

**Scottish Government  
BUILDING STANDARDS DIVISION  
REVIEW OF BUILDING STANDARDS**

**SECTION 6 – ENERGY  
(INCORPORATING CHANGES TO SECTION 3-  
ENVIRONMENT)**

**CONSULTATION REPORT**

**FEBRUARY 2010**



**The Scottish  
Government**



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## **Acknowledgements**

The Building Standards Division is grateful to all of the respondents who contributed their views on these proposals to review building standards.

## **EXECUTIVE 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.

## **1. 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 alteration, 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.

## **2. THE CONSULTATION PROCESS**

- 2.1 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.
- 2.2 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.
- 2.3 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.
- 2.4 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 respondents requested that their details and/or comments should remain confidential.

2.5 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.

2.6 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>
<b>Other*</b>	<b>10</b>

\* 'Other' includes software providers, standards/accreditation/training organisations and energy/fuel providers.

### **3. 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.

3.1 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.

3.2 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.

3.3 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.

Summary responses to questionnaire	Yes	No	Comment made	No response
<b>Issues relevant to all buildings</b>				
1	-	-	31 (38%)	51 (62%)
2	-	-	43 (52%)	39 (48%)
3	44 (85%)	8 (15%)	24 (29%)	30 (37%)
4a	39 (81%)	9 (19%)	35 (43%)	34 (41%)
4b	30 (64%)	17 (36%)	See 4a	35 (43%)
5*	30 (54%)	26 (46%)	46 (56%)	27 (33%)
6a	19 (36%)	34 (64%)	25 (30%)	29 (35%)
6b	-	-	20 (24%)	62 (76%)
7	34 (76%)	11 (24%)	38 (46%)	37 (45%)
8	46 (92%)	4 (8%)	20 (24%)	32 (39%)
9a	48 (86%)	8 (14%)	55 (67%)	26 (32%)
9b*	36 (75%)	12 (25%)	40 (49%)	35 (43%)
9c	28 (60%)	19 (40%)	24 (29%)	35 (43%)
<b>Issues relevant to domestic buildings</b>				
10	12 (24%)	38 (76%)	34 (%)	32 (39%)
11	43 (88%)	6 (12%)	19 (%)	33 (40%)
12	49 (88%)	7 (12%)	51 (%)	26 (32%)
13*	33 (63%)	19 (37%)	36 (%)	29 (35%)
14a	43 (88%)	6 (12%)	25 (%)	33 (40%)
14b	30 (67%)	15 (33%)	18 (%)	37 (45%)
15	16 (34%)	31 (66%)	35 (%)	35 (43%)
16*	47 (96%)	2 (4%)	13 (%)	32 (39%)
<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.

3.4 A detailed analysis of issues raised by the consultation and recommended action is provided under items 3 to 6 of this paper.

## **4.0 ISSUES COMMON TO ALL BUILDINGS - ANALYSIS AND RECOMMENDATIONS**

4.1 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.

### **4.2 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.**

### **4.3 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.**

## **4.4 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).**

## 4.5 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.**

### 4.6 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.**

### 4.7 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.**

### 4.8 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.**

#### **4.9 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.**

#### **4.10 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 equity, 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.**

#### **4.11 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.

## **5. DOMESTIC GUIDANCE - ANALYSIS AND RECOMMENDATIONS**

### **5.1 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.**

## **5.2 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 equity 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 be 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.**

### 5.3 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.**

## 5.4 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.**

## 5.5 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 5m<sup>3</sup>/m<sup>2</sup>.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 m<sup>3</sup>/m<sup>2</sup>.h.
- 2 respondents suggested that MVHR should be used for air-tightness levels of 5 m<sup>3</sup>/m<sup>2</sup>.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 m<sup>3</sup>/m<sup>2</sup>.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 5m<sup>3</sup>/m<sup>2</sup>.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 5m<sup>3</sup>/m<sup>2</sup>.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 m<sup>3</sup>/m<sup>2</sup>.h or less.
- Guidance is not clear that a mechanical ventilation system is required for dwellings achieving an air-tightness level of 5 m<sup>3</sup>/m<sup>2</sup>.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.**

## 5.6 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.**

## 5.7 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.**

### 5.8 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.

## 6. NON - DOMESTIC BUILDINGS - SUMMARY ANALYSIS & RECOMMENDED ACTION

### 6.1 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.**

**6.2 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.**

**6.3 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.**

### **6.4 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.**

### **6.5 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.**

### **6.6 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.**

## **6.7 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.

## **7. GENERAL COMMENTS ON PROPOSALS FOR 2010 REGULATIONS**

### **7.1 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).

### **7.2 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)

## **8.0 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.

## **9.0 Contact**

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