# Draft Framework for Consultation

# National Building Energy Standard-Setting, Assessment and Rating Framework

**May 2012**

**Energy Efficiency Working Group**
**Select Council on Climate Change**

Published by the Department of Climate Change and Energy Efficiency.

www.climatechange.gov.au



ISBN: 978-1-922003-46-1

# PREFACE

This document contains a draft of the National Building Energy Standard-Setting, Assessment and Rating Framework (the Framework), as specified in measure 3.1.1 of the National Strategy on Energy Efficiency (NSEE). This draft was developed by the Framework Subgroup of the Senior Officials Group on Energy Efficiency (SOG-EE). With the recent establishment of the Select Council on Climate Change (SCCC), responsibility for the Framework has passed to the Energy Efficiency Working Group under the SCCC.

This draft has been produced in order to obtain feedback from stakeholders on the proposals put forward in the document. The opinions and proposals expressed in this document have not been endorsed by the Commonwealth, state or territory governments.

This document has been released for consultation purposes only and does not necessarily reflect the views of governments or indicate a commitment to a particular course of action.

This document proposes that indicative goals for minimum building energy efficiency standards be set for 2015 and 2020, but has not specified what these goals should be. To assist in determining these goals, the Department of Climate Change and Energy Efficiency commissioned consultants, Pitt & Sherry. Pitt & Sherry have undertaken benefit/cost analyses of possible goals for reduced energy use in new residential and commercial buildings in 2015 and 2020 under different stringency levels and cost scenarios. The Pitt & Sherry report is available as a separate document. Also available are two further studies commissioned by the Department: the implications of including on-site energy generation in building standards by Energetics; and the use of redesign options to meet current or increased residential building standards by Sustainability House.

## The need for a Framework

Buildings are central to both Australia's economy and its carbon emissions. In 2010/11, the value of approved building work was nearly $75 billion, with $47 billion of this spent on residential building work. The building sector accounts for around 19% of Australia's energy consumption and 23% of its carbon emissions.

As buildings are essential for human shelter and define the environment in which we live, people have strong personal views and economic connections to how buildings are designed and operated. In particular, access to affordable housing is a major indicator of community wellbeing and the costs of buying or renting a dwelling and its ongoing energy costs are a key concern for many households. Given the very long life of buildings, decisions made during a building's design stage can have impacts on its energy consumption and carbon emissions for decades to come that can be difficult and expensive to change.

Governments are thus giving increasing attention to the efficient use of energy because of its multiple benefits: lowering carbon emissions, improving energy security, and helping households and businesses cope with rising energy prices.

Given the many barriers to increasing the energy efficiency of buildings and the need to address the wide variety of new and existing buildings, a range of policies that are complementary to a carbon price is required to realise the energy efficiency gains that are technically possible. These could include building standards, information provision on building and equipment energy efficiency, financial incentives to upgrade buildings, industry skills improvement and the development of new building technologies and materials. Many of these measures are captured within the NSEE.

The National Building Energy Standard-Setting, Assessment and Rating Framework is included in the NSEE to address a subset of building-related measures, in particular:

- minimum building energy efficiency standards; and
- building assessment and rating processes that can be used in minimum building standards and other policies.

The Framework can also help provide a clear, coordinated and visionary approach to increasing the energy efficiency of Australia's buildings for the following reasons:

- to address key market failures in the building sector, such as information barriers where information on the performance of buildings is not available or hard to interpret, and the split incentives that exist between building developers, owners and tenants;
- to reduce regulatory burdens on industry and increase productivity by ensuring that building energy efficiency standards and the systems used to assess and rate buildings are well designed, transparent, nationally consistent and clearly communicated to industry and the community;
- to enhance the ability of industry to plan ahead and develop innovative, practical and cost-effective energy efficiency solutions, which will also lower compliance costs for households and businesses; and
- to prepare the building sector for changes to building standards that will be necessary to assist in broader efforts to reduce carbon emissions and adapt to predicted future climate conditions and more extreme weather events.

## Principles to be applied under the Framework

To address the above issues and objectives, a common set of principles will be applied to determining the standard setting, assessment and rating initiatives to be included in the Framework:

- where possible, approaches should be consistent across Australia, while recognising differences in the relative effort required to achieve acceptable human comfort conditions in different climate zones;
- the greatest net economic, social and environmental benefit should be provided to the Australian community as a whole;
- building owners and tenants should be empowered to make informed, relevant decisions in relation to purchase and rental/leasing decisions;
- the need for increased standards must be justified relative to other feasible economic and regulatory policy options, including self-regulatory and voluntary approaches, that could be used to achieve similar levels of emissions and energy savings;
- approaches should be based on achieving measurable outcomes and allow maximum flexibility and innovation in how these outcomes are achieved in particular buildings;
- energy efficiency outcomes should be regarded as one element of achieving broader sustainability objectives to ensure that adverse environmental impacts are not created elsewhere;
- safe and comfortable living conditions for building occupants need to be maintained over the life of the building, taking into account potential climate changes;
- measures should be structured to allow the collection of nationally consistent data to assist future policy development; and
- approaches adopted should be reviewed on a regular basis to ensure they remain relevant and effective.

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# EXECUTIVE SUMMARY

In July 2009, the Council of Australian Governments (COAG) agreed to the National Strategy on Energy Efficiency (NSEE), which is designed to substantially improve the levels of energy efficiency across the Australian economy. Measure 3.1.1 of the NSEE requires all jurisdictions to work together to develop a consistent, outcomes-based national building energy standard-setting, assessment and rating framework (the Framework) for driving significant improvement in the energy efficiency (and potentially other environmental elements) of Australia's building stock.

This document contains a draft Framework that has been developed for consultation by the Framework Subgroup of the Senior Officials Group on Energy Efficiency (SOG-EE). The Select Council on Climate Change (SCCC), established in January 2012, has taken over responsibility for further development of the Framework. This work will be managed by the SCCC Energy Efficiency Working Group (E2WG). Following consultation, the E2WG will recommend a draft Framework to SCCC. In turn, SCCC will forward the Framework to COAG for approval.

Subject to COAG approval, the Framework will deliver the high-level outcomes listed below:

## Increasing environmental standards for building work on new and existing buildings

1. Step changes in the energy efficiency standards applying to new building work will come into effect in 2015 and 2020.[1]
2. The new minimum standards, to be primarily delivered through the National Construction Code[2], are expected to indicatively achieve[3] –
   a. for residential buildings: a X[4] per cent reduction in the average energy use of new buildings in 2020, with an interim step at 2015 involving the alignment of the existing standards with the other elements of the Framework.[5]
   b. for commercial buildings: a Y[4] per cent reduction in the average energy use of new buildings in 2015 and a Z[4] per cent reduction in 2020[5].
3. The new energy efficiency standards will be outcomes-based and cover the building fabric, fixed services, fixed equipment and fixed appliances using a flexible, 'whole-of-building', including design approach.
4. The new standards will be quantifiable and supported by clear methods of assessment.
5. The new standards will include separate heating and cooling performance requirements.[6]
6. Where appropriate, the use of locally generated renewable and low-emissions energy will be accommodated within the new standards[1].
7. Local construction practices will be accommodated within the new standards where climatically appropriate and necessary to facilitate cost-effective compliance.

1 Subject to regulatory impact assessment.
2 Noting the use of BASIX in NSW.
3 From a base level of buildings constructed in accordance with the 2010 Building Code of Australia (excluding state and territory variations), and only covering the energy used by building services, fixed appliances and equipment.
4 Comments are sought on what numbers X, Y and Z should be. See Section 4.3 for further detail.
5 The detailed standards to be included in the NCC may vary from this average outcome and will be based on achieving a positive benefit/cost ratio for specific building classifications and climate zones.
6 This outcome will be further informed by research into peak load issues.

8. The new standards will be applied to new work on existing buildings (including renovations, alterations and additions) in a nationally-consistent manner.
9. Minimum water efficiency standards, which incorporate Commonwealth, state and territory standards, will be introduced into the National Construction Code by 2015[7].

## Consistent building rating

10. Rating tools[8] used for regulatory purposes[9] (including government programs) will apply a consistent rating methodology, including appropriate normalisation, to ensure that ratings are meaningful and buildings can be fairly compared around Australia.
11. Ratings for all building types will be expressed using a consistent ten-star rating scale and include quantitative information about the building's performance.
12. Through consistent branding and other communications, the Framework will clarify the meaning of ratings and clearly identify those rating tools that may be used for regulatory purposes.
13. Where a building standard specifies, as a possible means of compliance, a minimum rating for a particular building type and/or environmental category, a single rating tool will also be specified for demonstrating compliance (Accrediting multiple rating tools for regulatory use is an alternative option under consideration. The final position will be informed by this consultation process).
14. The climate data used in rating tools will be regularly updated to take account of predicted climate change around Australia.
15. The Framework will achieve alignment between pre-construction/design ratings and post-occupancy/operational ratings.
16. Use of rating tools for regulatory purposes, where professional judgement is required, will only be carried out by accredited or licensed assessors who have met national training and competency standards.
17. The Framework will accommodate the development of rating tools by the market for non-regulatory use, particularly where such tools seek to improve industry best practice.

## Governance

18. Rating tools used under the Framework will be governed by national steering committees that report to an appropriate ministerial council and include provision for industry consultation.
19. A national body, reporting to an appropriate ministerial council, will be responsible for the implementation of the Framework.

7 Subject to regulatory impact analysis and their inclusion delivering net benefits to the Australian community.
8 Refer Glossary for definition.
9 Compliance with building standards may also be provided for through prescriptive Deemed-to-Satisfy provisions.

# 1. INTRODUCTION

## 1.1 Background

In July 2009 the Council of Australian Governments (COAG) agreed to the National Strategy on Energy Efficiency (NSEE), which is designed to substantially improve the levels of energy efficiency across the Australian economy. A major section of the NSEE is devoted to improving the energy efficiency of Australia's building stock. This will be achieved through:

- driving significant improvement in minimum energy efficiency standards for new buildings; and
- implementing measures to help raise the energy efficiency of existing buildings through voluntary actions in response to the provision of better information and economic incentives.

In July 2011 the Commonwealth Government committed to the implementation of a carbon price mechanism to cut carbon pollution and build a clean energy economy. It is generally recognised that there will also be a need for complementary measures targeting market barriers that would hinder the effectiveness of a carbon price in inducing actions to reduce emissions, e.g. split incentives, other negative externalities and information failures. In agreeing to the NSEE, COAG noted that addressing these market barriers through building energy efficiency and other measures is complementary to carbon pricing, and that energy efficiency is one of the most cost-effective ways to reduce carbon emissions and assist households and businesses transition to a low-carbon future.

The Commonwealth Government has also considered the Report of the Prime Minister's Task Group on Energy Efficiency, which recommended a range of measures to improve the energy efficiency of the Australian economy.

The final form of the Framework will take account of any relevant initiatives that arise from these processes to ensure that they complement each other.

Measures to increase the energy efficiency of Australia's building stock will be facilitated by improvements to the building assessment and standard setting processes currently used across jurisdictions. This will deliver national consistency in the way that the environmental performance of buildings is assessed and rated and how minimum standards of performance for new buildings and renovations are set into the future.

Measure 3.1.1 of the NSEE sets out the key elements of the outcomes-based national building energy standard-setting, assessment and rating framework that jurisdictions have committed to developing.

As described in the NSEE, the Framework has three key components:

1. providing a pathway, implemented primarily through the Building Code of Australia (BCA), for increasing the stringency of the minimum performance requirements for new buildings and renovations;
2. providing consistent, accurate and understandable methodologies for assessing and for publicly communicating the energy efficiency (and other sustainability elements over time) of new and existing buildings; and
3. enhancing governance arrangements for building energy assessments, ratings and standard setting.

The full text of the NSEE in relation to Measure 3.1.1 is included in Appendix A. Responsibility for development of the Framework was originally given to the Senior Officials Group on Energy Efficiency (SOG-EE). The Select Council on Climate Change (SCCC), established in January 2012, subsequently took over responsibility for the NSEE, including the Framework. This work will be managed by the SCCC Energy Efficiency Working Group (E2WG).

Note: from May 2011 the BCA became Volume One and Two of the new National Construction Code (NCC), with the Plumbing Code of Australia being added as Volume Three of the NCC. Elements of the Framework may be implemented through different volumes of the NCC. To reflect this, the Framework will use the term NCC rather than the BCA when referring to national building standards.

## 1.2 Purpose of this document

It is intended that a Framework - Policy Statement will be presented to COAG towards the end of 2012. This statement will contain objectives, principles and goals of the Framework and high-level commitments to change existing standards, and assessment and rating schemes. More detail on elements of the Framework, including implementation and funding arrangements will be provided for consideration by governments in the first half of 2013.

This document contains a proposed draft of the Framework – Policy Statement. After stakeholder consultation, a draft Policy Statement will be developed by the E2WG for consideration by the SCCC. In turn, SCCC will forward its agreed Policy Statement to COAG for approval.

The text boxes below recommend specific policy positions and commitments that could be included in the Policy Statement. The surrounding text provides an explanation of these boxes.

# 2. OVERALL OBJECTIVES OF THE FRAMEWORK

NSEE measure 3.1.1 requires that the Framework focus on energy efficiency but be capable of extension over time to cover broader sustainability elements such as greenhouse gas emissions and water use efficiency. The Framework should therefore contain broad objectives to guide the development of specific outcomes and elements over time.

The requirements for buildings to be affordable, safe, functional and maintain human comfort are inter-related with a building's environmental impacts. The implementation of the overall objectives of the Framework therefore needs to take into account some guiding principles to ensure that there are no undesirable consequences.

### OVERALL OBJECTIVE AND PRINCIPLES OF THE FRAMEWORK

The overall objective of the Framework is to drive significant improvement in the sustainability of Australia's new and existing building stock.

This objective will be achieved while ensuring:

- regulatory measures are subject to regulatory impact analysis;
- the varying characteristics, including functions, scale and construction, of different building types are taken into account;
- standards applying in particular locations facilitate cost-effective compliance by accommodating local construction practices and climate conditions;
- standards support efficient use of natural resources and energy;
- comfortable and safe conditions for building occupants are maintained;
- climatic variation across Australia, both currently and potentially with projected climate change, is taken into account;
- improvement and innovation in building design and technologies are encouraged;
- voluntary action to improve building sustainability beyond minimum standards is encouraged;
- consistency with other government measures to improve energy efficiency, mitigate greenhouse gas emissions and improve environmental performance, particularly minimum performance standards for appliances and mandatory disclosure of building performance; and
- the positive features of existing rating schemes and governance structures are retained as far as practicable.

Operational energy efficiency improvements and greenhouse gas emission reductions should be dealt with together in the Framework due to the many linkages between these outcomes. Improving energy efficiency not only reduces energy wastage and associated economic costs but also contributes to reducing greenhouse gas emissions caused directly and indirectly by the operation of buildings.

However, it is not practicable to target all possible outcomes in the Framework initially but that a staged approach should be taken, with the timing of incorporating other outcomes to be further considered.

Water efficiency is one element where there has been considerable development by governments of regulations and incentives. There are already minimum standards for water efficiency of certain fixtures and most jurisdictions already have building water use reduction targets and/or requirements for inclusion of water saving equipment and appliances in new residential buildings. An increase in the water efficiency of fittings that use hot water (e.g. showers and taps) also results in energy savings and reduced greenhouse gas emissions due to less water needing to be heated.

While more stringent energy efficiency standards are not proposed to be introduced for several years (see Pathways section 4.3), it is possible to include relevant water efficiency standards beforehand. Given the timeframe expected for completing the Framework and for making amendments to the NCC, the earliest this could occur is 2014.

Water efficiency standards will need to draw upon existing standards and best practice in water efficiency, including taking into account the Water Efficiency Labelling and Standards (WELS) Scheme – a national legislative scheme requiring certain water-using products to be labelled for water efficiency. They must also be consistent with the WaterMark product quality certification scheme, which confirms that certain plumbing products comply with the requirements of the Plumbing Code of Australia.

## INCLUSION OF SUSTAINABILITY ELEMENTS IN THE FRAMEWORK

Sustainability elements will be incorporated into the Framework in the following stages:

**Initial Stage**

- Reducing the energy use and greenhouse gas emissions caused by the operation of buildings;
- Reducing water consumption and increasing the efficiency by which water is used in buildings (subject to agreement with relevant government agencies responsible for water).

**Later stages (not necessarily in this order, and following full consultation)**

- Reducing the embodied energy and emissions in the construction and renovation of buildings;
- Reducing other negative environmental and health impacts of buildings, as determined at the time.

*Given the Framework's initial focus on energy efficiency and that the inclusion of water efficiency in national building standards is still under development, the rest of the draft Framework deals primarily with actions to improve the existing approaches to building ratings and standards in relation to energy efficiency and associated greenhouse gas emissions.*

# 3. COVERAGE OF BUILDING ELEMENTS

Buildings contain a range of structural components, as well as fixed and portable equipment and appliances. The characteristics and performance of these individual elements interact with each other and the building occupants' behaviour in determining the overall environmental performance of the building.

To make the Framework meaningful, what is in and out of its scope for the different purposes of rating buildings and applying standards needs to be defined. For example, plug-in portable appliances are not regulated in the NCC because, in general, it is difficult to regulate such appliances at the time of building approval. However, they can form a significant proportion of a building's energy use. The collection of information about some of the non-NCC regulated appliances installed in a building is however useful for assessing the building's operational performance.

## BUILDING ELEMENTS COVERED

In relation to energy use and greenhouse gas emissions, the Framework will cover, as far as practical, all relevant elements of a building, e.g:

- the thermal performance of the building envelope;
- fixed appliances and fixed equipment in the building, e.g:
  - » space heating, cooling and ventilation systems;
  - » hot water heaters and systems;
  - » lighting; and
  - » other mechanical services, e.g. pumps, lifts;
- energy control systems;
- on-site or directly connected energy generation facilities[10]; and
- portable plug-in appliances (not for regulation by the NCC but may be included in other assessments of total energy use/greenhouse gas emissions of buildings)

The elements included for particular building classifications, and for new buildings and renovations, will vary. The potential future inclusion in the NCC of building elements not currently regulated will be assessed as part of the determination of future major stringency upgrades. The inclusion of elements will be prioritised based on factors such as the contribution of the element to building environmental performance and the cost-effectiveness of such inclusions.

The Framework will seek to complement Minimum Energy Performance Standards (MEPS) and efficiency ratings for building services, appliances and equipment.

Elements to be covered in relation to other sustainability elements, e.g. water, will be further investigated. Stakeholder comments will be sought.

[10] Including renewable and low emission generators, cogeneration, trigeneration, fuel cells, etc. A methodology for apportioning energy from distributed generators shared by more than one building is still to be considered.

# 4. REGULATION OF NEW BUILDINGS AND RENOVATIONS

## 4.1 Objectives

The NCC already seeks to reduce greenhouse gas emissions by the efficient use of energy and through the use of energy from low emission or renewable sources (although this is only generally applied to certain building services such as heating and hot water systems at present).

The NSEE calls for the Framework to be outcomes-based. Consistent with this, future changes to the stringency of building standards should aim to achieve measurable outcomes relative to a defined baseline.

There is not a simple relationship between energy efficiency, energy use and greenhouse gas emissions. Energy efficiency is about the ratio of inputs to outputs. This can mean using less energy to perform the same task or increasing production using the same amount of energy.

Overall energy use may continue to rise even in an environment of improved energy efficiency in individual appliances or equipment. However, total greenhouse gas emissions are likely be lower than they otherwise would have been. A reduction in a building's greenhouse gas emissions could come from a range of factors, including: reduced use of appliances and equipment (either through changes in occupant behaviour or through reduced need due to more thermally efficient building designs); increasing the energy efficiency of appliances and equipment; use of on-site low emission energy sources (such as renewables); or a change over time in the greenhouse intensity of grid-supplied electricity.

Any consideration of claims made in relation to the resulting greenhouse benefit of allowing on-site energy generation should be mindful of the principle of 'additionality'[11] – to avoid double counting of abatement.

Energy efficiency is proposed to be the principal metric on which future regulatory standards will be based. This aligns with the NCC. However, in specific circumstances (such as for hot water systems), it may be appropriate to apply a greenhouse gas metric. Further analysis and evaluation will be undertaken to ascertain how these metrics can be combined over time (see also section 4.4 below).

### OBJECTIVE FOR THE REGULATION OF NEW BUILDINGS

The Framework will achieve measurable outcomes of reduced energy use and greenhouse gas emissions in all new buildings, compared to a reference baseline, by setting increasingly stringent standards on the total anticipated normalised energy used by the fixed appliances and equipment in these buildings.

The energy used for heating and cooling buildings will also be controlled through the setting of minimum standards for the thermal efficiency of the building envelope.

Additional complementary minimum standards may also be developed, e.g. minimum greenhouse gas standards for individual appliances or systems.

[11] Refer to the guidance released by the Australian Competition and Consumer Commission on carbon claims and consumer law – available at www.accc.gov.au

## 4.2 Treatment of building renovations

The NSEE refers to the Framework setting increasingly stringent standards for new buildings and 'major renovations' (i.e. alterations and additions to existing buildings). The NCC is generally applied by states and territories to all building work and is not limited to major renovations, although exemptions and reduced standards for renovations, where full compliance is not feasible, are also applied. Hence, any future increases in the energy efficiency provisions in the NCC will automatically apply to both new buildings and renovations.

The specific inclusion of renovations in the scope of the Framework provides opportunity for ensuring that the application of the NCC energy efficiency provisions to existing buildings at the time of renovation occurs consistently and to the fullest extent possible.

It is often claimed that there is more potential for energy efficiency gains in retrofitting existing buildings than in new buildings, due to lack of energy efficiency standards in the past and the relatively low turnover of the building stock. Some jurisdictions currently require buildings which are being renovated or extended over a certain size threshold, e.g. 50 per cent of the existing floor area, to be brought up to current energy efficiency standards for the whole building.

However, the scope to cost-effectively upgrade particular existing buildings up to current energy efficiency standards is dependent on the scale of the renovation work planned and the design, location and orientation of the existing building. A balance needs to be struck between the economic and environmental costs and benefits of encouraging retrofitting of existing buildings versus their complete replacement with higher performing buildings. Decisions of this nature will take into account such factors as improved operational energy efficiency versus loss of embodied energy from the demolition of the old building (although this may be reduced through recycling of building materials).

### APPLICATION OF ENERGY EFFICIENCY STANDARDS TO RENOVATIONS

A consistent national approach will be established to the interpretation and application of the NCC energy efficiency provisions to renovations of different scales and types.

A consistent threshold and methodology will be investigated, and proposed for public comment, for requiring an existing building being renovated to be completely upgraded to meet either current or a lower energy efficiency standard, taking into account the capacity to upgrade the thermal shell of the existing building.

## 4.3 Pathway for increased stringency in building standards

A key objective of the Framework is to provide greater certainty on the scale and timing of any future increases in the energy efficiency standards in the NCC in order to give industry time to adapt and to develop innovative and affordable solutions.

It is proposed that, subject to regulatory impact assessment, major step changes to the stringency levels in the NCC should occur at five year intervals, e.g. 2015 and 2020 to allow industry adequate time to adapt, whilst leaving open the possibility of minor adjustments in between these timeframes if circumstances warrant. Future goal setting could also occur on a rolling basis (e.g. set a 2025 goal in 2015, a 2030 goal in 2020, etc) to take into account changing economic and technological circumstances.

The Department of Climate Change and Energy Efficiency commissioned consultants, Pitt & Sherry, to undertake preliminary benefit cost analysis of options for achievable goals for reduced energy use in new residential and commercial buildings in 2015 and 2020. The study involved modelling of eight building types in each capital city using different stringency levels and cost scenarios to estimate possible energy reduction goals where the increased construction costs are balanced by the long term energy savings.

Pitt & Sherry's modelling was primarily based on energy savings coming from basic technology and material improvements to buildings (such as increased insulation or double glazing), rather than improved design (such as relocating windows and living areas to take account of solar orientation). Additional modelling undertaken by Pitt and Sherry, and other work commissioned by the Department[12] has found that improved design is likely to result in lower construction costs in achieving a given star rating, in which case higher energy reduction goals may be cost effective.

One finding of this study is that there are quite different potentials for further cost-effective energy savings in residential and commercial buildings, due to the different scales and types of construction and the stringency of previous energy efficiency standards. It is therefore proposed that the Framework establish separate goals for residential and commercial buildings.

The other major finding is that the potential for further cost-effective energy savings varies significantly across different climate zones. This will need to be accommodated in the sections of the NCC where the energy efficiency standards for particular building elements vary by climate zone, and particularly if the NCC allows for the achievement of a specific star rating, as currently occurs with residential buildings. In these cases the calculation of the compliance level underlying the standards or star rating for different climate zones may need to be recalibrated to reflect these varying levels of cost-effectiveness.

The percentage reduction goals identified in the Pitt & Sherry report should be regarded as indicative as it is difficult to predict technological and economic changes up to a decade in advance. The goals identified in the Pitt & Sherry report were also calculated on a breakeven basis (benefit/cost ratio of 1) to determine the highest potential goals that could be set, based on the assumptions made within a particular scenario, before the increased construction costs began to exceed the long term energy savings. The Pitt & Sherry goals are also averaged over different climate zones and building classifications, although with some weighting according to the different levels of construction activity between building classifications and jurisdictions. The study also did not take account of state and territory variations to the NCC.

The Pitt & Sherry report also examined the cost effectiveness of allowing on-site energy generation, such as PVs, to contribute to the achievement of building energy reduction goals. The report found that this could be cost-effective in some areas, depending on the scenario chosen, although the report did not calculate the network impacts of increased take-up of PVs. As this is a complex issue, the Department commissioned consultants, Energetics, to examine the implications of including on-site energy generation in building standards. This report is available as part of this public consultation.

Given the range of potential goals identified by the Pitt & Sherry report and the uncertainty about which scenario is the most realistic, this draft Framework has not proposed specific goals. Stakeholder views are sought on what they believe would be appropriate 2015 and 2020 goals for minimum building energy efficiency standards.

Whichever goals are chosen, it will be necessary to translate these average goals into specific amendments to the NCC for the various building classifications and climate zones to ensure the increased standards are cost effective in these cases. Any regulatory changes will involve a full regulatory impact assessment, which requires identification of the option with the greatest net benefits to the community from an intended course of action.

[12] Sustainability House, Identifying cost savings through building redesign for achieving residential building energy efficiency standards, 2012. Available on the DCCEE website

If the approach proposed in this document is adopted by governments it is most likely that there will need to be changes to the assessment methods and rating tools used to demonstrate compliance with the NCC. If the energy efficiency standards for residential buildings become more integrated and increasingly stringent then consideration will need to be given to whether the prescriptive 'Deemed-to-Satisfy' options for demonstrating compliance for Class 1 buildings should be discontinued in favour of rating tools which offer more design flexibility. Any changes would be introduced with sufficient notice to allow time for industry to adjust to the applicable assessment methods and rating tools.

### PATHWAY FOR INCREASED STRINGENCY IN BUILDING STANDARDS

The energy efficiency standards in the NCC will be progressively increased in the years 2015 and 2020

The indicative goals for average reductions in the energy used by new and extensively altered and extended buildings across Australia[13], compared to similar buildings constructed under the BCA 2010 standard are:

| | 2015 | 2020 |
|---|---|---|
| Residential buildings | (see below) | X% |
| Commercial buildings | Y% | Z% |

Some stringency changes for residential buildings may occur in 2015 as a consequence of adopting the other elements of the Framework, particularly in moving to a new 'whole-of-house' standard (see section 4.4).

Goals for particular building classifications and climate zones may vary from this average outcome to ensure cost effectiveness in these cases.

The specific increases to be included in the NCC at each of these years will be subject to regulatory impact analysis and a review of the impacts of previous energy efficiency upgrades.

In 2015, the 2020 goals will be reviewed and, if necessary, adjusted to meet any changed circumstances. Consideration will also be given to setting further goals beyond 2020.

Minor amendments to the building standards will continue to be made where necessary, as part of the existing annual NCC update process.

## 4.4 Flexibility in achieving building standards

At present, the standards for residential buildings in particular do not allow any trading off between the thermal performance of the building envelope and the energy efficiency of fixed elements such as heating, cooling, hot water systems and lighting. This lack of flexibility has been raised by some residential industry stakeholders as a limitation to the achievement of cost-effective energy efficiency standards.

[13] Only applies to the energy used by building services, fixed appliances and fixed equipment.

An outcomes based approach lends itself to setting performance based standards and allowing flexibility in the achievement of these standards. However, it may be desirable to set minimum standards for the performance of particular building elements to meet other objectives, e.g. human comfort or to reduce peak loads on energy grids. Legislated standards such as appliance MEPS will also continue to apply.

Flexibility in building standards could be informed by establishing a set of principles that consider trade-offs in outcomes that arise through different compliance routes. Put in terms of a hierarchy, this might be expressed as:

1. avoiding un-necessary energy use;[14]
2. where energy use is unavoidable, use it efficiently; and
3. where energy is used efficiently, use the least greenhouse intensive form of energy.

It is not desirable for a building with poor thermal efficiency to be able to offset this by installing highly efficient appliances or zero emissions energy generation, given the long life of the building envelope. It is therefore proposed to still maintain at least the current 2010 BCA thermal performance standards for the building envelope as a minimum, within an overall building energy use standard. Beyond this minimum standard, stakeholders' views are sought on the role, if any, that on-site renewable or low emissions energy should have in a flexible overall building energy standard.

The study by Pitt & Sherry indicates that rooftop PVs cost-effectively complement thermal performance standards under certain scenarios. While the indications are positive, further work is required before a decision can be made on the extent to which the Framework can or should accommodate renewable or low-emissions energy.

In establishing future standards, consideration should be given to whether future thermal energy efficiency improvements, that have a positive benefit/cost ratio, should be shielded from trade-offs.

It is also desirable that the building standards to be applied in particular locations are tailored to the local climatic conditions, particularly in locations that are subject to extreme hot or cold weather events, both now and into the future. Setting separate maxima for heating and cooling loads may assist in achieving this objective. The thermal performance standards applied by the Nationwide House Energy Rating Scheme (NatHERS) rating tools are based on total annual heating and cooling loads. However this can lead to a building's thermal performance in one season being out of balance with the performance in other seasons even though the annual thermal performance standard is still achieved.

In assessing cost-effective opportunities to increase NCC stringency requirements for the building envelope in the future, the balance in stringency between the building envelope, fixed appliances and equipment, and on-site renewable energy systems will need to be part of the regulatory impact analysis. There will also be a focus on ensuring comfort year round, and minimising both heating and cooling loads.

[14] While maintaining the same level of total utility.

### FLEXIBILITY IN BUILDING STANDARDS

Future building standards for both residential and commercial buildings will include:

- an overall normalised maximum limit on the combined energy expected to be used by the building services, fixed appliances and fixed equipment; and
- maximum normalised heating loads and maximum normalised cooling loads as calculated from the thermal efficiency of the building envelope, equivalent to no less than the 2010 BCA thermal performance standards.

Where relevant, the above will be set to take account of building type and climate zone.

In meeting the overall normalised maximum limit on the combined energy use, flexibility will be facilitated through allowing tradeoffs above the set minimum standards between individual building elements and building services, fixed appliances and fixed equipment.

Consideration will also be given to future standards allowing for offsets for energy generated by on-site zero and low-emissions energy systems up to a level to be determined. This is to be subject to further regulatory impact analysis that includes consideration of network impacts, equity principles, cross subsidies, complementarity and additionality.

There will be further investigation of mechanisms within the building energy efficiency standards to maintain thermal comfort during extreme hot and cold weather events and thus reduce peak loads on energy networks.

## 4.5 Maintenance of post-occupancy building performance

Given the long life of buildings, it is desirable to lock in the predicted energy efficiency performance of a building over its lifetime. However, the energy efficiency of buildings during occupation is likely to be different to the modelled energy efficiency of the building design, due to a number of factors:

- technical limitations of building energy modelling;
- design and specification changes during construction that are not reincorporated into building modelling;
- inadequate commissioning and maintenance of building services to ensure that it operates efficiently and as originally designed; and
- occupant behaviour or changes to the building once occupied that vary from the assumptions used in building modelling.

A number of other measures in the NSEE will contribute to reducing the gap between modelled and post-occupancy building performance, e.g. improvements in residential rating tools used for assessing NCC compliance to improve their comprehensiveness and accuracy, and mandatory disclosure of building performance at time of sale or lease which may show up changes in building performance over time and encourage owners to improve building performance where it has degraded (NSEE Measures 3.2.2 and 3.3.2) .

Also relevant is NSEE Measure 3.2.3 regarding the implementation of a HVAC High Efficiency Systems Strategy. This measure is intended to achieve long term improvements in the energy efficiency of HVAC systems, particularly in commercial buildings.

# 5. ASSESSMENT AND RATING OF BUILDINGS

## 5.1 Use of building ratings

The building assessment and rating approach expressed in the Framework is intended to be used across a range of related government programs (see example at Appendix B). How it would be used is subject to the current design of these programs and separate actions that may be taken by governments to modify these programs to align with this approach.

A concern expressed in relation to the current energy efficiency standards is that it is difficult to quantify the level of overall building performance required by the NCC. To the extent possible, the new standards under the Framework should be quantifiable and supported by clear methods of compliance. Recognising the different ways compliance can currently be demonstrated through the NCC, it is not proposed that a rating system will be the only methodology for compliance for every building classification.

It is acknowledged that there is currently a misalignment between the rating methodologies used by many of these programs. For example, the National Australian Built Environment Rating System for energy efficiency (NABERS Energy) which is used for assessing the actual performance of buildings, such as in the Commercial Building Disclosure program, has a different rating methodology and scale to the NatHERS which is used for rating the design efficiency and assessing performance against energy standards for residential buildings.

The residential energy efficiency provisions in the NCC allow the use of either prescriptive Deemed-to-Satisfy provisions or NatHERS rating tools for achieving compliance. In NSW these provisions are largely replaced by the Building Sustainability Index (BASIX), which is both a standard setting instrument and a rating tool.

Given existing commitments to the use of particular approaches to rating buildings for specific purposes, the Framework will seek to achieve convergence as far as practicable in the assessment and rating methodologies for different building types and environmental categories over time.

If the Framework leads to the inclusion of, for example, appliances and renewable energy in a 'whole-of-building' rating, new or modified rating tools will need to be developed which might provide the opportunity for progressing this convergence.

The Framework is focused on government regulations and programs in relation to buildings, and corresponding government managed rating tools. However, voluntary rating tools can also encourage best practice that goes beyond minimum standards. It is desirable for the two to work together to realise real change across the buildings sector and reduce environmental impacts in the most effective manner.

The development of the Green Star building rating system by the Green Building Council of Australia is a notable example. It would be useful for the Framework to clarify the relationship between NABERS Energy and Green Star to avoid confusion amongst stakeholders. Appendix C provides more information on this.

## 5.2 Communication of building performance

While the intent of the Framework is to eventually include a number of sustainability elements, problems can arise in attempting to combine assessments of these elements in a single rating scale. While a single sustainability rating provides for a simple communication message about the building's performance, it requires the rating of different sustainability elements to be weighted and aggregated. However, in many situations it is difficult to determine the relative importance of some sustainability

elements over others. It is therefore proposed that assessment of distinct sustainability elements be reported separately. This also provides governments and stakeholders with the flexibility to target different sustainability elements as appropriate.

There is currently a misalignment between rating scales used in rating tools for residential and commercial buildings, e.g. NatHERS uses a ten star scale and NABERS Energy currently uses a six-star scale. The metrics underlying the scales are also different, e.g. the NatHERS scale uses a fixed end point (i.e. virtually no extra energy required for space heating and cooling a house) whereas NABERS Energy rates buildings against the performance range of existing buildings.

While it is acknowledged that there are significant differences between the residential and commercial building markets and the context in which different rating tools are used, the use of a common rating scale would simplify the communication of building ratings to the general public and improve understanding of the relative performance of different types of buildings.

The NSEE states that building energy efficiency will continue to be communicated by star ratings. This is accepted but it would still be useful for additional quantitative information to be provided with a star rating to provide a more detailed picture of the building's performance, similar to the approach taken with appliance energy efficiency and water efficiency labels.

### RATING SCALES

The Framework will not require a single sustainability rating for buildings. Rather, distinct sustainability elements (e.g. energy, water, etc) will be assessed, rated and reported separately.

Building rating tools managed or accredited by governments will move towards a consistent ten-star rating scale for each sustainability element of the building being rated, with one representing worst performance and ten representing zero net energy use/emissions, etc.

Additional quantitative and explanatory information will be provided with the star ratings as appropriate for the purpose of the rating.

## 5.3 Enabling comparison between energy use and greenhouse gas emissions

In relation to energy use and greenhouse emissions, different energy sources are used in Australian buildings, e.g. electricity (from a range of generation sources), natural gas, LPG and firewood. The Framework seeks to provide a means of fairly comparing the greenhouse gas impact of buildings that use a combination of energy sources. This method should ensure that assessments consider both the end use of energy and its source. The best basis on which to compare the impact of different fuels is the "full fuel cycle" greenhouse gas intensity which takes into account indirect emissions from the extraction, production and transport of fuels and transmission losses in electricity networks.[15]

[15] This can be calculated from the scope 3 emission factors specified in the National Greenhouse Accounts Factors published by the Department of Climate Change and Energy Efficiency.

### METRICS FOR ASSESSMENT AND RATING OF BUILDINGS IN RELATION TO ENERGY USE AND GREENHOUSE GAS EMISSIONS

To measure energy efficiency, as well as to enable a fair comparison between different energy sources, assessments of buildings will be based on both:

- the energy used by building services, appliances and equipment; and
- the greenhouse gas emissions caused directly or indirectly from this energy use over the full fuel cycle.

## 5.4 Enabling comparison of different buildings

### 5.4.1 Comparing buildings with the same function

To compare the energy efficiency of buildings with the same function but different total energy use, due to varying sizes and construction, the amount of energy used by these buildings needs to be normalised, i.e. expressed as a multiple of a common, fixed unit of measurement. However, this can be difficult to do where the use of the building varies over time, e.g. houses with changing numbers of occupants, and commercial buildings containing different types of businesses. Establishing a meaningful comparison in these cases requires a standard method for estimating the likely level of building use based upon its design and choosing a normalisation unit that is most closely matched to different levels of use and is practical to measure.

### NORMALISATION OF BUILDING RATINGS ACCORDING TO BUILDING FUNCTION

Ratings and standards will in principle be normalised across the same building type by an appropriate unit of the building's operational function.

For houses and apartments, further analysis will be undertaken to assess options. Suggestions on appropriate normalising factors are requested. This analysis will include investigation of methods for calculating the 'assumed occupancy' of residential buildings, taking into account factors such as the number of bedrooms and the average occupancy levels for particular dwelling types and sizes determined from statistical data.

For non-residential buildings where the function is clear and can be reliably measured, an appropriate unit will be adopted, e.g. the guest capacity in a hotel. For other buildings which are designed to provide generic occupancies based upon common leasing arrangements, or where the unit of building function is too difficult to calculate or variable, the default normalisation will be per square metre of net lettable floor area.

### 5.4.2 Comparing buildings in different locations

The energy efficiency of buildings within a particular climate zone can be effectively compared when normalised by function as above. However, Australia has a wide variety of climates and it would be desirable to be able to rate buildings according to how well they respond to their local climate relative to buildings in other locations. Existing rating schemes normalise by location so that a building that performs to a specified level relative to its climate generally scores the same as similar performing buildings in other climatic regions, even though they may use different amounts of energy, e.g. in NatHERS a six star house in a hot or cold climate is allowed to use more energy/m2 for heating and cooling than a six star house in a mild climate.

There is no compelling reason to change this approach as it does allow fair comparison of buildings

in different parts of Australia. However, concerns have been expressed about the past practice of setting energy efficiency standards for residential buildings equivalent to a common star level across Australia for reasons of consistency when the cost of complying with this standard relative to the energy savings is unlikely to be even across climate zones.

A further complication is that heating and cooling loads on buildings are calculated by energy modelling tools relative to historical weather data. However, with projected climate change a building constructed now will face noticeably different climate conditions by the end of its life. There will need to be adjustment in energy efficiency standards and rating tools to take into account anticipated future climate conditions in different locations.

### ACCOUNTING FOR CLIMATE VARIATION IN RATINGS AND STANDARDS

There will be a common star rating scale across Australia, with the performance level for each star band to be set according to climate zone.

Building standards that use this star rating scale will be set at the most appropriate point on the rating scale that supports cost-effective achievement of performance levels in each climate zone.

The weather data used in rating tools will be updated to more closely match future climate projections over the expected life of buildings.

## 5.4.3 Comparing new and existing buildings

With the introduction of mandatory disclosure of building performance at time of sale or lease, it would be useful for ratings of new buildings as designed to be able to be fairly compared on the same scale with the ratings of the operational performance of existing buildings. This would also be useful for evaluating the extent to which the operational performance of new buildings after occupation matches their designed performance.

This may not necessarily require the same tool to be used for rating new and existing buildings, but the metrics and methodologies should be as consistent as possible.

### RATING NEW AND EXISTING BUILDINGS

Building rating tools used for assessing compliance with building standards and for mandatory disclosure will move towards consistent metrics and methodologies so that the same star rating scale can be used for both new and existing buildings.

# 6. RATING SCHEMES

## 6.1 Governance of Rating Schemes

As the reliance on rating tools to achieve compliance with more stringent energy efficiency standards increases, so too does the importance of good governance of rating schemes.

There are two major government-managed building rating schemes used for assessing energy efficiency:

- for residential buildings: NatHERS is used for assessing compliance of a building design with the thermal performance requirements in the NCC; and
- for commercial buildings: NABERS Energy is used for regulatory programs such as the Commercial Building Disclosure (CBD) program and for other government programs around Australia in relation to assessing operational energy use.

These tools can also be used for non-regulatory purposes, e.g. to assist in the design of new buildings, and to rate existing buildings (NatHERS is used for the mandatory disclosure of residential building ratings in the ACT).

Due to their different focus and use, at present each rating scheme has somewhat different administrative/reporting arrangements. However, the broad administrative elements of NatHERS and NABERS Energy are quite similar comprising a Steering Committee of inter-jurisdictional representatives, a Technical (or Stakeholder) Advisory Group and a National Administrator.

The Framework will document the ideal governance and administrative arrangements to be applied to existing rating tools and any future standard-setting, assessment and rating tools developed by governments. The national governance arrangements for these rating tools will need to consider:

- ensuring all assessors have the latest rating tool versions and are kept up-to-date with the latest developments in tool governance and related programs;
- setting minimum standards for qualifications, ongoing training and professional development of assessors;
- monitoring and quality control;
- compliance and enforcement;
- data collection and analysis of overall trends in the application of rating tools and building performance; and
- informing program evaluation and policy development.

To ensure adequate representation of all jurisdictions, all jurisdictions should be involved and contribute to the governance of each tool through a national steering committee. Where possible, existing committees should be used to govern any new tools.

To ensure appropriate involvement by governments, national steering committees should report to the most relevant ministerial council. At present this would be the Select Council on Climate Change. However this Council has a limited term and the establishment of more permanent arrangements for joint ministerial oversight of climate change related issues will be considered by COAG in 2013.

### GOVERNANCE OF RATING SCHEMES

While development and management of particular tools may be undertaken by different administrators or jurisdictions, to facilitate national consistency all rating tools used across jurisdictions for regulatory purposes should:

- have a national steering committee involving all jurisdictions that reports to the most relevant ministerial council; and
- include provision for industry consultation.

## 6.2 Accreditation of Rating Tools

In relation to commercial buildings, NABERS Energy rating tools are the only recognised rating tools for regulatory purposes, albeit for compliance with regulations that require operational ratings such as the *Building Energy Efficiency Disclosure Act 2010*. The NCC allows the use of energy analysis software, rather than rating tools, for compliance with the energy efficiency provisions for commercial buildings. However, it is possible that commercial building rating tools will be recognised for compliance with the NCC in the future.

In relation to residential buildings, effective delivery of the Framework relies on greater national consistency in the application and outputs of residential building rating tools. If the Framework leads to the inclusion of fixed appliances and on-site renewable and low emissions energy supply in a 'whole-of-building' rating, the NatHERS tools will be required to provide an expanded functionality.

NatHERS currently allows for rating tools developed by the private sector to be accredited for use in NCC compliance, provided they can match the ratings provided by the benchmark CSIRO AccuRate tool. If the energy efficiency standards for residential buildings are expanded and increased under the Framework, the accuracy of rating tools will assume greater importance. The potential requirement to develop new rating tools in the next few years provides the opportunity to consider whether it would be preferable to have just one government controlled rating tool used for regulatory purposes, rather than continue with an accreditation approach.

### ACCREDITATION OF RATING TOOLS

Where building standards include a minimum rating for a particular building type and/or environmental category, a single rating tool will also be specified for demonstrating compliance with that standard. (Accrediting multiple rating tools for regulatory use is an alternative option under consideration. The final position will be informed by this consultation process).

## 6.3 Accreditation of Assessors

The quality of assessors is critical to ensuring high quality ratings, particularly where the tool being used allows for variable inputs requiring the exercise of professional judgement and skill, and where the inputs to the tool cannot be easily verified by building certifiers.

State and territory governments currently determine accreditation or licensing requirements for energy assessors. At present, these requirements vary depending on the rating tool, e.g.:

- Under NatHERS, two organisations have been recognised by the NatHERS National Administrator to accredit assessors. However, not all jurisdictions require this accreditation for compliance with the NCC, and some require higher standards than the accrediting organisation.
- Under NABERS Energy, only assessors accredited by the NABERS National Administrator are able to perform assessments for NABERS Energy ratings on commercial buildings.

A major difference between the NatHERS and NABERS Energy assessor protocols relates to their application. NatHERS, although a scheme used for regulatory purposes, has no national standards for assessor accreditation, licensing, training and compliance. Whereas, NABERS Energy protocols are consistent across the country. However, it should be noted that NatHERS tools are currently used to demonstrate compliance with building regulations (i.e. the NCC energy efficiency provisions) that are administered under various pieces of state and territory legislation.

Consistency in accreditation and training is needed, noting that training and qualifications requirements of assessors are dependent on the tool being used and the purpose of its use, and may differ across jurisdictions. To improve accuracy and consistency of NatHERS assessments, it is important to have minimum national standards including accreditation (or licensing), qualifications, training, continual professional development and on-going quality assurance. The NatHERS qualification (certificate IV in NatHERS assessment) is being upgraded and is scheduled to roll out across the states and territories in 2012.

### ACCREDITATION OF ASSESSORS

The national building framework body[16] will determine what minimum national requirements for assessor training, accreditation (and potentially ongoing competency standards) are required for the use of an accredited tool for regulatory purposes, which all jurisdictions will apply according to their own processes and requirements.

## 6.4 Collection of Building Performance Data

The Framework has the capacity to assist in improving the level and quality of information on building performance available to industry, consumers and government. Comprehensive and up-to-date information would help ensure that:

- government policies and programs have an improved evidence-base and their effectiveness is enhanced;
- there can be improved decision-making about enhancing the sustainability of building stock;
- opportunities for national or jurisdictional energy efficiency innovation could be identified more effectively; and
- business investment decisions are better informed.

Data and information should be able to be used for multiple purposes wherever possible and collected only once to support many activities. Sharing of existing data collected by various state programs will avoid duplication, although noting the need to apply privacy principles to data on individual buildings.

[16] As described in section 7.1

At present, there are major limitations in building performance data, including:

- data is often coarse, fragmented, out-of-date or incomplete and is, therefore, not reliable for decision making;
- limited coordination in the collection and monitoring of key information at the federal level and at the inter-jurisdictional level; and
- very limited data on the effectiveness of initiatives, programs and policies, particularly in relation to building standards.

### COLLECTION OF RATINGS DATA

A national approach will be established for the collection and accessibility of data obtained from ratings and assessments, integrated with other NSEE measures relating to data collection.

A national protocol will be established for the collection and exchange of data obtained from ratings and assessments by jurisdictions to facilitate the creation of a national dataset that can be used for monitoring, evaluation and other purposes.

# 7. IMPLEMENTATION OF THE FRAMEWORK

## 7.1 Framework Governance

The Framework seeks to achieve concerted whole-of-government leadership and coordination in ensuring that increasingly stringent building standards are developed, understood and complied with.

Governance in the context of the Framework is about ensuring administrative arrangements effectively support the development, implementation and evaluation of standards for building performance in a well-coordinated, transparent and accountable manner. Effective delivery of the Framework relies on sound partnerships between all governments, multiple agencies, and a range of industry and community players. The Framework with its longer-term delivery over the next decade will require a regular review of the effectiveness of its governance arrangements.

Since all governments have important roles to play in developing and implementing the Framework, their roles and responsibilities need to be well articulated to improve the transparency and acceptance of the Framework by industry stakeholders.

It would therefore be beneficial to have one national body, that reports to a ministerial council, to coordinate the implementation of the Framework.

### FRAMEWORK GOVERNANCE

A national body, reporting to an appropriate ministerial council, will manage the implementation of the Framework.

## 7.2 Evaluation of the Framework

Without monitoring and evaluation, it is impossible to judge whether the Framework is delivering its outputs and outcomes effectively and efficiently, appropriately taking into account ongoing technical and scientific developments in building sustainability, responding to evolving community and stakeholder views, and so on. In addition, appropriate and objective monitoring and evaluation is required to understand what actual savings and environmental impacts have been achieved by the Framework, and its level of cost-effectiveness. Finally, monitoring and evaluation will allow informed setting of future directions.

Monitoring and evaluation of the Framework is critical to ensuring it remains relevant and effective. Monitoring is most effective when there is early consideration of its arrangements and agreement on the level and frequency of information to be provided.

### EVALUATION OF THE FRAMEWORK

A detailed plan for monitoring and evaluation will be developed as part of the implementation of the Framework.

The Plan will be guided by two broad objectives:

- tracking progress towards 'on the ground' outcomes, and
- monitoring the mechanisms supporting delivery of these outcomes.

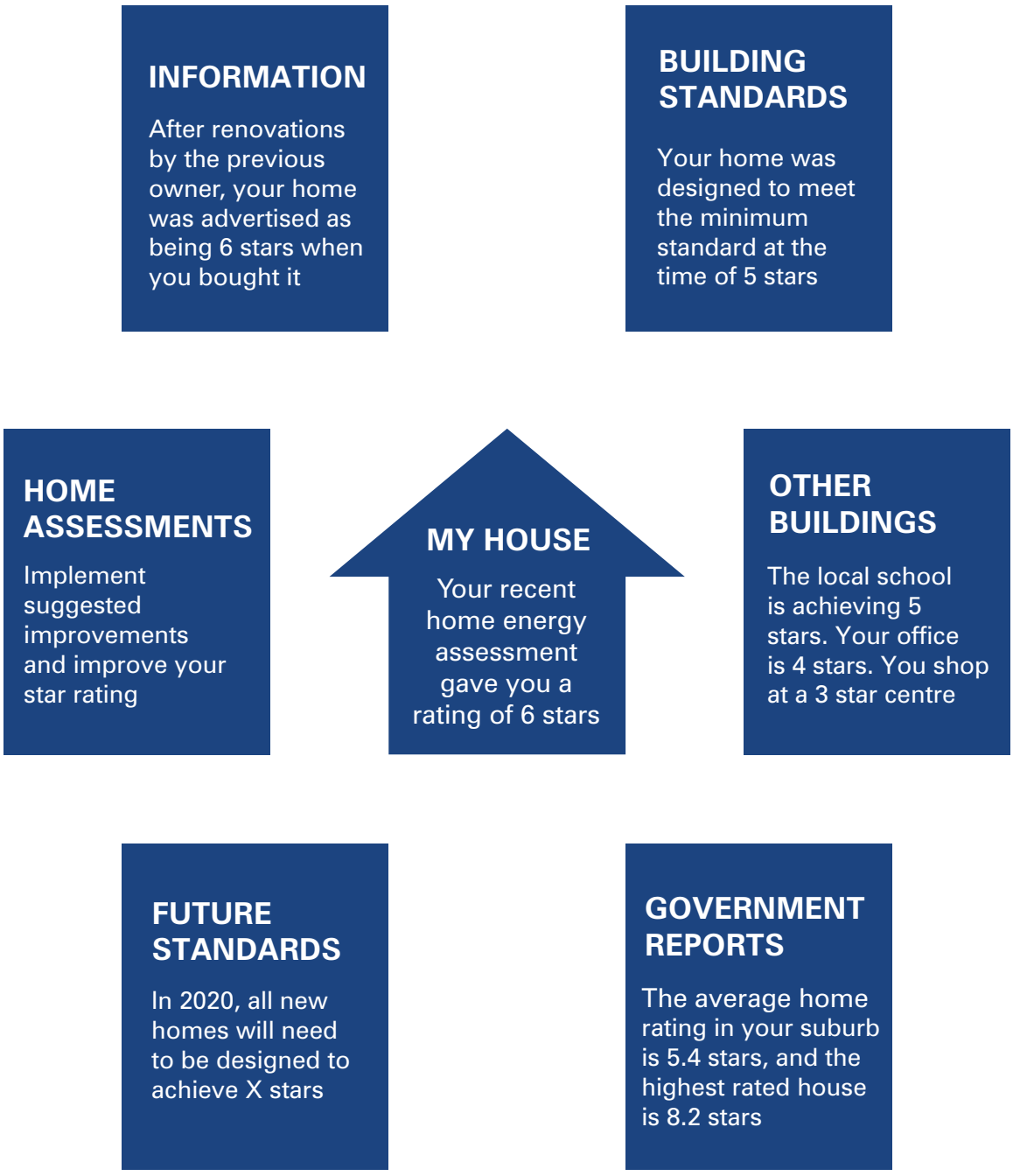
The Plan will identify the timelines for major review points for the Framework as a whole, but these are likely to be within two years after any major stringency upgrade to the NCC.

# APPENDIX A – NSEE MEASURE 3.1.1[17]

| Measure | Key elements | Indicative pathway | Implementation responsibility |
|---|---|---|---|
| 3.1.1<br><br>All jurisdictions will work together to develop a consistent outcomes-based national building energy standard setting, assessment and rating framework for driving significant improvement in the energy efficiency of Australia's building stock. To be implemented from 2011. | a. This measure will be used to increase the energy efficiency of new residential and commercial buildings and major renovations, with minimum standards to be reviewed and increased periodically, for example every three years.<br><br>b. Energy efficiency improvements will continue to be communicated via star ratings, underpinned from 2011 by new national measurement and reporting metrics relevant to both new and existing buildings, under the national framework.<br><br>c. This framework will:<br>• apply to new and existing building stock;<br>• cover all classes of commercial and residential buildings;<br>• over time set increasingly stringent minimum performance standards for new buildings and major renovations (subject to regulatory impact analysis);<br>• include common metric(s) to underpin standard setting and performance assessment;<br>• include flexibility to account for climatic variation;<br>• accommodate mandatory disclosure of energy performance at time of sale or lease;<br>• work towards convergence of existing, measurement-based rating tools (such as the National Australian Built Environment Rating System – NABERS Energy) for existing buildings with predictive or modelling-based tools used for rating new buildings; and<br>• be capable of extension over time to cover broader sustainability elements, including water management and greenhouse gas emissions and the maintenance of energy efficiency performance through commissioning, operation and maintenance of buildings.<br><br>d. Enhancement of the national governance framework of NABERS Energy as a part of the development of a unified national framework. | This measure will lead to the development of an integrated national outcomes-based framework.<br><br>The Australian Government Department of Climate Change and Energy Efficiency (DCCEE) will chair a group of jurisdictional representatives, drawing on external expert advice as required, to lead development of the national framework and consult with building industry stakeholders.<br><br>The Building Code of Australia (BCA) will be the instrument by which the framework is implemented for both new building work and major renovation of existing buildings. The revised code will:<br>• transition to a nationally consistent performance based assessment system and increase the performance standard for all new buildings over time;<br>• cover the building envelope and energy efficiency of key building services;<br>• allow innovation in meeting defined performance standards;<br>• provide for the use of rating tools developed by the market which provide an accurate assessment of a building's performance, and that such tools be transparent and user friendly; and<br>• facilitate effective monitoring and compliance.<br><br>The framework and implementation agreement to be agreed by the third quarter of 2011, with implementation staged from 2011.<br><br>Australian Government will chair the NABERS National Steering Committee with representation from all jurisdictions. NSW will provide national administration of NABERS and manage the development and delivery of the scheme, under the direction of the National Steering Committee | Australian, state and territory governments.<br><br>All jurisdictions via a specific purpose committee and including the NFEE Buildings Committee. |

17 The timelines in this text differ from the original NSEE. At the end of 2010 COAG agreed to an amended NSEE to reflect machinery of government changes, other administrative and governance changes and changes to program priorities during 2009–10. At its meeting in December 2011, COAG Senior Officials, on behalf of COAG, noted that implementation of this measure had been delayed.

# APPENDIX B – INTEGRATION OF BUILDING RATINGS ACROSS GOVERNMENT PROGRAMS



# APPENDIX C – GREEN STAR AND NABERS

Building rating systems are one of the most influential mechanisms for driving positive change and market transformation in the built environment. While the main objective of building rating systems has been to stimulate market demand for buildings with improved environmental performance, they have also established a common language for green building and promoted an integrated approach to building design.

The Green Building Council of Australia (GBCA) launched the Green Star environmental rating system for buildings in 2003. Green Star evaluates the green attributes of building projects in nine categories, including energy and water efficiency, indoor environment quality and materials. Green Star rating tools are currently available or in development for a variety of sectors, including commercial offices (design, construction and interior fitouts), retail centres, schools and universities, industrial facilities, multi-unit residential dwellings and healthcare facilities.

NABERS is a national initiative to measure and compare the environmental performance of Australian buildings. NABERS measures and communicates the actual impact of a building in a simple and intuitive manner to building owners, tenants and the community. NABERS ratings are available for offices, shopping centres, hotels and households, for a range of environmental impacts including energy, water, waste, transport and indoor environment. The coverage of building types and environmental impacts considered is continually being extended.

Green Star rating tools currently reference NABERS Energy in the 'Energy' category. Furthermore, the GBCA is developing a new Green Star assessment methodology, known as Green Star – Performance, to assess the operational performance of existing buildings. The GBCA has announced that this will reference the NABERS operational benchmarks, and will rate a building's performance across all nine categories in an integrated manner.

In 2010, a memorandum of understanding (MoU) was signed between GBCA, the Department of Climate Change and Energy Efficiency and the former NSW Department of Environment, Climate Change and Water[18], which administers NABERS on behalf of the Commonwealth, state and territory governments. The MoU outlines the parties' commitment to share information on rating tool development, calculators, benchmarks and methodologies to strengthen both rating systems.

Importantly, the MoU will deliver greater compatibility between the holistic assessment of building attributes covered by Green Star and performance of specific key impact areas such as energy, water and waste, which are assessed by NABERS.

Harmonisation between international rating tools is beginning to occur in mature markets. While this does not mean we will see one international rating tool emerge, representatives of the UK's BREEAM, the US' LEED and Australia's Green Star have agreed to work together to develop a common method of measuring and reporting the environmental impact of buildings. The alliance, established in 2009, is overseeing the 'Common Carbon Metric project', which will enable the development of common metrics to measure emissions of carbon equivalents from residential and commercial buildings.

[18] NABERS is now the responsibility of the NSW Office of Environment and Heritage

# Acronyms

| | |
|---|---|
| **BASIX** | Building Sustainability Index |
| **BCA** | Building Code of Australia |
| **CBD** | Commercial Building Disclosure |
| **COAG** | Council of Australian Governments |
| **CSIRO** | Commonwealth Scientific and Industrial Research Organisation |
| **HVAC** | Heating, Ventilating and Air Conditioning |
| **E2WG** | Energy Efficiency Working Group |
| **MEPS** | Minimum Energy Performance Standards |
| **NABERS** | National Australian Built Environment Rating System |
| **NatHERS** | Nationwide House Energy Rating Scheme |
| **NCC** | National Construction Code |
| **NSEE** | National Strategy on Energy Efficiency |
| **SOG-EE** | Senior Officials Group on Energy Efficiency |
| **SCCC** | Select Council on Climate Change |
| **WELS** | Water Efficiency Labelling and Standards |

# Glossary

| | |
|---|---|
| **Abatement** | Activity that leads to a reduction in the level of greenhouse gas emissions. |
| **Alterations and additions** | An addition or extension to an existing building that increases its floor area, and/or alterations to the structural elements of a building including the roof, ceilings, walls and floors. |
| **Assessment** | In relation to buildings, the process by which the performance of a building is estimated or measured against specified criteria. |
| **Building envelope** | The parts of a building's walls, roof, ceilings and floors that separate artificially heated or cooled spaces from the exterior of the building or other spaces within the building that are not artificially heated or cooled. |
| **Carbon dioxide equivalent (CO2-e)** | A standard measure that takes account of the different global warming potentials of each greenhouse gas to express an amount of greenhouse gases in a common unit |
| **Carbon price** | A financial cost imposed on individuals or organisations for causing the emission of greenhouse gases into the atmosphere. It could be a tax imposed by government, the outcome of an emissions trading market or a hybrid of taxes and permit prices. |
| **Climate change** | A change to the climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and is additional to natural climate variability over comparable time periods. |
| **Cogeneration** | Combined production of electricity and useful heat (for hot water or space heating) from the same process. Also known as combined heat and power. |
| **Commercial buildings** | In relation to the Framework, refers to Class 3 and 5 to 9 buildings as defined in the NCC. |
| **Cost-effective** | A measure is cost-effective if the desired outcome is worth more than the cost of achieving it. |
| **Direct emissions** | Emissions produced from sources within the boundaries of a building, e.g. burning of natural gas in water and space heaters. |
| **Emissions** | The release of greenhouse gases into the atmosphere. |
| **Embodied emissions** | The greenhouse gas emissions caused directly or indirectly from the production of embodied energy (see below). |
| **Embodied energy** | The total amount of energy used to produce a product or material contained in a building. This could include the energy used in sourcing, manufacture, delivery and installation. |
| **Energy efficiency** | The ratio of the level of services or functions provided in relation to the energy used to provide that output. |

| | |
|---|---|
| **Energy efficiency improvement** | Using less energy to achieve the same outputs, or using the same amount of energy to achieve higher outputs, or using less energy through reducing the outputs where this is regarded as acceptable or necessary for other reasons. |
| **Externalities** | Externalities occur where a party either does not pay the full costs of their actions (a negative externality), or is not fully paid for the benefits that they create for other parties (a positive externality or a 'spillover' to other parties). |
| **Fixed appliances and equipment** | Appliances and equipment and associated systems that: are fixed in place within or on a building; have dedicated connections to the building's energy or water supply; and would normally not be moved from building to building on change of ownership or lease. |
| **Fuel switching** | The substitution of one type of energy source that provides a particular service with another energy source that has lower emissions. |
| **Greenhouse gas** | The atmospheric gases responsible for causing global warming and climate change. The major greenhouse gases are carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF6). |
| **Greenhouse intensity** | The quantity of emissions produced directly or indirectly per unit of output. |
| **Indirect emissions** | Emissions generated elsewhere as a consequence of energy use in a building, e.g. emissions at electric power stations |
| **Information failures** | A range of situations where a lack of information held by a decision maker can lead to resources being allocated less efficiently than if full information was available to inform the decision. This can include information asymmetry where one party to a transaction has more relevant or better information than another, the undersupply by the private sector of information which has 'public good' characteristics, and bounded rationality where individuals faced with complex decisions and/or limited time may simplify their decision making processes to a suboptimal level. |
| **Local generation** | The production of electricity from a generator attached to a building, on a nearby site directly wired to the building, or from a generator connected to the same distribution network as the building. Also referred to as on-site, distributed or embedded generation. |
| **Low-emission energy** | Energy that has been generated with significantly less emissions than average grid-supplied energy. |
| **Normalisation** | An adjustment technique to allow buildings of varying structures, sizes, intended service levels or location to be fairly compared by expressing these characteristics as a multiple of a common unit of measurement, e.g. the energy use of buildings of different sizes could be compared by expressing the energy use as a multiple of a unit of the floor area, such as mega joules per square metre. |

| | |
|---|---|
| **Operational energy** | The energy consumed during the operation of a building once occupied. This can be defined as either the final energy use, i.e. the energy used in the building only, or as the primary energy use, i.e. the final energy use plus the energy consumed during the production of the energy and its transport to the building. |
| **Peak demand** | The maximum energy demand in a given location over a given time, e.g. per day or over a season, often driven by cooling or heating loads due to temperature extremes. |
| **Portable plug-in appliances** | Appliances and equipment that: are not fixed in place in a building; would normally be moved from building to building on change of ownership or lease; and are powered by plugging them into any mains socket, e.g. televisions, fridges, computers. |
| **Rating** | Assigning a value to a building assessment against a common scale (e.g. numbers of stars) to allow comparison with other buildings or a performance standard. |
| **Rating tool** | A procedure (e.g. a computer program) for taking pre-defined data on a particular environmental characteristic of a building and converting this data into a rating using algorithms and assumptions built into the tool. Rating tools simply provide information on the level of performance and do not set a level required for compliance with building standards. |
| **Renewable energy** | Energy that is derived from sources that are regularly renewed by natural processes or for all practical purposes cannot be depleted, e.g. solar energy, hydropower, wind, tide, geothermal and biomass. |
| **Residential buildings** | Class 1, 2 and 4 buildings as defined in the NCC. |
| **Split incentives** | When the parties engaged in a contract have different goals and levels of information making it difficult to achieve an agreement that benefits them both. A common example in relation to buildings is where landlords have little incentive to upgrade the energy efficiency of their building as the tenant gains the benefit of reduced energy bills. |
| **Thermal performance** | The effectiveness of a building envelope in maintaining acceptable levels of human comfort in the building relative to the outside weather conditions, through minimising the need for artificial heating or cooling. In relation to a particular building material or element, the extent to which the material or element reduces or promotes heat loss or heat gain. |
| **Trigeneration** | Production of three forms of energy (electricity, useful heat and cooling) from the same process. Usually a cogeneration unit with an additional device to produce cooling. |
| **Zero emission building** | In general, a building whose direct and indirect emissions from energy used in the building over the course of a year are balanced by emissions saved by using locally generated renewable energy. |