SECOND SUPPLEMENTARY SUBMISSION TO THE SENATE ECONOMICS – LEGISLATION COMMITTEE INQUIRY INTO THE SAFE CLIMATE (ENERGY EFFICIENT NON-RESIDENTIAL BUILDINGS SCHEME) BILL 2009

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Advanced Environmental

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Contents:

1. Introduction

Maria Atkinson, Global Head of Sustainability for Lend Lease Corporation and Ché Wall, Managing Director of WSP Lincolne Scott, appeared before the Senate Economics Committee public hearing on Friday, 12 February 2010.

This submission is made further to the evidence provided and questions raised in the public hearing, and in response to evidence provided by other witnesses.

2. The proposed Scheme

2.1 Cost

Concerns about the cost of the Scheme were raised at the public hearing

According to the Proof Hansard of the public hearing on 12 February 2010:

Senator MILNE—I want to hear what your concerns are. This legislation is on the table and I need to be very clear about what the Energy Efficiency Council says is wrong with it.

Mr Murray-Leach—There is the reason that it is expensive to administer.

Our response:

- The Scheme does **NOT** have extensive record keeping, reporting and auditing requirements; on the contrary, it is simple, low-cost and fair.
- Lend Lease & WSP Lincolne Scott have spent time and money pursuing a cost effective solution to address both the single building and large asset portfolio owners needs and costs.
- Every building owner receives electricity and gas bills – the Scheme is simply asking building owners to take those bills and the floor area of the building, and then calculate the energy efficiency of the building using readily available state- and energy-specific greenhouse gas statistics.
- The Scheme will create an obligation on a building by building basis. We expect that for owners of small buildings, there would be a one-off annual transaction through a third party in the same way that individuals use H+R Block to sign off their income tax returns. This will keep Scheme administration to an absolute minimum. Larger, corporate and portfolio building owners would interact directly with the registry. We expect this would be limited to 100-200 parties.

2.2 Thresholds

At the public hearing on 12 February 2010, the Department of Climate Change, represented by Mr Barry Sterland, raised the matter of thresholds.

The fundamentals of the Scheme proposed in the Bill and the Efficient Building Scheme upon which it is based are not sensitive to a threshold and the cost of compliance is designed to be so low that every building could reasonably assume an obligation under the scheme. We also consider thresholds might be part of a stepped introduction of the scheme.

2.3 Building classifications

At the public hearing on 12 February 2010, the Department of Climate Change, represented by Mr Barry Sterland, raised the matter of building classifications.
We note that Maria Atkinson is a member of the Australian Building Codes Board, representing industry.

Differential Issues
The Building Code of Australia is a National Code that applies to all states and territories through their own building control legislation. Regulation 5 of the Building Regulations 1989 (WA) (CI) adopts the BCA and requires all building work to comply with the Code.

Building Class
The BCA classifies buildings by their use. A building may be made up of a number of classes if it has a mixed use. The BCA identifies the following building classes:
Class 1(a) – a single dwelling or attached dwellings (eg: a terrace, duplex, etc) where each dwelling is separated by a fire wall.
Class 1(b) - one or more buildings that constitute a boarding house, guest house, hostel of small scale (ie: not exceeding 12 persons or 300m2 in floor area).
Class 2 – a building containing 2 or more dwelling units (eg: flats, apartments).
Class 3 – a residential building for a number of persons such as a large scale boarding house, guest house, hostel, the residential part of a hotel, motel, school, etc.
Class 4 – a dwelling unit that is a part of a commercial use (eg: a caretakers/managers flat).
Class 5 – an office building.
Class 6 – a shop or other building where goods or services are retailed directly to the public.
Class 7(a) – a car park building.
Class 7(b) – a storage building or building where goods are wholesaled (eg: a warehouse).
Class 8 – a laboratory or a building where a process takes place (eg: factory, workshop, etc).
Class 9(a) – a health care building (eg: a hospital, clinic, etc).
Class 9(b) – an assembly building (eg: community hall, sports hall, etc)
Class 9(c) – an aged care building.
Class 10(a) – a non-habitable building being a private garage, shed, or the like.
Class 10(b) – a structure (eg: a fence, wall, mast, swimming pool, etc).

ENERGY EFFICIENCY CODE RELIES ON THE DIFFERENTIATION OF BUILDINGS
The Australian Government introduced the **Energy Efficiency Provisions for Multi-Residential and Commercial Buildings.** On 30 April 2009 the Council of Australian Governments (COAG) announced that it would request the Australian Building Codes Board (ABCB) to significantly increase the stringency of the BCA energy efficiency provisions for all new commercial buildings in BCA 2010.
To prepare for the COAG request, the ABCB and the Department of the Environment, Water, heritage and the Arts, commissioned a series of studies that assisted the development of the proposed BCA provisions.
Development of the BCA energy efficiency provisions for multi-residential and commercial buildings proceeded in two stages. Firstly, provisions for Class 2, 3 and 4 buildings (eg –

apartments, hotels etc.) were included in BCA 2005. Secondly, provisions for Class 5, 6, 7, 8 and 9 buildings (eg - offices, shops, warehouses, factories, health care buildings, auditoriums, schools etc.) were included in BCA 2006.

The Deemed-to-Satisfy Provisions vary depending upon the climate zone in which the building is to be located.

2.4 Process for determining the initial cap for permit allocation.

The initial permit cap and starting point for the cap trajectory is proposed to be set at the market average to bring equity to the scheme and to ensure an initial balance between demand for additional permits for acquittal and surplus permits available. The market average will be determined on a building type by building type basis and specific to geographic/urban location to ensure fairness with respect to externalities beyond a building owner's control that include relative climate intensity and the carbon intensity of fuel supply. Provision also exists for the further sub definition of caps to cover over inherent circumstance such as a specific cap for heritage listed properties.

The Efficient Building Scheme provides flexibility for the definition of caps that can be refined after the initial data collection phase of the scheme indication. Importantly, the scheme is designed to operate by comparing like building to like building and to provide a balanced supply and demand for permits in the initial obligation period.

Supply and demand of permits will be balanced by ensuring the market average is calculated with reference to gross emissions for a market sector divided by gross floor area associated with the emissions. This will produce an emissions intensity cap in kg.Co2.e/m2 for comparison and annual liability consideration. However, permits will be issued with respect to the cap intensity multiplied by the gross floor area determined in the accounting period. This will ensure that the scheme is operated as a true cap and trade scheme, with an absolute cap on permits allocated, and that the introduction of new stock into the market does not result in distortion to the effective cap for the existing office stock.

2.5 Benefits for the property sector

Critics of the Scheme from within the property industry appear to have overlooked the **benefits to our sector** which the Scheme will deliver, including:

- Creating business opportunities for developers, contractors, and service providers;

- By providing a penalty price for carbon and a long term trajectory for the carbon cap against which a building is to be accountable, the Scheme provides certainty on both liability that will be avoided, and credits that will generated through a green refurbishment.;

- By providing a benchmark for each building type, in each climatic region, the Scheme will ensure meaningful information is provided to building owners, allowing them to prioritise capital investments in their assets. Without the benchmark, energy performance and carbon accounting of a building or a portfolio of assets is meaningless; and

- By providing real incentive to effect substantial energy efficiency improvements as soon as possible, the Scheme will increase asset values, yields and investment returns for green building owners.

3 NABERS (Energy)

The following information is provided in response to suggestions by the Energy Efficiency Council equating NABERS (Energy) to the Scheme proposed in the Bill, and support for NABERS (Energy) from the EEC and the Green Building Council of Australia.

3.1 Claim that NABERS (Energy) would achieve the same result

According to the Proof Hansard of the public hearing on 12 February 2010:

Mr Murray-Leach (Energy Efficiency Council): Roughly that is what NABERS does. It looks across a whole range of metrics of the building and it works out how to rate it based on its energy use per square metre. The only thing it does not do is say, 'What is an appropriate level? What is a benchmark for the industry?' It basically just rates it.

Mr Murray-Leach: (...) we would say that if you were going to pass this bill we would recommend that it be done with the NABERS tool. There is no reason to change that.

NABERS (Energy) would not and could not achieve the same result as the proposed Scheme, nor could NABERS (Energy) be the basis for the proposed Scheme.

As detailed below in this submission, NABERS (Energy) imposes considerable cost, it is not universally or even widely supported by the national property industry, it has a number of longstanding and ongoing fundamental technical flaws, and it is not suitable for mandatory application.

We point to the statement by the Institute for Sustainable Futures, which accompanies the Institute's statement of support for the Efficient Building Scheme (printed in full at the end of this submission).

For easy reference, we re-print here the Institute's specific statement regarding NABERS Energy and the importance of penalties:

NABERS Energy

The importance of penalties

This statement provides the perspective of the Institute for Sustainable Futures on the claim that the proposed *Efficient Building Scheme* replicates *NABERS Energy* and is therefore not required.

NABERS Energy fulfils an important role in providing incentive for energy efficiency improvements in buildings, however on the basis of our research we believe the proposed *Efficient Building Scheme* has potential to further accelerate the uptake of energy efficiency in Australia's commercial buildings. An important distinguishing feature is the *Efficient Building Scheme's* system of transparent financial rewards for energy efficient buildings and (in particular) financial penalties for inefficient buildings.

NABERS Energy is a framework for rating the operational greenhouse gas emissions of commercial and residential buildings relative to a benchmark. It provides market recognition for new and existing buildings that perform well. In some jurisdictions it has been used as a regulatory benchmark (for example, new office and retail buildings may be required to achieve a minimum NABERS energy rating via a commitment agreement). It is also used by organisations and businesses on a voluntary basis to benchmark the operational performance of their office buildings and tenancies.

Why NABERS Energy is not enough on its own:

International and local research, particularly within the field of behavioural economics, indicates that the conventional 'rational actor' model is not sufficient to explain human economic behaviour. Relatively good rates of return on energy efficiency upgrades and the recognition *NABERS Energy* provides will encourage, but not necessarily lead to, action on energy efficiency. This reflected in the current situation: whilst energy efficiency uptake in the commercial buildings sector has been positive, it still falls far short of the potential for improvement.

Why penalties are an important feature in this context:

Financial 'loss aversion' has been found to be a much greater driver for behaviour change than financial gain (eg. Brekke and Johansson, 2008). Experimental research has found that people are willing to take big risks to avoid losses but possibly not even small risks to achieve gains, leading to the conclusion that fines are likely to be a particularly strong incentive for behaviour change. (eg. Dawnay and Shah, 2005). It is the owners of poorly performing buildings who particularly need to be targeted, as this is where the greatest opportunity for improvement lies. In this light the penalties established by the *Efficient Building Scheme* are an important factor in improving energy efficiency and reducing greenhouse gas emissions in the commercial buildings sector.

3.2 Cost of using NABERS Energy

The following is pricing guidance for NABERS Energy assessment from an Accredited Assessors website.

"The NABERS Rating Calculator can help you to estimate your building's environmental performance. For an official NABERS rating, you must engage an Accredited Assessor. A NABERS Energy assessment generally costs between $1,000 and $4,000, depending on the size of the space being rated."

The cost of assessment in NABERS varies.

Under NABERS (Energy) an Accredited Assessor must survey the building to make assessments on criteria such as 'occupancy density' and to provide subjective judgment on criteria such as 'hours of usage'.

This requirement of Accredited Assessors to survey the building might have an appropriateness for organizational measurement, but it is an extra cost burden that would appear inappropriate for a mandated scheme.

The cost of measurement and reporting must be balanced with the benefit.

NABERS Energy is more costly than the reporting requirement needs to be.

3.3 **Claim that NABERS Energy is universally supported by industry**

> According to the Proof Hansard of the public hearing on 12 February 2010:
>
> Mr Murray-Leach, Energy Efficiency Council: NABERS is an Australia-only scheme. It is pretty well accepted that it is one of the best building rating schemes in the world. That is very well accepted by our industry. We have a number of international players who are members of the council who have said that they think it is basically one of the best building rating tools in the world. NABERS is not only the only Australian system at the moment but we think it is one of the best systems globally because it is simple and effective.
>
> Mr Dave Peebles, Green Building Council of Australia: (...)it is widely accepted across industry. It is a standard that everyone is familiar with.

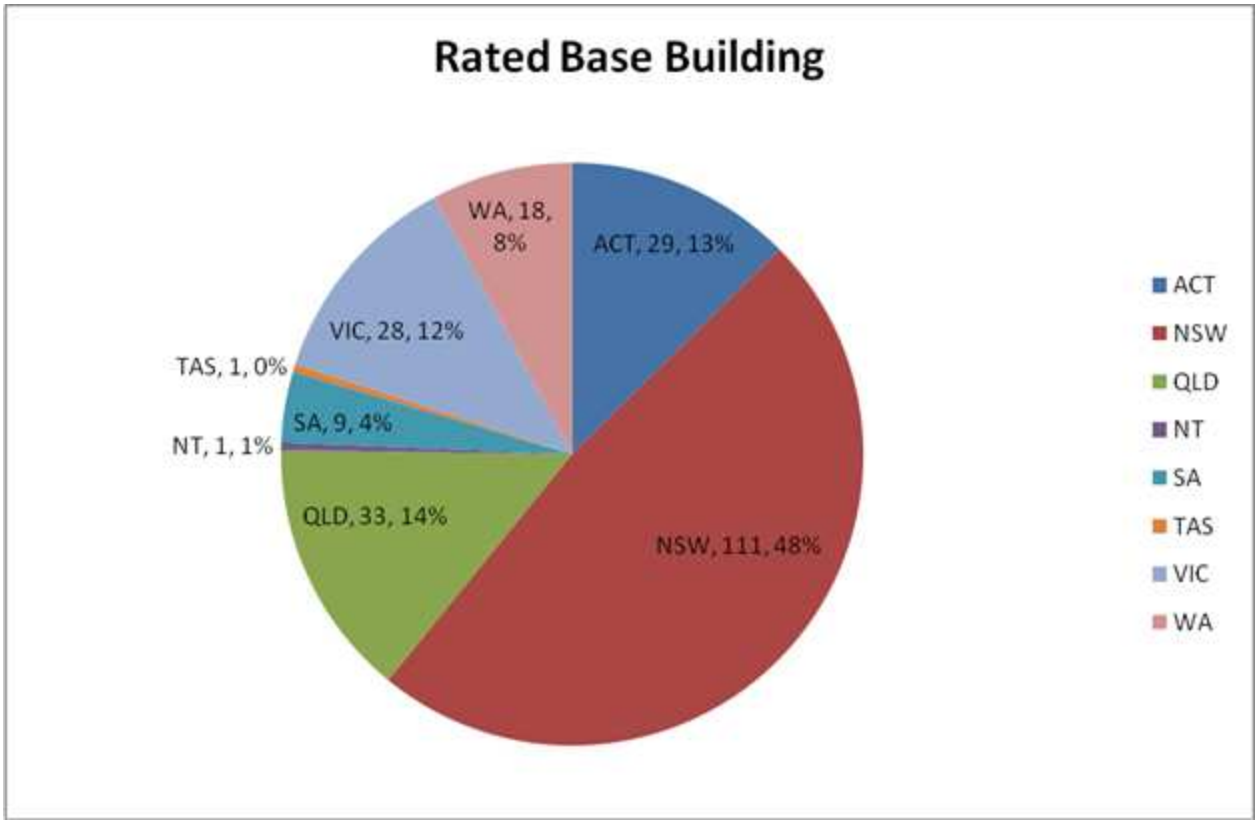
There is a common misrepresentation that NABERS is somehow universally supported by building owners. The number of certified ratings does not support this representation.

Current statistics were sourced from the official NABERS website on 15 February 2010. Base Building ratings were counted as these relate to landlords' energy consumption and are analogous to the scope of collection required by the Bill.

Number of ratings as Feb 2010 = 230 total from database for base building ratings.

Of this total, 111 – or 48% - are in NSW, with extremely poor numbers of ratings in other states.

For a tool that has been in the market for 8 years, this equates to about 30 new ratings each year - a very poor penetration.



Despite the Northern Territory Government being responsible for leasing an estimated 65% of the commercial office space in the Territory. There are only 3 buildings with NABERS (Energy) ratings.

3.4 History of technical concerns tabled by the Green Building Council

In February 2006 the Green Building Council of Australia prepared the following Position Paper which documents the flaws in the Australian Building Greenhouse Rating (ABGR) Scheme.

The following is from the Green Building Council of Australia Position Paper Energy Benchmarking Within Green Star Rating Tools **(February 2006)**

ISSUE

The office suite of Green Star rating tools currently refers to the New South Wales Department of Energy, Utilities and Sustainability's (DEUS) Australian Building Greenhouse Rating (ABGR) scheme to benchmark the energy efficiency initiatives of commercial office buildings.

The Green Building Council of Australia (GBCA) has received feedback from stakeholders that the ABGR scheme has limitations which need to be addressed.

This position paper details the issues which require resolution in order for Green Star to continue to reference ABGR as the national energy efficiency and greenhouse gas emissions benchmark tool.

SUMMARY POSITION

Stakeholder feedback and subsequent investigation by the GBCA in response to this feedback, has highlighted the following issues with respect to the referencing of ABGR as the national energy efficiency and greenhouse gas emissions benchmark tool:

- ABGR rating thresholds for each state were created to be consistent with the power consumed by each building rather than their corresponding greenhouse gas emissions and subsequent environmental impact;
- Victoria and New South Wales (NSW) government agencies modified their ABGR rating curves from the national curves to make the ABGR tenancy rating more stringent in Victoria and more lenient in NSW (ABGR Tenancy rating);
- There is no national comparative or consistent assigning of ABGR ratings, based upon greenhouse gas emissions for each state/territory, due to the climate and location normalisations applied by ABGR.
- The difference in ABGR rating bands between the states results in excess of 1.5 stars difference for the same normalised greenshouse gas emissions ($kgCO_2^e/m^2$) for both the ABGR tenancy rating and the ABGR base building rating.
- ABGR does not recognise energy efficiency initiatives beyond its current 5 star band.

- ABGR's greenhouse gas emissions are not reflective of the Department of the Environment and Heritage's current national greenhouse gas coefficients.
- ABGR *under*estimates associated electricity greenhouse gas emissions and *over*estimates associated natural gas greenhouse gas emissions.
- The ABGR base building rating is significantly impacted by tenant operation and behaviour, giving an inappropriate assessment of the base building's management efficiency.

As a result of these issues the GBCA believes that the ABGR scheme is currently unsuitable for reference in Green Star rating tools.

It is recommended that DEUS update the ABGR scheme for both base building and tenancy ratings to ensure that state and territory references are based on the national greenhouse gas emission coefficients.

The GBCA also requests that DEUS conduct research into the loads and operational practices of best practice tenancies to benchmark equipment loads and operational schedules for tenancies and that this information should be used to update the default equipment loads and operational schedules currently referenced by ABGR Tenancy Validation Protocol. This has particular relevance for the Green Star – Office Interiors rating tool.

Until the reseach on fitout equipment loads and operational schedules is complete the GBCA will advise Green Star – Office Interiors projects to use the following overall loads:

- Processor: 90w/person
- CRT: 60w/person
- Flat Screen: 20w/person
- Laptop: 20 w/person
- Periphery Equipment: 80 w/person
- Lighting 8 or 12 w/sqm

The GBCA recommends that DEUS communicate the process for responding to these issues and technical concerns.

In the interim, the GBCA has developed an 'Energy Efficiency Calculator' for its most recent rating tool: Green Star – Office Existing Building Rating. This replaces ABGR as the calculator for energy efficiency and greenhouse gas emissions, although the GBCA will allow buildings located in NSW that have an ABGR rating to defer to ABGR.

The GBCA will use the Energy Efficiency Calculator methodology to develop relevant energy efficiency references for future tools such as the Green Star – Retail rating tool which is currently under development.

In addition, the GBCA has developed a Management Efficiency supplement to its Green Star – Office Existing Building rating tool which scores base building energy management practices by assessing actual operational energy data, as well as management practices that ensure air quality, comfort and heat rejection water efficiency is maintained.

The GBCA looks forward to DEUS advice as to the process for revision of the current ABGR scheme and, when that revision is complete, the GBCA will revise its position as detailed in this paper.

BACKGROUND

Green Star

Green Star is a national rating tool that was established to create a common language and standard of measurement of environmental initiatives applied to buildings. Points are awarded within Green Star rating tools for projects which demonstrate that environmental initatives have been implemented. Different environmental imperatives across the continent are recognised through environmental weightings which are applied to each of the environmental categories:

- Management;
- Indoor Environmental Quality;
- Energy;
- Transport;
- Water;
- Materials;
- Land Use and Ecology; and
- Emissions.

To encourage the application and spread of innovative solutions that could improve a building's environmental performance, an 'Innovation' category is also included in each Green Star rating tool. The Innovation category is not subject to an environmental weighting factor as the innovation could fall under any number of Green Star categories.

Energy efficiency initiatives are assessed based upon the corresponding greenhouse gas emission saving. The commercial office suite of Green Star rating tools sets conditional minimum predicted energy requirements and points are awarded for incremental improvements in greenhouse gas emissions from this benchmark.

ABGR Scheme

The ABGR scheme is administered by the NSW Department of Utilities, Energy and Sustainability (DEUS - formerly the NSW Sustainable Energy Development Authority, SEDA) and is supported by various government agencies around Australia.

The ABGR scheme benchmarks a building's operational greenhouse gas performance on a scale of one to five, with a score of one star indicating the worst greenhouse gas emission performance and five stars the best. Three stars represents current market 'Best Practice'.

The ABGR scheme was primarily designed to provide an incentive to reduce energy consumption during office building operation. Inevitably, however, the tool is now also used to benchmark the design of new buildings and heating and cooling systems, by providing a rating for energy consumption and subsequent greenhouse gas emissions in each state/territory.

To determine the rating and the subsequent greenhouse gas emissions per square metre ABGR requires a minimum 12 months of actual building electricity use data that includes energy use, hours of operation, the Net Lettable Area (NLA) and the number of people and computers.

Predicting the ABGR rating for new building designs requires comprehensive energy modelling to be undertaken in accordance with the 'Validation Protocol for the Use of Computer Simulations to Estimate Building Energy Performance' ('Validation Protocol') published by DEUS.

The Validation Protocol outlines a methodology which allows building designs to be compared on a like-for-like operational basis, thereby removing the variations in overall performance due to changes in internal loads, operating hours, etc.

Green Star and ABGR

Currently the energy benchmark for Green Star - Office rating tools refers to the ABGR scheme.

Green Star – Office rating tools use the ABGR scheme's Validation Protocol whenever a computer simulation is used to estimate building energy. The Validation Protocol outlines the guidelines and rules to be adhered to when calculating the ABGR for Green Star- Office rating tools. The guidelines include advice for input parameters, simulation procedure, weather data, occupancy and internal conditions.

The Green Star standard variable rates (default tenant conditions) in the Validation Protocols allow office building designs or fitouts to be compared fairly on a like-for-like basis without the bias from variations in estimated internal loads or occupancy rates. This system is designed to work out the inherent energy efficiency of a building's design and when these variables are applied the estimated output will not necessarily be a prediction of the actual energy consumption in operation.

However, stakeholder feedback to the pilot Green Star - Office Existing Building rating tool recommended that an 'as-built energy simulation' with default tenant operational and load conditions be applied to determine the building's predicted energy efficiency potential under optimal operation conditions.

The Management Efficiency supplement to the Green Star – Office Existing Building rating tool compares actual operational greenhouse gas emissions with the base building's potential, as evaluated by Green Star – Office Existing Building.

STAKEHOLDER FEEDBACK

Developer X

We commenced using the (ABGR) Protocol on a number of tenancy designs that are endeavouring to gain Green Star – Office Interiors Certification and were surprised at the conservative ratings achieved given the design initiatives implemented. We investigated the Protocol further by comparing it to the design of our own tenancy (which has a 5 star Tenancy ABGR Commitment Agreement with DEUS). The results were discouraging with XXXX being awarded only 4.5 stars ABGR under the Green Star - Office Interiors energy simulation protocol. This rating is in conflict with our current 5 star ABGR operational data. These significant differences in rating, all branded ABGR, will likely confuse, mislead the design decision-making and result in lower confidence and perceived credibility of both rating systems and brands.

We believe the main issues are the use of an aggregate equipment load allowance and conservative operational schedules.

We appreciate the GBCA's desire to provide further normalisation to the Tenancy ABGR rating by defaulting operational activities to ensure the energy rating is focused on the design merits of a tenancy. However the current defaults are representative of an 'average' market and do not provide sufficient flexibility for innovative equipment selections or reflect operational practices of tenancies that achieve 4, 4.5, and 5 star ratings (ABGR).

We make a recommendation that DEUS and GBCA further research the loads and operational practices of tenancies achieving 4, 4.5 and 5 stars Tenancy ABGR. This data will enable benchmarking of equipment loads and operational schedules to occur so that the Protocol schedules defined for Green Star Energy Simulation represent current market operational best practices.

This issue not only arises on XXXX's fitout but on several other fitouts currently being rated by XXXX.

At present the outcomes of our investigations confuse us and will undoubtedly confuse industry. This will only serve to undermine both rating schemes and set back industry progress.

Professional Services X

I believe it is of great importance to the GBCA to revise the approach as at matter of urgency. I understand that the current situation may make it difficult for projects in NSW/ACT to be eligible for (Green Star) certification, let alone achieve any energy improvement points in (the) Energy 2 (assessment category). My experience is that the targets for Victoria are even less achievable. The reason for this local difference is that the ABGR scheme had its standards set by different jurisdictions relative to the operational performance of a sample of buildings in those locations, not from a sample of the national population of buildings. As (Green Star energy category) Ene-1 requires a mandatory 4 star in ABGR, the problems with this credit will potentially be stopping good environmental performing office fitout designs from submitting for certification. This disincentive may be felt more strongly in some states/territories than others.

Professional Services XX

I am currently writing an advice notice to client who is targeting 5 Star Green Star – Office Interiors. Their ABGR estimated rating is currently 1 star. The bulk of the electricity consumption is attributable to the default equipment loads and schedules which cannot be altered by good design (unless they go for 100% laptops workstations which appears unrealistic).

…. You may be interested in a little experiment I did using the ABGR 'reverse calculator'. I calculated the energy target for my client's project to achieve 4 star ABGR. It was around 149,000kWh for Melbourne. Change the project to Sydney and the target changed to 190,000kWh. This is a very big difference in what is being expected of design teams in different locations. Such an inconsistency could have the effect of discouraging design teams to use the Green Star tool in specific locations.

RESEARCH FINDINGS

The ABGR scheme was originially based upon 1996 data from a base building BOMA study and figues published by the Commonwealth on tenant light and power energy use (DISR, 1998). The methodology outlined below is contained within "Australian Building Greenhouse Rating Scheme Methodology" by the Exergy Group Pty Ltd 2000.

The original NSW methodology was extended to become a national rating scheme with further data being obtained through BOMA and relevant State Governments for benchmarking. Limited data sets were available from Adelaide, Brisbane and Perth.

Nominal rating thresholds were established based upon a national average rating curve obtained from this data.

Each state was then assigned a curve which was modified from the national average rating curve to allow for the differences in specific greenhouse gas emissions from state to state based upon the means by which each state's gas and electricity are produced.

The subsequent state curves and star rating thresholds were created based upon the principle that the degree of difficulty of obtaining a rating should not be dependent upon the location of the building. i.e. the star rating for each state should be consistent with the power consumed by each building rather than the corresponding greenhouse gas emissions.

There was no empirical evidence from obtained data that building performance was impacted by climate, however an element of climate correction was applied to the state rating curves based upon theoretical considerations. Additional correction factors that are uniform nationally, are applied in the ABGR scheme to normalise buildings to a uniform operational basis of 50 hours per week and 8W/m^2 of equipment (200W per computer) for tenancies.

Consultation with the relevant authorities on the proposed state rating curves resulted in the tenancy benchmarks for NSW being maintained at a lower level than the national curve and Sustainability Victoria (previously known as Sustainable Energy Authority of Victoria) agreeing to more stringent rating bands for the state of Victoria to encourage more efficiency within that state.

The greenhouse gas emissions from electricity production in Tasmania (hydopower) is essentially nil, however Tasmania is assessed using kWh so it could be compared to other states.

Greenhouse Gas Coefficients

The greenhouse gas coefficients as defined by the ABGR scheme are out of date and do not correlate with the numbers published by the Federal Department of the Environment and Heritage (DEH). Comparison between Table 1 and Table 2 below indicate that greenhouse gas emissions are being under-estimated for all states except Tasmania, with NSW and the ACT having the greatest disparity between figures. The greenhouse gas emissions associated with gas are also grossly over-estimated when compared to the DEH figures. Tasmania has almost zero emissions by virture of its electricity supply being sourced from hydo power. However, it is evaluated on a 1kWh= 1kgCO_2 basis within the ABGR scheme.

Table 1: Federal Government Greenhouse Gas Coefficients

State	Greenhouse Gas Coefficient for Fuel Type – Federal Government		
	Grid Electricity ($kgCO_2/kWh$)	Natural Gas (kg CO_2^e /GJ)	
		<100,000GJ/yr	≥100,000GJ/yr
NSW + ACT	1.054	0.0713	0.0680
NT	0.742	0.0536	0.0535
QLD	1.058	0.0688	0.0642
SA	0.960	0.0738	0.0712
TAS	0.006	N/A	N/A
VIC	1.392	0.0636	0.0634
WA	1.053	0.0607	0.060

Source: AGO Factors and Methods Workbook, August 2004, p27, 29 http://www.greenhouse.gov.au/workbook/

Table 2: ABGR Greenhouse Gas Coefficients

State	Greenhouse Gas Coefficient for Fuel Type – ABGR scheme	
	Grid Electricity ($kgCO_2/kWh$)	Natural Gas (kg CO_2^e /GJ)
NSW + ACT	0.94	0.23
NT	0.69	0.20
QLD	1.02	0.20
SA	0.95	0.21
TAS	1.0	0.75
VIC	1.34	0.21
WA	0.97	0.22

Base Building ABGR Ratings

ABGR's Reverse Calculator v4.08 tool, available for use at www.abgr.com.au, was used to assess the true environmental impact of each rating in each state.

The ABGR Reverse Calculator computes the maximum amount of energy a builiding can use to achieve a specified rating. The calculator provides both "raw" carbon emission and "normalised" carbon emission data.

The following default figures for 'hours of operation' and 'fuels' were used to create a raw data situation where normalisation of 'hours of operation' were not required to be applied.:

Hours of operation	50 hour working week
Fuels	85% electricity/15% gas breakdown[1]

The raw carbon emission data (carbon emissions before climate and location weighting factors are applied) per metre squared of base building is compared for each star rating in each state/territory within Figure 1 below. For a 4 star Base Building ABGR (conditional requirement of Green Star – Office Design) there is significant difference between the states with NT, QLD and NSW allowed more raw carbon emissions than SA, WA and ACT.

A NT 4 star benchmark allows over 60% more raw carbon emissions than ACT. NSW 4 star benchmark allows over 30% more raw carbon emissions than SA.

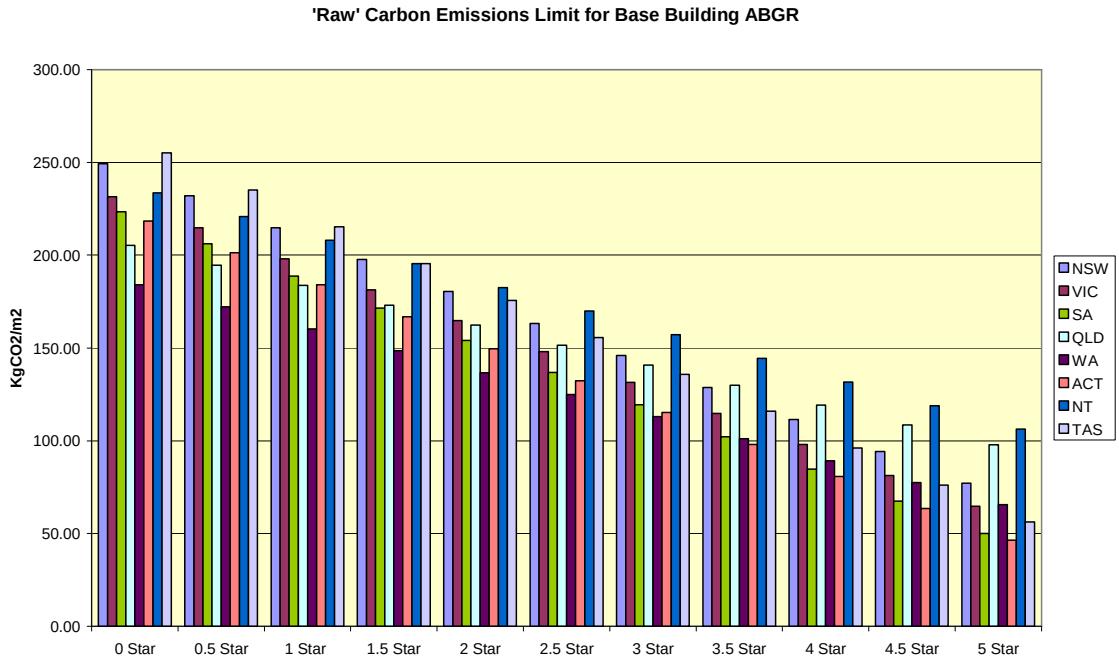


Figure 1: Base Building Raw Carbon Emissions Limit

Once normalisation factors (climate and location weightings) are applied, the relative difference between the states shifts to put a 4 Star Rating in NSW, SA, QLD and ACT on a relatively equal par. However, Victoria's allowance for normalised greenhouse emissions is significantly higher and NT is significantly lower.

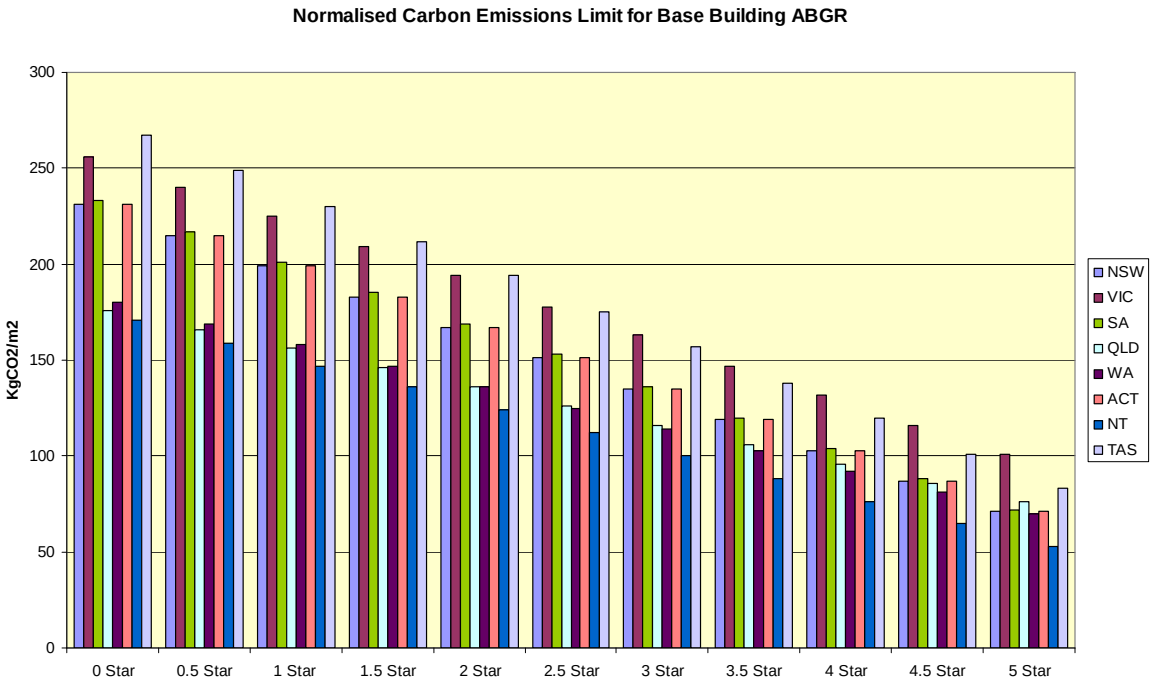


Figure 2: Base Building ABGR Normalised Carbon Emissions

The electricity and gas data required for a NSW base building to achieve a 4 Star Rating (obtained from the ABGR's Reverse Calculator v4.08), were then entered into the ABGR Performance Calculator v4.08 for each state. Figure 3 details the star rating and raw and normalised emissions assigned for each state. As well as demonstrating the disparity between the states/territories, this exercise also showed that the normalised emissions calculated between the Reverse Calculator and the Performance Calculator did not correlate for NSW.

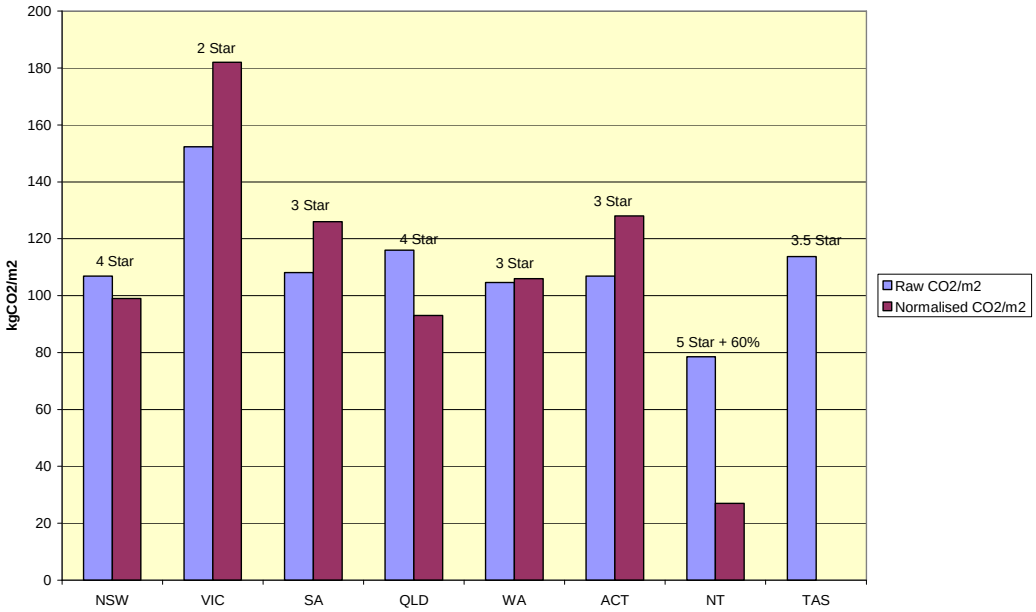


Figure 3: Base Building Star Rating comparison based upon consistent building energy use.

The raw greenhouse gas per sqm data already takes into account that each state has different greenhouse gas co-efficients for its electricity and gas. Standard hours of use (50 hours) were applied, thus the additonal normalisation is climate and location based only. NSW, SA, WA, ACT have similar raw greenhouse gas emissions. The result o f this research is that ABGR has a whole star difference between the NSW rating and SA, WA and ACT.

Tenancy ABGR Ratings

Similarly the ABGR's Reverse Calculator v4.08 was used to assess the environmental impact of tenancies around Australia.

The following default figures for hours of operation and computers were used to create a raw data situation where normalisation of hours of operation and equipment density were not required to be applied:

Hours of operation	50 hour working week
Computers	8 W/m^2 (Based upon computer load of 200W)
Fuels	100% electricity

The raw greenhouse gas emission data (greenhouse gas emissions before climate and location weighting factors are applied, called 'carbon emissions') per sqm of tenancy is compared for each star rating in each state within Figure 4.

For a 4 star Tenancy ABGR (conditional reqiurement of Green Star – Office Interiors) there are once again significant differences between the states.

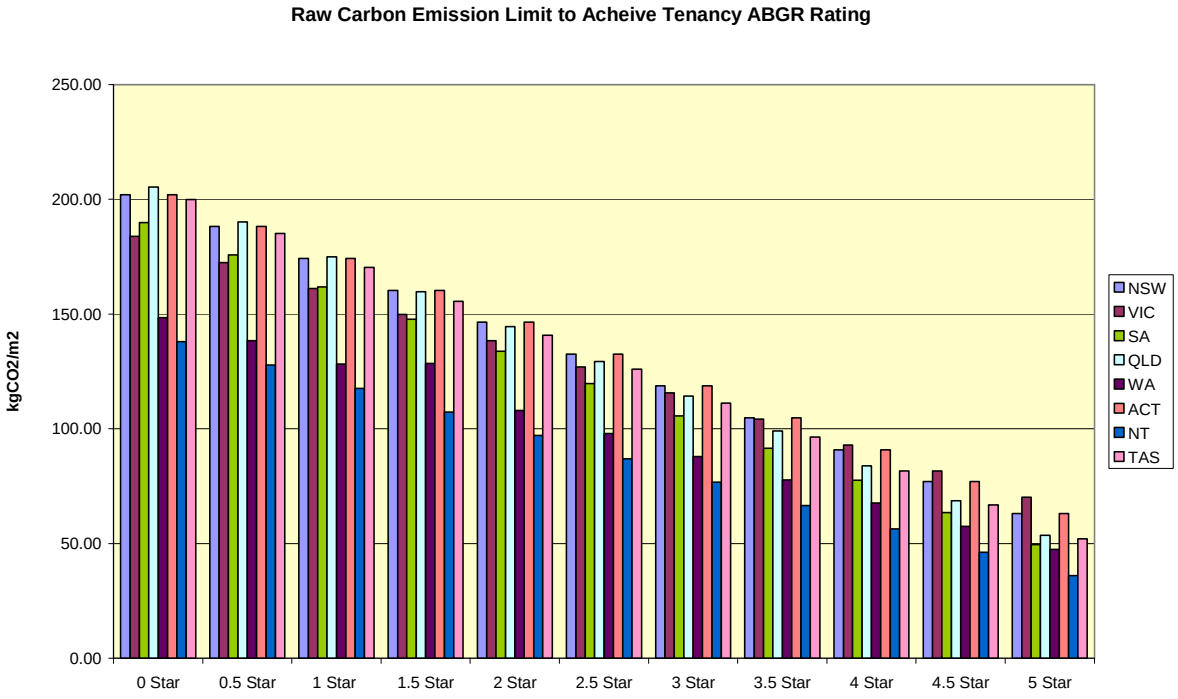


Figure 4: Tenancy ABGR Raw Greenhouse Gas (Carbon) Emissions

There is no significance change to the comparative difference between the states from raw to normalised greenhouse gas emissions.

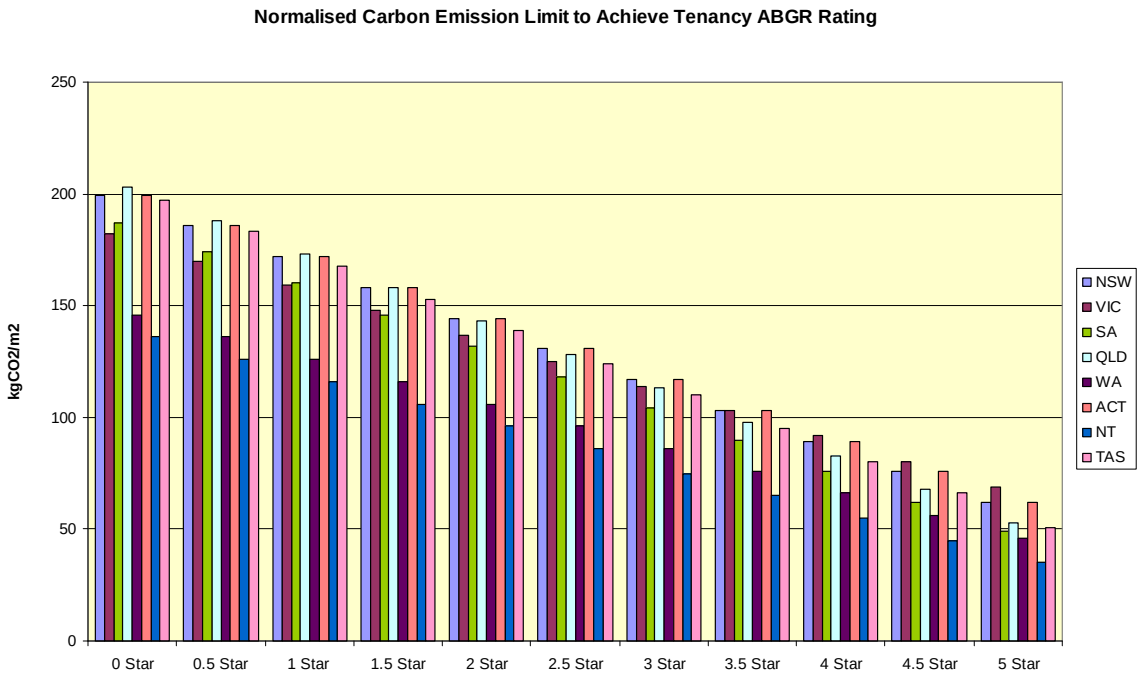


Figure 5: Tenancy ABGR Normalised Greenhouse Gas (Carbon) Emissions

The electricity data required for a NSW tenancy to achieve a 4 Star Rating (obtained from the ABGR's Reverse Calculator v4.08), was then entered into the ABGR Performance Calculator v4.08 for each state. Figure 6 details the corresponsing star ratings and raw and normalised emissions achieved for each state.

Figure 6: Tenancy Star rating comparison based upon consistent electricity data

Figure 6 clearly shows that although NSW, SA, WA and ACT have similar raw and normalised carbon emissions, there is up to a 1.5 Star difference between the star ratings achieved in each state, and Victoria has a 2 star rating difference when compared to NSW.

Despite having the lowest carbon emissions NT does not have the lowest star rating.

Greater than 5 Stars ABGR Study.

The original ABGR benchmarks[1] were created such that:

- An 'average' building should perform at 2 stars
- Excellent buildings should be able to attain 4 stars, but this should not be easily achievable
- Five stars should be attainable through exceptionally good design involving market leading innovation.

The 5 star ABGR benchmark was a theoretical projection from the empirical rating curves.

In recent years the commercial property industry has seen significant improvement in building systems and façade innovation, construction commissioning and facilities management, and the achievement of ABGR ratings above 5 stars are becoming a market reality.

The rapid shift of the industry was not anticipated by the original ABGR rating curves.

Sustainable design consultants Advanced Environmental Concepts (AEC) conducted a study[2] on the ABGR performance of buildings in NSW, VIC and SA for a Base Building ABGR Rating greater than 5 stars. Their findings have been supported by several professional service consultants and modelling experts.

The AEC study assessed ABGR impacts in two ways:

- A study involving computer modelling of a standard building in NSW, VIC and SA using two different air conditioning systems and comparing ABGR outcomes; and
- The ABGR Performance Calculator was tested on different locations and different electricity/gas ratios to establish sensitivities.

The key findings of this research included:

- ABGR penalises buildings outside of NSW/ACT
- This penalty in non-linear outside of NSW, that is, the better a building performs and the higher its subsequent ABGR the lower its rating under ABGR.
- This penalty does not have any reasonable or logical basis.
- A greenhouse gas neutral building must be achieved to get highest points under the Green Star – Office Design energy category Ene-2 in Melbourne. Conversely Sydney can emit up to 30kCO_2/m^2 more per annum and achieve the same ABGR.

These findings clearly limit the applicability of the ABGR scheme for Green Star beyond the assessment of buildings rating less than 4.5 star ABGR.

Effect of Tenant Operation and Behaviour

In most Australian office buildings, internal heat loads dominate external climate impacts for the loads that are placed on the space conditioning plant and equipment. Base building heating, ventilation and air conditioning (HVAC) energy consumption is dependent on the heat given off by building occupants, tenant lighting, and tenant office equipment.

Recent advice from DEUS[3] suggests that for a realistic range of office building tenant internal loads, the ABGR rating varies by +/- 0.3 stars from the base building performance under average tenant load conditions (Green Star simulation default loads).

However, it is important to note that the Exergy study only reviewed the impact of tenancies on base buildings energy use simulated using Sydney weather data.

Based on the variable ABGR benchmarks identified in and the different climates of Australia, it is anticipated that the potential tenant effect would likely exceed +/- 0.3 stars in other states.

Further undermining the ABGR rating, the Base Building ABGR is currently only normalised for variations based on the tenant demand for base building services (hours of operation). There is no normalisation based on the tenant loading or internal operations.

Potentially, if tenant electrical data/usage were known then this could be used to normalise the Base Building A/C use. However, given the variations in current star rating bands applied to ABGR around Australia, finding a consistent relationship between tenant electricity consumption or a tenant ABGR and a corresponding base building rating is anticipated to be a difficult exercise.

References

1. *Australian Building Greenhouse Rating Scheme Methodology*, Exergy Group Pty Ltd, October 2000
2. *ABGR Performance between States and greater than 5 Stars,* Advanced Environmental Concepts, 2004
3. *Study of Tenant Energy Use Impacts on Base Building ABGR Rating*, Exergy Australia for NSW Department of Energy Utilities and Sustainability, November 2004.

3.5 Response to GBCA concerns from NSW Department of Energy, Utilities & Sustainability

Note: The NABERS tool was originally developed by the Australian Dept. of Environment and Heritage (DEH). The NSW Department of Environment, Climate Change and Water (formerly Dept. of Energy, Utilities and Sustainability) was selected by DEH as the successful tenderer to proceed with the commercialisation of NABERS, with the contract for NABERS commercialisation signed in March 2005.

Further to the GBCA's February 2006 Position Paper (above), in late 2006/early 2007 a consultant to the GBCA documented the GBCA's issues and DEUS' response, in the document below.

In particular we draw the Committee's attention to the following (SFX Commentary in response to GBCA Issue 6):

*Sustainable FX suspect the significant discrepancy between the ABGR and DEH's published Natural Gas coefficients is probably a misunderstanding in the units – DEH's figures are kgCO2/**GJ**, whereas the ABGR are kgCO2/**kWh** – and therefore a conversion factor of 3.6 needs to be applied!*

In other words, the greenhouse gas coefficients for natural gas in ABGR (now NABERS Energy) are out by a factor of 3.6x. This disadvantages natural gas, which has a low GHG coefficient, and favours electricity, which has a high GHG coefficient. It is therefore encouraging and rewarding misdirected environmental outcomes.

This is due to a mistake in conversion of the DEH numbers.

We can confirm that the same greenhouse gas coefficients for natural gas still apply; that the mistake has not been fixed, nor has the error been disclosed.

PO Box 1488, WODEN, ACT 2606
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Email: *jdalton@sustainablefx.com.au*

Dear Michelle

Sustainable FX were invited by the GBCA to provide independent commentary on both the GBCA's Position Paper about using ABGR within Green Star, and DEUS's response to this paper.

Sustainable FX have commented on both the GBCA's issue and DEUS's response, and recommend DEUS engage their own independent advisor (possibly Dr Paul Bannister @ Exergy) to provide another independent perspective. This would allow both the GBCA and DEUS to be 'represented' by a third party, and I expect this may enable a workable compromise to be achieved in the minimal time frame.

As both tools compliment and strengthen one another, it is imperative that these issue be resolved immediately, so they can be incorporated into the February/March 07 revisions of each of the Green Star tools.

Please call me on 0400 315 895 if you have any questions.

Kind regards

Jonathan Dalton

INTRODUCTION

There is significant concern in the building industry that the Australian Building Greenhouse Rating system does not fairly award ratings across different cities and states. This concern appears to be founded on a number of industry rumours, many of which have previously been raised by the GBCA.

Sustainable FX has analysed the ABGR thresholds to determine the validity of these rumours, and hope this will allow DEUS to refine their ABGR tool (as required) and allow GBCA to use it with confidence in their Green Star rating tool.

METHODOLOGY and ASSUMPTIONS

Sustainable FX have identified the greenhouse gas emissions, normalised energy consumption and raw energy consumption for a 1,000m2 project in each of Australia's Capital cities. The energy consumption benchmarks were identified using ABGR's Reverse Calculator V4.08 using the following assumptions:

- A tenancy is occupied for 50 hours per week (ie 8am to 6pm), and that there is 1 PC every 15m^2. Even if different parameters were used, the relative difference between each state stays the same, therefore this approach is reasonable.
- A tenancy only consumes electricity (ie no gas). This is standard practice and is reasonable
- A building's air-conditioning system operates for 55 hours per week (ie 7am to 6pm). Even if different parameters were used, the relative difference between each state stays the same, therefore the approach is reasonable.
- A building only consumes electricity (ie no gas). This is NOT standard practice, as gas is used in cooler climates to provide heating. However, this simplification was necessary to allow comparisons to be made, and the impact of this assumption is addressed in the relevant section.

RESULTS

Postcode	2000	2600	3000	4000	5000	6000	800	7000
	Sydney	Canberra	Melbourne	Brisbane	Adelaide	Perth	Darwin	Hobart
	BASE BUILDING CO2 EMISSION BENCHMARKS (kg CO2/m2 pa - normalised)							kWh/m2
4 STARS	103	103	132	96	104	92	76	120
5 STARS	71	71	101	76	72	70	53	83
	NORMALISED ENERGY BENCHMARK – At 100% electricity (kWh/m2 - normalised)							
4 STARS	109.6	109.6	98.5	94.1	109.5	100.0	110.1	120.0
5 STARS	75.5	75.5	75.4	74.5	75.8	76.1	76.8	83.0
	RAW ENERGY BENCHMARK – At 100% electricity (kWh/m2 – normalised)							
	CLIMATE CORRECTED							
4 STARS	125.0	92.3	78.9	122.4	95.6	102.9	197.3	103.0
5 STARS	86.4	53.7	52.6	100.2	57.2	75.8	158.4	61.1

Postcode	2000	2600	3000	4000	5000	6000	80
	Sydney	Canberra	Melbourne	Brisbane	Adelaide	Perth	Darwi
	FITOUT CO2 EMISSION BENCHMARKS (kg CO2 /m2 - normalised)						
4 STARS	89	89	92	83	76	66	5
5 STARS	62	62	69	53	49	46	3
	NORMALISED ENERGY BENCHMARK – at 100% electricity (kWh/m2 - n						
4 STARS	94.7	94.7	68.7	81.4	80.0	71.7	79.
5 STARS	66.0	66.0	51.5	52.0	51.6	50.0	50.

TENANCY Parameters	Occupancy hours	
	50 Hrs/week (ie 8am to 6pm)	1 PC per
BASE BUILDING Parameters	Operating Hours	
	55 Hrs/week (ie 7am to 6pm)	

Note: Red text indicates threshold is more than 10% above the average (easier to achieve); Blue text indicates threshold is more than 10% below the average (harder to achieve)

ANALYSIS

NORMALISED ENERGY BENCHMARKS

The Normalised Energy Benchmarks for a 5 Star rating are reasonably similar across all states (74.5 to 76.8 kWh/m2 for base-building and 50.0 to 52.0 for tenancies (excl NSW/ACT)). This suggests the ABGR benchmarks have been set based on 'equivalent-energy', rather than 'equivalent green-house gas emissions. This method effectively rates the performance of a building (after adjusting for both climatic conditions AND the carbon coefficient of the local power source) rather than the buildings environmental impact.

The normalised energy benchmarks for a 5 Star fitout in NSW and ACT are significantly higher (>25%) than the rest of the country, effectively making it easier to achieve a 5 Star tenancy rating in these states (before climate correction is considered).

The normalised energy benchmarks for 4 Star rating (base-building and tenancy) are different between the various states. Therefore the improvement from a 4 to 5 Star rating represents a different % reduction in energy consumption in each state - this is different to what most members of the industry expect, which is a 1 star rating equates to about a 30% reduction in energy consumption.

- This appears to make it MORE difficult for a 4 star base-building rating to be achieved in Melbourne, Adelaide and Perth, but EASIER in Tasmania;
- This appears to make it MORE difficult for a 4 star tenancy rating in Melbourne and Perth, but EASIER in Sydney and Canberra.

RAW ENERGY BENCHMARKS

The Raw Energy Benchmarks show the amount of raw energy that could actually be consumed in each city whilst still achieving the 4 or 5 Star rating. This is significantly different to the normalised energy benchmarks because the benchmarks account for the differences in climate (and therefore heating/cooling requirements) between the cities.

Whilst this approach is reasonable (as ABGR is assessing building/tenancy performance rather than environmental impact), the significant difference is initially alarming – a 5 Star building in Canberra (53.7 kWh/m^2), Melbourne (52.6 kWh/m^2), Adelaide (57.2 kWh/m^2) and Tasmania (61.1 kWh/m^2), can only consume ½ the amount of electricity consumed in a Brisbane building (100.2 kWh/m^2) and only 1/3 the amount of electricity as a building in Darwin (158.4 kWh/m^2) to achieve the same star rating!

In reality, the difference is less significant, because buildings are usually heated by gas, which contributes about ¼ the amount of carbon dioxide to the atmosphere than coal, and therefore Canberra, Melbourne, Adelaide and Tasmania can effectively trade 1kWh of electricity for 4 kWh of gas.

Even when the difference between the greenhouse gas contribution of gas and electricity is taken into account, the difference between each states raw energy benchmark is suprising and Sustainable FX recommend the normalising factors be reviewed. In particular:

- Were the normalisation factors based on 'average' monthly conditions, or 'bin' temperatures?
- Did the normalisation factors account for the fact that approximately half of the energy consumed by HVAC equipment relates to fan and pump energy, and is therefore not affected by the climate;
- Did the normalisation factors consider that chillers have a coefficient of performance, meaning that 1kW of cooling can be provided for about 0.3kW electricity, whereas to provide 1kW of heating boilers consume about 1.2 kW of gas.

ADDRESSING GBCA issues & industry concerns

The following is a summary of the GBCA issue, DEUS's response and Sustainable FX commentary on the issue.

Please note: I have paraphrased and summarised the DEUS response so that it lines up with each of the GBCA's issues. I do not believe I have changed the intent of their response, however request DEUS confirm I have not inadvertently misrepresented their viewpoint.

GBCA ISSUE 1: ABGR rating thresholds for each state were created to be consistent with the power consumed by each building rather than their corresponding greenhouse gas emissions and subsequent environmental impact.

DEUS Response: ABGR rating thresholds for fitouts were set so that current standard practice in each state would result in the same ABGR star rating across the country. The DEUS research indicated there was a difference in fitout energy consumption across Australia, even though climatic differences have relatively minor impact on tenant energy consumption, and benchmarks were set based on this research.

DEUS are prepared (subject to stakeholder approval) to set one set of benchmarks that are to be used on fitouts across Australia. A single nation-wide set of benchmarks for base-building would need to be investigated further.

SFX Commentary:

One set of benchmarks (based on raw CO2 emissions) that is applicable across Australia would be ideal as it is a true measurement of environmental impact of a building's energy consumption.

The easiest way to implement this would be for ABGR to retain their current benchmarks for ABGR star ratings, whilst Green Star would require energy consumption to be calculated in accordance with the ABGR protocol (but not assessed in the ABGR calculator).

The impact of this change will need to be carefully evaluated, as it means that a rating is awarded regardless of climatic requirements (advantage to cooler climates) and cleanliness/dirtyness of its coal (disadvantage to southern states – which also have cooler climates). However, given that the dirty coal is generally in the regions that require less air-conditioning is required, Sustainable FX's preliminary analysis suggests these two 'conversion factors' cancel one another out – and as such a raw greenhouse gas emission targets calculated using the local greenhouse gas coefficients for electricity/gas and NOT adjusting for the climate could be reasonable.

GBCA ISSUE 2: Victoria and New South Wales (NSW) government agencies modified their ABGR rating curves from the national curves to make the ABGR tenancy rating more stringent in Victoria and more lenient in NSW (ABGR Tenancy rating).

DEUS Response: No response

SFX Commentary: The above analysis suggests their could be some truth to this rumour:

- a 4 star tenancy rating is harder in Melbourne and Perth, however the thresholds for a 5 Star ratiing do not appear to have been adjusted;
- a 4 and 5 Star tenancy rating is easier in Canberra and Sydney than the rest of the country.

A similar adjust appears to have been made for a 4 star base-building rating in Melbourne, Brisbane and Perth, however the thresholds for a 5 star base-building rating do not appear to have been adjusted.

GBCA ISSUE 3: There is no national comparative or consistent assigning of ABGR ratings, based upon greenhouse gas emissions for each state/territory, due to the climate and location normalisations applied by ABGR.

DEUS Response: No response:

SFX Commentary: No, ABGR thresholds appear to be based on normalised energy consumption, not on environmental impact (greenhouse gas emissions). I suspect this is because the ABGR tool is trying to rate (compare) the performance of different buildings, rather than the location of the building. Please refer to my response for GBCA issue 1 and 2 for further information.

GBCA ISSUE 4: The difference in ABGR rating bands between the states results in excess of 1.5 stars difference for the same normalised greenhouse gas emissions ($kgCO_2^e/m^2$) for both the ABGR tenancy rating and the ABGR base building rating.

DEUS Response: DEUS have completed their own analysis that does not support this finding, however DEUS do acknowledge there are some difference between the benchmarks for each state. Refer Issue 1 for further information

SFX Commentary: Simplistically this is correct – if normalised greenhouse gas emissions of say 100 kgCO2/m2 are considered, this would equate to a 3.5 star rating in Brisbane and a 5 star rating in Melbourne. However, this does not take into account the greenhouse gas emissions of the local power source or climatic differences, and therefore a Melbourne building emitting 100 kG CO2/m2 of normalised emissions would emit a different about in other states, and as such this is a nonsensical example.

If greenhouse gas emissions (rather than energy consumption) are to be used for awarding star ratings or Greenstar points, they should NOT be normalised.

GBCA ISSUE 5: ABGR does not recognise energy efficiency initiatives beyond its current 5 star band.

DEUS Response: No response.

SFX Commentary: When the ABGR scheme was originally developed, the benchmark for a 5 Star rating was set very high, and was not expected to be achieved in the near future. As computer models are frequenctly showing the 5 star rating can be achieved (and even exceeded – particularly in Sydney), this may need to be revisited. However it should be remembered that reality is very different to theoretical computer models – and despite the number of models that show 5+ ABGR star ratings, only one building has achieved it WITHOUT purchasing Green Power.

As technology, design, commissioning activities and power monitoring/management practices improve, I suspect there will be an increasing number of projects that do achieve a 5 star rating, and believe rating tools should be adjusted to reflect this inevitable outcome.

As I expect there would be significant adverse reaction if the benchmarks were raised (resulting in a building that had been awarded a 4 star rating this year to only achieve (say) a 3 star rating next year…), I suggest new

benchmarks could be set for additional stars, where the maximum star rating (10 stars?) could be equivalent to a carbon-neutral building (ie 0 CO2/m2/year).

This would mean the benchmarks would never need to be revised, and therefore this method would avoid the regular (every 3 to 5 years) disruption that would be created if the benchmarks for each star threshold were changed. The implementation of this change would need to be staged, as the industry may not appreciate having a high-performing building only achieving 5 out of 10 Stars, therefore it may be necessary to slowly introduce new stars.

This means the benchmarks for 1 to 5 stars would stay as they are (once the other issues in this paper have been addressed) and an additional star added once the top star rating has been achieved 5 times.

GBCA ISSUE 6: ABGR's greenhouse gas emissions are not reflective of the Department of the Environment and Heritage's current national greenhouse gas coefficients. ABGR *under*estimates associated electricity greenhouse gas emissions and *over*estimates associated natural gas greenhouse gas emissions.

State	Greenhouse Gas Coefficient for Fuel Type –	
	Grid Electricity ($kgCO_2/kWh$)	Natural Gas ($kg\ CO_2^e\ /GJ$)
		<100,000 / >100000 GJ/yr
NSW + ACT	1.054 (ABGR uses 0.94)	0.0713 / 0.0680 (ABGR uses 0.23)
NT	0.742 (ABGR uses 0.69)	0.0536 / 0.0535 (ABGR uses 0.20)
QLD	1.058 (ABGR uses 1.02)	0.0688 / 0.0642 (ABGR uses 0.20)
SA	0.960 (ABGR uses 0.95	0.0738 / 0.0712 (ABGR uses 0.21)
TAS	0.006 (N/A – ABGR uses kWhr)	N/A (ABGR uses 0.75 ???)
VIC	1.392 (ABGR uses 1.34)	0.0636 / 0.0634 (ABGR uses 0.21)
WA	1.053 (ABGR uses 0.97)	0.0607 / 0.060 (ABGR uses 0.22)

Source: AGO Factors and Methods Workbook, August 2004, p27, 29 http://www.greenhouse.gov.au/workbook/

DEUS Response: No response:

SFX Commentary: As ABGR benchmarks appear to be set on 'equivalent energy' rather than greenhouse gas emissions, therefore if the coefficients were revised, then the CO2 benchmarks for star ratings will also need to be revised. And as the same coefficient is used for setting the benchmark and determining a projects emissions it would not change the actual star rating.

Sustainable FX suspect the significant discrepancy between the ABGR and DEH's published Natural Gas coefficients is probably a misunderstanding in the units – DEH's figures are kgCO2/**GJ**, whereas the ABGR are kgCO2/**kWh** – and therefore a conversion factor of 3.6 needs to be applied!

GBCA ISSUE 7: The ABGR base building rating is significantly impacted by tenant operation and behaviour, giving an inappropriate assessment of the base building's management efficiency.

DEUS Response: No response.

SFX Commentary: Green Star awards points for the building's capability, not the building's actual performance. As such, and to allow like-for-like comparisons with other buildings, default internal loads and occupancies must be used for all buildings when calculating the Energy points achieved in Green Star.

The base-building energy consumption is normalised before an accredited ABGR rating is awarded to reflect differences in internal loads and hours of occupancy.

Sustainable FX do not believe an ABGR rating is a measurement of management efficiency – it is a measurement of the energy consumed by the building to meet the tenant's requirements. It is possible for the same ABGR rating to be awarded for an energy efficient buiding that is poorly managed and for an inefficient building that is being effectively managed.

The energy component of the Management Efficiency Supplement attempts to address this, by providing a % score, based on how much energy a building was consuming compared to the theoretical capability of the building. I think this is an excellent measure and should be explored further.

GBCA ISSUE 8: In relation to the Green Star – Office Interiors rating tool the GBCA requests that DEUS conduct research into the loads and operational practices of best practice tenancies to benchmark equipment loads and operational schedules for tenancies and that this information should be used to update the default equipment loads and operational schedules currently referenced by ABGR Tenancy Validation Protocol.

Until the reseach on fitout equipment loads and operational schedules is complete the GBCA will advise Green Star – Office Interiors projects to use the following overall loads:

- **Processor: 90w/person**
- **CRT: 60w/person**
- **Flat Screen: 20w/person**
- **Laptop: 20 w/person**
- **Periphery Equipment: 80 w/person**
- **Lighting 8 or 12 w/sqm**

DEUS Response: …The equipment schedules were agreed by both DEUS and GBCA prior to inclusion in the Validation Protocol. However, the proposed revisions suggested in the position paper are either equivalent or worse than identified in the Validation Protocol, as summarised below:

	Validation Protocol	***GBCA Position Paper***
PC with CRT screens	*220 W*	*230W (90wPC + 60w CRT + 80w Periphery)*
PC with LED screens	*190W*	*190W (90wPC + 20w LED + 80w Periphery)*
Laptop	*100W*	*100W (20w Laptop + 80w Periphery)*

DEUS therefore do not propose to change the validation protocol.

Good tenancy ABGR ratings are the result of efficient lights, efficient equipment and efficient management practices. At present, the ABGR Validation Protocol for Green Star sets default values for equipment and management practices, and therefore the ABGR rating calculated for Green Star is primarily a measurement of lighting efficiency.

DEUS suggest that either Green Star allows designers and tenants to use the likely behaviour of the actual tenants (rather than prescribing a particular behaviour), or the GBCA should review the prescribed schedules to determine appropriate schedules that do not unduly benefit users.

SFX Commentary:
As Green Star is assessing the 'capability' of a fitout, rather than the actual expected performance, Sustainable FX understand that some defaults (such as occupied and operating hours) must be defined inorder to provide a like-for-like comparison with other fitouts. However, mandating default values for tenant equipment prevents the tenant from being rewarded for selecting efficient equipment.

Sustainable FX recommend that default values for equipment be retained (possibly revised – separating the periphery equipment load from PC's in particular), however allow tenants the option of using manufacturers data for their own equipment if they wish. As 'average' energy consumption of equipment is not currently published (it is highly dependant on usage), this may have to be calculated using a formula developed by DEUS and ABGR. This formula may be something along the lines of average energy consumption is equal to (say) halfway between the 'full load' and 'standby' energy consumption, or even just allow the 'standby' power consumption to be used afterhours, rather than the 50% of equipment!). Alternatively, as Green Star Office Interior's is an as-built rating, the applicant could be given the option to conduct site measurements of energy consumption for each piece of equipment.

3.6 Ongoing technical and governance issues

In summary, the extent of the fixes to NABERS Energy that are required are such that the new version would be so different it would not be NABERS anymore, and all existing ratings would be invalidated (except in NSW).

On 14 December 2009 Matthew Clark from NSW DECCW – which is managing the NABERS Energy rating tool - provided an update on NABERS tools currently in use or under development, to the Property Council of Australia Sustainability Roundtable meeting.

The update detailed the areas of technical fixes that are being necessitated by the proposal to use NABERS Energy in the federal government's mandatory disclosure scheme. As these changes are extensive, it can only be concluded that NABERS is not currently fit for purpose as required by the Bill. Even with these fixes, the carbon accounting within NABERS is considered fundamentally incompatible with the aims on the Bill.

Following is an extract from the minutes of that meeting (with our comments in red):

> *Review of emissions factors in NABERS-Energy*
>
> The meeting noted that:
>
> - a national approach is being pursued, with the aim of creating greater consistency in ratings; In other words, there is currently no consistency, particularly at a national level.
> - adjusting carbon coefficients is relatively easy. Where a building uses mixed fuels, the relative value of electricity and gas will change with the coefficients; In other words it is currently inaccurate
> - buildings that use electricity over gas will be releasing slightly more carbon in NSW than currently assessed; Again, it is inaccurate, particularly in NSW which is treated favourably under the current scheme
> - factors will change on the basis of 'a normal building' in a particular location, in which it will be assumed that heating is by gas; Assumptions in NABERS for climatic differences are technology based and therefore fundamentally flawed.
> - if the carbon content of electricity gets worse, then the rating will also get worse; This assumes NABERS Energy uses correct carbon data, which it currently fails to do.
> - year-on-year there will be an actual carbon emissions change;
> - publication of coefficients tends to lag, so owners will often find out only after they already have their ratings;
> - the Department believes the impact of these changes will be relatively negligible, but members are concerned that this won't be the case. Members concerns are reasonable and this is the reason the Department resists technical fixes to NABERS Energy given the contractual reliance upon existing (but flawed) ratings

National Ratings Scale

The meeting noted that:

- under the current model climate corrections aren't as reliable beyond the 5 stars range; The current model is inaccurate for any building outside NSW that doesn't have an industry standard air conditioning system, known as Variable Air Volume (VAV).VAV technology is used as the basis for 'climate adjustments' so other systems are adjusted without due regard to actual climate variations.
- consultants have suggested using more recent climate models to update statistics Climate models are limited due to inadequate records in Australia and the NABERS methodology is inherently reliant on these poor and unrepresentative data sets. This should:
  - have minimal impact in NSW, with no change for Sydney; NABERS Energy (and before it the Australian Building Greenhouse Rating (ABGR) scheme) was developed in and for Sydney, with Sydney as the default, so Sydney is not burdened by the complex and flawed climate adjustment algorithms.
  - deliver worse ratings for buildings in Queensland, particularly for those located North of Brisbane; and The current co-efficients used under NABERS Energy have been distorted so as to make ratings easier in Queensland. In addition, the administrators of NABERs decided in April 2003 to implement the judgment of the designer of the scheme for star ratings in North Queensland rather than rely on measured or statistic analysis on energy use in the region. The PCA amongst others communicated dissatisfaction with this approach but it proceeded regardless.
  - see improvements for buildings in Victoria; The current co-efficients used under NABERS Energy have been distorted so as to make ratings harder in Victoria. Once changed, Victorian buildings will score better.
- the current philosophy is to benchmark 2.5 stars as average performance, but it needs to be decided whether this should be national or location-specific; If this changes, it is probably not NABERS Energy
- if a national average is adopted, the average will differ slightly between states, as averages are currently based on energy use in each state; ???
- open comment will be sought on the issue in January and strong feedback will be needed to secure changes in this area; and They have had strong feedback on the flaws in NABERS Energy (ABGR) since 2003 (refer comment on north Queensland star rating bands), but nothing has changed, least of all the poor governance of the scheme.
- the Department believes only buildings with star ratings of 2.5 or below would lose out under these changes. This is hard to believe given the commentary above.

3.7 Suitability for mandatory use

We note that in its February 2008 submission on Mandatory Disclosure of Commercial Building Energy Efficiency, the Property Council made the following comment.

The use of the Australian Building Greenhouse Rating Scheme, in its current form, would be inappropriate for mandatory disclosure.

This rating system was always intended to be voluntary, and is ill-suited to a mandatory framework.

ABGR has a number of well documented flaws that require rectification, and the tool is overdue for a rigorous review.

Most important would be the introduction of a modern and independent governance process, to ensure that concerns with the tool are properly considered and acted upon.

ABGR also poses problems if mandatory disclosure were to be extended to other types of commercial buildings, as it currently only relates to existing offices.

Furthermore, as the ABGR scheme does not identify energy efficiency opportunities, significant resources will need to be allocated to developing this additional capacity or creating an alternative assessment method.

3.8 Australian Building Code Board Review – March 2006 document

In March 2006 the Australian Building Code Board conducted a review of the ABGR (now NABERS Energy).

The following table, which is taken from the ABCB document, shows that for the same energy, a tenancy rating varies from 0.7 to 3 stars depending where it is located.

A base building varies from 1.3 to 5.6 stars.

These variations have no reasonable technical basis.

Climate Zone	Location	eQUEST 3.55 modelled energy consumption (MJ/annum.m²)				Equivalent ABGR star value		
		Tenant	Base building		Total	Tenancy	Base building	Whole building
			Electrical	Gas				
1	Cairns	447	489	0	936	2.5	1.9	2.3
	Darwin	447	626	0	1073	2.5	2.2	2.3
2	Brisbane	447	389	33	869	2.5	3.3	2.8
	Mackay	447	455	3	905	2.5	2.4	2.5
3	Alice	447	452	15	914	2.5	3.6	3.1
	Mt Isa	447	534	3	984	2.5	1.3	2.0
4	Kalgoorlie	447	377	26	850	1.6	3.8	2.7
	Wagga	447	322	107	876	3.0	4.6	3.8
5	Adelaide	447	329	75	851	2.5	4.5	3.5
	Perth	447	368	22	837	1.6	3.9	2.8
	Sydney	447	346	29	822	3.0	4.4	3.7
6	Albany	447	245	109	801	1.6	5.3	3.4
	Melbourne	447	273	112	832	0.7	5.0	3.0
7	Canberra	447	263	123	833	3.0	5.1	4.0
	Hobart	447	213	181	841	2.5	5.6	4.1

3.9 MEASURING & RATING ENERGY INTENSITY AND CARBON INTENSITY IN AUSTRALIA

The following information summarises what is needed to measure and rate energy intensity and carbon intensity in Australia – tasks that supporters of NABERS Energy claim that tool is capable of doing. It is not.

The brief:

- Accurate data which rates a building's actual greenhouse gas emissions per metre squared of building floor-space (or NLA).
- A benchmark for each building type in each climatic region, against which to compare the data for each individual building.
- An accurate tool which enables the comparison of ratings of buildings across each region and country-wide, if not world-wide.
- An accurate tool which enables energy intensity and carbon intensity to be measured, rated and accounted for at each and every stage of a building life-cycle, from design and planning to operation and occupation.
- A tool which allows buildings to be transparently and usefully compared at the point of sale
- A tool which provides credible and meaningful data that also meets the reporting requirements for:
    - The Carbon Pollution Reduction Scheme (CPRS);
    - The National Greenhouse and Energy Reporting Scheme (NGERS); and
    - State based energy efficiency schemes (such as NEET and VEET).
- a single simple transparent methodology is required that ensures data is collected in the simplest and most useful way, and discloses transparent, undistorted and useful information to be used across all current legislative requirements.

What we have:

In the Australian market, we have NABERS Energy - the abbreviated name for the National Australian Built Environment Rating System Energy tool, which was previously known as the Australian Building Greenhouse Rating (ABGR) scheme.

NABERS Energy measures and reports the following:

- a 'normalised' or 'corrected' assessment of a building's greenhouse gas emissions per metre squared of building floor-space or Net Lettable Area (the "actual" greenhouse gas emissions are only provided at the end of the certificate and even then they have been calculated using incorrect greenhouse gas co-efficients; by not reporting *actual* greenhouse gas emissions, it is clearly not able to validate *actual* carbon savings);
- a rating for each building which has been 'normalised' to factor in climatic variations (while it makes sense to factor in climatic variations, this 'correction' should be made to the *benchmark* for the building type in each climatic region);
- a rating which is *not* based on the true greenhouse intensity of the fuels (electricity or gas) supplied to the building according to the official greenhouse gas co-efficients provided by the Federal Department of Climate Change (NABERS Energy 'normalises' the raw data according to inaccurate co-efficients for

the greenhouse intensity of fuels: it underestimates associated *electricity* greenhouse gas emissions and overestimates associated natural gas greenhouse gas emissions; further, the State-wide co-efficients are influenced by the priorities of the State, with each State having devised its own co-efficients. In some cases, the difference in co-efficient is as much as 10%. NABERS Energy uses a greenhouse gas co-efficient of 1 kg CO2/kWh for Tasmanian electricity, instead of 0.13 kg CO2/kWh. A tenancy that scores 0.7 stars in Melbourne would get 3 stars in Sydney. And, depending on what state it's in, a base building rating can vary from 1.3 stars to 5.6 stars – for the same building.)

- a base building rating which is has been significantly impacted by tenant operation and behaviour ('normalised' to account for hours of use and a tenant head count using computers as a proxy) giving an inappropriate assessment of the base building's management efficiency;

What we need:

Characteristics of key carbon outputs	**NABERS Energy**	**Efficient Building Scheme data collection & reporting**
Undistorted by:		
- Building use	×	✓
- Location	×	✓
- Year on year climatic variations	×	✓
- Subjective inputs	×	✓
Able to validate actual carbon savings	×	✓
Allow for simple inclusion of other building types	×	✓
Simple assessment and auditing process	×	✓
Transparent and simple linkage to NGERS and CPRS	×	✓
Ability for building owners to provide fair comparison for building to building, based on a moderated benchmark	×	✓

4 Other approaches

4.1 Why the CPRS – or any version thereof - won't impact the non-residential building sector

The Department of Climate Change, represented by Mr Barry Sterland, suggested that the Government's proposed Carbon Pollution Reduction Scheme emissions trading scheme for Scope 1 emissions would impact on the building sector.

According to the Proof Hansard of the public hearing on 12 February 2010, Mr Sterland said in part:
"All the emissions covered by the scheme would be covered by the CPRS, and I will return to that later, so it is not additional emissions that are not covered by the CPRS, they are within the covered sectors."

And further:
"(...) all the emissions covered in this scheme would be covered by the CPRS, so, in a sense, if this were to work alongside a CPRS, it would be creating a double carbon price for a subset of emissions within that scheme."

With respect, the perception that non-residential building owners will be affected by energy price signals that will flow from Emissions Trading Schemes (such as the CPRS) and will therefore take action to introduce the significant (greater than 25% emissions reductions) energy efficiency initiatives that buildings present is wrong.

We re-state the considerable consensus that emissions reductions of 50 percent and more are achievable right now using existing skills and technology.

If you want to drive emissions cuts in buildings you need to find a mechanism that will touch those who hold the purse strings for buildings – that is, building owners.

The CPRS will not do this because:

i. energy costs are a small percentage of costs for non-residential building occupants, in the order of 1% of total costs;
ii. unlike householders who will bear the brunt of any energy price rises under the CPRS, non-residential building owners can negotiate cheaper prices; and
iii. building owners do not pay the electricity bills – those who occupy the building do because owners they can pass the additional price increases through to tenants.

Furthermore, it is important to note that the Energy Efficient Non-Residential Building Scheme, like the Efficient Building Scheme, has been designed so that it could operate either alongside the CPRS (or similar Emissions Trading Scheme) *without compromising it*, or as a stand-alone scheme.

The Bill provides a sector specific inclusive market mechanism that resolves issues of both double accounting and additionality that have imposed severe structural limitations on previous complementary measures, such as voluntary White Certificates, that have made them most ineffective in unlocking the abatement potential of existing buildings.

The Property Council of Australia agreed with this in September 2008, in their submission on the CPRS Green Paper:

"At its most efficient, a CPRS will achieve only 8Mt of CO2-e abatement per year from the built environment. However, by focussing on energy efficiency in buildings, the Government could achieve as much as 60 Mt CO2-e per annum of abatement.[1]"

And further:

"Complementary measures are needed to overcome the main impediment to owners who seek to improve the energy efficiency of their buildings – the lack of a reasonable return on their investment."

Finally, if the CPRS is going to be so effective, why is the Property Council advocating no less than seven 'complementary measures' to improve the energy efficiency of buildings and lowering their greenhouse gas emissions?

4.2 Why accelerated depreciation is not the answer

Accelerated depreciation – like white certificates – rewards industry leaders for what they would have done in any event, and is unlikely to stimulate the industry 'laggards' to action.

Further, listed property trusts pass all tax benefits to investors and the superannuation industry gets no benefit so accelerated depreciation is not a fiscal incentive for property trusts.

[1] PCA submission to Carbon Pollution Reduction Scheme Green Paper, http://www.propertyoz.com.au/library/Green%20Paper%20Submission.pdf

Listed trusts cannot use this incentive as refurbishment capital. Unlike the Scheme, which is low-cost to Government, accelerated depreciation is high cost to Australians.

4.3 Voluntary approaches

Some critics maintain that a voluntary approach specifically for the property sector would work. They claim that other examples of voluntary approaches have failed the property sector because they have not been specifically tailored to the sector.

Our response:

Voluntary approaches since the 90's for our sector have **failed.** They have failed wherever they have been tried: in Europe, Japan, Korea, the UK, the USA, and Australia.

The Tokyo Metropolitan Government is about to introduce a mandatory cap & trade scheme for buildings precisely because a voluntary trading scheme specifically for buildings did not work.

As we noted in our Supplementary Submission, Tokyo's voluntary trading scheme coupled with a mandatory disclosure regime, delivered a 2 percent reduction in emissions over three years.

White Certificate systems **have** been tried in Australia – take the NSW Greenhouse Gas Reduction Scheme (GGAS). It had a take up from the commercial building sector of less than 1%, despite initial aims for a 40% take-up from the sector.

White Certificate systems have **NOT** been successful in driving energy efficiency in our sector in Europe, including in Italy – where the certified measures do **not** include the commercial building sector.

In 2008 the certified measures were as follows:

- 63% elec savings in **domestic** sector
- 21% fuel savings for heating in the **civil** sector
- 7% elec saving in the **public** lighting sector
- 5% Combined Heat & Power in the **civil** sector
- 4% savings in the **industrial** sector

It is also worth noting that far from being simple. The Italian scheme is administratively cumbersome, involving a number of operators:

- A Regulatory Authority, who is in charge of the management of the mechanisms developing guidelines, issuing certificates, checking compliance, etc).

- A Technical Body charged with the task to develop and update the energy saving evaluation procedures.

- A Market Operator, who supervises the trading of White Certificates.
- An Energy Agency that is entrusted with the Monitoring and Verification of the performed energy saving projects carried out.
- The Operators, who are entrusted or allowed to gain White Certificates through energy saving projects.

4.4 The role for regulation

We fully support the ongoing reform of the Building Code of Australia.
(We note that a co-author of the Scheme, Maria Atkinson, Global Head of Sustainability for Lend Lease, is an industry representative on the Australian Building Codes Board.)

However we point out the goal of the Building Code of Australia (BCA) is to set *minimum* necessary standards for the design and construction of buildings and other structures. Unlike the Scheme outlined in the Bill, the Building Code of Australia and other forms of regulation do not stimulate innovation and best practice.

The Building Code of Australia does not apply to existing non-residential buildings – which comprise 98 percent of total building stock – except when those buildings undergo a major refurbishment. Its scope with respect to existing buildings is therefore very limited.

5. Conclusion

Every building owner receives electricity and gas bills – the Bill is simply asking building owners to take those bills and the floor area of the building, and then calculate the energy efficiency of the building using readily available state- and energy-specific greenhouse gas statistics.

The Bill applies fairly to all owners of non-residential buildings.

The Scheme proposed by the Bill is **NOT a tax.** A tax is a financial cost only, which is about raising revenue for Government. The Efficient Building Scheme offers financial reward and penalty, depending on where a building performs against the benchmark which is called the 'cap'. Given that permits are allocated up to the cap- the Scheme is **NOT** revenue-raising.

To allege that the Scheme is without detail of implementation is misleading. Lend Lease and WSP Lincolne Scott have dedicated resources and engaged international technical and legal expertise on the implementation and much of the detail is known, tested and documented.

The CPRS will not have a major impact on the non-residential sector.

The Scheme does **NOT** have extensive record keeping, reporting and auditing requirements; on the contrary, it is simple, low-cost and fair.

Lend Lease and WSP Lincolne Scott have spent time and money pursuing a cost effective solution to address both the single building and large asset portfolio owners needs and costs.

The Scheme will create an obligation on a building by building basis. We expect that for owners of small buildings, there would be a one-off annual transaction through a third party in the same way that individuals use H+R Block to sign off their income tax returns. This will keep Scheme administration to an absolute minimum. Larger, corporate and portfolio building owners would interact directly with the registry. We expect this would be limited to 100-200 parties.

We have worked with internationally recognised carbon traders and lawyers to address this issue.

As the fungibility is at the register level only, any credits passed through to an Emissions Trading Scheme register would create a corresponding reduction in the ETS cap to ensure that the credits are not counted twice.

The fungibility and double counting issues have been addressed.

We have spent two years studying various incentives for our sector and the Scheme is a culmination of incentive and penalty.

Importantly, carbon abatement in our sector also drives economic growth – creating jobs and boosting Australia's international competitiveness.

It would also help put a lid on higher energy prices by reducing energy demand and therefore deferring future costs associated with new infrastructure. We know from NSW IPART that every dollar spent on demand management saves $6.50 on energy infrastructure spending.

The Scheme can deliver all this, yet at the same time it is a simple, fair, low-cost scheme which is based on annual electricity and gas bills, the type of building and its floor area, and publicly available greenhouse gas statistics.

It is low cost to both building owners and the Government, and yet by being tailored to the non-residential building sector, it provides a real enabler for the sector to deliver deep, fast carbon emissions reductions.

At the same time, it will complement and help simplify existing policy measures, including the existing National Greenhouse & Energy Reporting (NGER) Scheme, the Energy Efficiency Opportunities (EEO) Scheme, and the imminent Mandatory Disclosure of Commercial Building Energy Efficiency.

We know that this Scheme remains at the forefront of international policy development for carbon abatement in buildings, and will enhance Australia's real estate and construction sector competitiveness internationally by leveraging market smarts to find the fastest, most cost-effective abatement opportunities.

6. Letter of support from Institute for Sustainable Futures, University of Technology Sydney

(Please see below)

Lend Lease

WSPLincolneScott Advanced Environmental

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UTS CRICOS PROVIDER CODE 00099F

10 February 2010

To Whom It May Concern:

RE: The *Efficient Building Scheme* proposal

The Institute for Sustainable Futures (ISF) at the University of Technology would like to express in-principle support for the *Efficient Building Scheme* proposal. ISF has undertaken extensive research into the potential for cost effective energy efficiency improvement in buildings and the institutional barriers that obstruct uptake of this potential. On the basis of this research, ISF considers that there is a very strong case for mandatory market-based policy instruments such as the proposed *Efficient Building Scheme* to address these barriers.

Improving the energy efficiency of non-residential buildings has been identified as one of the most cost-effective abatement opportunities for Australia. However in the current policy environment, uptake of energy efficiency in buildings has been limited.

The accelerated energy efficiency improvements the Efficient Buildings Scheme is likely to deliver could assist in the deferral of infrastructure upgrades, resulting in significant savings to governments. An investment of over $40 billion is proposed for electricity network infrastructure in Australia over the next 5 years. Establishing policy tools such as the Efficient Building Scheme can be instrumental in reducing the need for this unprecedented capital expenditure whilst also reducing customer bills and greenhouse gas emissions.

The Scheme's design appears to effectively address key barriers to and drivers for improving energy efficiency in buildings, such as the issue of 'split incentives' in the property industry and the impact of investment certainty on access to finance. It also has potential to drive cultural change within the sector by rewarding energy saving behaviour by building managers and tenants. Furthermore, the obligation of all building owners to report on greenhouse gas emissions will provide valuable data to government and research institutions that can inform future built environment and energy policy.

Yours sincerely,

Professor Stuart White
Director
Institute for Sustainable Futures, UTS
y

NABERS Energy

The importance of penalties

This statement provides the perspective of the Institute for Sustainable Futures on the claim that the proposed *Efficient Building Scheme* replicates *NABERS Energy* and is therefore not required.

NABERS Energy fulfils an important role in providing incentive for energy efficiency improvements in buildings, however on the basis of our research we believe the proposed *Efficient Building Scheme* has potential to further accelerate the uptake of energy efficiency in Australia's commercial buildings. An important distinguishing feature is the *Efficient Building Scheme's* system of transparent financial rewards for energy efficient buildings and (in particular) financial penalties for inefficient buildings.

NABERS Energy is a framework for rating the operational greenhouse gas emissions of commercial and residential buildings relative to a benchmark. It provides market recognition for new and existing buildings that perform well. In some jurisdictions it has been used as a regulatory benchmark (for example, new office and retail buildings may be required to achieve a minimum NABERS energy rating via a commitment agreement). It is also used by organisations and businesses on a voluntary basis to benchmark the operational performance of their office buildings and tenancies.

Why NABERS Energy is not enough on its own:

International and local research, particularly within the field of behavioural economics, indicates that the conventional 'rational actor' model is not sufficient to explain human economic behaviour. Relatively good rates of return on energy efficiency upgrades and the recognition *NABERS Energy* provides will encourage, but not necessarily lead to, action on energy efficiency. This reflected in the current situation: whilst energy efficiency uptake in the commercial buildings sector has been positive, it still falls far short of the potential for improvement.

Why penalties are an important feature in this context:

Financial 'loss aversion' has been found to be a much greater driver for behaviour change than financial gain (eg. Brekke and Johansson, 2008). Experimental research has found that people are willing to take big risks to avoid losses but possibly not even small risks to achieve gains, leading to the conclusion that fines are likely to be a particularly strong incentive for behaviour change. (eg. Dawnay and Shah, 2005). It is the owners of poorly performing buildings who particularly need to be targeted, as this is where the greatest opportunity for improvement lies. In this light the penalties established by the *Efficient Building Scheme* are an important factor in improving energy efficiency and reducing greenhouse gas emissions in the commercial buildings sector.