# SK/AD® Energy

Section 6: (Energy) Consultation Bulletin



The Scottish Government recently released the much-anticipated consultation on the proposed changes to the energy standards within the Scottish Building Regulations.

The consultation included numerous updates to the current building standards and relates to topics such as energy efficiency, air testing, ventilation, overheating and electric charging points.

SK/AD will continue to review the information released by the Scottish Government but below are some of the key proposals:

- An uplift to the 2015 standards for new dwellings of either 32% or 57% emissions reduction.
- Uplift to 2015 standards for non-domestic buildings of either 16% or 25% emissions reduction.
- A new metric for measuring energy performance in new buildings
- Commissioning of installed systems with confirmation of commissioning provided on completion of the building.
- Moving towards air tightness testing all new dwellings as opposed to the current 1/20 rule.
- The introduction of a requirement to assess and mitigate summertime over heating risk in both dometic and non-domestic buildings.
- Uplifts of backstop U-value requirements and minimum efficiencies on heating and ventilation systems.
- Installation of electric vehicle charging points for all new build dwellings.

#### When are the proposed amendments expected to come into effect?

Depending on the outcome of the consultation, it has been proposed that the amendments to the energy standards, ventilation and overheating will be revised within building regulations and supporting guidance in late 2021, with an aim to bring these changes into force in 2022.

# What are the new metrics for assessing energy performance in new dwellings?

The consultation has put forward two proposals for assessing energy performance, one of which will likely to be included in the updated Section 6 (Energy) Building Regulations. These metrics are Primary Energy Demand and Delivered Energy.

# What is primary energy demand?

Primary energy is defined as "energy from renewable and non-renewable sources which has not undergone any conversion or transformation process"

Primary energy takes into consideration the impact of the upstream activities involved with the production and processing such as:

- Planting of biofuel sources
- Cultivation of biofuel sources
- Extraction of fuels
- Processing of fuels (e.g. cleaning, grading)
- Transformation of fuels
- Transportation of raw and refined products
- Transmission and distribution losses

Within Annex 1 of the 2018 amendment to the Energy Performance of Buildings Directive, a requirement for Member states to include a primary energy metric for compliance with minimum energy performance standards was added. This requirement is currently being considered as one of the key metrics for implementation by the UK administrations.

#### What is delivered energy?

Alternatively, another metric has been proposed, which assess the calculated delivered energy needed for a new building. Due to the upstream activities involved with certain fuels, a primary energy target can have a differing impacts a dwellings performance depending on the fuels used.

Within the consultation, delivered energy is defined as "the amount of energy that needs to be supplied to the building from external sources, less any offsetting of that demand from the generation of energy or heat onsite from renewable sources"

It is the delivered energy total for each fuel supplied to a building to which primary energy and emissions factors are applied.



#### What are the proposed 'Notional dwelling' improvements?

Currently, within the Scottish Energy Standards, there are 5 notional dwellings dependant on the specified heating source, with any combustion fuels including on site renewables (PV). The updated proposal is to simplify this with two notional dwellings depending on a gas solution or an Air Source Heat Pump (ASHP). This is further split into two proposals with differing emission reductions, with the aim one of the standards being approved for implementation. These can be found below:

Table 1: Option 1: 'Improved' standard - 32% emissions reduction over the 2015 standards

Table 1:		
Notional Building 1		
Air Source Heat Pump (ASHP) - 250% efficiency	Fabric infiltration of 5.00 m³/(m².h)@50Pa	
Improved fabric (See Table 3)	Double glazed windows	
Natural ventilation	Intermittent extract fans	
Used when an ASHP is specified		
Notional Building 2		
Gas boiler - 89.5% efficiency	Fabric infiltration of 5.00 m³/(m².h)@50Pa	
Improved fabric	Double glazed windows	
Natural ventilation	Intermittent extract fans	
Increased PV*	Wastewater heat recovery	
Used when any other fuel is specified		

Table 2: Option 2: 'Advanced' standard - 57% emissions reduction over the 2015 standards

Table 2: Notional Building 1		
Air Source Heat Pump (ASHP) - 250% efficiency	Fabric infiltration of 3.00 m³/(m².h)@50Pa	
Advanced fabric improvements (See Table 3)	Triple glazed units	
MVHR (Heat Recovery Ventilation) 86% efficiency		
Used when an ASHP is specified		
Notional Building 2		
Advanced gas boiler	Fabric infiltration of 3.00 m <sup>3</sup>	
Advanced fabric (See Table 3)	Triple glazed units	
MVHR (Heat Recovery Ventilation) 86% efficiency	Wastewater heat recovery	
Increased PV*		
Used when any other fuel is specified		

**\*PV Calculations** - Houses -  $kWp = 0.4 \times ground floor area (m<sup>2</sup>) / 6.5. Flats <math>kWp = 0.4 \times dwelling floor area (m<sup>2</sup>) / (6.5 \times number of storeys in block)$ 

# What are the proposed maximum fabric values proposed for new build dwellings?

Below list the proposed maximum fabric values for both options 1 and 2. The updated U-Values below are challenging targets but are achievable. If implemented, these U-values are set to significantly increase energy efficiency of new build dwellings.

Table 3:						
Fabric Element	Current (2015) Notional Building U-value	Current (2015) Maximum U-value	Option 1 - Improved Notional Building U-value	Option 1- Improved Maximum U-value	Option 2 - Advanced Notional Building U-value	Option 2 - Advanced Maximum U-value
Wall	0.17	0.22	0.15	0.17	0.13	0.16
Roof	0.11	0.15	0.09	0.12	0.09	0.11
Floor	0.15	0.18	0.12	0.15	0.10	1.20
Doors/Windows	1.40	1.60	1.20	1.40	1.0/0.8	1.20
Rooflights	1.40	1.60	1.70	1.90	1.30	1.70
Party Wall	0.00	0.20	0.00	0.00	0.00	0.00
Y-Value	0.08	N/A	0.06	N/A	0.04	N/A
Air Infiltration	7.00	N/A	5.00	N/A	3.00	N/A

Table 3: Proposed maximum fabric values for new homes.

# Thermal Bridging at Junctions

It is also the intent of the Scottish Government to cease to provide a set of 'Accredited Construction Details' (ACDs) for common constructions in support of amended domestic standards from 2021. It is expected such information should now be produced by the construction sector as required during the design process.

#### What are the proposed maximum fabric values proposed for new work on existing dwellings?

The consultation highlights due to regular reviews of energy standards increasing the level of fabric specification sought from work to existing buildings, its increasingly difficult to set or justify more than one set of elemental standards.

Therefore, dependant on consultation feedback, the below proposals shown in Table 4 are recommended for extensions, alterations, and conversions. Table 4: Proposed maximum area-weighted average - U-values new work to domestic buildings

Table 4:			
Fabric Element	Current (2015)	Option 1 - Improved	Option 2 - Improved
Wall	0.22	0.17	0.16
Roof	0.15	0.12	0.11
Floor	0.18	0.15	0.13
Doors/Windows	1.60	1.40	1.20
Rooflights	1.60	1.90	1.70
Party Wall	0.20	0.00	0.00
Y-Value	N/A	N/A	N/A
Air Infiltration	N/A	N/A	N/A

# What are the minimum standards for building services?

With regards to building services, the consultation states as is the case with the 2015 and previous guidance on minimum standard for fixed building services, provisions set for Scotland are proposed to reflect those set elsewhere in the UK and are listed below in table 5. A gradual improvement of all services has been proposed and suitable products are widely available within the UK market.

# Table 5: Summary of key changes to minimum standards for fixed building services

Table 5:		
System/element	2015 Guidance	Proposed Guidance
Gas Central Heating Boiler	88% SEDBUK 2009	92% SEDBUK 2009
Oil Central Heating Boiler (Regular)	88% SEDBUK 2009	91% ErP1
MVHR (heat recovery efficiency)	70%	73%
Warm water and hot water heat pumps	<ul> <li>Air-to-air &lt; 12kW, SCoP of D or better</li> <li>Space heating (new dwellings), SCoP of 2.5 or better</li> <li>Domestic hot water, SCoP of 2.0 or better</li> </ul>	<ul> <li>No change</li> <li>Space heating (new dwellings), SCoP of 3.0 or better</li> <li>No chance</li> </ul>
Air / water cooled air conditioners	SEER 2.4/2.5	SEER 4.0
Internal Lighting	Luminous efficacy greater than 45 lamp lumens /circuit watt for 3 out of 4 fittings	All fittings to have efficacy more than 75 lamp lumens/circuit watt

# Air testing and ventilation

Current guidance calls for representative sampling of buildings to be tested at a frequency of at least 1:20. A review of EPC data for 2020/21 indicates that around one third of new dwellings are subject to an air tightness test and commonly achieving air infiltration rates below 5.00 m<sup>3</sup>/(h.m<sup>2</sup>)@50Pa.

The proposal now put forward is all new homes should be tested. The rational for this being a test all strategy provides greater assurance that the infiltration rate achieved in the dwelling is a fair representation to that declared at the design stage. A test all strategy can also provide assurance that the ventilation strategy adopted in the building is appropriate for the level of air infiltration present within the dwelling.

With regards to appropriate ventilation and determined air infiltration, the consultation has also put forward proposed measures for designers to consider when proposing suitable ventilation designs. These can be found in table 6 below.



Table 6 – Ventilation solutions for design infiltration levels.

Table 6:		
Ventilation type	Suitable for infiltration rate:	
Natural ventilation (with intermittent mechanical extract)	≥ 5.00 m³/(h.m²)@50Pa	
Continuous mechanical extract ventilation	≥ 3.00 m³/(h.m²)@50Pa	
Continuous mechanical supply & extract ventilation	Any	

The consultation has also highlighted issues that can impact ventilation performance with the use of dMEV systems. These included the nature of the trickle vents, the window coverings, the path between the room and the dMEV and the arrangement of the home.

On that basis, it is proposed, for design infiltrations rates of not less than 3.00 m<sup>3</sup>/(h.m<sup>2</sup>)@50 Pa, to be presented on the basis of a whole dwelling continuous mechanical extract system which may operate via a central fan or through a number of separate room extract fans. Such a system must be designed to deliver the required air supply in habitable rooms and has to be demonstrated on commissioning of the completed system.

In situations where the design infiltration is below 3.00 m<sup>3</sup>/(h.m<sup>2</sup>)@50 Pa the requirement will be continuous mechanical supply and extract ventilation, with or without heat recovery.

#### Improving and demonstrating compliance and reducing the 'Performance Gap'

It has long been known there is a gap between the designed and as built energy performance of dwellings in the UK. There are various reasons for this including a differing occupant behaviours, unconsidered design, or poor implementation on construction as well as SAP and SBEM calculations using standardised set of assertions on building operation use.

To address these issues, the consultation has put forward a proposal for a 'Compliance Plan' approach' alongside a Compliance Plan Manager Role to oversee compliance with building regulations. This role would review the project from concept to completion on behalf of the Relevant Person and be the verifier's point of contact to support the verification process.

Whilst the Compliance Plan is still in development, the consultation highlights several themes which are expected to form the basis of the plan and any compliance manual. Several of which can be found below:



# At Design Stage - (As Designed)

- Commission building work to engage at an early stage with consultants who can demon strate competence in the design and delivery of low energy buildings.
- Investigate and set out how compliance with the requirements of section 6 (energy) will be achieved.
- Avoidance of declaring design values without demonstrating an understanding of how these will be achieved in practice.
- Review the benefits that can be derived from improved compliance reporting output from SAP/SBEM calculation software.
- Advice on good practice to support clear cross referencing of calculated values and source of data (U-values and psi values) with elements presented in drawings and specification.
- Correct use of calculation software, determination of thermal performance, design and specification of building systems and controls.
- A more comprehensive and standardised approach to summarising the commissioning and performance testing of installed building services. Supported, at design or pre-construction stage, by a clear scheduling of specified services and their declared performance to assist in validation, post commissioning.

# At the Completion State - (As Built)

- Documentary and pictorial evidence of installations at key stages to show the correct application of construction practice.
- Verification of installed products and services against the declared building warrant specification
- Submission of an as-built compliance calculation (SAP compliance check) to reflect any changes made during construction, to confirm design intent is achieved.
- Correct and complete installation, avoiding loose fitting of insulation and gaps which will provide unwanted air pathways. Airtightness testing at key stages.
- Commissioning and validation of the declared performance, for both function (measurable output/effect) and energy consumption associated with that function (efficiency).



# Other proposals/recommendations

Whilst the key findings have been discussed above. Several other proposals and recommendations designers should consider can be found below:

- PV supply must be directly connected to dwellings as opposed to the landlords supply when completing SAP calculations.
- Limiting distribution of wet heating networks to <55°C.
- Minimum equivalent area of background ventilators in each habitable room should be not less than 5000 mm<sup>2</sup>.
- Introduce the term 'major renovation' into the regulations to provide a further means of defining a level
  of work to an existing building that is considered significant enough to trigger certain other activity e.g.,
  improving fixed building services.
- All dwellings with a parking space to have at least one EV charge point socket with minimum 7kW out put power rating Government's preferred position.
- Updated guidance on limiting the risk of overheating in new build dwellings, including a Simple ele mental approach dependant on building characteristics or a detailed Dynamic thermal analysis which informs design choices, specification, and passive measures.

# Conclusion

SK/AD welcomes the release of the consultation and look forward to adding our own comments and recommendations for implementation. The updated standards will be challenging but achievable and will result in new build dwellings which are increasingly energy efficient, built to last, and offer the house buyers reassurance their homes have been built as intended.

At SK/AD, with our team of Architects, Compliance Testers and Energy Assessors, we are well equipped to support our clients with any of the proposed amendments put forward.

SK/AD can provide a 'one-stop-shop' for all Section 6 and 7 requirements, including, SAPs, EPCs, SBEMs, thermal bridge calculations, air testing, sound testing and fan commissioning.

Recently, we have added 'as built testing verification' as part of our services with the use of the Veritherm smart thermal measurement technology. This technology will help identify actual energy performance, check quality and standards and help reduce the 'performance gap' within the industry. We expect this technology will play an important role in the next phase of house building in the UK.

If you have any queries regarding the consultation, or how we can help, feel free to call our office and one of our members of staff will be happy to help.

You can have your say here by clicking the link below:

https://www.gov.scot/publications/scottish-building-regulations-proposed-changes-energy-standards-associated-topics/documents/

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