7th May 2010

Building Framework Discussion Paper
Building and Government Energy Efficiency Branch
Department of Climate Change and Energy Efficiency
GPO Box 854
Canberra ACT 2601

Via e-mail buildings@climatechange.gov.au

Dear Sir,

Re: National Building Energy Standard-Setting, Assessment and Rating Framework

Thank you for the opportunity to provide a response on the consultation paper.

The Australian Institute of Refrigeration Air Conditioning and Heating (AIRAH) is a peak body for the air conditioning and refrigeration industry in Australia focusing on the improvement of technical professionalism in our industry. Our members typically work in the non-residential sector. It is from this perspective we provide our response.

AIRAH has provided substantial technical input to a wide range of issues relating to non residential rating tools, energy modelling and broader energy efficiency advice:

- technical working groups with ABCB in the development of Section J (BCA Volume 1)
- member of technical advisory group for NABERS IEQ
- member of the technical advisory group for NABERS – Data Centres
- technical advice for the development of Green Star Diffusion – Mechanical Engineering
- technical advice on federal government mandatory disclosure scheme
- development of draft HVAC diagnostic rating tool in partnership with Sustainability Victoria

A number of technical papers have been delivered on the topic of energy modelling at AIRAH's national conferences and a number of technical papers have been published in our monthly journal, EcoLibirum, on the topic,.

Responses to issues raised in the discussion paper:

> *Are there other key outcomes that could be considered for the Framework and how could these be practically included and in what timeframe (for example, a reduction in peak loads, water use, etc)?*

Before considering other outcomes there needs to be a strong push to measure the results of the current energy provisions. There is a push to continually improve the energy performance of buildings but there is very little evidence that the regulations are delivering the desired outcomes. At some point compliance must be measured.

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A detailed measurement and analysis of energy performance of the latest stock of buildings designed under BCA Section J has the potential to identify where the break downs in energy efficiency are occurring; construction, installation; commissioning; operation, maintenance etc. From these findings a holistic approach to improving compliance can be targeted and the guess work can be taken out of developing new benchmarks or applying % factors to unknowns.

A recent campaign by the Chartered Institute of Building Services Engineers (CIBSE) in the UK highlights that regulations on carbon reduction are not effective (appendix 1).

Before setting the benchmarks higher or incorporating other outcomes there needs to be a real understanding of how the latest stock of new buildings is performing. Any lessons from these performance measurements can then be used to improve how the current regulations and benchmarks are set. Only then should other outcomes be considered.

> *To what extent should different building classifications be treated uniformly in the Framework, or should different building classifications be treated separately, particularly the residential and commercial building classifications and specialised buildings, such as laboratories?*

Residential and non residential should be treated separately. The drivers for energy efficiency in non residential and residential sectors are quite different and don't align. The non residential sector is largely about technology and relatively little about user behaviour and services levels (at base building level, at least) while residential is largely determined by behaviour and service levels and relatively little by technology.

> *If the Framework were to be expanded to include water and other sustainability elements such as embodied energy/emissions or indoor air quality, how could this be done and in what timeframe?*

There is currently a strong push focused on the reduction of direct greenhouse gas emissions related to greenhouse warming potential of synthetic refrigerants within DEWHAs ozone and synthetic gas team. Government should look closely at integrating this work into the framework rather than looking at indirect and direct emissions as two distinct areas. A lot of the philosophy of energy efficiency once verified could apply to water efficiency. Indoor air quality would be a lot more complex. IAQ is only one factor in Indoor environment quality (IEQ) which is more closely linked with perceived sustainability.

> *What are the key factors that should be taken into account in setting future stringency levels for building energy efficiency in the BCA?*

As discussed earlier – measurement of acutal performance is crucial in considering setting future stringency levels.

> *How often should major upgrades to the BCA occur, taking into account industry preparation times and review cycles?*

Major upgrades should take account of the level of compliance being achieved through current measures and an understanding of how industry is adapting to the measures.

How can certainty on future stringency levels be improved, but in a way that allows scope for refinement at the time of specific changes to the BCA?

Certainty can only be improved by measurement and analysis of buildings that are being delivered under current regulations and learning and applying the lessons on why compliance is not being achieved.

What measurement metrics and normalisation approaches are most appropriate?

NABERS forms a good overall benchmark for performance but a level of detailed analysis and diagnosis needs to be performed to start to understand why compliance is not being achieved. One of the Heating Ventilation and Air Conditioning High Efficiency System Strategy (HVAC HESS) first stage projects is the development of a diagnosis process for air conditioning systems – once this project is developed the processes can then easily be applied to other building services. This can then be used to give more in depth understanding of energy use in buildings. The HVAC HESS is called up under the National Strategy for Energy Efficiency.

Should star ratings be used as the means for setting standards for commercial buildings in the BCA?

From a technical point of view it is inconsequential whether its star ratings or energy benchmarks – what is more important is a consistent methodology across commercial building rating tools for data inputs. Currently there is a wide range of discrepancy between NABERS, BCA and Greenstar. (See Appendix 2)

There are no existing rating scales for several classifications. To what extent this is an issue? Should DTS provisions be retained where it is not practical to develop a rating scale for particular types of buildings?

Ideally rating scales would be available for all classifications of buildings.
The practicalities in developing a full suite of rating tools are not discussed in the paper.
Benchmarks for all buildings should be based on measured and verified energy use.

Should the modelling protocols for commercial buildings BCA compliance and NABERS Energy Commitment Agreements be aligned?

Yes – see previous comments and Appendix 2

How can Government support improved modelling standards to more accurately predict future building performance?

Two approaches are needed. First, government can play a facilitation role to align modelling protocols. Second, as discussed earlier, measurement and verification is essential to help understand actual building performance.

Should modelled ratings include a correction factor to account for imperfect commissioning?

Government and industry need to better understand what consequences imperfect commissioning contribute to poor performance. There is also a need to understand the consequence of other building delivery issues; construction, installation, operation etc.

AIRAH comments on Capacity Building for Framework Implementation:

Linkages with the National Energy Efficiency Skills Initiative are essential and should be made as soon as possible in the development and implementation of this framework. A large range of interested stakeholders will be involved in both initiatives. The main concerns and frustrations AIRAH had with NFEE was the way the groups operated in a silo environment leading to substantial duplication of effort.

Energy modelling
There is a strong need to develop an accreditation scheme for non - residential energy modellers. To ensure realistic outputs of energy simulation software users must have a strong engineering / buildings services background. A lot of engineering judgement is required in developing energy simulation models and this judgement is developed through a sound knowledge of a buildings thermodynamics and building services systems integration.

Appendix 3 provides an initial outline of what AIRAH believes should be included in the training development for non-residential energy simulation professionals.

Training of assessors
As part of NFEE Education and accreditation program AIRAH was involved in the development of a nationally recognised post graduate qualification that includes a comprehensive component in Energy Auditing. AIRAH also manages an accreditation scheme for energy auditors. To avoid duplication of effort these two initiatives should be leveraged under this framework.

Dialogue with the National Energy Efficiency Skills Initiative needs to commence as soon as possible to facilitate this leverage.

Recommendations:

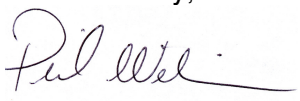
1 – Verification of compliance with current BCA Section J requirements is essential in understanding how effective the standards for energy efficiency are before looking at new outcomes or addressing higher stringency levels.

2 – The HVAC HESS diagnostic tool project needs to be commenced to provide a tool for industry that can analyse areas of energy use in more details than NABERS.

3 – The Government must work closely with AIRAH to develop the non-residential parts of this framework.

AIRAH is key to the development of this framework for the non-residential sector. We look forward to ongoing input and working collaboratively with government to deliver a successful outcome.

Yours sincerely,



Phil Wilkinson
AIRAH Engineering manger
Encl

About AIRAH

The Australian Institute of Refrigeration Air Conditioning and Heating (AIRAH) has a long and proud history of representing an industry of professionals who are of fundamental, and increasing, importance to the comfort, health and safety of the community.

Formed in 1920, AIRAH is recognised by government and industry bodies for its expertise across a wide range of issues in the area of engineering services for the built environment.

AIRAH encourages world's best practice within the building industry. As a registered training organisation and through continuing professional development, accreditation programs and a wide range of technical publications, AIRAH has earned a reputation for developing the competence and skills of industry practitioners so that they can better meet society's evolving health, safety and environmental demands.

As the leading specialist membership association for air conditioning, refrigeration, heating and ventilation professionals, AIRAH represents over 10,000 professionals across Australia.

In operation for over 80 years, AIRAH's longevity stems from the successful delivery of key industry benefits including education and training, representation, dissemination of information, networking and member recognition.

AIRAH has worked with a number of local, state and commonwealth government bodies including the Department of Climate Change, Sustainability Victoria, City of Melbourne, City of Sydney, Australian Greenhouse Office and Environment Australia (development of the Refrigerant Selection Guide, a scoping project for best practice programs to support the introduction of commercial refrigeration minimum energy performance), AIRAH has worked on projects in partnership with the Australian Fluorocarbon Council (AFC), Facility Management Association of Australia (FMA Australia), Green Building Council of Australia (GBCA), The Air Conditioning and Mechanical Contractors Association (AMCA) and the Air Conditioning and Refrigeration Equipment Manufacturers Association (AREMA).

Appendix 1

CIBSE launches 'Non-compliance costs' campaign

Tuesday, 20 April 2010

Non-compliance with the Energy Performance in Buildings and F-Gas Regulations is costing both business and the environment warns CIBSE at the launch of a new industry campaign.

With rates of compliance of Air Conditioning Inspections at less than **5%** (compared to **80%** for Display Energy Certificates and **70-75%** for Energy Performance Certificates), The Chartered Institution of Building Services Engineers (CIBSE) believes it is time to take action and bring this to the attention of government.

CIBSE President Elect Rob Manning explains: "The Non-compliance costs campaign aims to bring together the many voices of frustration and concern to form one united call for action. We need to raise the issue of non-compliance up the government agenda and promote the benefits of increasing compliance rates.

"Non-compliance has real costs; it costs the environment, it will cost the UK any chance of meeting the emissions targets and it costs non complying companies who are missing out on a real opportunity to increase their profits."

The campaign will run for 4 months, starting at Nemex on 20th April and running until the Energy Event in on 10th September. Participants can sign up to support the '*Compliance Charter'* which lies at the heart of the campaign.

The charter will spell out the costs of non-compliance and lays out 3 simple steps which are vital if air conditioning inspection compliance rates are to improve. Supporters will also have the opportunity for greater involvement through downloading letters to send to prospective candidates and subsequently to their MPs, as well as to local papers.

The compliance charter

1 - The UK government must acknowledge that air conditioning inspection compliance is not working and must move the responsibility for enforcement away from Trading Standards to a body which is more interested and able to act

2 - The government must set targets for air conditioning and f-gas compliance that the enforcing body agree are achievable and sign up to

3 - The government must increase communication with UK companies informing them of their obligations to comply with air conditioning inspection and f-gas legislation

For more information and to sign up please visit

www.cibse.org/noncompliancecosts

Appendix 2 – Where's the consistency – see attached

Appendix 3 – proposed content of energy simulation training for non-residential sector.

The modelling process

Overview of how heat is transferred in buildings and their engineering systems including thermodynamics and fluid dynamics so that user can use alternate approach to modelling systems that the software doesn't have – ie understand and overcome the limitations of the available software.

Input information required

- Weather data model and locations approximations
- Building fabric data model and simplifying assumptions
- HVAC system data model and simplifying assumptions including representation of key psychrometrics and equipment performance data over part load and full load conditions.

Key parameters that are modelled in the simulation – why they are important and what the impacts of them are

Understanding and application of BCA JV requirements

How information is input to software

What approximations are required?

For example all computer modelling system generally require some degree of simplifying assumptions to be made within the software application. These aspects apply to the weather data inputs, the building data configuration and input files and the system dater input files including how the system psychometrics are represented within the model.

Determining approximations for characteristics of equipment – eg coefficients of performance and integrated part load values

Understanding of the range of results that should be expected from outputs –eg of fans/pumps- check figures and how to trim system design such as air / water systems to reduce fan / pump energy.

What the pitfalls and traps are with modelling

How to model input power of fans, pumps etc (assumes theory of how pumps etc. work)

Example on how to model common systems – eg VAV and important issues such as turn down

Lighting

- lighting controls, Automatic and Manual including switch zoning arrangements and configurations;
- lighting types and application efficiencies;
- Perimeter lighting and natural supplementation; Interfacing of lighting with Daylight flux,
- Life cycle considerations of bulbs and filaments etc
- Advanced energy efficiencies and task lighting. and

- HVAC and light zoning compatibility

Glazing

- BCA aperture calculations
- Solar Shading Coefficients and there application
- Affect of Air flow on glass surfaces and surface coefficients
- Type of glazing and transfer mechanics for different types of glass
- Understanding and applying glazing data
- Use of glazing calculators

Understanding/checking of results (avoiding garbage in / garbage out)

Interpretation of results