Chapter 5

Other matters

5.1 This chapter considers some related matters raised in submissions:

- the adequacy of the relevant Australian Standards, which the program referred to; and
- the appropriateness of the energy efficiency provisions in the Building Code of Australia which informed the program's R-value conditions.

Issues relating to Australian Standards

5.2 Standards Australia is a non-government, not-for-profit organisation. It is the descendent of the Australian Commonwealth Engineering Standards Association (established 1922) and became a public company in 1999. According to Standards Australia, it is Australia's peak standards body, which develops internationally aligned Australian Standards and related publications to help ensure the safety, reliability and performance of products, services and systems. Standards are developed by technical committees representing a range of stakeholders. There are about 7000 Australian Standards, and 450 projects are now active.[1]

5.3 Australian Standards relevant to the Home Insulation Program were:

- AS/NZS 4859.1:2002: *Materials for the thermal insulation of buildings*
- AS 3999-1992: *Thermal insulation of dwellings—bulk insulation—installation requirements*

5.4 The HIP also referred to AS/NZS 3000:2007: *Electrical installations (known as the Australian/New Zealand Wiring Rules)*, so that it took precedence over AS 3999 in relation to safe treatment of downlights.

5.5 The main relevant standard is AS/NZS 4859.1. This standard covers mostly procedural matters to do with the testing and labelling of materials. It does not itself set minimum insulation levels in houses—that is done by the Building Code of Australia (considered below).

5.6 Concerns raised in submissions about Australian Standards were:

- AS 3999-1992 needs revision;
- In AS/NZS 4859.1, it is inadequate to set labelling standards referring only to material R-values under standardised test conditions, without considering the performance in real conditions, which may be much different;

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1 Standards Australia, *Submission 26*, attachment. Answers to questions on notice from hearing 17 February 2010 (received 15 March 2010), p. 5. *Annual review 2008–2009*, p. 2.

- there is no suitable Australian research establishment to inform this issue; and
- Standards Australia is excessively influenced by the fibreglass batts industry.

Claims that AS 3999-1992 needs revision

5.7 AS 3999-1992 (installation requirements for bulk insulation) requires bulk insulation to be 25 mm clear of downlights. The more recent AS/NZS 3000:2007 (the Wiring Rules) requires either downlight covers or a default clearance of 200 mm.[2] The Home Insulation Program required compliance with AS 3999 generally, but required compliance with the more stringent AS/NZS 3000 in respect of downlights (before it made downlight covers compulsory from 2 November 2009).

5.8 AS 3999 has been criticised as being outdated. Standards Australia advised that it is now going through a consultation process in relation to possible changes.[3]

Difference between stated and achieved R-values

5.9 In AS/NZS 4859.1 the advertised R-value of bulk materials may be determined by laboratory tests at a standard mean temperature of 23 degrees.[4]

5.10 Critics argued that this is inadequate, since the effectiveness of the insulation in real conditions in the roof may be far less than the stated material R-value. Two points are relevant:

- typical Australian roof conditions may be much hotter than the standard 23 degrees. At higher temperatures bulk insulation becomes less effective.[5]
- performance may be degraded by 'thermal bridging' – the tendency for heat to pass through less insulated pathways. This effect increases as the amount of insulation increases.[6]

5.11 Dr Aynsley, an academic expert on insulation, said:

> There have been studies done [in Australia] that dramatically show that there is a big difference between what people are sold in terms of an

2 Other conditions may comply if consistent with the design of the light. AS/NZS 3000:2007, clause 4.5.2.3. See Arrowform Pty Ltd, *Submission 14*, attachment 2.

3 Ms K. Riley-Takos (Standards Australia), *Committee Hansard*, 17 February 2010, pp 88–9. Standards Australia, *Submission 26*, p. 2; answers to questions on notice from hearing 17 February 2010, (received 15 March 2010), p. 5.

4 AS/NZS 4859.1, clause 2.3.3.3. In the 'American test method' the material is sandwiched between plates at temperatures of 13 and 33 degrees, and the flow of heat is measured. Mr T. Renouf (Wren Industries), *Submission 15*; *Committee Hansard*, 17 February 2010, p. 79.

5 Mr T. Renouf (Wren Industries), *Submission 15*; *Committee Hansard*, 17 February 2010, p. 81.

6 Wren Industries, *Submission 15*, Australian Foil Insulation Association, *Submission 23*, p. 5.

> R-value and what they actually get. That is even when they comply with standard 4859.1.[7]

5.12 A recent South Australian study found that a typical 200 square metre house, having the roof insulated with R3 material, would expect to have an achieved total R-value at least 30 per cent lower than that, mostly because of thermal bridging and minor installation defects. According to the study 'this gap increases significantly with increased levels of bulk insulation.'[8]

5.13 Some submissions argued that this situation has arisen because of pressure from the fibreglass batts industry. For example:

> Regulation of the insulation industry has been bedevilled by the continuing use of the description "Material R-value" on most bulk insulation products. This relates to the thermal resistance of a product itself considered in isolation and measured in a laboratory under controlled conditions… This use of material R-values in regulation has came about due largely to the influence of the fibreglass lobby and constitutes a departure from the current internationally accepted practice of writing codes and standards in terms of relevant performance criteria. The relevant performance criteria here, of course, being the performance of the building system in situ, not that of a component of the system in a lab.[9]

Lack of a suitable Australian insulation research facility

5.14 Critics argued, in relation to the points above, that 'the central problem is that no testing facility exists in Australia for realistic thermal measurement for both cold and hot climates.'[10] Accordingly to Dr Aynsley:

> The standard which I was involved in writing [AS/NZS 4859.1] calls for a whole lot of testing. The situation at the moment is that there is not a certified laboratory in Australia that can do a lot of that testing. CSIRO used to be able to do the testing long ago. It cannot do it anymore… I think it is an embarrassment, really, that a small country like New Zealand can maintain a building research institute like BRANZ [formerly Building Research Association of New Zealand] to test buildings and provide that sort of independent verification. We cannot do that here anymore.[11]

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7 Dr R. Aynsley, *Committee Hansard*, 17 February 2010, p. 25.

8 Australian Foil Insulation Association, *Submission* 23, attachment 6: M. Belusko, F. Bruno, W. Saman, *Thermal Resistance of Australian Roofing Systems*, paper to Australian Building Codes Board international conference, 20–23 September 2009.

9 Amalgamated Metal Industries, *Submission 25*, p. 4.

10 Wren Industries, *Submission 15*.

11 Dr R. Aynsley, *Committee Hansard*, 17 February 2010, pp 25–26. BRANZ (formerly Building Research Association of New Zealand) is 'an independent and impartial research, testing, consulting and information company providing resources for the building industry'. See www.branz.co.nz.

5.15 Mr Bostrom of Amalgamated Metal Industries argued that 'not only academia but testing and development have been run down in the name of economic rationality…':

> …We have abolished the CSIRO testing facility... The Australian Institute of Tropical Architecture, which Professor Aynsley headed, was shut down…when we need to renew our cyclone code I guess we are going to have to apply to the University of Edinburgh, where they still have an institute of tropical architecture—unlike Australia…while the rest of the world's standards have become immensely more professional over the last 25 years…in Australia we have gone backwards.[12]

5.16 The Institute of Tropical Architecture at James Cook University Townsville closed in 1999,[13] and the CSIRO insulation testing facility within the Division of Materials Science and Engineering closed in 2004–05.

5.17 CSIRO advised that it is in the process of re-establishing a commercial laboratory for testing bulk insulation material in accordance with AS/NZS 4859.1. This facility will be limited to testing insulation materials and will not provide research capabilities for insulation materials or address installation. CSIRO research in the area of energy efficient building design continues to be carried out by the Division of Sustainable Ecosystems.[14]

5.18 ICANZ agreed that there should be a 'proper, independent building research facility' able to investigate claims about insulation.[15]

Committee comment

5.19 Considering the importance of insulation to the energy efficiency of Australian homes, it is most regrettable that there is no independent scientific facility in Australia able to research the properties of the various systems and advise on insulation policy in context of overall energy efficient housing goals. It is unfortunate that the dispute between the different forms of insulation, about basic science to do with the suitability of the different systems, has endured for so long without resolution. It appears that the lack of a suitable research vehicle has been one of the reasons for this.

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12 Mr M. Bostrom (Amalgamated Metal Industries), *Committee Hansard*, 17 February 2010, p. 46.

13 Pers. comm. Dr R. Aynsley, 21 April 2010.

14 Pers. comm. M. Burgess, Research Program Leader, CSIRO Materials Science and Engineering. 29 April 2010. The insulation testing facility will be operated by the Industrial Research Services Group, which also tests other aspects of building materials (for example acoustic, fire resistance, slip resistance). See www.csiro.au/services/Building-and-construction-testing-services.html.

15 Mr D. D'Arcy (ICANZ), *Committee Hansard*, 17 February 2010, p. 56.

5.20 CSIRO's new test facility, since it will only test in accordance with AS/NZS 4859.1, will not resolve the wider arguments about the appropriateness of the standard or desirable policy on ceiling insulation.

5.21 The committee agrees that there should be a dedicated and independent research facility able to research insulation systems and advise on insulation policy. Where it should be housed would a matter for further consideration.

5.22 This should be regarded as an essential part of any future government initiative to improve home insulation, in order to ensure that the investment is directed most efficiently.

Recommendation 6

5.23 The government should establish a dedicated and industry-independent program to research insulation systems and help develop efficient and effective insulation policy.

Claims that Standards Australia's decisions can be unduly influenced by the sectional interests

5.24 Some witnesses argued that the Standards Australia technical committee BD–58, which developed AS/NZS 4859.1, is too dominated by sectional industry interests:

> The committees are dominated by commercial interests. At the last meeting of the committee on insulation, three prominent scientists in the field, who expressed opinions as to what a suitable amendment would be, were completely disregarded and a vote was taken, largely amongst fibreglass salesmen, as to what the appropriate measures should be.[16]

> You have in-house fighting all of the time on the technical aspects. In my opinion, standards for the insulation industry need to go out of house from Standards Australia to a more technical expert organisation like AIRAH [Australian Institute of Refrigeration, Air-conditioning and Heat]. Then you would remove the commercial aspect of a company that sits at the table on that committee.[17]

5.25 In response to these claims, Standards Australia advised that standards are developed by technical committees which 'consist of individuals nominated by organisations that represent the views of large groups of interested and affected parties with a common interest.' Technical committees aim to have a balanced cross section of groups that have an interest in the standard—for example, consumers, employers, government, industry, research and academic organisations.[18]

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16 Mr M. Bostrom (Amalgamated Metal Industries), *Committee Hansard*, 17 February 2010, p. 46. Similarly Mr T. Renouf (Wren Industries), *Committee Hansard*, 17 February 2010, p. 82.

17 Mr B. Tikey (AFIA), *Committee Hansard*, 17 February 2010, p. 32.

18 Standards Australia, answers to questions on notice from hearing 17 February 2010, (received 15 March 2010), p. 5–6.

5.26 Standards Australia pointed to the large number of organisations (23) that were represented on the technical committee (BD–58) which developed AS/NZS 4859.1. Standards Australia advised that after AS/NZS 4859.1 was amended in 2006, following complaints by the foil industry, it conducted an independent review of the process and was satisfied that due process had been followed.[19]

5.27 In relation to claims of conflict of interest for Standards Australia itself between its own commercial and standard-setting activities, Standards Australia advised that it divested its publication and certification business in 2003 to focus on standards development:

> The separation was designed to avoid the potential problem or at least perception that decisions about the need for standards or priorities may be influenced by considerations about what was best for the other related commercial activities… Standards Australia's operations are now partly funded via the return on investment from the sale of those assets, royalties received by the sale of material licensed to SAI Global and direct contributions from stakeholders wishing to develop specific Australian Standards.
>
> It ought to be highlighted, however, that the mechanism of funding for development of an Australian Standard does not alter the due process required for the successful publication of that Australian Standard.[20]

Recommendation 7

5.28 That Standards Australia consider amending its funding mechanism so as to disallow contributions from any stakeholders with a potential commercial interest in any Australian Standard.

5.29 Whilst Standards Australia's technical committees may be based on a 'balanced cross section' of interest groups: this can be seen to allow blurring of scientific and policy questions. It would seem logical for scientific matters in standards to be decided by appropriate experts, with the policy questions that arise from the science to be decided by a larger group that includes industry interests.

Recommendation 8

5.30 That Standards Australia consider reconfiguring its technical committee arrangements to prevent commercial interests from being seen to unduly dominate decisions which should be based on scientific evidence.

5.31 In relation to the points of dispute noted above, the committee notes that Standards Australia's responses focussed on procedural matters, not the actual points

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19 Standards Australia, answers to questions on notice from hearing 17 February 2010, (received 15 March 2010), p. 8.Ms K. Riley-Takos (Standards Australia), *Committee Hansard*, 17 February 2010, p. 94.

20 Standards Australia, answers to questions on notice from hearing 17 February 2010, (received 15 March 2010), p. 11.

of technical dispute (for example, the extent to which R-values in real conditions fall short of material R-values determined according to the standard). The committee recommends that Standards Australia should respond publicly on the points of scientific debate.

Recommendation 9

5.32 Standards Australia consider responding publicly and in detail to the scientific criticisms of AS/NZS 4859.1, and if necessary undertake an independent review of the standard.

Issues relating to the Building Code of Australia

5.33 The Building Code of Australia sets building standards which the states/territories implement through regulations. It contains minimum requirements for roof/ceiling insulation.[21] Although it applies only to new buildings, it is relevant to the inquiry as:

- the levels of insulation required in the HIP (see paragraph 2.21) were modelled on it (though they were not identical); and
- some submitters raised concerns about the adequacy of the Building Code of Australia's provisions on insulation, particularly in light of recent changes which will increase the roof/ceiling insulation requirement.[22]

5.34 The concerns raised in submissions were:

- the new, increased insulation requirements are not based on sound analysis of costs and benefits, and go beyond what is worthwhile; and
- the BCA does not adequately deal with the problems of bulk materials in hot climates and condensation in roof spaces.

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21 A building can be designed to satisfy the BCA through a number of pathways. Most homes use either an energy rating assessment (star rating) or the 'deemed to satisfy' acceptable construction practices set out in the BCA. The minimum insulation standards in the BCA are 'deemed to satisfy' provisions. Housing Industry Association, *Submission 16*, p. 2.

22 The new standard is part of various changes to the BCA's energy efficiency provisions, initiated by the Council of Australian Governments in 2009 as part of the National Strategy for Energy Efficiency. The Australian Building Codes Board released a Consultation Regulation Impact Statement in September 2009. BCA amendments were released on 11 March 2010. The states/territories have undertaken to implement the changes in their regulations by May 2011. COAG communiqué 30 April 2009. Australian Building Codes Board, *Consultation Regulation Impact Statement – Proposal to revise the energy efficiency requirements of the Building Code of Australia for residential buildings – classes 1, 2, 4 and 10*, September 2009. Hon. Kim Carr, Minister for Innovation, Industry, Science and Research, *COAG commitment on new building energy efficiency fulfilled*, media release 22 January 2010.

Concerns about increased insulation requirements in the Building Code of Australia

5.35 New insulation requirements are part of various changes to the Building Code of Australia's energy efficiency provisions which will increase the energy efficiency requirement for new residential buildings from five to six stars or equivalent. The roof/ceiling insulation requirements before and after the recent changes are shown in the following table:

Figure 3—Roof and ceiling insulation: minimum total R-values[1] for class 1 buildings[2]

climate zone[3]	1	2 below 300m	2 300m or more	3	4	5	6	7	8
2009	2.7	2.7	3.0	2.7	3.5	3.2	3.7	4.3	4.8
2010[4]	4.1 4.6 5.1	4.1 4.6 5.1	4.1 4.6 5.1	4.1 4.6 5.1	4.1 4.6 5.1	4.1 4.6 5.1	4.1 4.6 5.1	4.1 4.6 5.1	6.3 6.3 6.3
direction of heat flow	down	down	down & up	down & up	up	up	up	up	up

Notes:
[1] Total R-value: the sum of the R-values of the individual component layers in a composite element including any building material, insulation material, airspace and associated surface resistances.
[2] Class 1 buildings: detached houses and attached dwellings separated by fire-resistant walls and not above or below another dwelling; also certain boarding houses, guesthouses and the like.
[3] Climate zones are defined in the Building Code of Australia, from 1 hottest to 8 coldest: see Appendix 5.
[4] The 2010 standard varies according to the solar absorptance of the upper surface of the roof. The three figures are the standard where the roof has an upper surface solar absorptance of – not more than 0.4; not more than 0.6; and more than 0.6.

Source: *Building Code of Australia*, 2009, volume 2, table 3.12.1.1; 2010, volume 2, table 3.12.1.1a.

5.36 Several submissions argued that the increased insulation requirements are not soundly based:

> The Housing Industry Association considers that the current minimum standards set out in Part 3.12 of the Building Code of Australia (BCA) are sufficient… In separate submissions to the Australian Building Codes Board during 2009, HIA has outlined a range of significant concerns in relation to these future changes… HIA has called on the Government to recognise that there is a range of more cost-effective options for new homes to achieve improved energy efficiency.[23]
>
> The Australian Building Codes Board have planned to also introduce new higher insulation R-values into the 2010 BCA Energy Efficiency

23 Housing Industry Association, *Submission 16*, p. 3.

> Amendments also without justifying or validating the modelling outcomes from rigorous field research… This decision by the ABCB is made in the face of an over whelming reaction of dismay and rejection submitted by many industry stakeholders including those of the likes of the HIA, Master Builders Association and National architects bodies.[24]

5.37 Expert witnesses described the 'law of diminishing returns' from more insulation:

> The intention of the Building Code of Australia to double insulation levels from May 1, 2010, should be seriously reviewed…. Increased insulation is subject to diminishing returns…. The 20mm extra (insulation) will cost roughly twice as much for the extra insulation and will have only half as much effect as the first 10mm.[25]
>
> The correct choice is that choice that gives the minimum lifecycle cost… there is a level where extra R will actually cause an increase in life-cycle energy costs and greenhouse gas costs.[26]

5.38 Further, as the amount of insulation increases, the loss of efficiency through 'thermal bridging' (tendency of heat to pass through less insulated pathways) increases:

> The initial insulation added to a surface makes the most significant effect. As extra insulation is added an increasing proportion of the total heat transfer occurs through paths that have not been insulated; doors, windows etc. It is better to consider all of the heat paths in a particular building rather than to insulate one of them heavily.[27]

5.39 Further, it was argued that increased insulation requirements will worsen the 'heat box' problem in warm climates mentioned at paragraph 4.83ff (tendency for bulk insulation in warm climates to keep naturally ventilated houses hotter at night):

> Queensland's climate zones 1 and 2 are about to get a 100 per cent increase in R-value. That is completely unjustified… It is very, very serious, because the houses will stay hotter longer.[28]

5.40 On the other hand, the Australian Building Codes Board (ABCB), in its Regulation Impact Statement for the recent changes, said, 'studies carried out show a benefit in more roof insulation in all locations.'[29]

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24 Aluminium Foil Insulation Association, *Submission 23*, p. 3.

25 Dr R. Aynsley, *Submission 17*, p. 1. Similarly Dr R. Aynsley, additional information 20 April 2010; Mr T. Renouf, additional information 16 June 2010.

26 Autex, *Submission 10*, appendix A, report by James Fricker.

27 CSIRO Division of Building, Construction and Engineering, *Notes on the Science of Building*, NSB-162, August 1991, par. 7.02.

28 Mr T. Renouf (Wren Industries), *Committee Hansard*, 17 February 2010, p. 84.

5.41 ICANZ argued that 'by moving to 6 stars, Australia is simply bringing its standard closer to those countries with similar conditions.'[30] ICANZ submitted that references to diminishing returns are an 'oversimplification', because:

- labour is a major part of the installation cost, and this does not vary significantly with the thickness of material, so installing thicker material has diminishing marginal cost;
- given the likely higher costs of energy in future, 'it is often sensible to choose a high level of insulation, as the disbenefit [of going beyond today's proscribed levels] is so small at today's costs.'[31]

5.42 Concerns about the uncertain cost-effectiveness of more stringent energy efficiency requirements are also raised in some submissions to a recent government discussion paper on national building energy standard-setting. [32] For example, the Master Builders Association said:

> Increasing the energy efficiency requirements for new homes is subject to the law of diminishing returns… it is simply not cost-effective to mandate any more than a 6-star rating for homes.[33]

Claimed inadequate treatment of 'heat box' and condensation issues in the Building Code of Australia

5.43 Submissions on inappropriate use of bulk materials in warm climates, and the problem of condensation in warm climates, are described in chapter 4.

5.44 Several submissions argued that the Building Code of Australia pays insufficient attention to these matters. It was suggested that the table of R-values by climate zone in the BCA should include, as well as minimum R-values, a maximum

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29 Australian Building Codes Board, *Consultation Regulation Impact Statement – Proposal to revise the energy efficiency requirements of the Building Code of Australia for residential buildings – classes 1, 2, 4 and 10*, September 2009, p. 133.

30 ICANZ, *Submission 18*, p. 5.

31 ICANZ, additional information 19 April 2010, pp 7–8.

32 Department of Climate Change and Energy Efficiency, *National Building Energy Efficiency Standard-Setting, Assessment and Rating Framework–Public Discussion Paper*, March 2010.

33 Master Builders Association, submission 42 to National Building Energy Efficiency Standard-Setting, Assessment and Rating Framework discussion paper, May 2010, p. 12. Similarly Housing Industry Association, submission 73, p. 8: 'HIA would not support any changes to the BCA stringency for building energy efficiency without a clear target being established for new residential buildings, and evidence being provided that shows the changes will provide a positive cost-benefit…' Australian Institute of Refrigeration, Air Conditioning and Heating, submission 40, p. 1: 'There is a push to continually improve the energy efficiency of buildings, but there is very little evidence that the regulations are delivering the desired outcomes.' See www.climatechange.gov.au/government/submissions/building-framework-paper.aspx (accessed 20 June 2010).

up R-value for naturally ventilated houses in hot climates so that heat can escape from the house at night:

> Before the Energy provisions of the BCA were prepared, Professor Aynsley, former Head of the Australian Institute of Tropical Architecture, advised the ABCB to specify minimum R-value for heat flow down together with a maximum R-value for heat flow up [in tropical and sub-tropical climates].To my knowledge, the impact of such a regime was never modelled in preparing the BCA amendment, once again presumably because it would have excluded bulk insulation from consideration, even though it would have led to a superior result in terms of comfort and energy savings for the Australian community.[34]

5.45 Dr Aynsley submitted:

> 'Studies carried out show a benefit in more insulation in all locations' is based on computer modelling using the discredited Accurate energy rating software. This software does not adequately model latent heat exchanges, or energy exchanges and thermal comfort in naturally ventilated or evaporatively cooled building or the cooling effects of elevated air speeds.[35]

5.46 In relation to condensation problems: the Building Code of Australia's energy efficiency sections have a few relevant comments, but they do not give clear direction on the interaction of condensation and insulation in naturally ventilated warm climate houses.[36]

5.47 ICANZ submitted that 'high levels of insulation will not create a hot box when ventilation is adequate (not perfect) and heat gains through windows are moderated (not eliminated)'—because 'insulating reduces heat gains [during the day] by more than it slows night time heat loss':

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34 Amalgamated Metal Industries, *Submission 25*, p. 5.

35 Dr R. Aynsley, additional information 16 April 2010. The 'studies carried out' are those referred to in the ABCB's statement quoted at paragraph 5.41 above. See also M. Kordjamshidi et al. 'Modelling efficient building design: a comparison of conditioned and free-running house rating approaches', *Architectural Science Review*, vol. 50.1, 2007, pp 52–59. Similarly see submissions 65 (Tropical Green Building Network) and 53 (Prof. T. Williamson) to the Department of Climate Change and Energy Efficiency's National Building Energy Efficiency Standard-Setting, Assessment and Rating Framework March 2010 discussion paper: see www.climatechange.gov.au/government/submissions/building-framework-paper.aspx (accessed 20 June 2010).

36 *Building Code of Australia*, 2009, volume 2, part 3.12. The most relevant comments in volume 2 of the BCA are at 3.12.1.1: 'Artificial cooling of buildings in some climates can cause condensation to form inside the layers of the building envelope… Effective control of condensation is a complex issue. In some locations a fully sealed vapour barrier may need to be installed…' Also 3.12.1.2: 'In some climate zones insulation should be installed with due consideration of condensation and associated interaction with adjoining building materials.'

> If a house does not heat up as much during the day the fact that it can't cool down as quickly during the night is not important if it is more comfortable inside because it never got as hot in the first place.[37]

Committee comment

5.48 Determining concerns raised above is beyond the expertise of the committee. The Australian Building Codes Board should be asked to respond.

Recommendation 10

5.49 The Australian Building Codes Board should consider:

- **making public the submissions received during the consultation on the recent changes to the energy efficiency requirements of the Building Code of Australia;**
- **responding publicly and in detail to the concerns raised in this inquiry, and any related issues raised in submissions to the recent consultation, about the treatment of insulation in the energy efficiency requirements of the Building Code of Australia; and**
- **explaining the basis upon which BCA has not adopted suggestions that roof/ceiling R-value standards in the BCA (volume 2, table 3.12.1.1a) should include, in warm climate zones, maximum up values for naturally ventilated houses as well as minimum down values.**

5.50 It is regrettable that there continues to be uncertainty and dispute about such basic energy efficiency provisions. This reinforces the need for independent building research facility able to research into and advice about the efficiency of insulation systems and, as recommended at paragraph 5.23.

37 ICANZ, additional information 19 April 2010, pp 9 and 14.