



A FUTURE (RESILIENT) HOMES STANDARD FOR 2025

A PAPER FOR POLICYMAKERS AND REGULATORS

DELIVERING WHAT PEOPLE NEED

Imagine a house-buyer viewing their dream new-build home. What questions would they likely ask the seller before making the all-important decision to buy?

Maybe they would be interested in whether the price is within budget, whether the location suits them, what the local schools are like, the layout, the size, and the orientation – to name just a few.

But what about the things the buyer can't necessarily see when looking at a building? Or the things they might not think to ask about? Would an average buyer question:

- Whether the building will protect them sufficiently from noise between rooms and floors in the house, or from outside, so they are free from disturbances and can sleep better?
- What the temperature will be like in the house in the summer and in winter – including during future warmer weather? A home which gets too hot or too cold will be uncomfortable to live in, and it can also be damaging to health.
- What type of ventilation system the house has and whether it will supply enough fresh air to ensure good indoor air quality and help prevent the build-up of condensation or mould?
- What steps were taken to ensure the building and the building materials will adequately resist the spread of fire, so that they can feel safer should a fire start?
- How the house will perform in terms of the expected running costs, energy used, and the carbon emitted once it is occupied?

Buyers who would ask such questions are probably in the minority. However, these are some of the things researchers, construction experts, and common sense suggests people need from their homes for health, safety and well-being. Key attributes that make a home resilient.

A resilient home might therefore be described as one able to stand up to possible threats; which creates a healthy living environment in which people can thrive; and where there are no hidden problems or unexpectedly large fuel bills due to under-performance of the building fabric.

MIMA believes the ambition must be for the construction sector to be in a better position to give greater assurance to buyers at the time of purchase, or after people have moved in, that such issues will not arise.

In our view the Government's proposed Future Homes Standard for 2025 should be geared towards ensuring buyers get what they need from their homes: a well-performing home across the board – in terms of energy efficiency, carbon emissions, cost to run, air quality, internal temperatures, acoustic performance, and fire safety. And the ability to access proof of this.



THE CURRENT STATE OF PLAY

Well-documented concerns about the quality of some housing in general, about fire safety after the Grenfell tragedy, and about global climate change, are focusing minds on the need for change to current construction practices, frameworks and requirements.

Encouragingly, following a number of major building research programmes¹, industry collaborations², and newer initiatives³ taking aim at certain systemic issues often seen in buildings, including the “energy performance gap”⁴, problems with indoor air quality, and overheating, a growing number of construction sector organisations are actively seeking and finding solutions to them. As result, they are seeing their housing schemes perform very well. Such organisations are:

- Investing in building performance evaluation projects which look at the performance of buildings holistically
- Investing in performance verification methods and tools enabling them to prove to buyers that a building “does what it says on the tin”, and
- Investing in robust quality control and building physics training so their teams and supply chains are better able to avoid the types of mistakes in the build process which create operational performance problems and unhealthy indoor environments

By continuing to invest in such solutions, the sector will be in a much better position to give house buyers of the future robust assurances about the quality and resilience of housing schemes, if called upon to do so.

With the full support of Government in terms of leadership, funding and trialling, by 2025 it should be possible for the sector to be operating in a world where proof of performance is the norm for every new house built – possibly 300,000 each year.

The sector would be delivering resilient new homes in reality, in every scheme in every part of the country.

We are beginning to see movement in the policy landscape too, with a handful of local authorities having already set requirements for the performance of new homes built in their areas.⁵ However, with the exception of airtightness testing, at present national policy and regulation does not oblige the supply chain, including manufacturers, to demonstrate that new buildings, and the energy efficiency systems and measures which go into them, perform as they should in use.

There is no final report handed over to a buyer to outline the quality control processes enacted as the build took place and no test required to show that a home should perform to the standard required.

This needs to change. And it is all the more important as building standards, currently based on modelled performance, are ramped up over time. If we are going to “shoot for the moon”, we need to know we have prepared ourselves well to get there, and to get there safely.

¹ Such as Innovate UK and the former Zero Carbon Hub

² Such as by the Construction Industry Council

³ Including the formation of the Building Performance Network

⁴ See more about the energy performance gap on page 4

⁵ For example, the Great London Authority and Milton Keynes Council



MAKING IT HAPPEN

We, along with many other organisations, believe three changes would make a big difference:

a) Having a holistic vision for building performance

If the construction sector is to transition to a “resilience in reality” ethos, Government support is essential, and the challenges can't effectively be tackled in silos across the various parts of the Building Regulations.

Integrating policy is not always easy, but we agree with others that the “healthy buildings” agenda is an important and useful organising theme. The Town and Country Planning Association (TCPA), for example, has called for a Healthy Homes Act to be brought forward, intended to *“make sure there is absolutely no excuse for bad design...primary legislation... would make it illegal for homes to be built in a way that could damage people’s health, safety, wellbeing or life chances.”*

The TCPA sets out ten principles for a “decent home”⁶, and we would urge this type of thinking to be brought into the 2025 Future Homes Standard, alongside work by the All Party Parliamentary Group (APPG) on Healthy Homes and Buildings⁷, the UK Green Building Council⁸, and others. The Future Homes Standard provides an ideal vehicle to set out a long-term vision for the performance of new housing in a holistic way.

b) “Tracking and tracing” products and the “digital golden thread”

In line with the Hackitt Review findings⁹, the supply chain should be fully incentivised by Government to “track and trace” the actual products used throughout a build process – including the insulation - and record the installation process in some detail. Full digital records about the products should be kept, plus evidence that they match those design details specified in the design, and that the installation was done in accordance with the design, relevant good practice guidance, and any test certificates. Having stored key product information it should be easy to answer questions like:

- What type of insulation is in the walls, roof and floors?
- Was it installed to the correct thickness?
- Do the detailed design stage calculations suggest the insulation should deliver the thermal performance required?
- Is there any insulation missing?
- What is the Euroclass fire safety classification of the insulation?
- What is its expected acoustic performance?

c) Verifying actual performance

As discussed, if home buyers are to get a resilient home, then eventually policy and regulation will have to require that building performance is officially checked, on site.

⁶ See <https://www.tcpa.org.uk/healthy-homes-act>

⁷ See <https://healthyhomesbuildings.org.uk/>

⁸ See <https://www.ukgbc.org/wp-content/uploads/2018/04/Healthy-Housebuilding.pdf>

⁹ See <https://www.gov.uk/government/collections/independent-review-of-building-regulations-and-fire-safety-hackitt-review>



With blood pressure, for example, it's important to get it measured because it can be difficult to tell if something is wrong without the test. The same is true for housing. The benefits of such checks for home buyers are obvious, but such a change also has the potential to be beneficial for the construction sector, if implemented with the proper financial and technical support. Investing in methods and processes to help demonstrate that housing schemes perform as intended should have excellent reputational benefits, especially with regards to energy efficiency as the energy performance of new builds is a particular selling point. It should also mean more satisfied customers and reduced complaints.

WHY CLOSING THE “PERFORMANCE GAP” MATTERS

The UKGBC recently made the point that *“new homes should perform as intended to, yet in reality we know this is not the case at present. Although the issue is often highlighted by disparities in energy and carbon performance, this is a crosscutting problem which equally applies to other sustainability issues – not least those relating to occupant health and wellbeing, such as overheating and indoor air quality.”*¹⁰

With regard to energy performance specifically, there is a substantial body of evidence from the Zero Carbon Hub, Innovate UK, Leeds Beckett University, UCL, Oxford Brookes University, and the Building Performance Network demonstrating the existence of “performance gaps” between the designed energy and carbon performance of new housing and the as-built or in-use performance. The severity of the problem differs between schemes, with some homes performing extremely well in practice, but it is not uncommon to find the actual heat loss from buildings to be 20% to 50% worse than the design value.¹¹

The climate emergency demands that the carbon savings expected from the Future Homes Standard – potentially a huge 80% saving compared to 2013 standards - must be realised in reality, and not only in models.

A simplistic calculation shows that if a new house is predicted to require around 5,000 kWh of energy per year to heat it, but the actual heating demand (in use) is 20% higher, then around 1,000 kWh of unexpected energy would be needed for heating each year. If this happens in 90% of 300,000 the new homes completed annually, not only would people's fuel bills be higher than expected, but it could result in 270 GWh of unplanned energy demand.¹² The grid would have to deal with substantially higher loads than expected and unnecessary expenditure on grid maintenance and capacity.

LINKING IMPROVED STANDARDS IN 2025 AND QUALITY CONTROL

There are a growing number of impressive, high performing energy efficient homes being constructed. This includes many Passivhaus projects such as Preston Springs, Silken Park and Denby Dale, which all have mineral wool insulation installed.

For such projects there is typically a laser-sharp focus on getting the (often non-typical) design details exactly right on site, and checking the home's performance from inception to completion, and frequently after handover too. The result is that the homes are much more

¹⁰ See <https://www.ukgbc.org/news/home-truths-green-building-expectations-are-changing-and-businesses-are-responding/>

¹¹ See, for example <https://www.sciencedirect.com/science/article/pii/S0306261918304343>

¹² 5,000 kWh is roughly the heating demand of a 84m² semi-detached house built to the current 2013 Target Fabric Energy Efficiency standard in Approved Document Part L. It is provided for illustrative purposes. Obviously not all future homes will be semi-detached. Detached houses and flats would have a higher or lower annual heating demand.



likely to function in line with their design performance compared to more typical housing delivery models.

Similarly, if substantially tougher minimum energy efficiency standards are set from 2025 it will be more important than ever to guard against the potential for build issues and errors. Small problems can have significant unintended consequences. For example, thermal bridges account for 20% to 30% of the heat loss in a typical new build home, and as the fabric becomes more efficient and airtight, the impact of thermal bridges becomes greater.

Quality control and up-skilling are hugely important areas that require major improvement before very stringent fabric standards become the norm. With this in mind, we recommend that from 2021 the Government puts in place a programme to officially incentivise, recognise and reward construction teams and their supply chains who “shoot for the moon”: delivering early on the proposed 2025 carbon reduction level, in a small proportion of their new schemes, including trialling the types of performance verification and quality control techniques mentioned above.

WIDESPREAD SUPPORT FOR CHANGE

A substantial number of experts and organisations support the types of ideas covered in this paper, including the Committee on Climate Change who re-emphasised in February 2019 the vital importance of focusing on the real performance of new buildings, recommending major changes to current policy and legal frameworks to create a step change in quality and to be able to give consumers assurances that their homes are performing as intended. They called for an “*overhaul of the compliance and enforcement framework so that it is outcomes-based (focussing on performance of homes once built), places risk with those able to control it, and provides transparent information and a clear audit trail, with effective oversight and sanctions...*”.¹³

The recent BEIS Parliamentary Committee report on energy efficiency agrees: “*It is not sufficient for Building Regulations to delineate what builders should do, without any robust procedures that require builders to prove what they have done, their quality control processes and to test whether the dwelling performs to the standard required*”.¹⁴

Other organisations outside the sector are also helping us to think in a more joined up way. For instance, the Fire Protection Association recently called for a “code for resilient homes” which would, amongst other things, rate the ignitability of building materials and the potential for smoke toxicity at the design stage, and combine this with a mechanism to ensure no product substitution occurs during the build phase. This would complement new changes to Building Regulations on fire safety.

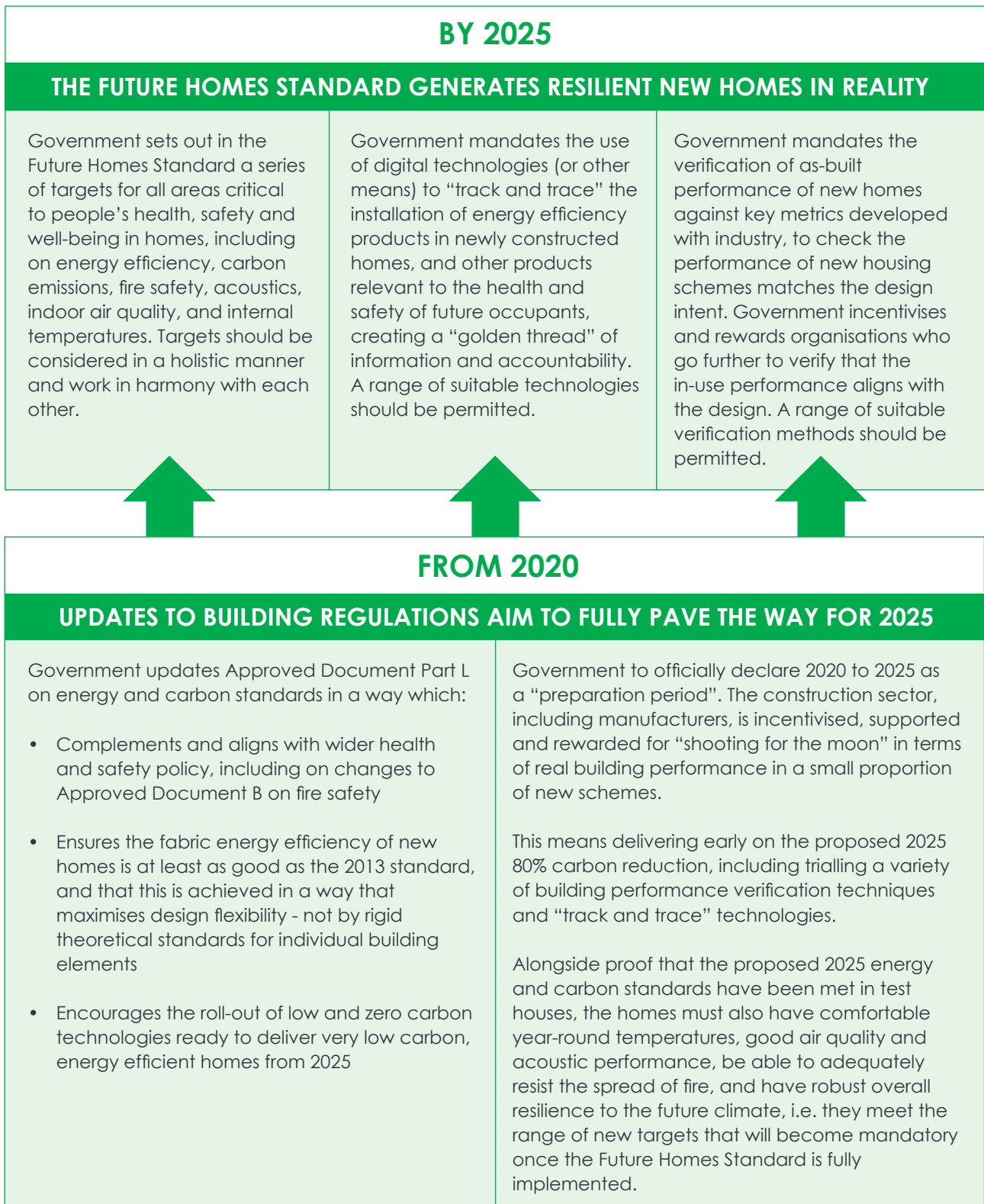
¹³ See <https://www.theccc.org.uk/publication/uk-housing-fit-for-the-future/>

¹⁴ See <https://publications.parliament.uk/pa/cm201719/cmselect/cmbeis/1730/1730.pdf>



KEY RECOMMENDATIONS

The 2025 Future Homes Standard provides a well-timed and high-profile means to bring the vital policy objectives discussed in this paper together to consistently deliver resilient homes. The policy in 2020 should start the ball rolling, and MIMA intends to fully engage in the process.





ANNEX

VERIFYING ACTUAL PERFORMANCE – ARE WE READY?

The verification of actual building performance is of course dependent on having suitable metrics, tools and technologies, and the ability to use them at scale.

The co-heating test has been used extensively in a research context for building performance evaluation, but more widespread use has been limited for practical reasons.

We suggest that a review of building performance techniques and tools is therefore needed, with the “State of the Nation” research currently being carried out by the Building Performance Network providing a good baseline to start from.¹⁵

Initiatives such as SMETER, the Government’s programme to “invest up to £5 million to develop, test and demonstrate technologies that measure the thermal performance of homes using smart meter and other data” also show promise.¹⁶

Future methods and tools will of course need to be sufficiently reliable and forensic to accurately identify the cause of any potential shortfalls in performance. Otherwise, there is a risk that energy efficiency measures may incorrectly be seen as under-performing when in fact shortfalls are due to other causes. We must also let the industry find and trial their own solutions. Requirements must not be overly prescriptive in terms of what quality control or monitoring regimes are used, leaving room for advances over time.

Regulation must now provide a strong imperative to bring forward such evaluation tools. With the right policy signals and support to drive further investment and research, there is every reason to be confident that a regime based on actual performance could be achieved at scale from 2025.

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¹⁵ See <https://building-performance.network/research/state-of-the-nation-domestic-buildings>

¹⁶ See <https://www.gov.uk/guidance/smart-meter-enabled-thermal-efficiency-ratings-smeter-innovation-programme>