



Halving Energy Use of New Homes

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FOREWORD



Sir David Attenborough warns us that “climate change could bring about the collapse of our civilisations and extinction of much of the natural world.”

Carbon emissions have risen sharply across the world - by 2.7% last year. The Paris conference agreed to limit global warming to 1.5°C by 2050 but at this rate we could reach 3°C by that date.



Lord Best, President of the Sustainable Energy Association

The UK is taking this issue seriously and giving a lead in the global effort to combat man-made climate change. The Government's industrial strategy includes a Grand Challenge on Clean Growth, to halve energy use in new buildings by 2030. This Sustainable Energy Association report – which notes that 40% of the UK's overall carbon footprint is contributed by the built environment – provides vital information on how the Government its objectives.

Fortunately, the relevant part of the Building Regulations (Part L) is being reviewed. So, this is the ideal moment to support Government in achieving its objectives by placing the necessary obligations on the UK's

housebuilders. We cannot expect voluntary action to achieve the desired results, so the compulsion of Building Regulations is the necessary route toward a Zero Carbon Scenario for the new homes of tomorrow.

This important report also backs the introduction of a New Homes Ombudsman which should raise standards, including of energy efficiency. It shows how the current "performance gap" can be closed and it advocates a tax stimulus – varying the level of stamp duty on new homes according to their energy performance – to drive consumer demand for energy efficient homes.

With sincere thanks to all at the Sustainable Energy Association for their perceptive analysis and hard work, I commend this timely contribution to the wider debate.



About the Sustainable Energy Association

In a world of finite resources, the Sustainable Energy Association exists to help create living and working spaces fit for future generations. Our work seeks to align the interests of business, politicians and consumers to make this a reality. We are industry leaders in energy in buildings. We are technology agnostic and provide objective, evidence-based policy positions which help shape how we think about, generate and use energy. We are constructive, collaborative and committed to achieving our vision, by ensuring that buildings are energy efficient, low carbon and warm.

The Sustainable Energy Association (SEA) is a member-based industry body. We draw on our wide-ranging membership from manufacturers of energy saving technologies and heating systems to housing associations with an interest in sustainable energy. SEA member's manufacture, distribute, install, retail or regulate a range of technologies, they also own and manage homes and supply energy. We take an objective 'whole building, technology agnostic approach' that recognises that there is no single solution to the energy challenges faced by the UK.

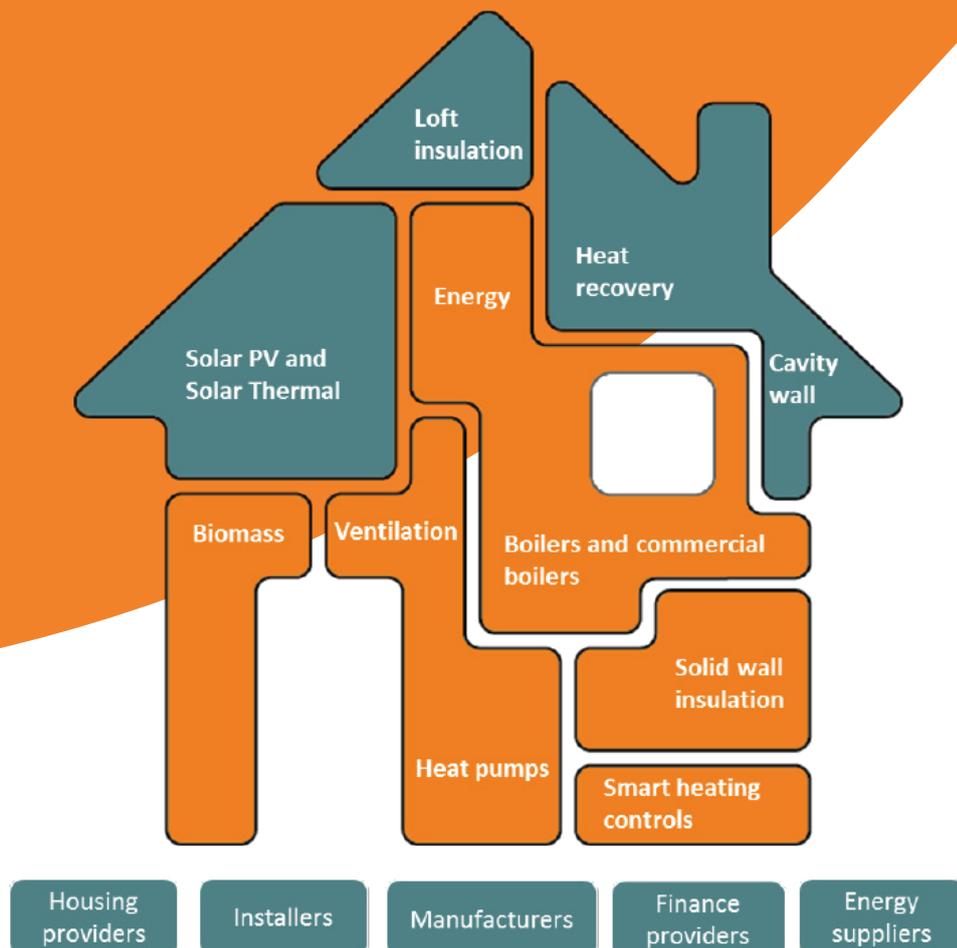




Table of contents

Foreword.....	3
About the Sustainable Energy Association.....	4
Executive Summary.....	7
Building Quality Homes, Halving Energy Use.....	8
Halving Energy Use.....	11
Buildings to Current Standards.....	19
Closing the Performance Gap.....	23
Future Proofed, Higher Standard Homes.....	27
Stimulating the Market.....	33
Conclusion.....	42
Summary of Recommendations.....	44
Appendix.....	46

Executive Summary

Building quality homes: halving energy use

With climate change high on the political agenda throughout the world, the UK government is committed to meeting its legal obligations to reduce carbon emissions dramatically by 2050.

The built environment contributes 40% of this country's overall carbon footprint. And, based on current standards, reaching the government target of an extra 300,000 homes every year will worsen carbon emissions.

This means the tackling of energy use in new homes is a vital ingredient in cutting emissions and achieving our international obligations.

At the same time, energy saving measures raise living standards, in particular addressing the misery caused by fuel poverty.

To this end government has set itself the target of halving energy use for new buildings by 2030 and this SEA report spells out how this can be achieved.

Reforming Building Regulations

1. The relevant part of the Building Regulations (Part L) sets the standards for new homes and is shortly to be reviewed: this provides the crucial window of opportunity to require Zero Carbon Compliance which would take us close to achieving the halving of energy consumption in new buildings. Further consideration will be needed following the development of a Net Zero Carbon Building definition for 2030.
2. Bearing in mind the substantial numbers of homes for which planning consent has already been granted but no construction has been started, the changes to Building Regulations should not apply only to developments that are yet to receive planning permission. To ensure historic, lower standards are not perpetuated in years to come, all homes built after new Building Regulations are approved should be covered.

New Homes Ombudsman

3. SEA supports the introduction of a New Homes Ombudsman – as promised by government in 2018 – to help homebuyers obtain redress where housebuilders fail them. This should help raise standards, including of energy efficiency.

Closing the Performance Gap

4. The current performance gap between estimated and actual energy usage needs to be closed by focusing on the outcome when new homes are built, not on their initial specification. The Energy Performance Certificate (EPC) should in future reflect the buildings actual performance. This would ensure that what is specified is actually installed and any cost-saving changes to building design are reflected in the EPC.
5. To assist in closing the performance gap, all new build properties should come with detailed information about the products installed, guarantees and maintenance information. A property inspection should be carried out after completion to ensure compliance with the energy performance promised at the outset.

Stimulating Consumer Demand

6. Demand from consumers for energy efficient homes should be stimulated by policy drivers and fiscal mechanisms. In particular these should include varying the level of Stamp Duty on new home purchase according to its energy performance.
7. The subsidies that support home buyers - the government's various Help to Buy and Lifetime ISA schemes - should be conditional on the homes achieving high standards of energy efficiency.

Public Sector Leading the Way

8. Public sector developments and social housing should lead the way for adopting higher standards and following best practice in procurement.





Building Quality Homes, Halving Energy Use

We need more homes to keep up with population growth and to achieve the UK Government target of building 300,000 new homes a year by the mid-2020s. However, we need to ensure these homes are 'quality' homes. The quality of new build homes is a major concern. Quality is ultimately linked to affordability and running costs for the consumer. Affordability is often considered by consumers and by finance providers as the cost of purchasing or renting a house; its running costs are ignored. This needs to be addressed otherwise people will not be able to afford to live in the homes that are being built.

The number of people renting has more than doubled over the last 20 years with 65% of 16-24 year olds living in private rented accommodation. The National Housing Federation recommends that a home is affordable to rent if less than 30% of household income is spent on rent. A gross annual income of £24,800 would therefore be needed to rent an average one-bedroom flat in England in order for it to be 'affordable'¹. With affordability being a major area for concern, it is important that the affordability of living in and running the property is also considered. As such, more efficient homes with lower running costs should be developed.

¹ BBC (2018) Where does rent hit young people the hardest in Britain <https://www.bbc.co.uk/news/business-45559456>



With affordability being a major area for concern, it is important that the affordability of living in and running the property is also considered.

Through the Climate Change Act, the UK Government has a legal commitment to reduce emissions by at least 80% of 1990 levels by 2050. With homes having a life of 100 years or more, the homes we build today need to be designed and built with this target in mind. Currently the built environment contributes to 40% of the UK's overall carbon footprint.² Around 80% of the homes we will live in in 2050 have already been built³.

Whilst this means a substantial proportion of the stock in 2050 already exists, we must not ignore the new homes which are adding to the problem. It is vitally important therefore that any new homes are built to better standards and reduce rather than increase emissions and climate change.

However, based on current standards of new housing stock carbon emissions will increase.

The dwellings we build now will be the homes for generations to come and without reform their legacy could be families unable to afford to heat their homes and increased emissions from the built sector contributing to climate change.

² UKGB, Climate Change, (2016) <https://www.ukgbc.org/climate-change/>

³ Friends of the Earth (2007) Home Truths https://friendsoftheearth.uk/sites/default/files/downloads/home_truths_summary.pdf



The Grand Challenge Building's Mission outlines the Government's pledge to halve the energy use of new buildings by 2030⁶.

Crucially this cannot be done without reform to new build housing.

Halving Energy Use

The Government's Industrial Strategy outlines⁴ Grand Challenges that the UK faces. Clean Growth is one of those challenges.

"Clean growth means growing our national income while cutting greenhouse gas emissions. Achieving clean growth, while ensuring an affordable energy supply for businesses and consumers, is at the heart of the UK's Industrial Strategy."⁵

It is important that the UK maximises the opportunities for regional and national industry and business that come from the global movement toward decarbonisation. The Grand Challenge Building's Mission outlines the Government's pledge to halve the energy use of new buildings by 2030⁶. By ensuring that new build housing is more energy efficient, we can deliver cost savings for consumers and ensure that the UK is at the forefront of innovative smart technology and leading international

efforts to reduce emissions. The New Build Mission is an opportunity to maximise economic growth, innovation in smart technology, and for the UK to become a global leader in modern methods of construction.

Crucially meeting the challenges of reducing carbon emissions cannot be met without reform to new build housing. By delivering energy efficient and future proofed homes we can achieve the Government's Mission, whilst providing quality homes that consumers will want to live in. The challenge is huge but so are the opportunities.

The high costs⁷ associated with energy retrofitting reveal that future proofing new build properties is a less intrusive and more cost-effective route to reducing carbon emissions.⁸

⁴ HM Government (2017), Industrial Strategy, Building a Britain Fit for the Future, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf

⁵ HM Government(2017) , The Clean Growth Strategy, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf

⁶ HM Government, Industrial Strategy, (2017) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf

⁷ Cambridge Econometrics, (2014). Building the Future: The economic and fiscal impacts of making homes energyefficient. <http://www.energybillrevolution.org/wp-content/uploads/2014/10/Building-the-Future-The-Economic-and-Fiscal-impacts-of-making-homes-energy-efficient.pdf>

⁸ Committee on climate Change (CCC), (2017). Meeting Carbon Budgets: Closing the policy gap, 2017 Report to Parliament. <https://www.theccc.org.uk/wp-content/uploads/2017/06/2017-Report-to-Parliament-Meeting-Carbon-Budgets-Closing-the-policy-gap.pdf>



Ensuring the 1 million houses the Government has promised to deliver have improved energy efficiency standards will avoid higher energy bills for consumers and circumvent making expensive improvements in the future^{9,10}.

The Building Regulations set the standards for new homes and will therefore play a significant role in determining whether the Mission to halve energy use is achieved and what the legacy of these new homes will be. The review of Part L of the Building Regulations in 2019 provides a small but crucial window of opportunity to ensure that the legacy is one of quality homes with reduced energy and emissions.

Figure 1 illustrates that the current building energy efficiency standard for new dwellings in England (Part L1A 2013, Building Regulations¹¹) could be improved upon. The Standard Assessment Procedure (SAP) is the UK government's recommended method system for measuring the energy rating

of residential dwellings. The substantial effect of tightened standards on building emissions and costs can be seen in SAP modelling.

A notional semi-detached dwelling built to Part L 2013 saves £36 per year and 89.6 kg CO₂e in comparison to a notional building built to Part L 2010 standard.

Additional savings of £159 per year and 630 kg CO₂e above the Part L 2013 can be unlocked if the dwelling is built in compliance with Zero Carbon Hub (ZCH) Carbon Compliance Level¹². Over the course of 50 years, cumulatively this adds more than £7,900 and 31 tCO₂e per property.

⁹ DCLG, 2017. Housing White paper. Collection.

¹⁰ The Conservative and Unionist Party Manifesto 2017.

¹¹ The Building Regulations 2010. Conservation of fuel and power. Approved Document L1A. L1A Conservation of fuel and power in new dwellings. 2013 edition incorporating 2016 amendments - for use in England. Online version.

¹² Kingspan Insulation, (2017). Regulations: a forward-thinking framework for an energy efficient future <https://www.kingspan.com/group/downloads/kingspan-insulated-panels-sustainability-report-en>



Comparison of Building Standards and emissions



Figure 1. Annually emitted greenhouse gas emissions of a semi-detached/end-terrace property with respect to building compliance level (Source: SAP 2012, Kingspan)



To understand what standard should be set for new homes, the SEA has analysed four scenarios to determine the optimum strategy for reducing emissions from one million of the new properties promised by the Government¹³. The modelling uses a heat pump as an illustration for a low carbon heating technology. Scenarios modelled are:

- ✓ **Baseline scenario** – maintain current new building standards and install a condensing gas heating system, which is substituted by a new gas heating system in 10 and 20 years;
- ✓ **Retrofit** – maintain current new build standards and install a condensing gas heating system, which is substituted by a low carbon heating technology (e.g. an air source heat pump) in 10 years;
- ✓ **Zero Carbon** – improve standards to Zero Carbon Hub Compliance level¹⁴ and install a low carbon heating technology (e.g. an air source heat pump);
- ✓ **Passivhaus** – improve standards to near to Passivhaus standard and install a low carbon heating technology (e.g. an air source heat pump).

The Grand Challenge Mission focuses on a reduction in energy use, therefore the annual energy demand from a typical property and the associated energy reduction benefit of adopting the tighter standards was modelled.

The results show that the Zero Carbon Hub Compliance level comes close to achieving the Mission Challenge of halving of energy demand by 2030, reducing energy use by 45% compared to current building standards. The SEA recommends that by 2030 all new build homes are net zero carbon. This will go one step further than

the Zero Carbon Hub Compliance level to ensure that buildings are zero carbon in-use. A task group has been convened to develop an industry-led definition for net zero carbon buildings. The task group brings together over 30 experts from across the building value chain and is being supported by 12 leading industry bodies. The Sustainable Energy Association is a supporter of the group and recommends that the definition developed is considered and its associated benefits analysed.

¹³ DCLG & The Rt Hon Sajid Javid MP, (2017). New planning approach to speed up delivering homes Press Release, 14 September 2017. <https://www.gov.uk/government/news/new-planning-approach-to-speed-up-delivering-homes>

¹⁴ Zero Carbon Hub (2018) Carbon Compliance Target. <http://www.zerocarbonhub.org/zero-carbon-policy/carbon-compliance-target>



Unlocking even lower energy demand can be achieved by pursuing Passivhaus standards in new buildings. If Passivhaus is targeted, the building can yield a high level of occupant comfort and minimise the heating demand to ≤ 15 kWh/m² at the same time. A reduction in space heating demand of around 75% and an 80% decrease in carbon emissions could be achieved if homes were built to Passivhaus standard in comparison to standard practice for UK new build¹⁵.

With a reduction in energy demand, also comes a reduction in carbon emissions. The analysis considers the carbon emissions associated with building to the three scenarios compared to the baseline. The analysis assumes that around 1 million new homes will need to be built over the next 4 years and looks at the impact these homes could have on period between the fourth carbon budget and 2050.

If building standards are not improved, the total emissions over this period could be 35.22 MtCO₂e. Analysis results reveal that carbon emissions associated with building 1 million new homes over this period could be reduced by 54% under the Retrofit Scenario, 94% under the

Zero Carbon Scenario and 98% under the Passivhaus Scenario.

Integrating scenario costs and benefits together and using a NPV calculation shows that the Zero Carbon Scenario is very competitive against the baseline – delivering a similar net present value (NPV) whilst supporting energy and carbon emission reductions.

Whilst Passivhaus was less competitive on an NPV basis, it should be noted that the costs of meeting this higher standard are very likely to come down with scale and therefore our initial analysis should be treated as conservative. The detailed analysis is shown in the appendix.

Building to Zero Carbon Compliance (i.e. to zero carbon standards with renewable heating) takes us close to achieving the Government's Mission of halving energy use (45% reduction) and this is recommended as an important step towards achieving the Mission and our 2050 decarbonisation targets. The work by the industry task group in regard to a net zero carbon definition for 2030 will need to be considered to ensure that the homes we build today are future proofed for 2050.

¹⁵ BRE, (2017). The Passivhaus Standard. <http://passivhaustrust.org.uk/>



Stepped improvements to the energy demand of buildings in Denmark and France have encouraged builders to adhere to higher future standards even when they are not currently in place. In Denmark specifically, the maximum energy demand per year has been more than halved from 2010 to 2020¹⁶, from 52.5 kWh/m² to 20 kWh/m². Along with raised public education and enforcement via fines, this has helped to make Danish buildings more efficient whilst not compromising the country's build out rate – an average of approximately 14,000 new homes have been built every year since 2009, increasing to nearly 20,000 in 2017¹⁷, which is the level thought to be needed in the UK to combat demand and historic under-supply¹⁸.

It has been shown that raising standards within new build does not necessarily affect the build out rate of properties. Within the UK, Scotland has had higher Building Regulation standards (see Table 1) since 2010 yet the Scottish housing market has seen the most growth of any region at 4.8%. The success of Scotland shows that the pace of delivery can be unaffected by improvements to energy efficiency and raised standards within Building Regulations.

¹⁶ Energy Policy Toolkit on Energy Efficiency in New Buildings: Experiences from Denmark

¹⁷ Statistics Denmark

¹⁸ Fixing our broken housing market: A housing white paper. MHCLG. (2017). https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/590464/Fixing_our_broken_housing_market_-_print_ready_version.pdf



Table 1. Comparison of some aspects of Building Regulations in England and Wales, and Scotland.

Aspect of building	England and Wales ¹⁹	Scotland ²⁰
Wall, floor and roof U-values	0.18, 0.13, 0.13	0.17, 0.15, 0.11
Windows and roof light U-values	1.4	1.4
Thermal bridging	Reference values for each junction	0.08 x total exposed surface area
Opening area	Same as actual dwelling up to 25% floor area	25% floor area
Thermal mass	Medium	Same as actual dwelling
Air permeability (m ³ /hm ²)	5	7
Waste water heat recovery	None	2 units or 1 if floor area <100m ²

¹⁹ Building regulations standard for England and Wales L1A 2013

²⁰ Building regulations standard for Scotland Section 6 2015





Buildings to Current Standards

Adding to the concerns around the quality of our housing stock is the fact that buildings are not always built to current Building Regulations. Homes built today may be built to previous Building Regulation standards if planning permission has been held for some time. This is due to the delay between the granting of planning permission and site construction and means that consumers can purchase a house that has been built to lower than current standards. Consumers are unlikely to be aware of this and therefore are being short-changed as they believe they are buying properties that meet current standards.

This is the result of a loophole in the Town and Country Planning Act 1990 which states that works must commence²¹ within three years²² after full or outline planning permission has been granted²³. However, transitional arrangements exist to allow work to be completed in accordance with the energy efficiency standards (Part L of the Building Regulations) under which the planning permission and building work was commenced. This means that amendments to the Building Regulations do not apply to sites where work has

commenced before the improved standards were introduced.

Any work undertaken within 12 months of the implementation of new standards is also exempt from adhering to the new higher standards.

The transitional arrangements apply to the whole planning application which may include a significant number of properties across multiple sites. This means that all properties under the application will not be subject to the new standards if building works have commenced at one of the plots. There can be a significant time lag between planning permission being granted and homes being completed. This may lead to increased energy costs for consumers and higher emissions from buildings as homes can be built to a lower standard than the requirements stipulated in the Building Regulations at the point of completion.

It is recommended therefore that planning permission regulation is amended to ensure that any new changes to Building Regulations are adopted by housing developers.

²¹The following are considered by MHCLG to be classed as a commencement of work: excavation for strip or trench foundations or for pad footings; digging out and preparation of ground for raft foundations; vibro-floatation (stone columns) piling, boring for piles or pile driving; drainage work specific to the building (s) concerned.

²² Default period is 3 years for submission of reserved matters and an additional 2 years for implementation following final approval of the last of the reserved matters

²³ Section 91, Paragraph 27, Reference ID: 21a-027-20140306.



Empowering consumers

The quality of housing stock is a concern for consumers. The number of defects in new build homes is high and increasing. Shelter have said that more than half of consumers of new build properties have experienced faults, defects or problems, from construction being unfinished to faults with fittings and utility issues²⁴. The National New Home Customer Satisfaction Survey revealed in March 2018 that 99% of respondents had reported quality defects with their new build property to builders, an increase from 96% in 2016.²⁵ Moreover, 25% of respondents to the 2016/17 customer survey had reported over 16 incidents, faults and defects to their builders²⁶, showing that a substantial percentage of customers are experiencing numerous issues with their new build properties.

The New Homes Review found similar problems, revealing that 93% of buyers of new builds have experienced snags and defects when they first moved in, with only 29% of these issues reportedly resolved in a timely manner and 24% left unresolved²⁷.

The majority of consumers believe new homes are not built to a higher standard than old housing stock and would prefer to live in older dwellings. The APPG for Excellence in the Built Environment in its 2017 report *More Homes, Fewer Complaints*²⁸, highlighted the depth of the problem of consumer dissatisfaction with new build properties. This reveals that consumer satisfaction remains crucial in the issues surrounding new build housing stock and that improving awareness and empowering consumers to act on this dissatisfaction could have a significant impact on the way in which homes are built.

In addressing the quality of homes more needs to be done to empower consumers when buying new dwellings. Empowering consumers and raising awareness could help to foster an improved climate for homebuyers so they are more aware of what high-quality, energy efficient homes look like, and therefore they are more likely to expect and demand better quality dwellings. the quality is not as expected or initially advertised. dwellings. the quality is not as expected or initially advertised.

²⁴ Shelter, (2017) *New Civic Housebuilding*, https://england.shelter.org.uk/_data/assets/pdf_file/0005/1348223/2017_03_02_New_Civic_Housebuilding_Policy_Report.pdf

²⁵ National New Home Consumer Satisfaction Survey, (2018), https://www.hbf.co.uk/documents/7471/HBF_CSS_Brochure_2018v2.pdf

²⁶ National New Home Consumer Satisfaction Survey, (2018), https://www.hbf.co.uk/documents/7471/HBF_CSS_Brochure_2018v2.pdf

²⁷ The New Homes Review, <http://www.newhomesreview.com/>

²⁸ APPG for Excellence in the Built Environment, (2016) *More homes, fewer complaints*, <http://cic.org.uk/admin/resources/more-homes-fewer-complaints.pdf>



The Government announced in October 2018 that there will be a New Homes Ombudsman, a watchdog that will champion homebuyers, protect their interests and hold developers to account. It intends to legislate to require all new developers to belong to a New Homes Ombudsman. The SEA welcomes this development.

The SEA believes that all organisations that engage in building new housing properties should be required to sign up to the New Homes Ombudsman, with the Ombudsman given the authority to strike off housing companies that do not sign up. The ultimate ambition of developing such an initiative is to move the whole sector onto the path towards a zero-defects culture.

The Ombudsman should provide consumers with multiple avenues to report and seek resolution to snags and defects. To help drive up quality and improve transparency, the SEA advocates the development of a Home Defects App developed by the New Homes Ombudsman. This app would allow the new home owners the chance to arrange appointments to view the property before property completion and utilise its function to report any snags or defects

after purchase. The app could monitor the progress of the development and would give the option for the consumer to refer the problems to the Ombudsman if they are not properly addressed. It may also be advantageous for consumers to have additional avenues to rate the speed, efficacy and quality of the response from the builder. This would encourage housebuilders to raise standards and respond speedily to complaints.

Ensuring better redress for consumers that experience poor quality housing is significant in the pursuit of raising standards and empowering consumers. House buyers should be confident that when they purchase a new home, they get the quality of build and finish they expected and that the energy performance in-situ is as claimed.





Closing the Performance Gap

Not only do homes need to be specified to high standards of energy performance, but every home needs to be actually built and perform to those standards. The performance gap between estimated and actual energy usage needs to be closed. The Energy Performance Certificate (EPC) rating of a new build property is based on the property specification. If materials or products are substituted or poorly installed during the construction of a property, this can significantly reduce the performance of the home, however the EPC is not necessarily updated.

Improving the EPC and taking an output focused approach

It is important to ensure that the products specified during the design stage are actually those installed and that any changes to building design are reflected in the EPC. The EPC rating should be reflective of the building's actual performance and the specified solutions should be installed.

The current EPC is very basic, and we recommend that all new build properties should come with a more detailed information pack which includes information about the products installed, guarantees, and maintenance information.

During the construction of a property a significant amount of data is collected so the cost of developing such a pack is low. The information should be retained, and held securely, for future occupants and for use during property refurbishments.

Analysis of energy demand is currently based on modelled energy demand, but this can diverge from actual energy use. The SEA advocates a move away from assessing modelled energy use in isolation towards a building performance standard that guarantees reduced energy usage through improved energy efficiency, better controls, improved workmanship and higher quality homes.

Introducing energy performance guarantees for new homes will additionally increase quality, as house builders will be held to account in regard to the energy efficiency of the property.

It is recommended that the Building Regulations adopt an outcome focused approach. By doing so, it is hoped that developers will be encouraged to consider a range of heating solutions and energy saving measures.

A kWh/m²/year metric should be introduced which refers to the actual energy demand of a property to ensure that homes deliver the energy savings expected at design stage. A kWh/m² metric is currently used in Toronto's zero emissions building framework²⁹, in some countries across Europe and within the Passivhaus Standards. The metric provides a consistent measurement at each stage of the process of design and crucially at operation, allowing identification of the most rewarding approach. The Building Regulations review should consider using an outcome based yet prescriptive approach as seen in Austria, Belgium and Denmark (as well as kWh/m²/year metric), which has resulted in these countries having the highest standards without compromising on their build out rate as specific methods and technologies are detailed in regulations.

This approach would encourage developers to lower energy demand through the deployment of the most cost-effective, high quality measures, ensure that they are installed correctly and guarantee that they will perform as predicted.

It is also recommended that rigorous inspection is carried out post build to ensure that homes have been built to the specification.



²⁹ The City of Toronto (2017), Zero Emissions Building Frameworks, <https://www.toronto.ca/wp-content/uploads/2017/11/9875-Zero-Emissions-Buildings-Framework-Report.pdf>

³⁰ Dame Judith Hackitt, (2018) Building a Safer Future, Independent Review of Building Regulations and Fire Safety: Final Report, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/707785/Building_a_Safer_Future_-_web.pdf

Improving Product Traceability

The quality of materials and products that are used is important in creating good quality homes that meet expectations of customers. The report by Dame Judith Hackitt³⁰ revealed challenges surrounding the identification of materials and products once delivered to construction site. Difficulty ensuring that the right materials and products are being used in the build project can be exacerbated due to products and materials being unidentifiable or untraceable to manufacturing origin. It is also important to ensure that the products specified are actually those installed. The lack of traceability makes product recall or accountability difficult if the materials have been tampered with or do not meet original specification. As product defect or quality reduction is increased.

Additional use of technology to enhance standards and the quality of new builds can come from accelerating reform to product traceability. Product traceability in the built environment sector is significantly underdeveloped comparative to other industries. Under the proposed new regulatory framework by the Hackitt Review, there is the expectation that all new high-risk residential buildings (HRRBs) trace all construction products used in the new builds, similar to the traceability process in the manufacturing of a car. Enabling a more effective recall system for products that do not match original specification or have been tampered with will come from more consistent batch numbering on the product and utilising technology to monitor traceability.

³⁰Dame Judith Hackitt, (2018) Building a Safer Future, Independent Review of Building Regulations and Fire Safety: Final Report, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/707785/Building_a_Safer_Future_-_web.pdf





Future Proofed, Higher Standard Homes

Building to Zero Carbon Compliance (i.e. to zero carbon standards with renewable heating) takes us close to achieving the Government's Mission of halving energy use and this is recommended as an important step towards achieving the Mission. However, to achieve the Mission some buildings will need to have higher standards.

It is suggested that public sector projects lead by following best practice in government procurement, demonstrating the benefits to private industry. This approach was taken by Brussels, where all new public buildings were required to submit to passive standard by 2010. Today, all new construction has a target of net zero energy³¹ and Belgium is considered to have one of the highest property and energy performance standards in Europe.

Given the current higher costs associated with building to Passivhaus standards, achieving economies of scale is key. This could be delivered via local authorities, combined authorities and devolved administrations utilising newly confirmed powers³² to diverge on housing standards by encouraging greater standards in their regions. The Government has released a revised National Policy Framework (NPPF)

and confirmed that local authorities can set higher energy requirements than those currently contained within Part L of the Building Regulations.

As outlined by the Government in the Clean Growth Strategy,³³ "Moving to a productive low carbon economy cannot be achieved by central government alone; it is a shared responsibility across the country. Local areas are best placed to drive emission reductions through their unique position of managing policy on land and buildings."

New housing stock that is delivered through the local authorities procurement process can be a catalyst for higher standards, requiring local authorities to demonstrate efficient best practice. Housing Associations also have a vital part to play in this process. As a supplier and buyer of housing stock, Housing Associations have a vested interest in the long term that comes as a result of having a substantial relationship with the immediate community. It is therefore likely they will want to go above and beyond the minimum standards.

³¹ Housing Europe - The State of Housing in the EU 2015, A Housing Europe Review - Belgium

³² UKGB, Government Confirms Local Authorities can set energy standards beyond Part L in NPPF, (2015): <https://www.ukgbc.org/news/government-confirms-local-authorities-can-set-energy-standards-beyond-part-l-in-nppf/>

³³ HM Government, (2017) Clean Growth Strategy, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf



Building above the minimum standards has significant benefits locally as well as nationally. A potential benefit of local authorities going above and beyond is the opportunity to increase demand and create jobs locally which ultimately reduces the costs associated with building to a higher standard³⁴, and make homes more affordable for local people. Reducing energy demand in a local area can provide benefits to the grid by limiting the strain on the local energy systems and reducing the need for additional energy generation capacity nationally.

Future proofing for a changing energy system

New homes are likely to be around for the next 100 years and this means they will need to be able to adapt to social, technological, economic, environmental and regulatory changes over their lifetimes. Consideration for these potential future changes will help to enhance the lifetime of the property and reduce costs for consumers. A building design that cannot respond to future changes is vulnerable to becoming obsolete and redundant if adapting to change is too costly.

It is recommended that house builders are encouraged to reduce the need for incremental changes over the property's lifetime by future proofing homes to enable them to adapt to and incorporate innovation or changing environmental conditions.

Homes must be functional, responsive and be able to support the transition to a smarter, low carbon future. It is not just our energy systems that will need to change over the next 30 years in order to meet climate change targets. The way we interact with our energy and how we purchase products will also change. Our housing stock will therefore need to embrace innovation and smart technology if it is to be resilient to change and adapt to future demands. The introduction of smart meters can be a catalyst for change and stimulate further technological advancements and give greater control to the consumer.

³⁴ KPMG (2016), Smart Construction, How offsite manufacturing can transform our industry, <https://assets.kpmg.com/content/dam/kpmg/pdf/2016/04/smart-construction-report-2016.pdf>



A smart and responsive energy future can deliver substantial advantages to consumers, the energy grid system and deliver job creation and economic growth. A study conducted by the Government estimates that the financial benefits of a smart energy system could be up to £40bn by 2050.³⁵

These financial advantages are yielded from avoided or deferred network reinforcements, reduced generation build, and better operation of the network grid system.³⁶

The Government aims for every home and business to have been offered a smart meter by 2020. Currently over 11 million meters are being utilised by consumers.³⁷ Consumers value the benefits of smart meters with 8 out of 10 utilising one saying they would recommend them to friends and family.³⁸

New build properties that are equipped with connected devices, appliances and sensors that can communicate with each other, will provide consumers with the flexibility to monitor consumption and adapt lifestyles to save money on energy bills.

In addition to the energy saving benefit for the consumer, smart meters are important in the move towards a smarter, responsive and flexible energy system and they are key to enabling domestic Demand Side Response (DSR).

Smart meters can record how much electricity is consumed in each half hour period and permit two way communication, therefore facilitating many aspects of DSR, such as the communication between smart appliances.

As the energy system develops smart appliances, such as smart washing machines, dishwashers and heat pumps could respond to instructions from smart meters reflecting new pricing signals, such as time of use tariffs, to use energy at periods when it is at its cheapest. This would empower consumers to play a greater role in their energy consumption, with the incentive of reducing energy bills.

It is recommended that all new homes are fitted with smart meters and that homes are designed to incorporate smart technologies. The building of a new house is the optimum time to install energy efficiency, low carbon heating systems, solar, and smart meters and technologies.

³⁵ Carbon Trust, Imperial College London, (2016) An analysis of Electricity System flexibility for Great Britain, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/568982/An_analysis_of_electricity_flexibility_for_Great_Britain.pdf

³⁶ UK Power Networks (2014), DNO Guide to Future Smart Management of Distribution Networks Summary Report, <http://innovation.ukpowernetworks.co.uk/innovation/asset/e0cba234-fd81-4eb1-9f44-2ec58840111A/LCL+Learning+Report+-+SR+-+Summary+Report+-+DNO+Guide+to+Future+Smart+Management+of+Distribution+Networks.pdf>

³⁷ BEIS, Smart Meters (2018): A Guide, January 2018: <https://www.gov.uk/guidance/smart-meters-how-they-work>

³⁸ Smart Energy GB (2017), Smart Energy Rollout Report, <https://www.SmartEnergyGBAnnualReportandaccountsforearended31stDecember2017.pdf>

The majority of consumers are supportive of the introduction of smart technology with 59% of consumers welcome technology in their home as it saves time and effort³⁹ with the substantial majority valuing the benefits of a smart home including its capacity for remote controlling.⁴⁰ With the ownership of smart devices doubling in the past two years and consumers expected to spend over £10.8bn on smart devices in 2019⁴¹ there is a burgeoning trend where consumers are increasingly seeking smart technology in the home. Builders therefore would benefit from developing properties that incorporate and maximise the benefits of this trend toward smarter and better-connected homes. Builders need to build homes fit for the future and a key part of this is building homes with low carbon emissions and low running costs.

Future proofing homes goes beyond resilience to energy-intensive retrofitting by being able to meet occupants and consumer's changing behaviours. The SEA supports the launch of the Government's

national design competition which aims to engage the public and businesses around an affordable and scalable vision for the home of 2030 that is higher quality, more energy efficient, and that also supports people, whatever their age and need, to live healthy and independent lives. The Government could use the winning design as a best practice standard that could be rolled out via public sector developments and social housing projects. It would be useful to compare submissions to the competition against the Net Zero Carbon definition that is being developed by an industry task group.



³⁹ Deloitte (2016), Switch on the Connected Home, The Deloitte Consumer Review, <https://www2.deloitte.com/content/dam/Deloitte/uk/Documents/consumer-business/deloitte-uk-consumer-review-16.pdf>

⁴⁰ PWC, Connected Home 2.0, <https://www.pwc.co.uk/industries/power-utilities/insights/energy2020/connected-home.html>

⁴¹ PWC, Connected Home 2.0, <https://www.pwc.co.uk/industries/power-utilities/insights/energy2020/connected-home.html>





Stimulating the Market

Empowering consumers and raising awareness could help to foster an improved climate for homebuyers so they are more aware of what high-quality, energy efficient homes look like, and therefore they are more likely to expect and demand better quality dwellings. Crucial to this, is empowering the consumer to seek better redress if the quality is not as expected or initially advertised.

In addition to empowering consumer rights, further policies could be adopted which would drive up demand for higher performing housing. This will not only stimulate the housing market and provide a multitude of benefits to consumers including reduced health problems and improved productivity, it will also encourage small business to flourish, enable successful private investment and crucially improve the economic growth and productivity of the UK economy as a whole.

It has been noted by the independent Off-site Housing Review that 'housebuilders often claim that there is no consumer demand for improved levels of quality (including energy efficiency) and that as the price of new homes for sale is in the main set by the assessed value of adjacent and comparable homes so there is unlikely

to be any uplift in the value of new better-quality homes versus other properties.⁴² However, as noted previously, the importance of energy efficiency is beginning to increase in priority for some house buyers.⁴³

Increasing awareness of energy efficiency by incorporating it into the buying decision-making process is key to changing the way consumers think about homes.

It not only impacts buyer behaviour, it has the ability to help to shape a market for energy efficiency retrofit as more efficient homes are likely to command a higher market rate.

Four avenues that could be perused to help facilitate consumer behaviour to enable greater demand for more energy efficient housing are considered below. The policies proposed will widely advertise the benefits of purchasing high performing homes and help to ensure that the value of energy performance is reflected in property values. They will also help to facilitate consumer led demand and encourage builders to strive for higher performance standards.

⁴² Construction Industry Council (2013), Offsite Housing Review, <http://cic.org.uk/publications/>

⁴³ NHBC (2018) Beyond location, location, location <https://www.nhbcfoundation.org/publication/beyond-location-location-location-priorities-of-new-home-buyers/>



Increasing awareness and salience of EPCs

Some of the policies to encourage energy efficiency will be dependent on reliable EPCs. The EPC has evolved significantly since its conception. Initially, it was an 'asset rating' metric, designed to serve as an indicator of the cost of running a home. It has since grown to become a central point in policy making, underpinning mechanisms such as the Renewable Heat Incentive, Feed in Tariffs and the Energy Company Obligation and being used to set property performance targets. The SEA supports the use of EPCs in these applications, however there is an opportunity to improve the salience, quality and usefulness of EPCs to drive consumer behaviour, influence purchasing decisions and encourage the deployment of energy efficient and low carbon solutions.

Currently, EPCs do not have a significant impact on property purchases or renting decisions. They are not highly visible to prospective buyers and are not easily accessible. For most people, property characteristics such as number of bedrooms/bathrooms, proximity to a school, local amenities are much more likely to influence a decision to a greater

extent than the energy performance. However, increasing visibility and coverage and providing an incentive or requirement for consumers to take note of the EPC rating during the house buying process may help to increase the importance placed on performance.

It is recommended that a requirement for EPCs to be more visible on price comparison or property search websites is introduced in order to increase consumer awareness and make them more of a contributing factor for prospective buyers and tenants when determining which property to rent or buy. This would consequently provide an incentive for housing developers to build to higher standards and promote more efficient homes.

It is essential that EPCs are up to date when they are being used to inform decisions related to the provision of finance or the purchase of a property. EPCs should enable consumers to make more informed decisions and place financial value on higher performance – to do this effectively, they must be reliable and accurate, and data must be accessible to prospective buyers.



The current EPC is very basic, and we recommend that all new build properties should come with a more detailed information pack which includes information about the products installed, guarantees, and maintenance information. During the construction of a property a significant amount of data is collected so the cost of developing such a pack is low. The information should be retained, and held securely, for future occupants and for use during property refurbishments.

In addition to increasing the salience of EPCs and ensuring that they reflect the products and measures installed, it is also important that property energy use is made more visible throughout the lifetime of the property. The SEA is a supporter of the London Energy Transformation Initiative which proposes a complementary recommendation for all new buildings to disclose their in-use energy data. Adding a 'be seen' element to the heat hierarchy will help to ensure compliance with Building Regulations, reduce the performance gap and encourage owners to adopt energy saving measures. This proposal will help to increase awareness of energy usage and could drive consumer demand for more efficient properties.

Creating a fixed link between stamp duty and energy performance

The SEA has long advocated varying Stamp Duty paid during the purchase of a house according to the energy efficiency rating of a house.⁴⁴ Doing so could act as a powerful incentive for homebuyers of new properties to purchase more energy efficient dwellings thus creating a market pull for higher performing homes.

Stamp Duty is applied to those properties that exceed £125k in all regions of the UK except Scotland, with a similar Land and Buildings Transaction Tax (LBTT) applicable in Scotland on properties exceeding £145k.⁴⁵ As the marginal rate is based on the value of the home and varies between 2%-12%, this could be adapted to vary in accordance to the properties SAP score, which underpins the EPC rating.

⁴⁴ Sustainable Energy Association, Energy Efficiency (2017) – A Policy Pathway, Addressing the Able to Pay Sector https://www.sustainableenergyassociation.com/wp-content/uploads/2017/03/SEA_Energy-Efficiency-A-Policy-Pathway_Final.pdf

⁴⁵ Broodies LLP, (2015) Land and Building Transactions Tax Return, https://broodies.com/sites/default/files/land_and_buildings_transaction_tax_0.pdf

In our paper Energy Efficiency - A Policy Pathway, we outline how Stamp Duty flexing could be introduced. The paper models a scenario in which Stamp Duty is flexed based on the change in SAP score from a target score. The target used for this scenario is EPC Band C (RdSAP score of 75) with the Stamp Duty being flexed around this point. This target was used to reflect the SEA's campaign to bring all

homes up to EPC Band C by 2035. For each percentage improvement in SAP score the Stamp Duty was adjusted by 1%. More than 8 out of 10 new builds are rated EPC A or B. This means that if a target SAP score of 75 was introduced, there may be an increased demand for higher performing new build properties.

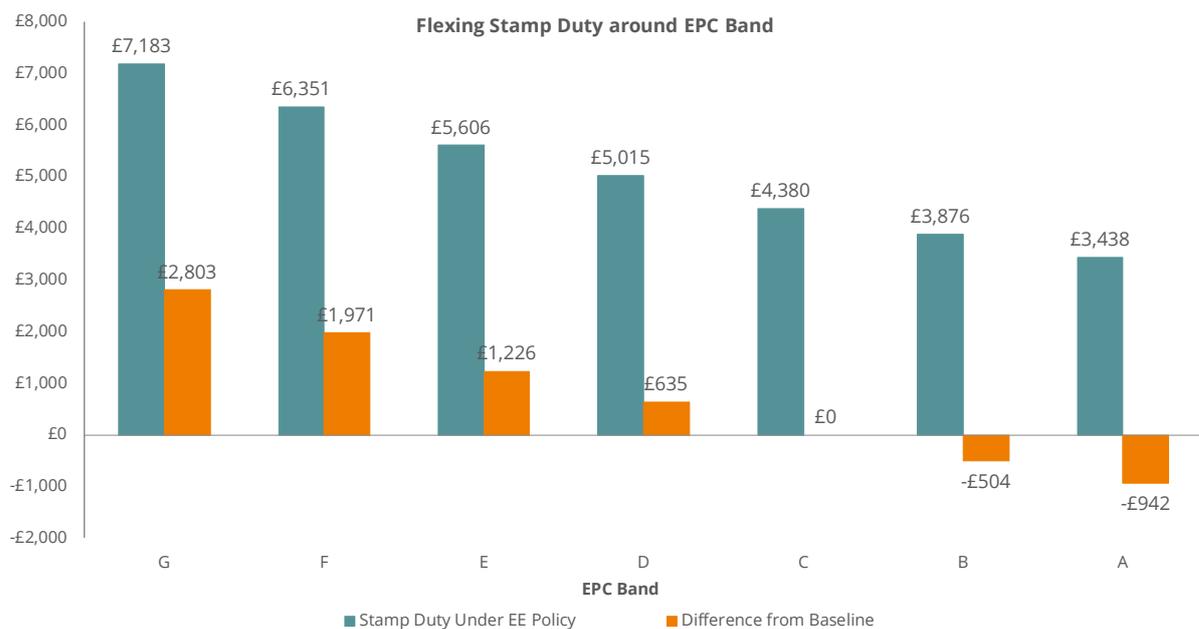


Figure 2 - Flexible Stamp Duty - adjustment by 1% per unit change in SAP



In the above scenario, the policy is not revenue neutral given the target EPC score is above the mid-point of the EPC scale for all homes. The overnment will receive additional revenue as a result of this policy⁴⁶ and this should be spent on providing funding or assistance to encourage the uptake of energy efficiency measures in existing homes.

This policy would lead to an uptake in energy efficiency measures in new builds as housebuilders would have an additional incentive to undertake this work due to the increased demand for higher performing homes. A home that attracts lower Stamp Duty would be a much more attractive proposition for buyers. Frontier Economics⁴⁷ have also stated that because Stamp Duty is a well-known tax, any adaption to it would be widely known, and foster a cultural shift in home purchasing where energy efficiency is considered a significant variable in the purchase of a new home.

However, it is important to note that Stamp Duty does not apply to all properties. For example, first time buyers purchasing a property worth up to £500,000 in England and Northern Ireland are not required to

pay Stamp Duty on the first £300,000 and will only pay 5% on any proportion between £300,000 and £500,000. This means that for properties worth £300,000 or less and aimed at the first time buyer market, this policy incentive will not apply. It is therefore necessary to target other financial trigger points to ensure a widespread culture shift towards a preference for higher performing homes. Two potential trigger points, mortgages and Help to Buy / Lifetime ISAs, are discussed below.

Encouraging lenders to offer energy efficient mortgages

An extension and complimentary policy to variable Stamp Duty would be reforming the mortgage products that are available to consumers in order to stimulate and finance larger investments in the energy efficiency of households, referred to as Green Mortgages. Currently lenders are required to undertake an in-depth assessment of the income and expenditure of all applicants including their utility bills. The Mortgage Market Review (MMR) legislation that governs this process is not specific about how it should assess the cost of utilities in reference to the mortgage granted.

⁴⁶ HM Revenue & Customs (2018), Quarterly Stamp Duty Land Statistics, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/730387/Quarterly SDLT_2018Q2_Main.pdf

⁴⁷ Frontier Economics (2017), Affordable Warm (2017), https://www.e3g.org/docs/FE_Energy_efficiency.pdf



It has been demonstrated⁴⁸ that lenders do not go into significant detail when investigating utilities, despite energy costs being one of the largest pieces of household expenditure. The LENDERS report identified opportunities for mortgage lenders to improve the accuracy of the data that they use to improve the affordability assessments to ensure that they more closely reflect the actual performance of a home and its occupants.⁴⁹ The report emphasised the ability for mortgages to highlight the potential savings for consumers of owning an energy efficient property and the impact it could have on their borrowing capacity. The Energy Saving Trust states that:

“Since low energy homes have lower energy bills, the natural consequence is customers in low energy homes can afford larger mortgage repayments”⁵⁰

The LENDERS project suggests that including energy efficiency at the right point in the mortgage process may have wider behavioural impacts beyond the direct financial benefit to consumers. It is likely to influence buyer perceptions of the value of energy efficiency. Consequently, home buyer preferences may also encourage sellers of existing homes to address the performance of their property prior to putting it on the market, acting as a driver to improve the thermal efficiency of the wider building stock.

Barclays Mortgages has introduced discounted interest rates to borrowers buying energy efficient new build homes⁵¹. The mortgage will be applicable to properties rated EPC Band A or B built by one of the house builders the lender has partnered with. Barclay’s introduced this product following mortgage customer feedback that “they are interested in purchasing an energy efficient home.”⁵²

⁴⁸ UK Green Building Council, (2013) Retrofit Incentives, https://www.ukgbc.org/sites/default/files/130705%2520Retrofit%2520Incentives%2520Task%2520Group%2520-%2520Report%2520FINAL_1.pdf

⁴⁹ UKGBC (2017) LENDERS project report https://www.ukgbc.org/wp-content/uploads/2017/09/Lenders_Core_Report_1.pdf

⁵⁰ Energy Savings Trust (2016), Can We Make Mortgages Go Green? <http://www.energysavingtrust.org.uk/blog/can-we-make-mortgages-go-green>

⁵¹ Barclays (2018) Barclays Green Home Mortgages <https://www.barclays.co.uk/mortgages/green-home-mortgage/>

⁵² Financial Times (2018) Barclays launches 'green' mortgage <https://www.ftadviser.com/mortgages/2018/04/04/barclays-launches-first-green-mortgage/>



The product utilises the property's Predicted Energy Assessment (PEA) which is produced prior to a property being finalised. The PEA gives consumers a predicted / target energy efficiency rating based on the property design. The final energy performance of the property must achieve at least this target energy rating to receive its final sign-off from the building inspector. Given that Green Mortgages have been introduced to encourage buyers to opt for higher efficiency homes based on the expected lower running costs, it is of even greater importance that homes are built to their designed performance.

Other financial institutions are also introducing Green Mortgage products with BNP Paribas Personal Finance and 26 other banks across Europe launching the Energy Efficient Mortgage Initiative⁵³. The Initiative will offer cheaper mortgages to people buying an energy efficient home or renovating one to a higher standard. Eligible new build homes will meet thresholds established by Green Building Councils across Europe. They will either need to meet national “nearly zero energy building” standards as required by EU climate regulations or they will be 20% better than national standards.

Over the coming two years, the banks will investigate how the scheme's criteria can be applied to their business with a view to offering products into the market to incentivise energy reduction and the purchase of more efficient properties. BNP Paribas Personal Finance has partnered with E.ON to pilot the Green Mortgage product in the UK which will allow additional borrowing to install appropriate energy saving solutions.

Enhancing government schemes

Equity Loans

With the Help to Buy Equity loan scheme, the Government lends consumers up to 20% of the cost of the newly built home, requiring buyers to have a 5% cash deposit and a 75% mortgage to make up the remainder costs.⁵⁴ Over the first five years, the homebuyer does not pay interest on the loan after which point interest is charged. This scheme could also be adapted to encourage the purchase of higher performing homes. The Government could lead the way and introduce a Green Mortgage aspect to this scheme.

⁵³ Energy efficient mortgages action plan (2018) <http://eemap.energyefficientmortgages.eu/>

⁵⁴ <https://www.helptobuy.gov.uk/equity-loan/equity-loans/>



The Equity Loans scheme has proved popular and has been extended until 2023. The cumulative total of the number of completions in the scheme (to 31 March 2018) was almost 170,000, the majority of these (81%) were first time buyers⁵⁵. It is expected that by March 2021 up to 360,000 households will have been supported by the scheme⁵⁶. The number of legal completions per quarter during 2017 averaged 11,500 which is almost 2,000 more a month than 2016. The new scheme which will run from April 2021 to March 2023 will only be available to first time buyers to ensure that support is targeted to those who need the most help to get into home ownership.

Additionally, this scheme could further stimulate an uptake of more energy efficient homes in the market, ensuring that new buyers can afford to live in their home as well as buy it. This could be achieved by ensuring that properties bought as part of the Help to Buy scheme are aligned with the most up to date Building Regulation standards. This expands on the SEA's proposal that planning permission regulation should be reformed to ensure that any new changes to Building Regulations are adopted by housing developers more quickly.

Reforming the Equity Loans scheme to ensure that funding is only granted to developments that build to the most up-to-date Building Regulations will ensure that first time buyers are able to access affordable, sustainable properties.

Help to Buy / Lifetime ISAs

In December 2015, the Government introduced the Help to Buy ISA initiative in order to increase the levels of home ownership by incentivising first time buyers to save for their first home. Since its introduction, the Help to Buy ISA policy has been joined by a new Lifetime ISA scheme (LISA) which launched on 6th April 2017⁵⁷. The SEA developed the concept of seeking further value for money on public expenditure by adding efficiency requirements to the Help to Buy and LISA schemes. The Help to Buy ISA has proven popular among first time buyers with over one million people opening an account⁵⁸ and over 146,700 property completions being supported by the scheme⁵⁹. Since the launch of the scheme over 196,000 bonuses have been paid but it has recently been announced the Help to Buy ISA will only be available to new customers until 30th November 2019⁶⁰.

⁵⁵ MHCLG (2018) Help to Buy (Equity Loan scheme) and Help to Buy: NewBuy Statistical Release https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/734061/HTB_EL_and_HTB_NewBuy_statistical_release.pdf

⁵⁶ HM Treasury (2018) Budget 2018 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/752202/Budget_2018_red_web.pdf

⁵⁷ HM Treasury, Lifetime ISA, 2017

⁵⁸ HM Treasury (2017) One million Help to Buy: ISAs opened <https://www.gov.uk/government/news/one-million-help-to-buy-isas-opened>

⁵⁹ HM Treasury (2018) Help to Buy: ISA scheme Quarterly Statistics, <https://www.gov.uk/government/statistics/help-to-buy-isa-scheme-quarterly-statistics-december-2015-to-31-march-2018>

⁶⁰ <https://www.helptobuy.gov.uk/help-to-buy-isa/faq/>



It is recommended that any similar scheme or policy is used to encourage energy efficiency.

The SEA has advocated the adoption of top-ups to Help to Buy ISA's to be utilised for retrofitting projects that improve energy efficiency of recently purchased dwellings⁶¹. Adaption to this policy can be utilised to enhance the uptake of energy efficient new build properties and further stimulate demand. Introducing a bonus scheme to the ISA scheme based on energy efficient rating would incentivise consumers to seek more energy efficient dwellings so as to achieve the reward of a higher bonus. The ISA bonus could be flexed; this differential could be based on the property's SAP rating, meaning the higher the SAP rating, (thus the more energy efficient the new build is), then the greater the bonus. Similarly, the lower the SAP rating the lower the Help to Buy ISA bonus.

With a bonus of up to £6,000, given £12,000 is invested into savings, there is a strong incentive for consumers to seek more energy efficient homes, changing consumer outlook and purchasing power. The additional funds allocated to those who purchase higher energy efficient homes are sourced by the marginal reduction in funds allocated to those who bought a house with less greater energy efficiency. Significantly, this means that a fiscally neutral scheme could be introduced.

In summary, the Government could amend a number of financial mechanisms to incentivise consumers and drive the market towards favouring more energy efficient properties. Targeting first time buyers provides an opportunity to change the mindset of the next generation of home owners and encourages them to consider the performance of a home as part of the house buying process. Fundamentally, this could lead to a wider change in the market and bring building performance higher up the home buyer wish list.

⁶¹ Sustainable Energy Association, Energy Efficiency (2017) – A Policy Pathway, Addressing the Able to Pay Sector

Conclusion

As we strive to increase national productivity, improve industrial competitiveness, reduce energy costs, provide affordable homes and protect the environment for future generations, the homes we build today are key. For most of us our homes are our biggest expenditure and the energy we use in these buildings represents one of the biggest operational costs. This energy is also as a significant contributor to the UK's total energy consumption.

As part of its Industrial Strategy⁶² the Government has identified the Grand Challenges that the UK faces. Clean Growth is one of those challenges and the Government has set out a Mission to halve energy use of new buildings by 2030. Halving energy use will reduce consumers bills and also reduce carbon emissions, but this cannot be achieved without reform.

The Building Regulations set the standards for new homes and will therefore play a significant role in determining whether this Mission is achieved. The upcoming review of Part L of the Building Regulations provides a small but crucial window of opportunity to increase standards and ensure that the legacy of the new homes we are building is one of quality homes, reduced energy use and carbon emissions.

Every home we build needs to achieve the improved standards we set, and this means closing the gap between estimated and actual performance by adopting an outcome focused approach, introducing energy performance guarantees for new homes. Rigorous post build inspections and improving product traceability to ensure that the products specified are actually those installed.

⁶² HM Government (2017), Industrial Strategy, Building a Britain Fit for the Future, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf



Central government and local authorities have an important role to play in raising baseline standards and then fostering a culture of reaching the highest possible standards. Government and public sector developments can lead the way by adopting higher standards and following best practice in procurement.

Awareness of the true cost of a home and the benefits of an energy efficient home needs to be increased and policy drivers and fiscal mechanisms should be used to help raise awareness and reflect the true value of energy efficiency in the housing market.

The SEA welcomes the Government's commitment to build new homes and to half the energy used in them. We call for these new homes to be built to high standards which minimise energy costs and carbon emissions.

The building of a new home is the optimum time to get the fabric, insulation and the heating system right so that all new homes can meet the energy demands of the present and the future. The upcoming review of Part L of the Building Regulations provides a window of opportunity to ensure that this happens.

It is time to invest in making our new buildings healthier and more energy efficient. In doing so we improve our health, reduce energy bills and greenhouse gas emissions, stimulate industry and increase prosperity for us all.



Summary of Recommendations



Reforming Building Regulations

Revise Building Regulations (Part L) to require Zero Carbon Compliance with renewable heating now and consider the outputs from the Net Zero Carbon Buildings Industry Task Group ahead of 2030.

All homes built after new Building Regulations are approved should be built to current standards and loopholes allowing properties to be built to older regulations should be closed.



Closing the Performance Gap

The current performance gap between estimated and actual energy usage needs to be closed by focusing on the outcome when new homes are built, not on their initial specification. The Energy Performance Certificate (EPC) should in future reflect the buildings actual performance. This would ensure that what is specified is actually installed and any cost-saving changes to building design are reflected in the EPC.

All new build properties should come with detailed information about the products installed, guarantees and maintenance information. A property inspection should be carried out after completion to ensure compliance with the energy performance promised at the outset.



New Homes Ombudsman

SEA supports the introduction of a New Homes Ombudsman – as promised by government in 2018 – to help homebuyers obtain redress where housebuilders fail them. This should be used to help raise standards, including of energy efficiency.



Stimulating Consumer Demand

Demand from consumers for energy efficient homes should be stimulated by policy drivers and fiscal mechanisms. In particular these should include:

1. Varying the level of Stamp Duty on new home purchase according to its energy performance
2. Encouraging reform of mortgages to encourage lenders to offer energy efficient mortgages
3. Increasing the awareness and salience of Energy Performance Certificates
4. Ensuring any subsidies that support home buyers, such as the Help to Buy and Lifetime ISA schemes are conditional on the homes achieving high standards of energy efficiency.



Public Sector Leading the Way

Public sector developments and social housing should lead the way for adopting higher standards and following best practice in procurement. An initiative such as rolling out the winning designs from the government's national design competition for the home of 2030, via public sector developments and social housing projects could facilitate this.



Appendix

Analysis of The Optimum Strategy for
Reducing Emissions in New Builds

The SEA has analysed four scenarios for the new-build sector to determine the optimum strategy for reducing emissions from one million of the properties promised by the Government⁶³. The analysis takes into account BEIS fuel and carbon price projections and SEA member data and uses a heat pump as an illustration for a low carbon heating technology:

- ✓ **Baseline scenario** – maintain current new build standards and install a condensing gas heating system, which is substituted by a new gas heating system in 10 and 20 years;
- ✓ **Retrofit** – maintain current new build standards and install a condensing gas heating system, which is substituted by a low carbon heating technology (e.g. an air source heat pump) in 10 years;
- ✓ **Zero Carbon** – improve standards to Zero Carbon Hub Compliance level⁶⁴ and install a low carbon heating technology (e.g. an air source heat pump);
- ✓ **Passivhaus** – improve standards to near to Passivhaus standard and install a low carbon heating technology (e.g. an air source heat pump).

The Grand Challenge Mission focuses on a reduction in energy use, therefore the annual energy demand from a typical property and the associated energy reduction benefit of adopting the tighter standards was modelled.

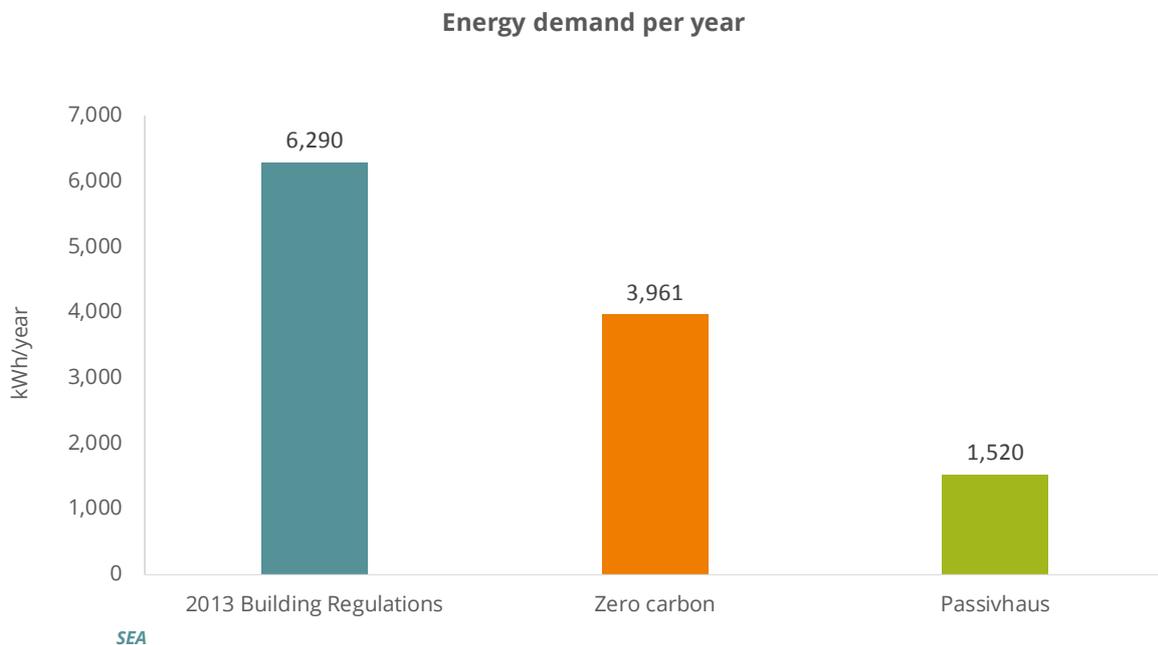


Figure 3. Total energy demand (kWh per year)

⁶³ DCLG & The Rt Hon Sajid Javid MP, (2017). New planning approach to speed up delivering homes Press Release, 14 September 2017. <https://www.gov.uk/government/news/new-planning-approach-to-speed-up-delivering-homes>

⁶⁴ Zero Carbon Hub (2018) Carbon Compliance Target. <http://www.zerocarbonhub.org/zero-carbon-policy/carbon-compliance-target>

As shown above, the Zero Carbon Hub Compliance level comes close to achieving the Mission Challenge of halving of energy demand by 2030. It reduces energy use by 45% compared to current building standards. Unlocking even lower energy demand can be achieved by pursuing Passivhaus standards in new buildings. If Passivhaus is targeted the building can yield a high level of occupant comfort and minimise the heating demand to ≤ 15 kWh/m² at the same time. A reduction in space heating demand of around 75% and an 80% decrease in carbon emissions can be achieved if homes were built to Passivhaus standard in comparison to standard practice for UK new build⁶⁵.

With a reduction in energy demand, also comes a reduction in carbon emissions. The below graph analyses the carbon emissions associated with building to three scenarios compared to the baseline. With the need to build 225,000 - 270,000 homes a year to keep up with population growth, this calculation assumes that around 1,000,000 new homes will need to be built over the next 4 years. The analysis looks at the impact these homes could have on period between the fourth carbon budget and 2050. If standards are not improved, the total emissions over this period could be 35.22 MtCO₂e. The results reveal that carbon emissions associated with building one million new homes over this period could be reduced by:

- 18.90 MtCO₂e (54%) under the Retrofit Scenario
- 32.94 MtCO₂e (94%) under the Zero Carbon Scenario
- 34.35 MtCO₂e (98%) under the Passivhaus Scenario

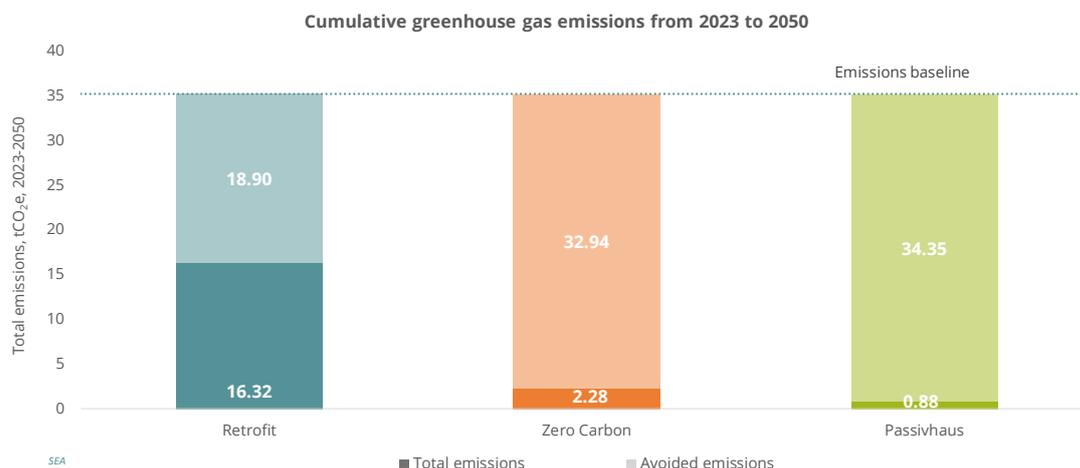


Figure 4. Cumulative greenhouse gas emissions in the years from 2023 to 2050, from a million new build properties (calculations based on a typical semi-detached/end-terrace building) under different new build scenarios.

⁶⁵ BRE, (2017). The Passivhaus Standard. <http://passivhaustrust.org.uk/>

Adding in the monetised cost of emissions from heating consumption over the 2023-2050 period (BEIS non-traded emissions' price forecast), the combined energy and emissions costs sum to £4,591m under the Baseline Scenario. Accordingly, a saving of £3,108m (24%) in the Retrofit Scenario, £7,681m (59%) in Zero Carbon Scenario, and £10,962m (84%) in Passivhaus Scenario could be achieved over the Baseline Scenario during this period (Figure 5).

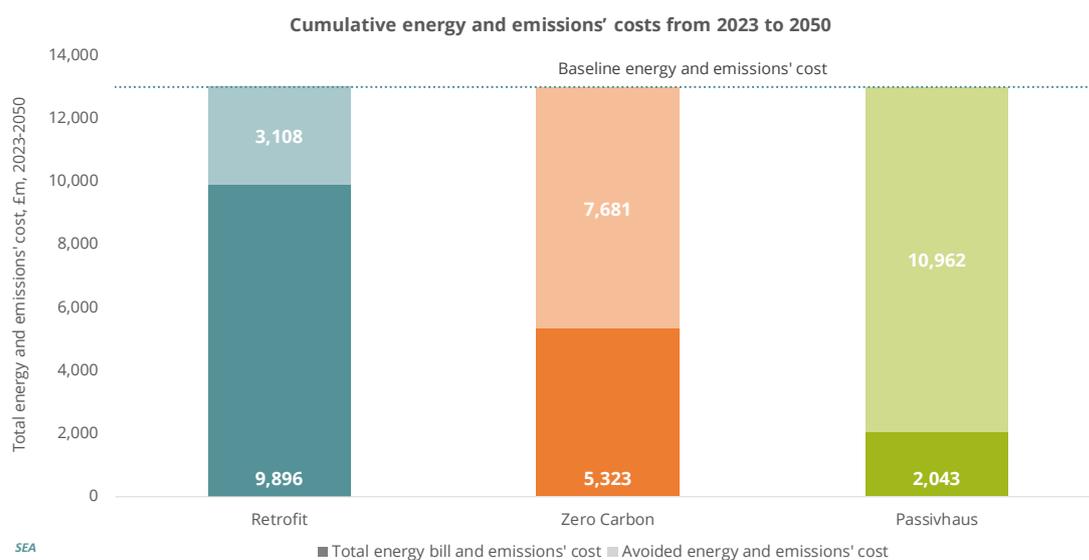


Figure 5. Cumulative energy and emissions' costs in the years from 2023 to 2050, from a million new build properties (calculations based on a typical semi-detached/end-terrace building) under different new build scenarios.

To understand how emissions might develop over time, we plotted the emissions' trajectory suggested in the Clean Growth Strategy (to meet targets of 58 MtCO₂e by 2032 and 6 MtCO₂e by 2050 accordingly), using the 2016 data for the residential emissions as a starting point⁶⁶. Our analysis found that the Zero Carbon and the Passivhaus scenarios contribute a relatively insignificant amount of emissions, when compared to Baseline and Retrofit Scenarios.

⁶⁶ DCLG, (2017). Housing White paper. Collection. <https://www.gov.uk/government/collections/housing-white-paper>

66 MtCO₂e in 2016, according to Committee on climate Change (CCC), (2017) Meeting Carbon Budgets: Closing the policy gap. 2017 Report to Parliament. <https://www.theccc.org.uk/wp-content/uploads/2017/06/2017-Report-to-Parliament-Meeting-Carbon-Budgets-Closing-the-policy-gap.pdf>

70 MtCO₂e in 2016, according to the BEIS, 2018. Updated energy and emissions projections: 2017 Projections of greenhouse gas emissions and energy demand from 2016 to 2035. Annex A: Greenhouse gas emissions by source. <https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2017>

Integrating our best estimate of scenario costs and benefits together, the current costs of Passivhaus make this standard uncompetitive against the Baseline on an NPV-basis. However, these costs are very likely to come down with scale and therefore our initial analysis should be treated as conservative. The energy savings associated with the increased efficiency of a heat pump in the retrofit scenario are not high enough to cover the additional capital cost of retrofitting an ASHP. However, the Zero Carbon Scenario, is very much competitive against the Baseline – delivering a similar net present value (NPV) whilst supporting energy and carbon emission reductions.

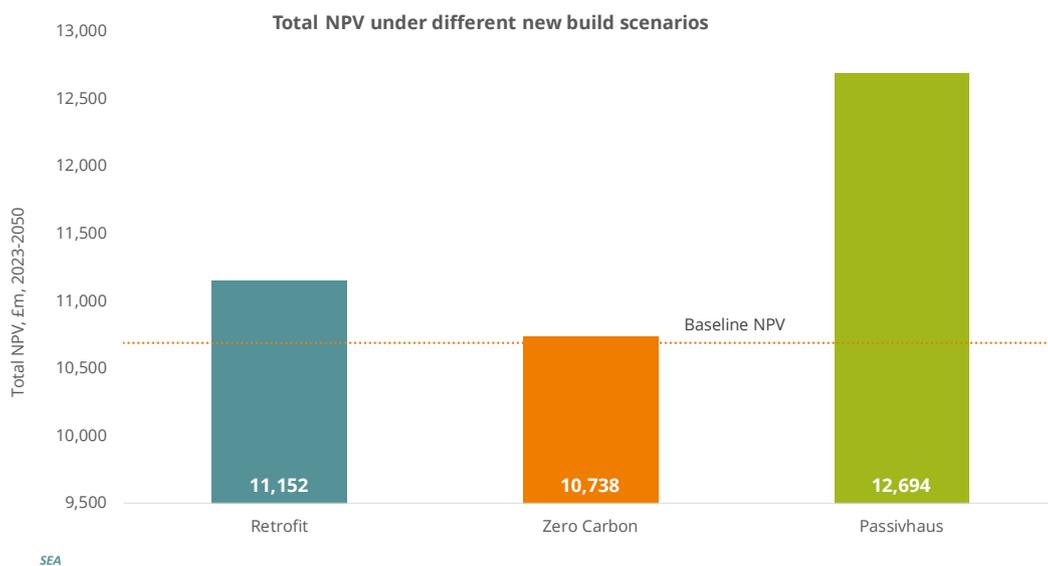


Figure 6. Total NPV under different new build scenarios for the period of 2023 to 2050, compared to the Baseline Scenario.

It is important to note that with greater competition and demand for low energy buildings, the costs of purchasing and installing energy saving measures are likely to fall further with economies of scale. Evidence from other Building Regulation improvements in the UK and abroad such as those in Germany suggests that this benefit can be achieved at no significant additional cost to consumers, as innovation and economies of scale drive down delivery costs. For example, a study in Germany has seen the extra costs associated with building to Passivhaus decrease almost two-fold between 2010 and 2015 (from €14,000 to €9,500 for a 140 m² house) owing to Passivhaus windows and thermal insulation becoming cheaper⁶⁷.

⁶⁷ Passipedia, (2015). Are Passive Houses cost-effective? https://passipedia.org/basics/affordability/investing_in_energy_efficiency/are_passive_houses_cost-effective

In conclusion, the analysis shows that, under the current assumptions, the Zero Carbon Scenario is the most cost-effective. It delivers a saving of 94% emissions over the Baseline Scenario (a saving of 32.94 MtCO₂) whilst also reducing energy use by 45%. In addition, compared to the Retrofit and Passivhaus Scenarios, it is the least costly.

The Scenarios analysed use an air source heat pump as an example low carbon heating solution, however there are a number of low carbon solutions that could be installed for example biomass, fuel cells, ground source heat pumps etc.

CONTACT US

- ✓ Samantha Crichton: samantha.crichton@sustainableenergyassociation.com
 - ✓ Lesley Rudd: lesley.rudd@sustainableenergyassociation.com
 - ✓ Jessica Ralston: Jessica.Ralston@sustainableenergyassociation.com
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Sustainable Energy Association | www.sustainableenergyassociation.com

Radcliffe House, Blenheim Court, Solihull, B91 2AA

E: info@sustainableenergyassociation.com | T: 0121 709 7740

