Passivhaus Trust Consultation Response

Building regulations - proposed changes to energy and environmental standards: stage 2 consultation and BRIA

16 October 2026

Introduction

This summary document sets out the PHT responses to the 2026 Scottish Government consultation paper 'Building regulations - proposed changes to energy and environmental standards: stage 2 consultation and BRIA'.

Supporting documents available online at: https://consult.gov.scot/local-government-and-housing/building-regulations-passivhaus-equivalent-stage-2/

The deadline for responses is **Friday 16 October 2026.**

PHT Position

For an overview of the Passivhaus Trust position: https://bit.ly/SPEStage2Consultation

PHT Consultation Responses

The Passivhaus Trust encourages members to engage with as much of the consultation as they can. If you are very time limited, we would recommend you focus on:

Consultation Question 2
Consultation Question 3
Consultation Question 4
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Consultation Question 7
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Overview of the Scottish equivalent to the Passivhaus standard

Consultation Question 1

With reference to the Partial Business and Regulatory Impact Assessment (BRIA) at Annex A of the consultation paper, are you able to provide any information, in confidence, that could aid in the production of the final BRIA?

☐ Yes

☐ No

If you have answered 'Yes' please contact the review team at: bsdenergystandardsreview@gov.scot

Q1 - Passivhaus Trust (PHT) Response

Answer: **YES**

The Passivhaus Trust will provide relevant information and research papers to support the development of the final BRIA, including evidence on costs, benefits, technical feasibility, implementation and building performance.

This will include evidence to help assess whether the proposals:

- are achievable across Scotland;
- take account of the costs of improving the delivery and operation of buildings;
- remain technically feasible;
- provide flexibility in how the required outcomes can be achieved, allowing best value;
- avoid conflict or duplication with other regulatory requirements;
- can be implemented with consideration of wider societal issues relating to the occupation and use of buildings; and
- support buildings to reliably deliver their predicted performance, helping to address the gap between designed and actual building performance.

The Passivhaus Trust is also providing its costs and benefits evidence papers to support this assessment.

https://passivhaus.uk/costs-and-value-of-passivhaus-interim-report/

https://passivhaus.uk/passivhaus-benefits/

https://passivhaus.uk/passivhaus-costs-summary/

Consultation Question 2

Do you have any comments on the merits of introducing the standard on a mandatory basis through a phased implementation?

☐ Yes

☐ No

Please provide information on why you agree or disagree or if you consider other actions need to be considered.

Q2 - Passivhaus Trust (PHT) Response

Answer: **YES**

The Passivhaus Trust supports the introduction of the Passivhaus certification route as a deemed-to-satisfy solution now, without further delay. Passivhaus has more than 30 years of evidence and experience behind it and therefore presents no risk to implementation. Recognising certification immediately would also help the industry begin its transition, as demonstrated in the schools sector where Passivhaus has already been used successfully to deliver the Scottish Futures Trust's performance metrics.

It is essential that the new standards are then made mandatory as soon as practical. The consultation refers to implementation in Autumn 2029. This is almost eight years after the Scottish Government first committed to introducing a Scottish Passivhaus equivalent and should provide sufficient time, three further years, for industry to prepare. Introducing certified Passivhaus buildings as a deemed-to-satisfy route now would further support upskilling, training and industry readiness, while allowing the wider regulatory framework to be introduced through a managed transition. The phased approach should therefore accelerate adoption, rather than provide justification for further delay.

NOTE:

The Passivhaus Standard is defined by clear performance and comfort criteria, developed and rigorously tested over more than 30 years through application, research and post-occupancy evaluation across different building typologies and climate zones. While elements of the proposed Scottish standard are aligned with Passivhaus principles, it should not be described as 'Passivhaus Equivalent' until its performance in practice, and any unintended consequences arising from differences in performance and comfort criteria, have been demonstrated. We strongly support the proposed deemed-to-satisfy route for fully Certified Passivhaus buildings, which provides a clear mechanism for recognising the established Passivhaus Standard within Scottish Building Standards.

We recognise that these consultation proposals represent an important step towards a Passivhaus equivalent. We therefore recommend referring to the new standard as 'Passivhaus Informed' rather than 'Passivhaus Equivalent', recognising the steps taken while avoiding an incorrect assumption of equivalent performance.

Consultation Question 3

Do you have any comments on the merits of introducing the proposed standard initially on a voluntary basis?

☐ Yes

☐ No

Q3 - Passivhaus Trust (PHT) Response

Answer: **YES**

The Trust supports voluntary adoption of the proposed standard as a transition towards mandatory implementation. This would allow industry to build skills, experience and capacity, while encouraging early delivery of higher-performing buildings. Recognition of Passivhaus Certification as a deemed-to-satisfy route would provide a proven and rigorous means of doing so from the outset.

However, voluntary adoption should be used as a mechanism to support industry readiness, not to defer regulation. The period before Autumn 2029 should be used to encourage voluntary adoption, provide training and guidance, and build industry capacity, with the standard becoming mandatory as soon as practical and no later than Autumn 2029.

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Primary compliance metric - delivered energy

Consultation Question 4

Do you agree with the proposal to present unregulated loads as information within reported outputs from the compliance calculation?

☐ Yes

☐ No

Q4 - Passivhaus Trust (PHT) Response

Answer: **YES**

The Passivhaus Trust supports the proposal to report unregulated energy alongside regulated energy and considers this an important step towards providing a more meaningful picture of a building's overall energy performance.

Energy use in buildings is not limited to regulated loads. Depending on the building type, unregulated uses such as appliances, equipment, refrigeration and other electrical loads can make a significant contribution to total energy consumption. For example, in a supermarket, refrigeration can be a major component of energy use. Focusing only on regulated energy therefore risks overlooking significant sources of consumption and opportunities for optimisation.

We support the use of Energy Use Intensity (EUI) as a whole-building metric, including both regulated and unregulated energy. This provides a clear and meaningful measure of the energy used by a building and complements metrics such as space heating demand, which address a different aspect of performance.

There is already a strong Scottish policy basis for this approach. The Scottish Passivhaus Equivalent Working Group reached unanimous agreement that EUI should be one of the metrics included in the regulations. EUI is also used within the wider Scottish public sector and is increasingly recognised across UK building policy and practice, including through the UK Net Zero Carbon Buildings Standard and the London Plan. This provides a strong basis for establishing a consistent whole-building metric within Scottish Building Standards.

We recognise that the proposal is currently for EUI to be provided as information rather than as a compliance metric. We consider this reporting requirement to be a very positive step in its own right and an important opportunity to build a stronger evidence base around predicted and actual whole-building energy use. However, Scottish Government should establish a long-term trajectory towards EUI becoming an outcome-based compliance metric, once sufficient evidence and experience have been gathered. This would ensure that the regulatory framework ultimately addresses the energy performance of the building as a whole, rather than only selected regulated energy uses.

Reporting EUI is particularly valuable because it creates the opportunity to compare predicted performance with actual energy consumption in use, including energy bills. This feedback loop can help identify where buildings are not performing as expected and support ongoing improvement in design, construction, commissioning and operation.

We therefore support the proposed reporting of total EUI, including both regulated and unregulated energy, alongside the other proposed regulated energy metrics. The methodology should be transparent about what is included within EUI and should avoid allowing on-site generation, such as PV, to obscure high underlying energy consumption. Reporting the underlying energy use before generation would provide a clearer picture of the building's actual energy performance.

Overall, we see the introduction of EUI reporting as a significant positive step and encourage Scottish Government to use the resulting evidence to develop a clear pathway towards its future use as a compliance metric.

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Secondary compliance metric – space heating demand

Consultation Question 5

Do you agree with the proposal to introduce a target space heating rate that only includes elements of the specification related to the fabric performance?

☐ Yes

☐ No

Q5 - Passivhaus Trust (PHT) Response

Answer: **NO**

While the Trust supports the introduction of a space heating demand compliance metric, a fabric-only metric does not represent the building's actual demand for heating. Ventilation losses are integral to the building's energy balance and become increasingly significant as buildings become better insulated and more airtight. Ventilation is therefore an important part of overall building performance and should be considered alongside fabric, when talking about space heating.

Introducing a Fabric Heat Loss Rate under the name 'space heating demand' risks creating confusion and moving away from the established understanding of the metric: how much energy a building needs for space heating. We therefore recommend that Total Space Heating Demand, including ventilation losses, is the metric.

If a fabric-only metric is retained as the compliance measure, it should be named clearly as a Fabric Heat Loss Rate, with Total Space Heating Demand also reported. This would follow the same principle as the proposed reporting of unregulated loads: the compliance metric can provide useful information on a particular aspect of performance, while reporting total demand provides a more complete picture of the building's actual heating requirement.

We also recommend that a single Peak Heat Load metric is recognised as an alternative route to compliance, at the Passivhaus benchmark of 10 W/m^2, or a less ambitious initial target if supported by research. This would provide a simple, readily understood metric with a clear relationship to Passivhaus performance.

A Space Heating Demand and/or Peak Heat Load metric would also support appropriate heating system sizing and provide a useful basis for comparing predicted performance with actual energy use in operation.

The approach should recognise the interaction between fabric and ventilation while remaining technology-neutral, with ventilation performance assessed through appropriate indoor air quality, comfort and energy outcomes.

NOTE:

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Level of challenge for new dwellings

Consultation Question 6

Do you have any comments on the roof U-value proposals across the Good and Best Practice options noting that these represent a relaxation in the level of challenge for this element?

☐ Yes

☐ No

Q6 - Passivhaus Trust (PHT) Response

Answer: **YES**

The Passivhaus Trust is not concerned about this minimal relaxation as Passivhaus focuses on overall absolute space heating targets for buildings rather than individual U-values. Often good building form factor can make a big impact on over all space heating requirements, so U-values of different elements do not need to be especially low.

Consultation Question 7

What uplift to the current energy standards for new dwellings do you consider appropriate as an outcome of this review?

Option 1: 'Good Practice' standard (6% emissions reduction)

Option 2: 'Best Practice' standard (37% emissions reduction)

Option 3: Retain current standard (0% emissions reduction)

Other (please specify)

Q7 - Passivhaus Trust (PHT) Response

Answer: **OTHER**

Mixed Option 1-2

The Passivhaus Trust supports the overall direction of the proposed uplift options, but considers that the individual requirements should be considered in combination rather than treating either option as a single preferred package. In particular, we support Option 1 for fabric performance and Option 2 for MVHR, with the following comments.

1. Fabric performance

We support the U-values proposed in Option 1, which are closer to the levels typically seen in optimised Passivhaus design in Scotland. The overall energy performance of a building depends on the interaction between fabric, airtightness, ventilation and building services, and the regulations should allow flexibility in how these elements are combined to achieve the required outcomes.

2. Services and ventilation

We support Option 2 for services, particularly because it is the only option that includes a requirement for mechanical ventilation with heat recovery (MVHR). However, the requirement should distinguish between the laboratory-tested efficiency of an MVHR unit and the efficiency achieved once installed in the building.

The Trust recommends that the requirement should be based on installed MVHR efficiency, with a limit of 75% - in line with Passivhaus, including the impact of cold duct losses and practical design and installation. This should also be reflected in the energy modelling, so that the calculated performance better represents the performance that can be expected in use.

3. Windows

Window performance should be considered in terms of overall thermal and comfort performance rather than U-value alone. Windows should be properly designed and installed, meet the relevant thermal comfort criteria in ISO 7730, and achieve appropriate fRsi values to minimise the risk of surface condensation and mould.

In the Scottish climate, this will generally mean triple glazing, although we do not consider that a specific U-value of 0.8 W/m^2K necessarily needs to be prescribed in all cases. The focus should be on achieving the required overall performance.

4. Airtightness

The proposed airtightness requirements should establish a clear trajectory towards 0.6 $m^3/(h \cdot m^2)$, consistent with Passivhaus-level performance. We also recommend that the modelling tests this more ambitious airtightness levels so that the benefits and practical implications can be properly understood.

Importantly, this would allow the regulations to consider the interaction between different performance measures. For example, the modelling should test whether Option 1 fabric U-values combined with Passivhaus-level airtightness can achieve overall energy performance comparable with the outcomes associated with Option 2. This would provide useful evidence on the relative contribution of different measures and avoid assuming that a particular combination of fabric and services is the only route to achieving the required performance.

5. Solar PV

Solar PV should be treated as a separate requirement, rather than being used to distinguish between the fabric or services performance of the different options. Applying the requirement consistently across all options would make the comparison between the options clearer and avoid penalising buildings that achieve stronger performance through their fabric or other measures.

Overall, the Trust supports a flexible approach that allows fabric, airtightness, ventilation and services to work together to achieve the required energy and comfort outcomes. The regulations should use the modelling to understand these interactions and establish clear performance trajectories, rather than relying on a single prescribed package of measures.

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Consultation Question 8

Do you support an approach to enable recognition of higher efficiency generation within a development regardless of whether it takes place within individual buildings or a communal heating system?

☐ Yes

☐ No

Q8 - Passivhaus Trust (PHT) Response

Answer: **YES**

Many Passivhaus buildings across the world successfully connect to heat networks. However, it is important that the efficiency of communal heating systems is accurately calculated and reflected in the assessment, including distribution losses. This will make the impact of communal systems transparent, particularly where those losses are significant relative to the building's space heating demand.

The methodology should therefore encourage genuinely efficient solutions rather than simply rewarding the specification of a communal system, while ensuring that occupants and designers have a clear understanding of the energy performance delivered.

Passivhaus buildings may have such low heat demand that connection costs for district heating become difficult to justify. Heat network standing charges can become disproportionately expensive for very low-energy buildings. The extremely low heat demand of Passivhaus buildings means they can already meet zero-emission heating requirements, reducing the need to connect to a heat network, and therefore avoiding network energy distribution losses that become more significant when heat demand is very low, e.g. with Passivhaus.

Forcing projects to connect to district heat networks could also unintentionally push projects away from improved fabric efficiency , because implementing both Passivhaus standards and linking projects to heat networks can create an undue financial burden on developers. Installing a heat network inevitably means there will be heat loss from the circulation within the building, which increases the risk of summer overheating. Overheating is a hazard for residents and a potential liability for developers /network owners. It also increases the demand for active cooling, which is an additional expense for building residents. We would argue that heat networks should be prioritised for more challenging buildings with higher heat demand.

A number of Passivhaus Trust members have contacted us, flagging that the need to connect to heat networks is a potential barrier for Passivhaus projects they have been working on. Others in the sector have reported feedback from planning applicants in London being forced to connect to a high-carbon heat network, undermining their carbon objectives compared to on-site alternatives.

The connection of projects to heat networks should be based on evidence and justified carbon accounting, including a comparison with other low-carbon heat options. Schemes should not be forced to connect to a heat network unless this clearly has benefits, including carbon emissions.

The Passivhaus Trust recommends that the Scottish Government reduces the uncertainty about whether district heat networks are necessary for Certified Passivhaus projects. To help developer confidence and to address the issues that we have encountered, the Passivhaus Trust recommends that the Government gives absolute clarity that Certified Passivhaus projects would be automatically exempt from having to connect to heat networks.

NOTE:

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We recognise that these consultation proposals represent an important step towards a Passivhaus equivalent. We therefore recommend referring to the new standard as 'Passivhaus Informed' rather than 'Passivhaus Equivalent', recognising the steps taken while avoiding an incorrect assumption of equivalent performance.

Consultation Question 9

Are you currently designing or building dwellings to the February 2023 standards and able to share cost information in confidence for any of the available heat solutions?

☐ Yes

☐ No

N/A

Q9 - Passivhaus Trust (PHT) Response

Answer: **N/A**

Method of target setting for new dwellings

Consultation Question 10

Do you support the proposal to allow the target rates for dwellings to fluctuate based only on the location, orientation, archetype and heat source of the dwelling?

☐ Yes

☐ No

Q10 - Passivhaus Trust (PHT) Response

Answer: **NO**

The Passivhaus Trust supports the move towards absolute energy metrics and sees this as a positive proposal, with the potential to make meaningful improvements to the design and delivery of projects across Scotland. Providing clients and designers with clear information about how their buildings are expected to perform, and the ability to compare this with performance in use, is an important step towards improving building performance. We do, however, have some concerns that allowing target rates to fluctuate could make the approach unnecessarily complex and create unintended consequences. In particular, variation according to archetype and orientation could create unintended incentives for poorer design decisions, such as selecting an orientation primarily to access an easier target, rather than optimising the overall performance of the building.

If this approach is adopted, we therefore support limiting variation in the target rates as far as possible. Any factors used to vary the target should be clearly justified by their impact on energy performance, and the methodology should remain as simple and transparent as possible. It should also encourage good design decisions, rather than creating incentives to design around the target.

We would also encourage further examination of whether separate targets by dwelling archetype are necessary for the total delivered energy metric. Where differences in total delivered energy between archetypes are small, a common target could simplify compliance and avoid weakening the incentive to optimise building form. Any variation should be supported by evidence that it is necessary to reflect meaningful differences in expected performance.

The relationship between the total delivered energy targets and permitted heat sources also needs careful consideration. The methodology should incentivise efficient heating systems while allowing appropriate combinations of technologies where these can deliver good overall performance. Separate targets for different heat sources should not inadvertently prevent the use of hybrid or integrated systems that may be appropriate for particular building types.

We would also propose that for the secondary fabric metric, see Q5, the Passivhaus peak heat load target of 10 W/m^2 is considered as an alternative fixed compliance metric. We are seeing an increasing number of projects in Scotland achieve Passivhaus Certification through the peak heat load metric, which is particularly well suited to the Scottish climate. This provides a clear performance target directly linked to the Passivhaus methodology and a useful figure for appropriately sizing heat pumps and other heating systems. If further research indicates that a less ambitious initial target, such as 15 W/m^2, would be more appropriate for the wider domestic building stock, this could provide a relatively simple transitional approach while establishing a clear trajectory towards the Passivhaus benchmark. A single target for all dwellings would also provide a simpler and more easily understood route within the standard.

The approach should maintain a clear relationship with established Passivhaus performance metrics, so that the new approach supports improved building performance without adding unnecessary complexity to compliance.

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proposed deemed-to-satisfy route for fully Certified Passivhaus buildings, which provides a clear mechanism for recognising the established Passivhaus Standard within Scottish Building Standards.

We recognise that these consultation proposals represent an important step towards a Passivhaus equivalent. We therefore recommend referring to the new standard as 'Passivhaus Informed' rather than 'Passivhaus Equivalent', recognising the steps taken while avoiding an incorrect assumption of equivalent performance.

Consultation Question 11

Do you agree with the proposal to present the target rates for dwellings within a target range table, replacing the notional dwelling specification currently shown in Table 6.1 in the Technical Handbooks?

☐ Yes

☐ No

Q11 - Passivhaus Trust (PHT) Response

Answer: **YES**

The Passivhaus Trust welcomes the move away from the current notional dwelling specification towards absolute energy targets, and considers the proposed target range tables a pragmatic way of allowing for legitimate differences between dwellings.

While this introduces greater complexity than the fixed absolute targets used by Passivhaus, we recognise the practical rationale for the approach. Care will be needed, however, to ensure that the flexibility within the tables does not create opportunities to manipulate the target or result in unintended design consequences. Variation should therefore be limited as far as possible and should encourage good design decisions, rather than incentivising design choices primarily to access an easier target.

We would also encourage consideration of the Passivhaus peak heat load metric as a simpler fixed secondary heating metric (for the secondary fabric metric - see Q5), at 10 W/m^2 or, if research supports a less ambitious initial target, 15 W/m^2. This could provide a clear and easily understood alternative fixed target route to the more complex range of target rates, while maintaining a direct relationship with established Passivhaus performance.

The methodology should remain simple and transparent, with the different target rates clearly defined and justified, and should ensure that the approach continues to drive improved overall building performance.

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Fabric performance for new dwellings

Consultation Question 12

Do you agree with the proposal to set a provision in guidance for a maximum 'upper limit' to the declared design air infiltration rate?

☐ Yes

☐ No

Q12 - Passivhaus Trust (PHT) Response

Answer: **YES**

The Passivhaus Trust supports the principle of setting a maximum upper limit for the declared design air infiltration rate, but considers the proposed limit of 5 $m^3/(h \cdot m^2)$ insufficiently ambitious. The consultation documents indicate that new dwellings are already achieving average airtightness results below 5 $m^3/(h \cdot m^2)$, so this would not provide a meaningful improvement trajectory.

We recommend an initial regulatory backstop of 1.5 $m^3/(h \cdot m^2)$, with a clear trajectory towards 0.6 $m^3/(h \cdot m^2)$. For dwellings, the Passivhaus target of 0.6 ACH is broadly equivalent to 0.6 $m^3/(h \cdot m^2)$, providing a clear benchmark for Passivhaus-level airtightness. There is also an important building-health consideration in setting airtightness levels above Passivhaus levels. Higher air leakage through the building fabric can increase the risk of thermal bypass and associated moisture risks. The Passivhaus Trust's technical review sets out the evidence for this relationship: https://passivhaus.uk/thermal-bypass-risks/

We are comfortable with $m^3/(h \cdot m^2)$ as the regulatory metric, as it provides a consistent basis for comparison between buildings of different scales. Airtightness is one of the most cost-effective and lowest-embodied-carbon ways to reduce energy demand and is also an important quality driver. Improving airtightness can reduce the need for additional materials and systems elsewhere, while airtightness testing provides a valuable quality assurance mechanism.

We therefore recommend 1.5 $m^3/(h \cdot m^2)$ as an initial regulatory backstop, with a clear trajectory towards 0.6 $m^3/(h \cdot m^2)$ and Passivhaus-level performance.

NOTE:

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Standard 6.1 approved compliance methodologies for new dwellings

Consultation Question 13

Do you have any views or comments on the development and usability of the consultation version of the HEM/Scottish wrapper for new dwellings?

☐ Yes

☐ No

Q13 - Passivhaus Trust (PHT) Response

Answer: **YES**

The Passivhaus Trust welcomes the continued development of the HEM/Scottish wrapper and notes that newer HEM versions are getting closer to PHPP in terms of accuracy. In particular, the modelling of air source heat pump systems appears more closely aligned, although significant disparities remain between PHPP and HEM for direct electric heating and heat networks. We would therefore welcome further opportunities to test and compare the two methodologies and would be keen to support any additional modelling exercises undertaken by Scottish Government.

We recognise that the HEM/Scottish wrapper is still under development and that the development and implementation timetable has already extended beyond that originally anticipated. Given this, there is an inherent risk in relying on a new and evolving calculation methodology as the basis for a major change to the Scottish energy standards. The current consultation version is not yet the final tool and does not capture all of the proposed changes.

In this context, the proposed recognition of PHPP as an additional approved compliance methodology is essential. PHPP provides an established and independently developed calculation methodology with more than 30 years of development and extensive use in Scottish certified Passivhaus projects. It provides a valuable safety net while HEM continues to develop, as well as giving designers and clients confidence that compliance can be demonstrated using a robust methodology with a proven track record.

The Trust therefore supports continued development and testing of the HEM/Scottish wrapper, but considers it important that the regulatory framework does not become dependent on a single evolving tool. We would welcome continued comparison between HEM and PHPP to understand and, where appropriate, resolve significant differences in outputs, while retaining PHPP as a robust alternative route to compliance.

We would be very happy to support Scottish Government with further testing and modelling exercises as the tools are developed.

Consultation Question 14

Do you agree with the proposal to recognise a modified version of PHPP as an additional tool that implements the approved methodology for standard 6.1 'Energy demand' for new dwellings?

☐ Yes

☐ No

Q14 - Passivhaus Trust (PHT) Response

Answer: **YES**

The Passivhaus Trust strongly supports this proposal. It is very positive to see PHPP recognised as an approved compliance methodology. PHPP is a reliable, tried and tested approach, with extensive use internationally and a well-established evidence base in Scotland.

However, we would welcome greater clarity on what is meant by a 'modified version of PHPP', including what modifications are proposed, how these would work within the Scottish Building Standards compliance process, and we look forward to working with Scottish Government to develop this approach alongside the Passive House Institute.

In particular, we would support modifications that enable PHPP to provide the information and outputs required for Scottish Building Standards compliance, while retaining the established PHPP methodology and underlying calculations. It is important that modifications to reporting requirements do not inadvertently alter the methodology itself or create a different calculation approach.

The Trust would therefore welcome further detail on the proposed modifications and confirmation that the integrity and consistency of the established PHPP methodology will be maintained.

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We recognise that these consultation proposals represent an important step towards a Passivhaus equivalent. We therefore recommend referring to the new standard as 'Passivhaus Informed' rather than 'Passivhaus Equivalent', recognising the steps taken while avoiding an incorrect assumption of equivalent performance.

Level of challenge for new non-domestic buildings

Consultation Question 15

Do you have any comments on the cooling efficiency proposals across the Medium and High options noting that these represent a relaxation in the level of challenge for this element?

☐ Yes

☐ No

Q15 - Passivhaus Trust (PHT) Response

Answer: **NO**

Consultation Question 16

What level of uplift to the current energy standards for new non-domestic buildings do you consider should be introduced as an outcome of this review?

Option 1: 'Medium' standard (10% emissions reduction)

Option 2: 'High' standard (11.5% emissions reduction)

Option 3: Retain current standard (0% emissions reduction)

Other (please specify)

Q16 - Passivhaus Trust (PHT) Response

Answer: **OTHER**

The Passivhaus Trust supports the overall direction of the proposed uplift options, but recommends that the individual requirements are considered in combination to drive meaningful overall performance improvement.

1. Fabric performance

We support the Medium fabric standard, which provides a good level of fabric performance while allowing flexibility in how the overall energy targets are achieved.

2. Services and ventilation

We support the High standard as the preferred uplift for services, particularly because it provides stronger ventilation and services performance. As with residential buildings, the requirement should specify installed MVHR efficiency, including cold duct losses and practical design and installation. Where 90% is specified as unit efficiency, we recommend a 75% minimum installed efficiency as a backstop.

3. Windows

Window requirements should focus on overall thermal and comfort performance rather than prescribing a single U-value. There may need to be greater flexibility for non-domestic buildings where occupancy patterns and comfort requirements vary. Requirements should still consider relevant criteria, including ISO 7730 and appropriate fRsi values, to manage comfort and condensation risks.

4. Airtightness

Airtightness should establish a clear trajectory towards 0.6 $m^3/(h \cdot m^2)$, consistent with Passivhaus-level performance. We recommend modelling this more ambitious airtightness levels to understand the benefits and implications.

5. Solar control

The rationale for the proposed reduced g-value should be clarified and supported by evidence, particularly in relation to overheating, daylight and energy performance.

Overall, the requirements should work together to deliver meaningful performance improvement and maintain consistency with the ambition of the proposed Passivhaus Equivalent standard.

NOTE:

The Passivhaus Standard is defined by clear performance and comfort criteria, developed and rigorously tested over more than 30 years through application, research and post-occupancy evaluation across different building typologies and climate zones. While elements of the proposed Scottish standard are aligned with Passivhaus principles, it should not be described as 'Passivhaus Equivalent' until its performance in practice, and any unintended consequences arising from differences in performance and comfort criteria, have been demonstrated. We strongly support the proposed deemed-to-satisfy route for fully Certified Passivhaus buildings, which provides a clear mechanism for recognising the established Passivhaus Standard within Scottish Building Standards.

We recognise that these consultation proposals represent an important step towards a Passivhaus equivalent. We therefore recommend referring to the new standard as 'Passivhaus Informed' rather than 'Passivhaus Equivalent', recognising the steps taken while avoiding an incorrect assumption of equivalent performance.

Consultation Question 17

Do you support an approach to enable recognition of higher efficiency generation within a development regardless of whether it takes place within individual buildings or is communal?

☐ Yes

☐ No

Q17 - Passivhaus Trust (PHT) Response

Answer: **YES**

Many Passivhaus buildings across the world successfully connect to heat networks.

However, Passivhaus buildings may have such low heat demand that connection costs for district heating become difficult to justify. Heat network standing charges can become disproportionately expensive for very low-energy buildings. The extremely low heat demand of Passivhaus buildings means they can already meet zero-emission heating requirements, reducing the need to connect to a heat network, and therefore avoiding network energy distribution losses that become more significant when heat demand is very low, e.g. with Passivhaus.

Forcing projects to connect to district heat networks could also unintentionally push projects away from improved fabric efficiency , because implementing both Passivhaus standards and linking projects to heat networks can create an undue financial burden on developers. Installing a heat network inevitably means there will be heat loss from the circulation within the building, which increases the risk of summer overheating.

Overheating is a hazard for residents and a potential liability for developers/network owners. It also increases the demand for active cooling, which is an additional expense for building residents. We would argue that heat networks should be prioritised for more challenging buildings with higher heat demand.

A number of Passivhaus Trust members have contacted us, flagging that the need to connect to heat networks is a potential barrier for Passivhaus projects they have been working on. Others in the sector have reported feedback from planning applicants in London being forced to connect to a high-carbon heat network, undermining their carbon objectives compared to on-site alternatives.

The connection of projects to heat networks should be based on evidence and justified carbon accounting, including a comparison with other low-carbon heat options. Schemes should not be forced to connect to a heat network unless this clearly has benefits, including carbon emissions.

The Passivhaus Trust recommends that the Scottish Government reduces the uncertainty about whether district heat networks are necessary for Passivhaus projects. To help developer confidence and to address the issues that we have encountered, the Passivhaus Trust recommends that the Government gives absolute clarity that Passivhaus projects would be automatically exempt from having to connect to heat networks. Clearly stating that certified Passivhaus buildings are assumed not to connect to district heating, would give clarity to developers.

Method of target setting for new non-domestic buildings

Consultation Question 18

Do you agree with the proposal to allow the building target rates to fluctuate based only on the location, building type, activity types, heat source and orientation of the new building?

☐ Yes

☐ No

Q18 - Passivhaus Trust (PHT) Response

Answer: **NO**

The Passivhaus Trust supports the move towards absolute energy metrics, while recognising that excessive variation in target rates could make the approach unnecessarily complex.

We support limiting variation in target rates as far as possible, while recognising that specialist non-domestic buildings and activities may require bespoke energy targets. Activity type can have a genuine and significant influence on energy use and should therefore be appropriately reflected where necessary. However, variation should not create unintended incentives for poorer design decisions, such as selecting an orientation primarily to access an easier target. The methodology should remain as simple and transparent as possible and should encourage good design decisions. The Passivhaus Trust is concerned with the proposal to allow special dispensation for direct electric heating, as shown in the examples provided for a hotel, this could result in 10x more energy than other solutions. As noted above, the standards should promote/ reward good decision making that leads to lower overall energy use.

We would also propose that the Passivhaus peak heat load target of 10 W/m^2 is considered as an alternative fixed metric within the standard. Many Scottish non-domestic projects are now targeting Passivhaus peak heat load (for the secondary fabric metric - see Q5), which is particularly well suited to the Scottish climate. This provides a simple, easily understood performance target directly linked to the Passivhaus methodology and a useful figure for appropriately sizing heat pumps and other heating systems. If further research indicates that a less ambitious initial target would be more appropriate for the wider building stock, this could provide a relatively simple transitional approach while establishing a clear trajectory towards the Passivhaus benchmark.

The approach should maintain a clear relationship with established Passivhaus performance metrics, while allowing appropriate flexibility for specialist building types and activities. This should support improved overall building performance without introducing unnecessary complexity into the compliance process.

NOTE:

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proposed deemed-to-satisfy route for fully Certified Passivhaus buildings, which provides a clear mechanism for recognising the established Passivhaus Standard within Scottish Building Standards.

We recognise that these consultation proposals represent an important step towards a Passivhaus equivalent. We therefore recommend referring to the new standard as 'Passivhaus Informed' rather than 'Passivhaus Equivalent', recognising the steps taken while avoiding an incorrect assumption of equivalent performance.

Consultation Question 19

Do you agree with the proposal to present the target rates for new non-domestic buildings within a target range table, replacing the notional building specification currently shown in Table 6.1 in the Technical Handbooks?

☐ Yes

☐ No

Q19 - Passivhaus Trust (PHT) Response

Answer: **YES**

The Passivhaus Trust welcomes the move away from the current notional building specification towards absolute energy targets, and considers the proposed target range tables a pragmatic approach to reflecting genuine differences between non-domestic buildings and their uses.

While this introduces greater complexity than the fixed absolute targets used by Passivhaus, we recognise the practical rationale for the approach. Variation in target rates should be limited as far as possible, while recognising that specialist building types and activities may require bespoke energy targets. We have particular concerns that variation according to factors such as orientation could create unintended incentives for poorer design decisions, for example selecting an orientation primarily to access an easier target rather than to optimise the overall performance of the building.

The tables should therefore encourage good design decisions and avoid creating incentives to manipulate the design in order to access an easier target. Clear guidance on how the target is determined will be important, and the methodology should remain as simple and transparent as possible.

We would also encourage consideration of the Passivhaus peak heat load metric as a simpler fixed metric (for the secondary fabric metric - see Q5), at 10 W/m^2 or, if research supports a less ambitious initial target, of say 15 W/m^2. Many Scottish non-domestic projects are now targeting Passivhaus peak heat load, which is particularly well suited to the Scottish climate. This could provide a clear and easily understood alternative fixed compliance route within the standard, rather than being limited to those using the Passivhaus deemed-to-satisfy route.

The approach should maintain a clear relationship with established Passivhaus performance metrics, while allowing appropriate flexibility where there are genuine differences in building type and activity. It should support improved overall building performance without introducing unnecessary complexity into the compliance process.

NOTE:

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Fabric performance for new non-domestic buildings

Consultation Question 20

Do you agree with the proposal to set a provision in guidance for an 'upper limit' to the declared design air infiltration rate?

☐ Yes

☐ No

Q20 - Passivhaus Trust (PHT) Response

Answer: **YES**

The Passivhaus Trust supports the principle of setting a maximum upper limit for the declared design air infiltration rate, but considers the proposed limit of 5 $m^3/(h \cdot m^2)$ insufficiently ambitious. The consultation documents indicate that new buildings are already achieving average airtightness results below 5 $m^3/(h \cdot m^2)$, so this would not provide a meaningful improvement trajectory.

We recommend an initial regulatory backstop of 1.5 $m^3/(h \cdot m^2)$, with a clear trajectory towards 0.6 $m^3/(h \cdot m^2)$. For larger buildings, in addition to an ACH limit, the Passivhaus standard includes a recommended target of 0.6 $m^3/(h \cdot m^2)$, providing a clear benchmark for Passivhaus-level airtightness. There is also an important building-health consideration in setting airtightness levels above Passivhaus levels. Higher air leakage through the building fabric can increase the risk of thermal bypass and moisture risks. The Passivhaus Trust's technical review sets out the evidence for this relationship: https://passivhaus.uk/thermal-bypass-risks/

We are comfortable with $m^3/(h \cdot m^2)$ as the regulatory metric, as it provides a consistent basis for comparison between buildings of different scales. Airtightness is one of the most cost-effective and lowest-embodied-carbon ways to reduce energy demand and is also an important quality driver. Improving airtightness can reduce the need for additional materials and systems elsewhere, while airtightness testing provides a valuable quality assurance mechanism.

We therefore recommend 1.5 $m^3/(h \cdot m^2)$ as an initial regulatory backstop, with a clear trajectory towards 0.6 $m^3/(h \cdot m^2)$and Passivhaus-level performance.

NOTE:

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Standard 6.1 approved compliance methodologies for new non-domestic dwellings

Consultation Question 21

Do you have any views on the development and usability of the consultation version of the Scottish SBEM v7?

☐ Yes

☐ No

Q21 - Passivhaus Trust (PHT) Response

Answer: **YES**

We believe PHPP is a much more accurate tool than the current SBEMv7 modelling software for non-residential buildings. Modelling undertaken for this consultation shows a big disparity between PHPP and SBEM values.

Consultation Question 22

Do you agree with the proposal to recognise a modified version of PHPP as an additional tool that implements the approved methodology for standard 6.1 'Energy demand' for new non-domestic buildings?

☐ Yes

☐ No

Q22 - Passivhaus Trust (PHT) Response

Answer: **YES**

The Passivhaus Trust strongly supports this proposal and welcomes the recognition of PHPP as an approved compliance methodology for non-domestic buildings.

PHPP is an established methodology used across a wide range of building typologies, including residential, offices, schools, healthcare, hotels, retail and other non-domestic buildings. The Scottish Government's own modelling has demonstrated its application across a range of non-domestic building types, including offices, health centres, hotels, schools, retail and warehouses. This provides a strong basis for recognising PHPP within the Scottish Building Standards compliance framework.

As with Q14 on the domestic methodology we would, however, welcome greater clarity on what is meant by a 'modified version of PHPP', including what modifications are proposed and how these would work within the Scottish Building Standards compliance process. We look forward to working with Scottish Government and the Passive House Institute to develop this approach.

As with the proposed recognition for dwellings, we support modifications that enable PHPP to provide the information and outputs required for Scottish Building Standards compliance, while retaining the established PHPP methodology and underlying calculations. Any changes should therefore relate to the reporting and compliance requirements rather than alter the established calculation methodology.

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We recognise that these consultation proposals represent an important step towards a Passivhaus equivalent. We therefore recommend referring to the new standard as 'Passivhaus Informed' rather than 'Passivhaus Equivalent', recognising the steps taken while avoiding an incorrect assumption of equivalent performance.

Ventilation and indoor air quality

Consultation Question 23

Do you agree with the proposal to accept any ventilation system/solution of achieving the performance sought in standard 3.14 'Ventilation'?

☐ Yes

☐ No

Q23 - Passivhaus Trust (PHT) Response

Answer: **NO**

The Passivhaus Trust supports the proposal to allow any ventilation system or solution but only where the approach can demonstrably achieve good indoor air quality. We are answering NO as we feel standard 3.14 is too vague to be able to deliver good IAQ. This is consistent with the Passivhaus approach, which does not prescribe a particular ventilation technology but sets clear requirements for outcomes including indoor air quality, thermal comfort, noise and energy performance. We do not agree that all ventilation systems are equally suitable to provide good indoor air quality and safe and healthy humidity levels. It is essential that the standard in 3.14 becomes result-based, e.g. aiming at certain IAQ. Such outcomes should be prescriptive for wet rooms and critical habitable rooms, e.g. bedrooms, home offices and to a certain degree also living spaces (especially rooms where people spend many hours and occupants will have a long-term exposure to the IAQ of such rooms).

In practice, mechanical ventilation with heat recovery (MVHR) will be the most effective solution for achieving these outcomes in Scotland, particularly in highly insulated and airtight buildings. MVHR provides controlled fresh air supply, removes pollutants and moisture, and recovers heat from extract air, significantly reducing ventilation heat losses. It can therefore make an important contribution to both energy efficiency and thermal comfort. However, the objective should remain the performance achieved, rather than mandating the technology itself.

The Trust therefore supports a technology-neutral approach, provided that the requirements for indoor air quality, comfort, noise, energy use and fan power are sufficiently robust and are demonstrated through appropriate design and commissioning. This should allow innovation in ventilation solutions while ensuring that alternative approaches do not achieve flexibility at the expense of building performance or occupant comfort. Historic ventilation approaches, such as natural ventilation with intermittent extract fans and passive stack ventilation, seem to be not safe and effective for modern buildings.

It is also important that ventilation is considered as an integral part of the building's energy and fabric strategy. All buildings require well-designed ventilation to maintain good indoor air quality, and the performance of the ventilation system can have a significant impact on actual heating demand.

The Trust welcomes further research and guidance on MVHR and other ventilation solutions, particularly where this can help industry understand how to achieve good installed performance, including appropriate design, commissioning, controls, ductwork and fan power, rather than relying solely on the stated performance of individual products.

Overall, we support flexibility in the choice of ventilation system, but the performance requirements must remain non-negotiable. The aim should be to enable innovation while ensuring consistently high standards of indoor air quality, comfort and energy efficiency.

For a detailed discussion on the evidence supporting balanced ventilation, please refer to the study:

https://www.sciencedirect.com/science/article/pii/S0378778823011131

And on the importance of performance requirements:

Scottish Government, Research: https://www.gov.scot/publications/research-identify-changes-guidance-standard-3-14-ventilation-2015-effective-improving-ventilation-indoor-air-quality

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Consultation Question 24

Do you have any views on additional guidance for MVHR systems that would be beneficial to be included in future guidance?

☐ Yes

☐ No

Q24 - Passivhaus Trust (PHT) Response

Answer: **YES**

The Passivhaus Trust considers that future guidance on MVHR should focus on the performance outcomes that a ventilation system must achieve, rather than simply specifying particular technologies.

It is important to establish clear requirements for:

- **Indoor air quality**, including sufficient fresh-air provision to occupied spaces and appropriate ventilation of all relevant rooms. Guidance should also address appropriate filtration and frost protection strategies, taking account of indoor air quality, energy performance and the need to maintain adequate ventilation during cold weather.
- **Heating and energy performance**, including ventilation heat recovery and fan energy.
- **Comfort**, including avoiding draughts, excessive noise and excessively or high or low indoor humidity.
- **User control and demand responsiveness**, allowing ventilation rates to be adjusted to actual need where appropriate. Systems should maintain their required airflow rates under normal operating conditions, including as filters become progressively loaded, and provide appropriate user control over normal and boost operation.

- **Design, installation and commissioning,** including verification that required airflow rates and system performance have been achieved, with commissioning results reviewed by a suitably qualified person. Guidance should support the industry upskilling needed to deliver systems reliably in practice.
- **Operation, maintenance and servicing**, with requirements considered from the design stage and clearly communicated to building owners and occupants at handover. This should include appropriate access for maintenance, filter replacement, routine servicing and clear information on operation and maintenance requirements. The Passivhaus Trust's existing guidance on MVHR maintenance provides a useful basis for this. https://passivhaus.uk/mvhr-maintenance/
- **Installed efficiency**, with MVHR heat recovery performance assessed as installed, rather than relying solely on laboratory efficiency of the ventilation unit. This should account for factors such as ductwork pressure losses, heat losses from ductwork within and outside the thermal envelope, and installation and commissioning quality.

The Passive House Institute (PHI) criteria provide a useful, proven example of the level of performance that can be achieved. For Passivhaus Certification, ventilation systems are required to provide sufficient ventilation to all relevant rooms, achieve defined minimum fresh-air flow rates, be controllable according to demand, avoid excessive indoor humidity, and provide comfortable conditions without unacceptable draughts or noise.

For example, the PHI criteria require average fresh-air provision of at least 20 m^3/h per person in residential buildings (the UK Passivhaus Trust recommend that this is typically increased to 30 m^3/h per person in the UK to account for our climate) alongside a minimum air change rate, with higher or project-specific requirements for non-residential buildings. The Trust would also encourage Scottish Government to consider the extract ventilation rates used in Passivhaus design, particularly for kitchens and bathrooms, to help manage moisture and maintain indoor air quality. Guidance should also address the ability of systems to maintain adequate airflow as filters become loaded, rather than assessing performance solely at commissioning. Passivhaus certification also requires ventilation systems to be designed so that they do not cause unpleasant draughts and set maximum sound levels of 25 dB(A) in supply-air rooms and bedrooms in residential buildings, and 30 dB(A) in other relevant rooms. These criteria demonstrate that good ventilation performance is about much more than the efficiency of the heat exchanger itself.

The Scottish guidance should therefore set clear, measurable outcomes for IAQ, ventilation rates, comfort, noise, draughts, humidity, energy use and installed heat-recovery performance, while remaining technology-neutral. It should also make clear that good design and installation are essential to achieving the intended performance.

The Trust would encourage Scottish Government to draw on the established PHI criteria when developing this guidance. These requirements have been applied and tested across a large body of certified Passivhaus projects and provide a useful evidence base for defining what constitutes a high-quality, fit-for-purpose ventilation system.

Finally, guidance should recognise that ventilation cannot be considered in isolation from airtightness and the wider building design. As buildings become more airtight, well-designed ventilation becomes increasingly important to maintain indoor air quality and comfort while minimising energy use.

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Consultation Question 25

Do you have any views on the proposal to decouple the link between fabric air infiltration and ventilation solution?

☐ Yes

☐ No

If you answered 'Yes' please provide details for your response, in particular thoughts on methodologies that could be implemented to determine the appropriate ventilation solution.

Q25 - Passivhaus Trust (PHT) Response

Answer: **YES**

The Passivhaus Trust supports the principle that uncontrolled fabric infiltration should not be relied upon as a means of providing ventilation. Infiltration is uncontrolled and unpredictable and does not provide a reliable basis for achieving good indoor air quality. A leaky building fabric is not a substitute for a properly designed ventilation strategy.

However, we are concerned about the proposal to 'decouple' fabric air infiltration from the ventilation solution if this is interpreted as meaning that airtightness and ventilation can be considered independently. Airtightness is beneficial for all ventilation strategies and should remain an important part of the design of any well-performing building.

Airtightness provides greater control over where air enters and leaves a building. This is particularly important where ventilation relies on designed air paths, such as trickle vents combined with mechanical extract. In an airtight building, the designer has greater confidence that air will enter through the intended supply openings and move through the building along the intended route. In a leaky building, air can instead enter through uncontrolled leakage paths, potentially bypassing intended supply routes or entering in inappropriate locations. This can undermine the effectiveness of the ventilation strategy and result in poor indoor air quality despite nominal compliance with ventilation provisions.

There is evidence from Scottish housing research that this is a significant issue. Sharpe et al. (2015), studying contemporary new housing in Scotland, found that trickle ventilation as installed and used was ineffective in meeting desired ventilation rates, with high CO_2 concentrations measured in bedrooms. The study also found very limited occupant interaction with trickle ventilators. This illustrates the risk of relying on background ventilation routes that are not reliably controlled or used as intended.

Research into Passivhaus dwellings provides further evidence of the importance of combining airtightness with controlled ventilation. Moreno-Rangel et al. (2020), in a literature review of indoor air quality in Passivhaus dwellings, found that high airtightness reduces reliance on uncontrolled air permeability and makes the provision of adequate ventilation particularly important. The review also highlights the importance of controlling where ventilation air is drawn from and how it is distributed within the building.

More recent research provides further support for this approach. Rojas et al. (2024) reviewed in-use indoor air quality measurements from more than 600 Passivhaus and Passivhaus-like dwellings. Overall, pollutant and CO_2 concentrations were generally lower than those reported in naturally ventilated homes. The authors also identified the quality assurance associated with Passivhaus certification as a factor supporting ventilation and indoor air quality performance.

The Trust therefore considers that the regulatory approach should make a clear distinction:

- **Fabric infiltration should not be treated as ventilation provision.** Ventilation rates should be determined from required IAQ and occupancy outcomes, rather than from assumptions about uncontrolled air leakage.
- **Airtightness should nevertheless remain an important design requirement.** Controlling uncontrolled air movement improves the ability of any ventilation strategy to deliver air where needed, while reducing unwanted heat loss and draughts.
- **Ventilation solutions should be determined from measurable performance requirements**, including IAQ, ventilation rates, comfort, noise, draughts and energy efficiency, rather than being prescribed solely according to airtightness level.
- **Airtightness and ventilation should remain integrated in the design process.** They should not be treated as unrelated variables, as the effectiveness of the ventilation strategy depends in part on controlling unintended air paths.

As set out in Q23, the non-negotiable principle should be the maintenance of high standards for indoor air quality, comfort, including noise, and energy efficiency. A technology-neutral approach is appropriate where these outcomes are clearly defined, measurable and demonstrated.

It is also important that space heating demand calculations capture the actual ventilation heat losses associated with the chosen ventilation strategy. Excluding ventilation losses because fabric infiltration and ventilation have been decoupled risks producing a space heating target that does not represent the actual heating requirement.

Overall, the Trust supports the principle that uncontrolled infiltration should not be relied upon to provide ventilation. However, we do not support decoupling airtightness from the wider ventilation design process. Good airtightness is beneficial for all ventilation strategies: it reduces uncontrolled heat loss and gives the designer greater control over the intended movement of air. The regulatory approach should therefore require both good airtightness and a ventilation strategy capable of demonstrating the required IAQ, comfort and energy performance.

Relevant research

Sharpe, T., Farren, P., Howieson, S., Tuohy, P. and McQuillan, J. (2015) 'Occupant interactions and effectiveness of natural ventilation strategies in contemporary new housing in Scotland, UK', *International Journal of Environmental Research and Public Health*

Moreno-Rangel, A., Sharpe, T., McGill, G. and Musau, F. (2020) 'Indoor air quality in Passivhaus dwellings: a literature review', *International Journal of Environmental Research and Public Health*

Rojas, G., Fletcher, M., Johnston, D. and Siddall, M. (2024) 'A review of the indoor air quality in residential Passive House dwellings', *Energy and Buildings*

NOTE:

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We recognise that these consultation proposals represent an important step towards a Passivhaus equivalent. We therefore recommend referring to the new standard as 'Passivhaus Informed' rather than 'Passivhaus Equivalent', recognising the steps taken while avoiding an incorrect assumption of equivalent performance.

Overheating

Consultation Question 26

With regards to the proposal to reference the use of PHPP as an additional overheating risk assessment methodology option, do you know of any risks and opportunities that should be considered to inform the development of draft guidance?

☐ Yes

☐ No

If you answered 'Yes', please send calculation output sheets which detail your building specification(s) to buildingstandards@gov.scot with the subject title 'Call for evidence – February 2023 design specification'.

Q26 - Passivhaus Trust (PHT) Response

Answer: **YES**

The Passivhaus Trust strongly supports the proposal to recognise PHPP as an additional overheating risk assessment methodology, with established approaches such as CIBSE TM59 used where appropriate.

PHPP is an established and widely used methodology for assessing summer comfort and overheating risk in Passivhaus buildings. It provides a relatively simple and transparent calculation methodology, with clear inputs, outputs and error checking, making it straightforward to review and identify errors. Its use internationally also provides a substantial body of experience across

different building types and climates, including warmer climates such as Australia, Spain, Portugal and Greece.

There is an opportunity to build on this international experience as the risk of overheating increases with climate change. PHPP includes approved UK climate datasets and allows designs to be stress-tested against higher summer temperatures. The continued development of future climate data for use with PHPP could provide further opportunities to assess climate resilience as this work develops.

PHPP also provides an opportunity to consider overheating and cooling holistically. The software can calculate peak cooling loads, supporting appropriate sizing of active cooling systems in low-energy buildings. This is particularly useful where cooling systems need to maintain comfort during periods of high external temperatures while avoiding unnecessary oversizing and poor efficiency.

However, the guidance should recognise the limitations of a single-zone, steady-state PHPP assessment. For some multi-residential and non-residential buildings, PHPP alone may not be sufficient to assess summer comfort and overheating risk, particularly where there are different occupancy patterns, significant internal gains, complex solar exposure or other higher-risk spaces. In these circumstances, dynamic thermal modelling should be required where appropriate, using established approaches such as CIBSE TM59.

The UK Certifiers' Circle has already developed guidance for this situation through its *Dynamic Thermal Modelling for Summer Comfort* guidance. This establishes a common approach to modelling, reporting and user handover where dynamic modelling is required, while retaining correct PHPP inputs as part of the overall Passivhaus assessment. We recommend that Scottish guidance draws on this established approach rather than creating a separate and potentially inconsistent methodology.

Passivhaus also has established quality assurance processes that Scottish guidance could build upon. Passivhaus certification requires a written Summer Comfort Statement, signed by the building owner, which identifies the critical assumptions underpinning the design, the summer comfort strategy, overheating results and stress testing. This provides a useful model for ensuring that the assessment is transparent and that the relevant information is communicated to building owners and users.

The Trust therefore recommends that Scottish guidance:

- Recognises PHPP as an approved overheating assessment methodology, with CIBSE TM59 and other appropriate dynamic modelling approaches available where required.
- Uses a performance-based approach, with clear requirements for overheating risk, comfort and resilience rather than prescribing a particular modelling software.
- Clearly defines when PHPP is sufficient and when dynamic thermal modelling is required, particularly for complex multi-residential and non-residential buildings.
- Requires critical modelling assumptions to be clearly stated, including occupancy, internal gains, window opening, shading and ventilation assumptions.
- Requires all permitted methodologies to include appropriate stress testing against future climate conditions and changes in occupant behaviour, at a level at least equivalent to the Passivhaus Standard.
- Recognises the value of the PHPP cooling load calculation where active cooling is proposed, to support appropriate system sizing.

- Builds on the established Passivhaus Summer Comfort Statement approach to ensure that the assessment, assumptions, summer comfort strategy and stress-test results are clearly communicated to building owners and users.
- Draws on the existing UK Certifiers' Circle guidance for dynamic thermal modelling to support consistency between PHPP and dynamic modelling approaches.

Overall, the Trust considers that recognising PHPP would provide Scotland with a robust, transparent and internationally established additional overheating assessment methodology. It would also provide an opportunity to establish a more coherent approach to overheating, climate resilience, active cooling and post-completion user information, while ensuring that dynamic modelling is used where the complexity or risk of a building warrants a more detailed assessment.

NOTE:

The Passivhaus Standard is defined by clear performance and comfort criteria, developed and rigorously tested over more than 30 years through application, research and post-occupancy evaluation across different building typologies and climate zones. While elements of the proposed Scottish standard are aligned with Passivhaus principles, it should not be described as 'Passivhaus Equivalent' until its performance in practice, and any unintended consequences arising from differences in performance and comfort criteria, have been demonstrated. We strongly support the proposed deemed-to-satisfy route for fully Certified Passivhaus buildings, which provides a clear mechanism for recognising the established Passivhaus Standard within Scottish Building Standards.

We recognise that these consultation proposals represent an important step towards a Passivhaus equivalent. We therefore recommend referring to the new standard as 'Passivhaus Informed' rather than 'Passivhaus Equivalent', recognising the steps taken while avoiding an incorrect assumption of equivalent performance.

Compliance and Assurance

Consultation Question 27

Do you have any comments on the structure of the proposed Building Standards Energy and Environmental Compliance Handbook and its application for the production of the Energy and Environmental Design and Construction Statements?

☐ Yes

☐ No

Q27 - Passivhaus Trust (PHT) Response

Answer: **YES**

The Passivhaus Trust supports the overall structure and the emphasis on managing compliance from design through construction and completion. The separation between Design and Construction Statements provides a useful framework for demonstrating that design intent has been carried through into the completed building.

The Handbook would be strengthened by making clear that this is intended to be a risk-based and performance-focused process, rather than primarily an evidence-gathering exercise. The level and type of evidence should be proportionate to the performance risk and complexity of the project, with particular focus on critical interfaces and aspects of the design that are fundamental to achieving the intended energy and environmental performance.

The Handbook should also make clear that evidence should demonstrate not only that specified products or details have been installed, but that the design intent and required performance have been maintained through construction and verified at completion.

Consultation Question 28

Do you have any comments on the presentation of the principle of communication and collaboration throughout the Handbook?

☐ Yes

☐ No

Q28 - Passivhaus Trust (PHT) Response

Answer: **YES**

This section appears very compatible with existing Passivhaus quality assurance approaches. The RIBA Passivhaus Overlay to the RIBA Plan of Work, jointly commissioned by RIBA and the Passivhaus Trust, provides an established framework for integrating Passivhaus requirements, responsibilities and quality assurance activities throughout the design and construction process.

The Overlay emphasises early engagement, clear allocation of responsibilities, coordinated design development and timely decision-making to identify and manage risks before they become costly to resolve. It also recognises the importance of collaboration between the client, design team, contractor and specialist suppliers and trades.

We particularly welcome the Handbook's emphasis on early collaboration and on explaining the “why” behind design and construction decisions. This is important in ensuring that performance requirements are understood and maintained through detailed design, procurement and construction.

The Handbook could usefully reinforce the importance of collaboration at critical interfaces between disciplines, particularly around airtightness, thermal bridging, insulation continuity, windows and doors, ventilation and building services. These are areas where decisions made by one party can have a significant impact on the performance of another system.

The RIBA Passivhaus Overlay provides a useful existing model for how this collaborative, risk-managed approach can be embedded throughout the project lifecycle.

Consultation Question 29

Do you have any comments on how the use of the Handbook could help to mitigate the risks associated with achieving compliance?

☐ Yes

☐ No

Q29 - Passivhaus Trust (PHT) Response

Answer: **YES**

The Passivhaus Trust supports the proposed risk-based approach. Identifying performance risks early, assigning responsibility and establishing the required checks and evidence before construction begins should significantly improve the likelihood of achieving the intended outcome.

The Handbook should, however, make clear that risk management is not simply about identifying risks and collecting evidence. It should establish how performance-critical risks will be controlled, checked and verified, including what action is required where the design or construction deviates from the agreed approach.

Particular attention should be given to risks arising at interfaces between building fabric, airtightness, thermal bridges, windows and doors, ventilation and building services. These are areas where relatively small changes or defects can have a disproportionate effect on overall building performance.

The approach to managing changes during construction is therefore particularly important and should ensure that substitutions or changes are assessed against the overall performance of the building, rather than simply individual product compliance.

Consultation Question 30

Do you have any comments on the emphasis made within the Handbook on robust evidence gathering and effective process management to aid in achieving compliance?

☐ Yes

☐ No

Q30 - Passivhaus Trust (PHT) Response

Answer: **YES**

This section appears very compatible with existing Passivhaus quality assurance approaches. Passivhaus Certification requires a structured process of evidence gathering and verification throughout design and construction, with evidence submitted to the Certifier demonstrating compliance with the relevant criteria.

This includes the development and checking of the energy balance and supporting calculations, documentation of the building design and construction, records of products and systems, site inspections, testing and commissioning, and resolution of outstanding issues before certification. Importantly, this evidence is gathered progressively through the project rather than retrospectively at completion.

We therefore support the Handbook's emphasis on planned evidence gathering and effective process management. The Passivhaus Certification process provides a well-established example of how a structured evidence trail can support quality assurance and provide confidence that the intended performance has been carried through into the completed building.

We would encourage the Scottish approach to retain this focus on progressive evidence, checking and verification, rather than allowing compliance to become primarily a retrospective documentation exercise.

Consultation Question 31

Do you agree with the roles and responsibilities of the actors identified in the Handbook related to the production of the Energy and Environmental Design and Construction statements?

☐ Yes

☐ No

Q31 - Passivhaus Trust (PHT) Response

Answer: **YES**

The Passivhaus Trust supports the clear allocation of responsibilities between the client/relevant person, design team, contractor, certifiers, verifier and specialist suppliers and contractors.

However, the Handbook should place greater emphasis on ensuring that the people undertaking energy and environmental design and assurance activities have the appropriate competence for the complexity and performance requirements of the project.

In particular, the generic reference to the “Design Team / Agent” may not sufficiently recognise the distinct expertise required for energy modelling, building physics, airtightness, thermal bridging, ventilation and building services.

The responsibilities for maintaining design intent through construction should also be explicit. The contractor is responsible for delivering the construction, but the process should ensure that significant changes, substitutions and departures from the design are identified and assessed by suitably competent members of the design team before they affect building performance.

The Handbook should also make clear that responsibility for collating evidence does not replace responsibility for delivering compliant work.

Consultation Question 32

The Handbook focusses on five energy and environmental considerations:

- *Airtight construction*
- *High performance insulation*
- *Thermal bridge free design*
- *Ventilation*
- *Optimised energy use*

Do you have any comments on the use of these considerations as main themes throughout the Handbook?

☐ Yes

☐ No

Q32 - Passivhaus Trust (PHT) Response

Answer: **YES**

The Passivhaus Trust supports the use of these considerations as themes throughout the Handbook. They reflect several important aspects of high-performance building design and construction and are consistent with key Passivhaus building principles.

It may be helpful, however, to distinguish between building principles and the wider approach required to deliver them. The Passivhaus Trust identifies three core principles of approach: detailed performance and comfort criteria, accurate modelling in PHPP, and rigorous quality assurance across design, construction and commissioning. These underpin five key building principles: high-performance insulation, continuous airtightness, minimised thermal bridging, high-performance windows and appropriate solar control, and quiet and efficient mechanical ventilation with heat recovery.

The five considerations in the Handbook therefore overlap significantly with the physical principles of Passivhaus, but should not be considered in isolation. For example, airtightness, insulation, thermal bridging and ventilation need to be understood through an integrated performance assessment, while windows, solar gains and shading are also important to energy performance and summer comfort.

We recommend that the Handbook makes clear that these five considerations are interdependent aspects of overall building performance, supported by clear performance criteria, appropriate modelling, and robust quality assurance. This would help ensure that the approach focuses on achieving the intended outcomes rather than treating individual building measures as sufficient in themselves.

Consultation Question 33

Focussing on the associated schedules to the Handbook, do you have any comments on the actions identified to prove compliance with the standards?

☐ Yes

☐ No

Q33 - Passivhaus Trust (PHT) Response

Answer: **YES**

The approach set out in the schedules is strongly aligned with established Passivhaus quality assurance processes. Passivhaus Certification requires evidence to be planned, gathered and checked progressively through design and construction, providing a clear evidence trail from design intent through to the completed building.

We therefore support the use of schedules to identify the actions and evidence needed to demonstrate compliance. The Scottish approach could usefully build on this established model, particularly the principle that evidence gathering and verification should be integrated into the project process rather than treated as a retrospective exercise at completion.

The schedules are generally comprehensive, but care will be needed to ensure they do not become a checklist of documents, photographs or product information. Evidence should be proportionate to the performance risk and complexity of the project, with particular focus on performance-critical details, interfaces, changes and testing and commissioning.

Importantly, evidence should demonstrate that the required performance has been achieved, not simply that a specified product or construction method has been used. The schedules should therefore retain a clear link between design intent, as-built construction, testing and verification.

The existing Passivhaus Certification process provides a useful example of how this can be achieved through progressive evidence gathering, checking and independent verification. We recommend that the Scottish approach makes full use of this existing experience and avoids creating a parallel evidence process where established Passivhaus certification or equivalent robust quality assurance already provides the necessary evidence.