

A Low Carbon Building Standards Strategy for Scotland

2013 Update

**Report of a Panel appointed by Scottish Ministers
Chaired by Lynne Sullivan 2013**



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Ministerial Endorsement



Following its publication in late 2007, the original Sullivan Report provided a routemap for delivery of very low carbon buildings, setting aspirations for carbon abatement and energy efficiency within building standards. The Report also gave us the goal of 'net zero carbon' to aim for. Almost all of the recommendations from the original Report have now been taken forward.

In 2008, we entered into what became the current, prolonged economic downturn. This presented a challenge for implementation of some recommendations to the extent originally identified. So in light of this, following my announcement in December 2012 on the consultation on the next set of energy standards, I asked the Sullivan Panel to reconvene and revisit some of their original recommendations.

Most people are aware of the scale of the task that addressing climate change presents. Reducing our output of greenhouse gases, and in particular carbon dioxide emissions from buildings, is an essential part of this process. The Scottish Government has to meet the legally binding emissions reduction targets which are the 'will' of the Scottish Parliament. We are proud of these targets but they are extremely challenging and will require transformational change to the way Scotland generates and consumes energy over the coming decades. Our electricity and heat need to be greener and we need to use less. An important factor in achieving this will be making our buildings as low carbon and low energy as practical.

However, we remain sensitive to issues which affect business and industry.



I was delighted to attend on the first day that the Panel met and very grateful to them for their work in updating elements of their original Report. Indeed, I have already made use of one of the recommendations – the longer implementation timescales they suggest for the next set of energy standards – when I announced a deferment in the introduction of these standards until 2015. To be in the best position to deliver the standards in practice, this additional time will need to be used wisely by industry. This includes working in partnership with government on the Action Plan recommended by the Panel.

As before, the Scottish Government will be diligent in commissioning research and working with industry to investigate and develop these recommendations. We are now at a point where there is greater optimism for future growth across the construction industry – growth which remains essential as part of a successful low carbon economy.

A handwritten signature in black ink, appearing to read 'Derek Mackay'.

Derek Mackay MSP

Minister for Local Government
and Planning

Chair's Foreword



It is nearly six years since the original Expert Panel met to craft 'A Low Carbon Building Standards Strategy for Scotland'. In the ensuing period, much has changed. The building industry has been significantly affected by the economic downturn, with decline in the demand for new buildings, particularly in the private sector. This unforeseeable reduction in construction activity has not only affected commercial buildings and housing output in a negative way, but has led to wider implications for industry, such as a loss of skilled operatives and the closing down of some construction companies. As a consequence it became evident that some of our 2007 recommendations might prove overly challenging in these circumstances.

However, the need to mitigate the effect of climate change remains a pressing task. In view of the above, I was delighted when at the end of 2012 Mr Mackay, Minister for Local Government and Planning, invited me to chair a reconvened Panel to revisit specific topics.

Focusing on the recommendations for 'Eventual and Staged Standards', we consider it would be beneficial to extend the preparation time for the next two sets of energy standards for new buildings for an industry that is in the early stages of recovery from the effects of the downturn, and for government and industry to work together to use this time to best effect. Inter alia, time is needed to understand the implications of the EU Directive requiring 'nearly zero energy buildings' from 2019, and its impact on building standards.

Work that has been undertaken by the Zero Carbon Hub elsewhere in the UK indicates that it may not be practical for every new home to achieve net zero carbon. We consider that this will also be the case for non-domestic buildings. In view of this, our Report advocates that the concept of 'Allowable Solutions' should be investigated and developed. This could support Scottish Ministers in delivering a 'zero carbon standard' for new buildings which can be achieved in practice.



In 2007 we recognised that both government and industry need to be aware of the financial cost of building to more challenging energy standards. More recently, the concern that energy efficient construction is seldom valued during property transactions has become a greater challenge to ongoing improvement. We favour action to assist in the recognition of monetary saving, through lower fuel bills, within the valuation process.

It is considered that action following the original Report moved Scotland into one of the top European Countries in terms of the energy standards set for new buildings. The recommendations that we now make through this document seek to add additional flexibility and practicality as further progress is made towards 'nearly zero energy' and very low carbon new buildings.

A handwritten signature in black ink, appearing to read 'Lynne Sullivan'.

Lynne Sullivan OBE

Chair of the Panel

Introduction

This Report is not a stand-alone document and should be read in conjunction with our original 2007 Report, which remains available on the Scottish Government website at: www.scotland.gov.uk/sullivanreport.

Since the publication of the original Sullivan Report, significant progress has been made to implement the original recommendations. In January 2011, the Scottish Government published a progress report summarising the extent of investigation and implementation of the original Report recommendations (also available via the link above).

The Panel met on the 8th and 9th of May 2013. This time around, we did not start with quite the same 'blank canvas' that we had in 2007, though we have the benefit of hindsight. The construction industry has gone through difficult times with the economic downturn. The need to mitigate climate change is still there, but unlike before, Scotland now has legally binding targets to meet, set through the Climate Change (Scotland) Act 2009. Additionally, from 2019 onward new development will have to respond to the EU requirement for 'nearly zero energy' new buildings.

For this update, we were asked to consider three specific topics:

Eventual and Staged Standards ambition and pace of change

Taking stock of the Scottish Government progress in implementing our original recommendations for reduction of carbon emissions from new buildings, and how the economic downturn has influenced what has been achieved. We were asked to think about the way forward for 'Eventual and Staged Standards' and what further improvement in building performance is now considered achievable.



Process

delivering a 'net zero carbon' standard for new development

Linking both to the 'Process' workstream of the original Report, and ongoing review on 'Eventual and Staged Standards', we were asked to consider the possibilities of extending 'net zero carbon' compliance for new buildings to include offsite and offsetting solutions. This follows work undertaken in England through the Zero Carbon Hub on the potential for 'Allowable Solutions' as part of a zero carbon standard for new homes.

Costings

recognising the value of energy efficient new buildings

The challenges surrounding the valuation of new buildings, with higher energy efficiency not being reflected in the value of properties. We were asked to reflect on the contribution that the building standards system can make to support financial market transformation in this area.

In reconvening the Panel, Scottish Ministers asked us to think strategically, with a focus on new buildings. We recognise that any work to take forward our views in these areas will require significant further dialogue between government and industry before broader discussion and public consultation.

Eventual and Staged Standards

Ambition and pace of change

We revisited our recommendations made in 2007 for a staged progression towards 'net zero carbon' new buildings in 2016/17, discussing both the Scottish Government's divergence from that route map and the reasons for this divergence.

In acknowledging the introduction of the Climate Change (Scotland) Act 2009 and its legally binding greenhouse gas abatement targets, we recognise that balancing action towards meeting climate change targets and supporting continued economic growth during a period of economic downturn is essential. Our level of ambition has not changed but we consider this must be moderated to reflect the economic climate and downturn in construction. We also recognise that, as less new building is taking place, greater emphasis is needed on energy and carbon improvement to the existing building stock.

For the next staged improvement, we recognise that the proposals within the recent energy consultation¹ are beyond the scope of this Panel. However, we judged that it was still relevant to discuss the timing of this next staged improvement. Some Panel members emphasised the potential impact, on development and investment, of standards which are more challenging than those elsewhere in the UK, particularly during a period of recovery from recession.

We also deliberated on whether a longer lead-in time would allow the industry time to prepare for changes whilst continuing to build on the momentum achieved since we last reported. There was support for this approach, which would also help maintain economic recovery in the sector and provide greater opportunity to prepare for and deliver change.

Looking beyond the next change in standards we considered the European commitment set out in Article 9 of the recast Energy Performance of Buildings Directive², for all new buildings to be 'nearly zero energy' from 2021, or 2019 for new non-domestic public buildings. We deem that this sets a timetable for subsequent review of energy standards.

¹ <http://www.scotland.gov.uk/Publications/2013/01/4018>

² <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:153:0013:0035:EN:PDF>



In our 2007 Report, we recommended staged improvements programmed for 2013 of 75% reduction in carbon dioxide emissions for non-domestic buildings and a 60% reduction in carbon dioxide emissions for domestic buildings, when compared to 2007 standards. We consider that further investigation into these levels is still required in support of both the Scottish Government's climate change agenda and the EU requirement for 'nearly zero energy' new buildings. However, future review must continue to recognise the practical and economic conditions that apply.

Furthermore, we noted research would be needed to assess if such levels of carbon dioxide emissions reduction would meet or exceed requirements for 'nearly zero energy' new buildings. We consider that this may also require review of how energy and emissions are presented within the standards. We discussed whether this staged improvement could be aligned with the timing of this European obligation. The Panel noted that work with the UK Government will define 'nearly zero energy' for new buildings, to inform future review.

We reflected on discussions on 'Allowable Solutions' (see 'Process' topic) and support investigation of this concept to address remaining emissions and enable a 'net zero carbon' standard for new development to be delivered.

Ministers asked us to consider whether departure from our original recommendations on staged standards has resulted in 'lost opportunities' to deliver emissions abatement. Discussion highlighted the challenges of constructing in the current economic environment. It was suggested that not constructing new buildings also reduces overall emissions. However, we agreed that, although correct, this is not a desirable outcome from a social and economic point of view. On this basis, we agreed there is no need to further explore these issues in terms of any perceived shortfall.

On skills, we discussed and agreed that a skilled workforce is key to the successful delivery of improved standards. Recent years of recession have also resulted in job losses within this workforce. We thought that slowing the rate of improvement would provide additional time for the industry to develop and implement the skills needed to support low carbon buildings. This is an area where we consider there is a need for continued action and leadership both by government and industry.

On the energy performance of new buildings, we also confirmed the need to better understand potential performance gaps between designed and as-built performance and the factors which can contribute to this. Industry and government should work together to gather evidence on the factors which can affect performance to support action on this topic³. We noted the Scottish Government intends to work on this as part of the ongoing review of energy standards.

We also believe that the early availability of the National Calculation Methodologies, namely, Standard Assessment Procedure (SAP) and Simplified Building Energy Model (SBEM), is crucial when implementing improved energy standards.

We noted there are examples, such as the Greener Homes Innovation Scheme, demonstrating how the Scottish Government continues to support industry led innovation, research and development to bring about reliable, robust and deliverable solutions. We would encourage this to continue. Additionally, we discussed what work could be undertaken by the Scottish Government and industry to assist in the delivery of these staged improvements. Foremost, we considered that an 'Action Plan' should map out work needed to support successful delivery of the next set of standards and to further the transition to 'nearly zero energy' buildings.

³ Subsequent to our meeting, the Zero Carbon Hub has published their interim report on this topic - 'Closing the gap between design and as-built performance' (July 2013) - http://www.zerocarbonhub.org/news_details.aspx?article=40



Whilst a range of possible items for inclusion in such an 'Action Plan' was suggested at our meeting, we recognise this is best addressed by further review and development of proposals by government and industry. However, during discussion, we highlighted a number of potential themes, including:

- Better availability of information and resources on low carbon buildings, including feedback on performance and lessons learned.
- Revision of processes to give greater assurance on designed performance being achieved in practice.
- Training and delivery of low carbon construction skills.
- Early availability of calculation tools and software.
- Promotion of the value of low carbon/energy buildings, including the role of incentives.

We noted that concerns can arise from requirements and prescription on low carbon equipment within the Scottish Planning system, in addition to provisions under building regulations. In reviewing the staged improvements, we ask the Scottish Government to examine elements of the Planning and Building Standards systems which address greenhouse gas emissions. These should offer consistency and alignment in policy approach and delivery, providing clarity to developers.



Eventual and Staged Standards **we recommend:**

- ✓ To support a more successful implementation through a longer lead-in time, the energy standards proposed and already consulted on for 2014 should instead be published in 2014, but implemented a year later in 2015.
- ✓ The Scottish Government investigates whether the 60% and 75% reductions in carbon dioxide emissions, originally recommended for 2013 in the 2007 Sullivan Report, would also deliver new buildings which meet the definition of 'nearly zero energy' new buildings in the EU Directive.
- ✓ Subject to the previous recommendation, subsequent review of energy standards should be programmed to align with the EU Directive requirement for 'nearly zero energy' new buildings from 2019.
- ✓ Beyond the current review, delivery of a 'net zero carbon' standard is linked to the development of the concept of 'Allowable Solutions'.
- ✓ In tandem, the Scottish Government publishes an 'Action Plan' setting out a range of work elements to support the successful implementation of each staged improvement.
- ✓ That Scottish Government aligns the emissions abatement aspects of both the Planning and Building Standards systems.

Process

Delivering a 'net zero carbon' standard for new development

We acknowledge that delivery of zero carbon objectives through an entirely on-site strategy is not currently a realistic approach for mainstream housing production, due to issues of cost and practicality of building to such a standard on many sites. This follows work, by the Zero Carbon Hub⁴ (ZCH), into practical means of delivering zero carbon new homes. We consider that this premise is likely to apply equally to new non-domestic development.

During discussions, we noted that the UK definition of 'zero carbon building' was amended in 2011 to remove the energy element relating to cooking, appliances/equipment and process⁵, bringing it into line with the definition of 'net zero carbon' put forward in our 2007 Report.

One outcome of the ZCH review was development of the concept of 'Allowable Solutions'⁶. This could offer flexibility in meeting a regulated emissions standard by looking beyond the development site itself. It was first raised in 2008 and discussed in detail in publications by the ZCH from 2011. The Panel noted that this concept was to be further investigated by the UK Government this summer⁷.

We recognise that the cost of delivering a 'net zero carbon' building can vary considerably, as can the practicality and risks of applying certain solutions, including low and zero carbon technologies. We endorse the view that setting a 'net zero carbon' standard purely on the basis of on or near-site solutions is not practical at this time. Should Scottish Ministers seek to deliver a 'net zero carbon' policy for new development, it is felt that greater flexibility in how such a standard is delivered is essential.

4 <http://www.zerocarbonhub.org/>

5 Sometimes referred to as 'unregulated energy' - <http://www.zerocarbonhub.org/definition.aspx?page=2>

6 <http://www.zerocarbonhub.org/definition.aspx?page=9>

7 <https://www.gov.uk/government/publications/budget-2013-documents>, paragraph 1.109 - consultation on Allowable Solutions in England was subsequently launched on 6 August 2013
<https://www.gov.uk/government/consultations/next-steps-to-zero-carbon-homes-allowable-solutions>

Whilst the focus of current ZCH work is on domestic construction, we noted that the concept of 'Allowable Solutions' should also apply to new non-domestic buildings.

We support further investigation of the potential for 'Allowable Solutions' to address the gap between levels of carbon compliance set by building or site-related measures and a 'net zero carbon' standard. We understand that this would require amendment to primary legislation but that this does not hinder initial investigations.

In taking this forward, we consider the following to be of importance:

- 'Allowable Solutions' should apply in addition to a minimum level of building performance set through energy standards.
- Provide clear information on what constitutes an 'Allowable Solution', with a range of options to allow flexibility in approach but avoiding over-complexity.
- They should be simple to implement and offer benefits which are easily substantiated and are additional to those delivered by other initiatives or incentives.
- Prior to implementation, establish the delivery processes and tools which enable demonstration of benefit, to support certainty in application by developers.
- 'Allowable Solutions' may be perceived as a 'carbon tax' on new development. The application of such a mechanism at a national level will require significant discussion and engagement in developing proposals.

We noted that there may be a range of presentational issues around the concept of 'Allowable Solutions', including that they may not directly benefit the owners or occupiers of new buildings. Also that the concept of 'saving carbon' is not as familiar a concept as 'saving energy' which equates to 'saving money'.



In taking forward the standards set for building-related measures, our general view is that development should focus on reducing energy demand through a 'fabric first' approach, with efficient services, supported by use of renewable technologies, where appropriate. This is particularly relevant for new homes. We also strongly advocate use of simple solutions rather than 'layering' of complex technologies.

We discussed how, in contributing to emissions reduction, 'Allowable Solutions' as a policy may only be effective in the medium term. This is due to broader agendas such as grid decarbonisation, locally distributed heat, and other work to improve the energy efficiency of the existing building stock. It is important this be borne in mind.

Finally, we consider that, should a 'net zero carbon' standard be delivered through 'Allowable Solutions', terminology must be clear and representative of what is being sought. In particular, it should be explicit that very low carbon buildings implementing 'Allowable Solutions' can meet a 'zero carbon standard for development'. However, only new buildings which have zero net emissions should be described as 'net zero carbon buildings'.



Process

we recommend:

- ✓ **'Allowable Solutions' should be investigated as a potential option for delivering a 'net zero carbon' standard for new development.**
- ✓ **If introduced, 'Allowable Solutions' should apply to both domestic and non-domestic new buildings.**
- ✓ **Investigation of 'Allowable Solutions' should recognise the need for simplicity and clarity of such solutions both in application and in substantiation of benefit.**
- ✓ **Should regulation incorporate 'Allowable Solutions', the term 'net zero carbon' new building should apply only to development where emissions are reduced to zero without off-site 'Allowable Solutions'.**
- ✓ **That Scottish Government works with industry and other UK administrations in investigating 'Allowable Solutions'.**

Costings

Recognising the value of energy efficient new buildings

In 2007 we identified that the measures we discussed could impose considerable constraints on development and recommended that costing research should be carried out in future and in partnership with industry. More recent research and experience shows that enhanced energy standards add extra capital cost which is often not paid back by reduced running costs. However, capital costs are likely to reduce as the standard becomes the norm.

We are aware of evidence that shows that energy efficiency and the savings that it offers to the building occupier is seldom valued by prospective buyers of new homes or other new buildings. In view of this, surveyors (and ultimately lenders) do not factor in the additional value of low-energy buildings in relation to running cost savings, reducing the potential for a developer to recoup their additional capital investment⁸.

We offered suggestions as to why this may be:

- People expect a new building to be energy efficient. It is a 'given' so it is difficult to promote.
- Location is still 'king' both for new homes and commercial buildings.
- Education is lacking on carbon emissions. There is a need to make this more of a 'currency' in the eyes of the public, and give clarity to the twin objectives of energy efficiency and low carbon in buildings.
- Some newer technologies available to industry are often not viewed with confidence by prospective owners, warranty providers, insurers or lenders.
- Lack of fiscal incentives and awareness, by building owners and occupiers, of benefits in return.

Citing previous work by MEARU⁹ for the Scottish Government as an example, we also noted that better information to building occupiers can assist in the recognition of the benefits of low carbon living.

⁸ Subsequent to our meeting, published research on house prices in England (Department for Energy and Climate Change, July 2013) indicates a more positive trend in this area - <https://www.gov.uk/government/publications/an-investigation-of-the-effect-of-epc-ratings-on-house-prices>

⁹ <http://www.scotland.gov.uk/Resource/Doc/217736/0116377.pdf>, as used in <http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/techbooks/Sustainability>



We discussed how the car manufacturing industry is being pushed by emissions reduction targets at a European level. Action by that industry has established a common language and terminology when marketing products. There is some frustration that this does not occur within the UK construction industry, and house building in particular, where no 'universal language' has been developed. This leads to a disconnect in marketing terms.

In 2007 we were divided in our view of the value of Energy Performance Certificates (EPCs)¹⁰ in promoting energy efficiency and this time our position was similar.

In the commercial sector the 'Corporate Social Responsibility' aspect of an 'A band' EPC or an 'Excellent' BREEAM¹¹ rating is often worth more to occupants, than the savings that emerge as a result.

Some of us warned that there is a danger in awarding a building a label or a certificate, before actual performance in practice had been proven. Provision of information on modelled/calculated design performance alone, on an EPC or a sustainability label¹², is simply not enough. We consider there ought to be some type of financial incentive to 'pull' prospective buyers and occupiers towards the preference for low carbon, energy efficient buildings and the benefits they offer.

We were advised that there is currently work underway elsewhere in the UK on valuation. This work suggests that a formal mechanism to link valuation to SAP rating (for homes) would assist surveyors establish the additional value that energy efficient construction can bring. It is hoped that valuation and lending bodies would be able to buy into such a methodology in the future.

¹⁰ Information on EPCs available at www.scotland.gov.uk/epc

¹¹ <http://www.breeam.org/about.jsp?id=66>

¹² <http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/techbooks/Sustainability>

Costings

we recommend:

- ✓ **Research is carried out in partnership with the construction industry to develop a universal language for the marketing of very low carbon and very low energy buildings.**
- ✓ **That Scottish Government gives consideration to introducing a financial inducement for prospective owners and occupiers that choose to own or occupy low carbon/low energy buildings, linked to either an EPC or a sustainability label.**
- ✓ **That Scottish Government works with those developing valuation tools that may emerge so that they can be applied in Scotland.**
- ✓ **That valuers and lenders are encouraged to recognise and make use of valuation tools that emerge.**

Reference

List of Panel Members

Member	Role	Organisation
Lynne Sullivan OBE (Chair)	Architect and Partner	sustainableBYdesign Architects
Richard Amos	Building Surveyor	Richard Amos Ltd.
Andrew Carpenter	Chief Executive	Structural Timber Association (formerly the UKTFA)
Kate Carter	Lecturer in Architecture	Edinburgh University College of Art
Hywel Davies	Technical Director	Chartered Institution of Building Services Engineers
Jestyn Davies	Chair	Scottish Property Federation
Stewart Dalgarno	Chair of Building Standards and Planning Theme Group	Construction Scotland
Stephen Garvin	Construction Director	Building Research Establishment (BRE), Scotland
Philip Hogg	Chief Executive	Homes for Scotland
Neil Jefferson	Customer and Business Development Director	National House Building Council (NHBC)
Michael Levack	Executive Director	Scottish Building Federation
Alan McAulay	Building Standards Manager	South Lanarkshire Council
Lori McElroy MBE	Programme Director	Architecture and Design Scotland
Rainer Mikulits	Managing Director	Austrian Institute of Construction and Engineering
Knut Helge Sandli	Senior Engineer	Norwegian Building Authority
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Paul Tuohy	Research Fellow	Energy Systems Research Unit, University of Strathclyde

Acknowledgements

- Page 01** Malin House, European Marine Science Park, Dunstaffnage – ADF Architects
(Image © Dennis Hardley Photography)
- Page 02** Forth Valley College, Stirling Campus – Reiach and Hall Architects
(Image © Dave Morris Photography)
- Page 04** The Houl, Dalry, Dumfriesshire – Simon Winstanley Architects
(Image © Andrew Lee Photography)
- Page 07** Model 'D' House, Old Rayne, Aberdeenshire – Gökay Deveci Architect
(Image © Stuart Johnstone Photography)
- Page 09** 5 35' West, Ardfern, Argyll – Cameron Webster Architects
(Image © Keith Hunter Photography)
- Page 11** Japanese House, Portobello – Konishi Gaffney Architects
(Image © Alan Craigie Photography)
- Page 12** Da Vadill Houses, Lerwick – Richard Gibson Architects
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(Image © David Barbour Photography)
- Page 18** Culloden Battlefield Visitor Centre, Inverness – Gareth Hoskins Architects
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