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Neil Byron
Presiding Commissioner
Energy Efficiency Inquiry
Productivity Commission

Email to: energy@pc.gov.au

Friday 24th June, 2005

RE: ENERGY EFFICIENCY INQUIRY

Dear Sir/Madam,

I write to you in the hope that my submission can offer some salient points for consideration in the current 'debate' over the benefits, or otherwise, of Energy Efficiency legislation and in particular the Energy Efficiency Provisions in the Building Code of Australia and the recent recommendations made in the Draft Report on Energy Efficiency by the Productivity Commission.

BACKGROUND:

Troppo Architects has been in business for 25 years. Our core business, and indeed our reputation and innumerable awards are in *housing for the tropics* which can be less specifically described as design for climate. I think that it is reasonable to suggest that this background places us in a rare position in relation to understanding the issues that must be addressed in housing design for energy efficiency.

PAST DETAILED WORK

Over the past two to three years Troppo (Townsville) in conjunction with numerous other industry representatives has been working consistently to try to ensure that the Energy Efficiency Provisions of the Building Code of Australia make sense and meet the objectives for energy efficient housing in the tropics. This entire process has been one of endeavouring to amend clauses that provide little or no benefit and significantly compromise other important *human* aspects of 'life' in the tropical environment, and indeed have as their basis a presumption of universal air conditioning.

From the start, the code has shown a complete lack of understanding of the climatic issues as well as an assumption that 'life' is about 'comfort', and that comfort is defined as a specific temperature range. Clearly these assumptions have missed the mark in the drive for a more sustainable society.

I have appended one of our detailed submissions made to the ABCB in relation to a (limited) number of the *problem* clauses.

It is important to point out at this stage that Troppo have *never* agreed with the legislative approach to dealing with energy efficiency. We believe that the only means by which true society wide energy efficiency will be achieved is through education and individual self motivation through positive and negative incentive *and fundamentally, a dramatic increase in the cost of energy.*

POLITICAL SUICIDE

In recent years efforts have been made, with a degree of success, to raise the price of water to better reflect the real cost of the resource. Taking a similar approach to power has been touted as 'political suicide' but it is just this approach that *must* be taken. Given an appropriate pricing regime elevated power costs will ensure that users will think carefully about their usage and the means by which they may reduce the associated costs. Power costs (electricity and fuel) must be real in order that the *entire community* and our regulatory tools can work together towards an appropriate and balanced pattern of consumption.

AFFORDABILITY - WHAT IS IT?

Powerful and well resourced lobby groups such as the Housing Industry Association (HIA) and the Queensland Master Builders Association (QMBA) have made detailed and clearly weighty submissions to both the ABCB and the Productivity Commission in relation to the issue of energy efficiency legislation. The HIA and the QMBA have shown a strong and dare I say a universal tendency to place the interests of their members ahead of the need for energy efficient and sustainable housing. Clearly this reflects their charter. Although powerful, these groups have an interest only in negotiating for a position that offers the most lucrative outcome for their members. The solicitations of these groups must be considered for what they are and not as appropriate arguments for abandoning *more energy efficient housing.*

AGREE THAT LEGISLATION SHOULD BE THROWN OUT

I understand that the Productivity Commission's draft recommendations call for a moratorium on the implementation of new legislation, and that this recommendation is based on a suggestion that an evaluation process should be undertaken prior to the decision to implement. I understand too that the HIA supports this position. Clearly this consideration is based solely on economics.

I would go one step further and rather than a moratorium I would propose that the legislation be thrown out conditionally upon a more realistic, humanistic and workable, and infinitely less cumbersome approach being taken to the issue of reducing energy demand as outlined in 'Political Suicide' above, that is, raise the cost of energy to *motivate* a community driven response.

MARKET WILL MAKE APROPRIATE HOUSING MORE AFFORDABLE ONCE PRESSURE COMES TO BEAR

It is most unfortunate that Australians have a love affair with home ownership as everyone's fundamental right (unlike many parts of the world) and at an ever diminishing age. The issue of housing affordability will always draw a great deal of interest because it focuses on *self interest.* Indeed, the 'first home owners grant', although a staggeringly *ignorant* tool proved phenomenally popular, for obvious reasons; it was a gift to *individuals.*

Logically, if we cannot afford the impacts of climate change, neither can we afford cheap housing. But we will choose to have it (the cheap housing) anyway. In weighing up the value of preserving the earth's ability to naturally serve us with *housing affordability* in our current debate it is simply a 'no contest'; biodiversity and the earth's ecosystems will lose.

There are a number of salient points, I think, that must be kept in mind in relation to housing affordability.

1. It is not a purely economic debate; we cannot afford to disregard the *finite* nature of natural resources, simply because we have the money to purchase houses.
2. The *affordability* of a particular style of housing is dependent largely upon its volume within the market. More of a particular type of housing will result in a reduction in the cost of that type of housing. This will hold true too for houses built of *appropriate* materials and in an *appropriate* fashion. What is also pertinent is that appropriateness is a locality specific condition and local expertise *must* prevail over state based rules.
3. Affordability of housing is dependent too, and far more significantly than the debate would have us believe, on issues of town planning, proximity to services, transportation alternatives, density, and the like. We continually fail to understand, or

at least to objectively debate this issue in our continuing pursuance of the 'great Australian dream'- the 1/4 acre block. Again, the affordability argument must not only consider the economics, it must focus on the ecological and indeed the social. If such considerations are not given appropriate weighting then we are completely wasting our time debating energy efficiency.

FIRST HOME OWNERS GRANT APPROACH TO AFFORDABILITY

In the event that *appropriate* housing is seen as *unaffordable* perhaps a significantly more informed *'appropriate housing grant scheme'* might be implemented to bridge the gap that causes us such concern.

GREENHOUSE GAS EMISSIONS ARE SUPPOSEDLY THE BOTTOM LINE

The purpose of the Energy Efficiency Inquiry in brief was to 'examine and report on the economic and environmental potential offered by energy efficiency improvements which are cost-effective for individual producers and consumers'. That the Draft Report's recommendations suggest that energy efficiency measures be rolled back in the individual Australian's best interest, seems to miss the impacts of the burdens both environmental and financial (and not to mention socially) that will be born by those same individuals as a result of our continuing inefficient use of finite, fossil fuelled, greenhouse gas emitting power sources.

If indeed this whole convoluted debate is about reducing greenhouse gas emissions then I think it reasonable to suggest that this should be kept in mind as the priority. We have seen legislation produced in the Energy Efficiency Provisions of the Building Code of Australia that is utter non-sense in relation to thermal performance. It represents a significant backwards step and forces *my company* to design buildings that will *most certainly* require *increased energy demand* to those that we would have designed prior to the legislation. Clearly the point has been lost somewhere during this most impressively massive, and *flawed* process. The process is not the outcome and indeed bears no relation to it whatsoever. We must try to maintain our focus on the matter at hand.

SUMMARY

If one good thing were to come out of this inquiry that would likely surpass whatever other policy decisions were made, it would be that an appropriate pricing regime involving elevated power costs be implemented.

Real pricing of energy is essential for enabling individual users to appreciate and contemplate the value of the energy they use and importantly to individually feel the financial impact of their use and then as individuals to begin to make consumption decisions that will collectively reduce our greenhouse gas emissions and energy intensity as a nation and indeed as a planet.

Prepared jointly with Sandy McCathie of ecoSAV Y (Townsville sustainability consultancy specialising in the built form).

Yours faithfully,

Geoff Clark
Director:
troppo architects (qld) pty ltd

FURTHER

I must return your attention to the paragraph entitle 'Background' at the top of this letter. Troppo's reputation and body of work has been enabled by a solid understanding of principles of climatically responsive design, a desire to ensure the maintenance of regional appropriateness and true belief in the need to always do better, to do more with less, and to provide appropriate accommodation.

There is no more certain means to disarm this condition than to legislate nonsense that negates the possibility of producing *better* and more appropriate outcomes. If productivity is the concern of the commission then the commission should understand that my *productivity will* most certainly be lost in the event that this process of legislation continues along the current path. I will most certainly quit the profession to which I have invested so much study, time, money, conscience and effort. In all honesty I cannot imagine that I will remain 'an architect' beyond the end of this calendar year.

A joint-submission to the Australian Building Codes Board

Proposed amendments to the BCA Energy Efficiency Provisions for Classes 1 & 10 for Climate Zone 1 ONLY for adoption in May 2004

INTRODUCTION

A joint submission to the Australian Building Codes Board (ABCB).

This joint submission proposes amendments to the *Building Code of Australia* Energy Efficiency Provisions for Classes 1 & 10 for Climate Zone 1 ONLY for adoption in May 2004.

The amendments proposed in this submission seek to increase the ability of the Deemed-to-Satisfy provisions to support appropriate and/or innovative housing design in Climate Zone 1 – the tropics.

This joint-submission has been developed by and in consultation with a broad cross-section of North Queensland industry organisations and interested parties. Notably, representatives of the Townsville City Council, Royal Australian Institute of Architects, Housing Industry Association, Troppo Architects, Building Designers Association of Queensland, Townsville Building Certification, Thuringowa Building Certifiers and Queensland Master Builders Association.

Endorsement for the proposed amendments is detailed at the end of this submission.

HOUSING DESIGN IN THE TROPICS – THE CONTEXT

Housing design in the tropics seeks to minimise heat gain. Passive solar heat gain in winter may be appropriate in the lower latitudes or at higher altitudes.

Optimal building materials for the tropics have low thermal mass and combine to allow rapid thermal response of buildings. High thermal mass results in a flattening of diurnal temperature variations. In the higher latitudes of the tropical zone, the *average* diurnal temperature is above comfort, and as such an averaging of temperature variations will result in permanent discomfort. Buildings in the tropics must be given the opportunity to respond to 'relief' associated with what are sometimes very rapid shifts in climatic conditions such as a shower of rain, the arrival of a sea breeze, as well as the daily setting of the sun.

Ventilation is a critical element of housing design in the tropics. Mechanical ventilation can assist during times when natural ventilation is inadequate. Ventilation serves a two-fold role, firstly in exhausting warm air from within a building, and secondly in invoking personal cooling (a physiological response to breeze) as air passes over the body.

Shading has the potential to prevent heat load by direct insolation to both walls and openings. Functional shading is of significantly greater benefit than insulation as it has the potential to prevent direct solar gain. Additionally, shading removes the need, in non-airconditioned spaces, to provide bulk insulation. This allows a house to respond more quickly to beneficial short term climatic changes.

Bulk insulation is important for airconditioned houses *only*. Airconditioning has become very common in the tropics largely due to the construction of housing that is inadequate in regard to thermal mass, ventilation and shading. It is recognised however that even in appropriately designed tropical houses, some people choose to aircondition some portions of the house, notably sleeping areas. Bulk insulation is therefore important for airconditioned *sections* of the house.

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The priority in Climate Zone 1 is to keep the heat out. Important to this task are:

- Thermal mass (low)
- Ventilation (maximum)
- Shading (maximum)

It is also important to acknowledge that the tropical climate is essentially benign, and as such outdoor living is a high priority aspiration. Outdoor living spaces must however be adequately shaded, and sheltered from rain, as both sun and rain can at times seem incessant. Additionally, outdoor living spaces must offer direct connection to indoor living spaces in order to ensure their use.

In summary, best practice design for the tropics must:

1. Utilise lightweight construction materials
2. Ventilate to both 'change air' and to induce a physiological response
3. Shade walls and openings
4. Insulate appropriately (reflective only in non-conditioned spaces – bulk in conditioned spaces)
5. Provide all weather outdoor living spaces

OVERVIEW OF PROPOSAL

In the light of best practice design principles for the tropics, and in recognition of a need not only to improve the 'airconditionability' of houses, but to ensure that the need to aircondition is minimised, for Climate Zone 1 only, **items 1-4 are amendments proposed for adoption in May 2004**.

The concepts identified in items 5 & 6 are supported in principle but the details for an amendment have not yet been worked through. They are raised in acknowledgement of the desire for their being addressed in this or a future amendment of the BCA.

Items (Amendments) 1 - 4 are proposed for adoption in May 2004

1. **Extrapolation of glazing limits** specified in Table 3.12.2.1
2. An **exemption for glazing when shaded** by projection to 45 degrees from vertical to allow for verandahs/ deep overhangs and to address unreasonable concession given to performance enhanced glazing when shaded.
3. Publishing of **glazing values for extended projections** in Table 3.12.2.1 Maximum Effective Glazing Area.
4. Requirement for **proof of Part 3.12.4 Air movement**

Items 5 & 6 are raised but require further work

5. **Clarification of glazing area calculations** for Table 3.12.2.1 Maximum Effective Glazing Area.
6. **Introduction of a Zoning concept**, for Climate Zone 1, to optimise thermal performance for both air-conditionable and non-airconditioned areas of the building to both individual *and* overall benefit, and to enhance the useability of outdoor living spaces.

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A. SHADING/OVERHANGS

Due to the heat and humidity the vernacular of the tropical zone is characterised by surrounding verandahs, or combinations of verandahs that run for the full length of one or more sides of the building. These verandahs provide effective shading to adjacent walls, glazing and openings as well as useable and accessible outdoor spaces during the wet (hot) season. Deep overhangs also allow doors and windows to be kept open during downpours. This vernacular model was developed at a time when air conditioning was not available, and as such, indicates an appropriate 'low tech' response to climate.

In acknowledgement of the benefit of deep overhangs, Amendments 1 and 2 are proposed.

Item 1 (Amendment 1)

In 'Notes' section of Table 3.12.2.1, amend Note 7 to read:

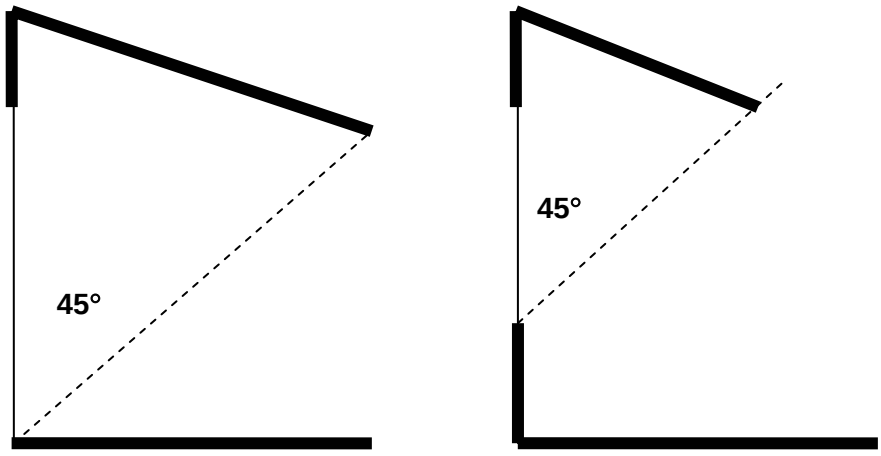
7 Glazing area limits for shading area projections exceeding those shown in the Table can be interpolated and/or extrapolated.

Item 2 (Amendment 2)

Additional text for **3.12.2.1 External Glazing**

(b) (iii) When the angle between a line joining the base of any glazing, and the extended overhang projection associated with that glazing exceeds 45 degrees from the vertical (refer figure 3.12.2.x) compliance with Table 3.12.2.1 is exempt for that glazing.

Figure 3.12.2.x



(a) Projection for verandah (b) Projection for window

Justification for Amendment 2

(a): Surrounding verandah

A verandah beam is traditionally and typically 2100mm above floor level (level with top of door frame). In this case the depth of the veranda must therefore be a minimum of 2100mm to achieve a 45° shadow angle.

(b): A typical window

Sill is typically 1000mm above floor. An eave at a height of 2100mm above floor level (typical) will require a projection of 1100mm.

B. GLAZING - Extended Glazing Values

Extended glazing areas have been published in the Northern Territory for increased shading projections (for zones 1-3 only).

Extended projections are common in Climate Zone 1. The publishing of Table 3.12.2.1 (extended) as an amendment to the BCA is supported.

Item 3 (Amendment 3)

Include **Table 3.12.2.1 (extended)** as published in the Northern Territory of glazing area limits for extended shading (zones 1-3) to 2000mm projection.

Extended values for Climate Zone 1 (only) are provided below.

Table 3.12.2.1 (extended)

MAXIMUM EFFECTIVE GLAZING AREA

(Percentage of total *glazing* area to the total *floor* area of the storey)

Glass Description	Glazing Frame	Glazing System performance characteristics (U-value/SHGC)	Maximum effective *glazing* area percentage							
			No Shading	Shading (projection from face of building (mm))						
CLIMATE ZONE 1				300	450	600	900	1200	1500	2000
Single clear	Aluminium Standard	5.6/0.86	18	21	22	24	27	31	35	40
	Timber of UPVC	4.6/0.78	19	23	24	26	30	34	39	45
Toned (minimum 5mm)	Aluminium Standard	5.6/0.66	23	27	29	31	36	40	46	53
	Timber of UPVC	4.5/0.59	26	30	32	35	40	45	51	59
Single solar control, pyrolytic low-e	Aluminium Standard	4.1/0.48	31	37	40	43	49	55	63	72
	Aluminium thermally improved	3.3/0.46	33	38	41	45	51	58	65	76
	Timber of UPVC	3.2/0.47	32	38	41	44	50	57	64	74

C. GLAZING PERFORMANCE

Performance glass performs significantly better than plain glass *in the un-shaded condition*, but has negligible performance benefit in the shaded condition. There is a significant cost associated with the use of 'performance glass' and as such the real *value* or worth of the product must be acknowledged.

Referring to the current Table 3.12.2.1 and also the extended values published for use in the NT, the maximum effective glazing area percentages for various shading projections (for aluminium frames, as an example) are:

- single clear glass - 18% (no shading), 27% (900mm), 40% (2000mm)
- low e glass – 31% (no shading), 49% (900mm), 72% (2000mm).

A comparison of heat gain through performance glazing (Optilight) and clear glazing is being measured at the Research house in Rockhampton. Preliminary monitoring (yet to be validated) has shown that when exposed to direct sunlight there is an 8°C difference in heat transfer into the house between the two (with the clear glass allowing the significantly greater heat transfer) *(verbal communication with Kevin Hoffman, Built Environment Research Unit, Queensland Department of Public Works).*

However, when shaded, the *difference* in performance between 'performance glazing' and clear glass, in keeping heat out, is significantly reduced and almost negligible. Preliminary data from monitoring at Research House Rockhampton reveals a difference in heat transfer into the house of only 1-2°C between the two glazing types. *(verb. Comm. Kevin Hoffman)*

Further evidence of the enhanced benefit of shading in comparison to performance enhanced glazing *when considering heat gain*, is contained in the table reproduced below entitled 'Heat gain through various glass treatments' from the Your Home Technical Manual.

Heat Gain Through Various Glass Treatments
(reproduced from Your Home Technical Manual, Section 1.8a Glazing Overview, p4/6)

Unshaded single glazed window	100%
Double glazing	90%
Internal vertical blinds/open weave drapes	76%
Internal Venetian blinds	55-85%
Internal Holland blinds	55-65%
Tinted glass	A* 40-65%
Solar control film/reflective glass	B* 20-60%
Trees – full shade over north wall	20-60%
1.0m eaves over north wall	30%
External roller shutter	25-35%
External awning	25-35%
2m pergola over north wall with deciduous vines or shade cloth	20%
Outside metal blind or minature louvres parallel and close to window	15-20%

A Effectiveness is reduced as the colour darkens*
B Solar film, tinted glass and reflective glass of varying effectiveness is available. They significantly reduce light levels all year round.*

Given the advantage of shading with regards to minimising heat gain and the negligible measured difference in heat gain, *when shaded,* between different glazing types, it is proposed that in a cooling climate – Climate Zone 1, there be little or no difference in maximum effective glazing areas (as specified in Table 3.12.2.1) for different glazing treatments, when adequately shaded.

It is considered that glazing is considered shaded when the angle between a line joining the base of any glazing, and the extended overhang projection associated with that glazing exceeds 45° from the vertical (refer figure xx).

This is further evidence in support of **Amendment 2**. The inclusion of Amendment 2 will remove the unreasonable concession given to performance glazing for the case where glazing is shaded.

D. MODELLING / STAR-RATINGS

Compliance with the BCA Energy Efficiency provisions may be granted on the basis of assessment by a modelling program such as BERS and the achievement of a 3.5 star rating. Providing that the rating assessment has been undertaken by a qualified practitioner, these applications meet the BCA energy efficiency requirements by the performance method.

Because, energy rating software, including NATHERS and BERS, are not yet able to assess natural ventilation/breeze access, these models are only showing that the building *uses* energy efficiently, no merit or incentive applies for achievement of natural ventilation. In other words, yes they can prove *compliance* with the regulations, but there is no differentiation for good tropical design.

It is felt that in Climate Zone 1, where natural ventilation and breezeways are a priority for good tropical design, that until naturally ventilated buildings can be effectively modelled, for applications seeking compliance by use of a modelled star rating that compliance with Part 3.12.4 Air Movement is additionally proven by alternative means eg through Deemed-To-Satisfy provisions or other non-modelled means.

Item 4 (Amendment 4)

To **Part 2.6**, **V2.6.2 Alternative Verification Methods** add point (a) and explanatory information as follows.

Compliance with P2.6.1 is achieved by verifying the building in accordance with V2.6.2.1 or V2.6.2.2.
(a) For Climate Zone 1, compliance with Part 3.12.4 Air Movement must additionally be proven by alternate means.

Explanatory Information:
Energy rating of houses and energy analysis software have not yet been developed that accurately evaluate natural ventilation/breeze access, a priority in tropical design.

E. GLAZING CALCULATIONS

Calculations of glazing in Table 3.12.2.1 Maximum Effective Glazing Area require clarification.

Currently the maximum effective glazing area is defined as the percentage of total glazing area to the total floor area of the storey.

It is felt that there would be less ambiguity in maximum effective glazing areas if calculations were undertaken on the basis of individual windows and on a per room basis.

Item 5

Support is given for clarification of the methodology for calculations of glazing in accordance with Table 3.12.2.1 Maximum Effective Glazing Area.

F. ZONING

This amendment is still under development. However, the concept is put forward in acknowledgement of the support for the future adoption of such an amendment.

This amendment is proposed as an optional approach to elevate the BCA provisions from preventing worst case to encouraging *appropriate* design in the tropics – Climate Zone 1.

Importantly this proposal encourages a rethink of *airconditioning* as being the sole means of providing comfort conditions in Climate Zone 1 and encourages the enhanced consideration of ventilation, breezes and connection of indoor and outdoor living spaces. The proposal acknowledges the fact that shaded outdoor areas will more often than not provide comfort conditions *within* the environment.

The increasing use of airconditioners in housing has been recognised in the BCA Energy Efficiency Provisions. Indeed the BCA Energy Efficiency Provisions has this at its core – the use of airconditioning is assumed. However, the exponential increase in the use of airconditioners can be attributed largely to poor building performance.

It is imperative that overall building performance be addressed as the first step in minimising the use of air conditioners, and that the second step be reduced heat load to conditioned spaces.

It is common practice in the tropical zone for bedroom areas to be air conditioned and living areas to remain un-air conditioned. This is an acknowledgement of the fact that connection with the outdoors and an outdoor lifestyle is highly valued in this climatic zone. In order to facilitate outdoor living, and therefore reduced dependency upon air conditioners, a house may be zoned into spaces that are intended to be air conditioned, and spaces that are not.

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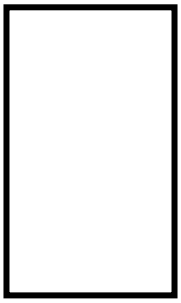
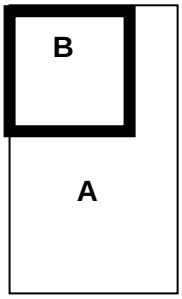
It is proposed that an optional zoning clause be introduced to allow the definition of some rooms as *non-airconditioned* spaces and allow them to be designed optimally to perform as such.

The zoning concept requires that non-airconditioned zones be designed for fast thermal response times (no bulk insulation requirement). In the non-airconditioned zones the priority design features are shading, ventilation and breezes.

An example of the difference in approach is:



(moderate insulation on whole)



Low insulation on "A" non-air conditioned spaces; high insulation on "B" air conditionable rooms (eg bedrooms, perhaps a living area)

It is proposed that the Zoning clause be included as a new part entitled 'Zoning' after current Part 3.12.4 Air Movement and before current Part 3.12.5 Services.

It is proposed that a zoning approach would an option for compliance with the BCA Energy Efficiency Provisions.

A preliminary outline for the requirements of a zoning clause are:

For "A" non-air conditioned portion:

- Ventilation: Minimum opening sizes in accordance with table xxxx (to be provided/determined) (in order to provide a minimum 50% openability relative to wall area or 40% openability relative to floor area for each room and at least two ventilation openings, each at least 40% of required ventilation opening for room, separated by at least 90 degrees.)
- Glazing: No maximum restriction on glazing area in "A"
- Shading: Wall shading in accordance with Figure 3.12.1.2 Measurement of building projection for wall shading (1:4 projection)
- Insulation: RMB to walls and roof.
- Thermal mass: low thermal mass

For "B" air-conditionable portion:

- Glazing: Glazing type/area exemption is only available when overhangs to openings achieve 45 degrees.
- Shading: Overhangs/openings in accordance with Table 3.12.2.1 (glazing)
- Insulation: Bulk insulation to walls and ceilings.

The principle of a *restriction* plus a *concession* will mean that the designer will need to weigh up the costs/benefits on a case by case basis. Too, a decision will have to be made whether to make substantial connection with the outdoors, and waive the right to air condition, or vice versa. It is also important to keep in mind though that a separate living space can still be provided that *is* air conditioned, as long as it meets the more stringent requirements. This will allow people to give themselves the opportunity to live outdoors – this is most important.

To avoid unintended use of a zoning clause and potential skewing of built form there must be roughly equivalent construction costs for "A" non-airconditioned and "B" airconditionable portions and also in comparison with construction under Deemed-to-Satisfy. It is considered that a higher upfront cost with lower long term operating costs would be acceptable.
It is acknowledged that airconditioners will be installed after the fact and given that the building will function well without them, it is anticipated that their duration of use will be shortened/minimised.

Item 6

Support is given to continuing work on the development of an optional, new Part to address Zoning.

Endorsements

Organisations that endorse the items and contents of the Northern Queensland joint-submission are listed below. Endorsement is provided in full, unless otherwise stated.

- Housing Industry Association (Queensland)
- Queensland Master Builders Association – *partial endorsement*
- Royal Australian Institute of Architects (Queensland Chapter)
- Building Designers Association of Queensland (Townsville Branch)
- Troppo Architects (Qld) Pty Ltd
- Townsville Certification Group
- Thuringowa Building Certifiers
- Townsville City Council
- Thuringowa City Council – *partial endorsement*

Comments from parties having only partial endorsement:
Thuringowa City Council – Gave support in principle. Request further information eg assessment of any cost implications and improved clarity for the diagrams.

Queensland Master Builders Association (QMBA) – Gave support to items 1-4, with the additional provision that for Item 2 the effect of % of glass allowed on other walls is looked at.

Other QMBA comments were:
On section C, '*The arguments are about no real difference between heat gain from sunlight on ordinary glass and high performance glass when the glass is shaded. It does not however canvas the heat gain from ambient temperatures. High performance glass could have an R rating of R1.0 which is even higher than a block wall. As the R value can be high an argument could be put that a glass house (in high performance glass) could perform better than a block house. We therefore do not support this item as further research needs to be undertaken.'*

Items 5 and 6 (also identified as sections E and F) were *not* supported by the State Housing Committee of the QMBA.