

## EXECUTIVE NOTE

### THE BUILDING (SCOTLAND) AMENDMENT REGULATIONS 2010 SSI/2010/32

The above instrument was made in exercise of the powers conferred by Section 1, 8(8), and 54 of and Schedule 1 to the Building (Scotland) Act 2003. The instrument is subject to negative resolution procedure.

#### Background

The SSI amends the Building (Scotland) Regulations 2004 which prescribe functional standards to apply to the design, construction or demolition of a building, the provision of services, fittings or equipment in or in connection with a building, and the conversion of a building.

The Building (Scotland) Amendment Regulations 2010 will come into force on 1 October 2010.

#### Policy Objectives

The SSI is required to implement changes to the building regulations arising out of an essential updating of standards and guidance, in addition to fulfilling the Scottish Government's purpose and strategic objectives.

The Amendments comprise changes to Regulations and to associated guidance in the Scottish Building Standards Technical Handbooks. The principal amendments are as follows:

- **Section 2 (Fire)** – A requirement is introduced for sprinkler systems within school buildings and minor changes made to update references to the “fire and rescue service”
- **Section 3 (Environment)** – Minor changes are made to clarify ventilation requirements and extend the requirement to control surface or interstitial condensation to all building types, rather than just domestic as presently required.
- **Section 4 (Safety)** – A requirement is introduced for potential points of unlawful entry in domestic buildings to be secured to deter house breaking.
- **Section 5 (Noise)** - Completely rewritten to improve the sound insulation to new attached dwellings, requirements introduced for attached residential buildings, and provision of sound insulation within homes and buildings with sleeping accommodation.
- **Section 6 (Energy)** – Amendments being made to further the conservation of fuel and power and further the achievement of sustainable development.

#### Consultation

The Building (Scotland) Amendment Regulations 2010 and associated technical guidance have been the subject of two public consultations carried out from 6 May 2008 to 29 July 2008 and 30 June 2009 to 2 October 2009.

Details of the consultation package were sent to a wide range of professional organisations and institutions, construction research bodies, designers, housebuilders, technical specialists and those public bodies responsible for the administration and enforcement of the building standards system. The Building Standards Division consultation database comprises approx. 580 construction-related organisations throughout Scotland and the UK and all were invited to comment on the detailed proposals in the consultations.

### **Financial Effects**

For a detailed assessment of the financial effects of the changes to Regulations and guidance, it will be necessary to scrutinise the Costs and Benefits sections of each Regulatory Impact Assessment (RIA), of which there are five: Section 1 - Structure; Section 2 - Fire; Sections 0, 3, 4 – General, Environment & Safety; Section 5 – Noise; and Section 6 – Energy.

Directorate for the Built Environment  
February 2010

**REGULATORY IMPACT ASSESSMENT (Ref: 2009/18)**

**FINAL REGULATORY IMPACT ASSESSMENT  
ON THE REVIEW OF SECTION 1: STRUCTURE OF  
THE TECHNICAL HANDBOOKS  
FOR WAYS OF COMPLYING WITH  
THE BUILDING (SCOTLAND) REGULATIONS 2004 (AS AMENDED)**

**FEBRUARY 2010**

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## REGULATORY IMPACT ASSESSMENT ON THE REVIEW OF SECTION 1: STRUCTURE OF THE TECHNICAL HANDBOOKS FOR WAYS OF COMPLYING WITH THE BUILDING (SCOTLAND) REGULATIONS 2004 (AS AMENDED)

### 1.0 PURPOSE AND INTENDED EFFECT

#### 1.1 Objectives

This Regulatory Impact Assessment (RIA) addresses amendments to the technical guidance on structure within the Building (Scotland) Regulations 2004 and the supporting section 1 of the Technical Handbooks. The key objectives of the amendment are:

- to reference structural Eurocodes in compliance with UK obligations under European Directives;
- to maintain levels of structural safety to protect people in and around buildings; and
- to further the achievement of sustainable development.

It is intended that the amended guidance will come into force on 1 October 2010 and a summary of the proposed technical changes are set out in **Annex C**. In Scotland, the relevant Eurocodes will be cited in the Technical Handbooks which provide guidance on demonstrating that designs comply with the Building (Scotland) Regulations 2004 (as amended).

#### 1.2 Background

Scottish Building Regulations set standards for the health, safety and welfare of persons in and around buildings, furthering the conservation of fuel and power and furthering the achievement of sustainable development. These standards are supported by guidance contained in the Technical Handbooks. The Building Regulations apply to new buildings and to buildings being converted, altered or extended. Scottish Building Regulations are devolved to the Scottish Parliament, therefore there is no alternative framework in place which deals with Scottish Building Regulations and sets standards for structural safety.

Building Regulations are expressed in functional terms and do not dictate the method (national design standard) that should be used to achieve the desired level of structural safety. The Scottish Government issues guidance on how the requirements of the Building Regulations may be met. The guidance may be relied upon in any proceedings as tending to negative liability for an alleged contravention of the Building Regulations. This does not however preclude the use of alternative approaches provided the designer can satisfy the local authority verifier, or in the case of certified designs, the approved certifier, that the aim of the Building Regulations is being fulfilled.

In 1975, the European Commission decided on action, based on Article 95 of the Treaty of Rome, with the objective of the elimination of technical obstacles to trade and the harmonisation of technical specifications. This included the initiative to establish a set of harmonised technical rules for the structural design of construction works (the Eurocodes).

The Eurocodes contain unified calculation methods to be used:

- to design buildings and civil engineering works to harmonised European technical specifications recognised throughout the European Economic Area (EEA); and
- check their conformity with the Construction Products Directive (CPD) 89/106/EEC Essential Requirement (ER) 1 - Mechanical Resistance and parts of ER 2 - Safety in Case of Fire and ER 4 - Safety in Use; and

- determine the performance of construction products for CE marking in accordance with the Construction Products Directive (89/106/EEC) as amended by the CE Marking Directive (93/68/EEC); and
- when producing public procurement construction works and engineering services specifications in accordance with Directive 2004/18/EC of the European Parliament and Council of 31st March 2004 on the co-ordination of procedures for the award of public works contracts, public supply contracts and public services contracts implemented in Scotland by the Public Contracts (Scotland) Regulations 2006.

The Commission developed the first generation of harmonised European Standards (ENV) in the 1980's. In 1989, the Commission transferred the preparation and the publication of the Eurocodes (EN) to the European organisation for standards (CEN). CEN with expert representatives from Member States has prepared a complete suite of structural Eurocodes covering basis of design, loading, the major construction materials, geotechniques and the design in earthquake areas. The Eurocodes were first introduced in Scotland as harmonised European design standards (ENV) in 1994 for practitioners to use and to provide feedback to CEN during their development.

The Eurocodes have more formally co-existed with the UK national standards (British Standards) since May 2007 and have been used by engineers as an alternative approach to satisfy Building Regulations for a number of years.

National Standards Bodies such as the British Standards Institution (BSI) in the UK, are not permitted to change any part of the text in the core EN document. However, they are allowed to add a National title page, a National Foreword and a National Annex. Some safety factors and a number of other parameters, such as those reflecting differences in climatic conditions, are left open in the Eurocodes for selection at a national level. These are termed Nationally Determined Parameters (NDPs). The National Annex may also include reference to non-contradictory complimentary information (NCCI), such as national standards or guidance documents.

Whilst the Eurocodes are voluntary standards, under CEN / National Standard Bodies agreements, the Eurocodes will replace conflicting national standards with the same scope and field of application on 31 March 2010. Withdrawal of a standard means that while documents will still be available there will be no five-year review by a British Standards Institution (BSI) committee to consider the currency of the standard and to decide whether it should be confirmed, revised or withdrawn. Therefore, current levels of safety in structural design will not be updated as knowledge increases. For example, safety factors may need to be amended to take account of climate change. Practically this means that from April 2010, the National Codes of Practice for the design of buildings and civil engineering works in the UK will be the Eurocodes (e.g. BS EN 1992 and not BS 8110 for concrete).

Currently, all 58 Eurocodes have been published by BSI and 44 UK National Annexes are available. Most supporting Documents (e.g. BSI PDs) are also published or will be published by March 2010.

Eurocode 0: EN 1990 Basis of structural design;  
 Eurocode 1: EN 1991 Actions on structures (10 parts);  
 Eurocode 2: EN 1992 Design of concrete structures (4 parts);  
 Eurocode 3: EN 1993 Design of steel structures (21 parts);  
 Eurocode 4: EN 1994 Design of composite steel and concrete structures (3 parts);  
 Eurocode 5: EN 1995 Design of timber structures (3 parts);  
 Eurocode 6: EN 1996 Design of masonry structures (4 parts);  
 Eurocode 7: EN 1997 Geotechnical design (2 parts);  
 Eurocode 8: EN 1998 Design of structures for earthquake resistance (6 parts);  
 Eurocode 9: EN 1999 Design of aluminium structures (5 parts).

### **1.3 Rationale for Government intervention**

The Building (Scotland) Regulations made by the Scottish Ministers are subject to approval by the Scottish Parliament. The content of the regulations, so far as it relates to technical specifications, is also scrutinized by the European Commission (EC). The EC checks with all the countries that have adopted the Construction Products Directive (89/106/EEC) to ensure that no barriers to trade in construction products are created, either directly or indirectly by the way products are described.

To meet the requirements of the CPD, materials and construction methods must be described by use of suitable European Standards wherever these exist. There has been a rolling programme of change from National British Standards to European Standards.

To comply with the Public Procurement Directive (2004/18/EC) in relation to public procurement of construction works and engineering services specifications. The Directive is implemented by The Public Contracts (Scotland) Regulations 2006 which imposes a preference to adopt European Standards when tendering for public works contracts.

Without intervention, Scottish Government may be open to infraction proceedings through failure to properly implement European Directives. For example, if British Standards continue to be cited in the Technical Handbooks, multi-national manufacturers of construction products may complain to the European Commission that Scottish Building Regulations and the supporting guidance provide a regulatory barrier to trade in the European Economic Area. This can result in a ruling or even a fine by the European Court of Justice. EU law can take the form of Regulations, Directives or Decisions and all may require some kind of action by Member States in order to ensure compliance.

The maximum fine that could be imposed on the UK is currently some €534,000 (£350,000) per day or some £127 million per year.

Scotland would be required to pay a percentage of any UK fine (potentially up to 100%) if the infraction related to devolved matters, depending on the extent of our involvement.

From 31 March 2010, the current British Standards (BS) will no longer be supported by BSI and will become progressively more outdated with time. There is a risk that continuing to reference British Standards could lead to confusion over liability should a structural problem arise as a result of using a withdrawn BS containing an error.

Without intervention, the use of the Eurocodes will not be encouraged and the benefits of using the Eurocodes will not be realised.

## **2.0 CONSULTATION**

Before making or amending the Building Regulations, Scottish Ministers are required to consult the Building Standards Advisory Committee (BSAC) and such other bodies as are considered necessary to inform on the matters under consideration. This exercise has been carried out through a BSAC Working Party and discussions have taken place with local authority verifiers and industry.

### **2.1 Within Government**

The SG Building Standards Division consults widely, and has continued dialogue, with the following Government bodies: Department for Communities and Local Government (CLG); Building Regulations Unit – Department of Finance and Personnel, Northern Ireland and the National Assembly for Wales, SG Better Regulation Unit, SG Directorate for the Built

Environment, SG Communities Scotland; SG Greener Scotland Directorate; Historic Scotland; SG Fire and Rescue Advisory Unit; Health and Safety Executive; Scottish Prison Service; MOD Estates; SG Health Directorate; Scottish Environment Protection Agency, Scottish Natural Heritage and SG Procurement Directorate.

## 2.2 Public Consultation

Following consideration by the BSAC Working Party (Structure) on the proposed introduction of the Structural Eurocodes, proposals went to public consultation on 30 June 2009.

The views and opinions on the proposals were sought from over 500 key stakeholders and users of the building standards system in Scotland. Public, private and third sector organisations, Non-Departmental Public Bodies (NDPBs) and individuals were advised of the consultation by letter and that the documents were accessible on the Building Standards Division (BSD) website. 1500 organisations and individuals who have registered to receive the BSD e-newsletter were advised by email. BSD ran 3 Stakeholder Consultation Information events attended by 124 key stakeholders' representatives. The main purpose of these events was to provide an overview and explanation of the questions posed in the consultation paper and to encourage written response to it. In addition, BSD in partnership with Structural Engineers Registration Ltd (SER Ltd), alerted over 478 structural engineers (Approved Certifiers of Design) to the consultation package.

All were invited to submit comments by 2 October 2009. There were 41 responses from the following consultees:

Local Authority	15	37%
Professional Organisations/Trade Associations	9	22%
Individuals	9	22%
Contractors/Developers	2	5%
Manufacturer	3	7%
NDPB or Agency	2	5%
Designer/Consultant	1	2%

3 (7%) of the respondents asked for their responses to remain confidential.

3 (7%) of the respondents did not complete the consultation questionnaire; they submitted comments instead.

12 (29%) of the 41 respondents submitted additional comments.

A list of all consultees is appended to the consultation package which is available on the BSD website at: [www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards](http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards)

The Consultation Report is attached at Annex D.



## **3.0 OPTIONS PROPOSED**

### **3.1 Options**

In considering how to address the objectives identified in 1.1, three options were identified:

- Option 1 Do nothing;
- Option 2 Promotion and subsidy;
- Option 3 Reference Structural Eurocodes in guidance supporting Building Regulations.

### **3.2 Risks associated with each option**

#### **3.2.1 Option 1 Do nothing**

This is a high risk option for Government. Without intervention, the Scottish Government may be open to infraction proceedings through failure to properly implement European Directives (see clause 1.3).

Designs of structures will continue to be made to the withdrawn British Standards (BS). Whilst the BS material codes should continue to produce safe designs there is a risk that they become out-of-date as technology advances or errors in the codes are identified. There is also a significant risk that the BS loading codes will become out of date as a result of changes to snow and wind loads for example. The consequences of climate change will also be taken into account as data emerges to support future revisions to the BS EN National Annexes.

The BS standards are no longer being supported by BSI and there is a risk that using withdrawn standards may produce unsafe designs in the future.

#### **3.2.2 Option 2 Promotion and subsidy**

This is a medium risk option for Government. The use of structural Eurocodes would only be realised in a small proportion of new buildings or building work as a result of the extra costs involved in re-training. Promotion will only be attractive to those clients, developers and procurers of buildings that work across Europe or in the public sector.

This option could be implemented by introducing good practice guidance documents for adoption and application on a voluntary basis. This could be delivered through different media such as Ministerial launch, broadcasting, leaflets and guidance documents made available to designers, developers and builders online and at public libraries.

For this to appeal to wider industry, some incentive would be necessary such as a subsidy, however there are several good reasons against this being the best option:

- it may not be considered appropriate that public money should be used for subsidising new building work in the private sector;
- it is not clear that a subsidy would be effective in increasing the take up of structural Eurocodes;
- promotion would be less likely to be acted upon than introduction through guidance supporting Building Regulations;
- the potential benefits of adopting the Eurocodes may not be realised;
- not in line with SNP manifesto commitment to improve the enforcement of building regulations;
- the Scottish Technical Handbooks would need to be re-written to take account of voluntary codes and the legal status of the guidance would need to be clarified with solicitors.

Implementation and delivery plans would need to be tailored to the specific target audience on a prioritised basis. The Building Standards Division would deliver these plans in

partnership with other key stakeholders such as the Institute of Structural Engineers, The Institute of Civil Engineers, Structural Engineers Registration Ltd and The Standing Committee on Structural Safety. It is anticipated that the implementation and delivery plan would be launched on 31 March 2010 and continue to be delivered over a 5 year period.

### **3.2.3 Option 3: Reference Structural Eurocodes in guidance supporting Building Regulations**

This is a small risk option for Government. The guidance has legal status as one way of complying with Building Regulations. This option also allows SME's to negotiate with local authorities on the continued use of other national standards including withdrawn British Standards on a case by case basis. However should industry and structural engineers choose to use the Eurocodes there will be an increase in costs which may be passed on to the building client.

These costs include:

- cost of re-training;
- cost of in-house familiarisation during design process;
- the additional time spent by the professional institutions to train students and staff; and
- additional time spent by the Local Authority verifier when processing building warrant applications and training staff.

Implementation will be through guidance in the Technical Handbooks which support compliance with Building Regulations. The guidance will apply to building warrant applications received after 1 October 2010 for new buildings and to existing buildings being altered, extended or converted.

A letter will be sent to Local Authority Chief Executives, The Institution of Structural Engineers, the Institution of Civil Engineers, Structural Engineers Registration Ltd and placed on the BSD website from 31 March 2010 explaining the transitional period to 1 October 2010. Those registered for the BSD e-newsletter will also be alerted to the existence of the letter.

## **3.3 Implementation and delivery plans**

### **3.3.1 Option 1 : Do nothing**

No implementation and delivery plan required as there is no change and therefore no delivery.

### **3.3.2 Option 2 : Promotion and subsidy**

Could implement by introducing good practice guidance documents for adoption and application on a voluntary basis. This can be delivered through a number of mediums such as leaflets which could be developed, and made available to designers, developers and builders, for example at libraries and through web access.

### **3.3.3 Option 3 Reference Structural Eurocodes in guidance supporting Building Regulations**

Implementation will be through guidance in the Technical Handbooks which support compliance with Building Regulations. This provides for both flexibility and innovation in the proposed solutions. Proposals will be applied, through Section 9 of the Building (Scotland) Act 2003. The guidance will apply to building warrant applications received after 1 October 2010 for new buildings and to existing buildings being altered, extended or converted.

The Scottish Government (SG) has supported Communities and Local Government (CLG) where their implementation and delivery plan includes:

- supported involvement at relevant committees of the professional Institutions, including the ICE Structures panel and the IStructE implementation panel;
- direct and supported involvement at conferences and training events;
- support for representation of the strategic CEN and BSI committees (e.g. CEN/TC250, ECN, CB/20, B525 to ensure that UK concerns are not compromised;
- support for experts on CEN Project Teams, in particular, those involved in the material independent codes (e.g. EN 1990, EN 1991 and EN 1997) ensuring the influence on the contents of the codes in particular on safety related items;
- support to industry national technical contacts during development;
- support of necessary background research;
- support the provision of Guidance (e.g. Companion Documents for each Eurocode, worked examples etc) which is on the CLG website;
- Two key documents known as the Green Guides; CE Marking under the Construction Products Directive and Implementation of the Eurocodes in the UK; and
- supported involvement in uploading NDP's onto Commission website / database.

The SG and CLG remains committed to supporting the development and the implementation of the Eurocodes. In addition to these established activities, CLG is working closely with the European Commission and other stakeholders on activities looking at further harmonisation such as the reduction of the NDP's in the existing Eurocodes and the development of new Eurocodes (e.g. on structural glass, assessment and retro-fitting of existing structures and robustness). The CLG, through their membership of the ENC, are at present actively involved in advising the Commission on mandates relating to future activities.

Details of the Building Standards Division implementation and delivery plan is contained at Annex B.

## **4.0 COSTS AND BENEFITS**

### **4.1 Sectors and groups affected**

In considering structure, the following sectors and groups for each option are given below.

- a) All those involved with the structural safety aspects of building design and construction would (if they have not already done so) have to familiarise themselves with the new Eurocodes and guidance through training e.g. structural or civil engineers.
- b) Persons procuring new buildings or building work that may need to bear the extra cost of adapting to the Eurocodes.
- c) Builders who may have to modify their standard building types and construction detailing. Where relevant, they would need to seek amended and/or replacement Scottish type approvals and possibly sooner than they had otherwise intended;
- d) Building materials and component manufacturers would need to make changes to their products and literature to suit;
- e) Local authority verifiers would have to train staff in areas where the structural Eurocodes make an impact e.g. LA structural engineers or officials that check against non-certified designs, designs to the Small Buildings Structural Guide or where the Eurocodes are used to satisfy Building Standard 2.3: Structural fire protection;
- f) Professional Institutions such as the Institute of Structural Engineers and The Institute of Civil Engineers continue to run training courses and amend existing publications;
- g) other structural safety enforcing authority personnel e.g. events or safety at sports grounds.

## **4.2 Benefits**

In considering the introduction of Structural Eurocodes, the following benefits for each option are given below:

### **4.2.1 Option 1: Do nothing**

Many firms (including structural engineers) involved in the design and construction of domestic buildings in the UK are micro-businesses or Small to Medium sized Enterprises (SME's). Considering that approximately 80% of all building warrant applications in Scotland involve small extensions or alterations to domestic premises, the need to design to Structural Eurocodes is not considered to be necessary.

Equally, micro-businesses or SME's in the UK manufacturing industry who do not trade out with the UK would see the introduction of the Structural Eurocodes as an unnecessary extra burden imposed by Government.

The 'do nothing' approach at this stage would align with England and Wales who have postponed introduction of the Eurocodes to 2013. This would provide industry with more time to become acquainted with the Eurocodes and continued to allow those firms who wish to use them to do so as an alternative approach to satisfy Building Regulations.

### **4.2.2 Option 2: Promotion and subsidy**

- Targeted and partnership approach to promotion and subsidy is more likely to successful adoption of the Eurocodes than the 'do nothing' approach.
- Professional Institutions such as the Institution of Structural Engineers, the Institution of Civil Engineers are already promoting the use of Structural Eurocodes through conferences, seminars and publications and articles in professional magazines.
- Government subsidy will be welcomed by the professional institutions and the manufacturing industry.
- UK Government less likely to get infracted by EC than 'do nothing' approach.
- Adopting voluntary codes will not be seen as an extra burden imposed by Government.

### **4.2.3 Option 3: Reference Structural Eurocodes in building regulations and guidance**

The Eurocodes are recognised by Member States of the European Economic Area to serve as:

- a framework for drawing up harmonised technical specifications for construction works; and
- a means of demonstrating product compliance with the essential requirements of the Construction Products Directive (89/106/EEC) as amended by the CE marking Directive (93/68/EEC); and
- a basis for specifying contracts for construction works and related engineering services in accordance with the Public Procurement Directive 2004/18/EC.

The intended benefits of the Eurocodes are to:

- provide common design criteria and methods of meeting necessary requirements for mechanical resistance, stability and resistance to fire, including aspects of durability and economy;
- provide a common understanding regarding the design of structures between owners, operators and users, designers, contractors and manufacturers of construction products;
- facilitate the exchange of construction services between Members States;
- facilitate the marketing and use of structural components and kits in Members States;

- facilitate the marketing and use of materials and constituent products, the properties of which enter into design calculations be a common basis for research and development, in the construction industry;
- allow the preparation of common design aids and software;
- increase the competitiveness of the European structural and civil engineering firms, contractors, designers and product manufacturers in their world-wide activities.

### **4.3 Costs**

There are no significant environmental or social costs associated with these measures. The costs of each of the proposals as well as the costs of implementation are discussed below.

#### **4.3.1 Option 1: Do nothing**

This option imposes no implementation costs but there is a risk of costs incurred by Scottish Ministers through UK infraction proceedings as described earlier. The maximum fine that could be imposed on the UK is currently some €534,000 (£350,000) per day or some £127 million per year. Scotland would be required to pay a percentage of any UK fine (potentially up to 100%) if the infraction related to devolved matters, depending on the extent of our involvement.

It is estimated that approximately 25% of structural engineers employed by larger organisations will already be working with and learning the new Eurocodes. The 'do nothing' approach may result in costs associated with abortive work, training and loss of production.

The assessment does not attempt to provide costs associated with estimates of unsafe designs as there is currently limited data available to support this analysis.

Without intervention, the use of the Eurocodes will not be encouraged and the benefits of using the Eurocodes will not be realised. Further analysis is provided below and Section 5: Small / Micro-firms Impact Test and in Annex A.

#### **4.3.2 Option 2 Promotion and subsidy**

This option would impose some costs on Government to fund efforts to encourage industry to adopt best practice principles and to produce guidance material to show how this could be achieved.

No exact values have been assessed, as the actual costs will be proportional to the number and type of publications and the extent of the advertising and publicity campaign. However, the recent promotional campaign to launch the fire safety regulations and guidance for existing buildings under Part 3 of the Fire (Scotland) Act 2005, cost around £350k allocated to fund:

- guidance documents;
- website;
- press articles;
- radio adverts;
- trade publications;
- posters; and
- leaflets.

As with the potential benefits, these costs are difficult to estimate since they depend on the take-up rate, but they could amount to 10% of option 3 and it is likely that take-up would be highest in the public sector due to the Public Procurement Directive (2004/18/EC) implemented by The Public Contracts (Scotland) Regulations 2006.

The development costs for production of voluntary guidance documents would form part of the work of the Scottish Government - Building Standards Division. Therefore the costs of development, publishing, distribution and raising awareness of voluntary codes would be borne by Government and not the public. The documents would be available online at no charge. References made to BS would be replaced by reference to BS EN standards. See cost analysis in Section 5.0 and Annex A to establish the cost of purchasing Eurocodes and training costs.

#### **4.3.3 Option 3: Reference structural Eurocodes in Technical Handbooks that supports compliance with building regulations**

There will be one-off costs imposed by this proposal and these will be largely incurred by consultancies which specialise in building structural designs. In order to estimate these one-off costs, an estimate for an average consultancy in the industry has been made based on a report published in 2004 by the Institution of Structural Engineers (ISE) – ‘National Strategy for Implementation of the Structural Eurocodes: Design Guidance – April 2004’. This report provided estimates on the costs of adopting the Eurocodes. Our approach has been to refine some of the assumptions underlying these estimates where appropriate and to adjust the 2004 cost figures in line with inflation.

These one-off costs are likely to include the following (this is not an exhaustive list):

- purchasing the structural codes and the National Annexes;
- purchasing guidance documents;
- attending technical seminars;
- self training and adapting in-house practice to comply with the Eurocodes; and
- loss of production.

It is estimated to cost on average £1500 to buy the relevant codes per SME firm and a further £1500 on average per structural engineer for training. Clearly these figures will vary according to a number of variables such as:

- does the firm already have access to existing BS and EN standards online?;
- how many Eurocodes are required to carry out the work profile of the engineer?

More detailed analysis is carried out in Section 5.0 and Annex A.

The costs to the construction industry material sectors is comparable to designs adopted under existing British Standards (see Annex A).

#### **4.4 Effects on Firms / Consumers and the Public Sector**

##### **Effect on Firms**

There will be costs involved in the construction industry for the introduction of structural Eurocodes. The impact on larger firms who already design projects to the Eurocodes will be minimal. The impact of the Eurocodes on firms who do not have access to them or are not acquainted with them will incur additional costs of buying the documents, training and loss of production during the transition process. It is expected that some of these costs may be passed onto the consumer. For example, engineers who use the Eurocodes will take longer to design structures in the initial transition stage and until they become familiar with the codes. Thereafter, normal Continuing Professional Development (CPD) studies required for the professional institutions (e.g. 30-40 hours per year) is expected to maintain technical knowledge levels.

The effect on the manufacturing construction material sectors (e.g. steel, concrete, masonry, timber etc) is expected to be minimal (see Annex A) as the National Annex calibration of the Eurocodes will not significantly change production. Costs will be incurred to update technical literature although this would have been necessary if new BS codes were

introduced or existing codes updated. All firms will have to make their employees aware of the changes and may have to provide training sessions for their staff.

An opportunity exists for firms to compete internationally for contracts awarded in the field of design and construction which could result in employing new members of staff.

### **Effect on Consumers**

Clients receiving a design service may incur additional design costs and delays as engineers become familiar with the new Eurocodes however this is likely to be off-set against competition in the market place. Ultimately, clients in the construction industry are likely to receive a reduction in costs as competition has been widened.

### **Effect on the Public Sector**

Contractors tendering for Public sector clients should give preference to European standards in their tender specifications in accordance with The Public Contracts (Scotland) Regulations 2006 transposing EU public procurement Directive (2004/18/EC). Public sector clients should therefore benefit from increased competition.

## **5.0 SMALL / MICRO FIRMS IMPACT TEST**

The SG Building Standards Division has consulted The Department of Business, Enterprise and Regulatory Reform (BERR) and followed the relevant guidance.

The small firm's impact test regards all firms with less than 50 full time employees as being small businesses. The majority of small firms have fewer than 10 employees and guidelines state that a concerted effort should be made to consult them over policy proposals.

The UK construction industry is dominated by small firms. Over 99 per cent of the around 980,000 enterprises in the construction sector in 2007, were small firms<sup>1</sup> with the majority being classified as sole proprietorships. In 2007, small firms accounted for 75 per cent of construction sector employment and over 54 per cent of industry turnover.

Parties affected by the proposals would include small firms involved in the construction of buildings and in the materials used in construction. There are a number of ways in which small firms may be disproportionately affected by the proposals when compared to how larger firms are affected, for example, it may be harder for small firms to alter their design process.

Assessment has been based on Option 3 as Options 1 and 2 have no cost implications for small firms, including micro-businesses.

The majority of SME's and micro-businesses in the construction industry deal with the domestic alteration and extension market. The proposed changes may have an impact on domestic alterations and extensions. For small structural engineering firms in the construction industry, the proposed technical changes will create some training issues if they choose to adopt the Structural Eurocodes.

In order to explore the issues facing smaller firms, the Building Standards Division contacted and interviewed the following 5 small businesses by telephone:

- Structural Engineer (Sole Trader);
- Material sector structural Engineer (Sole Trader)
- Construction Group (350 employees with 1 structural engineer)
- Consultants (43 employees, with 17 structural engineers)
- Engineering Group (5 employees with 2 structural engineers)

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<sup>1</sup> BERR statistics [http://stats.berr.gov.uk/ed/sme/smestats2007.xls#UK Whole Economy!A1](http://stats.berr.gov.uk/ed/sme/smestats2007.xls#UK%20Whole%20Economy!A1)  
Small firms defined as firms employing less 50 employees, including sole traders.

## **Familiarity with the provisions of the Eurocodes**

Generally respondents were not fully familiar with the provisions of the Eurocodes but have attended some training seminars to raise their knowledge and awareness of them. One respondent commented that the language and equations used in the Eurocodes were different but the end results were the same as using British Standards. All respondents have knowledge of the principles contained in the Eurocodes but most of them have still to apply them in practice.

## **Costs and benefits of fulfilling the Eurocodes**

All respondents thought that the costs of fulfilling the Eurocodes would be relatively high when compared to the potential benefits. The main cost would be the cost of training staff and the loss of productive time associated with this, although buying the Eurocodes would also be a significant cost in some cases. There might also be additional design costs associated with using the Eurocodes until engineers become familiar with them.

Training costs estimates varied from £400 per engineer due to current levels of knowledge and economies of scale to £1500 per engineer. Costs would vary according to how many Eurocodes each engineer was required to use and be familiar with but £1500 per engineer was the consistent estimate from most SME's interviewed.

Firms suggested that that they would need to purchase between 10 and 15 Eurocodes and estimated these at an average of £110 per code. One respondent suggested that simplified design manuals produced by industry or the professional institutions would be used initially by engineers at a cost of on average £60 per manual. No firm interviewed would need to purchase all 58 parts. Those respondents from larger organisations commented that there would be no additional costs as they could obtain Eurocodes through their normal online subscription to access standards.

One respondent said that using the Eurocodes took longer and that the end product could cost about 10 per cent more to make. However, other respondents suggested that costs for some structures would in fact be lower, with a saving of around 5 per cent for some buildings. This is in line with our estimates presented in Annex A, although the 10 per cent increase in costs seems particularly high.

It was generally thought that increased opportunities in terms of it being easier to compete abroad would be unlikely to accrue to small firms. It was pointed out that most small firms tend to work in a 30 mile radius of their locality. There might, however, be increased opportunities for larger firms who either already operated overseas or had the capacity to do so. It was also thought that the Eurocodes would lead to more opportunities for overseas contractors to work in the UK.

Structural Engineers and other SME's may choose not to adopt the guidance in the Technical Handbooks and propose an alternative approach such as using existing British Standards. In such cases, the design methodology must be agreed with the local authority on a case by case basis.

## **Summary - small firms impact test**

Generally, there are likely to be costs to most SME's resulting from the implementation of the Eurocodes, both in terms of training staff and in purchasing the Eurocodes. Training costs are likely to impact more on smaller firms because they do not have the economies of scale available to larger firms.



There may also be some increased construction costs (depending on the sector) associated with using them but overall, an aggregate of 0.3% cost savings is estimated in construction costs. See Annex A.

The benefits accruing from the Eurocodes such as increased ability to compete abroad are less likely to accrue to small firms than larger firms as small firms tend to work more locally.

It is considered that the proposals to change the guidance apply in a proportional and equitable way. Only those firms that choose to adopt the Eurocodes to erect, alter, extend or convert buildings will be subject to the proposed changes

## **6.0 LEGAL AID IMPACT TEST**

There will be no increased use of legal process or new rights created by the revised guidance therefore no impact on the need for legal aid.

## **7.0 'TEST RUN' OF BUSINESS FORMS**

There are no business forms included with any of the options.

## **8.0 COMPETITION ASSESSMENT**

If Ministers choose option 1 or option 2, this may result in criticism and lobbying from industry which could lead to infraction proceeding be taken against Scottish Ministers by the European Commission.

Option 3 - the programme of Eurocodes includes ten main subjects:

- EN 1990 Basis of structural design
- EN 1991 Actions on structures
- EN 1992 Design of concrete structures
- EN 1993 Design of steel structures
- EN 1994 Design of composite steel and concrete structures
- EN 1995 Design of timber structures
- EN 1996 Design of masonry structures
- EN 1997 Geotechnical design
- EN 1998 Design of structures for earthquake resistance
- EN 1999 Design of aluminium structures

The key construction sectors of industry are covered therefore no competition issues exist in manufacturing to the Eurocodes. The benefits accruing from the Eurocodes such as increased ability to compete abroad are less likely to accrue to small firms than larger firms as small firms tend to work more locally.

Therefore, as the Eurocodes are voluntary, there are no significant areas where issues of competition, restriction or imbalance have been identified.

## **9.0 ENFORCEMENT, SANCTIONS AND MONITORING**

### **9.1 Background**

All matters relating to enforcement, sanctions and monitoring will be carried out under the existing processes, which form the building standards system in Scotland, as set out under the Building (Scotland) Act 2003. Parties responsible for operation of this system are the 32

Scottish local authorities, appointed as verifiers under the Act, and the Building Standards Division of the Scottish Government.

## 9.2 **Enforcement and sanctions**

Generally, work subject to the Building (Scotland) Regulations 2004 as amended requires a building warrant to be obtained from the verifier prior to work commencing and, a Completion Certificate accepted by the verifier once works are finished. Any works that do not require a building warrant are also set out in the regulations.

Where a building warrant is required, proposals are subject to the scrutiny of verifiers who have enforcement powers under the Act to ensure compliance with the regulations. Where cases of non-compliance are referred to the Procurator Fiscal, persons found guilty of offences in terms of the Act are liable on summary conviction to a fine not exceeding level 5 on the standard scale (currently £5000).

## 9.3 **Monitoring**

The Building Standards Division will review the implementation of any changes made to building standards legislation and guidance. The Division will monitor the effectiveness of any changes and ensure that subsequent reviews are made on an informed basis.

In line with Scottish Government policy, any implemented changes will be subject to a revised RIA within a 10-year period.

## 9.4 **Post-implementation review**

Continuous monitoring of the implementation of proposals is available through feedback from local authority verifiers, designers, manufacturers, developers and property owners. These parties are in regular contact with the technical officers in the Building Standards Division and the queries they raise will offer a broad view of how proposals are being implemented and if intent is being achieved. They may also identify areas where objectives may be unclear and allow clarification of these objectives as part of the ongoing review process. Issues raised in this manner become a matter of record and are used to inform the continued development of building standards and guidance.

# 10.0 **SUMMARY AND RECOMMENDATION**

## 10.1 **Summary of Costs**

We estimate the total one-off transition costs to implementing the Eurocodes to be in the aggregate £17.5 million. After the initial costs we expect there to be no further transition costs to implementation. We believe that any future periodic updating of the Eurocodes would be sufficiently minimal to be covered by Continued Professional Development required through membership of the professional institutions.

Cost to construction industry in terms of construction costs is in the aggregate comparable between British Standards and Eurocodes, therefore no additional construction costs are expected.

See Annex A for details.

## 10.2 Summary benefits and costs table

Option	Total benefit per annum	Total cost per annum
<p>Option 1 Do nothing.</p>	<p>This approach would align with England and Wales who have postponed the introduction of the Eurocodes to 2013. This would provide industry with more time to become acquainted with the Eurocodes and continue to allow those firms who wish to use them to do so as an alternative approach to satisfy Building Regulations.</p>	<p>This option imposes no implementation costs but there is a risk of costs incurred by Scottish Ministers through UK infraction proceedings for failure to properly implement the Public Procurement Directive (2004/18/EC) and the Construction Products Directive (89/106/EEC) as amended by the CE marking Directive (93/68/EEC)</p> <p>This can result in a ruling or even a fine by the European Court of Justice. EU law can take the form of Regulations, Directives or Decisions and may require some kind of action by Member States in order to ensure compliance.</p> <p>The maximum fine that could be imposed on the UK is currently some €534,000 (£350,000) per day or some £127 million per year.</p> <p>Scotland would be required to pay a percentage of any UK fine (potentially up to 100%) if the infraction related to devolved matters, depending on the extent of our involvement.</p>
<p>Option 2: Promotion and subsidy</p>	<p>UK Government less likely to get infringed by EC than the 'do nothing' approach.</p> <p>Adopting voluntary codes will not be seen as an extra burden imposed by Government especially on SME's.</p>	<p>Estimated £350k allocated to fund for:</p> <ul style="list-style-type: none"> <li>• guidance documents;</li> <li>• website;</li> <li>• press articles;</li> <li>• radio adverts;</li> <li>• trade publications;</li> <li>• posters; and</li> <li>• leaflets.</li> </ul> <p>As with the potential benefits, these costs are difficult to estimate since they depend on the take-up rate, but they could amount to 10% of option 3 and it is likely that take-up would be highest in the public sector due to The Public Contracts (Scotland) Regulations 2006.</p>

Option 3:	Adopting the Eurocodes will demonstrate product compliance with the essential requirements of the Construction Products Directive (89/106/EEC) as amended by the CE marking Directive (93/68/EEC) and promote compliance with the Public Procurement Directive 2004/18/EC.	Total cost of buying Eurocodes, guidance manuals, attending training seminars, self-training and loss of production for 1544 professionals in Scotland is estimated at £17.5m.  Cost to construction industry in terms of construction costs is in the aggregate comparable between British Standards and Eurocodes, therefore no additional construction costs are expected.
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### 10.3 Recommendation

From the information provided in the preparation of this RIA it is proposed to adopt option 3 to meet EU obligations under the Construction Products Directive (89/106/EEC), The Public Procurement Directive (2004/18/EC) and all associated Regulations.

### 11.0 DECLARATION AND PUBLICATION

#### DECLARATION

**I have read the Regulatory Impact Assessment and I am satisfied that the benefits justify the costs.**

**Signed by the accountable Minister** . . . . .

**Stewart Stevenson, Minister for Transport, Infrastructure and Climate Change**

**Date** . . . . .

Contact: Colin Hird  
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## ANNEX A

### ESTIMATE OF FUTURE COSTS

According to a study carried out in 2004 by the Institution of Structural Engineers, the total costs of adopting the Eurocodes within a consultancy with 16 fee-earning technical staff specialising in building structures would be approximately £255,000. The costs were expected to be incurred as a one-off expense during the first year of implementation however, we suspect that these costs may be spread over the first 3 years of implementation. The table below provides a breakdown of this figure into its constituent components assuming the firm does not have access to existing codes online.

Item	Cost (£)
Cost of purchasing 1 set of structural Eurocodes including National Annexes (estimate)	2,750
Cost of buying guidance documents (assumed)	1,000
Cost of updating software (assumed)	20,000
Attendance at technical seminars (assume 3 days per person)	
Cost of seminars (assume £150 net each seminar) = $16 \times 3 \times £150$	7,200
Cost of attendance = $16 \times 3 \times 7.5 \times £50$	18,000
Familiarisation with codes in the office (assume 12 man days for each person) = $£16 \times 12 \times 7.5 \times £50$	72,500
Alterations to standard 'in house' specification documents (allow 14 documents at average of 1 man –day each) = $£14 \times 7.5 \times £50$	5,250
Loss of productivity during the first year of change (assume an average annual billing (productive time) = 1600 hours and 10 per cent loss of productivity) = $1600 \times 16 \times 0.1 \times £50$	128,000
<b>TOTAL</b>	<b>254,700</b>

Source: *Institute of Structural Engineers (2004)*

As can be seen from the above table, the total implementation cost estimated here is very sensitive to assumptions made with regard to the expected loss of productivity that is likely to arise as a result of having to adjust to the new codes. We have refined this estimate in the following ways:

**Passing of time** — because the estimates above date back to 2004, we assume that during the five years since the report was produced, the implementation processes in the UK would be underway; familiarisation, purchasing codes, and alteration of current documents are has already begun. As such, it has been assumed 5 per cent implementation of Eurocodes by 2009.

**Revising the cost of purchasing Eurocodes** — we do not believe it is realistic to expect all firms to purchase the complete set of 58 Eurocodes, but only those that are practically necessary for the work carried out in relation to Section 1 of the Technical Handbooks. We have therefore revised the purchasing cost accordingly downward.

**Decreasing cost of updating software** — much of the cost of updating software would have decreased significantly since 2004 due to technological advances. Moreover, beyond this, we expect that because the Eurocode implementation will be and already is seen as such a major change, most of the existing software will, driven by competition in the market, incorporate the new codes into annual updates. This will further reduce any additional cost for updated software had by the Eurocodes by at least 50 per cent.

Based on current software packages, we believe that updated versions may also aid in company familiarisation processes. For example, interactive learning modules could offset some of the expected productivity loss to Eurocodes.

**Other drivers of implementation** — it would be inaccurate to attribute UK implementation of the Eurocodes to guidance supporting Building Regulations. In the first place, it is likely that a number of internationally-focused EU firms will transition to Eurocode-based procedures in any of the other 26 Member States. There is also an important dynamic aspect to take into account, characterised by pre-emptive implementation of the codes by leading market players in order to stay ahead of the curve (the pre-emptive behavior of certain firms would be independent of the general time passing described above). The proportion of firms we can expect to pre-emptively learn Eurocodes has primarily been dependant on the deadline for complete implementation. We would attribute no more than 75 per cent of Eurocode implementation in the UK to the publication of the guidance supporting Building Regulations.

**Adjusting the assumption about productivity loss** — in the above estimate the assumptions about the loss in productivity, account for over half of the total implementation cost. We believe that the 10 per cent assumption is likely to be an overestimate and that this is largely because losses in productivity will already have been captured to some extent within some of the other cost categories. For example in attending seminars, and time spent in becoming familiar with the codes. One contributing factor to this is the current Continuous Professional Development (CPD) requirement for industry members to undergo one week of professional training per year; this amounts to approximately 2.5 per cent of annual labour time spent fostering productivity. Given the timeliness and importance of Eurocode implementation, these seminars would doubtless include education on them.

Thus, accounting for productivity loss in the way it has been done above, suggests some element of double counting will have been carried out. Because the overlap between productivity loss and offsetting components (e.g. familiarisation, CPD, intra-company knowledge spillover, interactive software, pre-existing adoption initiatives, etc.), we revise the 10 per cent assumption of productivity loss to 5 per cent net productivity loss.

**Accounting for inflation** — Having revised the estimate according to the above refinement, adjust the new estimate to account for inflation changes between 2004 and 2008. According to CPI data published by the OECD, UK inflation between 2004 and 2008 was 6.5 per cent.

Revised Estimate of the Costs of Adopting the Eurocodes within a Consultancy with 16 Technical Staff Specialising in Building Structures with no current access to existing codes online

Item	Cost (£)
Cost of purchasing 1 set of structural Eurocodes including National Annexes (estimate) 15 x £130	1,950*
Cost of buying guidance documents (assumed) = 10 @ £70	700*
Cost of updating software (assumed) = 0.5x£20,000	10,000*
Attendance at technical seminars (assume 3 days per person)	
- Cost of seminars (assume £150 net each seminar) = 16x3x£150	7,200
- Cost of attendance = 16x3x7.5x£50	18,000
Familiarisation with codes in the office (assume 12 days for each person) = 16x12x7.5x£50	72,000
Alterations to standard 'in house' specification documents (allow 14 documents at average of 1 day each) = 14x7.5x£50	5,250
Loss of productivity during the first year of change (assume an average annual billing (productive time) = 1600 hours and 5 per cent loss of productivity) = 1600x16x0.05x£50	64,000*
<b>Sub - Total</b>	<b>179,100*</b>
Add inflation 6.5% (2004 – 2008 figures)	190,741
Deduct 5% implementation by 2009	- 9537
<b>TOTAL</b>	<b>181,204</b>

*\*Estimate has been revised following changes to underlying assumptions*

*Source: Institute of Structural Engineers (2004), Scottish Government Building Standards Division*

The above estimate is based on the assumption of a consultancy with 16 engineers. Multiplying the average costs for one engineer by the total number of structural engineers that are members of the Institution of Structural Engineers in Scotland provides an estimate of the total transition costs that will be expected to arise as a result of adopting the Eurocodes.

While we do not expect every member of the ISE to comply with the transition to Eurocodes, as some members may continue to use existing standards. We nevertheless assume that there are other associations and institutions which we are presently not taking account of such as civil engineers who carry out structural design of buildings. We also assume that 25% of firms (see section 5.0) will have access to existing codes online and will incur no additional cost when accessing Eurocodes. Therefore we are settling on the total number of registered structural engineers (excluding retired members) as our estimate for the number of parties incurring transition costs and consider this to be a conservative estimate.

**Table : Aggregate transition costs**

Scenario	Expected transition cost per structural engineer (£)	Total number of registered structural engineers in Scotland	Aggregate transition costs (£million)
Therefore allowing 5.0% implementation by 2009 and 5.0% productivity loss	11,325	1544	17.5

*\* This figure was obtained from the Institution of Structural Engineers*

*Source: Institute of Structural Engineers (2004), Scottish Government Building Standards Division*

### 4.3.2 Cost of construction

An assessment has been carried out to establish whether there is likely to be an increase in construction costs as a result of implementation of the Eurocodes<sup>2</sup>. In order to analyse the main impacts of the changes to be introduced a key component of our methodological approach included the employment of notional building designs using the current and the proposed standards in order to assess what the impacts of adopting Eurocodes would be on the cost of constructing these buildings in practice.

The relevant codes Structural codes considered here include EN1990, EN1991, EN1992, EN1993, EN1994, EN1995 and EN1996. EN 1998 and EN 1999 are not considered here because of their relative insignificance to the UK's construction industry.

The notional buildings designed to both Eurocodes and British Standards so that cost comparisons can be made were:

- A two-storey detached house with masonry walls, timber floors and traditional timber rafter roof;
- A single-storey office block, constructed similar to the above house;
- A seven-storey office building, constructed of reinforced concrete;
- A seven-storey office building similar to the concrete building, but now of steel and steel-concrete composite construction.

<b>Building type</b>	<b>Construction costs under British Standards (£)</b>	<b>Construction costs under Eurocodes (£)</b>	<b>Change (£)</b>	<b>Change (%)</b>
Two storey detached house (masonry)	40,621	40,505	-116	-0.28
Single storey office	47,179	47,179	0	0
Seven storey concrete office building	1,806,688	1,801,081	-5,607	-0.3
Seven storey steel office building	1,682,105	1,689,455	7,350	0.4

**Total cost of change (%) = -0.18%**

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<sup>2</sup> Europe Economics draft report - Consultation Stage Impact Assessment of the Adoption of the Eurocodes (June 2009)



## **ANNEX B**

### **IMPLEMENTATION & DELIVERY PLAN**

#### **DELIVERY AND COMMUNICATION**

The proposed changes will be taken forward in the form of guidance within the Technical Handbooks which support compliance with the Building (Scotland) Regulations 2004. This guidance will be introduced as part of the Building (Scotland) (Amendment) Regulations 2010 and implementation will be carried out under existing processes, which form the building standards system in Scotland, as set out by the Building (Scotland) Act 2003.

The Technical Handbooks are the primary reference source for compliance with building standards and, as such, are used by designers and others involved in the building process to ensure compliance with the Scottish Building Regulations.

The guidance to the standards will illustrate the most common way of meeting the requirements of the building standards and, thus, complying with the Building (Scotland) Regulations 2004 (as amended). When carrying out work that is subject to the building standards, it is the duty of the relevant person (normally the owner of the building) to comply with the requirements of the Regulations.

Publication in this form is the established method of introducing changes to the building standards system and ensures that information on changes reaches those involved in works that are subject to building standards. This information is made available in paper form, as a priced publication, or free of charge, as an electronic download from the Building Standards Division (BSD) website, [www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards](http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards)

#### **IMPLEMENTATION**

The proposed changes will form part of the building standards system in Scotland, produced and maintained, on behalf of Ministers, by the BSD and operated and enforced by the 32 Scottish local authorities.

Building work subject to the Building (Scotland) Regulations 2004, as amended, requires a building warrant to be obtained prior to commencing building work and to have a Completion Certificate accepted by the Verifier on completion of the work. Such works are subject to the scrutiny of local authorities as Verifiers of the system, who also have enforcement powers under the Act to ensure compliance with the Regulations.

#### **IMPLEMENTATION PERIOD**

The proposed changes to the guidance within the Technical Handbooks are relevant to any party responsible for a building who intends to carry out building work that is subject to building regulations.

Proposed changes will be published online in April 2010 with hard copy documents following on. Guidance will come into effect on the 1<sup>st</sup> of October 2010 and be applicable to all building warrant applications made on or after that date. This will provide the minimum 12 week implementation period required for any such change.

## **PROMOTION**

Any changes to the building standards system are publicised by the BSD through the website, seminars and articles in relevant publications. In addition, the BSD would seek to promote changes to the standards and guidance in association with organisations who have an expressed interest in building design and accessibility issues, together with other key stakeholders who have been involved in development of guidance and in the consultation process.

## ANNEX C

### SUMMARY OF PROPOSED CHANGES

This Regulatory Impact Assessment (RIA) addresses the proposals to amend the guidance in Section 1: structure of the Technical Handbooks and in particular:

- Standard 1.1 Structure;
- Standard 1.2 Disproportionate Collapse.

It should be noted that the small buildings structural guidance has been removed from the Technical Handbooks and is currently being updated to align with the introduction of the Structural Eurocodes. The existing guidance in the Handbooks can continue to be used until the amended regulations and guidance comes into force on 1 October 2010. The intention is to produce an updated but separate publication titled 'The small buildings structural guidance (2010)' which should be available from October 2010.

### CHANGES GENERALLY

This summary outlines proposed changes to the guidance contained in Section 1: Structure of the Technical Handbooks. The key objectives of the proposals are:

- to reference structural Eurocodes in compliance with UK obligations under European Directives;
- to maintain levels of structural safety to protect people in and around buildings; and
- to further the achievement of sustainable development.

The numbering system below refers to the relevant clause number within the Technical Handbooks.

### DOMESTIC BUILDINGS

- 1.0.1 reference to SCOSS updated
- 1.0.1 guidance for clients on procurement added
- 1.0.2 aims re-written to reflect Structural Eurocodes
- 1.0.4 clause on certification introduced
- 1.0.5 guidance on relevant legislation added for CDM regulations
- 1.0.5 guidance on alternative approaches added including the use of withdrawn British Standards
- 1.1.1 reference to guidance on fixings and stone masonry added
- 1.1.2 reference to Structural Eurocodes added for loadings
- 1.1.3 reference to Structural Eurocodes added for design and *construction*
- 1.1.4 reference to BS EN 1997-2:2007 for geotechnical investigation of the site
- 1.1.5 reference to BS EN 1997-1:2004 for design of *foundations* adjacent to existing *buildings*
- 1.2.1 guidance in relation to disproportionate collapse updated to align with Structural Eurocodes

The previous annexes forming the Small Buildings Structural Guidance (SBSG) have been removed from the Technical Handbook and is now referenced in clause 1.0.6.

### NON-DOMESTIC BUILDINGS

- 1.0.1 reference to SCOSS updated
- 1.0.1 reference to procurement added
- 1.0.2 aims re-written to reflect Structural Eurocodes
- 1.0.4 clause on certification introduced
- 1.0.5 guidance on relevant legislation added for CDM regulations
- 1.0.6 guidance on alternative approaches added including the use of withdrawn British Standards
- 1.1.1 reference to guidance on fixings and stone masonry added
- 1.1.2 reference to Structural Eurocodes added for loadings

- 1.1.3 reference to Structural Eurocodes added for design and *constructon*
- 1.1.4 reference to BS EN 1997-2:2007 for geotechnical investigation of the site
- 1.1.5 reference to BS EN 1997-1:2004 for design of *foundations* adjacent to existing *buildings*
- 1.2.1 guidance in relation to disproportionate collapse updated to align with Structural Eurocodes

## **DEFINITIONS TO BE REMOVED**

It is proposed to remove the following definitions from Appendix A of the Technical Handbooks. Instead, reference to loads will be made by referring to the appropriate expressions contained within the Eurocodes.

**Dead load** means the load due to weight of all walls, permanent partitions, floors, roofs and finishes, including services and other permanent *construction* and fittings.

**Imposed load** means the load assumed to be produced by the intended occupancy or use, including the weight of moveable partitions; distributed, concentrated, impact, inertia and snow loads, but excluding wind loads.

**Wind load** means the load due to the effects of wind pressure or suction.

## **ANNEX D**

### **CONSULTATION RESPONSES SUMMARY**

#### **ACKNOWLEDGEMENTS**

We are grateful to all of the respondents who contributed their views on these building standards review proposals.

#### **EXECUTIVE SUMMARY**

1. A consultation exercise commenced on the 30 June 2009 to seek comments on proposals to amend the guidance contained within the Technical Handbooks in Section 1 - Structure. The closing date for the consultation was 2 October 2009. Consultation proposals were placed on the Building Standards Division (BSD) website and over 500 key stakeholders were invited to respond. Consultees were encouraged to respond on any aspect of the proposals but were specifically invited to comment on the targeted issues.

The key objectives of the proposed amendments are:

- to reference structural Eurocodes in compliance with UK obligations under European Directives;
- to maintain levels of structural safety to protect people in and around buildings; and
- to further the achievement of sustainable development.

4. There were 41 responses to the consultation. The majority of respondents are generally content with what is proposed.

5. A detailed analysis of the content of all the consultation responses has been carried out by the Building Standards Division (BSD) of the Scottish Government in consultation with the Building Standards Advisory Committee (BSAC) - Structure Working Party. The Division have considered the extremely helpful comments and suggestions from responders on the technical detail.

6. The analysis of responder's comments did not identify any strong barriers or objections to the proposed changes, with the exception of the proposal to remove guidance on disproportionate collapse. A significant level of concern was also expressed regarding the proposals effect on the continued use of existing British Standards.

7. The Building Standards Advisory Committee (BSAC) working party met on 17 December 2009 to review the responses received from the consultation exercise and approved the various recommendations included in this report.

## 1. INTRODUCTION

Scottish building regulations set standards for the health, safety and welfare of persons in and around buildings, furthering the conservation of fuel and power and furthering the achievement of sustainable development. These standards are supported by guidance contained in the Technical Handbooks. The building regulations apply to new buildings and to buildings being converted, altered or extended.

## 2. THE CONSULTATION PROCESS

Before making or amending the building regulations, Scottish Ministers are required to consult the Building Standards Advisory Committee (BSAC) and such other bodies as are considered necessary to inform on the matters under consideration. This exercise has been carried out through a BSAC Working Party and discussions have taken place with local authority verifiers and the industry.

Following consideration by the Building Standards Advisory Committee (BSAC) Structure working party of proposed changes to the guidance contained in Section 1: Structure of the Technical Handbooks and the proposed introduction of the Structural Eurocodes in 2010, Building Standards Division (BSD) went to public consultation on 30 June 2009.

The views and opinions on the proposals were sought from over 500 key stakeholders and users of the building standards system in Scotland. Public, private and third sector organisations, Non Departmental Public Bodies (NDPB's) and individuals were advised of the consultation by letter and that the documents were accessible on the Building Standards (BS) website. Also, 250 organisations and individuals who have registered with BSD were advised by email. In addition, BSD ran 3 Stakeholder Consultation Information events attended by 124 key stakeholders' representatives to provide an overview and explanation of the questions posed in the consultation paper and to encourage written response to it. All were invited to submit comments by 2 October 2009.

In addition to agreeing or disagreeing with the specific questions for the proposals a number of responders offered comments or suggestions on the detail of the proposals. To ensure that all comments were considered, the analysis of the questionnaire responses and all additional comments received was carried out by the Building Standards Division (BSD) of the Scottish Government in consultation with the Building Standards Advisory Committee (BSAC) - Structure Working Party. This working group consists of experienced construction professionals from various sectors of the industry who are familiar with the proposals, having been involved since the initiation of the review. The working party met on 17 December 2009 to review the responses received from the consultation exercise and approved the various recommendations included in this report.

There were 41 responses from the following organisations:

Local Authority	15	37%
Professional Organisations / Trade Associations	9	22%
Individuals	9	22%
Manufacturer	3	7%
Non-Departmental Public Body or Agency	2	5%
Contractors / Developers	2	5%
Designer / Consultant	1	2%

2 respondents asked for their responses to remain confidential:

- CORSIE Consulting Structural Engineers
- Scottish Building Federation.

5 respondents didn't provide permission to publish their responses and so they must be treated as confidential:

- Robert Mosiey
- Hugh Campbell
- Historic Scotland
- Argyll & Bute Council
- Ogilvie Construction

3 (7%) of the respondents did not complete the consultation questionnaire; they submitted comments instead.

In total, 12 (29%) of the 41 respondents submitted additional comments.

### **3 CONSULTATION ISSUES AND RESPONSES**

The consultation paper sought views on eight questions on proposals intended to maintain, or where necessary improve, levels of structural safety to protect people in and around buildings and to further the achievement of sustainable development. An important matter was the proposal to reference structural Eurocodes through building regulations and provide guidance to comply with European Directives. The proposals are intended to apply to both domestic and non-domestic buildings.

#### **3.1 Issue 1: Construction procurement**

##### **3.1.1 Background**

The contractual arrangements used by clients to procure a building can have important consequences for the reliability of the design and the adequacy of the construction. Clients have a duty under the Construction Design and Management Regulations 2007 (CDM) to ensure that competent people are employed to do the work, that sufficient time is allocated for the work to be undertaken and that the various members of the design and construction teams cooperate and exchange information. Frequently building design procurement will involve the appointment of a number of designers who may be employed by more than one organisation. Detailed design of individual structural details and components can be passed to specialist contractors. In these circumstances a lead designer or other appropriately experienced and qualified person should be appointed to oversee the design process.

The purpose of introducing guidance on procurement matters to the technical handbooks was to draw to the attention of those procuring construction work the importance of these matters to the successful compliance with the requirements of the building standards. In addition the guidance will advise that Scottish Ministers will approve schemes for the certification of design for compliance with the mandatory requirements of the structural building standards 1.1 and 1.2 on the basis that they take account of the need to coordinate the work of various designers and specialist contractors.

##### **3.1.2 Consultation responses**

Views on the introduction of guidance on procurement were sought via the following question:



**Q1. CONSTRUCTION PROCUREMENT** - Do you agree that guidance on procurement issues is an appropriate matter for inclusion within the Technical Handbooks?

<b>Total no. of responses = 34</b>	<b>No. of responses (% of total responses to question)</b>	<b>% of all consultation responses</b>
<b>Yes</b>	23 (68%)	56%
<b>No</b>	9 (26%)	22%
<b>Yes and No</b>	2 (6%)	5%
<b>Blank</b>	7	17%
<b>Comments</b>		
<p>Some of the comments from the majority of respondents who agreed with this proposal included:</p> <ul style="list-style-type: none"> <li>• While there is a general concern regarding the level of non enforceable guidance being placed within the Technical Handbook, which ultimately leads to confusion on the part of all parties involved in the construction process, it is considered that this area of practical guidance in relation to highlighting the need to have a single overall engineering design responsibility will be of benefit to all parties.</li> <li>• There is value including advice on procurement as it may reinforce the clients responsibilities already recognised within the CDM Regulations.</li> </ul> <p>From those who disagreed:</p> <ul style="list-style-type: none"> <li>• It would be a step too far for the building standards system to determine the procurement method and should under no circumstances be included in the guidance.</li> <li>• At the present time there is no direct connection between the CDM Regulations the Building (Scotland) Act and the use of the Building Regulations to obtain a building warrant and a completion certificate.</li> <li>• Procurement is an issue for the designer/client</li> <li>• We agree in principle although the precise nature of the guidance would need to be seen before we could endorse this proposal fully.</li> </ul> <p>From the 2 who replied yes and no:</p> <ul style="list-style-type: none"> <li>• Both responses are divided between “yes” and “no” because while it is agreed that a “competent person” should be employed to ensure adequate supervision and to provide quality control during the execution of the works, doubts arise over the remit of the verifier in these regards.</li> </ul>		

### 3.1.3 Analysis of Responses

A significant majority of those responding on this issue were in favour of including guidance on this matter. Support for the proposal was drawn from across all categories of respondent.

Of the nine responses opposed to the proposal six were local authorities some of which expressed concern regarding the role of the Verifier in enforcing this advice. The majority of local government responders were however supportive of the proposal. Two were from trade organisations one of which entered a comment to the effect that they were in favour in principal to the proposal however wanted to see more detail of the precise nature of the guidance.

### 3.1.4 Conclusions

There was very clear support for the principal of the proposal even amongst those who responded negatively to the question where concerns centred on how the guidance would be enforced in practice. The intention behind the proposal was to advise and inform those responsible for procuring construction of the influence of procurement on compliance with building standards and not to add to the enforcement role of the Verifier.

### 3.1.5 Recommendation

**3.1.5.1** That the proposed amendment to the technical Handbook be adopted in its present form. Working Party to discuss best method to clarify that the additional procurement advice does not add to the enforcement role of the local authority verifier.

## 3.2 Issue 2: SCOSS and Construction Fixings

### 3.2.1 Background

The Standing Committee On Structural Safety (SCOSS) is an independent body supported by the Institution of Civil Engineers, the Institution of Structural Engineers and the Health and Safety Executive to maintain a continuing review of matters affecting the safety of structures. The prime function of SCOSS is to identify in advance those trends and developments that might contribute to an increasing risk to structural safety.

The consultation sought views on whether it would be appropriate to provide guidance information provided by SCOSS on matters that might influence compliance with to the relevant structural building standards.

In particular views were sought in relation to the specific issue of safety critical fixings which have been the subject of a safety alert issued by the SCOSS committee which has expressed concern that fixings do not always receive the attention that they deserve.

### 3.2.2 Consultation responses

Views were sought via the following two questions:

**Q2(a). FIXINGS** - Do you agree that guidance on matters raised by Standing Committee on Structural safety (SCOSS) is appropriate for inclusion within the Handbooks?

<b>Total no. of responses = 34</b>	<b>No. of responses (% of total responses to question)</b>	<b>% of all consultation responses</b>
<b>Yes</b>	30 (88%)	73%
<b>No</b>	4 (12%)	10%
<b>Blank</b>	7	17%

**Q2(b). FIXINGS -** Are there other similar matters that you think ought to be included within the Handbooks?

(If yes, please list under comments)

<b>Total no. of responses = 26</b>	<b>No. of responses (% of total responses to question)</b>	<b>% of all consultation responses</b>
<b>Yes</b>	10 (38%)	24%
<b>No</b>	16 (62%)	39%
<b>Blank</b>	15	36%

### **Comments relating to Q2(a)**

Comments from those respondents who agreed included:

- It is vitally important that the reference in section 1 clarifies the ALERT in that it is aimed squarely at concrete anchors which are not approved by a recognised accreditation route such as a British Standard or European Technical Approval (ETA) and not fixings in general
- The guidance should clearly state that it applies only to those fixings which are not approved by a recognised accreditation route such as ETA or British Standards.
- If something fundamental to safety has been highlighted by SCOSS then it should be included, but it would not be appropriate to keep changing the Technical Handbook for ALERTS not applicable to most building designs.
- It should be borne in mind that ALERTS by other bodies should not be given where there may be a conflict of interest or commercial gain or advantage may be involved e.g. SER and BRE are a commercial scheme providers.

Those who disagreed considered that:

- Adequate information on fixings is already available to engineers and other professionals. In manufacturers data, BS or ERD documents.
- Instead a web page should be produced that lists (with links) all such guidance that is deemed to be relevant and a section included in the Technical Standards directing users to the guidance.

### **Comments relating to question 2(b)**

SER Ltd has issued a number of useful technical bulletins. It is considered that these should be referred to in the Technical Handbooks, in particular any guidance on fixings, which are often “crossed off” on the schedule of the SER design certificate and required later via form Q certification.

### **3.2.3 Analysis Of Responses**

There was very strong support for the principal of drawing attention to issues raised by SCOSS in the Technical Handbooks. Some concerns regarding the specific application of the Alert issued by SCOSS would be addressed by reference to the detailed text of the alert and there may be a case for replicating some of the advice from the alert dealing with matters; such as the need for selection and specification by competent persons, the use of fixings having recognised approvals and the importance of proof testing; within the handbook to clarify this point.

There were no other areas identified for similar attention aside from a suggestion that SER technical Bulletins should also be referenced. This is considered inappropriate given the quasi-commercial status of SER and would create a precedent for other commercial publications to be given similar status.

### **3.2.4 Recommendation**

**3.2.4.1** To include reference to the general advice issued by SCOSS within Section 1 of the Technical Handbooks

**3.2.4.2** To include specific mention of the SCOSS alert on Fixings however consider expanding the current wording to clarify intent.

## **3.3 Issue 3: Alternative Approaches**

### **3.3.1 Background**

In 1975, the European Commission decided on action, based on article 95 of the Treaty of Rome, with the objective of the elimination of technical obstacles to trade and the harmonisation of technical specifications. This included the initiative to establish a set of harmonised technical rules for the design of construction works which would serve as an alternative to the national rules in force in the Member States and, ultimately, would replace them.

The major change being proposed to the guidance involves the introduction in 2010 of European loading and material design codes (The Eurocodes). These, together with the relevant UK national annexes, will replace the current generation of British Standards, which are to be withdrawn by BSI in March 2010. In order for Scotland to meet its obligations under the above treaty referencing the Eurocodes within the technical handbooks is currently being considered. Consideration needs to be given to the status that is to be afforded to the withdrawn British Standards.

With the possible exception of the wind code, there is no reason why the existing British Standards should not continue to be used to design safe structures for some time to come. The consultation exercise sought to obtain views on whether these withdrawn codes should continue to be cited within the Technical Handbook guidance thereby conferring evidence that may be relied on in any proceedings as tending to negative liability for an alleged contravention of the building regulations.

The major area of immediate concern with regard to the British Standards lies with the wind code where for reasons unconnected to the European design methodology the National Annex to BS EN 1991-1-4 dealing with wind actions shows higher wind speeds than are given in the existing British Standard. Particular attention will need to be paid to this code in the light of future government climate change impact predictions.

Although it is proposed that reference to specific national standards will no longer be made within the Technical Handbooks this does not mean that these withdrawn British Standards can no longer be used. The intention is to introduce a safeguard against inappropriate use by requiring acceptance as an alternative approach by a verifier or in the case of certified work, by the Approved Certifier of design (Building Structure). This safeguard will become more relevant over time as the withdrawn codes will not be updated.

### **3.3.2 Consultation Responses**

Views were sought via the following three questions:

**Q3(a). ALTERNATIVE APPROACHES** - Do you agree that references to superseded BS codes should be removed from the handbooks?

Total no. of responses = 36	No. of responses (% of total responses to question)	% of all consultation responses
Yes	16 (44%)	39%
No	20 (56%)	49%
Blank	5	12%

**Q3(b). ALTERNATIVE APPROACHES** - Do you think it is necessary to provide guidance on the reliability of superseded BS loading codes?

Total no. of responses = 35	No. of responses (% of total responses to question)	% of all consultation responses
Yes	24 (68%)	58%
No	11 (31%)	27%
Blank	6	15%

**Q3(c). ALTERNATIVE APPROACHES** - Do you think it is necessary to provide guidance on the reliability of superseded BS material design codes?

Total no. of responses = 35	No. of responses (% of total responses to question)	% of all consultation responses
Yes	24 (68%)	58%
No	11 (31%)	27%
Blank	6	15%

**Q3 (a), (b) & (c) – Comments**

Comments from the majority of respondents who voted for references to superseded codes remain within the guidance included:

- These changeovers will take some time to effect. Help will be needed.
- If it is likely that the BS's will continue to be used then they should remain in the standards, this avoids the situation whereby verifiers need to consult with the Fire Brigade should the design differ from the guidance issued, in any case, guidance should be provided on the reliability of the loading and design codes.
- Where an alternative solution is proposed using a superseded BS Code it would be useful to have readily accessible guidance on their reliability

Comments from respondents who agreed that references should be removed included:

- To avoid confusion all reference to the superseded codes should be removed from the Technical Handbooks.

- If the codes are no longer supported then they cannot be relied upon to be accurate and provide best practice in the long term. This will become more acute as time progresses.
- It may be useful to have a transitional arrangement for a relatively short period to allow industry to adapt. However if more formalised alternative approaches are included it would slow the change to the adoption of the Eurocodes.
- CI 1.0.5 should be retained allowing for Engineers to adopt alternative methods/approaches including the use of superseded British standards. It would be useful to list the Eurocodes and their equivalent British standard for reference.

### **3.3.3 Analysis of Responses**

Opinions on whether to continue citing withdrawn standards were fairly evenly divided with a small majority favouring retention. All stakeholder groups were represented amongst those voting against removal of reference to British Standards while those in favour were mainly representative of the views of local government and professional / trade organisations.

Analysis of the comments supplied by those opposing removal of the British Standards revealed a substantial proportion who appeared to imply that a failure to reference British Standards would mean that they could no longer be used. It is possible that many of these concerns could be addressed by additional text within section 1.0.5 of the handbooks to explain in more depth the circumstances under which withdrawn codes may still be used. The need to retain section 1.0.5 was mentioned by two of those providing a negative responses though its removal was never the intention of the proposals.

One local government responder provided a negative response on the grounds that there would be a requirement to consult the fire service for alternative approaches. This arises from a misunderstanding of the requirements of the legislation that can be addressed by clarification to all verifiers.

Perhaps unsurprisingly, given the responses to Q3(a), the responses to questions 3 (b) and (c) demonstrated a desire for guidance on and reliability of withdrawn codes where these continue to be used.

### **3.3.4 Conclusions**

There is clearly a high level of concern amongst responders that citing European codes will result in the withdrawn British Standards being no longer used. This needs to be addressed by better guidance than is currently proposed regarding the circumstances under which the withdrawn codes may continue to be used.

Distinction needs to be made between loading codes which may be impacted in the shorter term by climate change predictions and material design codes that will see their usefulness diminish of a longer period driven by an assessment of the risks associated with their continued use.

### 3.3.5 Recommendations

3.3.5.1 Replace existing references to British Standards with references to the new European design codes and associated National Annexes.

3.3.5.2 Provide improved guidance than that currently proposed to clarify the status and reliability of exiting British Standards that may be used as alternative approaches.

3.3.5.3 Clarify for Verifiers the legislation requirements for fire service consultation with regard to alternative approaches.

### 3.4 Issue 4: Loading

#### 3.4.1 Background

European Design standards use the term “Actions” in place of the British Standard term “Loads” . The consultation sought responses on whether the new term should be used in the Technical Handbooks to achieve consistency with Eurocode terminology or whether this would create confusion for those unfamiliar with the term.

#### 3.4.2 Consultation Responses

Views were sought via the following question:

**Q4. LOADING** - Do you agree that within the technical handbooks the use of the term “Loading” should be replaced with “Actions” for consistency with Eurocode terminology?

Total no. of responses = 35	No. of responses (% of total responses to question)	% of all consultation responses
Yes	28 (80%)	68%
No	7 (17%)	17%
Blank	6	15%
<b>Comments</b>		
Those who agreed commented:		
<ul style="list-style-type: none"><li>• There should be terminology consistent with the codes in force.</li><li>• Reference to “Actions” should be encouraged to promote familiarity with the terminology the revised codes bring and discourage future reference to the superceded codes.</li><li>• Suggest "Actions (Loadings)" is used for clarity.</li></ul>		
The minority who disagreed commented:		
<ul style="list-style-type: none"><li>• Consistency is important but so is ‘readability’ – ‘loading’ lets the reader know exactly what it means but the term ‘actions’ can be anything and, therefore, not easily understood (readability).</li></ul>		

### 3.4.3 Analysis

The consultation showed a clear majority in favour of adopting the European terminology as a means of encouraging familiarity with the new design standards. A suggestion that the term loading should also be placed in brackets alongside “Actions” would assist those who raised concerns that the new term would result in lack of clarity.

### 3.4.4 Recommendation

**3.4.4.1** References to “Loading” in the current edition of the Technical Handbooks be replaced with “Actions (Loading)”. **Post meeting note: this has subsequently been changed to “Loading (Actions)” as a result of the reference to standard 1.1 and Essential Requirement 1 ; Mechanical Resistance of the Construction Products Directive.**

## 3.5 Issue 5: Design and Construction

### 3.5.1 Background

Citing specific European Codes within the Technical Handbooks provides the user of these codes with a defence of compliance with the requirements of the regulations in any proceedings alleging contravention of the regulations. Unlike the current range of British Standards however the European Design Codes can only be considered to provide adequate levels of design and construction reliability when they are used in accordance with the basic assumptions set out in BS EN 1990. These assumptions include:

- The choice of the structural system and the design of the structure is made by appropriately qualified and experienced personnel;
- Execution is carried out by personnel having the appropriate skill and experience;
- Adequate supervision and quality control is provided during execution of the work
- The construction materials and products are used as specified in EN 1990 or in EN 1991 to EN 1999 or in the relevant execution standards, or reference material or product specifications;
- The structure will be adequately maintained
- The structure will be used in accordance with the design assumptions

It is important that any person seeking to rely on the use of these codes as demonstrating compliance with the regulations understands the additional responsibilities that BS 1990 also places on the user. It is proposed therefore to explicitly state this within the guidance documents.

### 3.5.2 Consultation Responses

Views were sought via the following question:



**Q5. DESIGN AND CONSTRUCTION** - Do you agree that it is important to draw attention to the basic assumptions set out in BS EN 1990 within the guidance provide in the Technical Handbooks?

Total no. of responses = 35	No. of responses (% of total responses to question)	% of all consultation responses
Yes	32 (91%)	78%
No	3 (9%)	7%
Blank	6	15%
<b>Comments</b>		
<p>Only 3 people disagreed. Those who agreed commented:</p> <ul style="list-style-type: none"> <li>• The definition and application of all assumptions is essential. Otherwise the BSO will have no idea of the appropriateness of the design of the structure.</li> <li>• Clarity of purpose of the references to BS EN 1990 is essential.</li> <li>• It should be made clear that these assumptions may not apply to alternative approaches such as superseded British Standards.</li> <li>• If the reliability of the designs is dependant on assumptions in BS EN 1990 then it is important that the attention of the user is drawn to this fact.</li> </ul>		

### 3.5.3 Analysis of Responses

There is clearly overwhelming support for this proposal across all stakeholder groups.

### 3.5.4 Recommendation

**3.5.4.1** Include references to the basic assumptions in BS EN 1990 that underpin the use of the European Design Standards within the Technical handbook guidance.

## 3.6 Issue 6: Disproportionate Collapse

### 3.6.1 Background

BS EN1991 brings together for the first time in a single code design rules that assist the design of robust buildings. Previously rules to prevent disproportionate collapse were embedded within material codes and supplemented by design information within the Technical Handbooks. The consultation proposal is to remove the guidance from the technical handbook and rely on the European Standard.

### 3.6.2 Consultation Responses

Views were sought via the following question:

**Q6. DISPROPORTIONATE COLLAPSE** - Do you agree that that it is sufficient to replace the existing guidance within the technical handbooks with a reference to BS EN 1991?

<b>Total no. of responses = 34</b>	<b>No. of responses (% of total responses to question)</b>	<b>% of all consultation responses</b>
<b>Yes</b>	9 (26%)	22%
<b>No</b>	25 (74%)	61%
<b>Blank</b>	7	17%
<b>Comments</b>		
<p>The minority of respondents who agreed that the existing guidance should be replaced took the view that:</p> <ul style="list-style-type: none"> <li>• If there is a suite of Eurocodes relating to structural design then they should be fully embraced and where possible the possibility for duplication should be avoided.</li> <li>• It maybe however, that a short narrative relating to the principles of disproportionate collapse is included within section 1.</li> </ul> <p>A range of views from the respondents disagreed with this proposal included:</p> <ul style="list-style-type: none"> <li>• The ability to be able to refer to non-conflicting industry guidance needs to be permitted.</li> <li>• This would restrict alternative approaches.</li> <li>• Those requirements existing in BS are reliable and should still be in use; this should be emphasised.</li> <li>• An overview of the disproportionate collapse requirements should still be provided to a similar extent as provided currently for clarity.</li> </ul>		

### 3.6.3 Analysis of Responses

There is clearly a substantial body of opinion that is opposed to this proposal across all stakeholder groups. Many respondents expressed concerns that focusing attention on the European Standard would restrict the use of innovative approaches to a complex subject.

### 3.6.4 Recommendation

**3.6.4.2** That existing guidance provided within the technical Handbook should be retained following a check to ensure that no conflict with BS EN 1991 exists.

## 3.7 Issue7: Malicious Action

### 3.7.1 Background

The proposal to introduce specific mention of the risks posed by malicious action arose as a consequence of a proposal to introduce similar guidance throughout the rest of the UK. The guidance proposes that consideration should be given to the design of buildings that may be subject to malicious or wilful damage as a result of being an iconic structure, the business or status of the occupants or its location. There is no intention at this stage to provide any guidance on specific types of building that may fall within this category.

### 3.7.2 Consultation Responses

Views were sought via the following question:

**Q7. MALICIOUS ACTION** - Do you agree that guidance on design for malicious damage is appropriate for inclusion within section 1?

Total no. of responses = 34	No. of responses (% of total responses to question)	% of all consultation responses
Yes	24 (71%)	58%
No	8 (24%)	20%
Yes and No	2 (5%)	5%
Blank	7	17%
<b>Comments</b>		
<p>A few of the comments from those who agreed with this proposal included:</p> <ul style="list-style-type: none"> <li>The introduction of 1.2.4 Malicious Actions whilst suitably contained within section 1 offers insufficient guidance to designers and verifiers. The requirements of this new section should be expanded to clearly identify the range and type of buildings which require additional measures.</li> <li>It would be necessary to provide a list of buildings or building uses to define where this standard would apply. A list based on that contained in BS EN 1991-1-7 would be essential.</li> <li>This relates back to design for robustness which includes both accidental &amp; malicious attack. In this context it should be included, but guidance must be mindful that social attitudes to what is acceptable risk changes with time.</li> </ul> <p>From those who disagreed:</p> <ul style="list-style-type: none"> <li>If there is currently no statutory need to protect buildings against particular forms of malicious action beyond that required by the disproportionate collapse requirements, the inclusion of this guidance will inevitably cause confusion among verifiers, applicants and their agents.</li> <li>Don't really see how this can be subject to the warrant process. What is the statutory remit of such references / control?</li> </ul> <p>Two remain undecided without further clarity of purpose and clarity of a statutory remit. It is suggested that this issue would be better addressed in a generic note at the beginning of the Standard rather than being identified within a sub clause.</p>		

### 3.7.3 Analysis of Responses

Views both for and against this proposal were spread amongst all stakeholder groups with no group favouring a particular opinion. Although there is apparently strong support for the principal of including guidance on malicious acts an examination of the comments supplied shows those in favour heavily qualifying their support with a desire for more detailed guidance on the type of building that needs to be protected and how appropriate protection could be achieved.

Amongst the substantial minority against the proposal there were compelling arguments put forward regarding the difficulties of enforcing additional protection measures in situation where there is no explicit statutory requirement.

Given that the driver for including such guidance is set against a national background of potential terrorist action there may be an argument for proceeding with legislation on the basis of co-ordination of approach at a UK level.

### **3.7.4 Recommendation**

**3.7.4.1** Guidance on the need to design for the consequences of malicious action be omitted from Section 1 at this time.

## **3.8 Issue 8: Small Buildings Structural Guidance**

### **3.8.1 Background**

The current version of the Small Buildings Structural Guidance SBSG was introduced to the technical handbooks in 2005. Previously the document had been separately published. A further development in 2005 was the introduction of rules for the design of timber framed structures. Similar design rules (except those for timber framed structures) are available within BS 8103 however this standard is no longer cited within the Section 1 guidance.

The purpose of the SBSG is to assist those with expertise in building design and construction, but who are not necessarily structural engineers, to design a limited range of mainly domestic buildings without the need for structural calculations. There is considerable anecdotal evidence available that the document in its present form is not widely used. A further concern is that the document has become overly complex to be useful to its intended audience.

The SBSG cannot be retained within Section 1 in its current form as it contains conflicts with European Design codes. Perhaps the most serious of these is the updated wind speeds now quoted in the National Annex to BS EN 1991-1-4. The Building Standards Division has commissioned research on the impact of the revised wind speeds on the SBSG for masonry structures and this has shown that a revision of the application of this section of the document must be made. No similar exercise has yet been undertaken for the timber frame section of the document.

A revised BS 8103 Part 3 dealing with timber floors and roofs is shortly to be issued by BSI. This document has been extensively updated and is fully consistent with European standards. Revisions to other parts of this code are underway.

### **3.8.1 Consultation Responses**

Views were sought via the following question:

**Q8(a). SMALL BUILDINGS STRUCTURAL GUIDANCE** - Are the design rules provided in the SBSG widely used for the purposes of obtaining building warrants?

<b>Total no. of responses = 25</b>	<b>No. of responses (% of total responses to question)</b>	<b>% of all consultation responses</b>
<b>Yes</b>	7 (28%)	17%
<b>No</b>	18 (72%)	44%
<b>Blank</b>	16	39%

**Comments**  
The majority of respondents don't consider that the SBSG is widely used for the purpose of obtaining building warrants. Their comments included:

- It is the experience of this authority that SBSG is rarely used to demonstrate compliance. Even if the SBSG is used by designers, its use can be inconsistent i.e. only certain parts of the guide used where convenient, rather than the overall scope of the SBSG being assessed for the particular works.
- There is limited or partial use of the small buildings guide by a small number of designers. The guide is used mainly for small extension or alteration design and not currently used for the full scope or size of buildings covered.
- The SBSG could be more widely used by applicants in the design of small buildings removing the requirement for more demanding structural design and calculations. Many applicants and their architects appear to be unaware of SBSG and submit unnecessary structural details and calculations with their warrant applications.

**Q8(b). SMALL BUILDINGS STRUCTURAL GUIDANCE** - Does the scope of the SBSG guidance cover a useful range of building types?

<b>Total no. of responses = 26</b>	<b>No. of responses (% of total responses to question)</b>	<b>% of all consultation responses</b>
<b>Yes</b>	23 (88%)	56%
<b>No</b>	3 (12%)	7%
<b>Blank</b>	15	37%

**Comments**  
The minority of people who said no commented:

- The SBSG guidance needs to be extended. It could be set out more clearly.
- The SBSG does seem to be used by designers, however its use can be inconsistent i.e. only certain parts of the guide used where convenient, rather than the overall scope of the SBSG being assessed for the particular works.

**Q8(c). SMALL BUILDINGS STRUCTURAL GUIDANCE** - Is the guidance easy to understand and apply by those with expertise in building design and construction, but who are not necessarily structural engineers?

Total no. of responses = 24	No. of responses (% of total responses to question)	% of all consultation responses
Yes	15 (62%)	37%
No	9 (38%)	22%
Blank	17	41%
<b>Comments</b>		
<p>Comments included:</p> <ul style="list-style-type: none"> <li>• The SBSG is considered as a very useful tool to aid construction professionals in the design of a reasonable range of modest buildings. The guidance is however, considered to be in some instances over complex and could benefit from some refining where perhaps over designed simplistic structural solutions would provide an easier to understand resource for designers of small buildings.</li> <li>• The SBSG does seem to be used by designers, however its use can be inconsistent</li> <li>• The guidance is relatively easy to understand and would be used at the initial design stage as a “ready reckoner” but, as previously noted in most cases an engineer would be appointed to check the structural aspects.</li> <li>• Some architects claim to have used the SBG but clearly have not fully considered all the sections of the book. While the guidance is clear it does take a large amount of time for a verifier to check that all parts of the guidance have been addressed.</li> </ul>		

### 3.8.3 Analysis of Responses

The consultation appears to have confirmed the view that the SBSG is not widely used. The majority of those responding with this information were local authority stakeholders with a significant number of professional / trade organisations also offering a similar opinion. A number of respondents pointed out that its use is generally limited to the design of parts of the building and it is rarely used for the design of an entire building.

Some concerns were expressed regarding inconsistency of use and complexity with one private sector organisation involved in the timber frame industry expressing concern over the safety of the document and advised that it should be withdrawn.

### 3.8.4 Recommendations

**3.8.4.1** The SBSG should be removed from section 1 of the technical handbooks and reissued as a stand-alone document and updated in line with the Eurocodes.

**3.8.4.2** The format and scope of the document should be reviewed with the aim of making it more relevant to its intended audience.

**3.8.4.3** Consideration should be given to citing Parts of BS 8103 as these emerge as European compliant documents

#### **4.0 ADDITIONAL COMMENTS RECEIVED**

In addition to responses in relation to specific consultation questions two additional matters were raised by responders that require consideration. The first of these concerned the continued referencing within the Technical Handbook of BS5502-22 Buildings and Structures for Agriculture Code of practice for design construction and loading. Although there has been no notification by BSI of a proposed withdrawal date for this code the design criteria make extensive reference to design codes that will be withdrawn. The respondent has however made a strong case for retaining this code in use on the grounds that it permits significant reductions in design loading and hence more economical buildings than would be possible if designs were carried out to the new European Standards. It must however be appreciated that the use of reduced design loads is possible due to the acceptance of an increased probability that these loads will be exceeded.

We have in recent weeks experienced a number of building failures across Scotland during the recent period of heavy snow fall though it is far from clear whether the actual amount of snow exceeded code expectations. In consequence it is proposed to retain a reference to BS5502-22 as an alternative approach to designing agricultural buildings but to keep a close review of information emerging from investigation into the recent building failures.

The second additional response that requires specific consideration relates to the introduction of specific guidance on the design of stone masonry. The Scottish Stone Liaison group publication "Natural Stone Masonry in Modern Scottish Construction provides guidance in relation to new construction. Guidance in relation to traditional construction is to be found in the publication "Conversion of Traditional Buildings, Application of the Scottish Building Standards" published by the Scottish Government. It is proposed to make reference to both of these documents in the revised guidance.

#### **5.0 NEXT STEPS -**

All responses received were considered by the Structure Working Party of the Building Standards Advisory Committee and have assisted in informing the decisions made with regard to proposals. Where the proposals relate to changes to the building regulations or their associated schedules the process of making the necessary changes to the guidance will now be completed. Subject to Ministerial approval, publication of the standards and guidance is expected in April 2010 followed by implementation in October 2010.

**REGULATORY IMPACT ASSESSMENT (Ref: 2008/02)**

**REGULATORY IMPACT ASSESSMENT  
ON THE REVIEW OF SECTION 2: FIRE OF THE TECHNICAL HANDBOOKS  
FOR WAYS OF COMPLYING WITH  
THE BUILDING (SCOTLAND) REGULATIONS 2004 (AS AMENDED)**

**February 2010**



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Ref: 2008/02

## **REGULATORY IMPACT ASSESSMENT ON THE REVIEW OF SECTION 2: FIRE OF THE TECHNICAL HANDBOOKS FOR WAYS OF COMPLYING WITH THE BUILDING (SCOTLAND) REGULATIONS 2004 (AS AMENDED 2006 AND 2007)**

### **1.0 PURPOSE AND INTENDED EFFECT**

#### **1.1 Objectives**

This partial Regulatory Impact Assessment (RIA) addresses amendments to the functional standards and technical guidance on fire within the Building (Scotland) Regulations 2004 and the supporting section 2 of the Technical Handbooks. The key objectives of the amendment are:

- to improve safety of people in and around buildings following the outbreak of fire;
- to further the achievement of sustainable development;
- to encourage innovative design and construction of buildings;
- to promote inclusive design;
- to reduce environmental pollution; and
- to improve assistance to the fire and rescue services.

It is intended that the amended guidance will come into force on 1 October 2010 and a summary of the proposed technical changes are set out in **Annex C**. In Scotland, the relevant Eurocodes will be cited in the Technical Handbooks which provide guidance on demonstrating that designs comply with the Building (Scotland) Regulations 2004 (as amended).

#### **1.2 Background**

Scottish Building Regulations set standards for the health, safety and welfare of persons in and around buildings, furthering the conservation of fuel and power and furthering the achievement of sustainable development. These standards are supported by guidance contained in the Technical Handbooks. The Building Regulations apply to new buildings and to buildings being converted, altered or extended. Scottish Building Regulations are devolved to the Scottish Parliament, therefore there is no alternative framework in place which deals with Scottish Building Regulations and sets standards for structural safety.

Building Regulations are expressed in functional terms and do not dictate the method of compliance. The Scottish Government issues guidance on how the requirements of the Building Regulations may be met. The guidance may be relied upon in any proceedings as tending to negative liability for an alleged contravention of the Building Regulations. This does not however preclude the use of alternative approaches provided the designer can satisfy the local authority verifier that the aim of the Building Regulations is being fulfilled.

##### **1.2.1 Life safety**

The Scottish Government is committed to contributing to the reduction in the incidence of fire related deaths and injuries.

The standards and guidance issued under the Building (Scotland) Regulations 2004 came into force on 1 May 2005. At that time, the intention was to transfer the previous regulations and guidance on fire safety to the new building standards system with no technical changes. However, following a two and a half year research project commissioned by the UK

Government, into the effectiveness of residential sprinklers<sup>3</sup> in reducing fire related deaths and injuries, Scottish Ministers agreed to introduce a mandatory requirement to install automatic life safety fire suppression systems in all new:

- high rise domestic buildings e.g. blocks of flats with 7 or more storeys;
- sheltered housing complexes; and
- residential care buildings e.g. care homes for the elderly.

Part 3 of the Fire (Scotland) Act 2005 introduces a fire safety regime which applies to non-domestic buildings. The regime does not generally apply to domestic buildings but may apply where staff are employed or members of the general public have access e.g. a dental surgery within a dwelling. The regime will also apply to domestic buildings which are licensed as Houses in Multiple Occupation and to some domestic buildings where certain care services are provided. Those domestic premises covered by Part 3 of the 2005 Act are defined in section 78 of the Act.

Persons with obligations under the Act require to carry out a fire safety risk assessment which may require additional fire safety precautions to reduce the risk to life in case of fire. For example, measures to reduce the risk and spread of fire, means of escape, fire-fighting equipment, fire detection and warning, instruction and training. Other measures are prescribed by Regulation. The risk assessment should be kept under review. In many premises, existing fire safety measures have been incorporated in accordance with Building Regulations; however, it is possible for a higher standard to be applied as a consequence of a fire safety risk assessment. Section 71 of the 2005 Act makes it clear that terms, conditions or restrictions in licences, including statutory certification or registration schemes, are to have no effect if they relate to fire safety requirements or prohibitions which are or could be imposed under Part 3 of the 2005 Act.

### 1.2.2 Sustainable development

The Scottish Government is committed to building a sustainable future and in December 2005, published 'Choosing our Future – Scotland's sustainable development strategy'. Individuals, businesses, local authorities and communities are taking action to change the way we use resources, plan and develop services and seize the economic opportunities that sustainable development presents.

It is Scottish Government policy to continue to embed the principles of sustainable development in Building Regulations, planning policy, and procurement guidance, rather than expecting developers to adopt voluntary codes of practice. The fire related provisions of Building Regulations are intended to:

- provide occupants with an opportunity to escape in the event of an outbreak of fire;
- provide facilities to assist the fire and rescue service to fire-fight and carry out rescues; and
- to embed inherent fire protection in buildings to further the achievement of sustainable development.

### 1.2.3 Inclusive design

In response to the Scottish Government's policy on equality and social inclusion, one of the key objectives of this review is to ensure that buildings better address the varying needs and abilities of the people who use them. New standards and guidance on inclusive design and accessibility were introduced on 1 May 2007, however no additional guidance was introduced to assist occupants who have varying needs and abilities to escape from

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<sup>3</sup> Building Research Establishment Ltd - Effectiveness of residential sprinklers in residential premises (February 2004)

buildings in case of fire. The Disability Discrimination Act 1995 and 2005 set out measures intended to end discrimination against people with disabilities in the areas of employment, access to goods, facilities and services, in the management, buying or renting of land or property, in education and in public transport.

The Fire Safety (Scotland) Regulations 2006 are made under the Fire (Scotland) Act 2005 and contain provisions which are part of the fire safety regime. These regulations must be considered along with Part 3 of the 2005 Act. The regulations contain further requirements in respect of fire safety risk assessment and obligations on duty holders. These risk assessments should take account of the needs of all building users, including those with mobility or sensory impairments.

#### 1.2.4 Fire and Rescue Services

Building Regulations and the associated guidance recognise the important role that the fire and rescue services have in responding to reported fires. Fire and rescue service personnel are trained to enter *buildings* following the outbreak of fire to assist with any evacuation of the *building* occupants, effect rescues of any casualties and to fight fires. Fire-fighters operational duties are made on a statutory basis in the Fire (Scotland) Act 2005 which imposes a statutory duty on each relevant authority and this includes making provision for the purpose of:

- a. extinguishing fires in its area; and
- b. protecting life and property in the event of fires in its area.

Although the fire development will vary with each incident, it is important that the facilities to assist the fire and rescue services take account of the *building* design. The Building Disaster Assessment Group carried out extensive research on behalf of the UK Government to assess the interaction between *building* design and the operational response of fire and rescue services. The subjects covered by the research included:

- physiological performance criteria for fire-fighting;
- fire-fighting in under-ventilated compartments; and
- fire-fighting media in high-rise buildings

The research found that building design could be improved to assist the fire and rescue services carry out their statutory functions.

#### 1.2.5 Innovative design and construction

The Building Standards Division (BSD), formerly the Scottish Building Standards Agency, Framework document, June 2004 (available on <http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards>) states that the new building standards system “*will move away from the fairly rigid constraints of building control to the flexibility of building standards which promote innovation in design without compromising public safety. Designers and developers will have the freedom to use new and innovative designs, provided they can demonstrate that these designs meet the new high-level functional standards for health, safety, welfare, convenience and sustainable development.*” Further, the Scottish Government Policy on Architecture for Scotland states that “*the quality of our architecture, and of our urban and rural places, is a reflection of our cultural aspirations and is vital to the perception of Scotland as a place of imagination, creativity and innovation*”.

The guidance for alternative approaches in the Technical Handbooks is limited and can only be fully understood by competent fire engineers. Therefore, the prescriptive solutions contained in the handbooks continue to be used inflexibly and stifles innovation. A framework document ‘A simplified approach to alternative fire safety strategies’ Scottish

Government (2010) provides practical guidance for designers and enforcers when varying from the handbooks and can be accessed via the BSD website.

### 1.3 Rationale for Government intervention

There has been no substantive review of means of escape in the case of fire since 1994.

However, it is recognised that the majority of vulnerable occupants continue to live in dwellings with the minimum of fire safety measures such as smoke alarms in circulation spaces.

From 2004 to 2006, Scottish fire statistics (**see Annex A**) show there were around 3 fire deaths per 100,000 population (weighted) in the 60 and over age group. This rate is around double the Scottish average of 1.4 deaths per 100,000 population over the same period. This means that higher proportion of fire related deaths occur in the elderly population when compared with other age groups.

Without Government intervention:

- Scottish building standards will not contribute to a reduction in fire deaths and injuries;
- the death and injury rate in vulnerable groups will continue to be disproportionately high;
- prescriptive solutions contained in the handbooks will continue to stifle innovation;
- the guidance will not provide advice on best practice for inclusive design issues; and
- facilities within buildings to assist the fire and rescue services e.g. number of stairs, smoke vents and water supplies will continue to be problematic and challenging to the fire and rescue services.

## 2.0 CONSULTATION

Before making or amending the Building Regulations, Scottish Ministers are required to consult the Building Standards Advisory Committee (BSAC) and such other bodies as are considered necessary to inform on the matters under consideration. This exercise has been carried out through a BSAC Working Party and discussions have taken place with local authority verifiers and industry (**see Annex D**).

### 2.1 Within Government

The Building Standards Division (BSD) consults widely, and has continued dialogue, with the following Government bodies: Directorate for the Built Environment, Communities Scotland; Greener Scotland Directorate; Historic Scotland; Fire and Rescue Service Advisory Unit; Health and Safety Executive; Scottish Prison Service; MOD Estates; Scottish Commission for the Regulation of Care; Scottish Fire Services College; Health Directorate; Department for Communities and Local Government (CLG); Building Regulations Unit – Department of Finance and Personnel, Northern Ireland and the National Assembly for Wales.

### 2.2 Public Consultation

An intermediate regulatory impact assessment forms part of a package issued for public consultation. This package seeks general comment on proposals and is issued to a list of individuals and organisations previously identified as having an interest in building standards. A list of all consultees is appended to the consultation package. The full consultation package is available on the Building Standards Division website at: <http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards>)

A summary of the consultation process and responses is attached at **Annex D**.

Scottish Building Standards has an extensive data base of over 600 names of individuals and organisations with a specific interest in building regulations and are alerted to any forthcoming consultation.

### **3.0 OPTIONS**

#### **3.1 Options**

In considering how to address the objectives identified in 1.1, three options were identified:

Option 1 Do nothing;

Option 2 Promote life safety, sustainable development, innovation in design, inclusive design and assistance to the fire and rescue services in new building work through additional information campaigns;

Option 3 To improve life safety, sustainable development, innovation in design, inclusive design and assistance to the fire and rescue services in new building work through regulation and guidance.

##### **Option 1 Do nothing**

This is a high risk option for Government. Without intervention, Scottish building standards will not contribute to a reduction in fire related deaths and injuries. To mitigate this risk, Scottish Ministers may wish to consider using the national fire statistics which show that there has been a decline in fire related deaths and injuries in Scotland.

- in 1996, the number of fire related deaths was 110 and injuries 2060; and
- in 2006 the number of fire related deaths was 52 and injuries 1635.

The decline in the figures may be attributed to a combination of changing lifestyles, targeted community fire safety education, consumer safety improvements and the introduction of smoke alarms through building regulations.

Ministers are likely to be challenged on the other key objectives in the review and may not have a robust case to answer. For example:

- the death and injury rate in vulnerable groups will continue to be disproportionately high;
- prescriptive solutions contained in the handbooks will continue to stifle innovation;
- the guidance will not provide advice on best practice for inclusive design issues; and
- facilities within buildings to assist the fire and rescue services will continue to be problematic and challenging to the fire and rescue services. For example, insufficient water supplies to fight fires in high rise buildings.

No implementation and delivery plan required as there is no change and therefore no delivery.

##### **Option 2 Promotion and subsidy**

This is a medium risk option for Government. Improvements in fire safety standards would only be realised in a small proportion of new buildings or building work as a result of the extra costs involved. Promotion will only be attractive to those clients, developers and procurers of buildings that acknowledge there is room for improvement in current fire safety standards. For this to appeal to industry, some incentive would be necessary such as a subsidy. However there are several good reasons against this being the best option:

- it is not considered appropriate that public money should be used for subsidising new building work in the private sector;
- it is not clear that a subsidy would be effective in increasing the take up of improvements;
- promotion would be less likely to be acted upon when compared with introduction through regulation and guidance;
- not in line with the SNP manifesto commitment to improve the enforcement of building regulations.

This option could be implemented by introducing good practice guidance documents for adoption and application on a voluntary basis. This could be delivered through different media such as Ministerial launch, broadcasting, leaflets and guidance documents made available to designers, developers and builders online and a public libraries.

Implementation and delivery plans would need to be tailored to the specific target audience on a prioritised basis. The Building Standards Division would deliver these plans in partnership with other key stakeholders such as the Fire and Rescue Services Advisory Unit, Chief Fire Officers Association, Scottish Association of Building Standards Managers, Scottish Prison Service, Defence Estates, Historic Scotland, Commission for the Regulation of Care and the Health Directorate. It is anticipated that the implementation and delivery plan would be launched on 1 October 2010 and continue to be delivered over a 5 year period.

### **Option 3 Improve building regulations and guidance**

This is a small risk option for Government. The supporting guidance will have more explanation of intent. However there will be a small increase in the costs of construction which is likely to be passed on to the building client including:

- cost of materials and labour;
- additional time spent by the verifier in processing building warrant applications and training staff;
- additional time spent by the Scottish fire service college and the fire and rescue services in training students and staff;
- an increase in the cost of buildings being erected, altered, extended or converted.

Significant improvements in fire safety standards cannot be achieved without financial implications. The cost of providing safer buildings and dwellings should be balanced against the benefits that will accrue to building users throughout the life of a building and in the case of dwellings, must not contribute disproportionately to the cost of dwellings, at the risk of undermining the affordability of homes.

Implementation will be through the Building Regulations and the associated building standards and guidance given in the Technical Handbooks. The changes will apply to building warrant applications received after 1 October 2010 for:

- new buildings; and
- to existing buildings being altered, extended or converted.

## **3.2 Implementation and delivery plans**

See **Annex 2B** for details of implementation and delivery plan.

## **6.0 COSTS AND BENEFITS**

### **4.1 Sectors and groups affected.**

Sectors and groups that would be affected include:

- a) Persons procuring new buildings or building work that would need to bear the extra cost of the work;
- b) Builders who would have to modify their standard building types and construction detailing. Where relevant, they would need to seek amended and/or replacement Scottish type approvals and possibly sooner than they had otherwise intended;
- c) All those involved with the fire safety aspects of building design and construction would have to familiarise themselves with the new guidance and methodologies through training etc.
- d) Building services engineering contractors who would need to invest to increase the capacity for commissioning and testing buildings and engineering services;
- e) Building materials and component manufacturers would need to make changes to their products and literature to suit;
- f) Local authority verifiers would have to train staff in areas of the fire safety standards and guidance where the new standards have been introduced or existing guidance has been extended;
- g) fire and rescue service personnel; and
- h) other fire safety enforcing authority personnel.

### **4.2 Benefits**

In considering fire the following benefits for each option are given below:

#### **Option 1: Do nothing**

As mentioned earlier, the Scottish Government is committed to assisting towards a reduction in the number of fire related deaths and injuries. Doing nothing would not make any progress with regard to these reductions and would offer no benefits. Without any improvements in fire safety, there will be no reduction in the cost of fire to the state, including the NHS to treat casualties from fire. GPs and other organisations such as therapy groups will continue to provide care and support long after the fire incident.

#### **Option 2 Promotion and subsidy**

This option will produce benefits, but these are likely to be small because only a small proportion of the industry, probably that in the public sector is likely to adopt the changes. This is supported by experience gained from, for example, DTI's Construction Best Practice (now Constructing Excellence) which suggests that only a small proportion (about 20%) of the target market has used the programme, although this figure is much higher (nearly half) in respect of public sector clients.

The standards and guidance in section 2: fire of the Technical Handbooks addresses a disparate range of building issues and hence is of interest to a very broad audience. Given the diversity of the changes it is difficult to target guidance on best practice easily and cost effectively. The benefits produced would be predominantly social, in terms of a reduction in



the incidence of fires as well as a reduction in risk of fatality and injury attributable to fire. There would also be some economic and environmental benefits. Further details on the nature of all three impacts are discussed under Option 3.

Any benefits gained by the introduction of a voluntary code would be wholly dependent on the level of use of any such code. Without mandatory status, benefits would be limited and such guidance is unlikely to be followed, as it would be left to the market forces to determine whether to improve fire safety.

Option 2 is unlikely to address the SNP manifesto commitment to improve the enforcement of building regulations.

### **Option 3 Improve building regulations and guidance**

Option 3 would produce the greatest benefits which would be mostly social but also have some associated economic and environmental benefits. It has the advantage over Option 2 in that it provides clear and consistent guidance to all parties.

In domestic buildings, the provision of additional smoke alarms and heat alarms, and sprinklers as an option for houses, flats and maisonettes below 18 m (mandatory to high rise domestic buildings since 2005) would lead to reductions in deaths and injuries. Improved guidance on ventilation systems to control smoke in such buildings will also lead to risk reductions. The introduction of a simple guide for alternative approaches will lead to an increase in design flexibility and innovation.

In general, the proposals will have a positive benefit to assist occupants when escaping from fires and will help the fire and rescue services to implement search and rescue operations, to fight fire and hence, limit property damage.

Specific benefits under this Option 3 can be quantified under the following categories:

#### **Social benefits**

The basic approach for assessing social benefits is to determine the annual risks of death and injury per accommodation unit, estimate how the proposed revision would reduce these risks and then calculate the number of lives saved and injuries prevented per year for a given number of dwellings. In order to calculate a financial benefit, deaths and injuries have been converted into a cash sum using standard valuation figures. Specifically, the value of life used is £1.55m and value of non-fatal injury involving burns is £174.4k and non-fatal injury overcome by smoke is £44k. (figures based on Communities and Local Government prices 2007).

There can be other social benefits associated with reducing the severity and incidence of fires, such as reducing the distress and disruption caused by fire (e.g. the upset at the loss of a person's home and belongings etc.). These may be considerable but are far harder to quantify and therefore a figure has not been included in this RIA.

#### **Economic benefits**

The economic benefits of Option 3 could also potentially be quite extensive e.g. asset protection of school buildings against fire. Although property protection is generally addressed through insurance, by introducing certain life safety measures, the Building Regulations will indirectly help to reduce damage to property. Such benefits have also been included in this RIA where it has been possible to identify and quantify them.

There may be substantial savings in terms of avoiding the economic loss associated with buildings and their contents damaged or destroyed by fire. For example, a recent Government publication estimated the average property loss per fire at £8,507 for domestic properties and £33,624 per fire for commercial properties. In the case of very large fires the negative impact on the local community/business could be significant. Where the amendments give alternative approaches to meeting the requirements of the mandatory standards in section 2: fire, this could produce cost savings in terms of reduced construction costs. They also provide greater design freedom and promote innovation. Where relevant these savings from avoided property damage and reduced construction costs are estimated.

### **Environmental benefits**

The environmental benefits of Option 3 would arise from further limiting the size and hence the consequence of fires. Combustion products, including smoke and toxic substances, from fires can not only lead to localised deterioration in air quality (which can cause respiratory symptoms, including asthma) but also larger, particularly industrial fires, may have a widespread effect both on people and on the natural environment. Water usage as a result of action to extinguish fires depletes resources and the run-off can lead to pollution of water courses.

Smaller fires would reduce water usage and help to reduce air and water borne pollution. Such benefits are extremely difficult to quantify and are likely to be small in comparison to the social benefits, therefore, figures have not been included in this RIA.

### **Benefits from the provision of 2 stairs in high rise domestic buildings**

From research undertaken by the Building Disaster Assessment Group in the light of the World Trade Centre incident, has shown that there is a potential conflict between persons escaping down a stair and firefighters undertaking firefighting and search and rescue operations over several levels within the same stair enclosure. Whilst statistics indicate that these issues have not been a problem in the UK, there is evidence that they may increasingly become so in light of modern firefighting procedures and as the number of high rise buildings, and the height to which they are built, increases. If this option is chosen, the means of escape for occupants and firefighting and search and rescue operations can be more effective.

The provision of 2 escape stairs with clear guidance is likely to be attractive to developers as there currently is a misconception that only single escape stair domestic buildings are acceptable provided the distance to escape (7.5m) has not been exceeded. A building with 2 or more escape stairs allows a more efficient use of space, with a greater number of flats per storey. Designers who choose this option, will reduce the total number of escape stairs constructed in flatted developments resulting in cost savings for developers.

### **Benefits from the provision of smoke ventilation of common access areas in blocks of flats**

The installation of improved ventilation systems in blocks of flats is unlikely to reduce the risk of death or injury as the majority of fire related deaths and injuries occur in the dwelling of fire origin. Following collapse of the world trade centre in New York, the public perception of risk in high rise buildings has changed and more occupants from flats and maisonettes are likely to use common escape routes following the outbreak of fire. The guidance is therefore a proactive measure taking account of the latest research<sup>4</sup> and will benefit

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<sup>4</sup> Smoke ventilation in common areas of flats and maisonettes, BRE Report for ODPM

occupants escaping and fire and rescue service personnel entering the building following the outbreak of fire.

### **Benefits from additional fire detection and fire alarm in dwellings**

The introduction of additional smoke and heat alarms in dwellings will result in a reduction in the number fire related deaths and injuries. This will reduce the costs to the NHS, fire and rescue services, police and local authorities as they will spend less time treating and administering the consequences of fire.

According to Scottish Government fire statistics for the years 2003/04 to 2006/07 where fatalities were recorded, the most common locations where a fire started were living rooms 38%, kitchens 24%, bedrooms 21% and other 17%. These statistics correlate favourably with the following causes of accidental fires in *dwellings*:

- careless disposal of cigarettes and matches in more than 40% of cases;
- fires from cooking activities in more than 20% of cases; and
- electrical, space heaters and candles in around 5% of cases each.

There are approximately 9 deaths per million dwellings per year in the UK. According to research<sup>5</sup> it is estimated that installing smoke alarms in dwellings could reduce the risk of death to about 30% - 50% of the risks where there are no alarms. It is estimated that the addition of a smoke alarm in the principal habitable room and a heat alarm in the kitchen would reduce the risk of death or injury by about one half of these figures i.e. 15% to 25%. This equates to a saving of  $(1.35+2.25) / 2 = 1.8$  deaths saved per million dwellings = 0.054 deaths saved per 30,000 dwellings per year. Cost of lives saved =  $£1.55m \times 0.054 = £83.7k$ .

It is estimated that of the 1700 injuries per year in Scotland about 3% of those injuries occur in new dwellings i.e. 51 fire related injuries per year. Assuming the number of injuries prevented is 20% and the estimated percentage split is 15% for non-fatal injuries were the occupants are overcome by smoke and 5% for non-fatal injuries involving burns. This equates to a saving of 51 fire related injuries per year =  $51 \times 5\% \times £174.4k$  (involving burns) plus  $51 \times 15\% \times £44k$  (smoke) =  $£444.7k + £336.6 = £781.3k$  per year.

~~The need to provide fire detectors in domestic extensions and conversions has been clarified. The current guidance is widely interpreted to "require" this already so the amendment would produce no significant additional benefit in terms of reductions in casualties. However, the clarification would ensure that there is a consistency of approach across Scotland and would reduce risks of deaths and injury in those areas where the guidance was not previously interpreted in this way.~~

### **Benefits from additional guidance on life safety fire suppression systems in dwellings**

The introduction of life safety fire suppression systems as an option within dwellings should reduce the number of fire related deaths and injuries. However, in the absence of evidence to compare the reliability of suppression (active system) with the reliability of protected enclosures (passive systems), it has been assumed that both types of fire protection systems are 70% reliable and could save up to half of fire deaths and injuries in new build dwellings<sup>6</sup> This means that there will be no significant benefit in terms of reducing the number of fire casualties when compared with existing fire safety measures contained within the handbooks.

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<sup>5</sup> Determining the best option for the provision of additional smoke alarms in dwellings and houses, BRE Report for ODPM

<sup>6</sup> Effectiveness of sprinklers in residential premises. BRE report for ODPM

## **Benefits from improvements to firefighting shafts in tall buildings**

As noted in earlier, the work on fire safety in tall buildings in the light of the World Trade Centre incident showed that firefighters may not be able to safely penetrate more than 34m into a 'compartment' to rescue a casualty. This conflicts with guidance in the 2007 edition of section 2:fire which set out a minimum distance from any point on the floor to the fire main landing valve in a firefighting shaft to 60m.

The new guidance on firefighting shafts and rising mains is based entirely on performance in terms of the efficiency of water supplies and the distance that firefighters can safely penetrate inside a building. The revised guidance recommends that no point on the floor should be more than 45m from a fire main outlet in a building with no sprinklers (60 m in a building fitted with sprinklers). This should address the potential conflict between building design and the operation response of fire and rescue services. This should improve firefighter safety and assist them with any evacuation of the *building* occupants, effecting rescues of any casualties and to fight fire. Other measures to assist firefighters in such situations include consideration of changes to fire-fighters' clothing, equipment and procedures, which are being considered elsewhere within Government and with the Fire and Rescue Service.

## **NON-DOMESTIC BUILDINGS**

### **Benefits of providing guidance on fire detection and fire alarm systems**

Standard 2.11 requires that every building must be designed and constructed so that occupants are alerted to the outbreak of fire. The current standard is limited in its application to: dwellings, residential buildings and enclosed shopping centres. The proposed amendment removes this limitation, meaning the standard would apply to all buildings. This proposal would cover those building uses that were previously covered by Fire Precautions Act (and correctly not covered under the building regulations at the time).

The Fire (Scotland) Act 2005 has superseded the FPA and requires that persons with obligations under the Act (other than certain private dwellings), provide a suitable and sufficient fire safety risk assessment.

The proposed guidance is based on a risk assessment approach to take account of the building use and occupant characteristics including people with disabilities and is compatible with the benchmark guidance issued by Scottish Ministers under the Fire (Scotland) Act.

### **Benefits from inclusive design**

These changes bring section 2: fire in line with section 4: safety as well as other supporting British Standards. Additional guidance has been introduced to assist occupants who have varying needs and abilities to escape from buildings. This should also assist businesses meet their duties under Part III of the Disability Discrimination Act 1995 (DDA) and Part 3 Fire (Scotland) Act 2005.

## **Benefits from improvements to firefighting shafts in tall buildings**

As noted earlier, the work on fire safety in tall buildings in the light of the World Trade Centre incident showed that firefighters may not be able to safely penetrate more than 34m into a 'compartment' to rescue a casualty. This conflicts with guidance in the 2007 edition of section 2:fire which sets out a minimum distance from any point on the floor to the fire main landing valve in a firefighting shaft to 60m.

The new guidance on firefighting shafts and rising mains is based entirely on performance in terms of the efficiency of water supplies and the distance that firefighters can safely penetrate inside a building. The revised guidance recommends that no point on the floor should be more than 45m from a fire main outlet in a building with no sprinklers (60 m in a building fitted with sprinklers). This should address the potential conflict between building design and the operation response of fire and rescue services. This should improve fire-fighter safety and assist them with any evacuation of the *building* occupants, effecting rescues of any casualties and to fight fire. Other measures to assist firefighters in such situations include consideration of changes to fire-fighters' clothing, equipment and procedures, which are being considered elsewhere within Government and with the fire and rescue service.

### **Benefits from installing auto-suppression in school buildings**

Concerns about fire in school buildings have traditionally centred on life protection rather than asset protection, but fires in schools result in significant costs in terms of the damage and disruption they cause. This includes school records and work being irreparably damaged and classrooms and community facilities being unusable for long periods of time.

There is currently no mandatory requirement to install sprinklers in schools under building regulations. An automatic fire suppression system will help to prevent the fire from spreading and limit the damage to the room of origin. This will also keep the disruption caused by fire to a minimum, preserve school records and allow the community facility to function shortly after the outbreak of fire.

In assessing the benefits of installing automatic fire suppression systems it is the 'avoided' costs that are measured as benefits.

Benefits from avoided costs following the outbreak of fire in a school building can be accrued from:

- a reduction in damage to property;
- savings in the use of temporary or alternative accommodation;
- savings from the need to use temporary transport;
- savings in fire and rescue service response costs;
- savings in costs accrued from treatment to injuries cause by fire and smoke;
- and
- loss of rental from use as a social and community facility.

The average saving from avoided costs per school is estimated to be £223,400 for primary schools and £1.1m for secondary schools<sup>7</sup>. For Executive Summary of research report see **Annex A**.

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<sup>7</sup> Automatic fire detection and suppression systems in new school buildings, Tribal Group report for SBSA (2007)

### 4.3 Costs

The cost of implementation for each option is given below.

#### **Option 1: Do nothing**

This option imposes no implementation costs.

#### **Option 2 Promotion and subsidy**

Option 2 would impose some costs on Government to fund efforts to encourage industry to adopt best practice principles and to produce guidance material to show how this could be achieved.

The development costs for production of voluntary codes of practice would form part of the work of the Scottish Government - Scottish Building Standards. Therefore the costs of development, publishing, distribution and raising awareness of voluntary codes would be borne by Government and not the public. The documents would be available online at no charge.

No exact values have been assessed, as the actual costs will be proportional to the number and type of publications and the extent of the advertising and publicity campaign. However, the recent promotional campaign to launch the fire safety regulations and guidance for existing buildings under Part 3 of the Fire (Scotland) Act 2005, cost around £350k allocated to fund:

- guidance documents;
- website;
- press articles;
- radio adverts;
- trade publications;
- posters; and
- leaflets.

As with the potential benefits, these costs are difficult to estimate since they depend on the take-up rate, but they could amount to 10% of option 3 and it is likely that take-up would be highest in the public sector.

#### **Option 3 Improve building regulations and guidance**

The key proposals to change section 2: fire are summarised at **Annex A**. Overall, it is considered that all costs are economic i.e. there are no significant environmental or social costs associated with these measures. The costs of each of the proposals, as well as the costs of implementation are discussed below.

##### **Cost of new guidance and familiarisation**

Based on 2006 prices, the cost of production for hard copies, CDs and online is estimated at £20k (including inflation).

There are approximately 550 building standards professionals in Scotland. The time impact per person should be no more than 7 hours on training and familiarisation. Therefore, based on an average hourly rate of £15 per hour, the total cost for building standards professionals would be  $550 \times £105 = £58k$ .

However this can be off-set against Continued Professional Development requirements. For example, building standards professionals (verifiers) architects, architectural technologists, fire engineers, fire and rescue service personnel and other fire safety consultants may incur no additional costs as professional institutions demand at least 20-25 hours Continued Professional Development as part of their professional membership criteria.

According to the Scottish Corporate Sector Statistics 2004, there are approximately 270,430 enterprises in Scotland. This figure includes the self employed. There are an estimated 42,345 voluntary organisations. Assuming one person from every enterprise and every voluntary organisation in Scotland spends 1 hour familiarising themselves with the guidance at a rate of £8.70 per hour and £4.88 per hour respectively, the total cost of familiarisation will be £2.35m plus £0.2m = £2.55m. However, it is estimated that only 5% of enterprises and voluntary organisations will need to use the guidance with the remainder using construction professionals to advise them when carrying out building work. Therefore the total cost of familiarisation for enterprises and the voluntary sector would be £127k.

## DOMESTIC BUILDINGS

The estimated figures for 2005 have been taken from the NHBC 'New House-Build Statistics 2006' and the Scottish Executive 'Statistical Bulletin: Housing Series: Nov 2006'. The proposed cost is based on approximately 30,000 new homes built in 2010 taken from the Scottish Government 'Firm Foundations: The Future of Housing in Scotland' 2007.

Year	Total dwellings erected	Houses	Flats and maisonettes
2005	25,000	64% (16,000)	36% (9,000)
2010	30,000	64% (19,200)	36% (10,800)

### ~~Costs from the provision of additional stair in high rise domestic buildings~~

~~To construct a fire-fighting shaft in a high rise domestic building (i.e. topmost storey more than 18 m above the ground) would cost about £100k. A fire-fighting shaft will normally consist of a fire-fighting lobby, fire mains, fire resistant doors, a fire-fighting lift and possibly a natural or mechanical smoke shaft. Therefore 10,800 flats per year in 2010 @ 16 flats per block = 675 blocks. However, it is estimated that only 5% of these blocks would be constructed over 18 m above the ground = (675 x 5% x 100k) = £3.38m per year.~~

~~However, this additional cost will be off-set by the number of flats that can be provided within the 30 m travel distance (say 14 flats per storey) along the protected lobby. This design will allow all points within the storey to be reached by the 60 m distance recommended for fire fighters hose from fire mains outlets. Therefore, 10,800 flats per year say in a 4 storey block = 10,800/ (14 x 4) = 192 blocks = (192 x 5% x 100k) = £960k per year.~~

### **Costs of improved guidance for smoke ventilation of common access areas in blocks of flats and maisonettes**

The key change is to amend the guidance on the installation of smoke ventilation in common areas of blocks of flats is to provide more effective protection for occupants and fire-fighters. The intention is allow the option to construct a vertical smoke shafts or provide 1.5 m<sup>2</sup> automatic opening ventilators on the vertical face of an external wall. The additional cost of the smoke shaft in domestic buildings up to 18 m above the ground is estimated at £15k i.e. cost of the smoke shaft minus the cost of the external wall ventilators. 10,800 flats per year in 2010 @ 20 flats per block = 540 blocks. Cost for single stair flats and maisonettes = 540 x £15k = £8.1m. However, current practice suggests that natural or

mechanical smoke vent shafts are already being provided in blocks of flats due to the desire to locate escape stairs within a central core as oppose to adjacent to an external wall.

### **Costs of additional fire detection and fire alarm**

The additional cost of 1 mains operated smoke alarm to BS 5446: Part 1: 2000 and 1 additional heat alarm to BS 5446: Part 2: 2003 is £120 supplied and fitted per dwelling.

Therefore the total cost installation for 30,000 dwellings per year = £3.6m per year.

Guidance for communication in domestic alterations and extensions has been clarified. The current guidance is widely interpreted to “require” this already so the amendment would produce no significant additional costs.

### **Comparison of cost between protected enclosure and auto-suppression options**

The following costs for comparison purposes are based on a typical 4 bedroom house (1200 sq ft) 111.52 m<sup>2</sup> and a typical 2 bedroom flat (650 sq ft) 60.4m<sup>2</sup>. In Scotland, 80% of new build dwellings are timber frame with the remaining 20% using masonry construction.

#### **a. Automatic life safety fire suppression systems**

The suppression system is based on a typical residential sprinkler systems designed and installed in accordance with BS 9251: 2005 together with a 1300 litre tank and pump for houses and a 5000 litre tank and pump for flats and maisonettes.

House – £1695 direct from the 32mm main (Tank and pump £1750 extra) It is estimated that about 30% of new build houses would require a tank and pump.

Flat - £995 per flat from a boosted supply feeding the cold water 28 mm copper (Tank and pump £6000 extra for entire building). It is estimated that about 85% of new build flats would require a tank and pump.

#### **b. Protected enclosures**

Based on 100% timber frame walls the cost is currently £62/m<sup>2</sup> in 2007 and proposed cost of £65/m<sup>2</sup> assuming a discount of £1/m<sup>2</sup> is £64/m<sup>2</sup> for bulk buy, based in using insulation quilt within the frame in 2010.

House

64 x 111.52 = £7137. Therefore say 30% of total cost for protected enclosure = £2141

Flat

64 x 60.4 = £3865. Therefore say 30% of total cost for protected enclosure = £1160

Therefore, the cost of installing a suppression system or the cost of constructing a protected enclosure are comparable but the final costs will depend on whether a tank and pump is necessary for the suppression system. It is assumed that both methods of fire protection are 70% reliable but there will be no significant additional costs should the developer or designer choose the suppression option in the guidance.



## NON – DOMESTIC BUILDINGS

### Costs of providing guidance on fire detection and fire alarm systems

It is intended (under the proposed amendment to the building regulation) that on completion, the Fire (Scotland) Act should not trigger additional costs for the fire alarm system requirements for a new building. It is envisaged that new buildings will not require expensive alteration immediately on occupation. In other words, the installation of a fire detection and fire alarm system would be more economically performed during the new build construction phase as oppose to a retro-fit following occupation of a non-domestic building. There are therefore no significant additional costs of installing fire detection and fire alarms systems in non-domestic buildings when considering the building in use.

### Costs of providing auto-suppression in school buildings

The following data was received from the British Automatic Sprinkler Association (BASA) and relates to the cost of building primary and secondary schools in Scotland and the value of installing sprinkler systems as a percentage of the contract value. Table 4.1 shows that the average cost of building a primary school is around £5 million, while the average cost of building a secondary school is around £ 16 million.

**Table 4.1: Total Investment in School**

School Type	Average	Base	Minimum	Maximum	Median
Primary	£5,142,000	22	£3,082,000	£7,000,000	£5,000,000
Secondary	£15,823,000	8	£8,500,000	£21,000,000	£18,250,000
<b>All</b>	<b>£7,990,000</b>	<b>30</b>	<b>£3,082,000</b>	<b>£21,000,000</b>	<b>£6,000,000</b>

Source: BASA – Schools with sprinkler systems cost data (Scotland only)

Table 4.2 shows the contract value of the sprinkler system as a percentage of the total investment in a new primary and a new secondary school in Scotland. On average, the value of the sprinkler system contract accounts for around 1.9% of the total investment in a primary school, while the value of the sprinkler system contract accounts for around 1.7% of the total investment in a secondary school.

**Table 4.2**

School Type	Average	Base	Minimum	Maximum	Median
Primary	1.9%	21	0.9%	2.8%	1.9%
Secondary	1.7%	8	1.3%	2.2%	1.8%
<b>All</b>	<b>1.8%</b>	<b>29</b>	<b>0.9%</b>	<b>2.8%</b>	<b>1.9%</b>

Source: BASA – Schools with sprinkler systems cost data (Scotland only)

The average cost of installing an auto-suppression system in a primary school is £166,700 and a secondary School is £407,000.

### Costs from inclusive design

These changes will help to clarify the existing requirements of The Disability Discrimination Act 1995 and 2005 and the Fire (Scotland) Act 2005 and are therefore considered to produce no significant additional costs.

### **Costs of improvements to firefighting shafts in tall buildings**

It is estimated that the additional costs incurred for fire mains would only apply to new buildings with a storey at a height of more than 50 m above ground level (approximately 16 storeys). Therefore the impact in Scotland for dry mains to wet mains would be minimal.

The distance that fire fighters can safely fight fire within a building will have minimal impact. This is because the guidance on travel distance for escape should not exceed 45 m in any direction. Where this distance has been exceeded, protected zone or a compartment wall would be necessary. Fire-fighters can therefore set up a forward control point and establish a safe bridgehead from which to commence operations from that point.

### **Costs of providing emergency voice communication systems**

The provision of these measures will assist in the evacuation of occupants with disabilities, help businesses meet their duties under Part III of the Disability Discrimination Act 1995 (DDA), as well reflect the guidance in other supporting British Standards. As these changes will help to clarify the existing requirements of such legislation they are therefore considered to impose no significant additional cost.

### **Costs associated with other changes in the guidance**

The other changes proposed are to improve and clarify the intent of the guidance, reflect changes introduced in other sections of the Technical Handbooks, as well reflect the guidance in other legislation, they are therefore considered to impose no significant additional cost.

### **Effects on Firms/Consumers and the Public Sector**

This exercise will be completed at the end of the consultation exercise.

## **7.0 SMALL/MICRO FIRMS IMPACT TEST**

The SG Building Standards Division has consulted The Department of Business, Enterprise and Regulatory Reform (BERR) and followed the relevant guidance.

The small firms impact test regards all firms with less than 50 full time employees as being small businesses. The majority of small firms have fewer than 10 employees and guidelines state that a concerted effort should be made to consult them over policy proposals.

The UK construction industry is dominated by small firms. Over 99 per cent of the around 980,000 enterprises in the construction sector in 2007, were small firms<sup>8</sup> with the majority being classified as sole proprietorships. In 2007, small firms accounted for 75 per cent of construction sector employment and over 54 per cent of industry turnover.

Parties affected by the proposals would include small firms involved in the construction of buildings and in the materials used in construction. There are a number of ways in which small firms may be disproportionately affected by the proposals when compared to how larger firms are affected, for example, it may be harder for small firms to alter their design process.

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<sup>8</sup> BERR statistics [http://stats.berr.gov.uk/ed/sme/smestats2007.xls#UK Whole Economy!A1](http://stats.berr.gov.uk/ed/sme/smestats2007.xls#UK%20Whole%20Economy!A1)  
Small firms defined as firms employing less 50 employees, including sole traders.

Assessment has been based on Option 3 as Options 1 and 2 have no cost implications for small firms, including micro-businesses.

In order to explore the issues facing smaller firms, the Building Standards Division consulted the following small businesses during the policy development process:

- Architect (Sole Trader);
- Fire Engineer (< 20 employees)
- Building surveyor (< 10 employees)
- Construction Group (< 50 employees)

The majority of micro-businesses in the construction industry deal with the domestic market. Approximately 80% of all Building Warrant Applications in Scotland have an estimated cost of under £50K. The proposed changes have little impact on domestic alterations and extensions.

3 responders welcomed the additional simplified guidance on alternative approaches to using the guidance contained in the Technical Handbooks and the use of active systems such as sprinklers to allow design freedoms.

The Construction Group were not aware that domestic buildings incorporating flats and maisonettes could be designed with 2 escape stairs allowing more flats to be incorporated in the design. Savings would therefore accrue from the need to provide multiple single escape stairs in multi-plot developments. The new guidance and diagrams provide this clarity. The construction group felt that the cost of installing an additional smoke alarm and heat alarm in all new dwellings would cost around £120 which they felt was insignificant in terms of total build cost.

For small firms in the construction industry, the proposed technical changes may create some training issues (see costs of guidance and familiarity). However this is mitigated to a certain extent by the simplified guidance to explain the issues in a clear and concise manner. The majority of costs borne initially by these firms will be passed on to the building owners.

It is considered that the proposals to change the guidance apply in a proportional and equitable way. Only those firms that choose to adopt the Eurocodes to erect, alter, extend or convert buildings will be subject to the proposed changes.

## **6.0 LEGAL AID IMPACT TEST**

There will be no increased use of legal process or new rights created by the amendment and introduction of building standards and therefore no impact on the need for legal aid.

## **10.0 'TEST RUN' OF BUSINESS FORMS**

There are no business forms included with any of the options.

## **8.0 COMPETITION ASSESSMENT**

The current guidance relating to fire safety within dwellings has an imbalance between the use of passive fire protection systems e.g. walls, floor and doors and active systems such as enhanced fire alarm systems and auto-suppression systems.

If Ministers choose option 1 or option 2, this imbalance will continue and may result in criticism and lobbying from industry.

However, if option 3 is adopted by Ministers, there is likely to be an increase in the provision of building products manufactured and marketed relating to the provision of active fire protection systems. This means that the new standards and guidance for domestic buildings should provide the correct balance between the use of active and passive fire protection systems.

Therefore, there are no significant areas where issues of competition, restriction or imbalance have been identified.

## **9.0 ENFORCEMENT, SANCTIONS AND MONITORING**

### **9.1 Background**

All matters relating to enforcement, sanctions and monitoring will be carried out under the existing processes, which form the building standards system in Scotland, as set out under the Building (Scotland) Act 2003. Parties responsible for operation of this system are the 32 Scottish local authorities, appointed as verifiers under the Act, and the Building Standards Division of the Scottish Government.

### **9.2 Enforcement and sanctions**

Generally, work subject to the Building (Scotland) Regulations 2004 as amended requires a building warrant to be obtained from the verifier prior to work commencing and, a Completion Certificate accepted by the verifier once works are finished. Any works that do not require a building warrant are also set out in the regulations.

Where a building warrant is required, proposals are subject to the scrutiny of verifiers who have enforcement powers under the Act to ensure compliance with the regulations. Where cases of non-compliance are referred to the Procurator Fiscal, persons found guilty of offences in terms of the Act are liable on summary conviction to a fine not exceeding level 5 on the standard scale (currently £5000).

### **9.3 Monitoring**

The Building Standards Division will review the implementation of any changes made to building standards legislation and guidance. The Division will monitor the effectiveness of any changes and ensure that subsequent reviews are made on an informed basis.

In line with Scottish Government policy, any implemented changes will be subject to a revised RIA within a 10-year period.

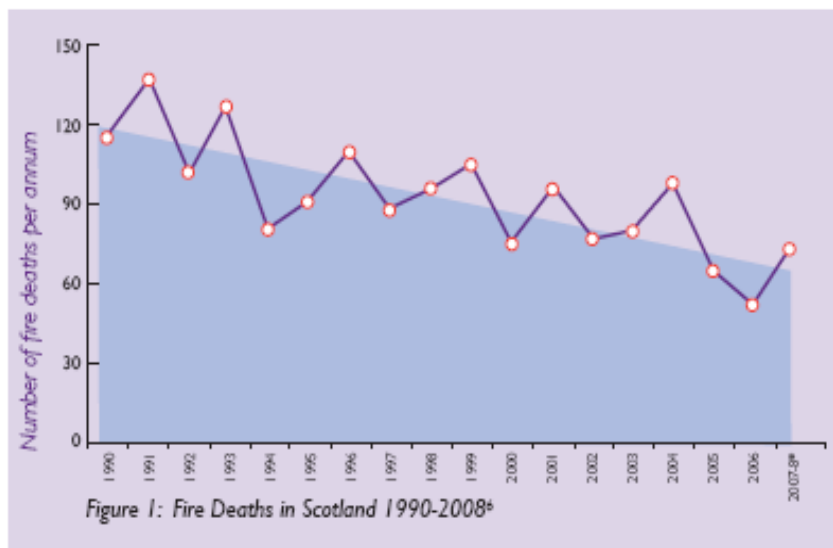
### **9.4 Post-implementation review**

Continuous monitoring of the implementation of proposals is available through feedback from local authority verifiers, designers, manufacturers, developers and property owners. These parties are in regular contact with the technical officers in the Building Standards Division and the queries they raise will offer a broad view of how proposals are being implemented and if intent is being achieved. They may also identify areas where objectives may be unclear and allow clarification of these objectives as part of the ongoing review process. Issues raised in this manner become a matter of record and are used to inform the continued development of building standards and guidance.

## 10.0 SUMMARY AND RECOMMENDATION

### 10.1 Summary and recommendation

The sustained reductions in fire deaths per annum, shown in Figure 1 below, have been achieved through a combination of community fire safety activities and the introduction of various pieces of legislation relating to fire safety in the home. Examples of legislation include the Furniture and Furnishings (Fire Safety) Regulations (1988) and guidance on the recommendation to fit hard-wired smoke detection in all new build and converted domestic dwellings through revised Scottish Building Regulations (1993). In addition, Scottish Fire and Rescue Services have been active for many years in enforcing fire safety regulations in non-domestic premises, formerly through the Fire Precautions Act 1971 and more recently through the Fire (Scotland) Act 2005. Figure 1 includes a trend line, which highlights a sustained reduction in fire deaths and an approximate decline of almost 50% over the observed time period.



**Whilst there has been a significant downward trend in Scottish fire deaths since 1990<sup>9</sup>, Scottish Ministers are committed to reducing the number and consequences of fire related incidents.**

The value of life used in this RIA is £1.55m and value of non-fatal injury involving burns is £174.4k and non-fatal injury overcome by smoke is £44k. (figures based on Communities and Local Government prices 2007).

Within the last 3 years there has been on average 60 deaths and 1700 injuries every year in Scottish dwellings which equates to 90% of all fire deaths and injuries. Therefore, the estimated average total cost of all fire related deaths and injuries in Scotland is £102.5m per annum

Estimated average property loss per fire is Domestic - £8,507 and Commercial - £33,624. There is on average 15,000 reported building fires reported every year in Scotland with 7,500 in dwellings alone. Therefore total average property loss per reported fire per year is Domestic - £63.75m and Non-domestic - £252.18m.

**Therefore, the total cost of fire in Scotland can be estimated at £418.43m.**

<sup>9</sup> Scottish Community Fire Safety Study 'A study examining fire deaths and injuries in Scotland' - Joint report by Strathclyde Fire and Rescue Service and the Scottish Government (2009)

This figure is based on a combination of reported fires and figures produced in 2009 from the Association of British Insurers.

A sensitivity analysis has not been carried out for the purposes of this RIA.

## 10.2 Summary benefits and costs table

The summary of benefits and costs are identified in the table below.

Option	Total benefit per annum	Total cost per annum
Option 1 Do nothing.	Economic, environmental and social - no benefits	<p>Economic - <b>£418.43m per annum</b></p> <p>Environmental – no change.</p> <p>Social – Continued cost to Fire and rescue service, NHS, police, local authority etc. of fire related deaths, injuries, damage and disruption.</p> <p>Policy and administrative – no effect.</p>
Option 2:  Promotion and subsidy	<p>Economic – where applied, will deliver new buildings that are safer from the effects and consequences of fire.</p> <p>Environmental – where applied, will contribute to a reduction in property damage and contribute to a sustainable built environment.</p> <p>Social – where applied should result in reduction in fire deaths, injuries.</p> <p>All benefits dependant on voluntary subscription to proposed guidance which we estimate at 10% take up and is likely to be the highest in the public sector</p>	<p>Economic, Environmental and social</p> <p>Estimated <b>£350k per annum</b> allocated to fund for:</p> <ul style="list-style-type: none"> <li>• guidance documents;</li> <li>• website;</li> <li>• press articles;</li> <li>• radio adverts;</li> <li>• trade publications;</li> <li>• posters; and</li> <li>• leaflets.</li> </ul> <p>These costs are difficult to estimate since they depend on the take-up rate, but they could amount to 10% of option 3 and it is likely that take-up would be highest in the public sector</p>

<p>Option 3:</p>	<p>Economic, Environmental and social -</p> <p>Reduction in costs to Fire and rescue service, NHS, police, local authority. Insurance industry etc. proportional to reduction of fire deaths, injuries, damage and disruption.</p> <p>Whilst it is accepted social issues such as smoking, alcohol and deprivation are major contributors to fire deaths and injuries in Scotland, improving building standards can help to protect vulnerable occupants within their own homes.</p> <p>Additional smoke and heat alarm - reduction in fire deaths and injuries estimated at <b>£865K</b>. Further savings expected from increase use of fire suppression systems such as sprinklers.</p> <p>Average saving from avoided costs in a primary school fitted with sprinklers is <b>£223.4K</b> and in a secondary is <b>£1.1m</b></p> <p>All other benefits (see section 4.2) are either optional or necessary to satisfy other legislation.</p>	<p>Economic, Environmental and social -</p> <p>Cost of new guidance and familiarisation:</p> <ul style="list-style-type: none"> <li>• <b>£58K</b> (building standards)</li> <li>• <b>£127K</b> enterprises and voluntary sector)</li> </ul> <p>Assumed other professionals will familiarise themselves through the normal Continued Professional Development criteria required to satisfy the professional institutions (say 30-40 hours CPD)</p> <p>Installation costs of additional smoke and heat alarm in all new dwellings based upon present levels of construction £120 x 30,000 units = <b>£3.6m per annum</b></p> <p>Average installation cost of sprinklers in new a new primary school is <b>£166.7K</b> and secondary school is <b>£407K</b>.</p> <p>All other costs (see section 4.3) are either optional or necessary to satisfy other legislation.</p>
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### 10.3 Recommendation

From the information provided in the preparation of this RIA it is proposed to adopt option 3 which will contribute to a sustainable built environment.

**11.0 DECLARATION AND PUBLICATION**

**DECLARATION**

**I have read the Regulatory Impact Assessment and I am satisfied that the benefits justify the costs.**

**Signed by the accountable Minister . . . . .**

**Stewart Stevenson, Minister for Transport, Infrastructure and Climate Change**

**Date . . . . .**

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## ANNEX A

### RESEARCH

#### A) SCOTTISH FIRE DEATHS

There are more than 15,000 building fires reported to the emergency services every year in Scotland. However, this is only a small proportion of the actual fires in buildings as the other fires that go unreported are successfully extinguished by the occupants without the attendance of the fire and rescue service. There are approximately 7500 fires reported in *dwelling*s alone which results in on average, 60 deaths and 1700 injuries every year, usually as a result of smoke inhalation. This means that more than 90% of all Scottish fire deaths occur in *dwelling*s. Occupants in *dwelling*s are therefore at greater risk from death or injury caused by fire than occupants in non-domestic buildings.

According to Scottish Government fire statistics for the years 2003/04 to 2006/07 where fatalities were recorded, the most common locations where a fire started were living *rooms* 38%, kitchens 24%, bedrooms 21% and other 17%. These statistics correlate with the following causes of accidental fires in *dwelling*s:

- careless disposal of cigarettes and matches in more than 40% of cases;
- fires from cooking activities in more than 20% of cases; and
- electrical, space heaters and candles in around 5% of cases each.

From 2004 to 2006, there were around 3 fire deaths per 100,000 population (weighted) in the 60 and over age group. This rate is around double the Scottish average of 1.4 deaths per 100,000 population over the same period. This means that higher proportion of fire related deaths occur in the elderly population when compared with other age groups. In response to this, and following an extensive 2.5 year research project, automatic life safety fire suppression systems were introduced in all new sheltered housing complexes and residential care buildings in 2005. However, it is also recognised that the majority of elderly residents aged over 60 years live in *dwelling*s without any special fire safety measures in place.

*The 2002 Scottish House Condition Survey (SHCS) estimated that there were just fewer than 2.2 million dwellings in Scotland. Of this total, it is estimated that are a total of 49,000 properties (2%) categorised as 'housing for older people' and 21,000 (1%) categorised as 'housing for people with disabilities within the public sector. Within the private sector, the majority of housing built since 2000 (up to 100,000 units or 4.5%) is suitable for ambulant disabled persons'. The SHCS also records the following statistics:*

- just over one third of households have at least one member with a long term illness or disability (17% of whom recorded a mobility or physical impairment); and
- one household in ten includes a person who uses a mobility aid; and
- a quarter of households include at least one member who can be classified as belonging to a Community Care grouping.

The standards and guidance in section 2: fire of the technical handbooks can help to reduce the risk to occupants in *dwelling*s but will not eliminate them.

## **B) ASSET PROTECTION FOR SCHOOLS**

### **Executive Summary**

#### **Introduction**

1. Tribal Consulting was commissioned by the Scottish Building Standards Agency (SBSA) to undertake a cost benefit analysis of the introduction of automatic fire detection and/or suppression systems in new school buildings. Concerns about fire have traditionally centred on life protection rather than asset protection, but fires in schools result in significant costs in terms of the damage and disruption they cause. This includes school records and work being irreparably damaged and classrooms and community facilities being unusable for long periods of time.

2. Through the building regulations, Scotland has introduced requirements for automatic fire suppression systems in enclosed shopping centres, residential care buildings, high rise domestic buildings and buildings in a sheltered housing complex. An automatic fire suppression system will help to prevent the fire from spreading and limit the damage to the room of origin. However, there are no mandatory requirements for sprinklers in schools under building regulations.

3. The study was commissioned as part of the overall review of fire standards which will consider the introduction of a standard to require automatic fire suppression systems and integrated automatic detection systems in new school buildings. The review needs to know whether the number of fires in Scottish schools warrants a requirement for sprinklers and/or integrated automatic fire detection systems. Hence, a cost benefit analysis for schools is required which considers the costs and benefits of three options:

- automatic fire detection only systems
- automatic fire suppression only systems
- integrated automatic fire detection and suppression systems

#### **Prevalence of Fires in Scottish Schools**

4. Over 2001/02 to 2005/06 there was a total of 758 fires in Scottish schools which is an average of approximately 152 per year. Across Scotland as a whole, the probability of a fire occurring in a school is 5.2%, but there is considerable variation across the local authorities. Glasgow, Inverclyde and West Dunbartonshire have the highest probabilities of fire at over 10% while the more rural authorities of Argyll and Bute, Highland and the Scottish Borders have a probability of less than 2%. Approximately 37% of school fires are accidental with 62% of fires classified as deliberate or malicious.

5. In terms of the scale and severity of the fire, the analysis found that 52% produce damage to the room of origin, 10% produce damage elsewhere on the floor of origin and only 4% produce damage elsewhere on the property.

6. The horizontal area damaged by direct flame and by all means of damage (e.g. fire, heat and smoke) was examined. Less than 5% of fires affect an area of more than 50 square metres by direct burning, but 24% of fires affect an area of more than 50 square metres when all means of damage are considered. There would appear to be a relationship between the horizontal area of damage and the cause of the fire. Deliberate or malicious fires account for a larger proportion of fires which are over 5 square metres. Accidental fires tend to account for smaller areas of damage.

## **Installation of Fire Detection and Suppression Systems**

7. A total of 18 local authorities responded to the Tribal survey. Across these authorities, there have been 55 new build schools and 43 refurbished schools over the last five years. None of these schools have had only an automatic fire suppression system installed. Over half of the new build primary schools have an automatic fire detection system and 37% have an automatic fire detection and suppression system. Of the new build secondary schools, there is an even split between only automatic fire detection only systems and automatic fire detection and suppression systems. One refurbished primary and one refurbished secondary had automatic fire detection and suppression systems fitted.

8. The 18 authorities responding to the survey have plans for 104 new build schools and 59 refurbished schools over the period 2006/07 to 2010/11. None of the schools will have an automatic fire suppression system only, with over 80% of new primary and secondary schools having an automatic fire detection and suppression system.

9. Some 44% of authorities responding indicated that it was council policy to install automatic fire detection and suppression systems in new school buildings while 27% indicated it was policy to install automatic fire detection systems. Half of the local authorities (or their private sector partners) receive an insurance discount for the schools with automatic fire detection and suppression systems. However, 55% of authorities indicated that their decision to implement automatic fire detection and suppression systems in new schools was not driven by their insurer's requirements.

## **Cost Benefit Framework**

10. The analysis was undertaken for three options:

- Option 1: Installation of automatic fire detection only.
- Option 2: Installation of automatic fire suppression only.
- Option 3: Installation of automatic fire detection and suppression systems.

11. The purpose of the cost benefit analysis was to quantify in monetary terms as many of the costs and benefits of each option as is feasible. The costs and benefits were prepared over 30 years and the present value of the net benefits calculated for each option. The benefit cost ratio was also calculated which is the ratio of discounted benefits to discounted costs. A benefit cost ratio of one or more is required to ensure that the benefits at least equal or exceed the costs.

12. For each option, the costs and benefits have been analysed at the Scottish level on a model school. The costs of a model school are the average of primary and secondary schools. The framework enabled further disaggregation by school type and the analysis was also undertaken for primary and secondary schools.

13. The main costs that are examined include:

- capital cost of installation of the system
- maintenance of the system per annum
- costs associated with mis-use of the system

14. The benefits which are likely to arise from the different options are essentially "avoided costs". These are considered under the following headings:

- damage to property
- other education department costs
- fire response costs
- injury/fatality costs
- environmental costs
- social and community costs

15. Insurance costs are not included in the cost benefit framework as they could give rise to an element of double counting.

## **Results**

16. For Option 1 (fire detection only) in the model school, the costs outweigh the benefits with a benefit cost ratio of 0.7. A similar result was obtained for primary schools, although the secondary analysis showed a marginally positive benefit cost ratio of 1.1.

17. For Option 2 (automatic suppression only) the discounted benefits exceed the discounted costs across all school types with the "model" school analysis having a benefit cost ratio of 1.4; the primary school analysis shows a similar result; while the secondary school analysis for this option reveals a benefit cost ratio of 2.4 where the discounted benefits outweigh the discounted costs significantly.

18. For Option 3 (automatic suppression and detection) the benefit cost ratio for the model school is equal to one which means that the discounted benefits are equal to the discounted costs. A similar result is obtained for primary schools while the secondary results are a benefit cost ratio of 1.8.

## **Conclusions**

19. The results show that the benefits of installing fire detection only systems (Option 1) into new school buildings do not exceed the costs.

20. Both Options 2 and 3 have benefit cost ratios which are at least equal to one, but across all school types (primary, secondary, and a model school) the Option which yields the highest ratio is Option 2 (automatic fire suppression only). This reflects the fact that most of the significant benefits of the options arise from the suppression element of the system rather than the detection element. Hence, most of the benefits arise with Option 2, while the detection component in Option 3 really only adds to the costs.

21. On the basis of the results, it can be concluded that there are net benefits to be obtained by installing Option 2 (automatic suppression only) into new school buildings. However, the analysis of local authority intentions showed that where local authorities have plans to install suppression systems, the plans are for Option 3 (automatic fire suppression and detection systems).

## **ANNEX B**

### **IMPLEMENTATION & DELIVERY PLAN**

#### **DELIVERY AND COMMUNICATION**

The proposed changes will be taken forward in the form of guidance within the Technical Handbooks which support compliance with the Building (Scotland) Regulations 2004. This guidance will be introduced as part of the Building (Scotland) (Amendment) Regulations 2010 and implementation will be carried out under existing processes, which form the building standards system in Scotland, as set out by the Building (Scotland) Act 2003.

The Technical Handbooks are the primary reference source for compliance with building standards and, as such, are used by designers and others involved in the building process to ensure compliance with the Scottish Building Regulations.

The guidance to the standards will illustrate the most common way of meeting the requirements of the building standards and, thus, complying with the Building (Scotland) Regulations 2004 (as amended). When carrying out work that is subject to the building standards, it is the duty of the relevant person (normally the owner of the building) to comply with the requirements of the Regulations.

Publication in this form is the established method of introducing changes to the building standards system and ensures that information on changes reaches those involved in works that are subject to building standards. This information is made available in paper form, as a priced publication, or free of charge, as an electronic download from the Building Standards Division (BSD) website, [www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards](http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards)

#### **IMPLEMENTATION**

The proposed changes will form part of the building standards system in Scotland, produced and maintained, on behalf of Ministers, by the BSD and operated and enforced by the 32 Scottish local authorities.

Building work subject to the Building (Scotland) Regulations 2004, as amended, requires a building warrant to be obtained prior to commencing building work and to have a Completion Certificate accepted by the Verifier on completion of the work. Such works are subject to the scrutiny of local authorities as Verifiers of the system, who also have enforcement powers under the Act to ensure compliance with the Regulations.

#### **IMPLEMENTATION PERIOD**

The proposed changes to the guidance within the Technical Handbooks are relevant to any party responsible for a building who intends to carry out building work that is subject to building regulations.

Proposed changes will be published online in April 2010 with hard copy documents following on. Guidance will come into effect on the 1<sup>st</sup> of October 2010 and be applicable to all building warrant applications made on or after that date. This will provide the minimum 12 week implementation period required for any such change.

## **PROMOTION**

Any changes to the building standards system are publicised by the BSD through the website, seminars and articles in relevant publications. In addition, the BSD would seek to promote changes to the standards and guidance in association with organisations who have an expressed interest in building design and accessibility issues, together with other key stakeholders who have been involved in development of guidance and in the consultation process.

## **ANNEX C**

### **SUMMARY OF PROPOSED CHANGES**

This Regulatory Impact Assessment (RIA) addresses the proposals to amend the standards and guidance in Section 2: Fire of the Technical Handbooks and in particular:

- Standard 2.1 Compartmentation (no change to standard, guidance amended);
- Standard 2.2 Separation (no change to standard, guidance amended - check);
- Standard 2.3 Structural protection (no change to standard, guidance amended);
- Standard 2.9 Escape (no change to standard, guidance amended);
- Standard 2.11 Communication (standard and guidance amended)
- Standard 2.12 Fire and rescue service access (standard and title amended)
- Standard 2.13 Fire and rescue service water supply (standard, title and guidance amended)
- Standard 2.14 Fire and rescue service facilities (no change to standard, title and guidance amended);
- Standard 2.15 Automatic fire suppression systems (standard, title and guidance amended)

Standard 2.11 has been amended to cover all buildings to better reflect intent and align with guidance issued by Scottish Ministers under the Fire (Scotland) Act 2005;

Standard 2.15 has been amended to honour the Scottish Governments objective to further the achievement of sustainable development.

### **EXPLANATION OF CHANGES TO THE STANDARDS**

#### **Standard 2.11: Communication**

Explanation of changes required to standard 2.11 -

- Occupants can be alerted to the outbreak of fire by visually observing the fire or by occupants shouting 'fire' or by automatic manual warning systems or by automatic fire detection and warning systems. The previous standard suggested that only those occupants in dwellings, residential buildings and enclosed shopping centres need be alerted to the outbreak of fire.
- The removal of the limitation better reflects intent and allows the supporting guidance to compliment guidance issued by Scottish Ministers under Part 3 of the Fire (Scotland) Act 2005.

#### **Standard 2.12: Fire and rescue service access**

Explanation of changes required to standard 2.12 –

- The Fire (Scotland) Act 2005 recognises the valuable role that the fire services provide to the public including their rescue function from incidents such as fire, flooding, building collapse and any other rescue operation. In response to this, all fire services in Scotland have changed their name to include the “rescue” function in their title. For example, Fife Fire and Rescue Service.

#### **Standard 2.13: fire and rescue service water supply**

Explanation of changes required to standard 2.13 –

- The Fire (Scotland) Act 2005 recognises the valuable role that the fire services provide to the public including their rescue function from incidents such as fire, flooding, building collapse and any other rescue operation. In response to this, all fire services in Scotland have changed their name to include the “rescue” function in their title. For example, Fife Fire and Rescue Service.

- The Limitation has caused confusion. The original intent behind this limitation was to avoid duplication of legislation. The Fire (Scotland) Act 2005 includes requirements that a fire and rescue service “shall take all reasonable measures for securing that an adequate supply of water will be available for use, in the case of fire.” The guidance in the Technical Handbooks [Domestic] states that “It is therefore important to consult the fire service early in the design process to establish the extent of any water supplies for fire-fighting purposes. However, housing developers continue to argue that water supplies are not required by building standards and are not prepared to pay for their installation e.g. water hydrants. This was not the intention and we propose to remove the limitation.

## **STANDARD 2.15: AUTOMATIC FIRE SUPPRESSION SYSTEMS**

Explanation of changes required to standard 2.15 –

- This standard has been amended to include school buildings to comply with the Scottish Government policy to further the achievement of sustainable development.
- The words ‘life safety’ have been removed because the suppression systems in school buildings are installed primarily for protecting the property against fire;
- The word “growth” has been added because the function of a fire suppression system is to inhibit fire growth;
- The words “and smoke” have been removed because the mass flow rate and density of smoke will initially increase as a result of the sprinkler activation (albeit in a diluted, less toxic state).
- It has been introduced because accidental and deliberate fires in school buildings cause significant damage and disruption to the community and there is a positive benefit to cost ratio to justify introducing auto-suppression systems in new school buildings - see full research report on the Building Standards Division (BSD) website, [www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards](http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards) ;
- Note - the case has not been made for the installation of fire suppression systems in all new hospitals – see full research report on the Building Standards Division (BSD) website, [www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards](http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards)

## **DOMESTIC BUILDINGS – LATEST CHANGES**

The 2010 edition of section 2 has been partially rewritten to include:

- greater choice of active and passive fire safety measures within the *dwelling* of fire origin;
- improved guidance on fire detection and fire alarm systems in *dwelling*s to better reflect risk;
- improved guidance and greater choice on the escape strategy and fire safety measures serving *flats* and *maisonettes* including *high rise domestic buildings*;
- reference to fire service amended to fire and rescue services throughout guidance;
- standard 2.13 fire and rescue service water supply amended and clarified for domestic buildings;
- improved guidance on facilities to assist the fire and rescue services including the performance of fire mains;
- updated guidance on fire suppression systems including water supplies and component parts;
- incorporate Annex 2A *high rise domestic buildings* within the guidance to standards 2.1 to 2.15 and amend annex numbering;
- reference structural eurocodes in Annex 2A resistance to fire.



## **NON-DOMESTIC BUILDINGS – LATEST CHANGES**

The 2010 edition of section 2 has been partially rewritten to include:

- greater choice between active and passive fire safety measures;
- improved guidance on fire detection and fire alarm systems to better reflect risk;
- improved guidance on facilities to assist the fire and rescue services including the performance of fire mains;
- updated guidance on life safety fire suppression systems including water supplies and component parts
- amended standard and guidance to cover automatic suppression systems in schools
- guidance on width of exits has been re-worded to highlight that when deciding the width of exits, the largest exit should be discounted.
- the guidance for escape routes in residential buildings has been improved
- guidance is given on the provision of an emergency voice communication system in temporary waiting spaces
- guidance has been provided on the provision of a level platt at all final exits
- guidance provided on measures to protect occupants using an escape route beyond final exit, but before a place from which occupants can disperse is reached.
- removed guidance on air supported structures, as they are rarely built
- guidance provided on gas and oil pipes inside protected zones and protected lobbies

## **ANNEX D**

### **CONSULTATION REPORT**

#### **ACKNOWLEDGEMENTS**

We are grateful to all of the respondents who contributed their views on these building standards review proposals.

#### **EXECUTIVE SUMMARY**

1. A consultation exercise commenced on the 6 May 2008 to seek comments on proposals to amend building standards and guidance related to fire. The closing date for the consultation was 29 July 2008. Consultation proposals were placed on the Building Standards Division (BSD) website and over 700 consultees were invited to respond. Consultees were encouraged to respond on any aspect of the proposals but were specifically invited to comment on the targeted issues.

2. The key objectives of the amendment are:

- to improve safety of people in and around buildings following the outbreak of fire;
- to further the achievement of sustainable development;
- to encourage innovative design and construction of buildings;
- to promote inclusive design;
- to reduce environmental pollution; and
- to improve assistance to the fire and rescue services.

3. In order to achieve these key objectives, the main proposals targeted by the consultation and questionnaire focussed on the following range of fire related subjects contained within Section 2 of the Technical Handbooks:

- Alternative approaches
- Escape
- Communication
- Fire and Rescue Service facilities
- Fire Suppression systems

4. There were 48 responses to the consultation and 39 (81%) of the respondents completed the consultation questionnaire (in whole or in part). The majority of respondents are content with what is proposed. All 9 of the proposals were supported by at least 62% of the respondents who expressed a view. Three of the proposals were supported by over 90% of the respondents and only two were supported by less than 70% of respondents.

5. A detailed analysis of the content of all the consultation responses has been carried out by the Building Standards Division (BSD) of the Scottish Government in consultation with the Building Standards Advisory Committee (BSAC) - Fire Working Party. The Division have taken on board the extremely helpful comments and suggestions from responders particularly with regard to splitting the functional standards on escape from domestic buildings, comments received on alternative approaches and comments on the technical detail.

6. The analysis of responder's comments did not identify any strong barriers or objections to the proposed changes, with the exception of the recommendation for two escape stairs in high rise domestic buildings (see analysis to question 6). It is now the intention to review the technical detail of the standards and guidance ready for ministerial consideration with a view to introducing the new standards and supporting guidance in 2010.

## 1. INTRODUCTION

Scottish building regulations set standards for the health, safety and welfare of persons in and around buildings, furthering the conservation of fuel and power and furthering the achievement of sustainable development. These standards are supported by guidance contained in the Technical Handbooks. The building regulations apply to new buildings and to buildings being converted, altered or extended.

## 2. THE CONSULTATION PROCESS

Before making or amending the building regulations, Scottish Ministers are required to consult the Building Standards Advisory Committee (BSAC) and such other bodies as are considered necessary to inform on the matters under consideration. This exercise has been carried out through a BSAC Working Party and discussions have taken place with local authority verifiers and the industry.

The consultation exercise was issued to just over 500 public, private sector and third sector organisations, Non-Departmental Public Bodies (NDPB) and individuals and interested parties identified and listed on the BSD consultation inventory. The consultation documents were published on the BSD website as an electronic download, with paper copies issued to all individuals or organisations who requested a hard copy. An additional 250 organisations and individuals who have registered with the BSD were advised of the consultation by email. All were invited to submit comments on the proposals made in the consultation paper by 29 July 2008.

In total there were 48 (approx 7%) responses from the following organisations:

Contractors, Developers & Manufacturers	4
Designers & Consultants	10
Interest Groups & Advisory Committees	3
Local Authorities	8
Professional & Trade Bodies	11
Other Statutory Bodies	4
Individuals	3
NDPBs & Agencies	2
LG Fire Service Bodies	3
<b>TOTAL</b>	<b>48</b>

### 3. CONSULTATION RESPONSES

Aside from welcoming general comment on the detail of the proposals, a list of 9 questions (Q) relating to specific issues were sought from consultees. Not all consultees responded to all questions therefore a summary table of responses to each of the questions is set out below, followed by brief comment and recommendation on each issue.

Q	Summary of questionnaire responses	No of responses	agree with proposals
1	The proposal is to split the existing standard into 2 standards for domestic buildings and 3 standards for non-domestic buildings. The intention is to describe the stages of escape and re-write the relevant guidance for each stage to add clarity	37	32 (86%)
2	The guidance for alternative approaches in the Technical Handbooks is limited and can only be fully understood by competent fire engineers. Therefore, the prescriptive solutions contained in the handbooks continue to be used inflexibly and stifle innovation. The purpose of this guidance is to offer a performance based approach as an alternative method to satisfy the standards a. Do you find the performance guidance helpful? b. It is intended to publish the performance guidance separately from the Technical Handbooks. Do you agree?	37 37	Yes 32 (86%) Yes 23 (62%)
3	It is intended to publish the non-domestic Annexes for Residential Care Buildings, Hospitals and enclosed shopping centres separately from the Technical Handbooks because the guidance is specialised Do you agree?	37	Yes 26 (70%)

4	<p>The guidance allows a greater role in the use of automatic fire detection and fire alarm systems and automatic life safety fire suppression systems to satisfy the standards for escape from domestic buildings</p> <p>Do you agree with the extended role of active fire safety measures when designing an escape strategy from domestic buildings?</p>	37	Yes 36 (97%)
5	<p>Additional smoke alarms and heat alarms are proposed to help reduce fire related deaths and injuries in the dwelling of fire origin.</p> <p>Do you agree with the proposal?</p>	38	Yes 37 (97%)
6	<p>The additional guidance in Annex 2.A is intended to ensure safety of occupants and fire fighters in high rise domestic buildings</p> <p>Should high rise domestic buildings (18m - 60m) continue to be allowed to be built with only one escape route from the building?</p>	31	Yes 23 (74%)
7	<p>Guidance is proposed within the performance guidance on phased evacuation to allow designers to continue to use the methodology allowing reduced stair widths based on compartmentation and staged alarms</p> <p>Do you agree with simplifying the guidance on escape stair widths in the Handbooks and referencing the alternatives phased evacuation strategy in the performance guidance?</p>	34	Yes 25 (74%)

8a	Protected lobbies provide evacuees with protection from fire and smoke following the outbreak of fire where the topmost storey is at a height of not more than 7.5m above the ground level. It is proposed to allow the installation of automatic fire detection and fire alarm systems to be used instead of protected lobbies in non-residential non-domestic buildings served by a single escape stair where the topmost storey is at a height of not more than 7.5m above the ground level Do you agree?	35	Yes 27 (77%)
8b	Protected lobbies also provide fire and rescue personnel with protection from fire where the topmost storey is at a height of more than 7.5m above the ground level. It is proposed to allow the installation of automatic fire detection and fire alarm systems and automatic life safety fire suppression systems to be used instead of protected lobbies in non-residential non-domestic buildings where the topmost storey is at a height of more than 7.5m but not more than 18m above the ground level Do you agree?	34	Yes 22 (65%)
9	Standard 2.11 Communication:- Additional guidance provided to align with the sector specific guidance issued by Scottish Ministers under the Fire (Scotland) Act 2005 Do you agree with this proposal?	35	Yes 32 (91%)

In all cases the majority of consultees that responded to the individual questions were in favour with the proposals. Question 2b received the lowest level of support at 62% with 38% of responses recommending that the performance guidance on alternative approaches should remain within the Technical Handbooks.

#### 4. ANALYSIS

In addition to agreeing or disagreeing with the specific questions for the proposals a number of responders offered comments or suggestions on the detail of the proposals. To ensure that all comments were considered, the analysis of the questionnaire responses and all additional comments received was carried out by the Building Standards Division (BSD) of the Scottish Government in consultation with the Building Standards Advisory Committee (BSAC) - Fire Working Party. This working group consists of experienced construction professionals from various sectors of the industry who are familiar with the proposals, having been involved since the initiation of the review.

#### 5. FINDINGS

All responses received are being considered by the Building Standards Division (BSD) in consultation with the BSAC - Fire Working Party. The outcomes assisted in informing the decisions made with regard to each specific review proposal as follows:

**Q1 Standard 2.9 Escape - The proposal is to split the existing standard into 2 standards for domestic buildings and 3 standards for non-domestic buildings. The intention is to describe the stages of escape and re-write the relevant guidance for each stage to add clarity.**

Although 86% of responders to this question were in favour of splitting the existing standard 2.9 Escape for domestic buildings into 2 standards, some responders were not in favour of splitting the standard for non-domestic buildings. Some responders questioned the application of the standards (including the limitations). Other responders questioned the numbering and sequence of the standards.

##### Consideration

Responders found the new standards and guidance for escape from domestic buildings helpful. It set out more clearly the principles of escape from the dwelling of fire origin and the delayed evacuation principle from the flats and maisonettes. However, some responders found the 3 functional standards on escape from non-domestic buildings confusing and the guidance repetitive.

It is proposed to consider having 1 or 2 functional standards for escape from domestic buildings and only 1 standard for escape from non-domestic buildings. The application of the standards and numbering of the standards should be given further consideration.

**Q2 Performance based guidance - The guidance for alternative approaches in the Technical Handbooks is limited and can only be fully understood by competent fire engineers. Therefore, the prescriptive solutions contained in the handbooks continue to be used inflexibly and stifle innovation. The purpose of this guidance is to offer a performance based approach as an alternative method to satisfy the standards**

- a. Do you find the performance guidance helpful?**
- b. It is intended to publish the performance guidance separately from the Technical Handbooks. Do you agree?**

Whilst the majority of responders (86%) found the performance guidance on alternative approaches helpful, some responders felt there was either no need for the additional guidance, there is insufficient detail in the guidance or the purpose and scope of the guidance should be clarified. Question 2b received the lowest level of support (62%) with the remaining responders recommending that the performance guidance on alternative approaches should remain within the Technical Handbooks.

### **Consideration**

Many responders welcomed the additional performance guidance on alternative approaches, but some comments received were less favourable. The use of the word 'performance' clearly confused the responders and many requested that the purpose and scope of the guidance should be clarified. There is uncertainty as to where this guidance sits with the use of fire engineering solutions such as BS 7974 and the use of the International Fire Engineering Guidelines (IFEG) document.

There was significant resistance (38%) to publishing the guidance in a separate document.

It is proposed to review the purpose and scope of the guidance and where it should sit within the Technical Handbooks. For example, the guidance on alternative approaches in clause 2.0.6 of the handbooks could be simplified and consolidated. Alternatively, an Annex on Alternative Approaches could be introduced providing a framework on issues to consider when carrying out an alternative approach.



**Q3 It is intended to publish the non-domestic Annexes for Residential Care Buildings, Hospitals and enclosed shopping centres separately from the Technical Handbooks because the guidance is specialised. Do you agree?**

Although 70% of responders were in favour and welcomed the proposals, 30% felt that the additional guidance should be kept as Annexes within the Technical Handbooks.

**Consideration**

In light of the responses and comments received, this proposal has been reviewed.

1. A study of the use of the small buildings guide (structure) in 2005/06 concluded that the use and accessibility of the document was not fully realised by key stakeholders such as architects and structural engineers. The BSAC working party on structure agreed at that time, that the document would be better issued as an Annex within the Technical Handbooks to support compliance with the standards.

2. If the additional guidance for residential care buildings, hospitals and enclosed shopping centres was removed from the Technical Handbooks, there is a danger that separate publications requiring the reader to use both the Technical Handbooks and the sector specific publication would be confusing and inefficient.

3. If Section 2: Fire was reproduced 'in full' as sector specific guidance for residential care buildings, hospitals and enclosed shopping centres there would be an increased cost to stakeholders and questions would be raised about other sectors such as offices, shops, assembly buildings, entertainment buildings, and industrial and storage buildings. A suite of sector specific fire safety guides for new buildings, alterations, extensions and conversions may also be confused with the suite of sector specific guides issued by Scottish Ministers under the Fire (Scotland) Act 2005.

4. As the Scottish Ministers move the e-Government agenda forward, an opportunity exists in the future to consider production of sector specific guidance incorporating all sections of the Technical Handbook e.g. structure, fire, environment, safety, noise and energy which apply to new and existing buildings across a range of different legislation. This is out with the scope of the current review.

5. It is therefore proposed to retain the additional guidance on residential care buildings, hospitals and enclosed shopping centres in Annexes within the Technical Handbooks.

**Q4 The guidance allows a greater role in the use of automatic fire detection and fire alarm systems and automatic life safety fire suppression systems to satisfy the standards for escape from domestic buildings**

**Do you agree with the extended role of active fire safety measures when designing an escape strategy from domestic buildings?**

There was overwhelming support for this proposal (97%). Only 1 responder out of 37 disagreed.

**Consideration**

Whilst there was overwhelming support for this proposal a number of issues need to be considered before a final decision is reached. Firstly, the issue of sprinkler systems providing equivalent fire protection as ventilated protected lobbies needs to be considered in domestic buildings. Secondly, with regard to life safety in the dwelling of fire origin, research is currently being carried out by NHBC on the issue of escaping through open plan flats e.g. bedroom to living room / kitchen to exit. The final research report is expected to be published in the summer 2009 and will inform the finalised guidance.

**Q5 Additional smoke alarms and heat alarms are proposed to help reduce fire related deaths and injuries in the dwelling of fire origin. Do you agree with the proposal?**

There was overwhelming support for this proposal. Only 1 responder out of 38 disagreed.

**Consideration**

Over 60% of fire related deaths occur from fires originating in kitchens and living rooms. Most responders (97%) agreed that an additional smoke alarm in the principal habitable room and a heat alarm in the kitchen would reduce fire deaths and injuries. Responders also welcomed the additional guidance on false alarms and the choice of smoke alarm or heat alarm. One responder felt that there was too much guidance on smoke / heat alarms and reference to BS 5836-6 is all that is necessary. Another responder suggested that the guidance on choice of alarm was flawed and would not reduce false alarms. Also, the guidance on interconnection by radio frequency should be a matter for the client and not dictated by guidance for extensions which is illogical. It is proposed to take forward the recommendations for additional smoke / heat alarms and to review the guidance on alarm types, false alarms and interconnection.

**Q6 The additional guidance in Annex 2.A is intended to ensure the safety of occupants and fire fighters in high rise domestic buildings.**

**Should high rise domestic buildings (18m - 60m) continue to be allowed to be built with only one escape route from the building?**

This was perhaps the most contentious issue in the consultation. There were only 31 responses which was the lowest number of responses to any question. The low response rate to this question and the lack of response from key stakeholders suggests that opinion is divided. However, 74% of those who did respond could not support the guidance recommending 2 escape stairs from domestic buildings up to 60m above the ground. Lack of robust evidence base and commercial viability were cited as reasons to question such a move. However, other responders questioned the principle of delayed evacuation from flats and maisonettes and cited BS 5839-6 which could provide early warning to all occupiers from smoke detection in the common spaces. Others suggested that an integrated communication system would be more appropriate to allow fire-fighters to communicate with occupants within their dwellings. Some responders felt that the introduction of automatic life safety fire suppression systems in high rise domestic buildings in 2005 has significantly reduced the risk in such buildings.

**Consideration**

Ideally, there should be more than 1 escape route to choose from. This would allow occupants from adjoining dwellings to turn away from the fire and make their escape in the other direction. However, Planning Authorities in Scotland generally recommend that flats are designed with dual-aspect (i.e. views out of two elevations). This means that many two stair buildings would need a central corridor linking both exits and may be opposed by Planning Authorities.

The evidence suggests that fire will spread beyond the building of fire origin in approximately 8% of cases. However, the statistics cover both domestic buildings (houses, flats, maisonettes) and non-domestic buildings (check stats) Statistics provided for damage caused by fire spread into the common space, cannot clearly be separated from those other fires that spread beyond the dwelling of fire origin. There is no evidence to suggest that fire deaths and injuries beyond the dwelling of fire origin is a current problem. As a result, it can be concluded that the level of fire separation between dwellings is satisfactory. Maintenance issues in common spaces should be explored further.

It is therefore recommended that the current guidance allowing single escape stairs up to 60m in domestic buildings continues to be recognised in the Technical Handbooks. Buildings over 60m are out with the scope of the Technical Handbooks and the Scottish Government Building Standards Division should be notified of such developments by Local Authorities . This process and philosophy will be kept under continuous review.

**Q7** Guidance is proposed within the performance guidance on phased evacuation to allow designers to continue to use the methodology allowing reduced stair widths based on compartmentation and staged alarms.

**Do you agree with simplifying the guidance on escape stair widths in the Handbooks and referencing the alternatives phased evacuation strategy in the performance guidance?**

Many responders (74%) agreed that simplifying the guidance on escape stair widths would be desirable however were not convinced that the alternative phased evacuation methodology should sit within the performance guidance.

#### **Consideration**

The intention behind the performance guidance was to give advice on alternative approaches and not another level of prescription. There is a real danger of the calculation methodology for simultaneous evacuation being imposed on designers which could result in disproportionately excessive escape stair widths for some non-domestic buildings.

The proposal is therefore to attempt to simplify the guidance on escape stair widths within the handbooks by giving more explanation of the intent and to recognise 2 options for vertical escape:

1. Simultaneous evacuation; or
2. Phased evacuation.

This in effect would mean that the confusing 3<sup>rd</sup> option on vertical escape based on compartmentation which is not directly linked to staged fire alarms would be removed.

**Q8a Protected lobbies provide evacuees with protection from fire and smoke following the outbreak of fire where the topmost storey is at a height of not more than 7.5m above the ground level. It is proposed to allow the installation of automatic fire detection and fire alarm systems to be used instead of protected lobbies in non-residential non-domestic buildings served by a single escape stair where the topmost storey is at a height of not more than 7.5m above the ground level.**

Most responders (77%) agreed that this option should be recognised in the guidance. Some responders disagreed and felt that protected lobbies and early warning systems provide different functions and should not be considered in parallel. Other responders felt that there is a close correlation between protected lobbies and early warning in that they are both time related and the time saved in pre-movement will compensate for the lack of protected lobbies. Other responders asked that the logic behind this proposal is explained.

### **Consideration**

The purpose of a protected lobby in a non-domestic single escape stair building is to protect the escape stair from fire and smoke for sufficient time for evacuees to make their escape to a place of safety.

The proposal does not apply to non-domestic residential buildings as those buildings are already covered by the need for protected lobbies and automatic fire detection and fire alarm systems. The reason for this is due to the sleeping risk and the additional time required to evacuate the building i.e. longer pre-movement times.

Where manual only systems are installed in non-domestic non-residential buildings under Standard 2.11, there would be a need to install automatic fire detectors to compensate for the lack of protected lobbies.

The reason this guidance is limited to buildings with a storey height of not more than 7.5m above the ground is because single escape stair buildings are limited to building of that height. Whilst the 7.5m height is arbitrary, it has historically been linked to the height at which Fire and Rescue Service (FRS) personnel can rescue occupants using the standard 13.5m ladder. Whilst this practice is no longer common, FRS personnel continue to carry out external rescues as a last resort.

It is therefore proposed to allow automatic fire detection and fire alarm systems (incorporating auto-detection) as an alternative to protected lobbies in non-residential non-domestic single escape stair buildings where the topmost storey is not more than 7.5m above ground level. Need to establish what category of system e.g. at least category L1, L2 or L3.

**Q8b Protected lobbies also provide fire and rescue personnel with protection from fire where the topmost storey is at a height of more than 7.5m above the ground level. It is proposed to allow the installation of automatic fire detection and fire alarm systems and automatic life safety fire suppression systems to be used instead of protected lobbies in non-residential non-domestic buildings where the topmost storey is at a height of more than 7.5m but not more than 18m above the ground level.**

65% of responders agreed with this proposal. Other responders either disagreed with the proposal or asked that the logic behind the proposal is explained. Some responders felt that automatic fire suppression systems provide a more robust method of protecting escape stairs whilst others disagreed and felt that the passive protection afforded by protected lobbies was better. Some responders welcomed the additional choice of which method to use to protect evacuees and fire-fighters which also contributed to design freedoms. Others commented that the cost of installing an automatic life safety fire suppression system in the building instead of protected lobbies would not be commercially viable and unlikely to be adopted in practice.

### **Consideration**

Non-domestic buildings higher than 7.5m should have at least 2 escape stairs serving the upper storeys. It is worth noting that in a non-domestic building with 2 or more escape stairs, the provision of protected lobbies provide design freedoms to allow the designer to reduce stair widths i.e. each escape stair is less likely to be adversely affected by fire and smoke during the evacuation period of the building.

Therefore, the intention behind this proposal was to allow design freedoms and the installation of automatic life safety fire suppression systems and auto-detection and alarm systems should be considered as an equal alternative to protected lobbies. This proposal would also enjoy the benefits from reduced stair widths.

The 7.5m storey height has been explained in question 8a. The 18m storey height is also arbitrary but has historical links with the reach capability of FRS equipment such as hydraulic platforms. Therefore, the general intent is that buildings with a storey height of more than 18m cannot be easily reached by FRS equipment and personnel. As a result, the guidance recommends that at least one internal fire-fighting shaft (e.g. escape stair, fire-fighting lobby, fire mains and fire-fighting lift) is provided within the building to allow equipment and personnel to be deployed as quickly as possible.

Therefore, in light of the comments received and the lower consensus of opinion, it is recommended that the guidance explain the logic behind the sprinkler and AFD option in lieu of protected lobbies. Consider extending the option to all non-domestic buildings.

**Q9 Standard 2.11 Communication - Additional guidance provided to align with the sector specific guidance issued by Scottish Ministers under the Fire (Scotland) Act 2005. Do you agree with this proposal?**

91% of responders welcomed this proposal. However, some responders felt that the introduction of automatic fire detection and fire alarm systems (AFD) would limit the ability of designers to use such systems as a compensatory feature when designing buildings. One responder suggested that following the guidance in the Technical Handbooks should also satisfy the Fire Safety (Scotland) Regulations 2006.

**Consideration**

The introduction of guidance on AFD to align with the sector specific guidance may in some cases, hinder designers when using alternative approaches incorporating AFD in the fire safety strategy. However, higher categories of AFD could be specified as a compensatory feature in many other cases e.g. Category L2 in lieu of L4.

The installation of automatic fire detection and fire alarm systems has historically been applied through other legislation such as the Fire Precautions Act 1970 which imposed a statutory bar on applying more onerous standards than those contained in building regulations. However, following the introduction of the Fire Precautions (Workplace) Regulations 1992 the statutory bar was replaced by a regime based on risk assessment. This meant that additional fire precautions to that contained in building regulations may be applied following a suitable and sufficient risk assessment. This legislation has since been replaced by the Fire (Scotland) Act 2005 and associated regulations which follow the same principles.

Considering the overwhelming support for this proposal, it is recommended that the guidance to standard 2.11 be aligned with the sector specific guidance issued under the Fire (Scotland) Act 2005 whilst recognising that in some cases a higher standard of fire precautions may be applied.

## 6. ADDITIONAL COMMENTS RECEIVED

Additional comments received or suggestions made for further analysis that BSD are currently considering.

### General

- Postpone review due to wider economic considerations
- Reference to fire risk assessment (FRA) out with scope of Building Standards. Potential confusion with FRA required under part 3 of the Fire (Scotland) Act 2005
- Refer to updated documents e.g. historic buildings (conversions), 2007 CDM regs, 5<sup>th</sup> Edition of safety in sports grounds etc
- Reference to Technical Standards for prisons should be removed
- Application of standards to places of lawful detention should be clarified including detention centres under the Mental Health legislation.
- Definition of shared residential accommodation should be reviewed
- Clarification requested on application of building standards to dwellings used as B & B's , care homes etc and how this sits with application of part 3 of Fire (Scotland) Act 2005
- Application of standards for escape and limitations
- Numbering and sequence of standards should be reviewed
- Some responders requested more diagrams whilst other requested less diagrams. Some clarification requested about diagrams and precise method of measurement
- Rules of measurement (non-domestic) omitted from consultation document in error
- Need to update guidance on lifts, including new FR test for lift landing doors (current research project), activation of landing controls, operation during fire alarm, separation between lift machine room and escape stair and the use or otherwise of evacuation lifts.
- Request to review Occupancy Load Factors in guidance
- Concern over discounting largest exit
- Need to review guidance on auditorium
- Mirror guidance in sector specific guidance issued by Scottish Ministers under part 3 of Fire (Scotland) Act 2005
- Many comments received on smoke control in corridors e.g. escape route should be protected from all adjacent rooms, not just bedrooms, relationship between 25 Pascal's at 22m/s should be clarified and explained.
- Review fire hazards in protected zones.
- Review guidance on multiple galleries

### Scope

- Limiting scope of guidance to dwellings with any storey not exceeding 200m<sup>2</sup> is unduly restrictive
- Removal of travel distances within a flat or maisonette could result in travel distances in excess of 20m to reach an exit

### Delayed evacuation

- Some responders questioned the principle of delayed evacuation from flats and maisonettes and cited BS 5839-6 which could provide early warning to all occupiers from smoke detection in the common spaces.
- Others suggested that an integrated communication system would be more appropriate to allow fire-fighters to communicate with occupants within their dwellings
- The issue of crowding at exits to stairs in non-domestic buildings should be reviewed.



### **External escape stairs**

- Some responders questioned the need to remove the max 7.5m height restriction from the guidance. Agree with SG (section 4: safety) colleagues way forward e.g. may retain 7.5m in S2 and amend when S4 next reviewed. This is a safety issue, not a fire issue.
- Some responders questioned the fire resistance protection to external escape stairs from flats and maisonettes. Guidance currently allows 30 minutes fire resistance for up to 4 storeys (7.5m) buildings however this should be increased to 60 minutes to allow for delayed evacuation of occupants. Similarly in non-domestic buildings, evacuation could be delayed by design (e.g. vertically phased) or manual fire alarm system. Therefore, FR should be increased to 60 minutes. Insulation criteria requires further consideration. Consequential amendment – 30 to 60 mins FR to external wall of protected zone subjected to fire exposure.

### **Travel distance**

- Limitations on travel through smoke should be explored

### **Protected lobbies**

- Review new definition of protected lobby – could lead to more confusion

### **Suppression**

- Some responders recommended auto - suppression in all new build dwellings - research ongoing.
- Clarification on the use of concealed heads and continuing requirement to maintain head effectiveness / efficiency
- 2 head activation in lieu of 3 head activation (domestic)
- Obscuration (i.e, optical density) will be increased when sprinklers activate
- If suppression in hospitals being considered, should take account of increased health risks from MRSA and legionella
- Mist systems in places of lawful detention should be considered

## **Fire and Rescue Service Facilities**

- Some responders welcomed additional guidance linked to Building Disaster Assessment Group (BDAG).
- Others questioned wording as it implied that the FRS would initiate and assist with evacuation on arrival.
- Need to be clear about use / definitions of 'fire-fighting lobby' and 'protected lobby'
- Need to consider discounting escape stair in non-domestic buildings more than 45m above the ground in line with Approved Document B : Fire Safety (England and Wales) following research carried out by the Building Disaster Assessment Group (BDAG).

## **Smoke ventilation**

- Many comments received on smoke ventilation e.g. what is the performance criteria, limitations on heights of natural shafts, activation of AOV's, replacement air, venting from basements and mechanical systems.
- Mechanical systems of smoke extract are not pressure differentials therefore BS EN 12101-6 does not apply. Responders would welcome additional guidance on mechanical smoke ventilation in domestic buildings for escape, offensive fire-fighting and for smoke clearance purposes after the fire has been extinguished. Ideally, there should be synergy between the guidance for escape and that for fire-fighting but it is recognised that the functions are different and this may not always be possible.

## **7. CONCLUSIONS**

Whilst the majority of respondents agreed with the proposals, concerns have been expressed on a number of important issues and further investigation is currently being carried out. Key concerns raised include:

- Legal issues and confusion over repetitive guidance when splitting functional standards on escape;
- Purpose, scope and content of the performance guidance on alternative approaches should be reviewed;
- The use of early warning systems and sprinklers systems as an alternative to protected enclosures and protected lobbies requires further consideration;
- The principles of vertical phased evacuation should continue to be recognised within the guidance as oppose to adopting an alternative approach.
- Guidance on smoke ventilation within buildings should be considered further.

## **8. NEXT STEPS**

All responses received were considered by the Fire Working Party of the Building Standards Advisory Committee and will assist in informing the decisions made with regard to proposals. Where the proposals relate to changes to the building regulations or their associated schedules the process of making the necessary changes to the legislation will now be initiated. When the proposed changes to the standards and guidance are finalised and approved by Scottish Ministers, publication is expected in April 2010 followed by implementation in October 2010.

**FINAL REGULATORY IMPACT ASSESSMENT (Ref: 2008/03)**

**REGULATORY IMPACT ASSESSMENT ON AMENDMENTS TO SECTIONS 0, 3  
AND 4: GENERAL, ENVIRONMENT AND SAFETY OF THE TECHNICAL  
HANDBOOKS FOR WAYS OF COMPLYING WITH  
THE BUILDING (SCOTLAND) REGULATIONS 2004 (AS AMENDED)**

**JANUARY 2010**

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## **REGULATORY IMPACT ASSESSMENT ON AMENDMENTS TO SECTIONS 0, 3 AND 4: GENERAL, ENVIRONMENT AND SAFETY OF THE TECHNICAL HANDBOOKS FOR WAYS OF COMPLYING WITH THE BUILDING (SCOTLAND) REGULATIONS 2004**

### **1.0 PURPOSE AND INTENDED EFFECT**

#### **1.1 Objective**

This Regulatory Impact Assessment (RIA) addresses the proposals to amend the functional standards and technical guidance on a range of sustainability issues within the Building (Scotland) Regulations 2004 and sections 0, 3 and 4 of the Technical Handbooks. The principle aim of the amendments is to promote sustainable development and embed within the building regulatory system recommendations to deliver improved building practices that will help deliver the government's commitments under the Kyoto agreement. A secondary objective is to make building designers give greater consideration to the possible effects of climate change in their projects.

It is intended that improved standards and guidance will come into force on 1 October 2010.

#### **1.2 Background**

It is Scottish Government policy to continue to embed the principles of sustainable development in building regulations, planning policy, and procurement guidance, rather than expecting developers to adopt voluntary codes of practice.

The sustainability of new buildings in Scotland is already encouraged by current building regulations, planning policy and advice, and by procurement guidance for public buildings, social housing, schools, and healthcare buildings. Funding is already devoted to research, publications, and events in connection with sustainable development. Further improvements in the sustainability of new buildings should be achieved through continuing reviews of regulations, policy, and guidance.

The design, construction and maintenance of the built environment provide significant opportunities to contribute towards a more sustainable future. They have significant implications for energy use as well as health, transport, employment and communities. Safe, warm, dry homes are fundamental to our well-being. Our buildings make a big difference to how communities look, feel and function. They consume natural resources during construction, refurbishment, demolition and operation.

Scottish building regulations set standards for the health, safety and convenience of persons in and around buildings, furthering the conservation of fuel and power and furthering the achievement of sustainable development. These standards are supported by guidance contained in the Technical Handbooks. However in the majority of cases, usually as a result of market forces, the minimum level of compliance with the standard is the norm. If the Scottish Government intends to meet its policies, commitments and targets, a higher standard needs to be introduced in guidance. Building Regulations apply to new buildings and to buildings being converted, altered or extended.

Building regulations are one way to address the sustainable development of buildings. Others are through the planning system or the terms of public funding. There is also a role for a less regulatory approach, for example, good practice guidance to encourage developers, designers and contractors to re-use existing buildings or materials, to design buildings to limit waste, to minimise waste during construction or to use products containing recycled content.

### 1.3 **Rationale for government intervention**

Scotland is committed to building a sustainable future. Individuals, businesses, local authorities and communities are taking action to change the way we use resources, plan and develop services and seize the economic opportunities that sustainable development presents. Policies and programmes are in place to drive change in key areas: capitalising on Scotland's sources of renewable energy, promoting more efficient use of energy and transforming the way we deal with our waste. This is a priority that is shared across the UK and the international community. Scotland signed up to a new UK shared framework for sustainable development in March 2005 and issued 'Choosing our Future – Scotland's sustainable development strategy' in December.

### 1.4 **Issues to be addressed**

In 2006 the Scottish Building Standards Agency (now Building Standards Division) highlighted the need to review standards and guidance to promote sustainable development. The following issues were identified as areas for consideration and these were endorsed by the Building Standards Advisory Committee.

**Land contamination:** Sustainability policy is leading to increased development on brownfield sites. Brownfield development is inherently sustainable but often involves the identification and making safe of natural or man-made ground contaminants. Part IIA of the Environmental Protection Act 1990 provides the legislative framework for Scottish local authorities to carry out their statutory duty to identify, register, and carry out remediation of contaminated sites. However, due to the many and varied types of contaminants there are occasions when some may not be evident until development takes place.

**Surface water drainage and flooding:** Climate change is expected to result in more rain in the future and it is essential that this is taken into account now. It is essential that surface water is removed safely without damage to the building, danger to the people around the building and does not pose a risk to the environment by flooding from excessive run-off from hard surfaces. The building regulations already provide guidance on sustainable drainage but this needs to be reviewed to pick up on the latest published research. In addition, the area of paved surface that is given exemption from the application of building standards is now considered excessive and not consistent with surface water run-off design and management.

**Solid waste storage and recycling:** The European land fill directive sets very strict targets for the reduction of waste disposal to landfill sites. The Scottish National Waste Plan sets ambitious targets to 2020 to recycle solid waste. Over the years habitable space in dwellings has increased to the detriment of storage space and this has become a common complaint among householders. Without some form of encouragement, householders are unlikely to give over what little storage space is provided to increase recycling.

**Security:** Housebreaking remains a significant concern to the Scottish people, the government and the police. Despite a reduction in the number of reported incidents the Scottish Crime Survey continues to identify fear of a break-in as the greatest concern to the public. A home that is safe and secure provides a positive contribution to the quality of life of its occupants and contributes to the delivery of a more sustainable community. An extract from the England & Wales Crime Survey states that 'Households where there are no home security measures were almost ten times more likely to have been victims of burglary than households where there were simple security measures such as deadlocks on doors and windows'.

**Ventilation:** Ventilation of a building is required for several reasons; for human respiration, to prevent the accumulation of moisture that could lead to harmful mould growth and to prevent the accumulation of pollutants that could become a risk to the health of occupants. Increased insulation requirements and improved building techniques have resulted in a reduction in the number of natural air changes through the building fabric leading to an increase in the risk of condensation. Some minor changes were introduced in May 2007 but

greater consideration needs to be given to address different living styles which may have been overlooked in the latest changes.

**Condensation:** Compliance with complex and increasing energy standards applies to all buildings that are heated and in the interests of energy efficiency, can involve creating buildings that utilise more air tight construction methods. Additionally climate change may exacerbate problems of condensation in buildings due to higher relative humidity.

**Flueless gas appliances:** The recent introduction of flueless gas heating appliances onto the British market has dramatically increased no doubt due to the fairly straightforward and relatively inexpensive installation procedures. These appliances produce a vast amount of water vapour and ventilation provision in dwellings is unlikely to be sufficient to reduce the relative humidity to satisfactory levels within an acceptable time before there is damage to the building fabric. Such appliances are not covered in the guidance and this is unlikely to be acceptable with improved building techniques which reduce air infiltration through the building fabric.

**Biomass appliances:** Within the building standards biomass boilers and room heaters fall into the category of solid fuel combustion appliances. The current guidance supporting the standards provides no specific information on biomass appliances and is therefore not consistent with the government promotion of the use of bio fuels and low and zero carbon technologies. In addition the installation of biomass appliances, although similar to solid fuel, does involve the consideration of technologies that are not contained or clear within current guidance.

The following table lists the issues and the appropriate building standards.

Issue	Regulation or Standard
Land contamination	<ul style="list-style-type: none"> <li>• Standard 3.1 – Site preparation</li> </ul>
Flooding	<ul style="list-style-type: none"> <li>• Standard 3.3 – Flooding and groundwater</li> </ul>
Surface water	<ul style="list-style-type: none"> <li>• Standard 3.6 – Surface water drainage</li> <li>• Regulation 3 – Schedule 1</li> <li>• Regulation 5 – Schedule 3</li> </ul>
Ventilation	<ul style="list-style-type: none"> <li>• Standard 3.14 - Ventilation</li> </ul>
Condensation	<ul style="list-style-type: none"> <li>• Standard 3.15 – Condensation</li> </ul>
Biomass appliances	<ul style="list-style-type: none"> <li>• Standard 3.17 – Combustion appliances</li> </ul>
Flueless gas appliances	<ul style="list-style-type: none"> <li>• Standard 3.21 – Air for combustion</li> </ul>
Solid waste storage and recycling	<ul style="list-style-type: none"> <li>• Standard 3.25 – Solid waste storage</li> </ul>
Security	<ul style="list-style-type: none"> <li>• Standard 4.13 – Building security</li> </ul>

## 2.0 CONSULTATION

### 2.1 Statutory

Before making or amending the building regulations, Scottish Ministers are required to consult the Building Standards Advisory Committee (BSAC) and such other bodies as are considered necessary to inform on the matters under consideration. This exercise has been carried out through a BSAC Working Party.

### 2.2 Within Government

The Building Standards Division consults widely, and has continued dialogue, with the following government bodies: SG Planning Division; SG Communities Scotland; SG Greener Scotland Directorate; Historic Scotland; Departments for Communities and Local Government (CLG) and Building Regulations Unit – Department of Finance and Personnel, Northern Ireland.



### 2.3 Public Consultation

The Building Standards Division has an extensive data base of over 600 names of individuals and organisations with a specific interest in building regulations. All those on this list are alerted to any forthcoming consultation. The consultation exercise for these proposals commenced on the 6th May 2008 and closed on the 29<sup>th</sup> July 2008.

### 2.3 Consultation Response

The consultation report is set out in Annex A. The consultee responses assisted in identifying the forward direction for the proposals and this included the decision not to proceed with the requirements for solid waste storage and re-cycling. Implementation of the surface water control changes to Schedules 1 & 3, and the necessary aligning changes to the guidance to Section 3.6 (Surface Water) were implemented on the 1<sup>st</sup> May 2009. For the purposes of this regulatory impact assessment the following proposals are relevant.

Issue	Regulation or Standard
Land contamination	<ul style="list-style-type: none"><li>Standard 3.1 – Site preparation - improved guidance to reflect good building practice where land contamination is an issue</li></ul>
Flooding	<ul style="list-style-type: none"><li>Standard 3.3 – Flooding and groundwater - improved guidance to reflect good building practice where flood risk or ground water are issues</li></ul>
Ventilation	<ul style="list-style-type: none"><li>Standard 3.14 – Ventilation - alterations to standard and associated guidance to clarify intent, update and correct text.</li></ul>
Condensation	<ul style="list-style-type: none"><li>Standard 3.15 – Condensation – removal of limitation to standard to extend application to non domestic buildings and match current good standards.</li></ul>
Biomass appliances	<ul style="list-style-type: none"><li>Standard 3.17 – Combustion appliances - modernise guidance to reflect and support good building practice for wood burning appliances.</li></ul>
Flueless gas appliances	Standard 3.21 – Air for combustion - guidance to update on known ventilation and condensation risks associated with these appliances
Security	<ul style="list-style-type: none"><li>Standard 4.13 – Building security - introduction of a mandatory standard and guidance to address the security of domestic buildings</li></ul>

## 3.0 OPTIONS PROPOSED

### 3.1 Options

In considering how to address the objectives identified in 1.1 and the risks identified in 1.4, four options were considered:

Option 1 – do nothing;

Option 2 – increase awareness through the introduction of guidance outwith the Technical Handbooks;

Option 3 – expand and improve relevant guidance to existing standards;

Option 4 – amend building regulations, expand and/or introduce new mandatory standards and expand /improve associated guidance.

## **3.2 Risks associated with each option**

### **Option 1**

High risk that not promoting the identified sustainable building issues and associated good building practice through the building standards system may not be considered consistent with the Scottish Governments strategic objectives of improving the natural and built environment and addressing climate change. Improved sustainable construction may only occur voluntarily. The existing minimum building standards and associated guidance may be perceived as not being attuned to sustainable construction.

### **Option 2**

Medium risk of promoting only in a few buildings by reliance on voluntary uptake. Take up of the sustainable issues within construction will probably be limited to 'greener' minded designers, builders or other individuals. The existing minimum building standards and associated guidance may be perceived as not being attuned to sustainable construction.

### **Option 3**

Medium – Low risk by promoting sustainable development on construction matters where the existing mandatory standards are applicable to the proposed issues. Improved and updated guidance on compliance solutions and good practice for these standards will inform and promote uptake of sustainable solutions.

### **Option 4**

Small risk as the amended regulations and new or extended existing standards will be mandatory. These standards will set the minimum construction performance that will incorporate the identified sustainability issues into buildings. Associated guidance will support the application and interpretation of the mandatory standards.

## **3.3 Implementation and delivery plans**

### **Option 1**

No implementation required as there is no change and therefore no delivery.

### **Option 2**

Could implement by introducing good practice guidance documents for advice, adoption and application on a voluntary basis. This can be delivered through a number mediums such as leaflets which could be developed, and made available to designers, developers, builders and the general public at libraries and through internet web access.

### **Option 3**

Implementation will be through adoption of the guidance clause solutions relating to the issues. Delivery will be through the Scottish building standards system as applicable to all building work after the implementation date of 1 October 2010.

### **Option 4**

Implementation will be through the building regulations, the mandatory standards and guidance given in the technical handbooks. The changes will affect, where the sustainability issues are relevant, all new, altered, extended or converted buildings. Delivery will be through the Scottish building standards system as applicable to all building work after the implementation date of 1 October 2010.

## **4.0 COSTS and BENEFITS**

### **4.1 Sectors and groups affected**

Sectors and groups affected include:

- a) All those involved with building design, construction or implementing building works would have to familiarise themselves with the amended regulations, new standards and guidance through training etc. This will include buildings owners instructing or carrying out building works.
- c) Building materials and component manufacturers would need to make changes to their products and literature to suit;
- d) Persons procuring new buildings or building work would need to bear the extra cost of the work;
- e) local authority verifiers would have to train staff in relevant areas of the building regulations, standards and associated guidance where the scope has been extended or revised.

## 4.2 **Benefits**

The benefits in relation for the issues and options are:

### **Option 1 – do nothing**

The Scottish Government is committed to building a sustainable future and this option offers no benefits for any of the 9 sustainability issues identified in 1.4. There would be no improvement to Scotland, the UK or the wider community with regard to combating global warming and climate change and indeed 'doing nothing' would be detrimental to government commitments under the Kyoto agreement.

### **Option 2 – increase awareness through the introduction of guidance out with the Technical Handbooks**

Any benefits gained by the introduction of voluntary guidance would be wholly dependant on the level of use of the guidance. Benefits would, at best, be similar to those possible under option 3, but applicable only to those buildings constructed in compliance with the recommendations of such voluntary guidance. Without mandatory status, benefits are likely to be limited.

### **Option 3 – expand and improve relevant guidance to existing standards**

The principal benefit of option 3 is that, as an expansion of existing guidance, proposals will be applied through an existing monitoring and enforcement system to ensure that improvements are made to increase the sustainability of buildings.

The most appropriate issues identified in the list in 1.4 for adopting option 3 are, land contamination, flooding, biomass appliances and flueless gas appliances since the scope of the existing standards are wide enough to include them. Specific benefits under this option can be quantified as follows:

- changes can be introduced quicker and more simply without the need for an SSI;
- improved guidance to address the specific issues will assist, educate and guide designers and verifiers to incorporate the measures into buildings in Scotland.

### **Option 4 – Amend building regulations, expand and/or introduce new mandatory standards and expand /improve associated guidance.**

Amending Scottish building regulations has proved in the past to be a robust method of introducing necessary changes to building designs and constructions. Mandatory requirements set the minimum level for all buildings and building work.

The most appropriate issues identified in the list in 1.4 for adopting option 4 are ventilation, condensation and security, Specific benefits for these issues under this option can be quantified as follows:

- a clear ventilation mandatory standard will convey and apply the minimum design and construction performance requirements for air quality for the health occupants within buildings.

- extending the requirements for assessment of condensation to non-domestic buildings will ensure that the design and construction of all buildings will involve addressing the potential problems of interstitial and surface condensation. This will result in buildings where condensation does not pose a threat to the actual building or the health of its occupants.
- A mandatory standard to formalise good practice will improve home security and may also reduce the cost of burglary which the Association of British Insurers, in the report 'Securing the Nation' estimate to average at £3,300.

## **Costs**

The cost of implementation for the issues and their options is as follows:

### **Option 1**

This option poses no implementation costs for any of the issues.

### **Option 2**

The development costs for production of guidance documents or literature would form part of the work of the Scottish Government – Building Standards Division. Development costs related to the production of guidance would therefore be borne by government, not the public or industry, as would the cost of publishing and distribution. As with the building standards, such documents would be in the public domain, online and made available free of charge. As such, no revenues would be derived from this option. The documents would be available online at no charge.

As with the potential benefits, these costs are difficult to estimate since they depend on the take-up rate, but they could amount to 10% of option 3 and it is likely that take-up would be highest in the public sector.

### **Option 3**

The expansion and improvement of the relevant guidance to existing mandatory building standards would form part of the work of the Scottish Government – Building Standards Division. The cost of producing the necessary document changes falls into three formats.

- Cost of production and publishing hard copy amendments.
- Cost of production of updated compact discs (CDs).
- Cost of making available online versions

Whilst elements of these costs would be met by normal operational budgets the publication costs are relevant due to the range of diverse subjects covered and the resulting number of document page changes or replacements. The cost of publishing amended and updated guidance documents and compact discs, including online format, based on a similar exercise carried out in 2006 and taking account of inflation, is approximately £30000. Under the current proposals the publication content will be based on 3 main document packages of Section 2: Fire, Section 5: Noise and Sections 0, 3 and 4: General/Environment and Safety. On this basis the cost in relation to Sections 0, 3 and 4 publication of guidance to the mandatory standards would be in the region one third of the overall publication cost being approximately £10000.

Training: there are approximately 550 building standards professionals in Scotland. The time impact per person should be no more than 3 hours on training and familiarisation. Therefore, based on an average hourly rate of £15 per hour, the total cost for building standards professionals would be 550 x £45 = £24750

However this can be off-set against Continued Professional Development requirements. For example, building standards professionals (verifiers) architects, architectural technologists, fire engineers, fire and rescue service personnel and other fire safety consultants may incur

no additional costs as professional institutions demand at least 20-25 hours Continued Professional Development as part of their professional membership criteria.

According to the Scottish Corporate Sector Statistics 2004, there are approximately 270,430 enterprises in Scotland. This figure includes the self employed. There are an estimated 42,345 voluntary organisations. Assuming one person from every enterprise and every voluntary organisation in Scotland spends 1 hour familiarising themselves with the guidance at a rate of £8.70 per hour and £4.88 per hour respectively, the total cost of familiarisation will be £2.35m plus £0.2m = £2.55m. However, it is estimated that only 5% of enterprises and voluntary organisations will need to use the guidance with the remainder using construction professionals to advise them when carrying out building work. Therefore the total cost of familiarisation for enterprises and the voluntary sector would be £127k.

Adoption of guidance: the costs associated with adoption of the proposed expanded or improved guidance clause solutions as the methods of meeting the standards are as follows:

**Land Contamination (3.1)** - cost neutral as the improved guidance will reflect good building practice where land contamination is an issue. Any initial minor costs in relation to design, risk assessment or construction materials and methods will be balanced by the protection of the building life and sustainability gain.

**Flooding (3.3)** - cost neutral as the improved guidance will reflect good building practice where flood risk or ground water are issues. Any initial minor costs in relation to design, risk assessment or construction materials and methods will be balanced by the protection of the building life through flood resilience and sustainability gain.

**Biomass Appliances (3.17)**- cost neutral for modernised guidance part that reflects and supports good building practice for wood burning appliances that are already being installed on a regular basis. Biomass considered as carbon neutral and therefore any costs of adoption may be energy related and based on take up of this technology.

**Flueless Gas appliances (3.21)**- cost neutral as guidance reflects update of known ventilation and condensation risks and introduces reference to modern flueless appliance specific documents.

#### **Option 4**

**Ventilation (3.14)**- cost neutral for alterations to standard and guidance that only clarifies intent, updates and corrects text.

**Condensation (3.15)** - cost neutral, Domestic buildings no change other than text of standard. Non –Domestic buildings, condensation measures and consideration will generally form part of designing and construction for compliance with energy and air-tightness with costs therefore associated to these measures rather than condensation. Specialist buildings, such as swimming pools, already designed and constructed, by specialists, to the standards.

#### **Security (4.13)**-

The level at which introduction of a mandatory standard and guidance to address the security of domestic buildings would incur costs would depend upon the route taken.

The Association of British Insurers commissioned the quantity surveyors Davis Langdon to produce up-to-date costing for installing the target hardening features of 'Secured by Design' into new private developments by volume house builders. The report identified that the cost of upgrading to the security level required falls into the range of £480 - £730

per home. The costs identified for securing doors and ground floor windows of 3 bedroom detached houses was estimated to be around £510. As the costing will depend on the number and types of doors and windows that the dwelling has then the average cost per dwelling may better reflect the actual costs. From the building cost index (BCIS) published quantity surveying rates and available data, the cost of a new 100 m<sup>2</sup> dwelling would be £90,000. New building standards security measures could represent a 0.5% increase to this cost however, this will be offset by the basic security costs already voluntarily provided in new buildings.

Security measures are a key feature in house sales with many developers already deliver a good level of security to doors and windows and in these cases the actual costs to provide security to the new required building standard level would be zero or minimum.

**Production, Publication and training costs** - these costs are generally similar to those explained in Option 3.

## **5.0 SMALL FIRMS IMPACT TEST**

The SG Building Standards Division has consulted The Department of Business, Enterprise and Regulatory Reform (BERR) and followed the relevant guidance

The small firms impact test regards all firms with less than 50 full time employees as being small businesses. The majority of small firms have fewer than 10 employees and guidelines state that a concerted effort should be made to consult them over policy proposals.

The UK construction industry is dominated by small firms. Over 99 per cent of the around 980,000 enterprises in the construction sector in 2007, were small firms<sup>10</sup> with the majority being classified as sole proprietorships. In 2007, small firms accounted for 75 per cent of construction sector employment and over 54 per cent of industry turnover.

Assessment has been based on Options 3 and 4 as Options 1 and 2 have no cost implications for small firms, including micro-businesses (those which employ less than 10 full-time employees). It is considered that the proposals to change the regulations apply in a proportional and equitable way. Only those firms that choose to erect, alter, extend or convert buildings will be subject to the proposed changes.

The majority of micro-businesses in the construction industry deal with the domestic alteration and extension market. The proposed changes have little impact on domestic alterations and extensions. For small firms in the construction industry, the proposed technical changes may create some training issues (see costs of guidance and familiarity). However this is mitigated to a certain extent by the simplified guidance to explain the issues in a clear and concise manner. The majority of costs borne initially by these firms will be passed on to the building owners.

## **6.0 LEGAL AID IMPACT TEST**

There will be no increased use of legal process or new rights created by the amendment and introduction of building standards and therefore no impact on the need for legal aid.

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## **7.0 TEST RUN OF BUSINESS FORMS**

There are no business forms included with any of the options.

## **8.0 COMPETITION ASSESSMENT**

There are no significant areas where issues of competition, restriction or imbalance have been identified.

## **9.0 ENFORCEMENT, SANCTIONS AND MONITORING**

### **9.1 Background**

All matters relating to enforcement, sanctions and monitoring will be carried out under the existing processes, which form the building standards system in Scotland, as set out under the Building (Scotland) Act 2003. Parties responsible for operation of this system are the 32 Scottish local authorities, appointed as verifiers under the Act, and the Building Standards Division

### **9.2 Enforcement and sanctions**

Generally, work subject to the Building (Scotland) Regulations 2004 requires to obtain a building warrant before work commences and to have a completion certificate accepted once works are finished. Exclusions are set out under Schedule 3 to Regulation 5 of the Regulations.

Where a building warrant is required, proposals are subject to the scrutiny of verifiers (local authority building standards departments) who have enforcement powers under the Act to ensure compliance with the Regulations. Where cases of non-compliance are referred to the Procurator Fiscal, persons found guilty of offences in terms of the Act are liable on summary conviction to a fine not exceeding level 5 on the standard scale (currently £5000).

### **9.3 Monitoring.**

The Building Standards Division will review the implementation of any changes made to building standards legislation to monitor the effectiveness of said changes and to ensure that subsequent reviews can be made on an informed basis.

In line with Scottish Government policy, any implemented changes will be subject to a revised RIA within a 10-year period.

## **10.0 IMPLEMENTATION & DELIVERY PLAN**

Details of implementation and delivery are given within Annex B.

## **11.0 POST-IMPLEMENTATION REVIEW**

11.1 Continuous monitoring of the implementation of proposals is available through feedback from verifiers, designers, developers and property owners. These parties are in regular contact with the technical authors within the Building Standards Division and the queries they raise offer a broad view of how proposals are being implemented and if intent is being achieved. They also identify areas where objectives may be unclear and allows clarification of these objectives as part of the ongoing review process. Issues raised in this manner become a matter of record and are used to inform in the continued development of building

standards and guidance. The intention is to review the regulations within ten years of implementation.

## 12.0 SUMMARY AND RECOMMENDATIONS

### 12.1 Summary

The summary of benefits and costs has changed with alterations being made to the proposals following consideration of the responses to the consultation and with the agreement of the BSAC working party.

### 12.2 Summary costs and benefits table

The summary of benefits and costs are set out in the following table:

Option	Benefits	Total cost per annum
<b>Option 1</b> Do nothing.	No benefits to the Scottish built environment	No implementation costs. Potential for environment or sustainability loss and risk of standards and policy not being attuned to sustainable construction.
<b>Option 2</b> increase awareness through the introduction of guidance outwith the Technical Handbooks	Benefits likely to be less than Option 3. Reliance on voluntary uptake may restrict potential environment and sustainable construction benefits.	Costs estimated to be around 10% of Option 3 costs, with take up likely to be highest in the public sector
<b>Option 3</b> expand and improve relevant guidance to existing standards	Partial delivery of sustainability measures. Not as robust as Option 4, as there would be no new standards introduced e.g. dwelling security.	Limited costs associated with improved sustainability guidance where the guidance is merely supporting existing good construction practice. Publishing costs to Scottish Government around £30,000. Estimated cost of standards and guidance familiarisation for enterprises and the voluntary sector would be £127k



<p><b>Option 4</b> amend building regulations, expand and/or introduce new mandatory standards</p>	<p>Robust method of delivering sustainability measures to constructed buildings and the associated built environment benefits. New standard for basic security measures in new dwellings will support the reduction in burglary and the associated costs of £3,300 to owners.</p>	<p><b>Economic:</b> Limited costs associated with proposals other than the provision of basic security measures to dwellings. This cost is estimated to be 0.5% of the construction costs of a new dwelling if there were no other door window security measures planned. In most cases the new security building standard compliance costs will be offset against the good practice standard of security already provided by most developers, designers and building owners thereby reducing the costs to a minimum or zero. Estimated cost of standards and guidance familiarisation for enterprises and the voluntary sector would be £127k Publishing costs to Scottish Government around £30,000</p>
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**12.3 Recommendation.**

From the information provided in the preparation of this Regulatory Impact Assessment it is proposed to adopt Option 4. This option will deliver improved sustainability measures for buildings by means of mandatory building standards and supporting guidance.

**13.0 DECLARATION AND PUBLICATION**

**DECLARATION**

**I have read the Regulatory Impact Assessment and I am satisfied that the benefits justify the costs.**

**Signed by the accountable Minister** . . . . .

**Stewart Stevenson, Minister for Transport, Infrastructure and Climate Change**

**Date** . . . . .

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**ANNEX A**

**BUILDING STANDARDS DIVISION  
REVIEW OF BUILDING STANDARDS - SECTIONS 0, 3 & 4  
ENVIRONMENT/SAFETY**

**CONSULTATION REPORT**

## **CONTENTS**

### **EXECUTIVE SUMMARY**

- 1. INTRODUCTION**
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- 7. CONCLUSIONS**
- 8. NEXT STEPS**

### Acknowledgements

We are grateful to all of the respondents who took the time, effort and opportunity to contribute their views on these building standards review proposals.

### Executive Summary

1. To seek comments on the proposals from stakeholders and users of the building standards system in Scotland, a consultation exercise was commenced on the 6th May 2008 with a closing date of the 29<sup>th</sup> July 2008. The consultation proposals were issued direct to over 500 identified consultees and to invite wider responses, the consultation was also placed on the Building Standards Division website. Consultees were encouraged to respond on any aspect of the proposals but were specifically invited to comment on the targeted issues.

2. The main proposals targeted by the consultation questionnaire focussed on the following diverse range of sustainability related subjects contained within Sections 0, 3 and 4 of the Technical Handbooks:

- Surface water run-off control
- Site preparation – land contamination
- Flooding and ground water
- Condensation
- Solid waste storage
- Security of domestic buildings

3. There were 33 responses to the specific consultation questions received and a number of respondents 14 (42%) submitted additional comments on the content of the proposed

revisions to standards or guidance text within the Domestic and Non-Domestic Technical Handbooks. The vast majority of respondents were content with what was proposed, with 7 of the 8 review proposals supported by at least 80% of those who expressed a view

4. A detailed analysis of the content of all the consultation responses was carried out by the Environment and Safety Working Party of the Building Standards Advisory Committee. The Working Party took on board the extremely helpful comments and suggestions from responders particularly with regard to taking cognisance of related planning legislation and the need for building standards user guidance to support the introduction of the review measures.

5. The Working Party analysis of responder's comments did not identify any strong barriers or objections to the proposed building standards sustainability measures to be introduced to the technical Handbooks. This has allowed the technical detail and guidance direction to be finalised by the Building Standards Division. It is intended, subject to ministerial approval, to introduce the improvement measures in 2010.

## **1. INTRODUCTION**

1.1 The purpose of this building standards review is to consider the introduction of changes to mandatory building standards and/or associated technical guidance for a diverse range of sustainability issues within the Building (Scotland) Regulations 2004 and Sections 0, 3 and 4 of the Scottish Building Standards Technical Handbooks. The principle aim of the amendments is to promote sustainable development and embed, within the building regulatory system, recommendations to deliver improved building practices that will help deliver the government's commitments under the Kyoto agreement. A secondary objective is to make building designers give greater consideration to the possible effects of climate change in their projects.

## **2. THE CONSULTATION PROCESS**

2.1 The consultation exercise was issued to just over 500 public, private sector and third sector organisations, Non-departmental public bodies (NDPB's) and individuals and interested parties identified and listed on the Building Standards Division (BSD) consultation inventory. The consultation documents were published on the BSD website as an electronic download, with paper copies issued to all individuals or organisations requesting a hard copy. An additional 250 organisations and individuals who have registered with the BSD were advised of the consultation by email. All were invited to submit comments on the proposals made in the consultation paper by 29 July 2008.

In total there were 33 (approx 5%) responses from the following organisations:

Contractors, Developers & Manufacturers	1
Designers & Consultants	2
Professional & Trade Bodies	15
Local Authorities	9
NDPBs	2
Other Statutory Bodies	3
Individuals	1

There were 8 proposals contained within the consultation document to cover specific sustainability related subjects contained within Sections 0, 3 and 4 of the Scottish Building Standards Technical Handbooks. Consultees were encouraged to respond on any aspect of these proposals but Scottish Ministers indicated that they would welcome comments

specifically on the issues that were targeted. Given the wide range of stakeholders affected by the proposals, it was anticipated that a greater number of responses would be made to the consultation proposals. However, most key stakeholders, or representatives of their areas of interest, have offered response. This is considered sufficient to inform the assessment and further consideration on the introduction of the diverse range of sustainability proposals within building standards.

### 3. CONSULTATION RESPONSES

3.1 As well as welcoming general comment on the detail of the proposals, a list of 8 questions relating to specific issues on which the Building Standards Division sought comment was put to consultees. Not all consultees responded to all questions therefore a summary table of responses to each of the questions is set out below, followed by brief comment and recommendation on each issue.

Q	Summary of questionnaire responses	No of responses	agree with proposals
1	Agree with hardstanding exemption reduction down to 50m <sup>2</sup> in Schedule 1	19	16 (84%)
2	Alter Schedule 3 for hardstandings or paved areas from 50 to 200m <sup>2</sup> to be required to meet surface water standards without need for building warrant	19	13 (68%)
3	Improved guidance on ground contamination and the risks to buildings and materials	20	19 (95%)
4	Update and improve flooding and groundwater guidance	20	18 (90%)
5	Extend condensation standards to non domestic buildings	22	21 (95%)
6	Alter standard to introduce dedicated internal space in dwellings for waste segregation/ storage / re-cycling	21	17 (81%)
7	Application and enforcement of basic security measures through building standards for domestic buildings	23	19 (83%)
8	Effectiveness of building standards guidance for achieving basic security measures	22	20 (91%)

In all cases the majority of consultees that responded to the individual questions were in favour with the proposals. Question 2 received the lowest support level at 68% with a few consultees suggesting tighter controls are required.

#### 4. ANALYSIS

4.1 In addition to agreeing or disagreeing with the specific questions for the proposals a number of responders offered comments or suggestions on the detail of the proposals. To ensure that all comments were considered, the analysis of the questionnaire responses and all additional comments was carried out by the Building Standards Advisory Committee -. This working group consists of experienced construction professionals from various aspects of the industry who were all very familiar with the proposals, having been involved since the initiation of the review.

#### 5. FINDINGS

5.1 The Environment & Safety Working Party considerations assisted in informing the decisions made with regard to each specific review proposal as follows:

##### **Q1 Within Regulation 3, Schedule 1 - alter Type 21 to reduce the paved or hardstanding exemption area down to 50 m<sup>2</sup>.**

Although 84% of responders to this question were in favour and considered the proposals reasonable for the purposes, comments were made suggesting that the building standards proposals should align with Scottish Government Planning's permitted development consultation proposals and be subject to awareness publicity.

##### **Consideration**

The current Planning consultation is in relation to Classes of Permitted Development Rights for householders and the comments for alignment relate specifically to Class 4 - *the provision within the curtilage of a dwellinghouse of a hard surface for any purpose incidental to the enjoyment of the dwellinghouse*. Within the Planning consultation Question 18 asks: *Do respondents agree with the addition of requirements on drainage to PDR for new and replacement hard surfaces over an area of 5 square metres between the principal elevation and the road?* This question is founded on the recently approved requirements for England where for hard surfaces over 5 m<sup>2</sup>, planning permission is deemed to be granted on condition that, if the hard surface is between the principal elevation and the road, then it must be made of porous materials or provision shall be made to direct water run-off from the hard surface to a permeable or porous area or surface within the curtilage of the dwellinghouse.

Whilst the gap between 5m<sup>2</sup> and 50m<sup>2</sup> appears sizable, the Building Standards review proposal of moving the application of building standards for hardstanding areas down from 200 to 50m<sup>2</sup>, will apply to all hardstandings or paved areas with the exception of those paved areas that form part of an access required by the regulations. Paved areas that do form part of a required access are generally positioned between the road and the building entrance to provide an accessible route. Such paved accesses must meet the applicable building standards for dealing with surface water run-off and discharge. The current guidance given for achieving the standards includes sustainable urban drainage, a soakaway, a public system or a watercourse. Lowering the statutory hard surface exemption from standards to as low as 5m<sup>2</sup> could mean that anyone building or constructing a paved patio area or other similar facility greater than this size would require to comply with the applicable standards or possibly face enforcement proceedings. Enforcement of such works would be considered a challenging if not impossible task for local authorities. Further

research is needed to inform and allow a fuller understanding of current practice, costs and other implications and also to take on board the planning consultation outcomes in relation to dealing with surface water.

**Q2 Within Regulation 5, Schedule 3 - alter Type 21 to apply building standards to hardstandings or paved areas in the range 50 - 200 m<sup>2</sup>**

Whilst the majority of responders supported this proposal, a number of useful comments were submitted covering areas such as cost, enforcement, publicity and guidance. Only one responder was in favour of retaining the status quo on exemption areas and 3 others were claiming better controls if the requirement for building warrant was applied to the proposed paved areas. One responder indicated the need for clarification on building warrant requirement for some hardstanding types that are over 200 m<sup>2</sup>. Responders also raised the question of guidance to support the proposed changes.

**Consideration**

Retention of the exemption status quo for paved or hardstanding areas would not address the contribution (including accumulative) that surface water run-off from areas less than 200m<sup>2</sup> could input to ground saturation or even flooding. Applying the need for building warrant approval to all the proposed categories of paved areas would not be consistent with the intention of Schedule 3, where minor works are given the dispensation from building warrant on condition that the works meet the standards that are applicable. The responsibility for compliance with the applicable standards lies with the building owner and the necessary controls to ensure compliance already exist within the legislation. On the question of guidance it was noted that as the proposed changes relate only to the paved or hardstanding areas and there are no technical changes proposed, then the updated guidance that supports Mandatory Standard 3.6 (Surface Water Drainage) will apply. Additionally this guidance may not represent the only methods of compliance as designers / owners may wish to demonstrate compliance with the standard by alternative means.

**Q3 Within Section 3.1 Site Preparation - introduce additional guidance on contaminants and their risk to buildings and materials.**

Only one responder disagreed with the proposal and this was on the basis that there was not sufficient information for existing building alterations and extensions. All other responders supported the principal of the proposals with a few making suggestions for further guidance development areas. Some local authority responders expressed the need for clarification on risk assessment submission requirements.

**Consideration**

The main issues that have emerged are those related to the development of further guidance and the levels of information / assessment required by verifiers. Whilst it is acknowledged that perhaps all contaminants may not be specifically identified, the proposals will be revisited to ensure that the most appropriate guidance and references are included. Verification is the function of the local authorities building standards service and it is they who are required to risk assess specific submitted proposals. Experience and local knowledge will often assist verifiers in establishing the required information level for proposals that have contaminated land issues.

**Q4 Within Section 3.3 Flooding and Ground Water - update and improve guidance on both flooding and groundwater.**

Although 90% of responders were in favour and welcomed the proposals, a number of them have emphasized the need to ensure that building standards requirements do not conflict or

create confusion with planning legislation requirements or those of other statutory bodies with a vested interest. Helpful comments on suggested reference documents and clarification on building standards identification of flood risk development were also made by responders. A responder not in favour of the proposals stated that development in flood risk areas should not be approved under planning legislation.

### **Consideration**

Recognising that planning controls exist to control development in flood risk areas, building standards also recognise that development proposals could be approved with some risk of flooding. The main thrust of the proposals to Standard 3.3 guidance is in relation to clarifying the issues of ground water and flooding with emphasis on the actual effects on a building. The suggested reference documents will be considered for inclusion if deemed suitable. Flood risk assessment guidance will be further considered.

### **Q5 Section 3.15 Condensation – extend to apply standards and guidance on condensation to non – domestic buildings**

The majority of responders (95%) agreed with the proposed application of the condensation standard to non-domestic building with a few questioning why this had not been done before. Although agreeing with the proposals, responders commented on further reference documents, different condensation solutions for non domestic buildings, extending heating standards to non-domestic buildings and the need to allow for buildings that are intentionally designed for high moisture content or buildings requiring a controlled environment. One responder did not accept the need for controls in non-domestic buildings.

### **Consideration**

It has been established that condensation can affect any building if not designed or constructed properly, the guidance proposed to support Standard 3.15 for both domestic and non-domestic buildings will be reviewed to ensure it contains the appropriate reference documents and guidance solutions such as those suggested by responders. The guidance will also be revisited to ensure that buildings that are, by design, required to have high moisture levels are dealt with appropriately. In non domestic buildings heating standards for occupants is normally dealt with by other legislation such as the Health and Safety at Work Act.

### **Q6 Standard 3.25 Solid Waste Storage – extend the scope of standard to introduce provision for internal segregation / storage space within dwellings.**

A number of responders did not agree with the proposals stating reasons such as the need for more innovative solutions for flatted developments, not believing that proposals will assist the recycling aims, more efficient methods are available off-site and concerns over the proposed dedicated space being used by occupants for other purposes. Responders that agreed with the proposals considered that internal storage was less obtrusive than external storage, suggested that other non dedicated storage units could be utilised and identified that the provision of propriety systems designed within the kitchen units are likely to occur.

### **Consideration**

Responders provided constructive concerns on the feasibility of these proposals. It is therefore considered that the principal of promoting internal segregation and storage to assist in recycling within dwellings, requires to be revisited at this stage.



**Q7 Standard 4.13 - Introduction of a new standard that sets requirements to address basic physical security measures for domestic buildings.**

The majority of responders supported the proposals in principle. Main issues raised were: that guidance should not adversely affect means of escape; several responders of the view that these issues are already addressed adequately in development. One significant view was that this issue is better addressed by other agencies.

**Consideration**

Noted that one important stakeholder group did not consider building regulations the best vehicle to address such issues. Important, therefore, to recognise the limit of what can be achieved through building regulations and to identify the presence of, and relationship with, existing guidance on improving the security of dwellings, ensuring no conflicts arise. Building regulations should raise awareness of such initiatives. Proposals should ensure that effectiveness of current means of escape from dwellings and common areas is not compromised and that there is clarity on where standard 4.13 should be applied. The proposals for new guidance will be developed on this basis.

**Q8 Consideration of the effectiveness of the guidance and options given to support the new security standard.**

The responses were generally positive. Principal issues raised relate to need for flexibility of response (addressed by options in guidance), support for robust technical recommendations, particularly for glazing, concern should proposed European standards replace cited British standards and repeat of comment on not affecting means of escape in an emergency. One significant view that this should not be a building standards issue and one significant concern that the default provision under option c) would not be robust enough to achieve a significant improvement in security.

**Consideration**

Investigate the extent to which specification in the 'non-accredited' option within guidance can be reviewed to further benefit householders – discuss and develop this option with representatives of industry and police forces. This should include specification of locking devices. Per Q.7, ensure means of escape are not adversely affected by proposals. Consider adding provision for alarm systems into guidance. Ensure guidance option on Third Party Accreditation of elements and referred standards is clear and will deliver intent. Develop proposals on this basis.

**6. ADDITIONAL COMMENTS RECEIVED**

Other than the responses to the targeted issues some responders (14) also submitted additional comments on the content of the proposed revisions to the various standards or guidance. These comments now follow under their issue heading and with their considerations.

**SECTION 3.3 - FLOODING AND GROUNDWATER**

**1. Clause 3.3.1 second paragraph - It is not clear as to how the developer will be expected to demonstrate to the building standards service that the ground is not liable to accumulate groundwater.**

**Consideration**

There are no proposed changes to the requirement of the existing mandatory standard or the responsibilities of those involved. Although the guidance is being improved, designers can still propose compliance by solutions other than the guidance.

2. Clause 3.3.2 *Not clear if the 'adjoining ground' referred to is within the development or if it can also be 'adjoining ground' outside the ownership of the developer.*

#### **Consideration**

'Building Site' is a defined term within the Technical Handbooks and the intention is that any flood risk assessment for a building site should also give consideration of the effects of the development on ground adjoining the site.

3. Clause 3.3.3 - *Not clear if this requirement will apply to extensions and alterations to existing buildings.*

#### **Consideration**

In relation to extensions, alterations or conversions of existing buildings, references to a building are to so much of the building as is comprised in the extension, or the subject of the alteration or conversion. Clause 3.3.3 is a guidance clause and may be relative to proposals if this is the selected route for compliance with the standard.

4. Clause 3.3.2 - *SEPA guidance on generic requirements for undertaking a flood risk assessment should ideally be referred to within this clause.*

#### **Consideration**

Further consideration will be given to the inclusion of additional risk assessment guidance.

### **SECTION 3.6 - SURFACE WATER**

5. *Welcome the new paragraph in clause 3.6.0. It is important to clarify in the amended paragraph relating to controlled activities and SEPA authorisation that exceptions to controlled activities include discharges to coastal waters as well as discharges from single houses and users do not need to apply to SEPA for authorisation for all SUDS schemes. Recommend an amendment to the paragraph on controlled activities and SEPA authorisation as shown italics to read as follows: "The discharge of surface water is a controlled activity under the Water Environment (Controlled Activities) (Scotland) Regulations 2005 (as amended). Under these regulations surface water discharges to ground or water (wetlands, surface waters or groundwater) must be by means of a sustainable urban drainage system authorised by The Scottish Environment Protection Agency (SEPA). The only exceptions to this are if surface water is from a single dwelling and its curtilage, or if the discharge is to coastal waters. Authorisation is risk related, with discharges from buildings, including hard surfaces within their curtilage, being classed as low risk if they are carried out in accordance with General Building Rules (GBRs) Compliance with GBRs removes the need for formal contact with SEPA. Further information on the relevant GBRs is available from the SEPA website." Recommend amendment to the second sentence of the paragraph on water conservation within clause 3.6.0 as shown in italics to read as follows: ..."The introduction of conservation measures, such as the collection of surface water for its reuse is strongly encouraged in all localities to reduce the reliance on mains water and relieve pressure on the public foul drainage system." 3.6.2 - Recommend the last sentence of the paragraph on surface water drainage of paved surface should read as follows: .."Paved surface drainage systems should be designed, constructed and installed: a. incorporating SUD system techniques wherever possible as in clause 3.6.4; or b. where such techniques are not practicable, using a traditional piped drainage systems as in clause 3.6.3". Amend clause 3.6.3.a to read ...."a. a SUD system designed and constructed in accordance with clause 3.6.4, having regard to the requirements of The Water Environment*

*(Controlled Activities) (Scotland) Regulations 2005 (as amended) and planning advice in PAN 61 - Planning and Sustainable Urban Drainage Systems". Amend 3.6.3.d to read "...that complies with The Water Environment (Controlled Activities) (Scotland) Regulations 2005 (as amended)." Amend 3.6.5 by inserting the following at the end of the first sentence "However, they are not exclusive to such areas, and can be used as a means of close to source SUDS where ground conditions are appropriate". Recommend that domestic clause 3.6.7 send a strong signal that it is positive for the home owner to harvest rainwater, particularly in time of drought to help conserve potable water, but otherwise to help reduce the quantity of water having to be treated and handled by surface water drains. Recommend that 3.6.7 non-domestic handbook signals the scope for rainwater harvesting to potentially eliminate the need to apply to SEPA for an abstraction licence. Amend clause 3.6.8 to read "There can be substantial advantages from the use of SUD systems, but where a traditional piped system is exceptionally required ...". Recommend the removal of the car wash facilities example from clause 3.6.9 on the non-domestic handbook. Recommend additional guidance in 3.6.9 Of the non-domestic handbook as to the circumstances in which surface water should connect to the public foul sewer.*

### **Consideration**

Reference to other legislation or statutory bodies such as SEPA can enhance guidance to standards. Referring to the content of other legislation within guidance requires to be finely balanced with the need for designers to ensure that they engage with the other bodies where required to comply with their legislation. Further consideration needs to be given to assessing the suitability of the foregoing text suggestions in relation to building standards guidance and surface water.

**6.** *Clause 3.6.0 - Paragraph 2 - PAN 79 should also be referred to. Paragraph 4 - The rate of discharge from development should have no adverse impact on the receiving watercourse or drainage system. Standard 3.6.3 - Paragraph 1, b It should be noted that there are many places in Scotland where soil conditions are unsuitable for soakaways. d - Add to this section "and has undergone a Drainage Impact Assessment as required by the Planning Authority and Building Control,". Paragraph 3 - It should be clear that the impact of a soakaway on existing nearby buildings should be considered. Standards 3.6.4 - careful consideration should also be given as to the future ownership, operation and maintenance of the whole drainage scheme.*

### **Consideration**

Under the proposed guidance, other legislation, such as the Controlled Activities Regulations, have a role to play in dealing with discharges from development. Assessment on suitability of ground for soakaways is contained within the referenced guidance to the surface water standard as is the issue of proximity of buildings to the discharge proposals. Consideration will be given to inclusion of appropriate Planning document references.

**7.** *Consideration should be given to including advice on green roofs in clause 3.6.1 of the Domestic handbook. Non-D Handbook - consideration should be given to re-locating Standard 3.6.4 nearer the front of the flooding section.*

### **Consideration**

Currently green roofs that can achieve the criteria of the mandatory standard could form part of alternative solutions and there are no changes proposed that would affect this process. Guidance layout and text order will be re-appraised.

## SECTION 3.14 - VENTILATION

8. *Domestic- This section makes reference to OFTEC document T1/112 and T1/132, these documents are now obsolete and the information is now contained within OFTEC Technical Book 3. This section also makes reference to BS 5410 part 1. BS 5410 Part 1 only covers installations up to 45 kW. If the installation is above 45 kW the Standards should only make reference to BS 5410 Part 2.*

### Consideration

Reference to the identified relevant and updated OFTEC and BS documents will be checked before guidance finalisation in this section.

9. *There is no specific question on trickle vents. Suggest that trickle vents need not be universally required, especially where traditional (pre-1919) buildings offer fortuitous ventilation. The general thrust of improving air tightness is supported, although traditional detailing of windows allows controllable ventilation without water ingress. Clause 3.24.2 - Traditional buildings do rely on higher levels of ventilation to ensure the integrity of structural and finishing elements, so this recommendation is supported.*

### Consideration

The mandatory standards permit specific compliance solutions to be developed as most appropriate for individual buildings. Information on this issue is given in Part II Application of the Building Standards – Guide for Practitioners – Conversion of Traditional Buildings.

10. *Clause 3.14.0 Paragraph 2 refers to a combination of mechanical and natural ventilation as a "2 hybrid" system whereas 3.14.1 refers to the same system a "mixed mode". Consistency in terminology is required to prevent confusion.*

### Consideration

Assessment of consistent terms will be undertaken.

11. *Keen to encourage the use of the following ventilation measures: Natural /passive ventilation; hygroscopic materials in place of mechanical ventilation to deal with moisture; Use of off-site construction to promote tighter buildings and lower fuel costs while avoiding "fortuitous" air movement. We would encourage SG to look at initiatives such as Fairfield Housing Cooperative's housing development that used natural material to limit / reduce health problems.*

### Consideration

Comments extremely useful and may support future reviews relative to the topics.

12. *Non-Domestic clause 3.14.2 - Not clear under b (second bullet point) if the additional 600 square mm is 1) to be applied to every square metre of the room area above 10 square metres or 2) to be applied to every square metre of the room area when the room area is above 10 square metres.*

### Consideration

For a room of more than 10 m<sup>2</sup> in a building constructed with an infiltration rate of not more than 10 m<sup>3</sup> / h/m<sup>2</sup>, the base level is set at trickle ventilation of 10,000 mm<sup>2</sup> with guidance to increase the trickle ventilation by 600 mm<sup>2</sup> for each additional square metre of room area greater than 10. Clarity on this intention will be reviewed.

## COMBUSTION APPLIANCES – SAFE OPERATION

13. *Flueless gas appliances/Biomass Appliances: with these features now becoming more commonplace in both new and refurbishment projects we support the inclusion of amendments to these sections as further guidance to the designer and installer.*

### Consideration

Acknowledged.

14. *Believe that national guidance from the government on biomass systems would be helpful.*

### Consideration

Scottish Government guidance on biomass now available alongside support schemes such as the Scottish Biomass Heat Scheme (<http://www.scotland.gov.uk>) Additional guidance also available at <http://www.usewoodfuel.co.uk/>

15. *Domestic handbook - with reference to biomass, there should be signalled here the air quality issue. The environmental services section of the Council advise against planning applications proposing biomass installations (and some built have been closed down) on air quality grounds especially PM10 and PM2.5 particulate emissions. The SG is preparing separate guidance which the Council believe is due out in August/Sept 2008.*

### Consideration

External air quality dealt with by other legislation e.g. Environmental Act and Clean Air Act. Refer also to the **Measurement and Modelling of Fine Particulate Emissions (PM10 and PM2.5) from Wood-Burning Biomass Boilers** a Report on the potential cumulative impact of biomass boilers on urban air quality in Scotland: Published by Scottish Government on 7th November 2008 <http://www.scotland.gov.uk/Publications/2008/11/05160512/12>

## COMBUSTION APPLIANCES – AIR FOR COMBUSTION

16. *Supply of air for combustion to gas-fired appliances: should read" Open flued and flueless gas-fired appliances installed in a room space need to have a supply ....". 3.21.5 - Remove the words "as the only means of heating a room or space" from the second sentence.*

### Consideration

Research and expert advice indicates that condensation risk is generally related to where flueless appliances are the only means of heating a room or space, with the risk limited when these appliances are installed as additional heating within a room or space that has other methods of heating e.g. central heating system

17. *HSE welcomes the proposal to insert a new clause 3.21.5 for both domestic and non-domestic premises as this will highlight the existing British Standards relating to ventilation and installation of flueless gas appliances.*

### Consideration

Acknowledged.

## **7. CONCLUSIONS**

The vast majority of respondents were content with what was proposed within the review of the 8 wide range of sustainability related subjects contained within Sections 0, 3 and 4 of the Technical Handbooks.

Although generally in favour of the proposals, consultees did identify some areas of concern, such as the proposals to reduce exemption area criteria for surface water and its relationship to other legislation. Consultees also constructively questioned the practicalities and benefits of the proposals to provide dedicated space for segregation and storage of solid waste within dwellings.

## **8. NEXT STEPS**

All responses received were considered by the Environment and Safety Working Party of the Building Standards Advisory Committee and have assisted in informing the decisions made with regard to each specific proposal. With the exception of the proposal to introduce solid waste storage/recycling space within dwellings, all the other proposals will now be taken forward. The proposed changes to the mandatory standards and associated guidance will now be finalised and, subject to approval by Scottish Ministers, publication is intended for April 2010 followed by implementation in October 2010.

The surface water issues requiring changes to Schedule 1 and Schedule 3, will now be made under the Building (Scotland) Amendment Regulations 2009, to come into force on 1 May 2009.

## **ANNEX B**

### **IMPLEMENTATION & DELIVERY PLAN**

#### **DELIVERY AND COMMUNICATION**

The proposed changes will be taken forward in the form of guidance within the Scottish Building Standards Technical Handbooks. This guidance will be introduced as amendments to the Technical Handbooks and implementation will be carried out under existing processes, which form the building standards system in Scotland, as set out by the Building (Scotland) Act 2003.

The Technical Handbooks are the primary reference source for compliance with building standards and, as such, are used by designers and others involved in the building process to ensure compliance with the Scottish building regulations. Inclusion of these sustainability reviews to the documents will ensure that buildings constructed in Scotland are more sustainable.

The guidance to the various building standards will illustrate the most common ways of meeting the requirements of the functional standards and, thus, complying with the Building (Scotland) Regulations 2004, as amended. When carrying out work that is subject to the building standards, it is the duty of the relevant person (normally the owner of the building) to comply with the requirements of the regulations.

Publication in this form is the established method of introducing changes to the building standards system and ensures that information on changes reaches those involved in works that are subject to building standards. This information is made available in paper form, as a priced publication, or free of charge, as an electronic download from the Building Standards Division (BSD) website, [www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards](http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards).

#### **IMPLEMENTATION**

The proposed changes will form part of the building standards system in Scotland, produced and maintained, on behalf of Ministers, by the BSD and operated and enforced by the 32 Scottish local authorities.

Building work subject to the Building (Scotland) Regulations 2004, as amended, requires a building warrant to be obtained prior to commencing building work and to have a Completion Certificate accepted by the Verifier on completion of the work. Such works are subject to the scrutiny of local authorities as Verifiers of the system, who also have enforcement powers under the Act to ensure compliance with the Regulations.

#### **IMPLEMENTATION PERIOD**

The proposed changes to the guidance within the Scottish Building Standards Technical Handbooks are relevant to any party responsible for a building where they intend to carry out building work that is subject to building regulations.

Proposed changes will be published online by the beginning of 2010 with hard copy documents following on. Guidance will come into effect on the 1<sup>st</sup> of October 2010 and be applicable to all building warrant applications made on or after that date. This will provide the minimum 12 week implementation period required for any such change.

#### **PROMOTION**

Any changes to the building standards system are publicised by the BSD through the website, seminars and articles in relevant publications. In addition, the BSD would seek to promote changes to the standards and guidance in association with organisations who have an expressed interest in building design and accessibility issues, together with other key stakeholders who have been involved in development of guidance and in the consultation process.

## **ANNEX C**

### **SUMMARY OF PROPOSED CHANGES**

#### **SECTION 0: GENERAL, SECTION 3: ENVIRONMENT AND SECTION 4: SAFETY**

The following is a short, clause by clause summary of the changes to be made to the building standards and supporting technical guidance within the Scottish Building Standards Technical Handbooks.

#### **SITE PREPARATION**

Introduction of new clause 3.1.9 to provide guidance in relation to ground contaminants, their possible effects on buildings and materials and possible design and/or mitigation options

#### **FLOODING AND GROUND WATER**

Improved guidance text amendments to clause 3.3.0 and restructuring clauses 3.3.1 and 3.3.2 to improve guidance on both flooding and groundwater. Introduction of new clause 3.3.3 with guidance on resilient construction in flood risk areas.

#### **VENTILATION**

Amendment of standard to clarify the emphasis on air quality rather than ventilation and to remove the reference to resist moisture which is dealt with by standards 3.4 Moisture from the ground, 3.10 Moisture from precipitation and 3.15 Condensation

Amendment to paragraphs in guidance clause 3.14.0 to highlight the issue of ventilation relationship to energy consumption, natural ventilation and air-tightness of buildings.

Minor amendments to clauses 3.14.1 -3.14.4 to pick up corrections, updates and clarify intention of guidance.

#### **CONDENSATION**

Removal of limitation from standard to apply standard to all buildings.

#### **COMBUSTION APPLIANCES - SAFE OPERATION**

Introduction of guidance to clause 3.17.0 to inform on the issues of biomass as a solid fuel.

#### **COMBUSTION APPLIANCES – AIR FOR COMBUSTION**

Introduction of a new clause 3.21.5 to provide guidance on flueless gas appliance installations and ventilation.

#### **BUILDING SECURITY - new standard**

New standard introduced to reduce the potential for unlawful access to dwellings and unauthorised access to common areas in blocks of flats and the consequential risk of housebreaking, vandalism, assault and nuisance. Standard addresses specification and installation of doors and vulnerable windows/glazing.



**REGULATORY IMPACT ASSESSMENT (Ref: 2008/06)**

**FINAL REGULATORY IMPACT ASSESSMENT  
ON THE REVIEW OF SECTION 5: NOISE OF THE TECHNICAL HANDBOOKS  
FOR WAYS OF COMPLYING WITH THE BUILDING (SCOTLAND)  
REGULATIONS 2004 (AS AMENDED)**

**JANUARY 2010**

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# REGULATORY IMPACT ASSESSMENT ON THE REVIEW OF SECTION 5: NOISE OF THE TECHNICAL HANDBOOKS FOR WAYS OF COMPLYING WITH THE BUILDING (SCOTLAND) REGULATIONS 2004 (AS AMENDED 2006 AND 2007)

## 1.0 PURPOSE AND INTENDED EFFECT

### 1.1 Objective

The principal aim of the proposals is to improve sound insulation to an acceptable level for occupants, in a practical and cost effective manner and ensure that buildings provide an environment that does not affect health through noise disturbance. This is by resisting sound transmission to dwellings and residential buildings from buildings in different occupation and also by reducing noise levels to rooms used for sleeping in dwellings and residential buildings.

This Regulatory Impact Assessment (RIA) addresses the proposal to amend the existing functional standard 5.1 and associated guidance and introduces a further standard 5.2 with supporting guidance, within Section 5: Noise of the Technical Handbooks.

It is intended that improved standards and guidance will come into force on 1 October 2010.

### 1.2 Background

As a precursor to the review, Building Standards Division (BSD) hosted a workshop on 8<sup>th</sup> December 2005 at Denholm House, Livingston. The purpose was to seek industry opinion on the standards for noise and the current implementation of requirements. The information gathered was used to help set the agenda of the review.

This is the first time in twenty years that a major review of the building standards for noise has been carried out. Over this time period, lifestyle has changed and people's expectations have risen, which has resulted in a dramatic increase in noise complaints. Any noise generated within or between dwellings can affect the health of occupants and cause psychological and physiological affects such as depression. Several research studies (refer to annex A) have shown that noise can cause health problems and can be a nuisance to those living or sleeping, not only in domestic but also in non-domestic buildings. Services such as mechanical plant and lifts, where they are located adjacent to dwellings and sleeping accommodation, in residential buildings have also generated many complaints.

The present standard and guidance is applicable solely to dwellings and aims to limit the level of sound transmission passing through separating floors and separating walls of flats, maisonettes and semi-detached houses. The present guidance recommends a performance level for the sound insulation of separating floors and walls and offers generic details of constructions that could meet these performance levels.

### 1.3 Rationale for Government Intervention

Noise complaints have risen five fold over the last fifteen years. Lifestyles have changed dramatically over this time and occupants are now less tolerant of noise generated within their own household or by their neighbours. Improved thermal standards have resulted in better insulated external walls and consequently, improved noise insulation from external sources. This has resulted in the internal living space becoming quieter and occupants becoming more sensitive to loud music, television and conversation within their home. To counteract this, the proposal is to raise and extend the current standards and introduce sound insulation to rooms used for sleeping in buildings for the first time. Without these

improvements the affects of noise on the well-being of the occupants is likely to become more apparent in future years.

In England and Wales a review of the comparable noise standard resulted in higher standards coming into force in 2003 and for the first time all separating walls and floors requiring a sound test prior to occupation. Research has shown that complaints relating to general domestic activities are now minimal.

### 1.3.1 **Domestic buildings**

There are three cost areas that must be considered; the cost of increasing sound insulation and sound testing to separating walls and floors, providing sound insulation within the building and reducing noise from services.

#### **New buildings**

For new buildings, the present standard is designed to limit noise through separating floors and walls by insulating them to a performance level recommended within the guidance. On completion of the works a proportion of the buildings may be tested to check if the performance of the separating floor and wall achieve the levels intended when designed. Tests are made at the relevant person's expense (usually the building owner or developer). There is no specific requirement to carry out post-completion tests and only two or three local authorities presently require all sites to be tested as a matter of course.

Where an innovative design or deviation from a specified construction is used, only a few verifiers request a performance test. Some rely on the manufacturer's literature which can be tested under laboratory conditions and is used as evidence under 'reasonable enquiry' that the construction will achieve the performance standards. Without a test however, the effects from flanking transmission cannot be measured and on site the works may result in a failure.

The present guidance sets two sound performance levels; the individual value and the mean value, which has resulted in a degree of uncertainty and unreliability. The new proposal is for a substantial improvement to the minimum performance for airborne sound insulation of walls and floors, and the maximum performance for impact sound insulation for floors. The proposed performance levels are based on research that was carried out by Napier University, which concluded that at a level of 56dB there were few complaints by occupants regarding noise levels. The very nature of moving from a mean value to a minimum will encourage designers to design to an even higher level to ensure compliance when a post-completion test is carried out.

The levels proposed are in line with those recently introduced in England and Wales and are recommended good practice in quality housing developments around the country. The choice of types of construction and the number of dwellings to be tested would be chosen by the verifier. There have been instances when sound insulation problems have arisen where non-compliance has occurred. To check that these raised performance levels are met, a sound test is carried out prior to occupation of the building and this will help ensure the sound insulation of dwellings is satisfactory.

#### **Conversions**

The older the building the more problematic the possibility of compliance when a conversion is carried out. Historic buildings, pre turn of the century, have many hidden voids, back to back fireplaces and cupboards that provide paths for noise transmission. The guidance is written in such a way as to recognise these old building techniques and to direct designers to appropriate methods of achieving compliance.

Conversions should meet the performance levels in the guidance clauses, but verifiers will need to exercise some discretion when work to older buildings is proposed.

### **Internal insulation**

There is anecdotal evidence to suggest that noise through internal walls and floors in domestic buildings is becoming more problematic. Noise levels could be reduced where there is an apartment or room used for sleeping accommodation by insulating walls and floors. Although most noise within a dwelling can be controlled through discipline of the occupants, everyday domestic operations are more difficult to control other than by introducing physical sound reducing measures.

Proposals have been developed from current good practice and the guidance of warranty companies, such as the National House-Building Council (NHBC) who currently include in their own guidance a number of these measures, e.g. sound insulation round bathroom walls. Currently Approved Document E in England and Wales also recommends a standard for insulating walls and floors within a dwelling. As both of these guidance documents recommend internal insulation to floors and walls the large UK house builders incorporate the provision in all their designs. Introduction of this provision in Scotland is consequently unlikely to have a significant impact.

Many complaints also revolve around noise in common areas of domestic buildings and it is proposed to address this by improving sound insulation around entrance doors where most of the noise enters the dwelling.

### **Noise from services**

There is an increase in the number of complaints regarding noise from services such as lifts as the trend in the construction of high rise flats has increased. To limit the transmission of noise and vibration from services installations, it is important to focus on the potential sources of noise at the design stage.

## **1.3.2 Non-domestic buildings**

### **Internal insulation**

Rooms used for sleeping accommodation, namely bedrooms, have changed over the years as the trend to include TV's and surround sound are now considered more of the norm. With this in mind, there is anecdotal evidence to suggest the occupiers of such rooms can be disturbed by others in adjacent rooms. By introducing insulation into internal walls the noise from other rooms could be reduced in non-domestic buildings.

The affects of raising the performance levels and introducing new guidance has been considered in relation to current construction practice. As a result of improved standards and guidance in England and Wales there has been a noticeable decline in the level of noise complaints.

## **1.3.3 Domestic and Non-domestic buildings**

It is important to emphasise that although raising the standards will address some concerns by occupants there is no guarantee that an occupant would be entirely free from noise. The noise standards aim to reduce noise levels that will not threaten the health of occupants.

## **2.0 CONSULTATION**

Before making or amending the Building Regulations, Scottish Ministers are required to consult the Building Standards Advisory Committee (BSAC) and such other bodies as are considered necessary to inform on the matters under consideration. This exercise has

been carried out through a BSAC Working Party and discussions have taken place with local authority verifiers, industry, house builders, universities and acousticians.

## 2.1 **Within Government**

The SG Building Standards Division (BSD) consults widely, and has continued dialogue, with the following government bodies: SG Planning Division; SG Communities Scotland; SG Greener Scotland Directorate; SG Better Regulation Unit; Historic Scotland; Departments for Communities and Local Government (CLG) and Building Regulations Unit – Department of Finance and Personnel, Northern Ireland.

## 2.3 **Public Consultation**

The BSD has an extensive data base of over 600 names of individuals and organisations with a specific interest in building regulations. All those on the BSD list were alerted to the consultation. The Consultation Report is attached see Annex E.

A list of all consultees is appended to the consultation package which is available on the BSD website at: [www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards](http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards).

## 3.0 **OPTIONS**

In considering how to address the objectives identified in 1.1, three options were identified:

Option 1 Do nothing;

Option 2 Increase awareness of the need for improved sound insulation and introduce best practice guidance documents for adoption and application on a voluntary basis;

Option 3 Introduce revised and updated building standards and guidance on sound insulation.

### 3.1 **Options**

In considering how to address noise issues, a range of three options have been identified.

#### **Option 1**

Do nothing.

#### **Option 2**

Increase awareness of the need for improved sound insulation and introduce best practice guidance documents for adoption and application on a voluntary basis to:

a) raise performance levels to a level that will reduce complaints;

b) introduce measures to improve sound insulation to apartments in dwellings and residential buildings which are used for sleeping accommodation;

c) introduce measures to improve noise from services.

d) introduce a standard to reduce sound transference to rooms used for sleeping in buildings.

#### **Option 3**

Introduce revised and updated building standards and guidance on sound insulation to:

a) raise performance levels to a level that will significantly reduce noise complaints;

b) introduce measures to reduce noise from apartments in dwellings and residential buildings which are used for sleeping accommodation;

c) introduce measures to reduce noise from services;

d) introduce a standard to reduce sound transference to rooms used for sleeping in buildings

## 3.2 Risks associated with each option

### Option 1

High risk of no improvement and business as usual. There would be continued disturbance from neighbours and everyday domestic activities within the home and continued complaints. There is indicative evidence that occupants feel that the building industry should be providing them with a home that gives them enough peace to live a normal life, but at the moment, for a number of people, this is not happening. This would not be in line with the SNP manifesto commitment to improve the enforcement of building regulations.

### Option 2

Medium risk of no improvement as the guidance may only be applied to a small proportion of houses, as a result of the extra costs involved. This will probably be limited to those developers and procurers of buildings that acknowledge that there is room for improvement in current noise standards. For this to appeal to industry, some incentive would be necessary such as a subsidy. However there are several good reasons against this being the best option:

- it is not considered appropriate that public money should be used for subsidising new building work in the private sector;
- it is not clear that a subsidy would be effective in increasing the take up of improvements;
- industry guidance would be less likely to be efficient overall than regulations;
- not in line with the SNP manifesto commitment to improve the enforcement of building regulations.

### Option 3

Low risk of no improvement, as the improved standards will be mandatory. Guidance from England and Wales suggests that this option will significantly reduce noise complaints generated by neighbours. However there will be an increase in the costs of construction which is likely to be passed on to the buyer from the:

- cost of materials and labour;
- additional time spent by the verifier in the transitional period when checking the performance levels are being met at the building warrant assessment stage and on completion of the building;
- increased time spent during the construction stage and at completion stage by the house builder due to the additional site work;
- increased time spent while the builder is delayed when carrying out a sound test on site;
- an increased cost where a building is altered and extended.

## 3.3 Implementation and delivery plans

### Option 1

No implementation required as there is no change and therefore no delivery.

### Option 2

Could implement by introducing good practice guidance documents for adoption and application on a voluntary basis. This can be delivered through a number of mediums such as leaflets which could be developed, and made available to designers, developers and builders, for example at libraries and through web access.

### Option 3

Implementation will be through the building regulations, the technical standards and guidance given in the technical handbooks. The changes will affect any work to create a

new dwelling or residential building or where an existing building is altered, extended or converted under the building regulations. Changes required to building practice will apply equally to these forms of development. Based on the options, there is likely to be a cost implication to the public and, in the transitional period, a slower delivery of the building.

This will be delivered by proposals in the form of a performance specification and clauses which will give guidance on ways to meet the standard. This provides for both flexibility and innovation in the proposed solutions. Proposals will be applied, through Section 9 of the Building (Scotland) Act 2003.

## **8.0 COSTS AND BENEFITS**

### **4.1 Sectors and groups affected.**

In considering noise the following sectors and groups affected for each option are given below:

#### **Option 1**

Owners and occupiers of dwellings and residential buildings that are new, altered, extended or converted will have virtually no benefit at all, as any improvements would be solely on a voluntary basis.

#### **Option 2**

- a) Owners and occupiers of dwellings and residential buildings that are new, altered, extended or converted may benefit as some of the improvements may be taken on board but cannot be guaranteed.
- b) A social landlord may consider making improvements when they consider any new building work.
- c) The costs of a subsidy for new building work would be borne by the Government.

#### **Option 3**

- a) Persons procuring new buildings or building work would need to bear the cost of the work.
- b) House builders would have to modify existing standard building types to address issues raised. Where relevant, amended Scottish type approvals (approval of a building form for use anywhere in Scotland) may be required.
- c) All those involved with noise aspects of building design and construction would have to familiarise themselves with the new standards through training.
- d) A greater number of acousticians will be required to carry out the additional testing required.
- e) Building materials and component manufacturers will need to make changes in their products and literature to suit Scotland. However, this has already been implemented in England and Wales and the affect in Scotland should be low.



#### 4.4

### **Benefits**

In considering noise the following benefits for each option are given below:

#### **Option 1**

This option offers no benefits. The huge cost to the NHS, police and local authorities who deal with noise related incidents will continue, if not increase as problems are likely to escalate. Stress which can cause depression, is estimated to cost the UK £100 billion per annum, assuming that noise nuisance contributed 1% to this figure would be a cost of £100 million.

#### **Option 2**

Any benefits gained by the introduction of a voluntary code would be wholly dependant on the level of use of any such code. Without mandatory status, benefits would be limited and such guidance is unlikely to be followed, as it would be left to the market forces to determine whether to improve sound insulation. Without any real improvements there will be ongoing cost to the State, through the NHS to treat occupants with nervous dispositions who will also need support from GPs and other organisations such as therapy groups. Many hours are spent by local authorities through the Environmental Health Department, on pursuing ASBO's, the police on pursuing disturbances and complaints at great cost to the State.

#### **Option 3**

Specific benefits under this Option can be quantified under the following categories:

- a) The introduction of sound insulation within dwellings and residential buildings will limit noise transference to and within dwellings and residential buildings to a level where there are likely to be very few complaints. This will reduce the costs to the NHS, police and local authorities as they will spend less time and money pursuing complaints.
- b) The increase in sound insulation in separating floors and walls will certainly reduce the amount of noise passing between neighbours and reduce the amount of noise complaints. This will allow building occupants to remain within the same building for a longer period of time, as noise disturbance would be limited and no longer be a reason for occupants to move house. This would tie in to the principle of 'lifetime homes', where the occupant should be able to remain within the same house for a lifetime regardless of age or health issues. For the occupant there will be a saving in cost from not having to move home. By reducing the number of occupants requesting transfers to move home away from noisy neighbours there will be cost saving for housing departments in councils and housing associations.
- c) By introducing a sound testing regime, a minimum sound insulation would be achieved prior to a dwelling being occupied. At present, there is a high cost associated with remedial work after the occupants have moved in. There is a cost saving to be made by developers from not having to carry out remedial measures. This would save the state money and resources by reducing the time spent by local authorities dealing with complaints.
- d) Introducing a level of sound insulation internally within dwellings and residential buildings will reduce the amount of noise from occupants that can be heard within any habitable space within the building, which aims to reduce irritability felt by the individual from service noise and those created by other occupants. For occupants with a nervous disposition this could help how they feel by providing a quieter environment and may reduce the cost to the NHS long term if the occupants need less medication.

- e) As the building standards are supported by guidance, the opportunity to impart information to industry exists.
- f) The existing building standards system is well established and robust. On previous occasions, where there has been a concern over an area of building work that does not comply with building regulations, either by the owner or the public, improvements can be required under the building regulations to address and resolve the problem. These are then rectified by the verifier or the owner.
- g) Measures do exist to upgrade separating walls and separating floors where the occupant is dissatisfied with the level of sound insulation. However these measures are expensive and disruptive to the home owner to carry out. Remedial measures are normally only taken when the occupants complain, take legal action or are fortunate enough to have a landlord who will help resolve their complaint. This creates an additional cost. It would be more beneficial to the occupant if the separating walls and separating floors were constructed to a higher level in the first instance.
- h) Laminate flooring has been the cause of many complaints for occupants living in existing buildings. As laminate is a floor covering it is not covered under the building regulations. However, technical guidance has been given explaining the problems that can arise with noise which can affect occupants' neighbours. Advice includes giving consideration to the materials used and the method they are laid, as this can vary.

#### 4.5 **Costs**

The cost of implementation for each option is given in Annex B.

##### **Option 1**

This option imposes no implementation costs. However, 'doing nothing' would not make any improvements and may worsen the situation as explained in 1.3. An indication of the financial consequences resulting from this option is summarised in 10.1.

##### **Option 2**

The development costs for production of voluntary codes of practice would form part of the work of the BSD. Development costs related to such a code would therefore be borne by government, as would the cost of publishing and distribution. As with the building standards, such documents would be in the public domain and made available free of charge. As such, no revenues would be derived from this option.

This option would impose costs through funding of advertising and awareness campaigns. However, these would not be borne directly by the public. No values have been assessed, as costs will be proportional to the extent of any proposed promotional campaign.

The cost of the subsidy for new building work would result in considerable costs to the Government. The reasons against the approach have been outlined in 3.2. Any subsidy would have to be significant to make it attractive to developers to adopt these measures to make the necessary improvements.

By using the figures from the RIA England and Wales which assumed £1 m would need to be invested to promote similar design guidance as that of option 3. Adopting this option would reduce the cost of enforcement, and it can be assumed that this would relate to the equivalent of a 10% cost saving for Scotland of £100,000. However, if there is little voluntary adoption, there could be less than 20% of an improvement.

### **Option 3**

The revision of mandatory standards and guidance on the sound insulation of buildings would incur significant costs and an approximation of potential costs is possible. Due to the disparate issues addressed in relation to both non-domestic and domestic buildings, these costs have been assessed separately.

#### **4.3.1 Domestic**

##### **Increase in sound insulation**

The initial proposal to increase the new performance levels was to be either 56 dB or 58 dB.

Peoples' perception of noise is very subjective, however research has shown that a sound insulation level of 56 dB is likely to generate few complaints. A higher level of 58 dB was considered by the working party, but it was clear that there would be no significant reduction to the level of complaints as the increase is virtually inaudible. However the cost of producing constructions to achieve this level of sound reduction was shown to be prohibitive. Constructions in general use today could not be readily adapted at a reasonable cost to justify the higher insulation levels.

The conclusion was that there are very few noise complaints above a level of 56 dB. Other guidance such as 'Eco Homes' or 'The Guide for Sustainable Homes' look for similar levels and class these as "very good" or "excellent". In England and Wales many of the separating floor and separating wall constructions are constructed to Robust Details which can achieve a level of 56 dB. As house builders are now familiar with types of construction achieving this level, it would make it very easy to introduce this level in to Scotland.

The compliance cost was estimated by calculating the cost of moving from the current range of constructions to the new constructions.

Where conversions are carried out, this will be a relatively small number compared to that of new build. It is difficult to estimate the cost of compliance as the cost is based on the nature of the building and how much upgrading work would be required.

The main additional cost to increase sound insulation in separating walls and separating floors will arise from the additional element that forms a complete wall and floor construction.

The Scottish Environment Statistics lists 28,217 noise complaints made to Scottish local authorities in the year 2005/2006. Assuming approximately 20% of the complaints were from neighbours through separating walls and floor this relates to 5,643 cases. Assuming each complaint took one hour for one Environmental Health Officer to deal with, at a cost of £50/hour, then the cost would be £282,150 for one year.

In England and Wales the report 'Building regulations and Health' suggest 100,000 cases of noise related stress may result every year. This might correlate to 10,000 similar cases in Scotland. Assuming that the proposed improvements in sound insulation might reduce 20% of such cases, and those affected take 5 days off work per annum with an average salary of £20k and exact a cost to the NHS of £500 per case. The resulting benefit might be in the region of £1.8 million.

Summary of costs and benefits from implementation of proposals, see annex B for a breakdown of the figures.

### **Performance testing**

Although a number of sound tests are carried out every year by a few local authorities, there would be an increase in the cost of testing as all owners and developers need to test. However if sound insulation is improved as expected then there may scope be for a reduction in sound testing in the future.

### **Internal sound insulation**

In domestic buildings, the NHBC already require WC's in dwellings to be insulated against noise. There would be an increase in cost as there will now be greater areas of walls and floors to be insulated than previously.

### **Moderation and mitigation**

Those who are affected (e.g. builders, designers, building control, etc) by the implementation of the proposals will have non-recurring costs arising. These are from having to acquaint themselves with the new provisions and where necessary to invest in appropriate professional and technical training. Although difficult to quantify, the cost is likely to be low, as the proposals are not too complex to understand. There will be a greater number of acousticians required and subsequently more sound testing equipment will need to be purchased initially which will increase costs.

Obtaining specific costs to the NHS for the treatment of noise related illnesses has proved to be impossible but it is assumed to be several 10s of £m. Added to this the cost of sleeping tablets on prescription, the cost of police time dealing with noisy neighbour complaints and local authorities dealing with, and carrying out test, following complaints are also assumed to be many £m.

With the introduction of the Antisocial Behaviour etc (Scotland) Act a number of local authorities applied to the Scottish Executive for funding to deal with noise nuisance, one example is East Lothian Council where £105,000 was granted to set up an out-of-hours service. In March 2005 the Scottish Executive provided £2.8m to tackle domestic complaints. The Executive committed further funding in 2007, to deal with 'antisocial neighbour noise nuisance experienced in the home' at a cost of £4.9m and £10.6m for 2006-2008, which is specifically for local authorities. Assuming that the proposals save 10% of the overall cost of £18.3m since 2005, this would be a saving of £1.8m.

Substantial savings are expected to be achieved following the introduction of these proposals and £1.8M has been identified as a very rough estimate of the savings to the country for time off from work due to stress as a result of noisy neighbours.

#### **4.3.2 Non-domestic buildings**

The introduction of a standard covering internal insulation to walls and floors will have a marked increased on the cost of non-domestic buildings due to the extent of new insulation required. There is little evidence on the number of such rooms created each year. However, information was gleaned from a survey from verifiers, on the number of applications made to them over this period. For the period from 1 January 2006 to 31 December 2006, there were a total of 76 buildings, either new build or altered, in this category. It is reasonable to assume that a large portion of these rooms will currently be formed with insulation. For example, in hotels the level of insulation provided at design stage would vary depending on the rating of the hotel. The budget end of the market would be more likely to provide minimal insulation to keep construction costs down. The prestige hotel chains are very likely to have sound insulation measures between rooms.

In residential buildings some of these buildings such as nursing homes would bear an increase cost. As stated above some other types of residential accommodation such as hotels, do already provide sound insulation within their current designs.

#### **4.4 Effects on Firms/Consumers and the Public Sector**

##### **Effect on Firms**

There will be costs involved by the building industry for modifying house designs. Although this would be minimal as small builders normally construct one off houses which do not have separating floors or walls which limit the cost.

Manufacturers are likely to re-assess their current products and update their literature although many will already have done so following the changes in England and Wales. All firms will have to make their employees aware of the changes and may have to provide training sessions for their staff.

The smaller firms, such as specialists would benefit as the likelihood is the amount of consultation work would increase and they would carry out greater numbers of sound tests. Consequently this could result in employing new members of staff.

##### **Effect on Consumers**

An improvement in sound insulation will reduce the amounts of complaints and reduce the affects on health caused by noise disturbance. There will be an increased cost from additional element of construction and this cost will be passed on to the consumer e.g. normally through house purchase price or for those staying in hotel.

##### **Effect on the Public Sector**

There will be long term benefits to the public sector as it is anticipated the number of complaints will reduce because the sound insulation has been increased. This will reduce their long term costs by dealing with fewer complaints.

#### **9.0 SMALL/MICRO FIRMS IMPACT TEST**

The Small Business Service has been consulted and the impact of the amendments has been assessed during the consultation process.

##### **Preliminary Impact Test**

Assessment has been based on Option 3 as Options 1 and 2 have no cost implications for small firms, including micro-businesses (those which employ less than 10 full-time employees). It is considered that the proposals to change the regulations apply in a proportional and equitable way. Only those firms that choose to erect, alter, extend or convert buildings will be subject to the proposed changes.

For small firms in the construction industry, the move to higher levels of sound insulation, the introduction of performance testing and internal sound insulation to rooms used for sleeping in buildings may create training issues. However, this is mitigated to a certain extent because there is no change in approach to achieving compliance with the sound insulation levels, and several local authorities and small businesses are already familiar with testing as a way of demonstrating compliance. The majority of micro-businesses in the construction industry deal with the alteration and extension market. The proposals here still retain performance levels and Example Constructions in guidance that will achieve these levels, which in turn simplifies the guidance. The majority of costs borne initially by these firms will be passed on to the building owners.

### **Full Impact Test**

From preliminary work it was considered that these proposals would not present a significant impact on small and micro businesses in Scotland.

In the partial RIA, a commitment was given to carry out a small firm's impact test during the period of public consultation.

BSD contacted and interviewed six small businesses. They were as follows:

- Building Contractor (Sole Trader)
- Acousticians practice (between 1-9 employees)
- Manufacturer (between 10 – 49 employees)
- Manufacturer (between 50 – 250 employees)
- House builder (between 10 – 49 employees)
- House builder (between 50 – 250 employees)

BSD provided an explanation and questionnaire to several small businesses of the proposed key changes to Section 5 and asked how they were likely to affect their business. This was followed up with a discussion centred on key questions aimed at ascertaining the impact of these changes to each of them.

### **Summary of findings**

#### **Training for Staff**

The businesses that responded felt that there would be no significant training requirements placed upon them as a result of the proposed changes.

#### **Cost to Customers**

All the businesses interviewed agreed that any additional costs associated with the changes to the building regulations will be passed on to the customer. The increased sound insulation levels, testing and internal insulation will all increase the end cost to the customer.

#### **Timing**

The house builders and manufacturers felt that they would require some time in order to prepare for the proposed changes.

#### **Materials**

The manufacturers felt they would be capable of meeting the demand for products, as long as they were given a reasonable 'lead in' time.

#### **Building permission**

The house builders felt some changes would be needed to the building design, but it was assumed this would become common practice with time and the impacts would not be long term.

#### **Workers pay/Installation time**

Overall it was felt that workers' pay would not be affected by the proposed changes but installation time in some instances may take longer. The increased labour costs associated with this would be passed on to the customer.

### **Increased performance levels**

House builders felt this would not affect the cost for them as they already build to RDL designs. The smaller house builder advised there could be an increase in cost for separating walls as they are higher than the current levels.

### **Internal insulation**

House builders advised there would be an increase in cost for internal insulation, but felt this was 'a step in the right direction', and they would pass this on to the customer. The smaller house builder thought that there would be an increase in cost for build time.

### **Sound testing**

House builders stated that generally they tested to higher levels so this would not affect their business. The smaller scale house builder felt there would be a greater cost for carrying out sound testing. Manufacturer opinion is that testing ensures people are using reputable products.

### **Changes to business plans from the proposals - made before and after implementation**

House builders advised there would be none as there is no change to their current practice. Manufacturers were of the opinion they may consider supplying a system, improving installation instructions and the ease of installation of their products.

### **Change to business operation and relation to other businesses / consumers**

House builders stated it would 'introduce a level playing field' and improve industry standards. House builders need to update their designs. Smaller builders advised some re-education for their workforce would be required, to appreciate differences from current practice. Manufacturers do not think it would significantly change their business that much.

### **Generally**

It is considered that none of the above should be treated as an insurmountable barrier to the introduction of the amendments. It is not expected that there will be radical changes in the future to these proposals. Regarding the production and supply of materials, again any glitches are expected to be short-lived and will be mitigated by both the lead-in time to the introduction of the amended standards and guidance and also that these types of revised measures are already in existence in England and Wales. All issues considered it has been established that the amendments will not have a significant impact on small businesses in Scotland.

BSD will issue the latest version of the Technical Handbooks in April 2010, six months in advance of coming into force in 1 October 2010. Sound testing will be introduced in phases, with houses and flats coming into force six months after this date in May 2011, with houses and conversions six months later in October 2011, allowing a period of twelve to eighteen months for the building industry to adapt to the changes.

## **6.0 LEGAL AID IMPACT TEST**

There will be no increased use of legal process or new rights created by the amendment and introduction of the building standards and therefore no impact on the need for legal aid.

## **13.0 'TEST RUN' OF BUSINESS FORMS**

**There are no business forms included with any of the options.**

## **8.0 COMPETITION ASSESSMENT**

### **8.1 Competition**

There are no significant areas where issues of competition, restriction or imbalance have been identified.

### **8.2 Manufacture**

In buildings, there is likely to be an increase in the provision of building products manufactured and marketed relating to the provision of sound insulation both internally and for services. This has been somewhat pre-empted by the introduction of internal insulation in England and Wales. It is not anticipated that there will be any significant effect arising from the additional provision of such features prompted by introduction of the proposed guidance.

### **8.3 Implementation**

The proposed changes will affect any party carrying out work to create a new building or alter an existing building. Changes required to building practice will apply equally to all forms of development. Based on the recommended option, no disadvantages to any party, existing or emergent, have been identified.

### **8.4 Alternatives**

As stated in 8.1 above, Section 5 guidance consists largely of performance measures which allow different ways of meeting the standards.

## **9.0 ENFORCEMENT, SANCTIONS AND MONITORING**

### **9.1 Background**

The proposed changes will amend an existing standard and introduce a new standard and guidance within the Building Standards Technical Handbooks, which provide guidance on compliance with the Building (Scotland) Regulations 2004, as amended.

All matters relating to enforcement, sanctions and monitoring will be carried out under the existing processes, which form the building standards system in Scotland, as set out under the Building (Scotland) Act 2003. Parties responsible for operation of this system are the 32 Scottish local authorities, appointed as verifiers under the Act, and the BSD.

### **9.2 Enforcement and sanctions.**

Generally, work subject to the Building (Scotland) Regulations 2004 as amended requires a building warrant to be obtained from the verifier prior to work commencing and, a Completion Certificate accepted by the verifier once works are finished. Any works that do not require a building warrant are also set out in the regulations.

Where a building warrant is required, proposals are subject to the scrutiny of verifiers who have enforcement powers under the Act to ensure compliance with the regulations. Where cases of non-compliance are referred to the Procurator Fiscal, persons found guilty of offences in terms of the Act are liable on summary conviction to a fine not exceeding level 5 on the standard scale (currently £5000).

### **9.3 Monitoring**

Continuous monitoring of the implementation of proposals is available through feedback from verifiers, designers, manufacturers, developers and property owners. These parties are in regular contact with the technical officers within the BSD and the queries they raise offer a broad view of how proposals are being implemented and if intent is being achieved. They also identify areas where objectives may be unclear and allow clarification of these objectives as part of the ongoing review process. Issues raised in this manner become a



matter of record and are used to inform in the continued development of building standards and guidance.

The BSD will review the implementation of any changes made to building standards legislation and guidance. The Division will monitor the effectiveness of any changes and ensure that subsequent reviews are made on an informed basis.

In line with Scottish Government policy, any implemented changes will be subject to a revised RIA within a 10-year period.

**10.0 IMPLEMENTATION & DELIVERY PLAN**

10.1 Details of implementation and delivery are given within Annex C.

**11.0 POST-IMPLEMENTATION REVIEW**

11.1 Continuous monitoring of the implementation of proposals is available through feedback from verifiers, designers, developers and property owners. These parties are in regular contact with the technical authors within BSD and the queries they raise offer a broad view of how proposals are being implemented and if intent is being achieved. They also identify areas where objectives may be unclear and allow clarification of these objectives as part of the ongoing review process. Issues raised in this manner become a matter of record and are used to inform in the continued development of building standards and guidance. The intention is to review the regulations within ten years of implementation.

**12.0 SUMMARY AND RECOMMENDATIONS**

**12.1 Summary**

The summary of benefits and costs remains unchanged from the Partial RIA, some minor alterations have been made to the proposals following consideration of the responses to the consultation and within the agreement of the BSAC working party.

**12.2 Summary costs and benefits table**

The summary of benefits and costs are noted on the following page.

Option	Total benefit per annum	Total cost per annum
<p><b>Option 1</b> - Do nothing.</p>	<p>Economic, environmental and social - Little or no benefits</p>	<p>Economic - Around £100m.</p> <p>Environmental - no change.</p> <p>Social - Continued cost to NHS, police, local authority etc. of noise related problems.</p> <p>Policy and administrative - no effect.</p>

<p><b>Option 2</b> - Increase awareness of sound insulation in buildings and introduce best practice guidance documents for adoption and application on a voluntary basis.</p>	<p>Economic – may deliver buildings that are better insulated against sound. Costs are unquantifiable but anticipated to be fairly negligible say (20% of £100,000) £20,000.</p> <p>Environmental – where applied, may contribute to a sustainable built environment.</p> <p>Social – where applied should result in few noise complaints between neighbours.</p> <p>All benefits dependant on voluntary subscription to proposed guidance.</p>	<p>Economic - £100,000.</p> <p>Environmental – no change.</p> <p>Social – Continued complaints. Continued cost to NHS, police, local authority etc. of noise related problems.</p> <p>Policy and administration – no effect.</p>
<p><b>Option 3</b> - Introduce revised and updated building standards recognising current good practice where such is appropriate for implementation within the building standards system in Scotland.</p>	<p>Considerable reduction to NHS, police, and local authorities estimated to be around £100 million.</p> <p>Economic – will deliver buildings that are better insulated against noise.</p> <p>Environmental – will contribute to the sustainable built environment.</p> <p>Social – will reduce the number of noise complaints and reduce the number of physiological affects.</p>	<p>Economic- Implementation costs assessed at £51.2m based upon present levels of construction.</p> <p>Environmental – improved living environment for occupants with improved sound insulation.</p> <p>Social - reduction in complaints and cost to NHS, police, local authority etc. dealing with less noise related problems.</p> <p>Policy and administration – no effect</p>

### 12.3 Recommendation.

From the information provided in the preparation of this RIA it is proposed to adopt option 3 which will expand the scope of the standards to include non-domestic buildings and strengthen existing standards to a level that is likely to reduce noise complaints.

**13.0 DECLARATION AND PUBLICATION**

**DECLARATION**

**I have read the Regulatory Impact Assessment and I am satisfied that the benefits justify the costs.**

**Signed by the accountable Minister . . . . .**

**Stewart Stevenson, Minister for Transport, Infrastructure and Climate Change**

**Date . . . . .**

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## **ANNEX A**

### **RESEARCH**

#### **Noise: Performance testing regimes in Scottish Local Authorities: October 2006**

It was considered that it may be possible to improve the quality of sound insulation of dwellings in Scotland by raising awareness through measures such as increasing the rate of performance testing. The survey found that there are variations in the level of testing required by Scottish local authorities.

#### **Noise: Constructions used in separating walls and separating floors: New dwellings: May 2007**

A survey of local authorities in October 2006 had found that there are variations in the level of testing required by Scottish local authorities. It highlighted two main issues, the assessment procedure of whether testing is required to specified and non-specified constructions, and the use of pre-emptive approval and/or post construction testing.

The evidence gathered from this research shows wide variations in specified constructions currently being accepted. The results indicate that there are limited variations in those specified constructions which are being submitted and subsequently approved. This points to a lack of consistency in how performance testing is carried out as well as the lack of reference to the current guidance within the technical handbooks in respect of the number of tests carried out per project – usually a minimum of 4 locations per assessment per project. In many of the reported cases, despite the fact that these criteria could have been met this has not always been carried out.

#### **Service noise affecting dwellings: Dec 2007**

Services noise nuisance commonly occurs because the relevant expertise has not been commissioned to predict and mitigate this noise at the design phase. Even if the sound insulation of the separating wall and floor constructions are in line with section 5 of the Technical Handbooks for the Building (Scotland) Regulations 2004, this is not necessarily sufficient to attenuate services noise to an acceptable level inside neighbouring dwellings. One reason for this is that there is a wide range of services noise emission levels, i.e. quieter services may be attenuated sufficiently by section 5 constructions but noisier services would not be. Another reason is that services noise is often manifested as a result of vibrational energy input to the building structure which has been transmitted as structure-borne noise.

#### **To design separating constructions that are resistant to the transmission of noise: Jan 2008**

Design details for separating wall and floor constructions (termed Example Constructions) and the background to their selection. The Example Constructions are designed to achieve the recommended performance levels, a minimum airborne sound insulation performance for walls and floors is 56 dB  $D_{nT,w}$ , and a maximum 56 dB  $L'_{nT,w}$  impact for floors.

Current performance levels are based around a 'mean' approach whereas the proposed performance levels are intended to be a minimum (airborne) and maximum (impact) criteria. This has a significant influence on the designers approach. The designers will require to adopt separating walls and floors which are at least typically 4 dB better than the minimum or maximum guidance performance levels. This will help to ensure that they can meet the performance levels and will pass a sound test when it is carried out. This will provide some tolerance for design, workmanship and build influences.

## **OTHER RESEARCH AND SOURCE OF REFERENCE**

Times Online

East Lothian Council – Antisocial Behaviour etc. (Scotland) Act 2004 – Part 5 Noise Nuisance

Parliament News – issue 44 / March 2005

The Scottish Government Publications – An Evaluation of Local Authority Antisocial Neighbour Noise Nuisance

ODPM – Regulatory Impact Assessment: Signed 16, November 2002

The Building Performance Centre, Napier University – Housing and Sound Insulation: Improving existing attached dwellings and designing for conversions

## ANNEX B

### ESTIMATE OF FUTURE COSTS

#### Non-domestic buildings

Proposals within Option 3 of this document relate very closely to changes made to building standards for noise within Part E of the Building Regulations 2003, introduced in England & Wales in May 2003. As part of this process, the Office of the Deputy Prime Minister (ODPM) currently Communities and Local Government (CLG) produced a detailed cost assessment of proposals within a Regulatory Impact Assessment<sup>11</sup> prior to consultation in 2002.

Detailed breakdowns of output against specific building types are not available for Scotland. Whilst there are small but significant variations between both detail of proposals and the building standards systems in Scotland and England & Wales there is considered to be sufficient similarity in scope and intent of proposals to permit use of this same percentage figure against works in Scotland. This would permit the following assessment of implementation costs.

#### Estimate of future costs

Cost in non-domestic buildings to introduce internal wall insulation, based on a typical three storey care home. The number of buildings with sleeping accommodation was gleaned from figures supplied by a selection of verifiers on the number of building warrant applications. The figures are based on a three storey care home, assuming 40 rooms per building.

#### Doors

This is assumed that the draught proofing strips to the doors cost £20 per door, and that 20% of the buildings already have draught proofing fitted

	Description	Number altered	Cost in 2007 £000	Cost in 2010 £000	Difference £m
Residential building	Walls	76	38.5	40.4	1.9
	Doors	76	0.012	0.06	0.048

#### Domestic buildings

The estimated figures for 2005 have been taken from the NHBC 'New House-Build Statistics 2006' and the Scottish Executive 'Statistical Bulletin: Housing Series: Nov 2006'.

The proposed cost is based on approximately 30,000 new homes built in 2010 taken from the Scottish Government 'Firm Foundations: The Future of Housing in Scotland' 2007. The aim is to build 35,000 new homes by the middle of the next decade. As proposals in this RIA will not come in to force until 2010, for costing purposes the average increase in the number of homes presently built would be 5,000.

Year	Total dwellings erected	Detached	Attached	Flats/maisonettes
2005	25,000	47% (11750)	26% (6500)	33% (8250)
2010	30,000	44% (13200)	24% (7200)	38% (11400)

<sup>11</sup> [Final RIA, AD M](#), ODPM, 2002

## Summary of costs

The proposed cost is based on an average of increasing the number of new homes built per 5,000, therefore 30,000 new homes built in 2010 taken from the Scottish Government 'Firm Foundations: The Future of Housing in Scotland' 2007.

In Scotland 80% of separating floors and walls constructions are timber based with the remaining 20% made up of other construction types such as concrete or blockwork.

### Separating floors

The current cost to build timber frame construction is based on a £187 m<sup>2</sup> in 2007 and the projected cost is £229 m<sup>2</sup> in 2010 for the proposals. The other construction types such a concrete floors has a current cost average of £153 m<sup>2</sup> in 2007 and an average proposed cost of £238 m<sup>2</sup> in 2010.

### Separating walls

The cost is based on 80% timber frame wall constructions of £120/m<sup>2</sup> in 2007 and a proposed cost of £123/m<sup>2</sup> in 2010, with other constructions 115/m<sup>2</sup> in 2007 and proposed cost of 125/m<sup>2</sup> in 2010

### Internal floors

Based on 100% of timber frame construction, currently £63 m<sup>2</sup> in 2007, and proposed cost of £80/m<sup>2</sup>. It is assumed that the largest proportion of housing is built by larger scale developers who would receive a bulk buy discount of a minimum of £1/m<sup>2</sup> in 2007 and possibly up to £2/m<sup>2</sup> for bulk buy £78/m<sup>2</sup> in 2010.

### Internal walls

Based on 100% timber frame walls the cost is currently £62/m<sup>2</sup> in 2007 and proposed cost of £65/m<sup>2</sup> assuming a discount of £1/m<sup>2</sup> is £64/m<sup>2</sup> for bulk buy, based in using insulation quilt within the frame in 2010.

### Current costs

The current costs assume than 10% of dwellings have adopted better practices in terms of sound simulation levels such as housing associations. The exception to this is separating walls where the current practices are already achieving raised performance levels and have not been adjusted.

The cost of adopting these for adopting these practices for each dwelling types is shown in the table below.

Dwelling type	Cost for all proposals £
2 bed flat	1055
2 bed terrace	114
3 bed townhouse	296
3 bed detached	71
5 bed detached	124

The cost of adopting all the practices is given in the table below.

Proposal	Current annual cost 2005 (£m)	Proposed annual cost 2010 (£m)	Difference (£m)
Separating walls	113.9	115.5	1.6
Separating floors	111.6	128.8	17.2
Internal walls/with insulation	64.8	77.6	12.8
Internal floors/with insulation	142.6	154.4	11.8
Performance testing	5.6	13.6	7.6
Door insulation	0.02	0.23	0.2
<b>Total cost</b>	<b>428.5</b>	<b>490.1</b>	<b>51.2</b>

## **ANNEX C**

### **IMPLEMENTATION & DELIVERY PLAN**

#### **DELIVERY AND COMMUNICATION**

The proposed changes will be taken forward in the form of guidance within the Technical Handbooks which support compliance with the Building (Scotland) Regulations 2004. This guidance will be introduced as part of the Building (Scotland) (Amendment) Regulations 2010 and implementation will be carried out under existing processes, which form the building standards system in Scotland, as set out by the Building (Scotland) Act 2003.

The BSD Technical Handbooks are the primary reference source for compliance with building standards and, as such, are used by designers and others involved in the building process to ensure compliance with the Scottish Building Regulations. Inclusion of sound insulation within these documents will ensure that buildings are better insulated against sound.

The guidance to the standard will illustrate the most common way of meeting the requirements of the functional standard and, thus, complying with the Building (Scotland) Regulations 2004, as amended. When carrying out work that is subject to the building standards, it is the duty of the relevant person (normally the owner of the building) to comply with the requirements of the Regulations.

Publication in this form is the established method of introducing changes to the building standards system and ensures that information on changes reaches those involved in works that are subject to building standards. This information is made available in paper form, as a priced publication, or free of charge, as an electronic download from the BSD website, [www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards](http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards).

#### **IMPLEMENTATION**

The proposed changes will form part of the building standards system in Scotland, produced and maintained, on behalf of Ministers, by the Scottish Building Standards Division and operated and enforced by the 32 Scottish local authorities.

Building work subject to the Building (Scotland) Regulations 2004, as amended, requires a building warrant to be obtained prior to commencing building work and to have a Completion Certificate accepted by the Verifier on completion of the work. Such works are subject to the scrutiny of local authorities as Verifiers of the system, who also have enforcement powers under the Act to ensure compliance with the Regulations.

#### **IMPLEMENTATION PERIOD**

The proposed changes to the guidance within the Technical Handbooks are relevant to any party responsible for a building who intends to carry out building work that is subject to building regulations.

Proposed changes will be published online by April 2010 with hard copy documents following on. Guidance will come into effect on the 1<sup>st</sup> of October 2010 and be applicable to all building warrant applications made on or after that date. This will provide the minimum 12 week implementation period required for any such change.

#### **PROMOTION**

Any changes to the building standards system are publicised by the BSD through the website, seminars and articles in relevant publications. In addition, the BSD would seek to promote changes to the standards and guidance in association with organisations who have an expressed interest in



building design and accessibility issues, together with other key stakeholders who have been involved in development of guidance and in the consultation process.

## **ANNEX D**

### **SUMMARY OF PROPOSED CHANGES**

#### **CHANGES GENERALLY**

1. The existing standard has been reworded and now covers residential buildings separating walls and separating floors.
2. A new standard to reduce noise to rooms used for sleeping in buildings has been introduced.
3. A significant increase in the sound insulation performance of separating walls and separating floors.
4. The introduction of a robust post-completion testing regime.
5. The introduction of new guidance on the affect workmanship and on site supervision has on the performance of separating floors or separating walls.
6. Improved guidance on carrying out work to existing buildings.

#### **SPECIFIC CHANGES**

Changes are in both domestic and non-domestic sections unless otherwise indicated

##### **Introduction 5.0**

The problems of noise nuisance and the affect that this can have on the health occupants are explained. An explanation of the principles of noise transmission and flanking transmission are given.

##### **Standard 5.1**

Standard 5.1 has been rewritten and now covers separating walls and separating floors in residential buildings.

- 5.1 Reworded standard to expand scope to non-domestic buildings and more accurately describe the extent of coverage.
  - 5.1.0 Reworded to suit the changes to standard 5.1, to explain the reasoning and intent for the changes made.
    - 5.1.1 The scope of the standard has been rewritten to cover the changes in the standard.
    - 5.1.2 The design performance levels have been increased and a separate performance level is now given for conversions.
    - 5.1.3 With the increase in the performance levels new constructions have been developed called Example Constructions, which will meet the performance levels and replace the previous construction details.
    - 5.1.4 If Example Constructions are not used, the designer may wish to use other constructions.
    - 5.1.5 Other constructions have been included to allow innovative or new designs, which have not previously been tested.
    - 5.1.6 Conversions are sub-divided into buildings constructed pre 1919 now defined as a 'traditional building' and post 1919. This reflects the difficulties in converting older buildings where it is not always possible to upgrade to meet the standard in full. The conversion of a 'traditional building' should meet a lower sound insulation standard, whereas post 1919 conversions should meet the standard in full.

- 5.1.7 Domestic  
Guidance provided on how to reduce noise transference from communal areas.
- 5.1.8 Domestic and 5.1.8 Non-domestic  
The design of services within a building that have the potential to generate noise must be considered at an early stage in the design. The guidance explains a number of measures that can be used to limit the effects of service noise.
- 5.1.9 Domestic and 5.1.9 Non-domestic  
The post-completion test levels and the testing criteria used is dependant upon the design method used and whether it is new build or a conversion.
- 5.1.10 Domestic and 5.1.10 Non-domestic  
Post-completion testing introduced in phases for separating floors and separating walls.
- 5.1.11 Domestic and 5.1.11 Non-domestic  
Guidance is given on remedial action following a test failure.

## **Standard 5.2**

This is a new standard to reduce noise to rooms used for sleeping in buildings.

- 5.2 Standard covers walls and floors surrounding rooms intended for sleeping.
- 5.2.0 The introduction explains why the standard has been introduced.
- 5.2.1 Design performance levels are given for walls and intermediate floors to rooms used for sleeping in buildings.
- 5.2.2 Relates to insulation to internal walls.
- 5.2.3 Relates to insulation to intermediate floors.
- 5.2.4 Non-domestic  
Doors in internal walls will have a minimum door density is given.

## ANNEX E

### CONSULTATION RESPONSES SUMMARY

#### Acknowledgements

We are grateful to all of the respondents who contributed their views on these building standards review proposals.

#### Executive Summary

1. This review considers building standards and guidance that will improve sound insulation to attached new or converted homes, and introduces requirements for attached residential buildings, for example semi-detached houses or flats. Comments were sought from stakeholders and users of the building standards system in Scotland. The consultation exercise commenced on the 6th May 2008 and all stakeholders were invited to submit comments on the consultation paper by 29 July 2008. The consultation proposals were issued directly to over 500 identified consultees, made up of public, private sector and third party organisations, Non-Departmental Public Bodies (NDPB's), individuals and interested parties. The consultation documents were published on the Building Standards Division (BSD) website as an electronic download, found at <http://www.sbsa.gov.uk/latestupdates/consul.htm>, with paper copies posted to all individuals or organisations requesting a hard copy. This allowed a wider invite of responses to be made. Consultees were encouraged to respond on any aspect of the proposals but were specifically invited to comment on the targeted issues.

2. The main proposals targeted by the consultation questionnaire focussed on a diverse range of noise related subjects contained within Sections 5 of the Technical Handbooks, which are:

- Improving the sound insulation to attached new or converted homes;
- Introducing requirements for attached residential buildings;
- Introduce a new standard to provide sound insulation within homes; and residential buildings with sleeping accommodation.

3. There were 32 responses to the specific consultation questions received and a number of respondees 15 (48%) submitted additional comments on the content of the proposed revisions to standards or guidance text within the Domestic and Non-Domestic Technical Handbooks. The majority of respondents who expressed a view were in favour of the proposals, and several commended what had been produced.

4. A detailed analysis of the content of all the consultation responses was carried out by the noise working party of the Building Standards Advisory Committee (BSAC). The working party took on board the extremely helpful comments and suggestions from respondees.

5. The working party analysis of respondees comments did not identify any major objections to the proposed building standards noise measures to be introduced to the technical Handbooks. This has allowed the technical detail and guidance direction to be finalised by the Building Standards Division ready for ministerial consideration with a view to the introduction of the improvement measures, as intended, in 2010.

## **INTRODUCTION**

### **1. Background**

1.1 The purpose of this building standards review is to consider the introduction of changes to mandatory standards and associated technical guidance for a diverse range of noise issues within the Building (Scotland) Regulations 2004 and section 5 of the Scottish Building Standards Technical Handbooks. This review considers standards and guidance that will improve sound insulation to attached new or converted homes, and introduces requirements for attached residential buildings.

### **2. The Consultation Process**

2.1 The consultation exercise was issued to over 500 public, private sector and third sector organisations, NDPB's and individuals and interested parties identified and listed on the Building Standards Division (BSD) consultation inventory. The consultation documents were published on the BSD website as an electronic download, with paper copies issued to all individuals or organisations requesting a hard copy. An additional 250 organisations and individuals who have registered with the BSD eNewsletter were advised of the consultation by email. All were invited to submit comments on the proposals made in the consultation paper by 29 July 2008.

The proposals issued for public consultation between 6 May and 29 July 2008 received 32 responses. Only 3 of the respondents requested that their comments should remain confidential.

Given the wide range of stakeholders affected by the proposals, it was anticipated that a greater number of responses would be made to the consultation proposals. However, most key stakeholders, or representatives of their areas of interest, have offered response. This is sufficient to allow assessment on a comprehensive range of topics.

Generally respondents were in favour of the proposals and several commended what had been produced. Most of the comments were in favour of the proposals providing there was some fine tuning of the wording to give more clarity. From the responses, it is apparent that there is support for improvements to the noise standards. The main purpose of this report is to highlight the principal areas of contention; the 1919 cut-off date for conversions, the three methods of compliance, and the design and testing criteria in domestic buildings. In total there were 32 notified individuals/parties (approx 5%) of responses.

Respondents are summarised by group and listed below.

Local authority building standards	9
Individuals	1
Professional organisations	8
Manufacturers	2
House builders	2
Acoustic consultants/organisations	3
Independent	4
Other Statutory Bodies	3

### 3. Consultation Responses

3.1 A list of 10 specific questions BSD considered suitable for further consideration was put to consultees. A summary of responses to these questions is set out in 4. Analysis. The responses were fully considered as part of the review process, as outlined on the BSD website, which includes a brief summary of the main concerns raised and the outcomes reached from the analysis detailed in 5. Findings.

Summary of responses to questionnaire	Yes	No	Both	No response
<b>General issues</b>				
1	28	1		3
2a	21	2		9
2b	8	3	14	7
3a	23	1		8
3b	16	11		5
<b>Standard 5.1</b>				
4	26	2		4
5a	22	7		3
5b	19	10		3
6a	23	6		3
6b	19	8		5
7	17	9		6
8	18	10		4
9a	20	7		5
9b	21	7		4
<b>Standard 5.2</b>				
10	20	4		8

### 4. ANALYSIS

4.1 The total of 32 responses is considered disappointing particularly when this is the first major review in over twenty years. However, BSD held a workshop attended by several stakeholders to gather evidence and identify areas of concern, such as sound insulation levels. This gave stakeholders the opportunity to inform BSD and contribute to the review, and may explain why there was a lower response rate than anticipated.

There was generally positive response to most issues raised by the questionnaire. The 1919 cut-off date for conversions, the three methods of compliance, design and testing criteria in domestic buildings raised the most comments. Most respondents commented on the set questions while a few provided comments only on specific issues that were of particular interest to them. However the comments that were received have proved to be very helpful.

## 5. FINDINGS

5.1 Supported by the Building Standards Division, all responses received will be considered by the BSAC noise working party.

**Q1. Noise is a complex subject but it is important that the requirements and the guidance are readily understood. Although the detailed compliance procedures are more relevant to professionals, the various processes needed to be carried out to show compliance should be understood by everyone carrying out work. Are consultees content with the presentational style and clarity of the guidance given in section 5?**

The majority of respondees, 31 out of 32, supported the proposals in principle and commented that the guidance was well laid out, clear and understandable. One respondee who did not give support commented that with minor changes they would support the proposals.

### Consideration

Consideration is needed to minor changes.

### Decision

A number of textural changes will be made to the wording of the standard and the guidance to improve clarity for the user.

**Q2. Floor finishes do not form part of the building standards system and it is not intended that this should change. However a large percentage of complaints emanate from flats where carpets have been lifted and replaced with a hard floor finish such as exposed, sanded floor boards, laminate solid timber or tiled flooring. Numerous guidance leaflets have been published by different organisations but they appear to have little effect. a. Do consultees consider that the guidance in annex C of the consultation is helpful? b. Should it be issued as a separate leaflet or would it be more advantageous to include it as an annex to section 5?**

The proposals were supported by 21 (91%) of respondees. Some respondees thought it would be useful to have guidance in both the technical handbooks and a leaflet, which would be more useful for achieving wider distribution.

### Consideration

Based on the responses, consideration is needed on whether to:

- include this information in an annex to guidance in the domestic handbook; and
- develop a user-friendly leaflet in conjunction with other parts of Scottish Government.

### Decision

The guidance on home improvements will be contained in:

- an annexe to the guidance in the domestic handbook; and
- a leaflet 'Noise: Guidance on home improvements' has been developed in conjunction with other parts of Scottish Government, and will be available on our website [www.sbsa.gov.uk](http://www.sbsa.gov.uk).

**Q3. Conversion of old buildings, (from an office to flats, for example), and carrying out alterations to old and/or listed buildings can be very challenging. Achieving the standards required today can present numerous problems. Throughout the guidance to standard 5.1 the Historic Scotland guidance document Conversions of Traditional Buildings – Guide for Practitioners is referenced several times as providing guidance on compliance. This document proposes that 1919 is a specific date, although a little arbitrary, can be used to define a distinct change in building style. It is proposed that the guidance on ways to comply with standard 5.1 also use this date to provide a clear split on buildings that must comply with the standards and those that must comply as far as is reasonably practicable. a. Are consultees content with the design performance levels recommended? b. Are consultees content with the 1919 cut-off date?**

a. The proposals for design performance levels for conversions were supported by 23 (96%) of respondents. Several respondents were concerned that the standards should apply equally to new build and conversions. However this suggestion was made by respondents working in a non-acoustic related field who may not have appreciated the difficulties that achieving such a high level would create.

b. Opinion was divided with 16 (59%) of respondents supporting the 1919 cut off date and 11 (41%) of others concerned that the year is too specific. Respondees were of the opinion that it was a good idea in principle to specify a year, as this gives more clarity on dealing with conversions of traditional buildings, but were concerned that a cut off date would be problematic for buildings of a mixed age, where an existing building had been extended creating a difference in age between the building and the extension. However, Historic Scotland are concerned that this date is too specific for 'traditional buildings with load bearing mass walls which are moisture permeable' i.e. the materials used and the way the buildings are constructed, such as stone construction built after 1919.

### **Consideration**

There are several concerns raised in the consultation responses regarding conversions, requiring further consideration:

- whether to have the same design levels for new build and conversions;
- how to deal with a building of mixed age; and
- discuss with Historic Scotland the implications for 'traditional buildings'.

### **Decision**

As it would be difficult for an existing building to achieve the sound performance level for new build. The sound performance level for conversions will not be increased from the current requirements in section 5. A new defined term 'traditional building' will be introduced and used to distinguish a building by age, construction and components used. Conversions may have parts of the building of a mixed age, in this situation, the treatment of the building will be determined by whether it is a 'traditional building'.



**Q4. Much of the research underpinning these proposals is anecdotal and subjective as it is based on people's perception of noise and how it affects them personally. However research advises that few complaints are made where constructions are designed to the performance criteria proposed. Are consultees content with the design performance levels recommended?**

The proposals for the design performance levels were supported by 26 (93%) of respondents. However, a few respondents, who work in the acoustic field, were of the opinion that Ctr (criteria used for measuring low frequency noise levels) should be dropped. In their opinion there was a lack of evidence to suggest that Ctr worked well and that by raising the DnT,w (a criteria for measuring low, mid to high frequency noise levels) to the level proposed would automatically raise the low frequency levels. One respondent questioned why the impact level is higher for new build than in England in Wales

#### **Consideration**

Based on the responses, further consideration is needed on what is felt to be an inconsistent approach between:

- the design performance levels and the post-completion testing levels;
- stipulating different performance levels for the three methods of compliance and asking for different numbers of tests.

#### **Decision**

The design performance levels and the post-completion testing levels have been made consistent by the removal of Ctr. The three methods of compliance have been reduced to two by the removal of 'pre-tested constructions'. The 'post-construction test levels' for the remaining two methods of compliance will continue to differ as the Example Constructions have been extensively tested, whereas the 'alternative constructions' now named 'other constructions' allows innovative or 'other' constructions to be used. Therefore, the level of testing reflects the associated level of risk.

**Q5. Three options on ways to comply have been provided. They are:**

- a. use Example Constructions;**
- b. use 'pre-tested constructions';**
- c. use 'alternative constructions'.**

**The meaning of 'pre-tested constructions', in the context of section 5, is explained in the guidance. a. Is difference between the three options explained sufficiently clearly in the guidance? b. Are consultees content with the descriptor given to 'pre-tested constructions'?**

a. The proposals for the three options were supported by 22 (76%) of respondents. Opinion, whilst generally in favour, has identified a concern that the three options were overly complex and that the preference is for the three options be changed to two, by dropping 'pre-tested constructions'.

b. Opinion was generally in favour with 19 (66%) of respondents giving support. Whilst in favour of the descriptor, there were a number of concerns raised. General feeling was that there is insufficient information on 'pre-tested constructions', and on protocols for the management and monitoring, and that carrying out 20 tests over 4 sites was an unnecessary burden.

Several respondents questioned if Robust Details Ltd (RDL) would be an option and said it would be their preferred option if available.

### **Consideration**

Giving three options of Example Constructions, 'pre-tested constructions' and 'alternative constructions' is considered overly complex. Therefore, consideration is needed on whether to change the three options to two.

### **Decision**

The three options will be reduced to two and simplified by removing 'pre-tested constructions'.

**Q6. Three levels of post-completion tests are proposed once building work is completed to reflect the 3 levels of risk that is believed to exist. The 3 levels are;**

**a. Use of Example Constructions, which provide designs for separating walls and separating floors, and 'pre-tested constructions' that have already been tested and shown to achieve the recommended levels. By following the construction details, workmanship will be the sole cause of failure of compliance;**

**b. Use of 'alternative constructions' that have not been previously tested. Design and workmanship need to be considered for compliance;**

**c. Conversions. Complex old buildings, design and workmanship need to be considered for compliance.**

**a. Are consultees content with this principle for deciding on number of post-completion tests? b. Do consultees consider 20 tests over four sites to be a reasonable number of tests to ensure that 'other constructions' have a similar degree of robustness of compliance as the other two options?**

a. The proposals were supported by 23 (79%) of respondents. One respondent did not understand the rationale behind the number of tests. Another asked why we did not use the same ratio of 1 in 10 as RDL and if this would be adopted in Scotland. It was questioned why there was a need for two tests to be carried out on a semi-detached dwelling, as this was felt to be excessive. Several questioned whether the sound testing profession could meet the increased demand. One comment questioned when pre-tested became an 'other construction'.

b. The proposals were supported by 19 (70%) of respondents. One respondent asked if there would be testers to carry out a sound test in rural areas. A few respondents were of the opinion the descriptor needed further clarification and questioned whether the sound testing profession could meet the increased demand.

### **Consideration**

There are several concerns raised in the consultation responses regarding testing, requiring further consideration:

- is there is a need for two tests to be carried out on a semi-detached dwelling;
- could the sound testing profession meet the increased demand;
- should the 'pre-tested construction' option be dropped;
- should 'pre-tested construction' option should be explained further.

## Decision

Two tests will be maintained for a semi-detached dwelling as the test results can differ between the ground and first floor. The difference occurs at the junctions between the separating walls; at ground floor level with the floor and external wall junction; and at first floor with the roof and external wall junction. BSD have consulted with the sound testing profession and they have confirmed it is possible to meet the increase in sound testing levels. The 'pre-tested construction' option will be removed.

**Q7. Because Example Constructions and 'pre-tested constructions' have been designed and tested to cover low, medium and high frequencies ( $D_{nT,w}$ ) with an emphasis on low ( $C_{tr}$ ) frequencies, it is not considered necessary to recommend specific low frequency sound criteria to be carried out on site. However 'alternative constructions' will not have undergone the extensive testing of the other constructions and it is considered sensible to require the full range of test criteria to be taken into account at the post-completion stage. This will require testing for  $D_{nT,w}$  and  $C_{tr}$ . Are consultees content with this principle for post-completion testing?**

Opinion was generally in favour of the proposals with 17 (65%) of respondees giving support. There were a number of specific concerns with the testing criteria, with many of the opinion that  $D_{nT,w}$  was adequate on its own without the need for  $C_{tr}$ . A number of respondees were of the opinion that the introduction of dual criteria was overly complex and unnecessary as there is a lack of evidence to suggest that  $C_{tr}$  works well, and that by raising the  $D_{nT,w}$  criteria to the level proposed would automatically raise the low frequency levels. Others thought that if  $C_{tr}$  were to be adopted then it should be used consistently throughout all of the design and testing options. Concern was expressed from those working in the acoustics field over repeatability with site testing in the field, as had been demonstrated in England & Wales. One Institution in the field of acoustics expressed concern that they had not been accepted as a suitable test organisation.

## Consideration

There are several concerns raised in the consultation responses regarding qualifications of testers, requiring further consideration. Whether to:

- maintain the names of organisations and others; or
- amend this to protocols for carrying out sound testing.

## Decision

The qualifications of testers will now be stipulated by a combination of relevant qualifications, expertise and a membership of a professional organisation.

**Q8. It is proposed that present performance levels for airborne sound insulation of separating walls are substantially improved. However noise will pass through gaps and joints and negate much of the benefit of the improved wall performance. Since section 2 recommends solid core doors for fire protection and section 4 will recommend solid doors for security, the door leaf itself will provide some resistance to noise. Recommending full acoustic doors is not a realistic option because of cost but provision of a compressible seal round the 4 sides of the door should achieve an improvement of about 4 – 5 dB sound insulation. Are consultees content with these proposals?**

Opinion was generally in favour of the proposals with 18 (64%) of respondents giving support. Recognition was given that providing a seal around a door is the most practical solution for the sound proofing of doors. One respondent thought it was not practical to have seals around four sides of a door. Other respondents expressed concern that there was little benefit to occupants by introducing this and would be problematic by adversely affecting any self closing mechanism on fire doors. One respondent questioned whether such a seal 'existed on the market'. Several felt internal doors should have been included in dwellings.

### **Consideration**

Based on the responses, further consideration is needed on the wording and whether to introduce doors seals.

### **Decision**

The wording of the guidance will be amended to give greater clarity. It is considered beneficial to introduce doors seals and for this reason will remain in guidance.

**Q9. Extensive research and testing has led to the publication of Example Constructions that will repeatedly achieve the recommended performance levels. They have been developed from constructions that are in general use in the UK or can be achieved by minor adaptation of existing constructions. The constructions offer several options of different construction techniques but cannot cover all constructions. It will be possible to extend the list of Example Constructions as more become standard building practice. If a construction is not included then it may be acceptable as compliant under pre-tested or alternative constructions. a. Are consultees content with the range of Example Constructions provided? b. Are consultees content that Example Constructions will be accessible only in electronic form on the Scottish Government web site?**

a. The proposals for the Example Constructions were supported by 20 (74%) of respondents. It was recognised that the Example Constructions had used good construction practice in the detailing. A few respondents were of the opinion that a number of widely used constructions were omitted. One respondent did not think the name was appropriate and suggested it be changed.

b. The proposals for an electronic version only were supported by 21 (75%) of respondents. Other respondents disagreed, if this were the only method of access. However, if a version was made available in other formats, such as a paper copy on request, they would support the proposals.

### **Consideration**

This will be considered further.

### **Decision**

The number and type of 'Example Constructions' is considered sufficient, as they are, as the name suggests 'examples' of construction that can meet the standard, and any other forms of compliant construction may be used. The 'Example Constructions' will be accessible on the BSD website, and would be made available in hard copy on request by a member of the public who had no access to the web.

**Q10. The performance levels for internal walls, other than separating walls, is proposed at a relative modest level as most noise generated within a dwelling is more easily controlled than from a neighbouring dwelling. However it is recognised that rooms that were originally perceived to be quiet can often be noisy as they more often act as a retreat for young people. Walls between bedrooms in residential buildings will be influenced by market forces; too low and the public will not use the facility. Are consultees content with the design level recommended for internal walls?**

The proposals for the design level of internal walls were supported by 20 (83%) of respondees. The internal noise levels were welcomed and comment made 'that much of this was in practice already'. House builders questioned the need for the standard as they were of the opinion that there would be no benefit to householders.

<b>Consideration</b>
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Investigate further how much of the guidance given is already standard practice.
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<b>Decision</b>
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The internal sound insulation guidance will be maintained as some of this is already common practice, for example insulating walls round bathrooms.
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## **6. Additional Comments Received**

In addition to the 10 specific questions the BSD posed a further question;

**Q11. Consultees are encouraged to record any issues that they believe may be of significance in the review of section 5. Do consultees have any general comments on section 5?** 15 respondees provided additional comments on section 5, and the main points of contention are identified below.

**6.1 External noise** - A few respondees asked why the building regulations did not cover noise insulation through a building façade.

<b>Response to comment</b>
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Refer to 7.7
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**6.2 Flanking transmission** - Clarification was sought on whether there will always be indirect flanking transmission at wall and floor junctions in a building.

<b>Response to comment</b>
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Refer to 7.8
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**6.3 Noise from services** - It was acknowledged that thought is required at the design stage to minimise the generation of noise from services.

<b>Response to comment</b>
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As the response indicates this is a consideration at the design stage and bringing this to the forefront at the design stage is helpful, the paragraph on service noise will remain in guidance.
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**6.4 Standard 5.1** - 'not in excess of normal domestic activities' is overly prescriptive tolerable allowance should be given.

<b>Response to comment</b>
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This is the wording of the current standard.
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**6.5 Standard 5.1.b** - Comment was made that the wording 'or is for sole use of residents of the building' should be clarified, as the respondee thought this meant 'only the residents of the dwelling directly below the roof, walkway or access deck'.

<b>Response to comment</b>
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The wording will be clarified.
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**6.6 Standard 5.2** - 'where excessive noise is likely to occur' is overly subjective and prescriptive tolerance should be given.

<b>Response to comment</b>
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The wording will be altered.
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**6.7 Domestic buildings: scope of standard** - Comment was made that paragraph (j) and (l) contradict each other.

<b>Response to comment</b>
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The wording will be clarified.
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**6.8 Post-completion testing** - There were a number of concerns raised with the protocols for testing. Three respondees would like to see the protocols for testing written in a detailed manner and 1 questioned whether carpet could be used as a 3 mm resilient layer. One respondee would like third party accreditation for testers, and 1 respondee was dissatisfied that only one organisation and one accredited body were recognised as having suitable qualifications for testers. In their opinion this is too restrictive and should be reworded to include suitably qualified members of another organisation. One respondee requested more information on the qualifications of testers to be added to the guidance. Two respondees suggested that there may be a lack of registered acousticians to carry out the number of tests proposed and this may delay house completions. One respondee expressed concern that creating 'supply and demand' may increase costs of tests. One respondee would like a clause added to allow test failures to be referred to the verifier. One respondee thought that guidance on tolerable allowance should be given, and should state if a lesser test methods is permissible under any circumstances for example testing one pair of rooms as this is common practice at present.

<b>Response to comment</b>
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The wording will be altered to clarify the 'protocols for testing' and for those carrying out sound performance testing.
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**6.9 Example Constructions:** There were a number of comments made and questions raised with the design of the Example Constructions. It was acknowledged that most of the Example Constructions follow the better construction practice currently used with enhancements and improvements in a few areas. A few respondees commented that the

Example Constructions omit a number of widely used construction methods, assemblies and products that have the potential to be used as separating elements. Particularly the FFT's (floating floor treatment's) allowable in floor type 1B and 2B. It was questioned whether these types of floor could include a resilient overlay platform floor as a floating floor treatment as per RDL (Robust Details Ltd). There were 20 questions raised on specific details by manufacturers and designers. Comment was made that BSD should consider compiling details for structural steel buildings as this is a common construction in high rise flats. Comment was made that the internal walls and floors need supporting details, similar to the Example Constructions, and should take into account flanking to a suspended timber ground floor whilst maintaining solum ventilation. Respondee suggested the inclusion of a mechanism to update or add to the range of Example Constructions. It was suggested that the Example Constructions and the 'thermal details' be published together. Another felt the name 'Example Constructions' was not helpful and suggested 'Approved constructions'.

<b>Response to comment</b>
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The name 'Example Constructions' will be retained. Refer to 7.6.
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### **6.10 Non-domestic buildings - Perimeter seals for doors**

It was questioned whether the introduction of a perimeter seal to reduce noise passing through a door would have a detrimental effect on the noise level heard in a room, at a bed head, through the door.

<b>Consideration</b>
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This will be considered further.
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<b>Response to comment</b>
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British Standard BS5839: Part 1: 2002 allows the designer to take a flexible design approach so as to achieve the appropriate sound level.
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## **7. Misconceptions**

In reading the consultation responses, it became evident that some respondents did not appear to fully understand Scottish building legislation and key misconceptions are identified below.

7.1 For clarification, an 'alternative construction' is not lab tested.

7.2 For clarification, current Standard 5.1 does not apply to conservatories.

7.3 The wording of the standard 'or is for sole use of residents of the building' and 'is intended solely the residents of the dwelling directly below the roof, walkway or access deck' is intentional.

7.4 For clarification, Standard 5.2 does not apply to internal doors serving rooms within a dwelling in a domestic building.

7.5 There will be no conflict between the noise level heard in a room, at the bed head, through the door by introducing door seals. As British Standard BS5839: Part 1: 2002 allows a flexible design approach to be made so as to achieve the appropriate sound level.

7.6 The Example Constructions were developed from constructions that were tested on site and are intended to be examples only, in view of this any design may be used within the options for compliance. At the time the details were compiled there was not enough test information to permit the development of steel frame details. Steel frame separating floors and walls are presently being developed by the building industry. A suspended timber ground floor was not included as this is not generally used by most designers.

7.7 External noise has not been covered in building regulations as this is not within the policy area of BSD, this is already controlled by planning legislation.

7.8 For clarification, there is always direct flanking transmission through the junctions of walls and floors.

7.9 One acoustic organisation questioned why they had not been included in the consultee list. The list was checked and they were included amongst the consultees.

## **8. Conclusions**

Generally respondees were in favour of the proposals and several commended what had been produced. Most of the comments were in favour of the proposals providing there was some fine tuning of the wording to give more clarity.

From the responses, it is apparent that there is support for improvements to the noise standards.

Of the issues raised by the questionnaire, there was a generally positive response to most issues. Of all the questions, the 1919 cut-off date for conversions, the three methods of compliance, design and testing criteria in domestic buildings raised the most comments.

## **9. Next steps**

The next step is to introduce the revised section 5: Noise into the Technical Handbooks with the 2010 amendments.



**REGULATORY IMPACT ASSESSMENT (REF: 2009/03)**

**FINAL REGULATORY IMPACT ASSESSMENT**

**REDUCING CARBON DIOXIDE EMISSION AND ENERGY DEMAND –**

**AMENDMENT OF THE BUILDING (SCOTLAND) REGULATIONS 2004**

**AND ACCOMPANYING STANDARDS AND GUIDANCE WITHIN**

**SECTION 6: ENERGY AND SECTION 3: ENVIRONMENT OF THE**

**BUILDING STANDARDS DIVISION TECHNICAL HANDBOOKS.**

**JANUARY 2010**

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Ref: 2009/03.

**Reducing carbon dioxide emission and energy demand in new buildings - proposed amendment of the Building (Scotland) Regulations 2004 and accompanying standards and guidance within Section 6: Energy and Section 3: Environment of the Building Standards Division Technical Handbooks.**

## **1.0 PURPOSE AND INTENDED EFFECT**

### **1.1 Objective**

This Regulatory Impact Assessment (RIA) addresses amendments to the technical guidance on energy within the Building (Scotland) Regulations 2004 and the supporting section 6 and section 3 of the Technical Handbooks. The aim of the amendment is to contribute to the Scottish Government's Climate Change Programme through the introduction of improved standards and guidance to reduce carbon dioxide emissions and improve energy performance of new buildings through building regulations

In achieving the above, the following objectives are identified:

- To deliver new buildings and building work which are more economical to operate due to a reduced energy demand for heating, hot water, lighting, ventilation and other fixed services.
- To encourage the development and uptake of construction solutions, including incorporation of building-integrated low carbon equipment (LCE), which will further the delivery of buildings with lower carbon dioxide emissions and energy demand.

### **1.2 Background**

"The Stern review highlighted that there is now an overwhelming body of scientific evidence showing that climate change is a serious and urgent issue. More than 40% of Scotland's carbon dioxide emissions, a major cause of climate change, come from the energy we use to heat, light and run our buildings. So it is vital to ensure that new buildings are built in a way that minimises these harmful emissions and that existing buildings are improved and refurbished so that their use results in lower carbon emissions" – The Sullivan Report<sup>12</sup>.

Building regulations set minimum energy standards for new buildings and new building work. Challenging new targets for limiting carbon emissions from new buildings were introduced in May 2007 through amendment of the functional standards and technical guidance on energy within the Building (Scotland) Regulations 2004 and Section 6 (energy) of the supporting Technical Handbooks.

Following these changes, Scottish Ministers appointed an expert panel to review the way forward if buildings are to continue to contribute positively to Scottish and UK targets to reduce CO<sub>2</sub> emissions and address the risk posed by Climate Change. The recommendations of this expert panel were published in December 2007 as The Sullivan Report – 'A Low Carbon Building Standards Strategy for Scotland'.

This report makes a range of recommendations to reduce carbon dioxide emissions from new and existing buildings, some of which are still being investigated by Government. A key recommendation is the staged improvement of energy standards for new buildings, where the following proposals are made:

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<sup>12</sup> <http://www.sbsascotland.gov.uk/Topics/Built-Environment/Building/Building-standards/about/sullivanreport>

- for 2010, a reduction in CO<sub>2</sub> emissions, from 2007 levels, of 30% for domestic buildings and 50% for non-domestic buildings;
- for 2013, a reduction in CO<sub>2</sub> emissions, from 2007 levels, of 60% for domestic buildings and 75% for non-domestic buildings;
- delivery, in 2016/17 of net zero carbon buildings (emissions from heating, hot water, lighting and ventilation), if practicable,
- the aspiration of total life zero carbon buildings by 2030.

Additionally, a recommendation was made to reduce energy demand in 2010 by improving backstop levels for U-values and airtightness, reducing heat loss from new building to match levels achieved in Nordic countries.

Following investigation of these recommendations, on 27 February 2009 Stewart Stevenson, Minister for Transport, Infrastructure and Climate Change, announced the Scottish Government's intention to review building regulations to deliver a 30% reduction in CO<sub>2</sub> emissions from all new buildings from 2010.

### **1.3 Rationale for Government Intervention**

The Scottish Government is committed to reducing carbon dioxide (CO<sub>2</sub>) and other greenhouse gas emissions. The Climate Change (Scotland) Act 2009<sup>13</sup> introduced the most ambitious climate change legislation anywhere in the world. The Scottish Government's Climate Change Delivery Plan<sup>14</sup> sets out how the statutory emission targets which lie at the heart of the Act will be achieved. The Act commits Scotland to reduce emissions by at least 80% from 1990 levels by 2050, with an interim emissions reduction target of at least 42% by 2020 (subject to review). If such levels of reduction are to be realised, measures must be taken across all sectors which contribute significantly to national CO<sub>2</sub> emissions.

Scottish building regulations address the health, safety and welfare of persons in and around buildings and further both the conservation of fuel and power and the achievement of sustainable development. Building regulations set minimum standards for new buildings and where existing buildings are altered, extended or converted. Whilst buildings can be designed and built to higher standards, in the majority of cases, mandatory minimum standards set through building regulations are adopted.

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<sup>13</sup> [http://www.opsi.gov.uk/legislation/scotland/acts2009/pdf/asp\\_20090012\\_en.pdf](http://www.opsi.gov.uk/legislation/scotland/acts2009/pdf/asp_20090012_en.pdf)

<sup>14</sup> <http://www.scotland.gov.uk/Resource/Doc/276032/0082887.pdf>

Accordingly, it is important that these minimum standards are robust enough to address both the needs of Scotland's people and support the wider policy objective of addressing Climate Change.

For Government to reduce CO<sub>2</sub> emissions from the use of new buildings and from new building work, national energy standards have to be set at a sufficiently demanding level. Experience has shown that voluntary 'best practice' measures cannot be relied upon to deliver CO<sub>2</sub> reductions in the development of buildings except in situations where market forces either do not apply, or are moderated by additional conditions of development.

#### **1.4 The Risks to be addressed**

The action proposed within this review is the reduction of carbon dioxide emissions from new building and new building work, to assist with the mitigation of Climate Change. Accordingly, Climate Change is the primary risk identified.

The reduction of CO<sub>2</sub> emissions from new development continues to be an essential element in the development of the Scottish and UK Governments' Climate Change Programme. Failure to achieve improvements to energy standards for new buildings will have an adverse affect on these programmes.

In addressing this primary risk, there are subsidiary risks that must also be considered. Minimum energy standards applicable to new buildings and to new building work should still:

- be proposed with an understanding of the potential cost of improvement;
- remain technically feasible; and
- offer flexibility in the ways which mandatory standards can be achieved, to deliver best value.
- Ensure proposals do not conflict with other regulatory requirements.

## **2.0 CONSULTATION**

### **2.1 Development Phase**

Before making or amending the building regulations, Scottish Ministers are required to consult the Building Standards Advisory Committee (BSAC) and such other bodies as are considered necessary to inform on the matters under consideration. This exercise has been carried out through a BSAC Working Party.

### **2.2 Within Government**

The Building Standards Division has a standard distribution list for consultations. Government organisations and departments with a policy interest in proposals are contacted in respect of these proposals and consultation documents made available to these bodies.

This includes direct contact and discussion with the following bodies: SG Enterprise and Industry Division; SG Planning Division; SG Private Sector and Affordable Housing Policy Division; SG Regeneration, Fuel Poverty and Supporting People Division; SG Social Housing Strategy and Finance Division; SG Sustainable Development Strategy Team; Communities Scotland; Historic Scotland; Sustainable Buildings Division – Department for Communities and Local Government; Building Regulations Unit – Department of Finance and Personnel, Northern Ireland.

### 2.3 Public consultation

An Intermediate Impact Assessment formed part of a package issued for public consultation between 30 June and 2 October 2009. This sought general comment on detailed proposals which include, as one option, proposals to amend building standards and guidance.

Views and opinions on the proposals were sought from over 500 key stakeholders and users of the building standards system in Scotland. Public, private and third sector organisations, NDPB's and individuals were advised of the consultation by letter and that the documents were accessible on the BS website. E-mail notification of the consultation was also made to around 1500 organisations and individuals who have registered for the BSD newsletter. In addition, BSD ran 3 Stakeholder Consultation Information events attended by 124 key stakeholders' representatives to provide an overview and explanation of the questions posed in the consultation paper and to encourage written response to it. There were 82 responses from the following consultees:

Stakeholder Group	Responses (%)	
Contractor/Developer	6	7%
Manufacturer	9	11%
Designer/Consultant	7	9%
Interest Group	3	4%
Advisory Body/Committee	1	1%
Local Authority	16	19%
Professional Organisations/ Trade Associations	24	29%
Non-Departmental Public Body or Agency	3	4%
Individual	3	4%
Other	10	12%

Initially, 12 respondents didn't provide permission to publish their responses and were recontacted on this issue. 10 out of 12 gave permission.

- 1 respondent wished their details to remain confidential.
- 6 respondents asked for their responses to remain confidential.

A list of all consultees is appended to the consultation package which remains available on the Building Standards Division section of the Scottish Government Website<sup>15</sup>. The Final Consultation Report is attached as Annex D.

## **2.4 Europe**

Proposals to amend guidance under the Building (Scotland) Regulations 2004 require to be notified to the European Commission under the provisions of Technical Standards & Regulations Directive 98/34/EC<sup>16</sup>. This Directive seeks to prevent the creation of new technical barriers to trade and lays down a procedure for the provision of information in the field of technical standards and regulations. A standstill period on further development is imposed by the Directive until this consultation period is completed.

This period ended on 8 February 2010, with no comment on proposals being received from the European Commission. Accordingly, no modification of proposals will be made under Directive 98/34/EC.

## **3.0 OPTIONS PROPOSED**

### **3.1 Options**

In considering how to address the need to reduce carbon dioxide emissions arising from new buildings or new building work, three options are identified.

**Option 1** – Do nothing.

**Option 2** – Promote energy-saving and carbon dioxide reduction measures in new building work through additional information campaigns.

**Option 3** – Reduce energy demand and carbon dioxide emissions through building regulations, with revised performance measures for new building work and, for existing buildings, as a result of new building work.

## **4.0 COSTS AND BENEFITS**

### **4.1 Sectors and groups affected**

Sectors and groups affected can be categorised as:

- a) Persons procuring or occupying new buildings or building work, who may need to bear any additional costs associated with delivering buildings which have improved energy performance. Whilst this relates to a specific activity, the group who may be affected at one time or another can be considered to be the majority of the population.
- b) Developers who, in addition to (a) above, would have to review existing building specification, construction detailing and, potentially, methods of working. This might include, where relevant, seeking amended Scottish type approvals<sup>17</sup> for standard constructions, possibly sooner than otherwise intended.
- c) Building materials and component manufacturers, who may need to review and introduce changes to products and literature to address revised performance standards.

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<sup>15</sup> <http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/pubconsult>

<sup>16</sup> [http://ec.europa.eu/enterprise/tris/about/index\\_en.htm](http://ec.europa.eu/enterprise/tris/about/index_en.htm)

<sup>17</sup> The Scottish Type Approval System (STAS) operated by the Scottish Association of Building Standards Managers (SABSM, [www.sabsm.co.uk](http://www.sabsm.co.uk)) allows approved building types to be used throughout Scotland.



- d) Those involved with the energy aspects of building design and construction, who would have to familiarise themselves with any revised standards and methodologies.
- e) Building services contractors, who may need to invest to increase the capacity for commissioning and testing of buildings and engineering services.
- f) Local authority verifiers, who may need to arrange training of staff on changes to energy standards and guidance, to ensure these can be verified at design submission and during construction where necessary.

## **4.2 Benefits**

### **4.2.1 Benefits arising from policy objective**

A reduction in carbon dioxide emissions from new buildings and new building work:

- supports the Government's agenda to tackle Climate Change and reduces the adverse effect of greenhouse gas emissions on our environment; and
- as a sector where improvements are relatively simple to implement and measure, provides a significant and positive contribution to Government targets set for the reduction in CO<sub>2</sub> emissions; and
- reduces use of finite natural resources and promotes development and adoption of systems that incorporate renewable energy sources; and
- reduces energy costs arising from the operation of new buildings.

As is the case with current building regulations, improvements will also result in an increased benefit where buildings are altered, extended or converted and also where existing building elements and equipment are replaced, where this must be to current standards. Proposals under option 3 also introduce limited measures which require improvement to the existing building when carrying out other work. It is considered that the costs and benefits arising from such work will be proportionate to those for new buildings.

#### **Reducing Carbon Dioxide Emissions**

Today's new buildings are tomorrow's existing buildings. The number of new buildings per annum may only account for 1% of the entire stock, but by the year 2050, buildings built from this point onwards could account for a substantial percentage of our total building stock. It is therefore vital that new buildings continue to make a contribution to further reductions in CO<sub>2</sub> emissions. Regular review of the energy standards is required by the EU Directive on the energy performance of buildings, at intervals of no more than 5 years. With the Scottish Government's commitment to an overall 80% reduction in CO<sub>2</sub> emissions by the middle of this century, future energy performance improvements to buildings, new and existing, will remain on the agenda.

#### **Reduced use of resources**

Reducing CO<sub>2</sub> emissions and energy demand in buildings are only two measures amongst many that can be considered to contribute to the delivery of more sustainable communities. Where persons elect to carry out new building work, the outcome ought to place reasonable limits on carbon dioxide emissions and energy demand when the building is in use to ensure that resources are used effectively. Adoption of low carbon and zero carbon technologies, including energy generation from renewable sources can further assist in limiting use of resources. As energy standards are improved, the need to consider and implement such solutions is strengthened.

Other than in the case of conversion of buildings (where the use of a building is changed), current standards for construction are applied only to the new work and not to the remainder of a building. Following consultation last year<sup>18</sup>, separate measures to improve the performance of existing buildings, outwith the building standards system, are presently under development in response to sections 63 & 64 of the Climate Change (Scotland) Act 2009.

Proposals under Option 3 do now include provisions to improve the energy performance of existing buildings when extending a dwelling or carrying out work to service installations within a non-domestic building. It is intended that such provisions are compatible with future work carried out under the Climate Change (Scotland) Act 2009.

#### **Reduced fuel bills**

It is recognised that gains from reduced heating costs and attendant potential welfare savings can be relatively small given that current building standards already place significant limits on energy demand. However, significant and inexpensive gains are possible in many building types, dependant upon energy load profile, where good practice is adopted. This is identified further under section 4.2.3.

#### **4.2.2 Benefits - Option 1**

##### **'Do nothing'**

As noted under clause 2.3, the Scottish Government is committed to the delivery of an 80% cut in carbon dioxide emissions by 2050, with an intermediate target of at least 42% by 2020. Whilst building regulations have reduced carbon dioxide emissions from new buildings by approximately 60% since 1990<sup>19</sup>, doing nothing offers no further contribution towards meeting national targets for emissions reduction. Accordingly, no benefits are identified which relate to the intended objective.

Adopting an option which does not mandate improved building performance and attendant costs incurred when carrying out building work may be seen as beneficial in the short term. The effect of recession on the UK construction market and on business more generally has reduced capacity to deliver development and to incur and accept additional development costs. However, this would result in new buildings which continue to produce carbon dioxide emissions at current levels, creating a greater challenge for the future.

#### **4.2.3 Benefits - Option 2**

##### **'Promote energy saving and carbon dioxide reduction measures in new building work through additional information campaigns'**

Initiatives by the Scottish and UK Governments have resulted in an increased general awareness of climate change issues and the need to reduce emissions and save energy. However, it is considered that, as with the assessment of the previous proposed changes to building standards in 2007, the benefits from this approach are limited and difficult to quantify.

##### **Increased public awareness**

Promotion remains important, to inform on and promote the Government agenda on limiting CO<sub>2</sub> emissions and reducing energy demand, and to offer advice on how this can be achieved in respect of the built environment. However, if reliance is placed solely on such activity, there is a tendency for improvement action to be taken only by

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<sup>18</sup> Action on Climate Change: Proposals for improving the energy performance of existing non-domestic buildings - <http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/pubconsult#a10>

<sup>19</sup> see research report - <http://www.scotland.gov.uk/Resource/Doc/217736/0091337.pdf>

those who are persuaded that energy efficiency should be high on their agenda, even above commercial considerations. For this to have broader appeal, some incentive is generally necessary.

### **Delivering best value**

In new buildings, the financial returns from adopting energy efficiency measures greater than those within current building standards are limited, with extended payback periods, some exceeding the anticipated lifespan of the building, for the majority of solutions. Whilst there still remain very significant, effective and attractive options for improvement in older, less energy efficient existing buildings, the financial case for voluntary improvement on standards for new buildings offers far less direct benefit to building owners and occupiers. Accordingly, the issue of subsidy is not considered as, where incentives are to be offered, they should be targeted to deliver best value.

### **Limitations**

On this basis, it is unlikely that there would be voluntary adoption of such recommendations on any great scale and certainly not to the extent that can be achieved through regulation. There is an established and proven delivery method for improvement – through building regulations. This ensures that the intended performance will be applied to all new development work.

Accordingly, in respect of new works, it is considered that whilst benefits would accrue from such an approach, the level of improvement and benefits is not possible to quantify. Any benefits and related costs would be proportionate to those identified under Option 3.

#### **4.2.4 Benefits - Option 3**

##### **'Reduce energy demand and carbon dioxide emissions through revised performance measures for new building work through building regulations'**

This approach offers significant benefit in respect of the objective of this review – to reduce CO<sub>2</sub> emissions and energy demand arising from new buildings and new building work whilst also introducing limited measures to improve existing building performance. However, it does raise attendant costs that must be considered. Based upon a projected development profile, cumulative benefit can be assessed. The benefits offered by this option in delivering the policy objective are as follows:

##### **Delivering a 30% reduction in CO<sub>2</sub> emissions**

##### **Summary of national extrapolation of findings**

<b>30% CO<sub>2</sub> reduction target</b>	<b>National annual CO<sub>2</sub> savings (tonnes)</b>	<b>National annual energy savings (MWh)</b>
Domestic	12,700 – 15,600 <sup>1</sup>	35,500 – 43,400 <sup>1</sup>
Non-domestic <sup>2</sup>	7,100 – 8,700	18,000 – 22,000
<b>TOTAL</b>	<b>19,800 – 24,300</b>	<b>53,500 – 65,400</b>

Notes:

1. Assessment of carbon dioxide emission savings is expressed as a 30% reduction on current, assessed emissions. This figure omits additional reductions which may arise from wide-scale adoption of lower carbon fuels (biomass). Assessment is based upon current assessment procedure and fuel carbon factors (SAP 2005) and uses the national profile and annual build numbers identified within the domestic research project. Energy savings are based upon the application of the lowest cost options within the report, which identified significant adoption of biomass. Accordingly, energy savings may be greater than identified.

2. For non-domestic construction, the statistical information collected by the Office for National Statistics (ONS) on the construction of commercial buildings in Scotland is too general to allow compilation of national impact figures. Research undertaken by the Building Standards Division to develop an energy profile for non-domestic development in Scotland is not yet at a stage where this can assist in assessment of national impact. Accordingly, assessment extrapolates benefits from information provided within the non-domestic research project, applying this against a national development profile identified in England & Wales. This allowing mapping of the building categories onto 70% of a notional development mix. As a result, figures provided for national impact are approximate and should be treated with caution.

These figures represent a saving recurring annually for a one-off increase to the capital cost of construction.

It is intended, following development of an energy profile for non-domestic development and reassessment of proposed house building levels, that benefits will be reassessed. Amended figures will be published which quantify both CO<sub>2</sub> and energy savings in more detail, reporting within the overall Climate Change policy framework.

**Monetised Benefits** - Potential savings achievable through implementation of this option are categorised as direct savings to building users and costs to Government from not taking action, as follows:

- Direct savings to building users through reduction in energy demand and reduced fuel costs.
- Emissions reductions from reduced fuel consumption (heat from non-electrical sources) are valued at the shadow price of carbon (£26.50 per tCO<sub>2</sub> in 2008)
- Emissions reductions from reduced electricity consumption are valued at the price of EU Emission Trading Scheme (EU ETS) allowances (£16.26 per tCO<sub>2</sub> in 2008).
- A benefit of £1.10 per MWh is placed on reduced damage costs associated with marginal electricity generation (assuming a Combined Cycle Gas Turbine (CCGT) generator).

In addition to the above, a value of £18 per MWh can be assigned to the avoided costs of renewables, reflecting the high marginal cost of delivering additional energy from renewable sources. Department of Energy and Climate Change (DECC) guidance on assessing greenhouse gas policy identifies that there is uncertainty associated with this value and that, accordingly, costs/benefits analysis should be presented both with and without this factor.

Benefits in adopting this approach to reducing emissions include:

- An established delivery method - setting standards within Scottish building regulations to limit carbon dioxide emissions and energy demand has proved to be an equitable and robust way of improving the energy performance of new buildings. All new buildings which are to be heated (or cooled) or building work within such buildings will attract application of revised minimum standards.
- Certainty that reductions can be achieved - this approach is that, in addressing the performance of buildings, building regulations offer an established and proven delivery method which offers certainty that all new building work to new and existing buildings will result in improved performance, requiring that all new building work delivers reduced CO<sub>2</sub> emissions with an associated reduction in energy demand. This allows a quantitative assessment of improvement, which will assist the Government in meeting its targets for carbon emission reductions.

- Delivering the most cost-effective solutions - where subject to building regulations and a mandatory need to address improved building performance, those persons commissioning building work have the incentive to meet the regulations in the most cost effective manner possible. This is supported and encouraged by the use of functional standards and supporting guidance within building regulations, which allows flexibility in solutions and value engineering.

### 4.3 Cost of implementation

#### 4.3.1 Option 1 'Do nothing'.

This option presents no implementation costs.

#### 4.3.2 Option 2 'Promote energy saving and carbon dioxide reduction measures in new building work through additional information campaigns'.

The development costs for production of voluntary codes of practice would form part of the ongoing work of the Building Standards Division and partner organisations. Development costs related to such documents would therefore be borne by Government, as would any cost of publishing and distribution. This option would impose costs through funding of advertising and awareness campaigns. However, these would not be borne directly by the public.

**Precise values have not been assessed, as costs will be proportionate to the scale and type of publications and the extent of the advertising and publicity campaign. It is recognised that Government already funds the activity of a range of organizations including the Carbon Trust and the Energy Saving Trust who promote energy issues for owners of non-domestic and domestic buildings respectively.**

**As an example, a previous promotional campaign to launch fire safety regulations and guidance for existing buildings under Part 3 of the Fire (Scotland) Act 2005, cost approximately £350,000, funding production of guidance documents, a dedicated website, press articles, radio adverts, trade publications, posters and leaflets. Given that sources of guidance on reducing emissions and improving energy efficiency are already well established, it is suggested that a sum of around £250,000 as representative of the cost of a further, structured and sustained campaign to further promote improvement and implementation.**

For the purpose of this assessment, it is not proposed to assess any subsidy which might be offered for the delivery of new buildings to standards greater than those set through building regulations. As identified in clause 4.2.3, it is suggested that government subsidy for building improvements be targeted at existing stock where the greatest cost benefits can be realised. This is the approach presently taken.

Costs and related benefits would be proportionate to those identified under Option 3. However, as improvement is not mandated, any assessment of potential cost is not possible other than to recognise that adoption as a condition of development is practicable for publicly funded development whilst adoption of practice within the private sector will be less so.

#### 4.3.3 Option 3

**'Reduce energy demand and carbon dioxide emissions through building regulations, with revised performance measures for new building work and, for existing buildings, as a result of new building work'.**

Costs identified to implement change through building regulations comprise of development costs (changes to construction specification, land cost and cost arising from any redesign process) and regulatory costs (training costs for local authorities).

**Development costs**

Research was commissioned to assess the additional costs arising from the construction of buildings to improved energy standards in 2010. The final reports from this project for domestic and non-domestic buildings are published on the Building Standards Division website. The following cost assessment is based primarily upon the findings within these reports. Costs identified are non-recurring construction costs, incurred where a new building is created. Accordingly, CO<sub>2</sub> savings will accrue during the life of the building with no further cost aside from those associated with building & system maintenance.

Any assessment of additional capital cost must be necessarily broad and approximate, resulting in a range. It is proposed that potential costs specific to redesign of building to revised standards and training (an issue common across all strands of the 2010 review of building standards) should be recognised but not quantified as addition of these costs will not significantly affect the range identified. These costs are minimised by the practice of only reviewing building standards at regular, defined intervals (currently every three years) and introducing all changes arising at the same time.

The potential for improved energy standards resulting in a small increase in building footprint, particularly in housing development, is recognised. The cost of construction is assessed within published research. However, any effect on site layout and the potential reduction in the number of units that can be accommodated is not considered. Research proposed on this topic (for housing), whilst not taken forward due to lack of exemplar sites, did suggest that, on the basis of current practice, increases in building dimension of the order discussed can be accommodated without adversely affecting site layout or development density.

Development of Option 3, post-consultation includes limited measures which will improve the energy performance of existing buildings where building work is carried out. Whilst these measures will be detailed in the revised Building Standard Division Technical Handbooks, costs and benefits arising from implementation of this element cannot be quantified at this stage. It is proposed that costs associated with these measures can be considered within the cost range identified in the summary below. A further review of this element of proposals will be carried out, post-implementation, when the extent to which recommendations are adopted can be assessed.

**Domestic buildings**

Davis Langdon was commissioned by the Building Standards Division of the Scottish Government's Directorate for the Built Environment to carry out a study to evaluate the cost of measures to reduce carbon dioxide (CO<sub>2</sub>) emissions and energy demand for new housing in Scotland<sup>20</sup>. Cost and energy models were developed for a range

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<sup>20</sup> Assessing the costs of proposed changes to domestic energy standards in 2010 (Davis Langdon LLP September 2008) - <http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/resen13>

of 10 'baseline' dwelling types based on the current Scottish building regulations. A range of 14 potential improvement scenarios, comprising of three distinct levels of fabric improvements and use of a range of low carbon equipment, were then applied to the baseline dwellings with the aim of achieving 25%, 27%, 30%, 35% and 60% reductions in CO<sub>2</sub> emissions and 25%, 27%, and 30% reductions in delivered energy consumption.

**Investigation was based upon improvement of dwellings which use mains natural gas as the principal fuel source in new dwellings, with additional investigation on the potential costs where dwellings are fuelled by LPG, oil or electricity**

The report presents the methodology and findings from the study, along with an extrapolation of the potential national impacts of implementing various potential levels of CO<sub>2</sub> and delivered energy reductions. For the purpose of this exercise, costs reported are based upon the Ministerial commitment to deliver a 30% reduction in carbon dioxide emissions in 2010.

**National profile.**

Assessment is based upon an assessed split of dwelling types from the 2005 breakdown of housing registrations (source: National House Building Council), applied to the Scottish Government 2007 new dwelling completions data to give a broad projection of the numbers of each dwelling type completed in Scotland in 2007.

In all cases, the lowest capital cost scenarios identified within the research paper have been applied. It should be noted that the adopted scenarios will not always be appropriate for all locations, and that in some cases alternative scenarios will need to be adopted which may have higher capital costs. However, a range of tailored technical solutions that offer the same or better value than improvement scenarios are possible and it is considered that adopting these figures offers a reasonable indication of national impact.

In order to allow compilation of the national impact assessment, it has been necessary to extrapolate the data from this study to include dwelling types other than those used as baseline dwellings. It should also be noted that by its nature, the national impact assessment requires generalisations to be made, for example regarding dwelling sizes and configurations, and that there will inevitably be a margin of error with such an approach. It is suggested that a confidence level of +/- 10% would be appropriate and this is applied to arrive at the ranges of costs and CO<sub>2</sub> savings in the following table. Mitigation of these costs is discussed in clause 4.4.

**New domestic buildings - summary of national extrapolation of findings**

<b>CO<sub>2</sub> reduction target</b>	<b>National annual cost - private sector (£m)</b>	<b>National annual cost – public sector (£m)</b>	<b>National annual cost – total (£m)</b>
<b>30%</b>	<b>£100 - £123m</b>	<b>£16 - £19m</b>	<b>£116 - £142m</b>

**Notes:**

1. Assessment based upon projected build of 24,744 new homes per annum

2. Based on SG data, the public sector accounted for 13.6% of the total number of new dwellings completed in 2007. Whilst the proportion of each dwelling type constructed by the public and private sector differs slightly, this percentage is used above.

### **Non-domestic buildings**

Davis Langdon (in collaboration with Faber Maunsell) was commissioned by the Building Standards Division of the Scottish Government's Directorate for the Built Environment to carry out a study to evaluate the cost impacts of measures to reduce carbon dioxide (CO<sub>2</sub>) emissions and demand for delivered energy for a range of non-domestic building types in Scotland<sup>21</sup>. Cost and energy models were developed for four 'baseline' building types, namely a primary school, a secondary school, a city centre air conditioned office, and a retail warehouse. A number of potential improvement scenarios were then applied to the baseline buildings with the aim of achieving 25%, 30%, 37%, 50% (and for schools, 80%), reductions in CO<sub>2</sub> emissions and 25%, 37%, and 50% reductions in delivered energy consumption.

The four baseline buildings were selected from recent Scottish projects designed to the current building regulations. Energy models were prepared for each building type using both the simplified building energy model (SBEM) and dynamic simulation modelling (DSM) software, and elemental capital and lifecycle cost models were also prepared. Two defined levels of energy efficiency upgrade were then applied to the baseline buildings, and the three resulting energy models (baseline, intermediate and advanced energy efficiency) were used to evaluate a series of low carbon technologies including wind, biomass, photovoltaics and solar-thermal. The outputs from this analysis informed the identification and costing of a series of improvement scenarios for achieving the various CO<sub>2</sub> and delivered energy reduction targets.

Following the original report, additional work was undertaken that investigates whether alternative improvement scenarios that make use of architectural features or services efficiencies would be more cost-effective than the scenarios originally investigated, given the particular energy loads of certain buildings.

The report presents the methodology and findings from the study, along with a partial extrapolation of the potential national impacts of implementing various potential levels of CO<sub>2</sub> and delivered energy reductions. For the purpose of this exercise, costs reported are based upon the Ministerial commitment to deliver a 30% reduction in carbon dioxide emissions in 2010 (highlighted below).

### **Additional capital costs of four cheapest improvement scenarios to achieve target reductions (both DSM & SBEM modelling)**

CO <sub>2</sub> reductions	Schools		Commercial buildings	
	Primary	Secondary	Office	Retail
<b>30% (DSM)</b>	<b>0.8 – 3.9%</b>	<b>0.5 – 1.8%[2]</b>	<b>3.4 – 4.0%</b>	<b>2.6 % [1]</b>
<b>30% (SBEM)</b>	<b>1.2 – 3.7%</b>	<b>0.9 – 2.6%[2]</b>	<b>1.4 – 3.3%</b>	<b>2.5 – 5.0%[4]</b>
<b>Alternative scenarios (architectural solutions)</b>				
<b>30%</b>	<b>0.6%</b>	<b>not investigated</b>	<b>0.9%[3]</b>	<b>0.4%[1]</b>

Notes

<sup>21</sup> Assessing the costs of proposed changes to non-domestic energy standards in 2010 - (Davis Langdon LLP December 2008) - <http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/resen14>



1. No further options that achieve less than 37% for less than the cost of 37% options.
2. Only four of the scenarios investigated achieved this level of reductions for less than the cost of 37% options.
3. Only one of the scenarios investigated achieved this level of reduction.
4. Only three of the scenarios investigated achieved this level of reductions for less than the cost of 37% options.

### **National profile**

Due to the disparate nature of non-domestic building forms, the wide range of potential development models and the lack of national statistics that might assist in determining development mix, it is currently not possible to derive a national profile for proposed changes with any significant accuracy. Instead, research was carried out on a small number of representative building types of significantly different character and energy load profiles to allow identification of a broad potential cost assessment which might reasonably be applied.

For the purpose of this Regulatory Impact Assessment, a simple average of the reported values, excluding the lower improvement costs of architectural solutions, is proposed. This would assert a potential increase in capital costs of non-domestic development in the range of 1.7 - 3.1%

Based upon an assessed overall output of new non-domestic development (excluding infrastructure) of **£3,532m** (2007 figures), this would indicate an **additional capital cost in the region of £60m to £109m**.

Actual costs will be dependant upon a wide range of variables including the overall level of development, building mix and the solutions adopted to deliver the intended improvements.

### **All new buildings - life cycle costing and payback periods**

Research identifies that most of the improvement scenarios investigated have a very long payback period in terms of annual energy cost savings and some, due to the high capital costs or short replacement cycles, may not pay back the original investment. However, reduction of running costs is only one consideration within an overall policy objective and it should be recognised that, for Climate Change to be addressed, actions that do not result in a direct financial benefit to building users must be considered.

## **4.4 Summary of costs and benefits**

### **Option 1 - 'Do nothing'**

This option presents no implementation costs and no policy benefit.

### **Option 2 - 'Promote energy saving and carbon dioxide reduction measures in new building work through additional information campaigns'**

Costs and benefits cannot be quantified but would be proportionate to those identified under Option 3.

### **Option 3 - 'Reduce energy demand and carbon dioxide emissions through building regulations, with revised performance measures for new building work and, for existing buildings, as a result of new building work'**

<b>Costs (-) and Benefits (+)</b>	<b>Domestic (£m)</b>	<b>Non-domestic<sup>7</sup> (£m)</b>	<b>Total<sup>7</sup> (£m)</b>
<b>Increased construction costs<sup>2</sup></b>	<b>(-) 116 - 142</b>	<b>(-) 60 - 109</b>	<b>(-) 176 - 251</b>
Reduced energy consumption <sup>3 4</sup>	(+) 54.9 - 67.1	(+) 20.8 - 25.4	(+) 75.7 - 92.5
ETS & non-ETS & marginal generation - carbon savings <sup>4 5</sup>	(+) 13.6 - 16.8	(+) 7.5 - 9.2	(+) 21.1 - 26.0
<b>TOTAL (without Avoided Renewables)</b>	<b>(-) 47.5 - 58.1</b>	<b>(-) 31.7 - 74.4</b>	<b>(-) 79.2 - 132.5</b>
National benefit – Avoided renewables <sup>6</sup>	(+) 3.3 - 4.0	(+) 3.3 - 4.0	(+) 6.6 - 8.0
<b>TOTAL (with Avoided Renewables)</b>	<b>(-) 44.2 - 54.1</b>	<b>(-) 28.4 - 70.4</b>	<b>(-) 72.6 - 124.5</b>

#### Notes

- Note that, excepting cost, figures for non-domestic buildings are extrapolated from limited data and are therefore to be treated with caution.
- Non-recurring cost, applicable at time of construction, borne initially by developers but ultimately by owners, operators and users of buildings
- Estimated savings from reduced energy use identified at 75% of assessed value to incorporate an allowance for increased maintenance costs (adoption of low carbon equipment / more complex mechanical systems). Savings assessed as 67%:33% gas/electricity for domestic and 50%:50% gas/electricity for non-domestic buildings.
- Benefits accrue and are assessed as a net present value (NPV) based upon a 60 year building operation period and discounted at 3.5% per annum for years 1-30 and 3.0% per annum for years 31 – 60.
- Benefits from carbon savings weighted at 67% non-ETS (non-electricity) and 33% ETS (electricity) for domestic buildings and 50% non-ETS (non-electricity) and 50% ETS (electricity) for non-domestic buildings.
- Cost of reducing emissions by the policy alternative of investing in large scale renewable energy generation (£18 per MWh). DECC guidelines recommend presentation of cost/benefit with and without Avoided Renewables element. Benefits for electricity generation weighted as% of total reduction in demand – 20% domestic, 40% non-domestic.
- For qualification of non-domestic assessment, see clause 4.2.4.

#### 4.4.1 Impact of existing policies

Proposals take forward a 30% reduction in CO<sub>2</sub> emissions compared against 2007 building standards. Whilst this option offers a robust delivery route for improvement, the delivered impact may be moderated by existing government policies which already improve energy efficiency and reduce emissions.

#### Planning Policy on 'Low and zero carbon developments'

*At present, Scottish Planning Policy (SPP) 6 – 'Renewable Energy' – includes the recommendation to local planning authorities that development plans should set out local policy on new developments with a total cumulative floor space of 500 m<sup>2</sup> or more to incorporate on-site zero and low carbon equipment delivering at least an additional 15% reduction in CO<sub>2</sub> emissions beyond the 2007 building regulations. With the introduction of revised building regulations in 2010, this provision will fall.*

*Section 72 of the Climate Change (Scotland) Act 2009 modifies the Town and Country Planning (Scotland) Act to require that local development plans “ensure that all new buildings avoid a specified and rising proportion of the projected greenhouse gas emissions from their use... through the installation and operation of low and zero-carbon generating technologies”. Provisions in this respect are currently under review by the Planning Division of the Scottish Government.*

Where the recommendation on ‘Low and zero carbon developments’ within SPP 6 (as described within guidance document PAN 84 – ‘Reducing Carbon Emissions in New Development’) are applied to new development, CO<sub>2</sub> reductions equating to half of those proposed within the 2010 review of building standards are already sought. At present, there is little information identifying the extent to which this policy is being applied, the costs incurred in development or the reduction in carbon emissions being delivered on a national basis

Where this policy is currently applied, reductions in both additional development costs and stated reductions in CO<sub>2</sub> emissions and energy demand identified in this Impact Assessment will occur. Research supporting this review (see 4.3.3) identifies use of low carbon equipment in conjunction with building fabric improvements (rather than alone) as generally the most cost effective solution to deliver improvements to current building standards on carbon dioxide emissions.

## **5.0 SMALL/MICRO FIRMS IMPACT TEST**

### **5.1 Preliminary Impact Test**

In addition to guidance on assessment provided by the Scottish Government, information provided by the Department for Business, Innovation & Skills (Enterprise & Business Support)<sup>22</sup> was considered.

Assessment has been based on Option 3 as Options 1 and 2 propose no change to regulation and impose no actions that may incur costs for small firms, including micro-businesses (those which employ less than 10 full-time employees). It was proposed that the proposals to change the regulations apply in a proportional and equitable way. Only those firms that choose to erect, alter, extend or convert buildings will be subject to the proposed changes.

Proposals within Option 3 make little change to the system introduced in 2007, retaining the same methodology and simply introducing improved performance levels, reducing the need for further training. The majority of micro-businesses in the construction industry deal with the alteration and extension market. Where works do not involve the creation of a new building, proposals retain a simpler, elemental approach to compliance.

However, new provisions will also result in additional work to improve the energy efficiency of existing buildings where other building work is carried out, imposing additional costs when considering development. As noted in clause 4.1, proposals under Option 3 will affect any businesses carrying out building work which attracts the standards and guidance within Section 6 (energy) of the non-domestic Technical Handbooks

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<sup>22</sup> <http://www.berr.gov.uk/whatwedo/enterprise/framework/small-firms-ia/page38021.html>

## **5.2 Assessment**

Whilst preliminary work identified that proposals will not present a disproportionate impact on small businesses in Scotland, amendments to proposals within Option 3, post-consultation, confirmed measures that would prompt improvements to existing buildings when carrying out new building work.

Discussion of the core consultation proposals, including the potential to require improvement of existing building services, was carried out with a sample of small businesses between September and November 2009. Whilst there was no awareness of the consultation and little of building standards matters in general, the following general issues can be reported following this exercise:

- Through media exposure, there was a general awareness of the Government's position on climate change;
- There was an awareness of energy efficiency matters generally, though such awareness was not always acted upon;
- Building work was not high on the agenda of most parties (given the current economic situation);
- Proposals that imposed additional costs on any building work undertaken were not generally favoured (even when payback periods discussed);
- The issue of incentives or funding of improvements was raised.

Whilst discussions did not provide detailed feedback on consultation issues, they were helpful in identifying the level of awareness present within the small business community. There was also a degree of resonance with The Sullivan Report ("raising standards") which recognised that "Consequential improvements should focus (on) energy efficiency measures related to the work that was being done at the choice of the building owner".

It is important to record that small businesses often have to deal with a raft of small additional legislative requirements or changes, which generally have a cost or resource implication. Whilst proposals under option 3 require a specific trigger (building work) and will, particularly where existing building services are improved, result in benefits for the building operator (improved energy efficiency), they will add to existing regulatory burden.

## **5.3 Summary**

Proposals are applied to all building work and it is intended that improvements to existing non-domestic buildings are proportionate to the other building works proposed. On that basis, proposals are not considered to disproportionately disadvantage small to medium sized businesses.

However, as proposals will introduce an additional burden to those carrying out building work (the requirement to improve the energy efficiency of fixed building services to meet current standards), it is recommended that this aspect of the proposals be monitored and reviewed to determine that, in practice, this provision does not act to disadvantage smaller businesses.

## **6.0 LEGAL AID IMPACT TEST**

- 6.1 Assessment is based upon proposals within Option 3, as the only option that involves mandated action. Proposals are to revise existing standards and guidance which set performance levels for CO<sub>2</sub> and energy demand for new buildings and new building work.

Whilst proposals introduce the concept of improvement to existing buildings when carrying out new building work, no new procedures are created as a result. Accordingly, it is not considered that there will be any effect on individuals' right of access to justice through availability of legal aid or on possible expenditure from the legal aid fund.

## **7.0 “TEST RUN” OF BUSINESS FORMS**

7.1 There are no new business forms proposed within any of the options identified.

## **8.0 COMPETITION ASSESSMENT**

### **8.1 Competition**

No significant areas where issues of competition, restriction or imbalance will arise have been identified. However, some concerns would benefit from commentary.

The Office of Fair Trading (OFT) market report – ‘Homebuilding in the UK’<sup>23</sup> raised concern over the potential for more technical and complex solutions to improved energy standards to put less well-resourced, smaller developers at a disadvantage. It is reasonable to assert that such a concern might also be applied to non-domestic development.

Maintaining the current methodology for energy standards and guidance for new buildings will assist in minimising such concerns. The current methodologies for limiting CO<sub>2</sub> emissions and energy demand in new buildings, introduced in May 2007, allows significant design flexibility in how performance standards are met. The proposed changes outlined in Option 3 set higher performance standards but retain this familiar methodology and are not, therefore, expected to introduce any significant effect on competition.

Additionally, the Building Standards Division is working with partners in Government and the industry to ensure that cost-effective technical solutions that assist in meeting improved energy standards are widely understood and can be readily implemented.

### **8.2 Manufacture**

Within Option 3, guidance within building regulations would continue to prescribe performance standards which are not dependant upon use of particular products or materials. This offers the designer the flexibility and freedom to select those products and materials which best suit the design of the building, provided that the specified performance is achieved. Building performance levels identified within Option 3 can be achieved using products and materials that are already obtainable and widely understood.

It is anticipated that manufacturers that contribute to this agenda will continue to develop and review the types of product and material offered as a response to improved standards. Similarly, improved energy standards will assist in stimulating

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<sup>23</sup> Chapter 8, ‘Homebuilding in the UK - A market study’ (OFT, September 2008)  
[http://www.of.gov.uk/shared\\_of/reports/comp\\_policy/oft1020.pdf](http://www.of.gov.uk/shared_of/reports/comp_policy/oft1020.pdf)

the wider development, availability and application of newer, more innovative solutions.

Proposals under option 3 continue to recommend minimum efficiencies for energy-using building systems such as lighting, cooling & ventilation equipment, combustion appliances and other forms of heating. Proposals reflect recommendations developed in conjunction with UK industry through the Industry Advisory Groups (IAGs) convened by partners in the Department of Communities and Local Government in England & Wales. Accordingly, recommendations for improved minimum performance for such installations are not identified as a barrier to trade or competition.

### **8.3 Implementation**

The proposed changes will affect any party carrying out work to create a new building or alter, extend or convert an existing building (see clause 3.2). Changes required to building practice will apply equally to all forms of development. Based on the range of options identified, no disadvantages to any party have yet been identified. This will continue to be reviewed, with a particular focus on implementation of measures to improve the energy performance of existing buildings where new building work is carried out.

### **8.4 Alternatives**

Building standards offer guidance which consists largely of performance-based measures, allowing different ways of meeting the functional standards. Alternative solutions can readily be proposed by applicants, assessed and accepted by Verifiers as meeting functional standards and other requirements of the Building (Scotland) Regulations.

## **9.0 ENFORCEMENT, SANCTIONS AND MONITORING**

### **9.1 Background**

The proposed changes within Option 3 will require amendment to the Building (Scotland) Regulations 2004 and the modification of the standards and supporting guidance given within the Technical Handbooks (issued by the Building Standards Division of the Scottish Government) that support the Regulations. The Technical Handbooks list the mandatory functional standards set out under regulation 9 of the Regulations and give guidance on ways of complying with these mandatory functional standards.

All matters relating to enforcement, sanctions and monitoring will be carried out under the existing processes, which form the building standards system in Scotland, as set out under the Building (Scotland) Act 2003. Parties responsible for operation of this system are the 32 Scottish local authorities, appointed as verifiers under the Act, and the Building Standards Division, on behalf of Scottish Ministers.

### **9.2 Enforcement and sanctions**

Work subject to the Building (Scotland) Regulations 2004 generally requires that a building warrant must be obtained before work commences and to have a completion certificate accepted once works are finished. Whether or not such work requires a building warrant, as set out under Regulation 5 of the Regulations, the person responsible for the building or works, the 'relevant person' as defined in section 17 of the Building (Scotland) Act 2003, is required to ensure compliance with building regulations.

Where a building warrant is required, proposals are subject to the scrutiny of verifiers (Local Authorities, through Building Standards Departments) prior to approval of building warrant or acceptance of a Completion Certificate. Verifiers have

enforcement powers under the Act to ensure compliance with approvals and the Regulations. Cases of non-compliance can be referred to the Procurator Fiscal and persons found guilty of offences in terms of the Act are liable on summary conviction to a fine not exceeding level 5 on the standard scale (currently £5000).

### 9.3 Monitoring

The objective of this exercise is to determine whether 30% in CO<sub>2</sub> emissions and associated energy demand should be delivered through changes to building regulations. Building regulations are applied within a legislative framework summarised in clause 10.1 above. A separate, parallel consultation on compliance within building regulations is also underway. Obtaining further information on the extent to which buildings comply with the requirements set by building regulations will assist in monitoring of effectiveness of any proposals taken forward under this legislation. In line with Article 4 of Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings, any implemented changes which address this issue shall be subject to review within a 5 year period. In line with Scottish Government policy, any such review shall be accompanied by a further Impact Assessment.

### 9.4 Post-implementation review

Continuous monitoring of the implementation of proposals is available through feedback from local authority verifiers, designers, manufacturers, developers and property owners. These parties are in regular contact with the technical officers in the Building Standards Division and the queries they raise will offer a broad view of how proposals are being implemented and if intent is being achieved. They may also identify areas where objectives may be unclear and allow clarification of these objectives as part of the ongoing review process. Issues raised in this manner become a matter of record and are used to inform the continued development of building standards and guidance.

It is proposed to carry out further review of energy standards in 2013. Accordingly, a post implementation review looking at the immediate effect of revised standards and guidance will form part of the development of proposals for these projects. Following development of an energy profile for non-domestic development, this will include further assessment to quantify both CO<sub>2</sub> and energy savings, allowing reporting within the overall Climate Change policy framework .

## 10.0 SUMMARY AND RECOMMENDATIONS

### 10.1 Summary

The summary of benefits and costs remains principally unchanged from the intermediate RIA and are noted in full under Items 4 & 5. Proposals have been modified in response to public consultation and are summarised in Annex C.

### 10.2 Summary Costs and benefits table

The summary of benefits and costs remains unchanged from the intermediate RIA and are noted in full under Items 5.

Option	Total benefit per annum	Total cost per annum
Option 1 - Do nothing.	No benefits	No costs

<p><b>Option 2</b> - Increase awareness of the need for energy efficient design to reduce carbon dioxide emissions and introduce best practice guidance documents for adoption and application on a voluntary basis.</p>	<p><b>Benefits wholly dependent on scale of uptake of voluntary good practice</b></p> <p>Environmental – where applied, may contribute to the delivery of reduced carbon dioxide emissions and energy demand and a more sustainable built environment.</p> <p>Economic – where applied, may deliver buildings that are more energy efficient and reduce running costs. Where applied, may add value to new building stock as energy efficiency is a recognised selling point, particularly in the commercial and public sector.</p> <p>Social –Where good practice guidance applied to older buildings, reduction in energy demand will deliver lower fuel bills, contributing to both fuel poverty and security of energy supply agendas. Proposals seek to reduce carbon dioxide emissions as part of the government’s Climate Change Agenda which has a wider, long-term social remit.</p> <p>All benefits dependant on voluntary subscription to proposed guidance.</p>	<p><b>£250,000 suggested</b></p> <p>Cost wholly dependent on scale and form of public awareness exercise</p>
<p><b>Option 3</b> - Introduce revised and updated building standards guidance to reduce carbon dioxide emissions and energy demand in new buildings, recognising current good practice where such is appropriate, for implementation within the building standards system in Scotland.</p>	<p><b>Benefits arising from reducing energy demand and carbon dioxide emissions result in an overall policy benefit of £103.4m – £126.5m per annum.</b></p> <p>Environmental – will deliver a reduction in carbon dioxide emissions and energy demand and a more sustainable built environment.</p> <p>Economic – will deliver buildings that are more energy efficient and reduce running costs and assist in the development of a low carbon sector within the construction industry. Direct economic benefits are outweighed by implementation costs. Primary benefit of objective is not economic, but environmental.</p> <p>Social – Reduction in energy demand will deliver lower fuel bills, contributing to both fuel poverty and security of energy supply agendas. Proposals will reduce carbon dioxide emissions as part of the government’s Climate Change Agenda which has a wider, long-term social remit.</p>	<p><b>Implementation costs assessed at £176m to £251m per annum based upon 2007 levels of construction.</b></p>



### 10.3 Conclusion

Considering additional information presented during consultation, it is the view that **Option 3** provides the most appropriate solution to meet the objective set out in clause 1.1, to contribute to the Scottish Government's Climate Change Programme through the introduction of improved standards and guidance to reduce carbon dioxide emissions and improve energy performance of new buildings through building regulations.

This option ensures that the intended aims can be implemented in a structured manner, as part of the existing process of statutory permissions applied where building work is carried out.

It should be noted that proposals do incur a high cost in terms of £ per kg.CO<sub>2</sub> saved and are not intrinsically cost-effective (benefits are greater than costs). However, application of improvements within a flexible building standards system allows the intended levels of performance to be delivered in as cost-effective a manner as is practicable. The changes proposed by regulation are commended as the appropriate level at which good practice can be applied at this time, within a mandatory framework, to deliver the objective. Option 3 is also recommended for the following reasons:

- Options 1 will not result in any further reduction in the levels of carbon dioxide emissions from new buildings and new building work and is therefore not a practical consideration.
- Option 2 may only offer a means of reducing levels of carbon dioxide emissions from new buildings and new building work but, as a voluntary code, any benefit is dependant on uptake and this cannot be guaranteed outwith a legislative framework

### 10.4 Recommendation.

Introduce revised and updated building standards guidance to improve the carbon dioxide and energy performance of all new buildings, recognising current good practice where such is appropriate for implementation within the building standards system in Scotland.

**It is recommended to introduce standards and guidance under the Building (Scotland) (Amendment) Regulations 2010 and the October 2010 edition of the Building Standards Division Technical Handbooks for domestic and non-domestic buildings to this effect.**

11.0 DECLARATION AND PUBLICATION

**DECLARATION**

**I have read the Regulatory Impact Assessment and I am satisfied that the benefits justify the costs.**

**Signed by the accountable Minister . . . . .**

**Stewart Stevenson, Minister for Transport, Infrastructure and Climate Change**

**Date . . . . .**

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## **ANNEX A - IMPLEMENTATION & DELIVERY PLAN**

### **DELIVERY AND COMMUNICATION**

The proposed changes will be taken forward in the form of guidance within the Technical Handbooks which support compliance with the Building (Scotland) Regulations 2004. This guidance will be introduced as part of the Building (Scotland) (Amendment) Regulations 2010 and implementation will be carried out under existing processes, which form the building standards system in Scotland, as set out by the Building (Scotland) Act 2003.

The Technical Handbooks are the primary reference source for compliance with building standards and, as such, are used by designers and others involved in the building process to ensure compliance with the Scottish Building Regulations.

The guidance to the standards will illustrate the most common way of meeting the requirements of the building standards and, thus, complying with the Building (Scotland) Regulations 2004 (as amended). When carrying out work that is subject to the building standards, it is the duty of the relevant person (normally the owner of the building) to comply with the requirements of the Regulations.

Publication in this form is the established method of introducing changes to the building standards system and ensures that information on changes reaches those involved in works that are subject to building standards. This information is made available in paper form, as a priced publication, or free of charge, as an electronic download from the Building Standards Division (BSD) website, [www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards](http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards).

### **IMPLEMENTATION**

The proposed changes will form part of the building standards system in Scotland, produced and maintained, on behalf of Ministers, by the BSD and operated and enforced by the 32 Scottish local authorities.

Except where identified under schedule 3 to regulation 5 of the Building (Scotland) Regulations 2004 (as amended), work which is subject to building regulations requires a building warrant to be obtained prior to commencing building work and to have a Completion Certificate accepted by the Verifier on completion of the work. Such works are subject to the scrutiny of local authorities as Verifiers of the system, who also have enforcement powers under the Act to ensure compliance with the Regulations.

Note: where work is subject to building regulations but falls within the scope of schedule 3 to regulation 5 of the Building (Scotland) Regulations 2004 (as amended), it still requires to comply with the regulations.

### **IMPLEMENTATION PERIOD**

The proposed changes to the guidance within the Technical Handbooks are relevant to any party responsible for a building who intends to carry out building work that is subject to building regulations.

Proposed changes will be published online in April 2010 with hard copy documents following on. Guidance will come into effect on the 1<sup>st</sup> of October 2010 and be applicable to all building warrant applications made on or after that date. This provides well in excess of the minimum 12 week implementation period required for any such change. Further, it is intended that one aspect of revised guidance (airtightness testing) will be subject to a phased implementation.

**PROMOTION**

Any changes to the building standards system are publicised by the BSD through the website, seminars and articles in relevant publications. In addition, the BSD would seek to promote changes to the standards and guidance in association with organisations who have an expressed interest in building design and accessibility issues, together with other key stakeholders who have been involved in development of guidance and in the consultation process.

## **Annex B – Research**

Research that has helped to inform the proposals in this consultation is published online and includes the following projects:

### **Assessing potential impact of proposed changes to building regulations**

- **Assessing the cost of proposed changes to domestic energy standards in 2010**  
This project was commissioned to carry out a study to evaluate the cost of measures to reduce carbon dioxide (CO<sub>2</sub>) emissions and energy demand for new housing in Scotland. The project stems from recommendations from the Sullivan report.  
<http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/resen13>
- **Assessing the costs of proposed changes to non-domestic energy standards in 2010**  
This project addressed the costs impacts on new non-domestic buildings of improving energy standards and consideration of any modification of the carbon dioxide emissions standard to take into account of energy consumption. The project stems from recommendations from the Sullivan report.  
The original report published in 2008 considered potential improvement scenarios based on achieving 25%, 37%, 50% (and for schools, 80%), reductions in CO<sub>2</sub> emissions and 25%, 37%, and 50% reductions in delivered energy consumption.  
This 2nd edition reports builds on the original with the inclusion of a scenario for a 30% reduction.  
<http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/resen14>
- **Cost impact study of 'architectural solutions' for reducing CO<sub>2</sub> emissions from non-domestic buildings**  
This project made use of the models for the non-domestic study, the baseline buildings will be adjusted using two architectural solutions to reduce to CO<sub>2</sub> emissions and demand for delivered energy. This research is being used in the ongoing review of the energy standards.  
<http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/resen12>
- **Backstop levels of U-values and airtightness: Assessment of Nordic standards: Domestic**  
This project is an extension to 'Assessing the cost of proposed changes to building regulations in 2010: Energy Standards - Domestic' and evaluated the backstop U-values and airtightness of the Nordic standards.  
<http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/resen12>

### **Accredited Construction Details**

- **A technical review of the introduction to the Accredited Construction Details (Scotland) (ACD) and the improvement of their presentation**  
This project reviewed and updated the introductory and supplementary guidance text of the 2007 document for consultation issue, ensuring that it is appropriate to the document's primary purpose as guidance on limiting thermal bridging and air tightness. It promoted an understanding of the principles of limiting thermal bridging and air infiltration and placed greater emphasis on the design principles by developing

illustrative generic diagrams that are nonetheless consistent with the information in the specific guidance details.

<http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/resen2>

## Improvement measures for existing buildings

- **Financial benefits of improving the energy performance of an extensively glazed office building and school**

This project informed Section 50 of the Climate Change (Scotland) Bill as passed (now s.63 of the Act) as well as being used in the review of the energy standards, with regard to consequential improvements.

[Unpublished.](#)

- **Improvements to the Energy Performance of a Hotel**

A study of a city centre hotel that is being refurbished. It is a listed building in a conservation area, but has been extended and altered in the course of a long lifetime, with resultant hybrid servicing. Various scenarios were investigated, including improvements to the building fabric, energy efficient equipment, and other, low carbon equipment. The analysis includes an assessment of both capital and life cycle costs.

<http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/resen3>

- **Improvement measures to the energy performance of an existing building**

A study of an office building that is being extended to provide rental office space. Following an energy audit, the costs of various potential improvements to the fabric and services of the existing building were assessed, with a simple payback period analysis. Options for the addition of low carbon equipment were investigated and tenders obtained for a solar hot water system and photovoltaic panels, together with assessments by structural and M&E engineers. An important feature of the project was to discuss the practicability of options with the building owner and to understand their perspective on improvements to the building.

<http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/resen4>

- **Improvements to the energy performance of a retail building**

A study of a recently extended retail building within a major shopping development. Modelling addressed the cost and energy performance impacts of higher standards of insulation for the extension, improvements to the efficiency of equipment and fittings, and the installation of low carbon equipment. The analysis includes an assessment of both capital and life cycle costs.

<http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/resen5>

- **Improvements to the energy performance of an NHS property**

An analysis of a health centre which has had cavity wall insulation inserted. It assessed the resulting improvement to energy performance and reduction in CO<sub>2</sub> emissions using gas consumption and historic cost data. The energy performance improvement was assessed by comparing both the operational improvement and calculated Building Energy Rating. Costs were assessed to provide a simple payback period analysis. The project is intended as a pilot to develop a standardised analysis of improvements to NHS Scotland buildings.

<http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/resen6>

## **Extensions to existing buildings**

### **Energy Performance: Extensions to existing buildings designed to 2007 standards**

This project assessed the difference in energy performance, including CO<sub>2</sub> emissions, from new build 'extensions' designed to the backstops in 6.2.10 and target emission methodology 6.1 Non Domestic Technical Handbooks.

<http://www.scotland.gov.uk/Resource/Doc/217736/0091336.pdf>

## Annex C – Summary of proposed changes

### Background

On 27 February 2009, Stewart Stevenson, Minister for Transport, Infrastructure and Climate Change, announced the intention that new building standards for homes and non-domestic buildings, to be introduced in October next year by the Scottish Government, will reduce carbon emissions by 30 per cent beyond current standards. To deliver this reduction, it was proposed that revisions be made to the Building (Scotland) Regulations and supporting guidance within Section 6 of the Building Standards Division Technical Handbooks.

Energy standards and guidance were last revised in May 2007, with a focus on reducing carbon dioxide emissions, in addition to the more traditional function of limiting energy demand. When changes were introduced in 2007, it was the intent that future reviews would retain the core methodology for assessing and delivering improved building performance.

Accordingly, this review retains the familiar layout, structure and current methodology introduced in May 2007. Standards and guidance are updated or expanded only where this is required to assist in the delivery of an improved level of building performance, to give the intended 30% improvement over 2007 standards.

### Summary of changes

The following is a summary of the key changes proposed to current standards and guidance. Items highlighted in **bold** represent proposals amended or introduced following consultation.

#### Section 6 (Energy) – Domestic

- Standard 6.1 – standard updated to reflect changes to standard 6.9 in January 2009. No effect on guidance.
- Clause 6.1.2 - revisions to deliver 30% aggregate improvement on Target Emissions Rates. Amended fuel package table, revising fabric values and control specification; application of LCE component; **proportionate approach to solar thermal provision within target setting**; specification of reduced infiltration rate and increase in low energy lighting; alternative approach for solid mineral fuel; **specification of thermal bypass parameter**.
- Clause 6.2.1 - improved fabric backstops for newbuild; proposal to address performance of cavity separating walls.
- Clause 6.2.3 - revised guidance on limiting non-repeating thermal bridging & revision of current Accredited Construction Details document (intent to retain simple means of showing compliance using a simple Y-value calculation rather than a default value).
- Clause 6.2.4 - expanded guidance on limiting uncontrolled air infiltration, including reference to standard 3.14 where very low infiltration rates proposed.
- Clause 6.2.5 - introduction of airtightness testing regime.
- Clause 6.2.7 - improved U-values for conversion of heated buildings (aligned with non-domestic proposals).
- Clause 6.2.8 - expanded guidance on how to address energy performance in conversion of older buildings.
- Clause 6.2.9 - **improved fabric backstops for extensions**; alternative approach for highly-glazed extensions; **improving existing buildings - guidance on building extensions to better U-values if existing building fabric values are poor**.
- Clause 6.2.12 - **Improved U-value for glazing in conservatories**, irrespective of area.
- Standard 6.3 - **comprehensive revision of guidance on heating and cooling systems, efficiencies and controls**. Guidance on services to standard 6.3 - 6.6



includes information based upon UK industry recommendations (developed by the Department of Communities and Local Government)

- Clause 6.3.4 – **expanded guidance on performance of heat pumps**
- Clause 6.3.6 - additional efficiency criteria for solar hot water systems.
- Clause 6.3.7 - expanded guidance on micro CHP.
- Clause 6.3.8 - new guidance clause on efficiency of heating system circulators.
- Standard 6.4 - limitation within standard on cooled pipes or ducts in domestic buildings removed
- Standard 6.5 - standard extended to include lighting in common areas of domestic buildings.
- Clause 6.5.0 - statement on conversions under regulation 4 corrected.
- Clause 6.5.1 - increase percentage of energy efficient lighting; revised minimum efficacy; addition of guidance on lighting in common areas.
- Clause 6.5.2 - new guidance clause on efficiency of external lighting.
- Standard 6.6 - standard extended to include ventilation and cooling systems in domestic buildings.
- Clause 6.6.2 - new guidance clause on efficiency of air conditioning systems.
- Clause 6.6.3 - new guidance clause on efficiency of mechanical ventilation systems.
- Standard 6.8 - standard extended to cover ventilation and cooling systems in domestic buildings.
- Standard 3.14 (ventilation) - revision of guidance under clauses 3.14.2 (Ventilation of dwellings) & 3.14.10 (Mechanical aids to ventilation) to recognise trend towards building tighter to limit infiltration.
- Issue of amended Accredited Construction Details (Scotland) 2010 (separate).

### **Section 6 (Energy) – Non-domestic**

- Standard 6.1 - standard updated to reflect changes to standard 6.9 in January 2009. No effect on guidance.
- Clause 6.1.4 - amendment of U-value for display windows; amended guidance on smoke vents; revised % guidance on rooflights to ensure TER more representative; clarification on % area for display windows.
- Clause 6.1.5 – **amended assessment of cooling within notional building**
- Clause 6.1.6 – **note on assessment of notional building where electrical heating used in proposed building**
- Clause 6.1.7 - update of overall Improvement Factor to deliver 30% improvement on 2007 standards; clarification of role of LCE benchmark.
- Clause 6.1.8 – **note on revised UK carbon factors for fuels**
- Clause 6.1.10 – **clause deleted as information within clause 6.1.2**
- Clause 6.1.10 (new) - **new guidance clause on provisions for shell and fit-out buildings**
- Clause 6.2.1 - improved fabric backstops for newbuild; proposal to address performance of cavity separating walls
- Clause 6.2.4 - improved fabric backstops for shell buildings; amended window & door area percentage for residential buildings

- Clause 6.2.5 - **revised guidance on limiting non-repeating thermal bridging & reference to Accredited Construction Details document**, where relevant to form of construction (intent that simple means of showing compliance retained using simple Y-value calculation rather than default value); guidance on shell buildings.
- Clause 6.2.6 - amended guidance on limiting infiltration
- Clause 6.2.7 - introduction of guidance on airtightness test methods and on who should carry out tests; **guidance on shell buildings.**
- Clause 6.2.9 - improved U-values for conversion of heated buildings (aligned with domestic proposals).
- Clause 6.2.10 - expanded guidance on how to address energy performance in conversion of older buildings.
- Clause 6.2.11 - improved fabric backstops for extensions; alternative approach to compliance.
- Standard 6.3 - **comprehensive revision of guidance on heating and cooling systems, efficiencies and controls.** Guidance on services to standard 6.3 - 6.6 includes information based upon UK industry recommendations (developed by the Department of Communities and Local Government)
- Clause 6.3.1 - limit to application of heating efficiency credits to existing buildings.
- Clause 6.3.2 - addition of efficiency information on biomass boilers; amended list of air distribution system types; addition of guidance on efficiency of heating system circulators and water pumps.
- Clause 6.3.6 - new guidance clause on gas and oil firing warm air systems controls.
- Clause 6.3.7 - new guidance clause on radiant heaters controls.
- Clause 6.3.11 – **guidance on improvement of existing services when carrying out related building work**
- Clause 6.4.3 - **guidance on improvement of existing services when carrying out related building work**
- Clause 6.5.1 - Introduction of guidance on minimum lighting efficacy; incorporation of revised guidance on existing buildings (previously 6.5.4).
- Clause 6.5.2 - Improved minimum efficacy for display lighting.
- Clause 6.5.3 - revised guidance on lighting controls.
- **Clause 6.5.4 – new clause on improvement of existing services when carrying out related building work**
- Clause 6.6.2 - revised values for cooling equipment energy efficiency ratios; subdivision of classes of cooling equipment; revised list of air distribution systems, revised SFP values and introduction of maximum pressure drop criterion.
- Clause 6.6.5 - **guidance on improvement of existing services when carrying out related building work**
- Standard 6.10 – revision to include sub-metering of buildings.
- Annex 6.C – **revised guidance on modular and portable buildings for standards 6.1 & 6.2**
- Annex 6.G – **new annex on improving existing building services when carrying out related building work.**

## ANNEX D - Final Consultation Report: Analysis and Recommended Action

### **INTRODUCTION**

Scottish building regulations set standards for the health, safety and welfare of persons in and around buildings. They also further both the conservation of fuel and power and the achievement of sustainable development. Building regulations apply to new buildings and to the alternation, extension and conversion of existing buildings. The regulations and their mandatory functional standards are supported by guidance, published in the Building Standards Division Technical Handbooks.

### **SUMMARY**

A consultation exercise commenced on the 30 June 2009 to seek comments on proposals to amend the guidance contained within the Technical Handbooks in Section 6 (energy) and minor changes to section 3 (environment). The closing date for the consultation was 2 October 2009. Consultation proposals were placed on the Building Standards Division (BSD) website and over 500 key stakeholders were invited to respond. Consultees were encouraged to respond on any aspect of the proposals but were specifically invited to comment on targeted issues.

The key objectives of the proposed amendments are the delivery of a 30% reduction in carbon dioxide emissions in new buildings and new building work. Consultation proposals also proposed limited measures which would apply improvement to existing buildings where new building work took place.

There were 82 responses to the consultation. A detailed analysis of the content of all the consultation responses has been carried out by the Building Standards Division (BSD) of the Scottish Government in consultation with the Building Standards Advisory Committee (BSAC) - Energy Working Party. The Division have considered the wide range of both general and detailed comments from consultation respondents.

The majority of respondents are offered positive comment on the review and the technical areas addressed. There was recognition of the need to improve the energy performance of new buildings as part of addressing the Government's agenda for addressing the challenges posed by Climate Change, with the need to improve existing building stock also flagged.

The analysis of comments did not identify any strong barriers or objections to the proposed changes, though some key stakeholders questioned the introduction of proposed changes, and attendant costs at this time, in the current financial climate.

The Building Standards Advisory Committee (BSAC) energy working party met on 5 November 2009 and 28 January 2010, firstly to review the responses received from the consultation exercise and approve the various recommendations included in this report, then to comment on revisions to proposed standards and guidance.

### **ACKNOWLEDGEMENTS**

We are grateful to all of the respondents who contributed their views on these proposals to review building standards.

## 1. THE CONSULTATION PROCESS

- 1.1 Before making or amending building regulations, Scottish Ministers are required to consult the Building Standards Advisory Committee (BSAC) and such other bodies as are considered necessary to inform on the matters under consideration. This exercise has been carried out through a BSAC Working Party and discussions have taken place with local authority verifiers and industry. Following consideration, by the Building Standards Advisory Committee (BSAC) energy working party, of proposed changes to the guidance contained in Section 6: energy of the Technical Handbooks, documents for public consultation were prepared.
- 1.2 The consultation on amendments to the technical guidance on energy within the Building (Scotland) Regulations 2004 and the supporting section 6 and section 3 of the Technical Handbooks aims to contribute to the Scottish Government's Climate Change Programme through the introduction of improved standards and guidance on carbon dioxide and energy performance under building regulations. Following from recommendations within The Sullivan Report – 'A Low Carbon Building Standards Strategy for Scotland, proposals seek to deliver a 30% reduction in carbon dioxide emissions from new buildings compared to the previous 2007 building regulations. This will deliver new buildings and building work which are more economical to operate due to a reduced energy demand for heating, hot water, lighting, ventilation and other fixed services. It will also encourage the development and uptake of construction solutions, including incorporation of building-integrated low carbon equipment (LCE), which will further the delivery of buildings with lower carbon dioxide emissions and energy demand. Further reviews of energy standards are programmed for 2013 and 2016.
- 1.3 The consultation exercise was issued to over 500 public, private sector and third sector organisations, NDPB's and individuals and interested parties identified and listed on the Building Standards Division (BSD) consultation database. The consultation documents were published on the BSD website as an electronic download, with paper copies issued to all individuals or organisations requesting a hard copy. Email notification of the consultation was also made to the 1500+ organisations and individuals who have registered with the BSD e-newsletter. All were invited to submit comments on the proposals made in the consultation paper by 2 October 2009.
- 1.4 The proposals issued for public consultation between 30 June and 2 October 2009 received a total of 82 responses, excluding duplicate submissions. After further inquiry, seven of the respondees requested that their details and/or comments should remain confidential.
- 1.5 Given the wide range of stakeholders affected by the proposals, it was encouraging to note that a greater number of responses than usual were made to the consultation proposals, with most key stakeholders (or representatives of their areas of interest) offering responses. This provides sufficient information to allow a full and detailed assessment on the comprehensive range of topics addressed within proposals.
- 1.6 The distribution of respondents is summarised by group and listed below:
- |                                      |           |
|--------------------------------------|-----------|
| <b>Contractor/Developer</b>          | <b>6</b>  |
| <b>Manufacturer</b>                  | <b>9</b>  |
| <b>Designer/Consultant</b>           | <b>7</b>  |
| <b>Interest Group</b>                | <b>3</b>  |
| <b>Advisory Body/Committee</b>       | <b>1</b>  |
| <b>Local Authority</b>               | <b>16</b> |
| <b>Professional or Industry Body</b> | <b>24</b> |
| <b>Individual</b>                    | <b>3</b>  |
| <b>NDPB or Agency</b>                | <b>3</b>  |

**Other\*****10**

\* 'Other' includes software providers, standards/accreditation/training organisations and energy/fuel providers.

**2. The Consultation Responses**

Annex E of the consultation posed a range of questions on proposals as well as welcoming general comment. Questions 1 to 22 were on specific topics whilst Question 23 allowed respondents to offer comment on any aspect of the review.

2.1 A summary table of responses by question is noted below. This indicates both the percentage split of those respondents giving a view and the percentage of all respondents offering comment.

Summary of responses to questionnaire	Yes	No	Comment made	No response
<b>Issues relevant to all buildings</b>				
1	-	-	<b>31 (38%)</b>	<b>51 (62%)</b>
2	-	-	<b>43 (52%)</b>	<b>39 (48%)</b>
3	<b>44 (85%)</b>	<b>8 (15%)</b>	<b>24 (29%)</b>	<b>30 (37%)</b>
4a	<b>39 (81%)</b>	<b>9 (19%)</b>	<b>35 (43%)</b>	<b>34 (41%)</b>
4b	<b>30 (64%)</b>	<b>17 (36%)</b>	See 4a	<b>35 (43%)</b>
5*	<b>30 (54%)</b>	<b>26 (46%)</b>	<b>46 (56%)</b>	<b>27 (33%)</b>
6a	<b>19 (36%)</b>	<b>34 (64%)</b>	<b>25 (30%)</b>	<b>29 (35%)</b>
6b	-	-	<b>20 (24%)</b>	<b>62 (76%)</b>
7	<b>34 (76%)</b>	<b>11 (24%)</b>	<b>38 (46%)</b>	<b>37 (45%)</b>
8	<b>46 (92%)</b>	<b>4 (8%)</b>	<b>20 (24%)</b>	<b>32 (39%)</b>
9a	<b>48 (86%)</b>	<b>8 (14%)</b>	<b>55 (67%)</b>	<b>26 (32%)</b>
9b*	<b>36 (75%)</b>	<b>12 (25%)</b>	<b>40 (49%)</b>	<b>35 (43%)</b>
9c	<b>28 (60%)</b>	<b>19 (40%)</b>	<b>24 (29%)</b>	<b>35 (43%)</b>
<b>Issues relevant to domestic buildings</b>				
10	<b>12 (24%)</b>	<b>38 (76%)</b>	<b>34 (%)</b>	<b>32 (39%)</b>
11	<b>43 (88%)</b>	<b>6 (12%)</b>	<b>19 (%)</b>	<b>33 (40%)</b>
12	<b>49 (88%)</b>	<b>7 (12%)</b>	<b>51 (%)</b>	<b>26 (32%)</b>
13*	<b>33 (63%)</b>	<b>19 (37%)</b>	<b>36 (%)</b>	<b>29 (35%)</b>
14a	<b>43 (88%)</b>	<b>6 (12%)</b>	<b>25 (%)</b>	<b>33 (40%)</b>
14b	<b>30 (67%)</b>	<b>15 (33%)</b>	<b>18 (%)</b>	<b>37 (45%)</b>
15	<b>16 (34%)</b>	<b>31 (66%)</b>	<b>35 (%)</b>	<b>35 (43%)</b>
16*	<b>47 (96%)</b>	<b>2 (4%)</b>	<b>13 (%)</b>	<b>32 (39%)</b>

Summary of responses to questionnaire	Yes	No	Comment made	No response
<b>Issues relevant to non-domestic buildings</b>				
17*	33 (79%)	9 (21%)	19 (23%)	40 (49%)
18a*	33 (73%)	12 (27%)	36 (44%)	37 (45%)
18b	26 (59%)	18 (41%)	27 (33%)	38 (46%)
19	29 (72%)	11 (28%)	12 (15%)	42 (51%)
20*	38 (95%)	2 (5%)	23 (28%)	42 (51%)
21	39 (93%)	3 (7%)	29 (35%)	42 (51%)
22	31 (78%)	9 (22%)	9 (11%)	42 (51%)
<b>General comments</b>				
23	-	-	61 (74%)	21 (26%)

\* One respondent answered 'yes' and 'no' to these questions.

2.3 The total of 82 responses represents a welcome improvement on anticipated response levels. This is understandable, due both to the general interest in proposals developed from the Sullivan Report recommendations and, hopefully, from the series of three awareness seminars held during the consultation period.

2.4 In analysis of the responses, it should be noted that there are close similarities in a number of responses received, from some industry, manufacturer and interest groups and from some local authorities. Whilst this fact is noted here, it is not proposed to apply any corrective factor to analysis in response. This is simply taken to indicate generally similar views from a range of connected stakeholders, which is to be anticipated. Accordingly, where duplicate comments are received from different organisations, these are counted separately but may be identified as such within commentary text.

2.5 A detailed analysis of issues raised by the consultation and recommended action is provided under items 3 to 6 of this paper.

### 3.0 ISSUES COMMON TO ALL BUILDINGS - ANALYSIS AND RECOMMENDATIONS

3.1 The following is a summary of the general trends and main issues raised by respondents. Whilst not every comment is represented in summary, all relevant issues are noted for discussion and consideration. A course of recommended action in response to issues raised was discussed by the BSAC Working Party and is proposed following analysis for each question. Numbers shown in brackets indicate number of response comments on a particular topic.

#### 3.2 Question 1

##### Q.1 Review of current UK methodologies and National emission factors

As noted in the introduction to Annex B of this consultation, the Scottish Government will be maintaining dialogue with the UK Government on the review of SAP 2009, National fuel emission factors and the review of the SEDBUK scale. Consultees are invited to share any comments they have on the DECC review as this relates to Scottish building standards and guidance and within standard 6.1 in particular.

**Are there any issues arising from the DECC consultation that you wish to**

## highlight relative to this review?

31 respondents out of 82 raised issues relating to the current review of SAP, SEDBUK rating scale and revision of carbon factors for fuels. Most issues raised were related to technical aspects of the DECC/BRE review. All consultation responses to this question were passed on to DECC and BRE to ensure awareness of any comments not already made in direct response to the SAP consultation.

Issues raised included:

- General concern over timescale for SAP review and timely availability of revised methodology and software, which also limits current assessment and comment (8, some replication)
- Both commentary of potential for adopting user, climate and emission data which is more relevant to Scotland (4, verifier and interest groups) and support for maintaining UK methodology (2 manufacturers)
- Better recognition of linkage of passive and mechanical ventilation to address air quality and overheating; recognition of 'adaptive comfort' when evaluating peak temperatures; consideration of smart meters and similar measures that can effect behavioural change (4, developers & industry bodies, some replication)
- Ensuring methodology allows use of authoritative user-established Psi values; request to consider surface mass within thermal mass assessment (2, developer replicates responses)
- Improved modelling of solar management and highly glazed design solutions (6, inc. developers, manufacturers & industry body some replication); better recognition of solar shading including dynamic systems such as window blinds (trade association).
- Support SAP output report to assist with ensuring compliance (5, manufacturers & industry body, some replication)
- Disagreement with carbon factor and assessment method used for grid electricity (2, industry body and energy provider); concern over wide ranging impact this may have over many policy areas.
- Concern over effect revision of SEDBUK scale may have (3, manufacturers); also noted in context of forthcoming EU Energy Using Products Directive
- Concern over proposals for assessing oil-fired combi boilers (2, manufacturers)
- Noted that some developer assessments of proposed fuel packages under SAP 2005 do not achieve 30% improvement; query if part of improvement is inherent in SAP revisions (1)

Most of the issues raised in response to the consultation question relate primarily to the DECC review rather than on specific effects on proposals to revise Scottish building standards. There remain mixed views on development of further use of regional data. The most common concern is the availability of the revised SAP in time to allow assessment to take place. However, comments have also highlighted a need for improved communication and information on developments relating to SAP for stakeholders.

### Recommended Action

**BSD to continue engagement with DECC and BRE on development of SAP 2009, SEDBUK scale and carbon factors for fuels.**

**Discuss these and other SAP consultation responses as part of DECC SAP review group so that final proposals consider the full UK and Scottish agenda.**

**Determine and advise stakeholders on timescale for availability of SAP 2009 so that software for Section 6 compliance is available during the lead-in time of the 2010 Technical Handbooks.**

**For implementation, improve online resources to inform stakeholders on development with SAP and related issues applicable in Scotland; publish research supporting final fuel package proposals, demonstrating how the intended 30% improvement is met.**

### 3.3 Question 2

#### **Q.2 6.2.1 D & 6.2.1 ND – Guidance on thermal performance of cavity separating walls**

Research has identified that previously unanticipated heat losses can occur through cavity separating walls between buildings unless action is taken to limit air movement. This issue is being addressed within revisions to the UK calculation methodologies and revised guidance on limiting heat loss in such constructions will be provided within the Technical Handbooks.

Given that information on both the extent of this issue and the degree to which it can be mitigated by construction solutions is still being gathered, comment from consultees is welcomed.

#### **Do consultees wish to offer comment on this issue?**

43 respondents out of 82 offered comment on the issue of thermal bypass and current knowledge of this issue and proposed reaction within methodology and guidance to this heat loss mechanism.

Given that this is a topic not previously addressed, the principle issue raised was the need for clear and practical guidance on solutions, supported by research to ensure that any solutions (and the manner in which this issue is addressed within methodologies) are correctly assessed and effective. Solutions should consider the need to address related issues of fire and noise.

Issues raised included:

- Call for further research into extent of heat loss, particularly in non-masonry cavity constructions – more relevant to Scotland (10, general, some replication)
- Further development of relevant guidance on simple, buildable specification under standard 6.2 to better enable both design & verification (6, general, some replication)
- Solutions need to consider fire (1) and noise performance (7, general)
- Issue needs addressed within both domestic and non-domestic methodologies; benefit from addressing issue should not be incorporated into TER (2. manufacturer and energy assessor)
- Issue should be considered within revision of Accredited Construction Details (4, general)
- Detailed technical commentary and offer of joint working to research solutions (manufacturer)
- Suggest cavity fill become mandatory in new buildings (NPPB)

#### **Recommended Action**

**More information on this mechanism, assessment of effect within methodology and effective solutions is needed.**

**BSD to engage with CLG, BRE and industry. Develop guidance on this issue.**

**Consider incorporation of this element for party walls within revised Accredited Construction Details. Consider further research on this topic to inform future reviews.**

### 3.4 Question 3

#### **Q.3 6.2.3 D & 6.2.5 ND – Use of ‘Accredited Construction Details’ – determining Y-value.**



For low-rise domestic buildings, or non-domestic buildings using similar forms of construction, previous guidance included the option of ascribing a design Y-value of 0.08 within SAP or SBEM for heat loss from non-repeating thermal bridging, where it could be shown that the recommendations within the 'Accredited Construction Details' (ACD) document are followed.

It is proposed that a simple approach be retained but that, instead of a single default value, the Y-value should be calculated using the lengths of each thermal bridging element and  $\Psi$ (psi)-values for individual junction details, as set out in a revised ACD document. This will provide a more representative value for heat loss through non-repeating thermal bridging and also encourage more understanding of the principles involved in both design and construction of buildings to address this issue.

**Do consultees agree with this approach? If no, please give your reasons.**

44 out of 52 respondents (85%) who expressed a view on this issue supported the approach taken in the consultation document.

24 respondents out of 82 (29%) offered comment on the proposed approach.

Respondents were, on the whole supportive of the proposals (which accords with the removal of a single default value proposed both within SAP and in England & Wales).

The principle comments related to the need for awareness and training as this topic is not as widely recognised and understood as more established construction practices. For proposals to be effective, the need for verification both at design and construction stages was noted. Greater clarity on the applicability of ACDs to less 'traditional' non-domestic construction forms was also sought.

Issues raised included:

- Concern any proposals will not be effective without training; need for training (2, general)
- Clarification needed if proposal applies to SAP and SBEM (3, local authority, replicates); qualification on applicability to building forms needed
- Concern that monitoring/checking may be difficult without some form of accreditation scheme (standards organisation)
- Suggest verifiable, prescriptive solutions where default value is not used
- View that ACD for non-domestic buildings not necessary, nor practical, where products and systems have standard details and values, not cost effective as savings in many forms of non-domestic buildings are quite small (2, manufacturers, replicates)
- Do not support simplified method (Psi to Y conversion) for non-domestic buildings due to potential complexity of modelling unless this can be 'automated' by methodology (manufacturer).

### **Recommended Action**

**In taking forward proposals, which were strongly supported, BSD should offer clear and concise guidance on calculation is offered and that this aligns with the relevant carbon methodology.**

**In addition to any methods of calculating heat loss through linear thermal bridging, develop guidance on principles. Example solutions and details are essential to promote understanding and correct application (see also Q.4).**

### **3.5 Question 4**

**Q.4 6.2.3 D & 6.2.5 ND – 'Accredited Construction Details' – revised guidance document.**

The Accredited Construction Details document, used primarily for domestic

buildings, will be revised to provide better information on both the principles behind limiting non-repeating thermal bridging and air infiltration and on how these can be applied and demonstrated to allow specified performance levels to be claimed. The focus is now more on application of principles in both design and construction and less on use of specific details.

A draft of the revised introduction to the document forms an annex to amended domestic guidance and comment on the form and content of the document are invited. It is intended that the option of a simple approach to these construction issues should be retained, focussing upon explaining clearly and concisely what needs to be considered to allow designer, builder and verifier to apply and assess these principles successfully and address heat lost in this manner whilst also addressing the related issue of condensation.

**Q.4a Does this document clearly explain the issues which have to be addressed?**

**Q.4b Does this document give clear guidance on how to address those issues?**

**If no to either of the above, please identify where improvement should be made. General comments are also requested.**

39 out of 48 respondents (81%) who expressed a view on 4a considered information on issues to be addressed was clearly explained.

30 out of 47 respondents (64%) who expressed a view on 4b considered information on what action to take was clearly explained.

Given that the document presented is an incomplete draft of proposals, focussing on introductory principals, it was expected that views on information on action to be taken to address linear thermal bridging and infiltration would be less positive. This highlights the need to take forward the further work programmed to deliver a final document and revised suite of details that fully explains principles in the context of differing, typical, current constructions.

35 respondents (43%) offered comment on the proposed approach. The strongest representation was on the need to develop a wider set of representative, buildable details to illustrate principles, with supporting text and illustrations that clearly identify what is needed if the intended performance is to be achieved. The need for verification of design proposals during the construction phase was also stressed, as was flexibility rather than overt prescription on acceptable solutions.

Issues raised included:

- Consider other information provided on this topic (2, advisory body & individual), e.g. CLG in England & Wales and alternative enhanced details produced by the EST
- Quality and consistency of diagrams should be improved (6, local authority and professional body, some replication); details should be simple, generic and illustrate principles
- Greater coverage of differing constructions and junction details is needed; details have to be buildable and representative of achievable, current constructions to avoid practical difficulties and possible compliance issues (7, manufacturers and developers, some replication); details must consider more than thermal performance (2)
- Note the need for verification of work constructed on site (4, general, some replication)
- Use of user-assessed Y-values should be allowed and not be unnecessarily penalised (3, developer and industry bodies)
- View that ACD for most non-domestic constructions not needed, nor practical, where products and systems have standard details and values, not cost effective as savings in many forms of non-domestic buildings are quite small (manufacturer)
- Details should advise on suitability of materials in critical situations (example- timber cavity closers) (4, local authorities)

- Details should promote best practice – this is not evident yet (professional body)
- Both support for emphasis on application of principles before need to introduce accreditation schemes and for accreditation scheme per England & Wales, to assist in ensuring intended performance
- Identification of materials to deliver performance should, where possible, be generic; specify resistance rather than thickness of insulating elements (manufacturer)
- Accredited details should consider the range of climatic conditions encountered in Scotland to ensure both compliance and intended performance (individual)

### Recommended Action

**The revised Accredited Construction Details document will be essential to proposals for 2010. Make these available during the lead-in time for the new Technical Handbooks.**

**In addition to continued technical advice on the building physics issues arising, development of document should be taken forward in close partnership with the intended user groups – designers, verifiers, manufacturers and builders.**

**Consideration should also be given to alternate information sources and solutions.**

### 3.6 Question 5

#### **Q.5 6.2.5 D & 6.2.7 ND – Airtightness testing as an aid to determining compliance.**

To assist in determining compliance with both energy standards and ventilation provision, guidance for 2010 proposes the introduction of sample airtightness testing for all new buildings.

**Do consultees consider the recommendations given on testing regime, advice on test method and on those who should carry out testing are appropriate?**

30 out of 56 respondents (54%) who expressed a view on this issue considered the recommendations appropriate.

46 respondents (56%) offered comment on the proposed approach.

Despite the near equal split in opinion in answer to the consultation question, there was broad support for the introduction of airtightness testing as a means of assisting compliance. However, a range of issues were raised for consideration. The principle concern was improvement of guidance on both how to go about the testing process and what actions to take where tests fail. There was a significant minority view that a default value of 15m<sup>3</sup> should not be considered. Clarity on application of guidance to single or multiple developments and on who can undertake tests was requested as well as the suggestion that the benefits of thermal imaging as an aid to compliance could be considered.

Issues raised included:

- Need for this issue to be better understood by those involved in design and construction
- Improved and more detailed guidance on testing regime, responsibilities and methods used (9, local authorities and developers, some replication)
- Guidance on procedure where test failure occurs (9, local authorities and developers, some replication); need to identify poor (or too high) performance early enough to allow remedial work
- Disappointed that default infiltration value can be used (6, manufacturers and interest groups, some replication)
- Should sampling regime vary dependant upon construction used? (2); or development size; concern over cost of testing
- Concern that, where default value used, inspection regime may need increased (4, local authorities, some replication)

- Important that testers are competent and independent (2); consider accreditation scheme (4); need for accredited persons to be involved in design; recommend establishing that there are enough competent testers available prior to implementation; additional guidance on who can undertake tests (6, general)
- Consider airtightness testing in concert with thermal imaging (5, manufacturers and consultant, some replication)
- Does sample testing make low infiltration 'optional' – test all buildings or all within specified criteria, promoting better passive solutions?
- Why no mandatory backstop value for airtightness, particularly for non-domestic buildings?
- Consider the benefits of post-occupancy evaluation in determining performance

### Recommended Action

**There is broad support for the introduction of airtightness testing but a need to review and improve guidance on the topic, given that this will be a new element for many involved in the design & construction process to consider.**

**Review guidance on basis of comments. Proposals fundamentally accepted but some clarification would be beneficial.**

**In respect of calls for additional guidance on issues such as sampling regime, flexibility and remedial action – suggest this should be developed not by BSD, but by verifiers working together, if a consensual need for this arises. Potential to create supplementary document.**

**Consider issue of default infiltration value and absence of backstop value in future review, consultation intent considered valid for 2010.**

### 3.7 Question 6

#### **Q.6 Standards 6.3 to 6.6 Domestic & Non-domestic – specification of equipment efficiencies and controls.**

Following the principle adopted in 2007, recommendations on efficiency and controls for building services in guidance to standards 6.3 to 6.6 reproduce information, developed for the building service compliance guides which support building regulations in England & Wales. Recommendations prepared by the Department for Communities and Local Government (DCLG) follow discussion & development with UK industry. The intent remains to provide a consistent set of performance recommendations, representative of practices achievable within the current UK/European manufacturing base.

#### **Q.6a Standard 6.3 - would it be beneficial to have guidance on any other forms of heating provision? If yes, please give details.**

Q.6b In addition to specific questions identified under these standards, comment on any aspect of the revised information presented in proposals is welcomed.

19 out of 53 respondents (36%) considered further guidance on other forms of heating systems would be beneficial.

25 respondents (30%) offered comment on the additional guidance (Q.6a) - this included a small number of comments supporting the level of information currently proposed - whilst 20 respondents (24%) offered comment on other issues within guidance to standard 6.3.

For question 6a, the focus was primarily on less established, low carbon solutions that are likely to become more attractive and prevalent as a result of improved energy standards and the need to provide a route to the verification and acceptance on newer, innovative solutions within calculation methodologies.

Issues raised on other forms of heating included:

- District Heating solutions
- Guidance on range stoves
- Exhaust heat air pumps (2, replicates); air to air heat pumps
- Gas turbine CHP solutions (2, replicates); micro CHP (2, replicates); larger CHP installations
- Note scope for alternative solutions, including improving SAP Appendix Q route (4, manufacturers and developers, some replication)
- Clarify/ prominence of guidance on heat pumps (2); more guidance on renewable technology
- Review recommendations in 6.3.7 on HPER value to suit SAP 2009 and to reflect oil or LPG solutions
- Reference to bio-liquids and bio-liquid blends (industry body)
- Micro-Hydro (energy assessor)

For question 6b, the focus was primarily on ensuring consistency with recommendations elsewhere in the UK. Given that proposals continue the established use of information from the building services compliance guides produced by CLG, it is important that this be so, with any variations clearly identified and qualified. A specific comment on the minimum coefficient of performance of heat pumps was raised by several respondents, in general and in the context of operation in the colder Scottish climate.

Issues raised on heating-related issues included:

- Avoid making guidance overly complex
- Concern that SEDBUK review may result in no boilers meeting 90% efficiency
- Cost implications in providing systems to improved standards
- Promote simplicity in control systems; consider solutions such as smart metering which promote behavioural change and allow for in SAP (2, developer & industry body, replicates)
- Can consideration be given to inefficiencies arising from complexity of multi-dependant systems (developer)
- Minimum coefficient of performance for heat pumps appears too low (5, some replication); clarify how minimum CoP should be assessed, given low temperatures occurring in Scotland (3, General)
- Increased content from England & Wales compliance guides (which form the source of recommendations in guidance); ensure consistency with England & Wales (3, manufacturers) given common reference (esp. 6.3.9); examples of variation given
- Consider third party certification of innovative technologies to ensure performance (e.g. existing Microgeneration Certification Scheme) (certification body)
- Recommendations for lighting controls (6.5) of limited ambition – suggested alternative offered for discussion (industry body)
- Consider benefits of variable speed pumps in guidance and methodologies
- Ensure no confusion arises from reference to gross and net calorific values
- Should seasonal efficiency for boiler replacement be higher?
- Consider guidance on accessibility of heating controls; consider advice on low surface temperature emitters to avoid injury (interest group)

### **Recommended Action**

**Given continued use of recommendations produced by CLG in partnership with UK services industry, discuss issues raised with CLG, BRE and industry partners to give, where practicable, responses to issues raised within revised guidance.**

**Review comments in context of current research programme to determine what further supporting information, specific to Scotland, can be identified. Consider, also, future research programme in this area.**

### 3.8 Question 7

#### **Q.7 Standard 6.6 Domestic & Non-domestic – Mechanical ventilation and air conditioning**

*[note this issue is related to Q.18 (clause 6.1.8 ND) on target setting for non-domestic buildings]*

Current Non-domestic guidance addresses system efficiency for air conditioning and non passive cooling technologies, whilst similar guidance is proposed for domestic buildings. Guidance in clause 6.6.1 offers advice on use of design solutions to mitigate the need for cooling. However, such solutions are less applicable when dealing with existing buildings. There is a view that more should be done to encourage low energy and passive cooling solutions, particularly with a Scottish climate which, alone, generates little need for cooling.

**Where cooling needs cannot be mitigated by other means, should this standard also consider guidance to limit the intensity of energy used for cooling?**

Any such guidance would be in addition to provisions made to meet standard 6.1. One example suggested is that cooling load (above a defined threshold) is offset by an equivalent capacity for on-site generation of electricity using Low Carbon Equipment (LCE).

**If yes, what mechanisms might be appropriate in this respect and what parameters might be applied?**

34 out of 45 respondents (76%) who expressed a view on this issue considered it would be beneficial to have a further mechanism to limit the intensity of energy used for cooling in some manner.

38 respondents (46%) offered comment on the proposed approach.

There was a significant majority view to limit cooling intensity. However, in commentary on the issue, opinion was split fairly evenly on how to best achieve this with roughly equal representation for passive solutions though either design or specification of lower energy systems and strategies against offsetting through the use of on or off-site generation or other allowable solutions. A small number of respondents also expressed the view that cooling should not be considered in isolation and one recommended addressing, where relevant, through TER (standard 6.1) to allow greater flexibility in possible solutions.

Issues raised included:

- Preference is to reduce energy demand rather than offsetting cooling load (2); focus on design solutions using passive elements, where possible (8, local authorities and designers, some replication) – better natural ventilation, reducing load with vented fabric, fixed and dynamic shading – add to methodology; lower energy solutions
- Consider offset - introduce further low carbon or generating solutions (9, general); solutions should be simple and not burdensome; include offsite/allowable solutions (2)
- No comment on issue, but consider need to limit noise from system operation
- Take holistic design view, not isolated issue with bolt-on solution (2, consultants)
- Improve performance of systems where load is higher; introduce CoP for air conditioning as for heating (5, manufacturers and interest group/consultant, replicates)
- Preference would be to tighten TER for air-conditioned buildings to allow flexibility in solution (consultant)

- Lack of control in some heating solutions may contribute to need for cooling; after passive measures, improve controls and user behaviour to minimise cooling needs.

### Recommended Action

**There is a strong feeling that cooling loads could be addressed in a more robust manner, though no practical solution is identified.**

**In the absence of a clear steer from consultees, BSD reviewed potential solutions and determined that there is currently limited scope to address this issue in context of existing methodologies without further research. Investigate potential of encouraging improved cooling within notional building under standard 6.1 and further guidance on design-led solutions under standard 6.6.**

**Flagged for future consideration: methods of addressing through standard 6.1 (only affects new buildings); provision of further guidance and design advice on passive and lower energy solutions; and guidance on offsetting energy load using LCE.**

### 3.9 Question 8

#### **Q.8 Standard 6.6 – Mechanical ventilation and air conditioning. Guidance on ductwork design & installation.**

The design of the ductwork can be a significant factor in the efficient operation of a ventilation system. Currently, this issue is not addressed in guidance to standard 6.6, other than recommendations on maximum pressure drops for non-domestic installations.

Would consultees consider it beneficial for brief guidance on the design and installation of ductwork to be included in the Technical Handbook?

**If no, please give your reasons**

46 out of 50 respondents (96%) who expressed a view on this issue supported provision of guidance on design and installation of ductwork.

20 respondents (24%) offered comment on the approach which might be adopted.

The majority of comments focussed upon referencing either existing industry guidance or guidance prepared for AD L in England & Wales.

Issues raised included:

- Brief summary of issues and link to existing HVAC or CIBSE guide (3, general); industry standards continue to evolve
- Include reference to control of noise and vibration (2)
- Refer to work being undertaken for England & Wales guide (5, manufacturers and industry body, some replication)
- Guidance for larger heavily serviced buildings; current proposals verging on the impractical
- Include training in operation and maintenance issues

### Recommended Action

**BSD are currently reviewing use of E&W documentation on this issue to maintain consistent UK guidance on service issues. Develop proposals for referenced guidance with CLG, industry partners and verifiers.**

### 3.10 Question 9

#### **Q.9 Mechanisms for improving the energy performance of existing buildings**

### **when new building work is being undertaken**

Details of these proposals, set in the context of wider policy development to address improvement in the energy performance of our existing building stock, can be found in Annex D of the consultation package, where these questions are also repeated.

Given the prominence of this issue within the consultation and the level of comment, analysis looks at the three question areas separately before offering an overview summary.

#### **Q.9a Principle of requiring improvement triggered by building works**

These proposals introduce the principle of requiring additional improvements to the energy performance of an existing building, with new building work acting as a trigger. Do consultees agree with this premise?

**Please comment on your choice.**

48 out of 56 respondents (86%) who expressed a view on this issue supported the introduction of a mechanism to improve energy performance when extending existing buildings.

55 respondents (67%) offered further comment to support their view.

Three quarters of respondents viewed this as a positive proposal, though there were some concerns over how measures might be achieved and the extent of benefits that may be gained as well as recognition of potential for other solutions under the Climate Change Act. Issues of equitability and further comment are made under 9b and 9c.

In addition to numerous comments in support of the premise, issues raised included:

- Ideal time to improve, when carrying out other works; scheme in Essex under planning legislation where 10% of development cost spent upon improvement (individual)
- Difficulties in assessing performance of existing buildings (3, local authorities)
- Financial incentives may be required (4, developers and local authorities)
- Proposals may have little impact on building performance (2)
- Support objective but concerns that this may not be the appropriate route; further review of any such proposal needed
- Improvements to existing building should consider practicality and reasonable cost (3, general)
- Promote fabric improvements to reduce energy demand (manufacturer)
- Upgrade to controls can be simple and very effective – this general principle should be applied more widely (industry body)
- Consider benefits of replacement of poorer buildings with new properties (2, developers)
- Too narrow an approach to tackle climate change?

#### **Q.9b. Equitability**

Do consultees agree that the mechanisms proposed for improving the energy performance of existing buildings when new building work is being undertaken are equitable and in the spirit of the Sullivan Report recommendation?

**Please comment on your choice.**

36 out of 48 respondents (75%) who expressed a view considered that proposals were equitable.

40 respondents (49%) offered further comment on the proposed approach.



Again, three quarters of respondents viewed proposals as equitable, though there were some concerns over equitability and narrow focus of proposals. Concerns, which were in a minority, are similar to those expressed under 9a. Further comments are made under 9c.

In addition to numerous comments in support of the premise, some issues of concern were raised, included:

- Does not address improvement when undertaking minor works
- Not equitable for domestic – costly, may affect viability, administrative burden?
- Too narrow a focus, consider % cost of works used to improve?
- Also need to encourage other, simpler, cost effective improvements at the same time (professional body))
- Will this unreasonably penalise those who choose to develop?
- Perhaps not equitable or simple enough (2); does not engage with householders?
- More equitable for larger projects
- Equitable if funding is available (2)
- Should highlight issues and encourage improvement first
- Concern proposals do not go far enough – scope limited
- Consider phased approach to improvement in line with other work arising from the Climate Change (Scotland) Act 2009

#### **Q.9c. Extent of proposed improvements**

If consultees agree with questions 1 and 2, are you content with the measures proposed?

**If not, please give details of your concerns**

28 out of 47 respondents (60%) who expressed a view on this issue were content with measures proposed in the consultation document.

24 respondents (29%) offered comment on the measures proposed.

Whilst support for proposed measures is not as strong as support for principle or equitability, comments remain generally positive. Commentary on possible issues reflects those in 9a & 9b.

Issues raised included:

- Concerns over additional resource implications to support assessment; little impact on building performance and does not address more common inefficiencies in buildings (local authority)
- May be a disincentive to carrying out work
- Proposals not sufficiently developed; good first step?
- Effect complexity may have on compliance is a concern; consider 10% budget rule? (3, manufacturers)
- Why not focus on better standards for new buildings work
- Proposals represent further divergence between Scottish and other UK standards (manufacturer)
- Support proposals – consider benefits of using accredited persons to assist in assessment? (4, manufacturers/consultant & industry body, replicates)
- Consider replacement of chillers and boiler on the basis of efficiency rather than age? (professional body)

#### **Recommended Action**

**There is strong support to introduce provisions to require improvement in the energy performance of existing buildings. A range of issues relating to the proposed mechanism have been identified and many of these merit further investigation.**

**BSD propose to introduce proposals principally as consulted upon - consider any refinements needed to improve application. Look also at potential for further enhancement in 2013.**

**Improvement of existing building stock is recognised as an essential component in addressing Climate Change. Work should include further assessment of revised proposals and their compatibility with proposals triggered by building work within the overall agenda set out under s.63 & 64 of the Climate Change (Scotland) Act 2009.**

### **3.11 Misconceptions (general issues)**

In reading the consultation responses, a high level of understanding of the topics discussed was evident, with only a few areas where some respondents had misunderstood intent. These are noted below. There were, however, a number of areas where respondents identified that guidance on intent might be clearer and these are generally noted within the analysis above.

- Changes to SAP and SBEM. To clarify, use of SBEM for domestic buildings does not form part of the review agenda. SAP remains the UK methodology for dwellings.
- Thermal bridging and Accredited Construction Details. Differing construction types will be addressed – consultation published the draft of the introduction only. Accreditation of details will be needed – intention is to allow claimed values where it is clear principles are followed.
- Heating. SEDBUK efficiency concern – consultation noted that any changes in scale would be reflected in amended recommendations in guidance.

## **4. DOMESTIC GUIDANCE - ANALYSIS AND RECOMMENDATIONS**

### **4.1 Question 10**

#### **Q.10 Standard 6.1 - Emissions standards for smaller dwellings**

Whilst recommending a 30% saving in carbon dioxide emissions, The Sullivan Report expressed concern over the effect such improvements might have on the affordability of certain house types, notably small flats purchased by key-workers and first time-buyers.

**In recognition of this, should guidance be considered on the application of a smaller emissions reduction to such dwellings in 2010?**

The majority of respondents, 38 out of 50 (76% of those who provided a response to this question), did not support this proposal, principally on the basis that all dwellings, irrespective of size, should be required to meet the energy standards. The main reasons given for this included:

- concerns that a two-tier system would develop in the housing market;
- adds to the complexity of the system;
- potential issues with developers producing more lower cost dwellings in the market, creating a disparity;
- the proposal is inequitable and the same standards should apply to all dwellings irrespective of size and type; and
- a large number of dwellings producing slightly more emissions can have a significant impact on the overall emissions reduction achieved.

Of the remaining respondents, 12 supported the proposal and 32 did not provide a response. However, of the 12 who supported the proposal, three suggestions were received on how smaller dwellings might be defined:

- For dwellings of 75m<sup>2</sup> or less, lower the carbon reduction to 25%.
- For flats and smaller 2 and 3 bedroom semi-detached dwellings, a carbon reduction of 15%.
- Smaller dwellings could be defined as two apartment dwellings or less, having an area not exceeding 50m<sup>2</sup>.

#### **Recommended Action**

**BSD intend to follow the majority view of respondents, applying the same emissions reduction target to all dwellings.**

### **4.2 Question 11**

#### **Q.11 6.1.2 – Fuel package tables (secondary heating).**

In current consultation proposals, the application of default secondary heating (10% electric unless otherwise specified) when calculating Target Emissions Rate (TER) is maintained. On the basis that modern homes no longer require secondary heating, such a provision seems unnecessary and also misrepresents CO<sub>2</sub> emissions associated with new homes.

It is suggested that the application of a default 10% electric secondary heating is removed from both the target and design calculation. Accordingly, secondary heating would only be identified in target setting for oil and LPG fuels as a means of mitigating the TER and, in design (under clause 6.1.3), use of secondary heating would be solely at the discretion of the applicant.

**Would consultees agree with this approach?**

The proposals were supported by 43 (88% of those who provided a response to this question). Most considered this to be a sensible approach on the basis that secondary heating was not always a design requirement and was only really a requirement for dwellings heated with, for example, weather dependent systems such as solar heating.

A few respondents did, however, oppose this suggestion believing that it would make the calculation more onerous and compliance more difficult. However, there remains an issue of equitability for those dwellings heated with a fuel, such as gas, where the inclusion of a secondary heating element would not be included in the TER but would in the DER, making it more difficult to comply.

#### **Recommended Action**

**Based on the responses, consideration should be given to removing secondary heating as a default element of the TER calculation.**

**For the purposes of equitability, consider potential to allow secondary heating to continue to be included in calculations for both the TER and DER when it forms part of the proposed design or is needed for target setting.**

### **4.3 Question 12**

#### **Q.12 6.1.2 – Fuel package tables (solar thermal specification).**

The setting of the Target Emissions Rate in each fuel package now incorporates an element of low carbon equipment. Recognising the need to promote reduction in energy demand for hot water, the element specified is a solar thermal installation. For consultation purposes, the same area of solar panel is applied, regardless of

dwelling size.

**Should this element be revised to be proportionate, providing a greater contribution to reduce TER in larger dwellings, where the number of occupants will generally result in greater hot water demand?**

The majority of respondents, 49, representing 88% of those providing a view, supported this proposal. Of those respondents providing a comment, most agreed that the size of the solar thermal installation relates to the hot water demand. The following views on how the varying size of the installation might be determined were provided:

- relate the size of the solar thermal installation to the dwelling size (9 supported this view).
- relate the size of the solar thermal installation to the size of the hot water storage cylinder (8 supported this view).
- relate the size of the solar thermal installation to the design occupant capacity of the dwelling e.g. number of bedrooms (20 supported this view).
- One comment proposed that a two tier system is used where 4m<sup>2</sup> is used for a dwelling less than 125m<sup>2</sup> and 6-8m<sup>2</sup> for dwellings greater than 125m<sup>2</sup>.

However, seven respondents did not agree with this approach, one objector proposed that for the purposes of calculating the target for the notional building, then a standard panel size is much easier to calculate and will not then rely on poor estimates of water consumption.

#### **Recommended Action**

**Progress on the basis of solar thermal element being proportionate to hot water demand - establish the most effective way to set this in the TER calculation.**

**Review available research (including EST data) to relating the size of the solar thermal installation to the dwelling design occupant capacity.**

#### **4.4 Question 13**

##### **Q.13 Clause 6.1.6 – A simplified approach**

The fuel package tables in clause 6.1.2 provide a package of measures that, if followed, are considered to achieve compliance with standard 6.1 without the need for a SAP calculation and TER/DER comparison. Clause 6.1.6 details how this option should be applied. It is proposed to retain this simplified approach in guidance, allowing circumstances where use of SAP is not required to demonstrate compliance with standard 6.1.

**Do consultees agree with this approach?**

The proposal to continue to retain the simplified approach in guidance was generally supported, 33 of the 53 respondents agreed, representing 63% of those who provided a view. However, 19 respondents disagreed and considered that SAP should be used to demonstrate compliance, especially since all new dwellings are required to use SAP to submit an EPC when completed. Comments supporting the retention of the simplified approach included:

- SAP is very complicated and costs more. Retaining the simplified approach enables smaller companies to avoid this added complication and cost (3 comments).
- For simple buildings it lowers costs but still provides an alternative route to demonstrate compliance (2 suggestions)
- Suggests a move towards a more passive energy assessment such as PHPP which is a more practical approach than SAP (4 suggestions).

#### **Recommended Action**

**Based on the responses, propose that clause 6.1.6 on the simplified approach is retained in guidance.**

#### 4.5 Question 14

##### **Q.14 6.2.4 – Revised guidance on limiting air infiltration and revision of guidance on ventilation under standard 3.14**

Proposed guidance notes the revised target value for infiltration of  $7\text{m}^3/\text{m}^2.\text{h}$  and promotes adoption of improved performance in design. Guidance does not set a backstop for infiltration rate except where designing to better than  $5\text{m}^3/\text{m}^2.\text{h}$ , where additional ventilation would have to be considered under standard 3.14.

##### **Do consultees agree with this approach?**

The majority of respondents 43, representing 88% of those who expressed a view, supported the proposal to promote the adoption of improved performance in design, introducing a target value of  $7\text{m}^3/\text{m}^2.\text{h}$ , whilst not setting a backstop value. However, a number of points were raised in relation to this question.

- A number of comments were concerned if, unintentionally, an air-tightness level of  $5\text{m}^3/\text{m}^2.\text{h}$  or lower was achieved. Would BSD provide guidance on how to deal with this situation?
- A number of respondents agreed in principle to the revised air-tightness level but remained concerned regarding the effect this might have on the building and health of the occupants.
- 3 respondents suggested that there should be a backstop, 2 of which suggested that the backstop be set at  $10\text{m}^3/\text{m}^2.\text{h}$ .
- 2 respondents suggested that MVHR should be used for air-tightness levels of  $5\text{m}^3/\text{m}^2.\text{h}$  or lower.
- There were concerns expressed regarding the costs associated with the provision of mechanical ventilation systems.
- One respondent suggested that the approach is too complicated and better to either construct a dwelling with an air-tightness level of  $5\text{m}^3/\text{m}^2.\text{h}$  or lower with MVHR or construct a 'standard' dwelling with more conservative air leakage levels. This would prevent any future problems when maintaining the dwelling e.g. replacement windows.

##### **Recommended Action**

**Maintain consultation proposal without introducing a backstop air-tightness level.**

##### **Q.14b Does the guidance within the revised clauses to standard 3.14, provided in an annex to amended domestic guidance, provide clarity on what should be achieved where designing to better than $5\text{m}^3/\text{m}^2.\text{h}$ ?**

The proposals were supported by 30 (67%) of respondents.

While a majority of respondents did support this proposal, only one provided a comment. However, of those who thought the guidance did not provide clarity on what should be achieved when designing to  $5\text{m}^3/\text{m}^2.\text{h}$  or less, the following comments were received:

- Guidance does not address the issue of dwellings that unintentionally achieve an air-tightness level of  $5\text{m}^3/\text{m}^2.\text{h}$  or less.
- Guidance is not clear that a mechanical ventilation system is required for dwellings achieving an air-tightness level of  $5\text{m}^3/\text{m}^2.\text{h}$  or less.
- A number of comments (8) considered that more guidance is required on controllable ventilation systems, specifically passive ventilation solutions.

- Guidance does not specify the removal of trickle vents where a mechanical ventilation solution is being used.
- Guidance is confusing on the use of the term 'natural ventilation' when it means 'air leakage' (report supplied and alternative wording for this clause).

#### Recommended Action

**Consultation already notes intent to provide more guidance on ventilation solutions such as passive and MVHR. It is intended that this will be progressed.**

#### 4.6 Question 15

##### **Q.15 6.2.11 – Alterations to the insulation envelope.**

Given the significant heat loss that occurs through such elements, it is proposed that, when forming additional doors, windows and other glazing within an existing dwelling, the recommendation on the maximum area of glazing should be reviewed and reduced from 25% to 20% of the overall dwelling floor area.

**Do consultees agree with this approach and the identified percentage?**

Opinion was generally against this proposal with 31 (66%) of respondents objecting. There were a number of specific concerns, including:

- The proposal would limit design potential/flexibility.
- It would restrict daylighting standards for dwellings.
- The TER for new build is 25% so home owners may not be able to add an opening, say for a new toilet, if the existing openings already exceed 25%.
- It will increase the need for artificial lighting.
- Large glazed areas can maximise passive solar gain in winter.
- Would be better if a full SAP calculation could be completed for the whole house.
- May lead to discouraging people from improving their property.

#### Recommended Action

**Given the number of comments received opposing this reduction in the glazed area, it is proposed to leave the guidance at 25% at present, and consider further research to help develop guidance for existing dwellings as part of future reviews.**

#### 4.7 Question 16

##### **Q.16 6.2.12 - Conservatories.**

To deliver improved energy performance when carrying out work to existing buildings, it is proposed that performance standards for glazing within conservatories be aligned more closely to that specified for other types of extension.

Revised guidance on conservatories no longer links U-value to floor area, citing instead a single, area-weighted average U-value for glazed elements of 1.8, offering practical improvement on the previous U-values for conservatories of 2.2 & 3.3.

**Do consultees agree with this approach?**

Opinion was in favour of the proposals with 47 (96%) of respondents giving support. Comments received included:

- Concern about the embodied carbon in the building materials when appropriate use of solar shading can achieve U-values. However would prefer g value or  $G_{tot}$  (total solar factor) value is used to limit solar gain in conservatories.
- Maximum U-values and g values should be set to limit overheating in summer:

- Vertical glazing U-value 2.0 and g value 0.55
- Roof glazing U-value 2.0 g value 0.55 (high solar gain) 0.75 (low solar gain).
- Suggestion that U-values should be harmonised with those for the rest of the dwelling.

#### Recommended Action

**Subject to review of proposals elsewhere in the UK, recommend adopting a minimum U-value of 2.0 W/m<sup>2</sup>.K to give greater flexibility in the design of these buildings whilst still improving energy performance.**

#### 4.8 Misconceptions (domestic guidance)

In reading the consultation responses, a high level of understanding of the topics discussed was evident, with only a few areas where some respondents had misunderstood intent. These are noted below.

- 6.1 (carbon dioxide emissions) and the role of fuel packages in target setting only. Except where the simplified method is followed, elements included in the fuel package table need not be included in the design provided the TER is not exceeded and relevant backstop performance levels set out under standards 6.2 to 6.6 are met. For example, a solar thermal installation contributes to setting the TER but is not appropriate to all dwellings and need not form part of a design solution.

### 5. NON - DOMESTIC BUILDINGS - SUMMARY ANALYSIS & RECOMMENDED ACTION

#### 5.1 Question 17

##### Q17. 6.1.1 – Tools used to demonstrate compliance with standard 6.1.

The Simplified Building Energy Model (SBEM) is the National Calculation Methodology issued to allow determination of carbon dioxide emissions from buildings. Guidance presently recognises that alternative calculation tools may also be used. Whilst such tools can allow a more integrated, flexible approach to modelling, greater accuracy and are also necessary where building features cannot be modelled in SBEM, concerns have been expressed over the degree of variation in calculated emissions that can be reported when assessing a building using each option.

**Should use of SBEM or production of a SBEM compatible output be required to demonstrate compliance where the National Calculation Method can address all the elements present in a proposed design?**

**If not, please give your reasons.**

There were 43 responses to this question. The majority of respondents, 33 out of 43 (76%), supported the proposal in principle. 5 respondents found the question confusing. 6 of the respondents who support this proposal offered comments, focusing on the need for clear guidance on the use of SBEM. It was also suggested to introduce an improved software that would address complex buildings.

All of those who did not supporting this proposal offered comment. 6 of the Local Authorities commented that if an accreditation scheme is in place, then all approved software output should be acceptable. The increased accuracy of DSM tools compared to SBEM and the need for flexibility were also raised (6 respondents).

#### Recommended action

**Provide additional guidance on suitability of approach when choosing calculation tool. Revise and improve accreditation procedure for assessing compliance software used in Scotland and develop supporting guidance on this process.**

## 5.2 Question 18

### **Q.18a 6.1.8 – Creating the target carbon dioxide emissions rate. Improvement factors for naturally and mechanically ventilated buildings.**

Concerns have been expressed that application of the 30% reduction in CO<sub>2</sub> emissions identified for 2010 guidance may encourage the use of mechanical ventilation solutions in new buildings as, in more complex buildings, there is generally greater scope for improvement of building systems.

A straight 30% improvement to both ventilation strategies, which reduces the previous difference in target performance, may make the option of naturally ventilated buildings comparatively less viable. Given that designers should be encouraged towards lower energy solutions, it may be appropriate to consider a realignment of these values to recognise the benefits of naturally ventilated solutions whilst still delivering the intended overall 30% improvement on 2007 standards.

Consultees should note that it is not proposed to consult further on this issue and, accordingly, clear and well supported commentary is requested.

**Is there a concern that reductions, as presently applied, may be to the detriment of the less carbon intensive solutions offered by naturally ventilated buildings?**

**If yes, please identify your concerns.**

This concern was shared by 33 (71%) of 46 respondents. 19 respondents commented that naturally ventilated buildings should be encouraged and 8 suggested that the improvement factors should be adjusted to assist in this. 4 respondents suggested that there are instances where natural ventilation is not the most energy efficient design strategy. 5 consultees noted that noise and health issues relating to air quality should be considered in respect of mechanically ventilated buildings. An alternative standard for smaller buildings was suggested by one respondent.

#### **Recommended action**

**Revisit improvement factors which can be used to promote naturally ventilated buildings where these offer a practical solution. Note need to recognise that location and type of development may determine ventilation strategy. Intent to develop guidance to further encourage energy efficient design strategies for all buildings.**

**Q18b. Should a reduced improvement factor be applied to naturally ventilated buildings, with a proportionate increase in improvement factor for mechanically ventilated buildings?**

**If yes, please offer your view on what improvement factors may be more appropriate.**

The responses received were balanced, with 26 respondents (59%) supporting the proposal and 18 others (41%) concerned that this is not appropriate. Different percentage improvements were offered in the comments made, with most suggesting a 25% improvement for naturally ventilated and 35% for mechanically ventilated buildings.

#### **Recommended action**

**No specific, evidenced solutions offered. Evidence on actual buildings performance is required. Given Q.18a, key issue is to encourage mechanically ventilated buildings, when chosen, to use less energy. Retain proposed 30% improvement to both ventilation strategies and flag issue as a topic for further research to inform**



subsequent reviews.

### 5.3 Question 19

**Q.19 6.3.1 – Efficiency and credits. Limiting credits to existing buildings.**

Heating efficiency credits are available for specific additional measures and can assist in achieving the required effective seasonal efficiency levels for heating installations. To encourage the installation of more efficient heat pumps and radiant heaters in new buildings, it is proposed to limit the use of heating efficiency credits for these types of heat generators to installations made within existing buildings.

**Do consultees agree with this approach?**

**If no, please give your reasons.**

The proposals for the heating efficiency credits were supported by 29 (72%) of respondents. One respondent stated that this question was not clear. Of the respondents who were against this proposal few commented on the actual question. Regulating heat pumps was an issue raised by 3 respondents, whereas one respondent suggested that good management should be recognised as per in England and Wales.

#### **Recommended action**

**Based on the responses received, the effect controls have on the efficiency of heat pumps and radiant heaters needs to be assessed.**

### 5.4 Question 20

**Q.20 6.5.1 – Setting lighting efficacies**

Research in support of this review reinforces the message that significant energy savings can be made in many building types through adoption of better, more energy efficient lighting technologies and means of control. Consultation includes proposals for the introduction of minimum efficacies for general purpose lighting within both existing buildings and new buildings.

**Should greater prescription within proposed guidance be adopted for general and display lighting in new and existing buildings, to ensure that the potential benefits from such improvements can be fully realised?**

**If no, please give your reasons.**

**If yes, commentary on recommendations is welcomed.**

The proposals were supported by 38 (93%) of respondents. Opinion, whilst generally in favour, has identified a few issues such as the impact of lighting technologies and the lack of knowledge about them. Some of the Local Authorities (5 out of the 16 who replied to this question) suggested that separate switching for display and other lighting is required, as well as time controls.

#### **Recommended action**

**Giving the support for this proposal, we recommend minimum lighting efficacy levels be introduced along with lighting controls for general and display lighting.**

### 5.5 Question 21

**Q.21 6.10 – Metering for new and existing building**

Proposals under this standard are unchanged at present. However, the means to identify where energy is being used and how changes in behaviour can affect that

use is essential to any energy saving strategy.

On this basis, it is suggested that, within the current criteria for application, guidance should be added to recommend sub-metering of fuel and electricity in a manner which identifies fuel use in relation to building service functions (heating/hot water, lighting, general power, etc), together with the contribution of any installed low carbon equipment to overall energy demand.

**Should guidance include prescription on sub-metering in this format be introduced? If yes, should guidance consider building size as a criterion for application?**

**If no, please give your reasons:**

The proposals were supported by 39 (93%) of respondents. However, when considering the building size as a criterion for application, opinion was divided: 8 respondents were in favour and as many against. The practical implications and costs involved in introducing sub-metering were raised, while different building sizes were offered for consideration, ranging between 100 and 1000m<sup>2</sup>.

#### **Recommended action**

**Based on the responses received it is suggested that sub-metering is introduced for all qualifying buildings and that metering strategy reflect complexity of building and fixed building services within.**

### **5.6 Question 22**

#### **Q.22 Annex 6C – Modular and portable buildings.**

Whilst not included within consultation text, consolidation of guidance on the performance of modular and portable buildings in annex 6C and clause 6.2.1 will be made through direct discussion with industry during the consultation period.

It is proposed that this should maintain the current intent of encouraging improvement where older components are relocated or reused, whilst still giving acknowledging both savings in embodied energy arising from reuse of such buildings and components and the need to align with performance guidance applied elsewhere in the UK, recognising component manufacturing standards.

**Do consultees agree with the intent to maintain the current approach to this issue?**

**If no, please give your reasons.**

The proposals were supported by 31 (77%) of respondents. All respondents that disagree with the proposal offered comments, with the majority (6 out of 9) highlighting that due to the off-site construction techniques, improvement of the fabric for new buildings should be achievable. Heat loss was another issue raised in the cases where modular and portable buildings are used as accommodation and workspace.

#### **Recommended action**

**Taking respondent comments on board, progress discussions with industry association (MPBA) and revise guidance to maintain current intent whilst improving overall levels of energy performance from new buildings and allowing reuse of existing components. Recognition of single manufacturing standard suggests harmonisation with proposals in England & Wales where practical, including fabric backstop U-values and backstop date, prior to which components cannot be reused without upgrading.**

### **5.7 Misconceptions (non-domestic guidance)**

In reading the consultation responses, a high level of understanding of the topics discussed was evident, with only a few areas where some respondents had misunderstood intent. These are noted below.

- The Heating efficiency credits and how they are applied seems to be an area that respondents do not fully understand. Responses to Q19 demonstrated this.
- New items in the proposed guidance also highlighted areas that will need to be clear and well defined in guidance to ensure understanding when introduced in the 2010 issue of the Technical Handbook.

## **6. GENERAL COMMENTS ON PROPOSALS FOR 2010 REGULATIONS**

### **6.1 Introduction**

In addition to the 22 specific questions posed, general comments on proposals were welcomed. 61 respondents out of 82 (74%) offered comment on the proposed approach. This is particularly welcome, given the specific topic nature of other consultation questions. Key issues raised are summarised individually below.

Amongst issues raised were:

- Reminders of the costs related to proposed improvements and the effect this will have on the construction industry (from developers);
- Reinforcement of the need to signal future direction and update proposals for future reviews and the aim of zero carbon buildings (from manufacturers and interest groups);
- Strong support for addressing of energy standards through building regulations alone (from developers); and
- Recognition of the benefits increased accreditation might offer when considering the range of issued contributing to proposed improvements (from verifiers and certification organisations).

### **6.2 Detailed comment by category**

More detailed issues such as a range of comments on specific technical points in services guidance are not reproduced in the summary of issues below, but will be considered in taking forward proposals. Specific issues raised included:

#### **Practicality and Cost**

- Transition to new standards will be very challenging, particularly in current economic climate and state of the construction industry; this must be given serious consideration when deciding upon what is taken forward (5, developers)
- Concern that impact assessment does not consider wider cost of changes (developer)
- Consider a smaller improvement at this time (2 developers); smaller improvement for affordable homes

#### **Development of energy standards**

- Proposals for 2013 and beyond should be developed and issued for discussion as soon as practicable; Roadmap is vital to all concerned (6, mostly manufacturer and interest groups)
- Concern that overall target proposals exceed those in England & Wales (manufacturer)
- Concern that domestic fuel packages will not deliver intended 30% target (developer)

## **SAP & SBEM**

- Ensure software is available in time (general)
- Some respondents have further issues with National Calculation Methodologies which are not discussed within this consultation
- Better consideration of alternate, additional methods of solar control (industry body)
- Given difference in results obtainable from SBEM and DSM, additional guidance on which option to use would be welcomed (consultant)

## **Ensuring compliance/performance**

- If standards are to be driven forward, greater evaluation, post completion is also needed to confirm benefits (3)
- Improved site inspection and quality of construction will be needed to ensure delivery of benefits from improved standards (3)
- With new issues and increased complexity, dissemination and training will be very important (2 verifiers)

## **Specification of performance of elements**

- Simplify number of referenced window U-values and consider parity of reference for Window Energy Ratings (5, manufacturers and industry body, some replication)
- Concern that U-values in fuel packages are too onerous (manufacturer)
- Clarity on roof definitions requested and reconsideration of U-value for shell roof, as not achievable with common systems (2, manufacturers)
- Revised proposals for modular and Portable Buildings offered by industry for discussion and development (industry body)
- Guidance on biomass should reference consideration of air quality issues (professional body)
- Ensure that energy reduction takes priority over offsetting through low carbon equipment/generation (manufacturer)
- Welcome increases in fabric performance to reduce energy demand; recommend further improvement in backstop fabric values (4, manufacturer and industry body, some replicates)
- For cooling systems, test methods to determine performance need to be specified (research organisation)
- Concern that service improvements continue to progress faster than those for fabric (consultant)
- Ensure parity across the UK for services efficiency and control requirements (3, manufacturers)
- Detailed alternative proposals for lighting controls submitted for discussion and development (industry body)
- Research information on passive stack ventilation in tighter buildings offered for information and discussion (manufacturer)
- Consider credit for provisions that enable future installation of additional low carbon equipment
- Ensure that benefits of MVHR are not confused with cooling provisions in standard 6.6 (manufacturer)
- Need to consider lower efficiencies of CHP units which is offset by generation benefits (2, manufacturer and industry body, replicate)
- Consider Energy Saving Trust enhanced construction details (advisory body)
- Stress importance of maintaining indoor air quality; poor air quality can be particularly detrimental to a wide range of people; consider alternative forms for any written information on systems where beneficial to building users (interest group)

## **Procedural matters.**

- Introduction of airtightness testing will be challenging in more remote areas (local authority)
- Given extent of change, important that current warrant duration regime not made more onerous (2, developer, replicates).
- Address energy performance only through building standards, not planning legislation (6, developers & industry body)
- Consider a mandatory requirement for all developments to have a specified percentage of energy from renewables (2, local authority, replicates)
- Increased adoption of accreditation (approved certifiers, etc) would help address increased complexity, improve workmanship and compliance (4, general)
- Consider accreditation scheme for window replacement (2, manufacturer, replication)
- Consider benefits thermography may offer to verification of performance (consultant)

### **Improving Existing buildings**

- Rather than continued focus on new buildings, which already have far lower emissions, focus should be on existing stock where far greater and more cost effective improvements are possible (2, developer and industry body)
- Further research needed - example solutions on more challenging development sites, e.g. tight city centre, where low carbon and renewable solutions are less practicable?
- Building standards do little to encourage improvement of existing buildings and this should change (professional body)

## **7.0 NEXT STEPS**

Amendment to consultation proposals in response to issues raised in consultation responses have been considered and action, including those recommended in the sections above, has been taken, with changes to elate to changes to the building regulations or their associated schedules the process of making the necessary changes to the guidance will now be initiated.

Once proposed changes to the guidance are finalised, a submission will be made to Scottish Ministers. It is intended that revised proposals for Section 6 (energy) and minor amendments to section 3 (environment) will be published within revised Technical Handbooks at the start of April 2010, with these revised standards and guidance coming into force from the start of October 2010.

Further information on publication and implementation will be made available on the Building Standards Division web pages on the Scottish Government website.

## **8.0 Contact**

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