

The Energy Efficiency Standard for Social Housing post 2020 (EESH2)

Scottish Government Guidance for Social Landlords

This guidance supersedes the Scottish Government Guidance for Social Landlords on the Energy Efficiency Standard for Social Housing (EESH Guidance, last version published March 2020) from 1 April 2021.

March 2021

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Foreword

This guidance has been written to support social landlords in work to meet the second milestone of the Energy Efficiency Standard for Social Housing (ESSH2), which sets a performance target for all social housing to meet by 2032.

This guidance is published at a time of rapid change and urgency in Scotland's response to the climate change emergency. Social housing has an important contribution to make to this. Planning for investment in the future of Scotland's housing, this ESSH2 guidance should be read alongside other recent key document:

Securing a Green Recovery on a Path to Net Zero: Climate Change Update (December 2020). <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/>. Heat in buildings accounts for 20% of Scotland's greenhouse gas emissions, and the transition to zero emissions heat will involve changing the type of heating used in over 2 million homes by 2045, moving from high emissions heating systems, reliant on fossil fuels, to low and zero emissions systems such as heat pumps, heat networks and potentially hydrogen. This document makes a commitment that the Scottish Government will work with social landlords to bring forward the review of ESSH2 with a view to strengthening and realigning the standard with net zero requirements.

Heat in Buildings Strategy - Achieving Net Zero Emissions: Consultation (February 2021). <https://www.gov.scot/publications/heat-buildings-strategy-achieving-net-zero-emissions-scotlands-buildings-consultation/pages/3/>. Decarbonising our homes and workplaces means a fundamental shift for almost all of us. We have already made good progress on energy efficiency, with 45% of all homes, and 56% of social homes, now achieving EPC C or better. We now need to accelerate efforts to build on this and reduce our demand for energy. We will seek the agreement of social housing stakeholders to bring forward the review of ESSH2 to 2023, with a view to strengthening and realigning the standard with wider net zero requirements so that we can work in partnership with social housing to lead the transition to zero emission buildings and avoid the need for further retrofit in the future.

Housing to 2040 (March 2021). <https://www.gov.scot/collections/housing-to-2040/#housingto2040>. Affirms the Scottish Government's commitment to our climate change targets by taking action to make sure new homes are fit for the future, with zero emissions heating systems, and adapting and retrofitting existing homes so that the people who live in them can benefit from improved energy efficiency and decarbonised heating. Much of this will need the detailed input of the housing sector to design, develop and deliver. To make sure the housing sector is a key part of this work, we will establish a Zero Emissions Social Housing Task Force, which will act independently of government, advise on requirements in social housing to meet net zero targets and, longer-term, inform what is required in the private rented and owner occupier sectors.

The Energy Efficiency Standard for Social Housing post 2020 (EESH2)

Section 1: What is EESH?

1. The EESH encourages landlords to improve the energy efficiency of social housing in Scotland.
2. The EESH will help remove poor energy efficiency as a driver for fuel poverty and contribute to achieving the Scottish Government's ambitious climate change emissions reductions targets. It will support the Scottish Government's vision for homes and buildings that are warmer, greener and more efficient, and a housing sector that helps to establish a successful low carbon economy across Scotland.
3. The EESH was introduced in March 2014 and set a first milestone for social landlords to meet for social rented homes by 31 December 2020. A second milestone was confirmed in June 2019, for social rented houses to meet by December 2032 (EESH2).
4. The EESH milestones are defined by the Standard Assessment Procedure (SAP) 2012 methodology recorded in Energy Performance Certificates (EPCs). Older versions of SAP can be converted to SAP 2012.
5. The first EESH milestone set a single minimum Energy Efficiency rating for each home rented by social landlords. The target varied dependent upon the dwelling type and the fuel type used to heat it. In terms of the SAP 2012 methodology the target varied between a rating of 47 (in EPC band E) for an oil heated house, and 69 (in EPC band C) for a gas heated flat.
6. Social landlords were expected to ensure that they achieved the relevant minimum ratings by 31 December 2020 for all applicable social housing, subject to exemptions for some properties.
7. The EESH was reviewed in 2017-2019. The EESH Review Group included representatives from: Scottish Government; Local Authorities; Registered Social Landlords; Historic Environment Scotland; the Scottish Federation of Housing Associations; the Glasgow and West of Scotland Forum of Housing Associations; the Convention of Scottish Local Authorities; and the Scottish Housing Regulator.
8. A public consultation on proposals for EESH2 was carried out during 2018. An analysis of the responses is published online at <https://www.gov.scot/publications/consultation-analysis-energy-efficiency-standard-social-housing-post-2020-eesh2/pages/2/>.

Section 2: The ESSH2 Milestone

9. Informed by consultation responses, the ESSH Review Group considered proposals and agreed a new ESSH2 milestone as follows:

All social housing meets, or can be treated as meeting, EPC Band B (Energy Efficiency rating), or is as energy efficient as practically possible, by the end of December 2032 and within the limits of cost, technology and necessary consent.

10. It was further agreed that **no social housing is to be re-let below EPC Band D from December 2025**, subject to temporary specified exemptions.

11. The scope of the ESSH is self-contained homes, including a full range of facilities for the use of occupiers, provided for the purpose of social rents, and usually subject to tenancy agreements based on the model agreement for secure tenancies. This includes sheltered housing, vacant property, property marked for demolition, and secure tenancies under the mortgage to rent scheme.

12. The scope of the ESSH excludes the following types of housing:

- Houses purchased by former tenants. These are the responsibility of owners. The Scottish Government will introduce separate energy efficiency standards for owner-occupied homes.
- Hostels with common facilities for food preparation. These are not self-contained units, but may be subject to standards for houses in multiple occupation.
- Intermediate or mid-market rents. These will ordinarily be let under private residential tenancies or assured tenancies and will be subject to energy efficiency standards for private rented housing.
- Mortgage to shared equity. Unlike mortgage to rent, the occupier retains ownership and owner-occupier energy efficiency standards will apply.
- Commercial sub-lets. Housing let commercially will be subject to energy efficiency standards for private rented housing.
- Amenity blocks for Gypsy/Traveller sites. Amenity blocks should meet the energy efficiency standard set out in guidance on minimum sites standards.

13. The 2032 milestone has been developed so that **no exemptions should be needed**. Provided that landlords have a good grasp of the condition of their stock and what is possible and what is cost effective, they should be able to demonstrate that all houses either meet EPC band B, can be treated as meeting EPC band B, or are as energy efficient as practically possible.

Section 3: Review of EESSH2

14. This guidance applies from 1 April 2021 and sets out the expectations of landlords for EESSH2.
15. The EESSH Review (see paragraph 7) proposed a review of the EESSH2 milestone in 2025, or earlier subject to UK Government announcements on hydrogen and the re-provisioning of the gas network. The aim of the review was to: assess progress towards meeting the new standard; consider the 2032 milestone in the context of technological developments; and consider additional requirements regarding air quality and environmental impact.
16. The Scottish Government Climate Change Plan Update was published in December (<https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/8/>), commits to work with social landlords to bring forward the EESSH2 review with a view to strengthening and realigning the standard with net zero requirements. We will seek the agreement of social housing stakeholders to bring forward the review of EESSH2 to 2023.
17. The Scottish Government considers that an earlier review is needed because of the gathering pace of decarbonisation as a priority for change across all housing. This raises questions around how change in social housing fits with the wider change needed, particularly in owner occupied housing, which is the largest sector. There are opportunities for social housing to lead on decarbonisation and accelerate the pace of change elsewhere – but also significant costs that need to be addressed. We will look at the costs of EESSH2 as part of the review. We need to ask how does that affect what social landlords are being asked to do, and how it makes a difference to local heating strategies and shared tenure housing. There is also a question how this wider agenda impacts the flexibilities and scope for discretion for landlords that is a key element of EESSH2.

Section 4: Houses that meet EPC band B

- 18. Any house that meets EPC band B on actual or modelled energy efficiency performance complies with the EESSH2.**
19. An EPC for an existing building will normally be based on Reduced Data Standard Assessment Procedure (RdSAP).
20. Landlords are not required to obtain additional current EPCs for all their housing stock, nor are they required to obtain a new EPC after completing energy efficiency improvements. However, they should be satisfied that they can calculate or estimate the current SAP rating for the property.
21. EPCs are required on change of tenancy. New EPC data and SAP calculations should be used on an ongoing basis to check and refine the quality of modelling.
22. Different versions of SAP may produce different results. The overall rating band for energy performance is the same for all versions of SAP. The SAP guidance includes conversion tables from previous versions of SAP. Differences between ratings will also be affected by the differences in the range of data collected in different versions of SAP.
23. Landlords should advise SAP assessors of common technical data to assist in the production of accurate assessments.
24. Landlords should be aware that it is possible for SAP calculations to include errors, and with accepted margins of error within the SAP rating, these can vary slightly between two EPCs of the same property carried out by different assessors.
25. Landlords can disregard small variations of ± 2 SAP points between modelled and actual ratings or between similar houses with similar energy efficiency measures. So for example, if a landlord modelled the SAP for a property got a score of 81(B) then did an actual assessment and got a rating of 79(C) they can treat that property type as meeting band B. This does not mean that all houses within 2 points of the target should be treated as passes.

Section 5: Treated as meeting EPC band B

26. **Any house that can be treated as meeting EPC band B on the basis of its actual energy efficiency performance complies with the EESSH2.**
27. The Scottish Government considers that a specific target is a useful measure of performance across the social housing sector and the SAP is currently the best tool for measuring that performance.
28. However, new technology is not always well-reflected in SAP assessments. The SAP methodology includes a process for evaluating innovative technology, but this takes time and requires evidence from product testing. EESSH2 is not intended to act as a barrier to investment in innovative technology. Some innovative technology gives a much lower modelled energy efficiency than is actually experienced by tenants.
29. Landlords should be satisfied that an innovation provides tangible benefits for energy efficiency and is in the best interests of tenants. Evidence to support this should include:
- Evidence that the technology improves thermal efficiency,
 - A reasonable expectation that future improvements in the evaluation of energy efficiency will recognise the benefits of the technology,
 - Engagement with tenants to show support for the technology, **and**
 - Ongoing monitoring to demonstrate and monitor benefits.
30. Landlords can use data from other landlord's projects to support decisions for their own stock.

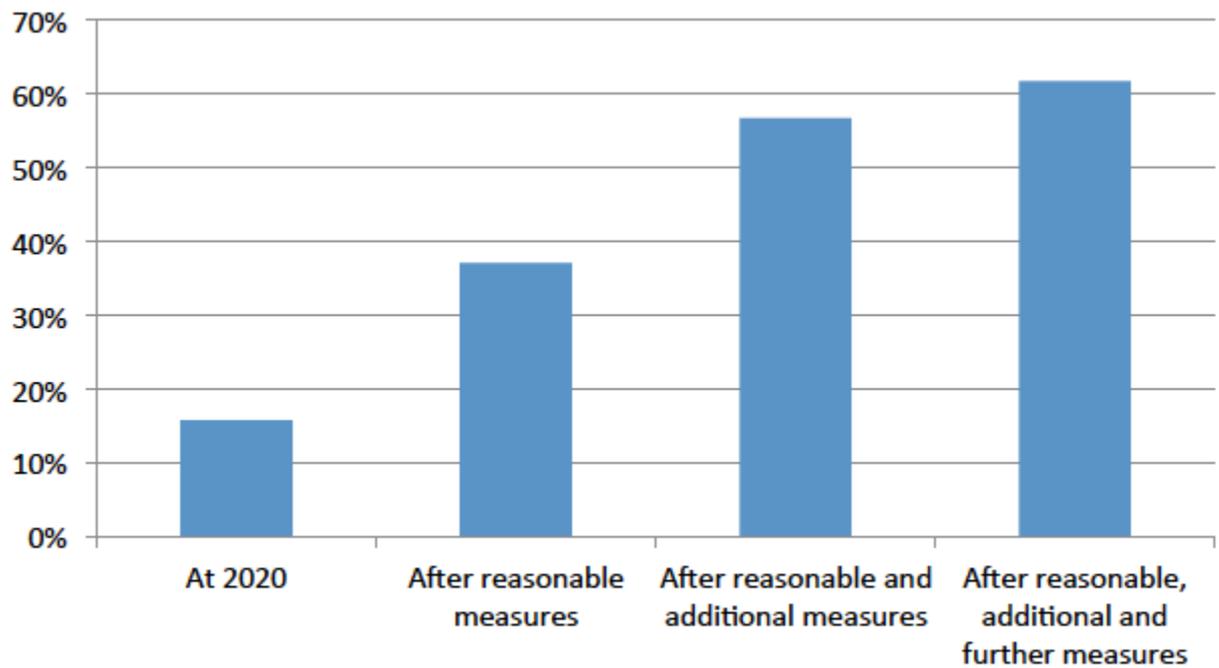
Section 6: As energy efficient as practically possible

- 31. A house that is as energy efficient as practically possible (within the cost, technology and necessary consent) complies with the EESSH2.**
32. The 2032 milestone recognises that EPC band B will not be met for all stock. This is acceptable, provided all reasonable efforts have been undertaken to improve the energy efficiency of the stock.
33. This recognises that there is a significant proportion of social housing that cannot be brought up to band B with existing technology at a reasonable cost, and the necessary consent of tenants and owners may be hard to obtain. The test here should be that the landlord is satisfied that the energy efficiency of the house has been improved as much as is practical in the circumstances.
34. To demonstrate this, the landlord should make an assessment of houses, or groups of houses, in their stock, which in their judgement cannot be brought up to EPC band B, to show how they have decided that those houses have been made as energy efficient as possible, and why they consider any additional improvements to be either (a) technically non-viable, (b) not cost-effective or (c) unlikely to secure the necessary consent.

Section 7: Within the limits of technology

35. The Scottish Government used case studies from a range of social landlords to model how many houses could be brought up to EPC band B with existing technology.

36. The following chart shows the modelled EESSH2 attainment rates for social houses after different stages of case study exercise:



37. The three categories of measure are as follows. Note that any measure is also subject to considerations of cost-effectiveness.

Reasonable Measures	Additional Measures	Further Measures
Double glazing Secondary glazing Heating controls Storage heaters Loft insulation top up Floor insulation Compact fluorescent lighting External Solid Wall insulation Internal Solid Wall insulation Water heat reclamation Thermostatic Radiator Valves (TRVs) Cavity Wall Insulation Hot water tank and pipe insulation Replace secondary heating Flat roof insulation Room-in-the-roof insulation Switch from storage heaters to electric wet Switch from storage heaters to gas Switch from storage heaters to air source heat pump Switch from storage heaters to quantum storage	Biomass boiler Air source heat pump Ground source heat pump Solar hot water (solar thermal) Solar Photovoltaic (PV) Micro combined heat and power	Insulated doors Additional layers of insulation – e.g. CWI and EWI Triple glazing Flue Gas Heat Recovery Battery storage linked to PVs

38. Landlords should consider what impact alternative measures could make.

39. There should be a process for reviewing any decision that improvement to band B is not technically possible at least once every 5 years.

40. Note that measures involving switching from existing heating system to condensing gas boiler or upgrading existing gas boiler, which were included as reasonable measures for the first milestone of the EESSH, are not included because climate change targets will require decarbonisation of the heat network.

Section 8: Within the limits of cost

41. Installation of energy efficiency measures can be expensive. Scottish Government modelling suggests that it could cost a total of £3.4 billion to bring 62% of Scottish social housing up to EPC band B using existing technology. While funding options should be explored, it may be expected that many measures will be funded from the landlord's own resources. Ultimately, for RSLs this means paying for measures out of rental income, and while local authorities have discretion on how to use their financial resources across housing and other areas, any spending over and above rental income reduces resources for other priorities. Landlords should be mindful that investment to reduce fuel poverty does not lead to rent poverty. For Local Authorities, this should be an element of their Local Heat and Energy Efficiency Strategies (LHEES), and it is recommended that RSLs also produce and publish an energy efficiency investment policy. Decisions on the cost-effectiveness of investment should be made with reference to these strategies and policies.
42. The EESSH2 milestone does not change landlords' responsibility to manage their investment policy to ensure that it is cost-effective, especially where substantial additional investment has a potential impact on rents.
43. A policy on cost-effective investment could include the following criteria:
 - Maximum spend per property. The simplest approach is to set a fixed limit for affordable investment.
 - Timescale to realise benefits. The total projected savings in fuel costs should exceed the cost of the measure within a defined number of years. This could be linked to the repayment for loan finance to support the measure.
 - Benefit relative to similar investment in other property. A significantly larger investment to achieve a broadly similar result in a comparable property might in some cases be considered excessive.
 - Current energy efficiency of the house. Generally, there are diminishing returns on successive improvements. Landlords may consider that houses which currently have poorer energy efficiency, or have not benefited from previous measures, should be prioritised over incremental improvements to houses that have already had investment.
 - Landlords may also factor in the potential cost savings of combining several measures or with other works such as repairs or upgrades. Costs may be considered excessive if the same result can be achieved more cheaply if postponed to a later planned programme of works.
 - Demolition or disposal. There may also be cases where the costs of works exceeds the cost of demolishing or disposing of the property.

Section 9: Within the limits of necessary consent

44. Meeting the EESSH2 milestone for 2032 will require action by others as well as landlords. Realising this aspiration for the sector will also require action from government, tenants, and energy suppliers e.g. through joined-up government policy on void periods and new-build properties; alignment with health outcomes; and working with tenants to make best use of improvements and encourage take-up.
45. In some circumstances tenants or owner occupiers may refuse to participate in the installation of energy efficiency measures necessary to achieve EESSH2. This situation can also arise in mixed tenure property if owners are unwilling or unable to contribute to the cost of common works. In such instances the landlord must have made every reasonable effort to inform and explain to the tenant or owner occupier why the work is necessary, when it is being done, and why their participation and co-operation is so important.
46. Landlords should review cases when the property becomes vacant or owners move. Landlords should liaise with their local authority if support is needed to allow owner occupiers to participate in common works, to establish if the local authority is willing to provide grant funding, or pay missing shares. As with any assistance, this would be at the local authority's discretion, and subject to local priorities and resources, and policy decisions on what owners should be expected to fund themselves.
47. There may be legal problems to overcome when embarking on a programme of energy efficiency works. An example of legal issues would be where properties are listed buildings or located in historically significant areas which place restrictions on the installation of specific energy efficiency measures, for example solar PV.

Section 10: Traditional buildings

48. SAP is a model and modelled energy efficiency may not correspond to the actual energy performance of individual buildings.
49. All houses should be improved where possible. SAP methodology treats traditionally constructed buildings in the same way as other buildings. Energy efficiency improvements should take account of appropriate materials and the need for ventilation for the health of the building and its occupants as well as vapour open materials to allow buildings to breathe.
50. Proposed measures generated by an EPC may not be appropriate for traditional buildings. Technically appropriate measures mean that materials used are vapour and capillary open, allowing dispersal of water vapour through the fabric. This means that some insulation materials suitable for modern buildings should be avoided in traditional buildings.
51. Historic Environment Scotland's research has shown successful projects on traditional buildings can include improvements to existing windows, floor insulation, warm and cold roof measures, internal wall insulation and ventilation improvements, see paragraph 80.

Section 11: Environmental Impact

52. Part of the first EESSH milestone was the principle that new energy efficiency measures should be installed on the principle of no detriment to the SAP modelled Environmental Impact of a building. However, there has so far been no formal requirement to measure or demonstrate this.
53. The Climate Change (Scotland) Act 2019 sets targets to reduce Scotland's emissions of all greenhouse gases to net-zero by 2045 at the latest, with interim targets for reductions of at least 56% by 2020, 75% by 2030, and 90% by 2040. This sets an unprecedented challenge of ensuring our homes, new and existing, reduce emissions from heating.
54. The Scottish Government recently published a consultation on a Heat in Buildings Strategy, with the aim of achieving net zero emissions from heating buildings by 2045. See <https://www.gov.scot/publications/heat-buildings-strategy-achieving-net-zero-emissions-scotlands-buildings-consultation/>.
55. Part of the EESSH2 proposals is that no detriment to Environmental Impact should be incorporated in the assessment of performance from 2025.
56. The Scottish Government intends to develop further guidance on meeting the Environmental Impact part of the EESSH2 milestone. We anticipate that this will require further development to ensure that it supports the aims of the Heat in Buildings Strategy.
57. This will be considered further in the EESSH2 review, proposed for 2023, see section 3 of this guidance.

Section 12: Air Quality

58. Air quality is a key health issue affecting people, homes and energy efficiency. While improvements in energy efficiency can lead to improvements in health outcomes, particularly for older people, young children, and those with respiratory and other chronic health conditions, there is the potential for unintended consequences adversely affecting the air quality in a home.
59. Poor ventilation can lead to poor indoor air quality, and in some cases problems can be exacerbated by modern design (e.g. increased airtightness; reduced air movement due to fire doors; chemical components in modern construction); insulation (by increasing air-tightness or creating cold spots); and the behaviour of occupiers (e.g. closing vents to reduce heat loss, closing windows due to security concerns, low recognition of health impacts of air quality).
60. Innovative technologies mean homes can potentially be very efficient. Proper use of energy and ventilation systems will help ensure air exchange rates meet recommended levels, and effective tenant engagement and advice is vital for successful outcomes in these regards.
61. This does not include poor air quality due to problems from outside. We know that external air quality can be a problem, and one over which landlords have little control.
62. Landlords must assess the risk that energy efficiency measures on a building might make air quality inside worse.
63. To support this, landlords may want to collect data on carbon dioxide, temperature and humidity, before and after projects. It is not a requirement that monitoring equipment is installed in every property.
64. From 2025, we propose to include a condition in EESSH2, that any new energy efficiency measures should be installed on the principle of no detriment to air quality and, where necessary, additional measures should include provision for improving ventilation (including the installation of mechanical ventilation where required), and that provision should be included for the monitoring of this.
65. The cost of ventilation and monitoring should be included in modelling of the cost of energy efficiency projects.
66. Evidence from projects carried out by landlords indicates that where ventilation is included in a project there may be a reduction in the overall SAP score, if using RdSAP. For example, a modelling exercise carried out by Hjalmland Housing Association Ltd. found that RdSAP software reduced the SAP score by 9 points when installing Mechanical Ventilation Heat Recovery. The EESSH is not intended to discourage investment in elements of projects which are essential to maintain building quality and health. For the purposes of EESSH2, a property should be treated as meeting the SAP score prior to any reduction due to ventilation systems being installed. Landlords may disregard the reduction in the score due to installation of ventilation.

Section 13: Restriction on re-letting

67. Most social housing will meet at least EPC band D from 2020. However, some homes which rely on oil-fuelled heating, and some exempt properties, will be below this minimum. It is projected that 0.5% social housing stock will fall below EPC D after 2020, estimated at around 3,000 homes.
68. EPC band B is an aspirational target and will not be achievable for all stock. Therefore, a minimum standard also applies from April 2025 that no social housing can be let if its energy efficiency performance is below EPC band D, though there may be situations where temporary exemptions continue to apply. **Social housing that cannot be brought up to EPC D by April 2025, and is not subject to temporary exemptions, should not be let to social tenants.**
69. It is for landlords to decide whether or not any property in their stock should be temporarily exempt from meeting a minimum of EPC band D. However, they must be able to show evidence to support exemptions to their tenants and to the Scottish Housing Regulator.
70. Where landlords decide that an exemption is required for the EPC band D minimum standard, they should still aim to install measures which improve energy efficiency for tenants to the best possible energy efficiency rating in the circumstances in order to show that the house complies with EESSH2.
71. The following temporary exemptions will apply to re-letting houses that do not meet EPC band D from 2025:
- A. Houses that are currently occupied.** Sitting tenants are not required to vacate property.
 - B. Social objections.** Where other tenants or owner occupiers in the building refuse to participate in the installation of energy efficiency measures.
 - C. New technology.** An exemption may be appropriate if there are reasonable grounds to consider that improvements in the evaluation of energy efficiency of buildings will recognise the impact of measures that have been installed.
 - D. Legal.** If the necessary work required to bring a house up to at least EPC band D cannot be carried out legally, there will be grounds for an exemption.
 - E. Demolition or disposal.** An exemption may be appropriate for homes subject to an approved decision to demolish, or dispose by way of sale, the property by Committee (for Local authorities) or Governing Bodies (RSLs), where the landlord considers that investment is not cost-effective by reason of the intention to demolition or dispose of it.
 - F. Acute local housing needs.** Some areas may have exceptional pressures on available social housing to meet local demand. This is particularly the case in rural and island areas where there is a lack of alternative housing. In the longer term, houses that cannot be brought up to band D, should be removed from a

landlords' stock for new tenants. However, some landlords may find that an additional period is needed to reach this position.

72. The landlord must make every reasonable effort to inform and explain to other tenants or owner occupiers why work is necessary, and why their participation and co-operation is important. Any exemption from the minimum requirement to meet at least EPC band D should be reviewed at least once every five years.
73. The landlord should not apply other types of exemption that were previously allowed under the first EESSH milestone. Houses should not be re-let if the reason why that cannot be brought up to band D is a technical obstacle to making the necessary improvements, grounds of cost or difficulties securing funding, plans to dispose of the property or it is a long-term void, unless one of the exemptions listed above in para 71 also applies.

Section 14: Monitoring performance

74. Performance towards the 2032 milestone will be monitored by the independent Scottish Housing Regulator.

75. The Scottish Government's role is to:

- A.** Make a clear national policy framework for improving energy efficiency in social housing in Scotland.
- B.** Specify in guidance the minimum standard to be met, the timescale for achievement, the scope of the properties that are expected to meet the minimum standard, and the relevance of all aspects of that standard to social housing.
- C.** Subject to resources, answer any novel or contentious technical queries the public may have regarding the EESSH that guidance cannot answer.

76. The Scottish Housing Regulator's role is to:

- A.** Take account of Scottish Government guidance in its approach to regulating the EESSH.
- B.** Monitor and regularly report progress on EESSH compliance and non-compliance.
- C.** Seek further information and explanation on aspects of reported compliance, including on exemptions, if necessary.
- D.** Ensure that results of EESSH monitoring are taken into account in its regulatory assessment of landlords.
- E.** Ensure that the provision of EESSH data used for monitoring follows the published process and that landlords are aware that they must satisfy themselves that the data provided is correct.
- F.** As individual issues arise, consult with Scottish Government policy colleagues regarding aspects of the EESSH policy that are novel or contentious.

Section 15: Further advice and guidance

77. The Scottish Housing Regulator will separately issue Technical Guidance for Landlords on the reporting of performance.
78. The Scottish Government has set up an online forum through Knowledge Hub to flag issues and share ideas regarding the guidance and EESSH more generally. This can be accessed online at <https://khub.net/web/energy-efficiency-standard-for-social-housing-review-group>. Note that to access the forum it is necessary for a member of staff to join Knowledge Hub and this group. The group is administered by the Scottish Government who will assist with applications to join.
79. The Scottish Government provides energy efficiency advice to support landlords, tenants and owner occupiers. This is delivered by Home Energy Scotland (HES) advice centres and managed by the Energy Saving Trust (EST).
80. Historic Environment Scotland has published research on successful projects on traditional buildings which include improvements to windows, floor insulation, warm and cold roof measures, internal wall insulation and ventilation improvements, <https://www.historicenvironment.scot/archives-and-research/publications/?q=Refurbishment>.

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