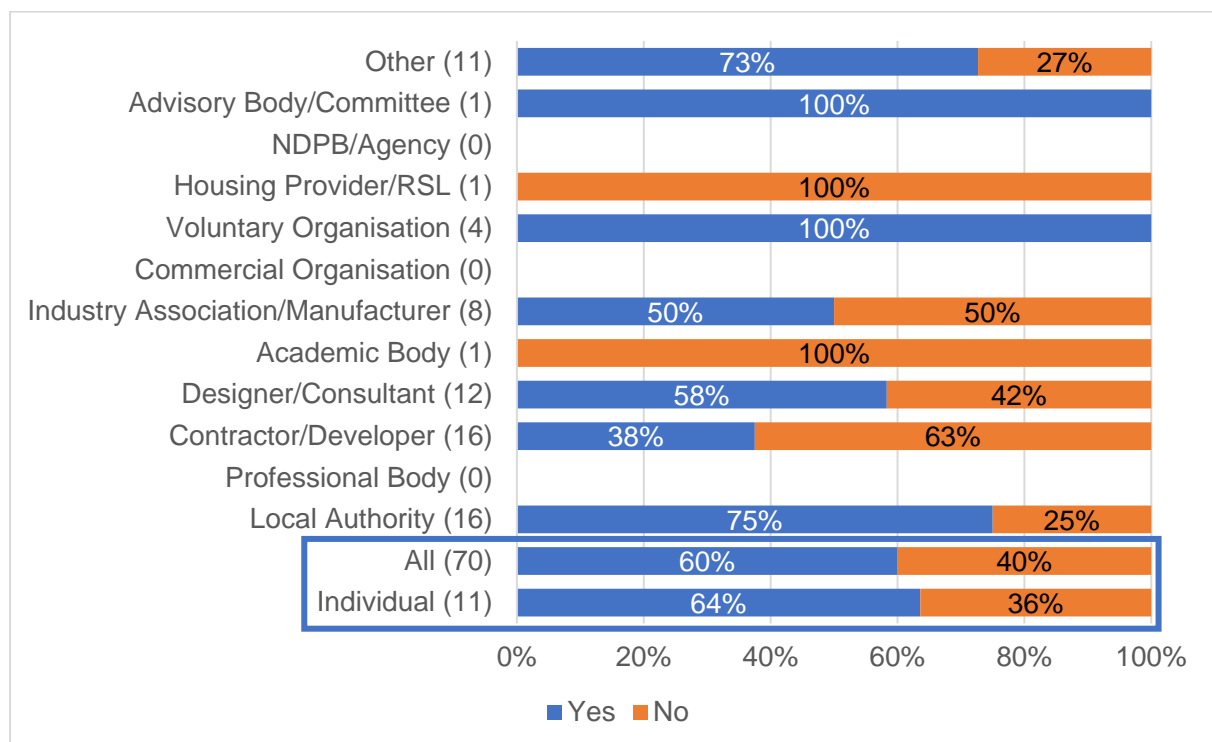
Another perceived issue of differing Scottish and English standards was highlighted by a Contractor/Developer who suggested that intermittent extract flow rates shown for continuous extract ventilation systems should align with the UK flow rates. An Approved organisation agreed that guidance is required but supported following the guidance in England for consistency, however, a Designer/Consultant stated that references to English standards should not be within Scottish technical standards.

## 5.5 Ventilation solutions in very low infiltration new dwellings

### 5.5.1 Question 36 - Should continuous mechanical extract systems be considered a viable solution in very low infiltration dwellings and, if so, under what circumstances?

In total, 70 responses were received to this question and 63 responses to the accompanying open question where respondents were asked to provide a summary of the reason for their view. Twelve respondents provided an open response but did not answer the preceding open 'yes/no' question. Most of these were 'no comment'.

Figure 43: Ventilation solutions in very low infiltration new dwellings



Base: 70 respondents (104 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### 5.5.2 Analysis

Overall, 60% of respondents were in agreement with the proposal (Figure 43).

### 5.5.3 Support for the proposal

Among respondents agreeing with the proposal and commenting on the circumstances in which continuous mechanical extract systems should be considered a viable option, most confirmed this should be for low infiltration dwellings. It should be noted that commentary provided by respondents indicates that the reference to 'continuous mechanical extract' may have been read as 'continuous mechanical supply and extract' – see below.

Many respondents, while agreeing the proposal, went on to qualify their response.

Many respondents stated that there should ideally be some form of heat recovery.

Several respondents who agreed with the proposal, went on to state how occupant behaviour influences how ventilation functions, with two respondents stating that occupants should be prepared to lose heat to achieve adequate air changes.

Several respondents agreeing with the proposal referred to trickle vents, one stating that an advantage of MEV systems is that they remove the reliance on trickle vents which may be installed incorrectly, another respondent stated they might be used incorrectly.

Several respondents stated that MEV systems should include adequate provision for trickle ventilation.

A campaign response repeated by two respondents who did not respond to the first part of the question called for the ventilation rate to be linked to occupancy and specifically to deliver an air change rate of 30 m<sup>3</sup>/h per person.

#### **5.5.4 Not in support of the proposal**

Among respondents objecting to the proposal, the most common reason (given by nine respondents) was the consequences of failure when reliant on a single fan.

Several respondents objected to the proposal, citing a preference for MHVR.

Several respondents rejecting the proposal had concerns about the sufficiency of background ventilation to facilitate the required air changes.

#### **5.5.5 We would also like to hear your views on whether heat recovery should be mandated for packaged supply/extract systems. - Please provide your comments below:**

In total, 62 responses were received to this open question.

#### **5.5.6 Analysis**

Around 70% of respondents were in favour of mandating heat recovery systems. The most common benefits mentioned were reduction in energy consumption and subsequent carbon emissions together with maintaining internal comfort for occupants.

Energy consumption and carbon reduction savings from MHVR were disputed by several respondents who disagreed that heat recovery systems should be mandated.

Other respondents called for more research before mandating heat recovery systems.

Respondents in favour mentioned the opportunity to include an MVHR at the design stage thereby future proofing them for low carbon heating solutions, also that, should systems be mandatory, developers need to be forced into providing adequate installations otherwise they may deliver whatever is cheaper and more convenient for them.



A few respondents stated that mandating may reduce flexibility and increase dependence on bolt on components to achieve compliance instead of innovative design and use of buildings.

A few respondents were of the opinion that the requirement for heat recovery may not be suitable in all situations, one stating it should be led by section 6 of the building standards, the other that it could be mandated on certain domestic buildings based on size or where centralised systems are possible e.g., in apartment blocks.

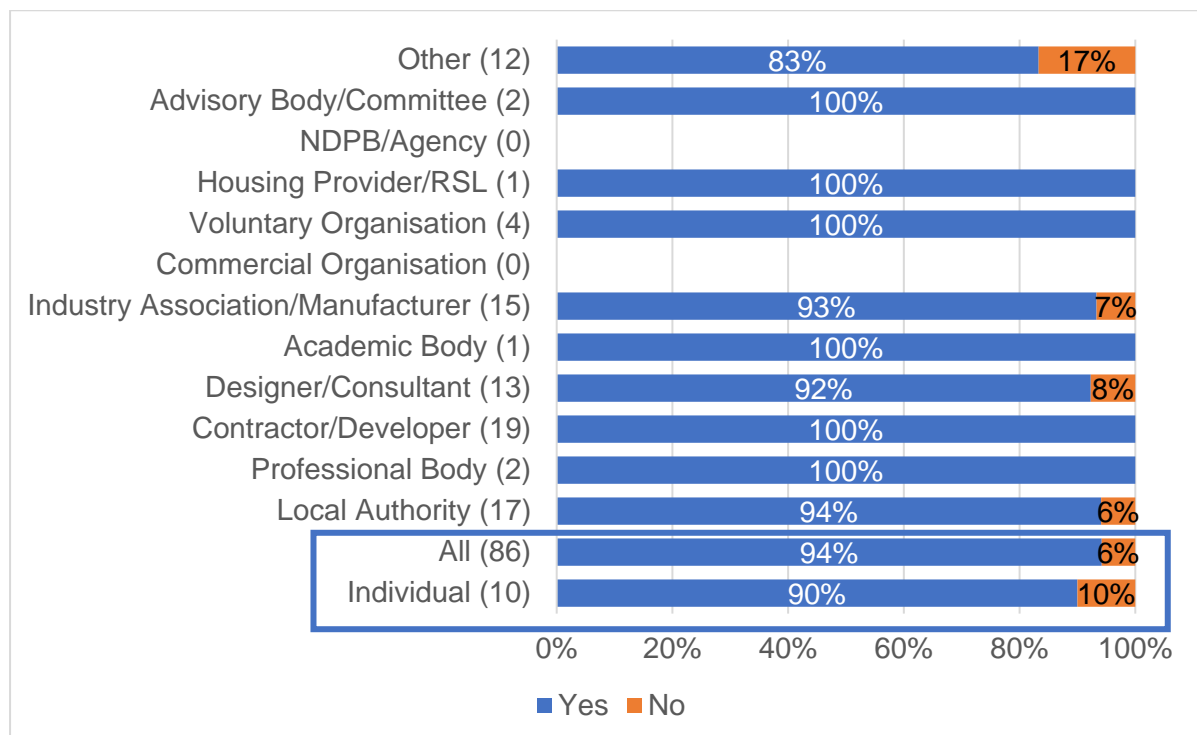
## 5.6 Incorporation of secondary guidance into the Handbook

### 5.6.1 Question 37 - Do you support the proposed incorporation of a revised version of the current 'domestic ventilation guide' as an annex to section 3 (environment) of the Domestic Technical Handbook?

**Question 9 - We would be grateful for your comments on the content of the proposed Annex and whether there are elements absent from the current guide or which would be better presented.**

There were 86 responses to the closed question, and 94% were in support of the guidance (Figure 44). Six respondents provided an open response but did not answer the preceding open 'yes/no' question. Most of these were 'no comment'.

Figure 44: Incorporation of secondary guidance into the Handbook



Base: 86 respondents (90 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### 5.6.2 Analysis

Overall, 90% of respondents were in agreement with the proposal (Figure 43).

There were 37 responses to the open question, some respondents reiterated their responses to earlier questions, others simply chose to comment that the guidance is good, with some going on to give reasons e.g., it will make referencing easier for designers and verifiers.

Several respondents asked for the incorporation of clear and simple diagrams, such as flow charts. Some referenced the diagram from page 15 of the consultation document. Other, general comments on the presentation of information included:

- Ensuring documents are electronic, fully indexed and referenced.
- Provision of a simple reference guide.
- Integrating the additional information on ventilation with the domestic ventilation guide provides a simpler method to retrieve or obtain relevant information from a single source.

Several respondents gave suggestions for additions to the guidance, and also commented on parts of the guidance that they considered should be amended. For example:

- Guidance on reducing noise from mechanical extract fans and MVHR systems.
- Additional guidance exploring the impact of massing, solar gain, pressure differential and the opportunities for creating stack ventilation, particularly here high spaces can be incorporated into buildings.
- Information reflecting guidance per Part F of the Approved Documents in England.

A few contractor/developer respondents repeated concerns from previous questions, that guidance should be clearly separated from mandatory requirements to avoid risk of confusion and misinterpretation.

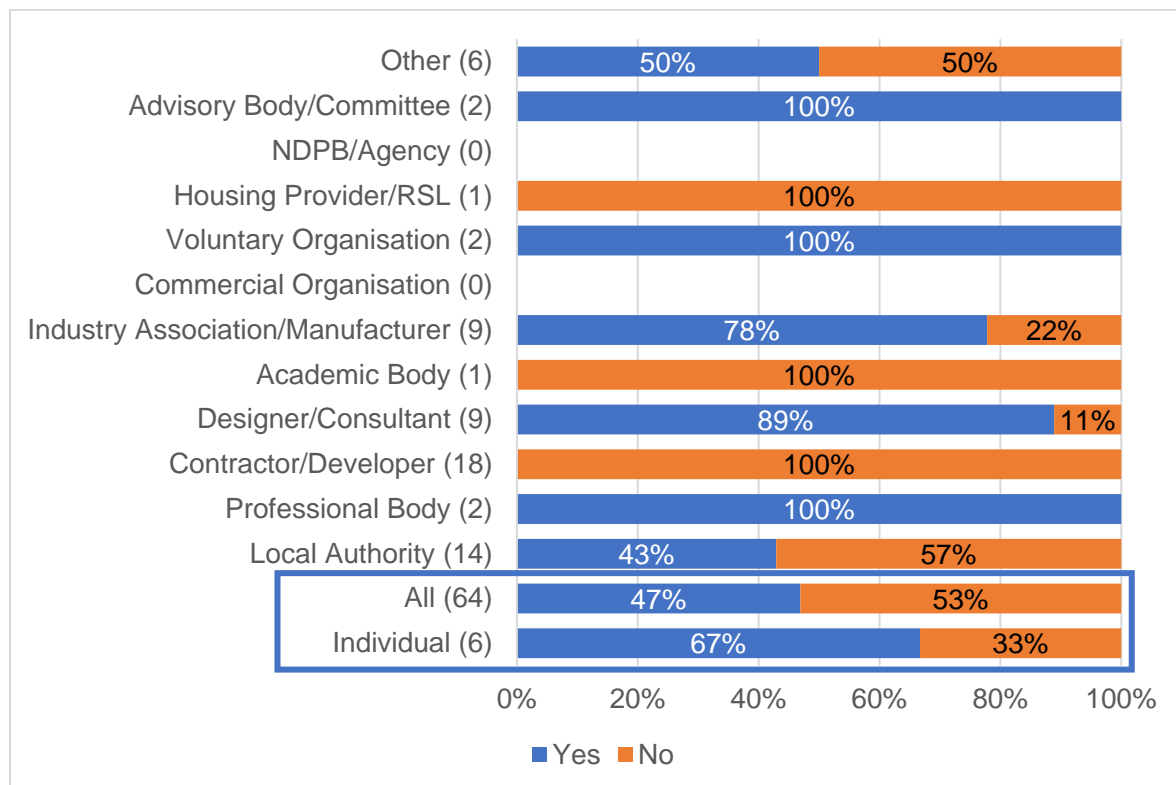
Numerous suggestions were made by one organisation for additional technical guidance, specifically referring to ducts.

## **5.7 Emphasis on design, commissioning, and testing**

### **5.7.1 Question 38 - Are there other elements of the commissioning of ventilation systems that you consider are both practical to implement and useful in providing additional assurance of performance in practice?**

In total, 64 responses were received to this question and 41 responses to the accompanying open question where respondents were asked to provide more detail to support their answer. Five respondents provided an open response but did not answer the preceding open 'yes/no' question.

Figure 45: Emphasis on design, commissioning, and testing



Base: 64 respondents (112 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### 5.7.2 Analysis

In total, just under half (47%) of respondents suggested there are other elements of the commissioning of ventilation systems that they consider are both practical to implement and useful in providing additional assurance of performance in practice (Figure 45).

There was strong support among many respondents for staged commissioning for example, an initial commissioning at handover followed up with an in-use rebalancing of systems, based on user feedback, with second stage re-commissioning after 1 year of use of any installed system. The purpose of the second stage commissioning (after a year) was variously described as to re-calibrate systems, re-balance systems, allow adjustments to be made based on user feedback; and to 'stress-test' the system in all seasons and allow adjustments required to be made to optimise the system.

Several respondents stressed the importance of guidance for end users. These respondents felt that guidance should be clear and easily understandable in the form of an operational material and should ideally be accessible digitally as well as within a user manual made available at handover.

Several respondents made reference to competence of personnel involved in commissioning systems as well as those designing and installing, respondents stressed that these should suitably trained and competent people.

Several respondents referred to noise levels, with a national organisation calling for guidance to be introduced into the building standards around the noise from mechanical ventilation systems and this to be provided as a test for compliance. A few respondents also stated that noise from mechanical ventilation systems is an issue for many local authorities and effective consultation needs to be undertaken to ensure that any potential issues are identified as early as possible.

A few respondents stated that the commissioning process should include a record of the name of the technician and the company employed by the person carrying out the ventilation testing in the report submitted to the verifier and it should detail of any competencies relevant to this role. A Membership Body also suggested the inclusion of the installers' details, for accountability purposes

Comments from respondents answering 'no' were general responses e.g., stating that every ventilation system should perform as designed once installed. One drew attention to the existence of commissioning apps which they feel may be worth considering in future updates to the regulations.

## **5.8 Thoughts on domestic and non-domestic ventilation**

### **5.8.1 Question 39 - We welcome your thoughts on domestic and non-domestic ventilation, or broader topics which would merit consideration as part of the planned review.**

Sixty-two responses to this open question were received.

#### **5.8.2 Analysis**

There were few themes discernible in the answers to this question, generally respondents commented on very specific points according to their specialisms, with some respondents going on to recommend evidence to support the points raised:

- Noise levels and their impact.
- Consideration of ventilation in the context of minimising risks from indoor pollutants.
- Levels of background ventilation.

Several respondents mentioned concerns about noise, one suggesting this may benefit from a wider discussion and integration with planning and public health guidance. Two respondents mentioned reports which they feel might contribute to the debate.

Several respondents welcomed the guidance and referenced ventilation practices necessitated by the pandemic to keep occupants safe.

A few respondents were concerned about ventilation in the context of minimising risks from indoor pollutants. Three respondents recommended a publication which details broader issues around ventilation, air tightness, indoor air quality and wellbeing of occupants.

Various other comments were made, however there were no obvious themes to these responses. They included:

- Ventilation should not be subordinate to energy.
- Guidance for retrofit to be prepared with great care stating that retrofit risks trapping in moisture.
- Levels of background ventilation given in Table 3.7a may be too high and could negate some of the benefits of improved thermal insulation and increase Carbon emissions.
- The importance of considering human nature in any proposals because people have greatly differing preferences and behaviours regarding their individual environments.
- A gap in minimum outside air rates between the 8 l/s/person outlined in the Building Standards Technical Handbook and those outlined in CIBSE Guidance and other industry bodies such as the BCO (British Council for Offices).

## **5.9 Further comments on proposed changes to ventilation standards**

### **5.9.1 Question 40 - We welcome any other comments you may wish to make on proposed changes to ventilation standards for domestic buildings.**

Forty-four responses to this open question were received.

#### **5.9.2 Analysis**

Respondents tended to make specific individual points however, a number of themes are discernible.

The necessity to harmonise energy and ventilation standards was highlighted as a concern by several respondents. A campaign response repeated twice warned of the perceived dangers that a halfway approach will result in unwanted heat loss and a widening performance gap.

A few respondents had concerns about appropriate ventilation standards for retrofit, making a specific reference to traditional buildings.

Trickle ventilation and the need to provide adequate ventilation in dwellings was mentioned by a few respondents. An Industry association/manufacturer noted how trickle vents in windows reduce thermal efficiency and are often permanently closed by occupiers. A Local Authority commented that where trickle vents are in a window head their exact area is not measured and that there is likely a high proportion of non-compliance of this aspect. It was also highlighted that the revised standards do not appear to allow trickle ventilation to be ducted.

A few respondents suggested that ventilation must cover both supply and extract as they are inextricably linked.

A few respondents drew attention to ventilation of garages, where current guidance refers to fortuitous ventilation through garage doors, stating this should be re-considered where new garage door installations are typically much tighter.

The content of two responses was of a highly technical nature.

## 6 Part 5 – Overheating risk in new dwellings and other residential buildings

In the consultation document, the BSD proposed that any new provision to assess and mitigate against the risk of summertime overheating should apply to all new dwellings, subject to the application of a set of trigger criterion that determine the need to consider the design and specification of the dwelling further to mitigate such risk.

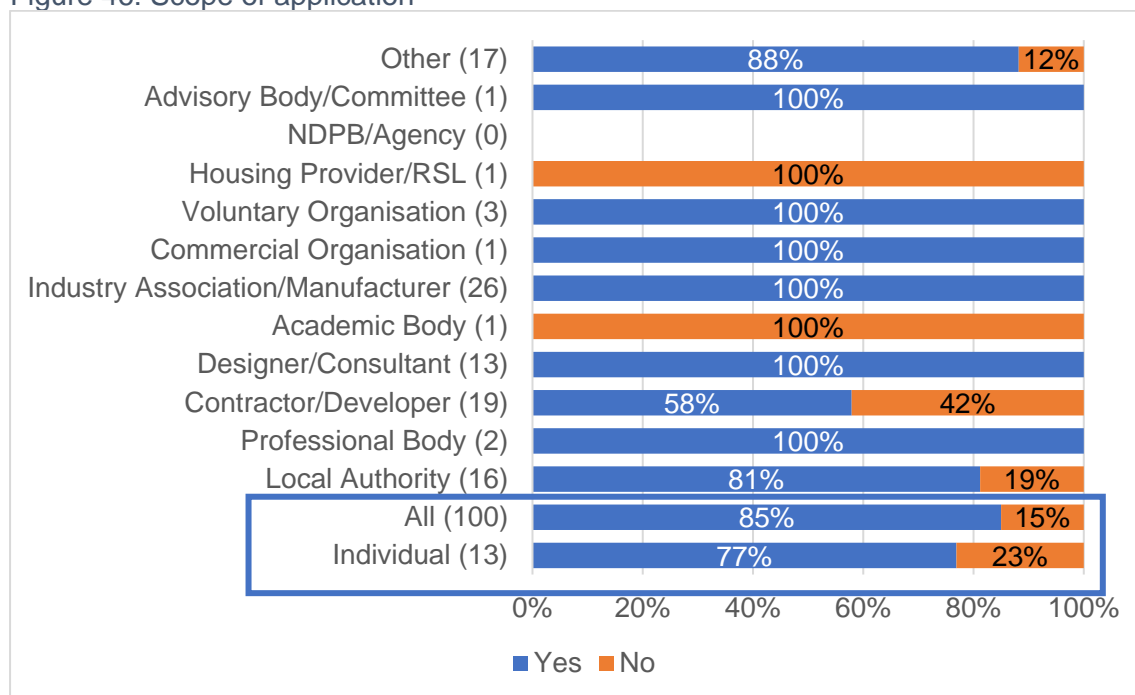
The BSD also proposed that the same assessment be applied to non-domestic residential buildings where the built form and occupancy is similar to dwellings (e.g., self-contained student flats accessed off a common area).

### 6.1 Scope of application

#### 6.1.1 Question 41 - Do you agree with the proposed introduction of a requirement to assess and mitigate summertime overheating risk in new homes and new non-domestic residential buildings offering similar accommodation?

One hundred responses to this question were received, and 84 responses to the accompanying open question. Five respondents provided an open response but did not answer the preceding open 'yes/no' question.

Figure 46: Scope of application



Base: 100 respondents (76 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3

#### 6.1.2 Support for the proposal

Overall, 85% of respondents to the closed question are supportive of the proposal (Figure 46).

Some respondents agreeing with the proposal chose to give reasons for their answer, the main reason given was climate change, which was specifically mentioned by sixteen respondents.

Many respondents also detailed risks to health and welfare associated with overheating, including physical and mental health problems; morbidity and mortality rates in the context of an ageing population; as well as implications for productivity and concentration.

Other reasons for supporting the proposal include increasing fabric u-values and airtightness, increased likelihood of the use of lightweight materials with low thermal mass, and avoidance of costly retrofitting. A few respondents mentioned windows as a contributor to overheating, one suggested that assessing new homes for summer overheating risks, might force architects and house builders to have second thoughts on what is a desirable amount of glazing.

Among those agreeing with the proposal a few respondents expressed concern regarding the reliance on mechanical means e.g., air-conditioning to overcome overheating. Two respondents went on to state that natural solutions are cheaper to build in at the construction stage, and that the life-cycle costs for a new build are approximately 20% on construction and 80% for the rest of the building's life. A Trade Association also stressed the importance of passive measures prior to the installation of energy intensive cooling systems, in line with the European Energy Performance Building Directive and the Greater London Authorities Cooling Hierarchy. The same respondent and one other respondent highlighted the importance of Solar Shading.

The following comments were each noted by a few respondents:

- The overheating risk should be addressed by a new Building Standard. A Profit for Purpose organisation urged caution, stating that this is only the right choice if the requirements are robust and effectively enforced.
- The proposal should only apply to any development without air conditioning.
- Concerns about the verification process and the additional burden on the designer and verifier.
- PHPP has a built-in methodology for assessing overheating risk based on the calculation of shading for as designed windows and suggested that adoption of the PHPP as a compliance tool would streamline the approval process for this section of the building standards.

### **6.1.3 Not in support of the proposal**

The predominant view among several respondents unsupportive of the proposal was that overheating is not an issue in Scotland.



#### **6.1.4 If you consider that proposals should be extended to non-domestic buildings which provide other forms of residential accommodation (which are not 'self-contained residential units'), we welcome your views on such provisions, including if the same or alternate approach to assessment is recommended?**

Of the 34 respondents to this open question. Fourteen chose not to go in to detail, simply re-iterating their support or stating this would be logical or would add consistency to the process.

A few respondents supported extending the proposal to care homes, with a Not-for-profit organisation reasoning that people living in these buildings will be significantly more vulnerable to the impacts of overheating in the buildings in which they live than other groups.

A minority supported extension of the proposals to all buildings, with one respondent recommended that the same approach be considered for non-domestic residential, particularly where occupants have limited opportunity to utilise other spaces in hot weather.

A number of respondents raised provisos in relation to extending the proposal:

- Noise levels need to be amended to reflect relevant guidance.
- Flexibility should be built into the requirements to ensure that undue constraints are not placed on the construction of new dwellings.
- Consideration should be given to commissioning testing of noise from mechanical systems.
- The management of noise, ventilation and overheating still has a firm place at the planning stage.

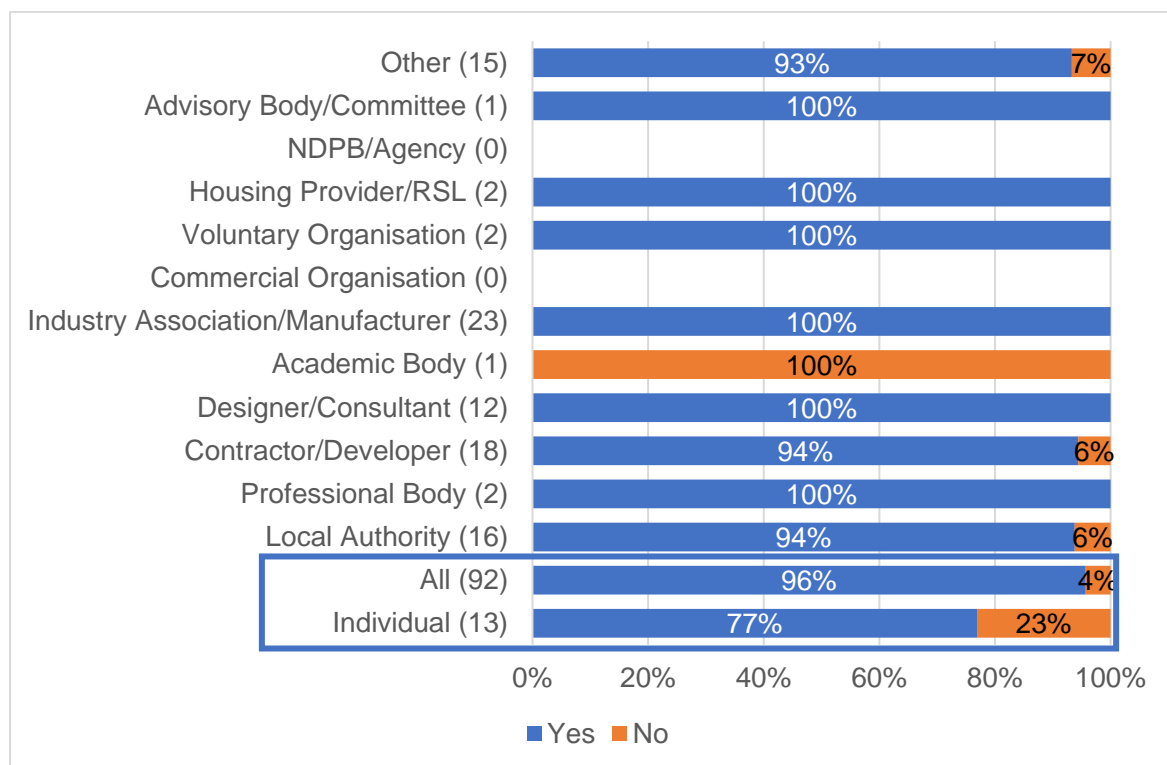
Many respondents suggested the same methodology is used for all buildings. Few respondents commented on alternative approaches to assessment.

## **6.2 Application of criteria for assessment**

### **6.2.1 Question 42 - Do you agree with the proposal that an initial assessment of dwelling characteristics should be undertaken to help inform design choices and the delivery of new homes which provide better thermal comfort in the summer months?**

Ninety-two responses to this question were received, and 74 responses to the accompanying closed question. Nine respondents provided an open response but did not answer the preceding open 'yes/no' question.

Figure 47: Application of criteria for assessment



Base: 92 respondents (84 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

## 6.2.2 Analysis

Overall, 96% of respondents answering the closed question agreed with the proposal (Figure 47).

Respondents agreeing with the proposal gave reasons for their agreement, caveated their response, or made suggestions to improve the process.

Several respondents stated their reason for supporting the proposal was to help ensure any risk of overheating is tackled at the outset to avoid having to retrofit mitigation measures. Similarly, respondents were of the opinion that early taking of decisions on the design of the building such as size and position of windows would lead to cost savings.

Several respondents supported passive mitigation measures e.g., shading rather than mechanical ventilation and air conditioning.

Some respondents praised the 'simple' approach. Other respondents (while still supporting the proposal) thought it overly simplistic.

Respondents commenting on glazing highlighted the importance of balancing limiting overheating against the benefit of natural light, glare, and adequate views.

A few respondents called for clarity of the guidance and to what it applies. They also recommended that illustrations and example diagrams should be provided.

A further few respondents suggested that feedback on measures implemented should be sought. For example:

- On-going assessment of the effectiveness of any chosen mitigation strategies in order to build library of outcomes from which others can learn.
- The proposal to use triggers might not cover all properties and in-use performance should be considered to assess whether the mitigation strategies have worked, and that the metrics are suitable.
- Consideration of the views of respondents on other sources of good practice guidance which have been implemented by developers and the outcome evidenced through feedback from residents.

A few respondents recommended that the proposals take into account thermal mass of building materials.

### **6.2.3 We would also welcome your knowledge and views on other sources of good practice guidance which have been implemented by developers and the outcome (e.g., no reports of significant summertime overheating) evidenced through feedback from residents.**

Other sources of good practice guidance recommended by respondents are:

- Overheating in New Homes – Tool and guidance for identifying and mitigating early-stage overheating risk in new homes (2019).
- Understanding overheating – where to start (NF44) NHBC.
- Zero Carbon Hub documentation published in 2016
- Avoiding summer overheating’ Passivhaus Trust.
- MHCLG (now DLUHC) research<sup>3</sup>
- The Good Homes Alliance checklist.
- Design criteria set out in the PHPP tool.

## **6.3 Should specific dwelling characteristics trigger use of CIBSE TM59**

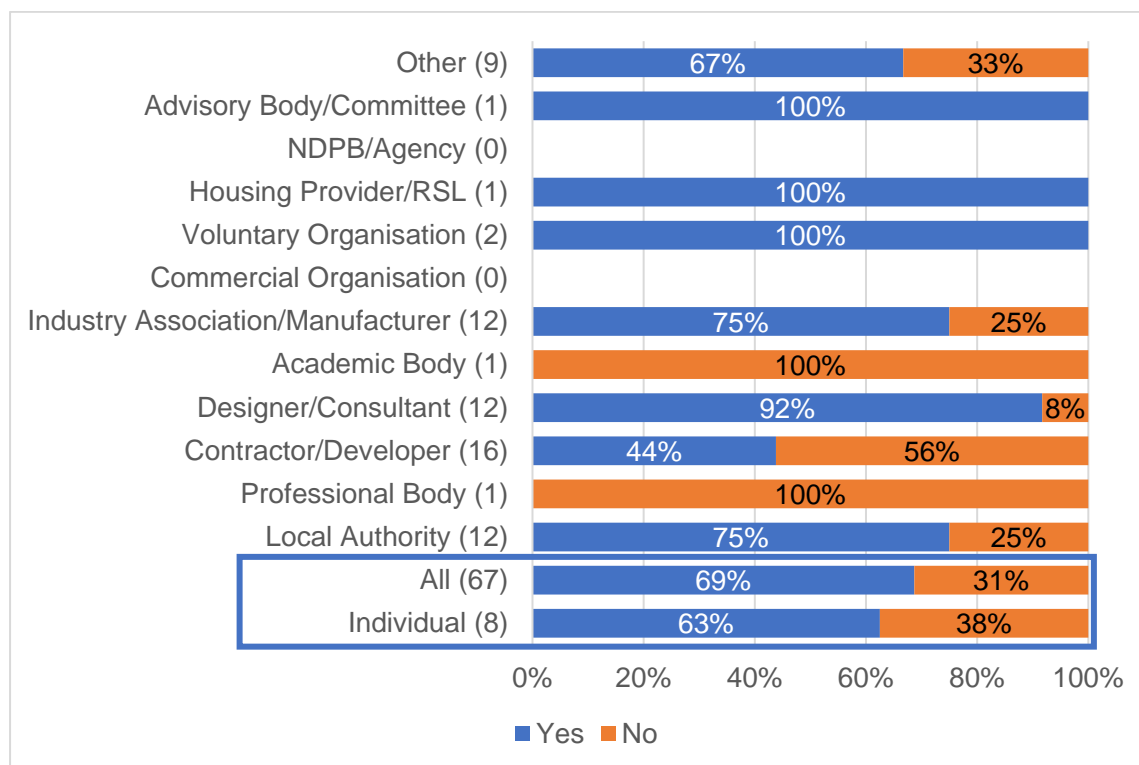
### **6.3.1 Question 43 - Are there circumstances where you consider the specific characteristics of a dwelling should trigger a need for CIBSE TM59 assessment rather than application of a simple elemental approach?**

In total, 67 responses to this question were received and 72 responses to the accompanying open question. Fifteen respondents provided an open response but did not answer the preceding open ‘yes/no’ question.

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<sup>3</sup> [MHCLG research into overheating in new homes \(2019\).](#)

Figure 48: Simple elemental approach or dynamic thermal analysis



Base: 67 respondents (109 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### 6.3.2 Analysis

Overall, 69% of respondents answering the first part of the question agreed with the proposal (Figure 48).

Respondents agreeing with the proposal gave a variety of different criteria they feel should trigger a CIBSE TM59 assessment.

A TM59 assessment should be triggered when a property has large areas of glazing, was a view shared by several respondents. Respondents expanded on this theme with suggestions that the orientation of glazing and the presence of glazing which is difficult to shade should be taken into consideration.

A view shared by several respondents was that reference should be made to mitigation measures when considering triggering a TM59 assessment. An Advisory body/Committee respondent went onto recommend TM59 being triggered where mitigation measures are extensive, which contrasts with an Industry Association/manufacturer respondent who stated a trigger should be lack of mitigating factors.

A few respondents who agreed with the proposal went on to state that a TM59 assessment should be carried out for all developments or all new developments. An Industry association/manufacturer respondent was concerned that the simplified method reduces the process to a tick box exercise and that the actual problem is not addressed.

The following potential triggers were each mentioned by one respondent:

- Buildings with complex forms or internal arrangements.
- Where it is noted during the basic assessment that more than one room, or a percentage of the building could overheat and limited opportunities for external shading due to heritage constraints.

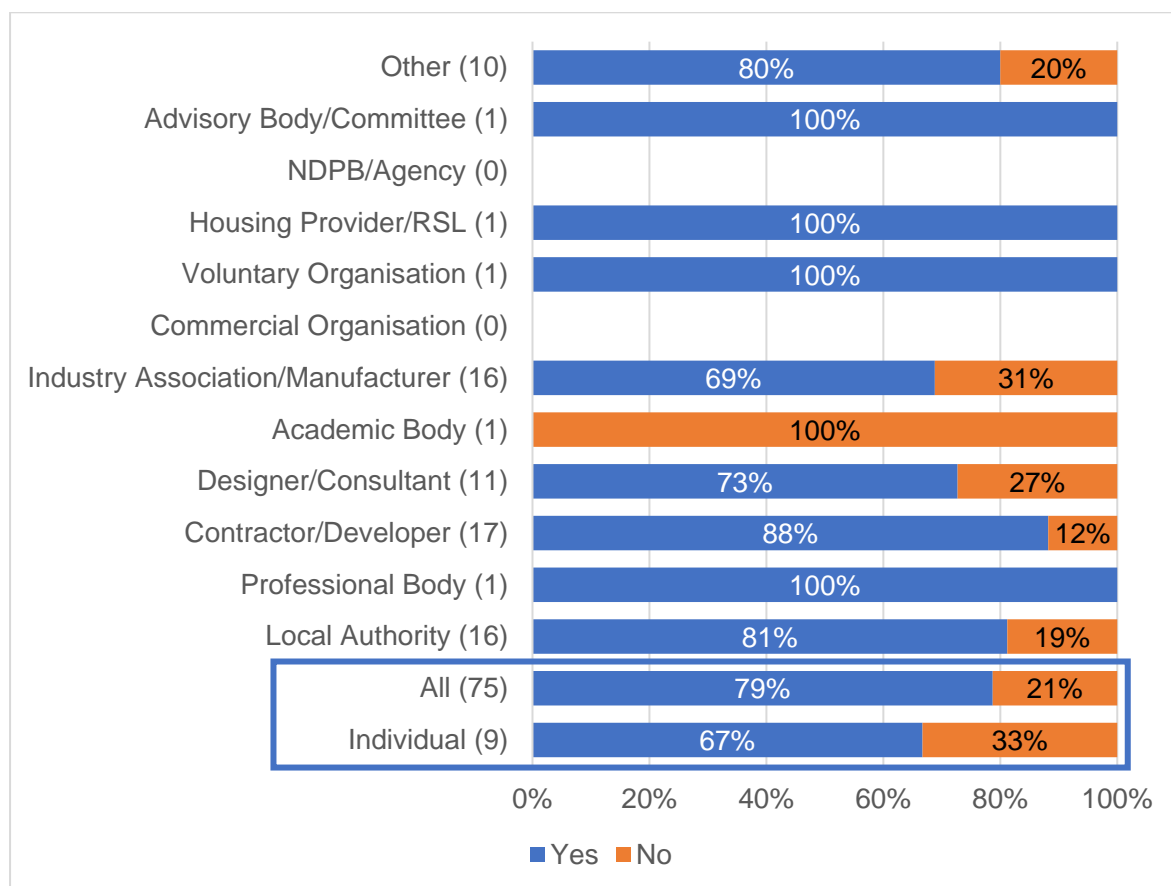
Those disagreeing with the proposal either stated that TM59 should be used for all development; the simple elemental approach is suitable for all developments or that specific characteristics should not define which approach is used.

## 6.4 Scope of mitigating measures proposed

### 6.4.1 Question 44 - Recognising the level of risk identified in the 'Addressing Overheating Risk in New Dwellings' published research paper, do you agree with the assessment proposals as a suitable means of mitigating summertime overheating in new homes through prescriptive actions?

Seventy-five responses to this question were received and 58 responses to the accompanying open question. Fourteen respondents provided an open response but did not answer the preceding open 'yes/no' question. Around half of these were 'no comment'.

Figure 49: Scope of mitigating measures proposed



Base: 75 respondents (101 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

## 6.4.2 Analysis

Overall, 79% of respondents who answered the closed question were in favour of the proposal (Figure 49).

Those in support of the proposal used the open question to voice their general agreement with the prescriptive approach or to go into more technical detail covering specific areas of the assessment proposals.

Several respondents, whilst agreeing with the proposals, thought the methods over simplistic. This contrasted with the views of several other respondents who supported simple prescriptive measures or 'simple assessment' at least for less complicated dwellings.

A few respondents (repeating a campaign response) agreed with the mitigation measures proposed but recommended that these should not be too prescriptive and allow variation in design if dynamic modelling demonstrates the risk of overheating is mitigated. Two of these respondents went on to question the exclusion of internal blinds in shading options, claiming that in many instances with the inclusion of appropriate blinds and the education of the homeowner, internal heat gains can be significantly reduced.

A few respondents commented on measures involving specifying the g value of glass; an Industry association/manufacturer thought it important that reducing glazed areas or limiting the g-value of the glass should not be considered a universal solution; and a voluntary organisation asked for care to be taken on site, when different g-values of glass are chosen for different rooms, that this is actually used. The Industry association/manufacturer respondent went on to suggest that the means of reducing the impact of solar overheating should be controllable so as to not have an adverse effect during the majority of the year when solar overheating is not an issue.

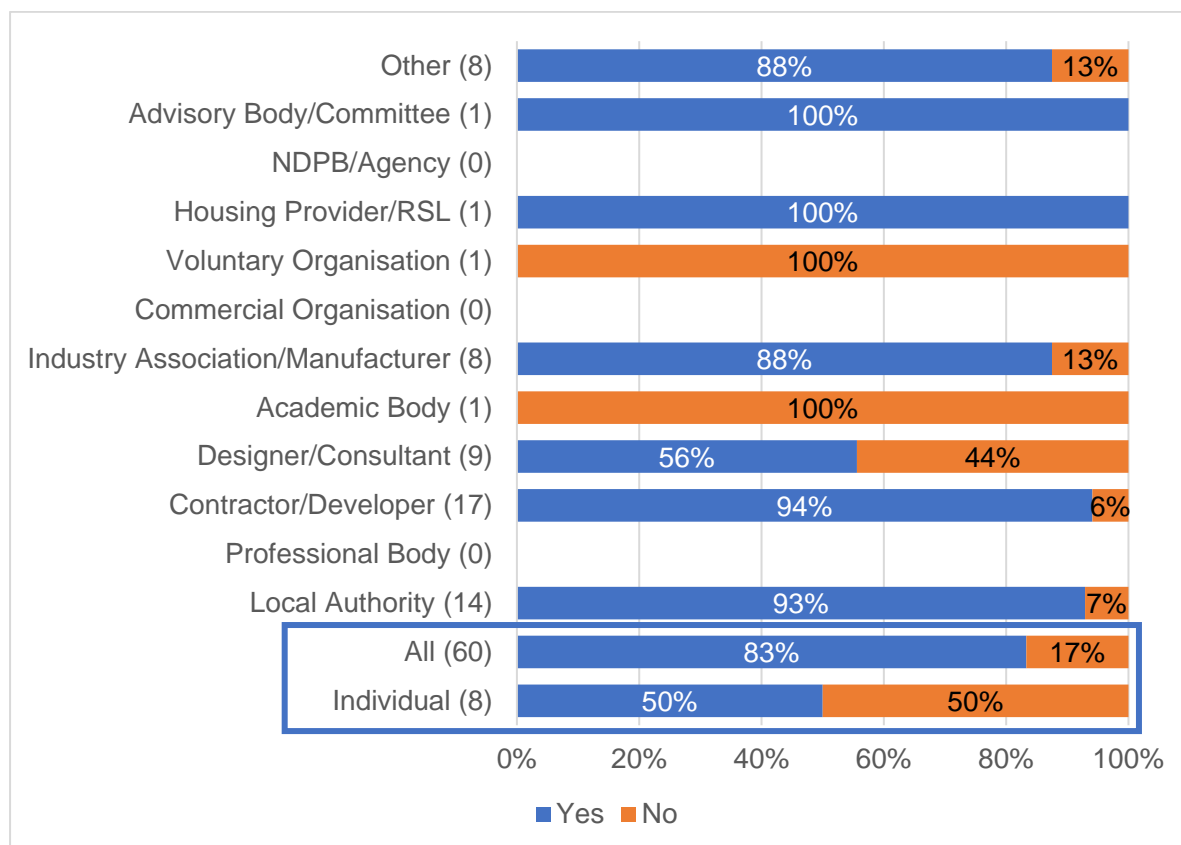
A few respondents who disagreed with the proposal recommended that 'baseline' g value be changed from 0.60 to 0.40 to address the problem of overheating and went on to recommend that a 'look up' table is provided, linking glazed area, room floor area and g value.

## 6.5 Practicality of solutions

### 6.5.1 Question 45 - Do you consider that the approach set out in the proposed standard and guidance will provide adequate assurance that ventilation measures provided to mitigate summer overheating can be used safely and conveniently in practice?

Sixty responses to this question were received and 44 responses to the accompanying open question. Twelve respondents provided an open response but did not answer the preceding open 'yes/no' question.

Figure 50: Practicality of solutions



Base: 60 respondents (116 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### 6.5.2 Analysis

There was widespread agreement with the proposal – 83% of respondents to the closed question answered ‘yes’ (Figure 50) – though respondents had strong views on factors that might limit the extent to which building occupants use the mitigation measures.

A number of factors that might prevent occupants opening windows were highlighted.

- Excessive noise was suggested as a factor by several respondents, it was acknowledged that the guidance details that this is assessed at Planning stage, however a few respondents suggested there is a risk that this will only pick up on proposals that require formal Noise Impact Assessments, and that other developments could be subject to elevated noise levels outside these conditions.
- Security issues, particularly for ground floor rooms were a concern for several respondents.
- Pollution was highlighted by several respondents as a factor that might limit the extent that occupants are safely or conveniently able to open windows.

- A few respondents repeated a campaign response which mentioned “insect ingress” as something that would prevent occupants opening windows.

A campaign response repeated by three respondents (who chose not to answer the closed question) acknowledged that opportunities to open large areas of glazing may be limited.

### **6.5.3 Caveats expressed where respondents support the proposal**

Several respondents agreeing with the proposal went on to caveat their response.

- A Local Authority commented that consideration should be given air paths within dwellings to ensure that in a new dwelling (where there is greater freedom of design) some degree of cross ventilation should be achievable without all internal doors being open. This response was repeated by two other respondents.
- Six respondents asked that a user guide be provide for occupants; a Trade association had concerns that in practice written information would not be handed over to the occupant.
- Three respondents who chose not to answer the closed question, commented that future effectiveness of the standard and guidance would depend on the extent of climate change.
- Five respondents stated that further research into the impact of any regulatory changes will be required to validate their effectiveness, or that the standard and guidance would need to be in place before their adequacy could be assessed.

### **6.5.4 Not in support of the proposal**

The eight respondents who disagreed with the proposal and answered the open question, largely gave similar comments to those who agreed with the proposal, referring to climate change; factors preventing occupants opening windows; and the need to monitor and assess guidance in practice.

## **6.6 Further comments on mitigating risk of summer overheating**

### **6.6.1 Question 46 - We welcome any other comments you may wish to make on the proposed introduction of provisions to mitigate the risk of summer overheating in new homes and residential buildings.**

#### **6.6.2 Analysis**

Thirty-three responses to this open question were received. Respondents gave a variety of comments; some took the opportunity to emphasise responses to previous questions, while others provided new information.

A number of themes are discernible from the responses:



- Climate change: a campaign response repeated by three respondents requested that the assessment take into account effects of global warming, use of design assessment tools that work for different climate zones.
- Skills, competence, and training: several respondents highlighted issues on this theme. Specific comments identified a need for an education process for Planning Officers; clarity on the knowledge, skills or experience needed by those undertaking assessments; upskilling for designers; a new competent person scheme should be developed; compliance assessments should be undertaken by qualified and competent professionals.
- Overheating in flats: request for greater guidance

Various considerations were put forward by numerous respondents, however, these had no common themes.

# 7 Part 6 – Improving and demonstrating compliance

In late 2019, BSD commissioned a short research project to assist in understanding the issues that arise in the delivery of low energy buildings and how greater assurance of process could be delivered, focusing primarily on building fabric issues. The output of the project was not intended to be a guide for designers and contractors but to inform the later development of such a resource.

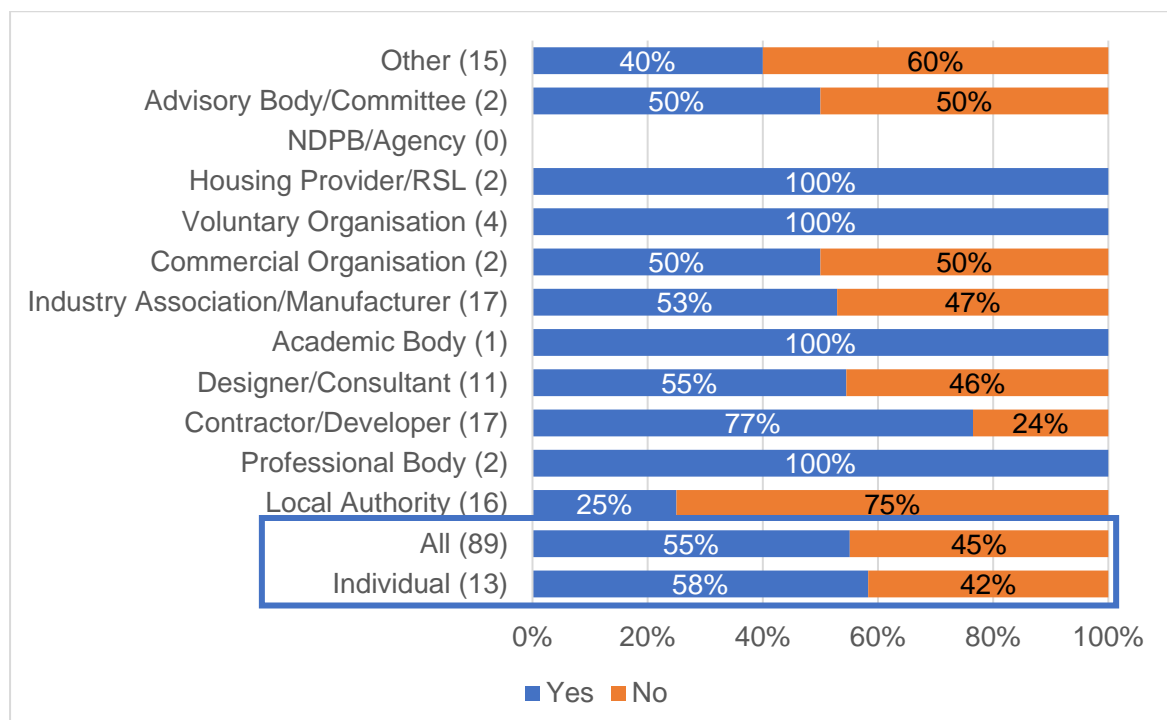
It is intended to now progress this agenda, extending scope to include the design, installation and commissioning of building services, in the context of the Compliance Plan approach. BSD are commissioning the development of a ‘compliance manual’ to support effective delivery of compliance with Section 6 (energy) in a format which would be compatible with the Compliance Plan approach and supporting core guidance.

## 7.1 Successful design or construction quality assurance schemes

### 7.1.1 Question 47 - Do you have any experience of successful design or construction quality assurance regimes which you consider may be useful to consider in the context of the development of a Compliance Plan manual to support the effective delivery of compliance with section 6 (energy)?

Eighty-nine responses to this question were received and 62 responses to the accompanying open question. Three respondents provided an open response but did not answer the preceding open ‘yes/no’ question.

Figure 51: Successful design or construction quality assurance schemes



Base: 89 respondents (87 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### **7.1.2 Analysis**

Overall, responses were split fairly evenly with 55% stating they do have experience of such regimes and 45% stating they do not have experience (Figure 51).

Respondents gave details of processes for National House Building Council (NHBC), Passivhaus and the Structural Timber Association, alongside references to technical guidance documents. There was a general appreciation of the difficulties around assurance of compliance.

### **7.1.3 Designed versus as-built performance**

Several respondents mentioned the gap between designed versus as-built performance. An Industry Association/manufacturer highlighted a perceived failure to introduce as built testing, suggesting that ignoring the performance gap (between designed and as built) risks the net zero ambition. A Local Authority called for robust action to ensure as-built compliance with section 6 regulations, and a review of the resources & training available to Buildings Standards Officers to deal with section 6 compliance. A Professional body called for the Certification of Design for Section 6 Energy to become mandatory. An Industry Association/manufacturer perceived a need for developing construction details to show 'good practice' for all aspects of Building Regulations (e.g., acoustic, fire, etc.). Another highlights that compliance is extremely difficult, and that supervision of outputs is even more challenging due to time pressures, weather and variances in materials delivered.

### **7.1.4 Competent individuals**

Several respondents raised this theme, noting the following:

- Most of the sector is unregulated and that any "Compliance Plan" introduced should be underpinned by the use of properly qualified individuals and businesses.
- An independent professional who can reinforce checks and verify compliance would be helpful.
- Competent Persons Schemes currently run in England and Wales could be used effectively in Scotland.
- A scheme in Canada where anyone submitting a warrant for buildings over a certain size (including dwellings), is required to sit exams relating to the various sections of the regulations.

Respondents gave examples of technical guidance, standards, and publications which they use or consider would inform a Compliance Plan Manual.

### 7.1.5 Other guidance

Other guidance, organisations and standards referenced by respondents:

- Building Research Establishment's Environmental Assessment Method (BREEAM).
- The NABERS scheme (NABERS a system for rating the energy efficiency of office buildings used across the UK).
- Local Authority Building Control.
- Construction Quality Assurance 1.
- RIAS Certification of Design for Part 6.
- Association for Environment Conscious Building) (AECB).

Passivhaus was mentioned by 14 respondents who identified several beneficial features of the Passivhaus process, with some respondents going on to state that Passivhaus has the longest track record of delivering homes that meet their design performance as well as the standards of energy efficiency needed to deliver net zero buildings.

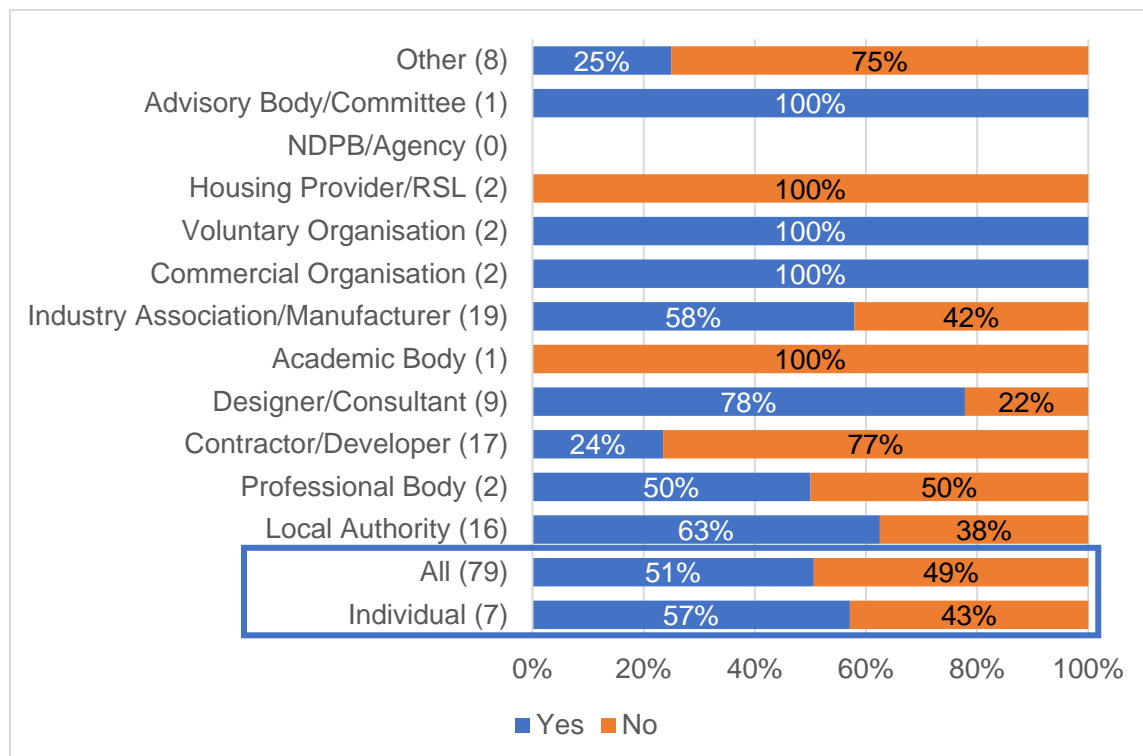
A total of 12 respondents referred to NHBC. Seven respondents mentioned NHBC sharing compliance issues on a monthly basis with developers.

## 7.2 Comments on the compliance themes identified

### 7.2.1 **Question 48 – Do you have any comments on the compliance themes identified (i.e., informed design, risk assessment, calculation, communication, competence, commissioning, quality assurance, performance testing and use of data) and any other actions you consider would be useful in supporting improved compliance with requirements for energy and emission performance?**

Seventy-nine responses to the closed question were received and 53 responses to the accompanying open question. Eleven respondents provided an open response but did not answer the preceding open 'yes/no' question.

Figure 52: Do you have any comments on the compliance themes identified?



Base: 79 respondents (97 no response) NB Individual respondents are listed separately at the bottom for information – as they are included in organisation responses (per Section 2.3)

### 7.2.2 Analysis

Just over half (51%) of respondents stated that they had comments to make (Figure 52). There was a total of forty responses to the open question. The proposals were welcomed by a broad spectrum of respondents, some respondents caveated their agreement with a need for flexibility or a requirement for third party assessment.

### 7.2.3 Competence

Almost a quarter of respondents leaving comments expressed a view on the competence requirements for compliance plan managers and other professionals in assessment or construction roles.

Several respondents suggested that the ‘coordinating individual’ role is aligned with the role played by a Passivhaus Designer/ Consultant with support from the Passivhaus Certifier. Respondents went on to repeat a campaign response – “Passivhaus achieves third party verification with a Certification scheme. Critically the Certifier is independent of the designer and contractor”.

A few respondents noted that currently there is no requirement for individuals who carry out energy assessments or produce compliance reports to be members of an approved organisation, and there was support for assessors being required to be members of professional organisations. One respondent went on to state that membership of professional organisations would ensure assessors are subject to

quality assurance in terms of reports and CPD and ensure assessments are completed to a high standard.

A few respondents welcomed the implementation of greater checks through the design and verification process but cautioned that this will require additional resource. A Local Authority stated “there is not sufficient resource or funding within building standards services to take these initiatives forward”; while an Industry association/manufacturer highlighted that the additional cost is not expected to be considerable, but it comes at a time when materials and labour costs are already extremely volatile. Another Industry association/manufacturer warned of a need to ensure designers and installers are not exposed to excessive burdens that hamper project progress.

#### **7.2.4 Designed v as-built performance**

Communication was highlighted as a key issue by several respondents in addressing the design v as-built performance gap.

A few respondents suggested that standards could be driven up by increasing use of thermal imaging equipment, with one suggesting this will have a similar effect to airtightness testing.

A few respondents highlighted the importance of recording key construction details in the effort to avoid performance gaps.

#### **7.2.5 Data**

A few respondents had views on how data collected during the assessment process could be best used.

A Commercial organisation suggested that data collected should be incorporated into a “building passport”. The respondent went on to state that an information pack of the products and methods of installation would not only benefit verifiers, but also benefit occupants, future generations and the Government’s own information on the types and quality of the housing stock.

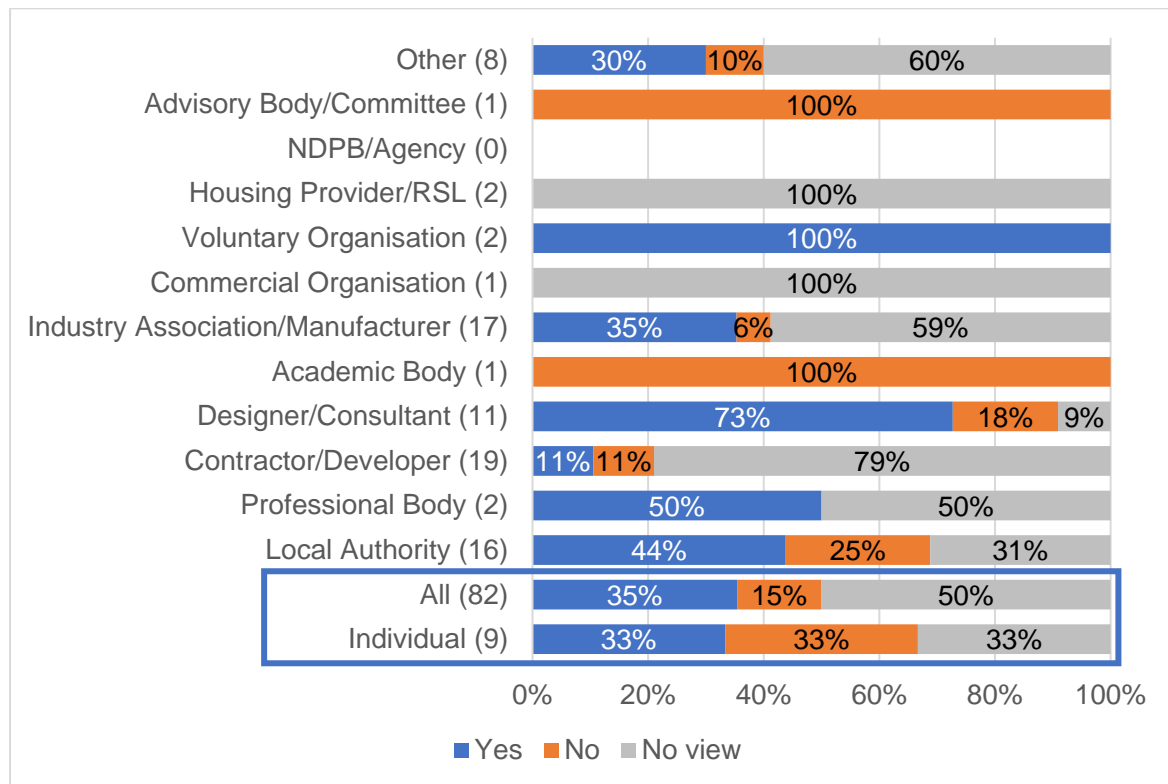
A Designer/consultant suggested that the assessment process could introduce the ability to extract powerful data on construction projects being undertaken and how the feedback and lessons learned can then be applied to future updates and revisions to the building standards and how it can apply to the construction industry in general.

### **7.3 Improving compliance with energy standards – topics of interest**

#### **7.3.1 Question 49 - Are there particular aspects to building design and construction which you consider should be prioritised as part of the development of a detailed compliance plan manual for section 6 (energy)?**

Eighty-two responses to this question were received with 52 responses to the accompanying open question. Nine respondents provided an open response but did not answer the preceding open 'yes/no' question.

Figure 53: Improving compliance with energy standards – topics of interest



Base: 82 respondents (94 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### 7.3.2 Analysis

Half of respondents stated they have 'no view' (Figure 53). Only just over a third (35%) stated that there are particular aspects that should be considered.

Respondents gave a range of views regarding priorities for the compliance plan manual. The main themes are:

- Many respondents (including a campaign response) suggested that all aspects are equally important and that none should be prioritised.
- Several respondents showed support for prioritising verification of products.
- Carbon and embodied carbon were mentioned by several respondents (including a campaign response): they highlighted a need to prioritise regulations which detail compliance with minimum standards for embodied energy and whole life carbon and suggested the inclusion of a compliance check for embodied carbon and the submission of Environmental Product Declarations. A campaign response stated all aspects of the consultation address operational carbon, but that a more important issue is embodied carbon.

- Guidance for occupiers was stated as a priority by several respondents: specific areas respondents stated should be covered by guidance include commissioning, operation, and maintenance schedules to inform future activities including replacement of plant.
- Airtightness testing was directly referenced as a priority by a few respondents.

Alongside the themes above respondents also asked for further detail regarding implementation in practice and highlighted a requirement for measures not to be overly burdensome on the design, build and commissioning process.

## **7.4 Further comments on improving compliance of building work**

### **7.4.1 Question 50 - We welcome any other comments you may wish to make on the topic of improving compliance of building work with the provisions within section 6 (energy) of the Technical Handbooks to better align designed and as-built performance.**

#### **7.4.2 Analysis**

Forty-five responses to this open question were received.

Respondents gave a range of comments, some choosing to use this question to express broad agreement with the proposals. The main focus for comments was on competence and skills requirements for various roles involved in the compliance process, from Compliance Manager to tradespeople. Respondents also re-iterated their responses to previous questions. Generally, responses were supportive although there were concerns around resourcing any changes.

#### **7.4.3 Passivhaus**

Passivhaus was cited in several responses either as an alternative means of compliance or as a baseline for performance for new build projects and together with AECB Retrofit /EnerPHit standard as a baseline for performance for whole house/building retrofit projects.

#### **7.4.4 Compliance Plan Manager**

A few respondents stress the importance of competence for individuals holding the role of Compliance Plan Manager. One respondent suggested a single point of contact to fulfil the “over role” working with a number of competent people each with responsibility for ensuring compliance within their respective discipline; each of these individuals being chartered members of a relevant professional body.

A few respondents urged caution that the role does not impose additional cost and burden on the industry, a Local Authority warned that contractors may try to perform this role themselves if perceived costs are too high.

The importance of independence in the role was highlighted by a Designer/consultant who stated that the Compliance Plan Manager should either be an independent clerk of works who is audited by an approved body or Building



Control should retain responsibility for ensuring that buildings are constructed in accordance with the approved plans.

#### **7.4.5 The role of “The Relevant Person”**

A campaign response highlighted the perceived problems below with the current model of the Relevant Person applying for Completion from the Verifier. The response stated that often the Relevant Person is the commissioning party; they may not have adequate technical knowledge. Verifiers do not have the resources to make increased numbers of site visits, and the extent of their duty of ‘reasonable enquiry’ cannot be adequately met. (The increased use of remote verification inspections (RVI’s) could improve this situation to an extent.)

#### **7.4.6 Verifiers**

A few respondents – including a campaign response – expressed concern that the proposals will impact on the verifier in terms of time and costs associated with pre and post building warrant work. Suggestions were made of methods to relieve the burden on Verifiers.

#### **7.4.7 Construction, Compliance and Notification Plan (CCNP)**

A few respondents had similar concerns around CCNPs, stating they are not robust, or extensive enough, and that CCNP stages are not always notified in a timely manner and roles/responsibilities need to be tightened up.

Other areas mentioned by individual respondents, largely re-iterating responses to previous questions include information for occupiers, enforcement, airtightness testing, modular construction, embodied carbon measurement and thermal imaging.

## 8 Part 7 – Electric vehicle charging infrastructure

The Scottish Government is committed to the decarbonisation of transport and with demand for Electric Vehicles (EVs) expected to grow rapidly, enabling people to switch to zero emission vehicles, will require ready access to convenient and reliable EV charging infrastructure.

This part of the consultation sought views on the Scottish Government's preferred policy options relating to the installation of EV charge points and enabling infrastructure (namely accessible trunking, conduits, or cable trays for electricity cabling) to facilitate the future installation of EV charge points in the car parks of residential and non-residential buildings.

### 8.1 Installation of electric vehicle charge points and ducting infrastructure

#### 8.1.1 Question 51 - What are your views on our policy goal to enable the installation of electric vehicle (EV) charge points and ducting infrastructure (to facilitate the future installation of EV charge points) for parking spaces in new residential and non-residential buildings parking?

In total, 108 responses to this open question were received.

Overall, respondents were supportive of the policy goal and a high proportion went on to qualify their response.

#### 8.1.2 Cost

The cost of installing charging points and associated infrastructure was a concern for several respondents who were in broad agreement with the proposals. Points raised include:

- Possible impacts of installing EV points (reduce parking spaces and increase charges for these spaces as well as having a knock-on effect of the cost of a property).
- The cost of installing a charging pillar with only one single charger is not significantly different from a pillar with two chargers.
- Extra cost associated with publicly accessible chargers.
- Unfair to burden building owners with an infrastructure cost for services, for which they may have no need or desire.

#### 8.1.3 Generating capacity and infrastructure

There was widespread questioning amongst many respondents of the adequacy of generating capacity and associated infrastructure to support greater usage of electric vehicles, with some respondents highlighting increased future use of electric heating

as possibly exacerbating any supply issues. A voluntary organisation suggested that an analysis of the supply chain is needed to support the proposals.

#### **8.1.4 Transport hierarchy**

Concerns around a sustainable transport hierarchy were voiced by many respondents of different types. There were fears that the proposals would sustain demand for and continued growth in private car ownership, which is the lowest priority in sustainable transport hierarchies.

Alongside comments relating to sustainable transport hierarchy were concerns about cycling. There was a general view that promotion of cycling infrastructure, particularly to support electric bikes should receive equal or greater priority to facilitating electric vehicle use, and where electric vehicle infrastructure is being installed it should be also readily accessible by e-bikes.

#### **8.1.5 Accessibility**

Several respondents expressed concerns about charging infrastructure and how easily members of the public will be able to access charging from domestic properties without dedicated off-street parking, these included:

- Clarity is needed on how multi-level flats and dwellings with no dedicated parking space and on street parking will be managed.
- The risk of electric shock and fire - research shows EV owners charge their vehicles dangerously using domestic multi-socket extension leads, not suitable for outdoor use, to charge from the mains in their home.
- New residential developments which do not have dedicated parking spaces, such as terraced streets and flats, should have bays specifically for the use of charging by shared vehicles.

#### **8.1.6 Exceptions**

A few respondents who questioned whether a blanket nationwide response is appropriate, recommended a more nuanced approach taking into account Local Transport Strategies or Local Development Plans, where there are specific strategies to create places to live where there will be little need to own a private car.

#### **8.1.7 Trip hazards**

A few respondents stressed the need to ensure that provision of charging facilities do not pose trip hazards, particularly for those who are visually impaired.

### **8.2 Views on preferred options for EV provision**

#### **8.2.1 Question 52 - What are your views on our preferred options for EV provision in new and existing buildings?**

105 separate respondents gave their views on the SG preferred options for EV provision in new and existing buildings.

### **8.2.2 Analysis**

26 responses read as variations of “no further comment” or “agree with the proposal”. 75% (or 79 respondents) provided additional views.

Overall, there was support for the preferred options but a number of areas requiring further detail were also highlighted.

Most of the concerns highlighted arose out of cost concerns, including ongoing maintenance and uncertainty over who would be liable for specific upfront and future costs. Whilst costs were viewed as significant, in new buildings, the future potential for higher costs to retrofit existing buildings was seen as a compelling reason to ensure an effective consultation process is undertaken, with clear requirements and design guidance.

Most comments sought clarifications on the requirements. It was felt that the presentation of the preferred options lacked specific definitions and detail. Many respondents requested for practical expectations of the proposal to be fully clarified, including the impact on Building Standards (where applicable) and further detail on the evidence needed to meet any requirements or exemptions.

### **8.2.3 Definition of “dwellings with a parking space”**

Several respondents felt that additional clarity was needed on the scope of the proposal. Clarity on how the requirements differ for on-road parking, private parking facilities and communal parking (including visitor parking) was sought. Respondents noted instances where residential parking spaces were not allocated to specific properties, with the feeling of uncertainty as to whether the proposal would apply.

### **8.2.4 Ducting and cabling infrastructure**

Several respondents asked for clarity on requirements for individual ducts to future connection points, chambers at future connection points, dedicated zones for future charge points, cabling, termination points. One respondent shared their uncertainty over the ownership and management of duct routing maps, shared duct chambers and future work.

### **8.2.5 Definition of major renovations**

A few respondents requested further detail on how the requirements would apply to renovation work in practice and what would constitute a ‘major’ renovation.

### **8.2.6 Concerns and insights**

Concerns and insights raised by respondents can be grouped into three key themes:

Many respondents queried electrical capacity, with most comments on this point being general in nature.

Cost was a second, predominant theme from many respondents, particularly evident in the responses from contractors and developers with concerns about the significant financial impacts.

One respondent was concerned about the blanket exemption cost because remote/rural areas of Scotland would likely incur significantly higher costs both in installation and grid reinforcement than their more metropolitan counterparts.

Professional bodies and voluntary organisations offered suggestions to overcome this, such as the use of a sliding-scale approach to costs based on the development size, so as to mitigate any viability concerns for small developments. Assurance was requested on who would pay for the electricity supply and wider grid network upgrades.

A third theme focused on user adoption. Respondents across a range of subgroups questioned the demand for EV charge points and ducting installation, some predicted scenarios of under-utilisation, particularly in rural locations.

A few respondents argued that exemptions should apply to demand in addition to cost-prohibitive circumstances. It was questioned why the proposed changes departed from the original EU directive's requirement for ducting in 1 in 5 spaces.

The additional cost of the proposed 'ducting 1 in 2 spaces' requirement would be significant and it was argued that the supporting rationale for this was largely unclear to respondents.

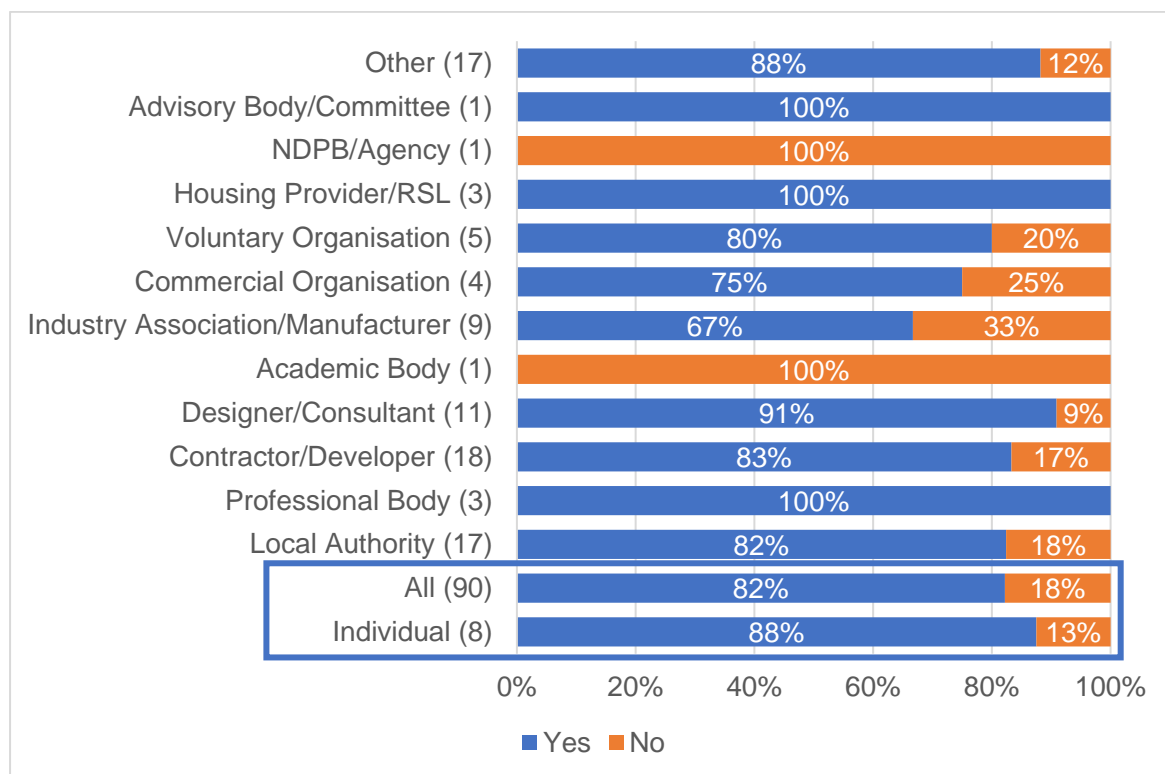
Respondents also offered solutions to match installation costs with demand.

### **8.3 Exemptions as set out in 7.6.1**

#### **8.3.1 Question 53 - Do you agree with the Scottish Government's preferred options for the exemptions as set out in section 7.6.1?**

In total, 90 respondents answered the yes/no question; 41 responses were provided to the accompanying open question, all from organisations. There were also an additional 15 responses in the free text answers, which declined to answer the original yes/no question. Of these, two detailed open text responses were given.

Figure 54: Exemptions as set out in 7.6.1



Base: 90 respondents (86 no response) NB Individual respondents are listed separately at the bottom for information - as they are included in organisation responses (per Section 2.3)

### 8.3.2 Analysis

The majority agreed with the proposed exemptions as set out in section 7.6.1, with 74 responses (82% of respondents) being in favour (Figure 54).

16 responses (or 18% of respondents) rejected the proposal. Of these, 15 generally provided thorough reasons and explanations as to why, along with requests for clarifications and proposing suggested exemptions.

### 8.3.3 Support for the proposal

Of the 74 respondents (82%) who agreed with the proposed exemption, 49 provided no further responses, 18 provided limited responses confirming their support of the proposal, and seven elaborated on their initial 'yes' response. The analysis below summarises the responses from those seven (who broadly agreed) who provided context for their overall agreement with the proposal, as well as concerns they raised.

The only recurrent theme amongst these seven respondents was that exemptions should be limited and narrowly defined. This would go towards encouraging developers to install EV infrastructure.

### **8.3.4 Not in support of the proposal**

15 of the 16 respondents who rejected the Scottish Government's preferred option for exemptions as set out in section 7.6.1 provided additional insights and opinions.

Of the 15 responses, several questioned the use of the 7% rule [Article 6 (c)], with two contending that it would be easy to find loopholes to claim the cost of infrastructure exceeding 7% of the total renovation cost. The nuances of these responses varied from a local authority requesting clarity on how the 7% rule would need to be evidenced: to an NGO respondent arguing that cost-based percentage exemptions should not be permitted if the policy goal of phasing out new petrol and diesel vehicles by 2030 is to be taken seriously.

Clarity on the practicalities of the 7% rule was requested by a few respondents, for example, on whether the £2000 limit per home takes in to account total network reinforcement costs as well as the plot specific EV Charger unit cost and, in relation to the timing of the proposal.

A few respondents had concerns about the feasibility of grid connectivity and unsustainable pressure on local electricity networks. Grid capacity upgrades were generally felt as a barrier to feasible and affordable EV infrastructure. Consideration was recommended for where upgrade works may impact third party landowners.

Additional exemptions were suggested by respondents who rejected the proposal.

A few respondents asked for flexibility and guidance where costs were prohibitive: suggestions to remedy this included making a financial contribution towards a public charging hub. Some raised concerns about the availability of current parking bays during infrastructure works, as well as constraints of public funding to meet the requirements for public buildings.

## **8.4 Views on preferred option for existing non-residential buildings**

### **8.4.1 Question 54 - What are your views on how our preferred option relating to existing non-residential buildings with car parks with more than 20 spaces could be properly monitored and enforced, given that the Building (Scotland) Regulations will not apply?**

69 responses were provided to this open question, although only 35 were substantive. 34 of the responses gave variations of 'nothing further to add' and so are not considered in the following analysis.

#### **8.4.2 Analysis**

Respondents were generally in favour of the proposal. However, whether respondents were in favour of, or against, the preferred option, the majority sought further detail on clarity on how the option would work in practice.

#### **8.4.3 Penalties vs incentives**

Discussion around money was the most recurrent theme arising from the responses. Many respondents made mention of the need for either incentives (6) or penalties (3)

for uptake of the proposal. Incentives were suggested in the forms of an incentive scheme, grants, rates relief, other tax relief or general discounts. Conversely, if using penalties for enforcement, responses noted that fines needed to be acceptably high so as to act as a deterrent, from both not installing or not providing relevant and accurate information.

#### **8.4.4 The building owners**

Several respondents, of which six were Local Authorities, considered the building owners in their responses. Four were concerned that the preferred option (for buildings with more than 20 non-residential car parking spaces, 1 in every 2 non-residential parking space to have ducting installed and 1 in every 10 non-residential parking space to provide an EV charge point socket with minimum 7 kW output power rating) would be met negatively by building owners.

Two responses, both from Local Authorities, felt that the provision would be consumer-led and that upgrading of the provision serving existing buildings would be positively viewed by building owners. Incentives for business owners were proposed.

#### **8.4.5 Questions on the monitoring and enforcing body**

Several respondents explicitly stated their belief that the preferred option relating to non-residential buildings with car parks with more than 20 spaces should be enforced by Local Authorities/Council (terms are used here interchangeably).

#### **8.4.6 Resourcing constraints**

Linked to answers around enforcement was the topic of resourcing. Several responses (of which six were provided by organisations and local authorities), spoke of this. The Local Authorities all pointed out that staffing levels and workloads would make Local Authority enforcement of the preferred option prohibitive at current capacity levels. The single individual respondent proposed a dedicated local council officer to check and apply the enforcement.

#### **8.4.7 Records or registers**

Several respondents highlighted the need for some sort of record keeping would be needed for this proposal to be successful and numerous suggestions made in this regard.

### **8.5 Views on proposed provision for charge points for accessible parking**

#### **8.5.1 Question 55 - What are your views on the proposed provision for charge points for accessible parking spaces? Do you have examples of current best practice for the provision of charge points for accessible parking spaces?**

In total, 81 responses were received to this open question. In summary, respondents can be categorised into three groups:



- 32 responses (or 40% of respondents) provided very short answers, to the effect of “no comment” or “no strong opinion”.
- 10 responses (or 12% of respondents) provided very short answers in agreement with the proposal. None of these respondents elaborated on this, nor did they include any best practice examples.
- The remaining 39 responses (or 48% of respondents) provided detailed comments and was comprised of five individuals and 34 organisations. Local authorities provided more than twice as many responses as any other subgroup, with ten responses.

### **8.5.2 Analysis**

The analysis below summarises the detailed views and insights provided by the 39 respondents (or 52% of respondents) in the third group (above).

General sentiment among respondents was positive and inclusive of various accessibility needs.

Specific examples of best practices were limited.

### **8.5.3 Specific requirements**

Several respondents offered specific considerations to be factored into new requirements for EV charging in accessible parking spaces. Recurrent considerations included easy access to the interface (such as height suitability, and the need for non-kerbed areas), plentiful space for movement around the vehicle. It was also thought that the strength and dexterity (required to use the cable management provision) of the user should be considered.

### **8.5.4 Ratios**

Amongst overwhelming support for the proposal, only four responses specified that the suggested ratio of 1 in 4 accessible parking spaces to have an EV charge point was suitable. Opposing views were offered from other respondents. Among these:

- Four respondents cited support for a more ambitious 1-in-2 ratio.
- Call for all EV charging facilities to provide sufficient and adequate space for everyone including those with accessibility needs.
- There are very few EV drivers with disabilities due to access to charging being a major barrier.

### **8.5.5 Retrofitting**

Three responses mentioned the challenge of retrofitting existing buildings. One who was against retrofitting accessible parking spaces at this point in time, said their opposition was due to the disruption this could cause for existing blue badge holders.

### **8.5.6 Legislative considerations**

Considerable references to adjacent and potentially conflicting legislation were made by a few respondents.

## **8.6 Further comments on EV charging provision**

### **8.6.1 Question 56 - We welcome any other comments you may wish to make on EV charging provision (e.g. the minimum standard of EV charge point or safety within the built environment).**

95 responses to this open question were received. With only 22 responses reading as variations of “no further comment”, 73 of the total 95 responses received gave full additional views.

#### **8.6.2 Analysis**

Four broad themes are discernible from this open response question.

#### **8.6.3 Costs**

The most recurrent theme in this additional comment question, was cost, discussed in 29 separate answers. Concerns ranged from costs associated with change to existing infrastructure, to initial equipment and install costs, to anticipated high running costs, to ongoing maintenance costs. It was also anticipated that all of these costs would likely differ between metro and rural locations, and so consideration is needed as to how to accommodate for this. The clear and discernible theme running through these responses was the lack of clarity or understanding as to what these costs would be, and who would be ultimately responsible to paying.

A recurrent issue was raised with regard to scenarios where consumers become ‘locked in’ to particular energy providers (and therefore, locked into certain bills / costs). This would be due to reliance on third party commercial companies to power the EV charge points, without the option to switch supplier.

#### **8.6.4 Network and grid**

20 respondents referenced network and grid concerns (terms were broadly used interchangeably). Potential issues raised ranged from costs for grid reinforcement and grid investment, additional grid capacity requirements due to increased reliance, and how to mitigate landscape impacts.

#### **8.6.5 Safety**

EV charge point safety was one of the most recurrent concerns that respondents discussed, with 11 making mention of it in the answers they supplied. Within the central topic of safety, there were three key themes:

- Electrical hazards: safety and quality of both the equipment and installation thereof should be paramount, which was noted on multiple occasions throughout the responses provided. A few respondents put forth similar concerns over electrical safety. For example, finding a safe location for things

such as lighting columns for EV charging units could be problematic, due to the risk of electric shock.

- Fire hazards: Furthering the above points, it is argued that EV charge point technology should be considered under a fire risk lens.
- Trip hazards (cables): many respondents were concerned with the potential tripping hazards that EV charge points could pose. Six of the eight specified that wires in public areas could be a trip hazard, with one charity mentioning the additional risk that this hazard could cause for people with disabilities.

#### **8.6.6 Layout and location of EV charge points**

Many respondents stated that consideration must be paid to the layout and locations of EV charge points. A lack of off-street parking in some locations would pose numerous challenges and urge moving toward communal or public charge points. According to another charity, flats account for 67% of all dwellings inhabited by Scottish residents, and it therefore crucial that those in rented and high-density accommodation have provisions for them to access EV charging infrastructure safely.

Additionally, layout changes could be needed to existing car parks in non-residential areas must be considered. These layout changes may include bay realignment, and modifications to footpaths, kerbing, and street furniture.

The number for EV charge points that should be installed was also a topic of debate. Several respondents agreed it would be beneficial for every home to have the facility for EV charging.

However, several respondents were in favour a more communal approach. They believed the location and layout of EV charge points could be used to change public behaviour, away from individual car ownership and toward less carbon intensive modes of transport, such as car sharing and the use of electrical bikes, scooters, and motorbikes. It was suggested by five respondents that the charging and parking needs of these types of modes of transport should be considered.



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