green building council australia

29 November 2019

Department of Water and Environmental Regulation
8 Davidson Terrace
JOONDALUP WA 6027
Via email: climate@dwer.wa.gov.au
cc : minister.dawson@dpc.wa.gov.au

To whom it may concern

Climate change in Western Australia – Issues Paper

The Green Building Council of Australia (GBCA) welcomes the *Climate Change in Western Australia* Issues Paper released by the Department of Water and Environmental Regulation.

The GBCA represents over 550 organisations with a collective annual turnover of more than $56 billion. Members include major developers, professional services firms, banks, superannuation funds, product manufacturers, retailers, utilities and suppliers. We also have 36 local government members, 26 state government departments and land organisations, and 22 university members.

Australia ratified the United Nations Framework Convention on Climate Change Paris Agreement on 10 November 2016 and has committed to reducing greenhouse gas emissions by 26 to 28 per cent below 2005 levels by 2030. Currently we are not on track to meet our international commitments.

Western Australia is predicted to be particularly vulnerable to the impacts of climate change with declining rainfalls, warming oceans and increased heatwaves (ref: The Critical Decade). The issues paper rightly identifies buildings as an opportunity to mitigate these impacts. Buildings account for over 50 per cent of Australia's energy use and almost a quarter of its emissions. The potential of energy efficiency investment, reform and incentives in the built environment to reduce emissions and increase productivity should be exploited in full. Realising this opportunity has been a focus for industry who have developed over several years a deep body of research supporting practical policy recommendations for government at all levels.

In October this year the GBCA and the Property Council of Australia launched a policy toolkit for government entitled *Every Building Counts: A practical plan for emissions reduction in the built environment* (Attachment A and www.everybuildingcounts.com.au). *Every Building Counts* comprises 30 recommendations covering residential, commercial and public buildings that are ready for implementation by state and territory governments. These policy recommendations were informed

by a comprehensive review of global and local policies with a proven record of increasing productivity and reducing emissions in buildings with the best value for governments and industry.

Key recommendations for state and territory governments include:

1. Accelerate the shift to high performance buildings with planning incentives.
2. Accelerate the shift to high performance buildings with targeted financial incentives.
3. Improve compliance, monitoring and enforcement of the National Construction Code.
4. Unlock the potential of distributed energy.
5. Lead through government owned and leased buildings.

The development of the toolkit was funded by the Cooperative Research Centre for Low Carbon Living and is proudly supported by the Australian Sustainable Built Environment Council, the Energy Efficiency Council and Curtin University.

Every Building Counts builds on the landmark report *Low Carbon, High Performance*, authored for the Australian Sustainable Built Environment Council (ASBEC) by ClimateWorks in 2016. *Low Carbon, High Performance* established the evidence base for policy to realise the potential of our built environment to drive productivity and reduce our emissions. It identifies a suite of policy measures to deliver $20 billion in financial savings by 2030 as well as contributing to improved health and productivity for building occupants.

With the right policy frameworks in place, we can minimise the costs of transitioning to a low carbon economy and create opportunities across all parts of industry, from sole traders and homeowners to large businesses.

We would be pleased to provide you with a comprehensive briefing of Every Building Counts at your earliest convenience. Please do not hesitate to get in touch with Tim Wheeler at the Green Building Council of Australia at tim.wheeler@gbca.org.au, to arrange a meeting.

Sincerely,

Jonathan Cartledge

Head of Public Affairs and Membership
Green Building Council of Australia

EVERY BUILDING COUNTS

A practical plan for emissions reduction in the built environment

FOR STATE AND TERRITORY GOVERNMENTS

green building council australia

PROPERTY COUNCIL of Australia

Source: Low Carbon Living CRC, Best Practice Policy and Regulation for Low Carbon Outcomes in the Built Environment, 2017

ENERGY EFFICIENCY MEASURES IN BUILDINGS COULD DELIVER:

$20 BILLION

in energy bill savings for businesses and households

OVER 50%

of the Australian Government's 2030 energy productivity target

OVER 25%

of Australia's 2030 emissions reduction target

WE ARE COMMITTED TO ACHIEVING DECARBONISATION BY MID-CENTURY IN ACCORDANCE WITH AUSTRALIA'S RESPONSIBILITIES UNDER THE PARIS AGREEMENT.

While Australia's leading property companies continue to top international sustainability benchmarks, the challenge remains to extend this progress across the sector more broadly.

The right policy settings can help our buildings achieve their full potential with consistency and efficacy. Targeted policies are needed for the sector as well as national consistency of processes and programs where possible.

Source: ASBEC Low Carbon, High Performance 2016

WE HAVE COMPLETED A COMPREHENSIVE REVIEW OF GLOBAL AND LOCAL POLICIES WITH A PROVEN RECORD OF EMISSIONS REDUCTION TO INFORM RECOMMENDATIONS WITH THE BEST VALUE FOR GOVERNMENTS AND INDUSTRY.

This work has resulted in a set of recommendations covering residential, commercial and public buildings that are ready for implementation by state and territory governments.

This report is companion to two others tailored for the Federal and local governments respectively and is the latest in a series of flagship publications showing how government and industry can work together to unlock a low carbon built environment.

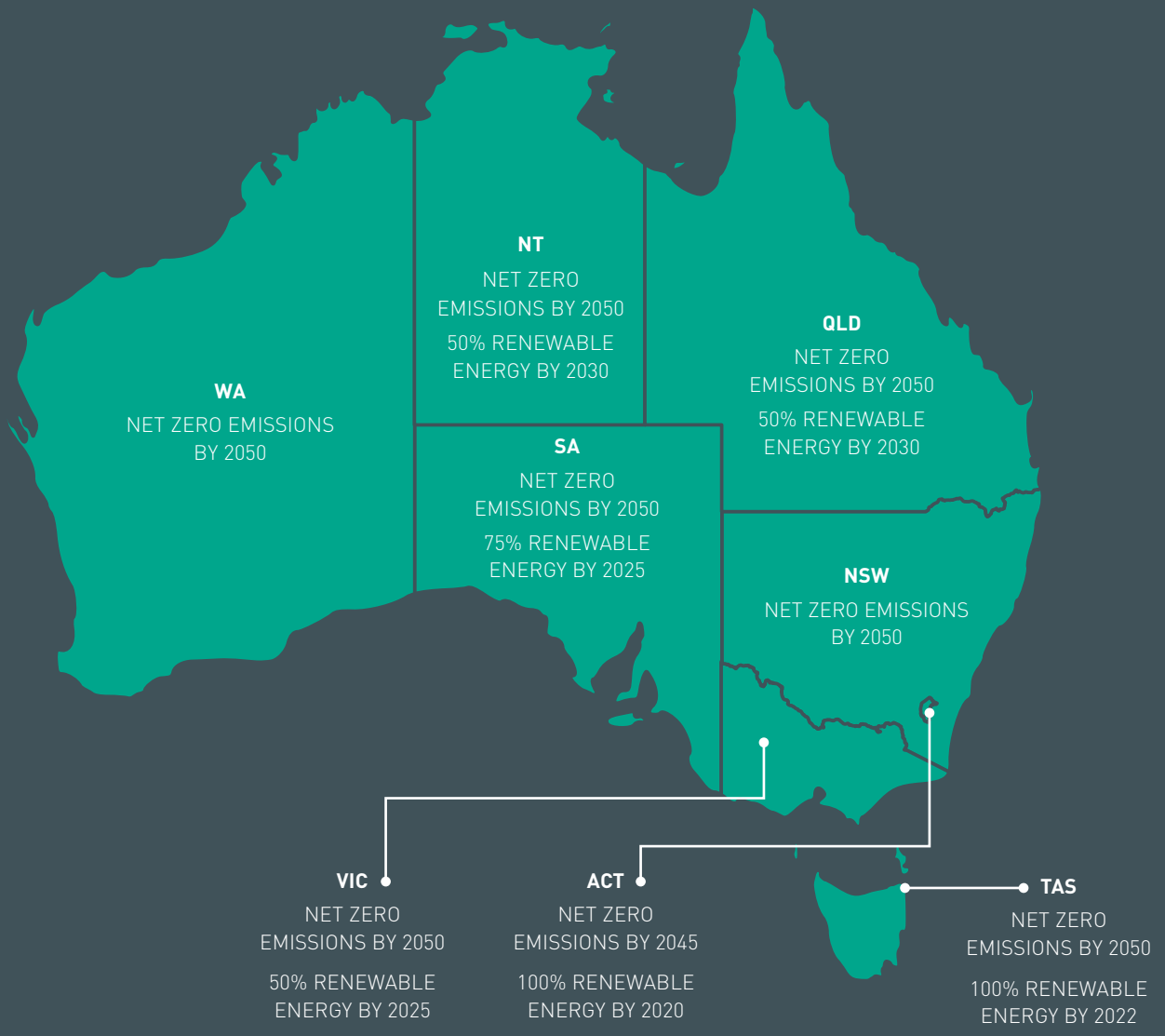
THE TRANSITION TO A LOW EMISSIONS ECONOMY IS UNDERWAY AND GATHERING PACE ACROSS AUSTRALIA.

At the sub-national level, many state and territory governments have chosen to join the international community supporting the Paris Agreement by setting their own emissions reduction commitments and progressing strategies to achieve these.

While clear and credible targets and commitments can help chart the course to a low emissions future, getting there depends in part on the policy choices made by governments, which will help determine whether emissions reduction opportunities are realised.

NATIONAL TARGET

26-28% REDUCTION
ON 2005 LEVELS BY 2030



AUSTRALIA'S TRANSITION TO A LOW EMISSIONS ECONOMY WILL BE SMOOTHER IF GOVERNMENTS SET A CLEAR AND STEADY TRAJECTORY FOR EMISSIONS REDUCTIONS IN KEY ECONOMIC SECTORS, AND A SUITE OF POLICIES THAT PROVIDE INDUSTRY CERTAINTY.

With the right policy frameworks in place, we can minimise the costs of transition, create economic opportunities across all parts of industry, from sole traders and homeowners to large businesses.

An ambitious strategy to improve the energy performance of Australia's buildings could create more than 80,000 job-years of employment.*

*Source: Energy Efficiency Council, Energy Efficiency Employment in Australia 2019

THIS REPORT WAS PRODUCED BY

PROJECT PARTNERS

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PROPERTY COUNCIL of Australia

SPONSOR

LOW CARBON LIVING CRC

Curtin University

STEERING GROUP PARTNERS

asbec AUSTRALIAN SUSTAINABLE BUILT ENVIRONMENT COUNCIL

energy efficiency COUNCIL

METHODOLOGY

We have completed a comprehensive review of global and local policies.

National

International

We have identified solutions for different building types across the built environment.

All buildings

Government

Commercial

Residential

We have identified the building lifecycle stage to which each recommendation can be applied.

All stages

Design

Construction

Commissioning

Sale/lease

Retrofit

Occupation

We assessed each policy according to the key criteria.

Impact

Emissions reduction opportunity

Ease of implementation

Lack of barriers or challenges for adoption

Cost effectiveness

Industry return on investment

POLICY THEMES

THEME 1

NET ZERO BUILDINGS PLAN

THEME 2

INCENTIVISE HIGH PERFORMANCE

THEME 3

MINIMUM STANDARDS

THEME 4

ENERGY MARKET REFORM

THEME 5

GOVERNMENT LEADERSHIP

THEME 6

ROBUST RATING TOOLS FOR DIFFERENT BUILDING TYPES

THEME 7

TRANSFORM MARKETS FOR MATERIALS AND PRODUCTS

THIS IS AN INTERACTIVE PDF. CLICK THE BOXES TO GO TO EACH THEME.

KEY RECOMMENDATIONS

1
Set a long-term vision for net zero buildings

THEME 1

2
Accelerate the transition to high performance buildings with planning incentives

THEME 2

3
Support a Zero Carbon Ready building code and improve enforcement and compliance

4
Support renters with minimum energy efficiency standards for rental properties

THEME 3

5
Unlock the potential of distributed energy

THEME 4

6
Lead through government owned and leased buildings

THEME 5

7
Empower owners, buyers and renters with a single national rating scheme for home energy performance

THEME 6

RECOMMENDATIONS SUMMARY

THEME 1
NET ZERO BUILDINGS PLAN

1.1 Set a long-term vision for net zero buildings

THEME 2
INCENTIVISE HIGH PERFORMANCE

2.1 Accelerate the shift to high performance buildings with planning incentives

2.2 Accelerate the shift to high performance buildings with targeted financial incentives

2.3 Introduce and support the harmonisation of energy efficiency obligation schemes

2.4 Support green loans and innovative finance products to drive high performing homes and retrofits

2.5 Incentivise deep retrofits for existing homes

2.6 Shift the mid-tier office building market to better performance

2.7 Provide support for distinct market segments through sectoral leadership strategies

THEME 3
MINIMUM STANDARDS

3.1 Support a Zero Carbon Ready building code

3.2 Improve compliance, monitoring and enforcement of the National Construction Code

3.3 Support renters with minimum energy efficiency standards for rental properties

3.4 Undertake a review to investigate energy performance improvements for existing buildings

3.5 Accelerate targeted retrofits for worst performing and highest risk housing stock

THEME 4
ENERGY MARKET REFORM

4.1 Unlock the potential of distributed energy

4.2 Ensure energy users are paid for the services they deliver to the grid

4.3 Invest in the best mix of demand-side and supply-side measures

4.4 Expand the mandate of the Energy Security Board to drive energy productivity across the economy

RECOMMENDATIONS SUMMARY (CONTINUED)

THEME 5
GOVERNMENT LEADERSHIP

5.1 Lead through government owned and leased buildings

5.2 Ensure infrastructure decisions align with emission reduction targets and address climate risk

5.3 Consistent planning pathways that support innovation

5.4 Advocate for a national built environment energy efficiency and emissions education and training agenda

5.5 Advocate for a national built environment energy efficiency and emissions research and innovation agenda

5.6 Drive the broader application of trusted, robust and credible building rating systems such as Green Star and NABERS in government projects

5.7 Support low income and vulnerable households and consumers with targeted assistance and tools

5.8 Inform consumers on residential energy efficiency

THEME 6
ROBUST RATING TOOLS FOR DIFFERENT BUILDING TYPES

6.1 Empower owners, buyers and renters with a single national rating scheme for home energy performance

6.2 Support mandatory performance disclosure for homes at the point of sale or lease

THEME 7
TRANSFORM MARKETS FOR MATERIALS AND PRODUCTS

7.1 Support Australian leadership in high performing building products

7.2 Support a nationally coordinated strategy to achieve net zero embodied carbon

7.3 Grow the availability of cost-effective low emissions building materials

THEME 1
NET ZERO BUILDINGS PLAN

NET ZERO BUILDINGS PLAN

1.1 Set a long-term vision for net zero buildings

RECOMMENDATION 1.1

A STATE-WIDE NET ZERO EMISSIONS PLAN

Set a long-term vision for net zero buildings

BUILDING TYPE:

All buildings

LIFECYCLE STAGE:

All stages

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

Australia's support for the Paris Agreement means that we are committed to transitioning toward a low carbon economy. To fulfil our obligation, Australia must reach net zero emissions by 2050. Buildings present some of the lowest cost emissions reduction opportunities and the technology already exists today to achieve zero carbon buildings. Realising the emissions reduction opportunities in this sector would reduce its share of the national carbon budget and provide a greater share of the budget for other sectors. A state and territory-wide plan with a clear and steady trajectory for emissions reductions in key economic sectors, and a suite of policies that provide industry certainty, would leverage opportunities for emissions reduction, and build on the progress shown by market leaders in recent years.

PATHWAY

State and territory governments should commit to a long-term target of net zero emissions by 2050 with staged interim, science-based targets that are aligned with Australia's obligations under the Paris Agreement. To achieve this target, governments should establish their own state-based plan for net zero emissions buildings by 2050, including interim targets and a process for regular review. The plan must contain clear responsibilities at the ministerial level, coordination with other levels of government and public reporting requirements.

NATIONAL

STATE AND TERRITORY CLIMATE CHANGE TARGETS

In Australia, the states of Victoria, New South Wales, Queensland, South Australia and Tasmania have committed to net zero emissions by 2050, while the Australian Capital Territory recently brought its net zero emissions deadline forward to 2045. ACT, Queensland and Victoria have interim emissions reduction targets, and the other key targets relating to renewable energy also exist in the ACT, Queensland, South Australia, Tasmania and Victoria.

INTERNATIONAL

CALIFORNIA'S ZERO NET ENERGY ACTION PLAN

In 2007, California adopted the goal that all new residential construction would be net zero energy by 2020 and all new commercial construction would be net zero energy by 2030. In 2008, the state's Public Utilities Commission adopted a Long-Term Energy Efficiency Strategic Plan, which reiterated this commitment. By 2015, the state launched its Zero Net Energy Action Plan to ensure that all new homes will be net zero energy by 2020.

THEME 2
INCENTIVISE HIGH PERFORMANCE

INCENTIVISE HIGH PERFORMANCE

2.1 Accelerate the shift to high performance buildings with planning incentives

2.2 Accelerate the shift to high performance buildings with targeted financial incentives

2.3 Introduce and support the harmonisation of energy efficiency obligation schemes

2.4 Support green loans and innovative finance products to drive high performing homes and retrofits

2.5 Incentivise deep retrofits for existing homes

2.6 Shift the mid-tier office building market to better performance

2.7 Provide support for distinct market segments through sectoral leadership strategies

RECOMMENDATION 2.1

PLANNING INCENTIVES

Accelerate the shift to high performance buildings with planning incentives

BUILDING TYPE:

All buildings

LIFECYCLE STAGE:

Design

Construction

Retrofit

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

The provision of planning incentives to homebuyers and builders that commit to best practice is an important mechanism that has largely been overlooked in the national policy mix. Planning incentives such as density bonuses and green door policies would support the accelerated deployment of high performing new buildings by targeting one of the highest priorities for building developers – the cost and time invested and the uncertainty of planning processes.

PATHWAY

State and territory governments should work with the Federal Government and local governments to deliver planning incentives that encourage the built environment towards better sustainability practice and reduced emissions. Priority should be placed on:

- Green door policies, which would provide expedited or prioritised review and approval of development applications associated with more sustainable and higher performing buildings.
- Density bonuses, which offer developers an increase in the permitted density of residential projects in exchange for more sustainable and higher performing buildings.

NATIONAL

BRISBANE'S CLEAN, GREEN SUSTAINABLE ACTION PLAN

In 2017 the City of Brisbane launched its 'Clean, Green, Sustainable 2017–2031' action plan, which included a number of priority actions to use the City Plan to support development in embracing high-quality, sub-tropical design across Brisbane. One of these priority actions was the introduction of a 5 per cent density bonus for five and six star Green Star rated buildings in high-density areas.

INTERNATIONAL

CHICAGO'S GREEN PERMIT PROGRAM

Chicago's Green Permit Program reduces the planning application process for developers and owners who build to sustainability benchmarks to less than 30 business days, and in some cases, less than 15 days. The length is determined by the number of sustainability elements in the project, LEED certification level and the project complexity.

RECOMMENDATION 2.2

FINANCIAL INCENTIVES

Accelerate the shift to high performance buildings with targeted financial incentives

BUILDING TYPE:

All buildings

LIFECYCLE STAGE:

Design

Construction

Retrofit

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

Notwithstanding the progress made by market leaders, energy efficiency investment for most stakeholders in the built environment remains a low priority. This is due to barriers such as the perceived difficulty of energy upgrades, high upfront costs and long payback periods. Financial incentives can drive accelerated uptake of energy efficiency and distributed technologies in new and existing buildings, by helping to reduce the gap between energy efficiency outlays and returns, and motivating action by building owners and tenants.

PATHWAY

State and territory governments should work with the Federal Government and local governments to deliver financial incentives that encourage the built environment towards better sustainability practice and reduced emissions. Priority should be placed on:

- Green depreciation, which would see the deferment of taxable income in early years in exchange for bringing forward investment in large upgrades that exceed the instant asset write-off threshold.
- Rates and charges relief for buildings that satisfy a performance standard, for instance stamp duty and land tax concessions for high-performing buildings, which could have a similar impact to green depreciation by targeting the point at which owners are considering making investments in their home prior to sales.

NATIONAL

ADELAIDE'S SUSTAINABILITY INCENTIVES SCHEME

The City of Adelaide's Sustainability Incentives Scheme provides a range of rebates that build on the City's commitments in supporting community investment in sustainable building upgrades. Rebates are available for Carbon Neutral Certification and for the achievement of voluntary performance ratings under Green Star and NABERS.

INTERNATIONAL

US ENERGY POLICY ACT

The US Energy Policy Act 2005 established a number of tax incentives to drive energy efficiency improvements for both commercial and residential buildings, including tax credits to builders of residential buildings who build to a high benchmark under the Energy Star rating system, and tax credits for home owners who upgrade their building envelope through purchase and installation of insulation, window and roofing materials.

RECOMMENDATION 2.3

HARMONISED ENERGY OBLIGATION SCHEMES

Introduce and support the harmonisation of energy efficiency obligation schemes

BUILDING TYPE:

All buildings

LIFECYCLE STAGE:

Commissioning

Retrofit

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

To achieve maximum emissions reductions at least cost, actions across all sectors and jurisdictions should be compared with each other, so that the most efficient and effective measures can be actively implemented. While energy efficiency obligation schemes exist in New South Wales, Victoria, South Australia and the ACT, each is different and requires bespoke applications to access incentives. To improve program design and administration, and reduce costs for delivering energy efficiency upgrades, these schemes should be harmonised and integrated.

PATHWAY

State and territory governments should support the objective of a single national energy efficiency obligation scheme, whilst taking action to introduce schemes in states where they do not currently exist and ensuring that existing schemes are aligned as much as possible with other jurisdictions. Best practice elements of harmonised EEOs will include consistent application and rules as well as wide coverage of sectors. State and territory-based schemes should be developed to support the long-term goal of a single national scheme to maximise their impact and effectiveness.

NATIONAL

NATIONAL ENERGY PRODUCTIVITY PLAN MEASURE 2.1

Under the National Energy Productivity Plan Measure 2.1, COAG Energy Council has been conducting work to harmonise schemes across state jurisdictions, such as consideration of eligible measures, products and methodologies. According to COAG, there is currently an analysis of national and international energy efficiency obligation schemes underway and based on the findings, further activities could be undertaken.

INTERNATIONAL

US ENERGY EFFICIENCY SCHEME HARMONISATION

Regulators in the US have made efforts to harmonise the details of energy efficiency schemes between and within states, through regulators sharing experiences and adopting similar regulatory requirements. Harmonisation in the US has in some cases been facilitated through a single government, private organisation or non-profit (such as in the cases of the Wisconsin Energy Conservation Corporation, the Energy Trust of Oregon and the Vermont Energy Investment Corporation) to carry out administrative duties such as product registration, and potentially some aspects of program design.

RECOMMENDATION 2.4

INNOVATIVE FINANCE MECHANISMS

Support green loans and innovative finance products to drive high performing homes and retrofits

BUILDING TYPE:

All buildings

LIFECYCLE STAGE:

Design | Construction | Sales/lease | Retrofit

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

Cost is one of the biggest barriers to building or renovating sustainably. For instance, the perception that the value of retrofit is less than its cost can make it extremely difficult to induce a homeowner to take action. Green finance mechanisms, such as green mortgages offer a way to overcome these cost barriers by providing an incentive in the form of a lower interest rate or increased loan amount, whilst elevating the consideration of sustainability in consumer decision making. Whilst green finance mechanisms are currently available in Australia, there is scope to drive broader interest through the right policy settings.

PATHWAY

State and territory governments should work with the Federal Government, property and finance sectors to accelerate the expansion of preferential financing mechanisms that incentivise sustainable buildings and upgrades. Measures could involve funding the development of green home finance products, like green mortgages, equity loans and home improvement loans, or incentivising industry to develop innovative ways of reducing the cost of retrofitting housing stock.

NATIONAL

BENDIGO BANK'S GREEN HOME LOANS

Since 2002, Bendigo Bank has offered Green Home Loans, which rewards owner occupiers for building or renovating their home in a sustainable way. The loan provides discounts on interest rates for projects that fulfil certain sustainability criteria, such as minimum environmental standards or installing a number of features and technologies designed to make the home more energy or water efficient.

INTERNATIONAL

GERMANY'S KFW BANK

Germany's KfW, founded in 1948, is a publicly owned bank which operates one of the country's most effective and far reaching energy efficiency refurbishment loan programs. KfW extends low-cost credit lines to local banks for retrofit projects in private housing. Retail banks in turn finance homeowners, by providing each housing unit up to €75,000 for a pre-defined investment package that relates to a different level of the KfW-Efficiency House, a standard that has been developed by KfW to define different levels of energy efficiency.

RECOMMENDATION 2.5

INCENTIVISE RETROFITS FOR HOMES

Incentivise deep retrofits for existing homes

BUILDING TYPE:

Residential

LIFECYCLE STAGE:

Retrofit

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

The current review of the National Construction Code – to be implemented in 2022 – is an opportunity to set higher standards for new homes. However, a challenge remains to improve the energy efficiency of our existing housing stock, which includes the 9.5 million homes which were built before minimum energy efficiency standards were introduced for residential buildings in 2005.
A number of state and territory governments currently offer programs that encourage consumers to adopt high-efficiency appliances and fixtures, such as energy efficiency obligation schemes. Whilst these schemes have been effective at driving uptake of cost effective upgrade measures, they have not been as effective at incentivising 'deep' retrofits that are required in existing housing stock. However, there is scope for these schemes to be combined with other policy instruments to drive broader retrofits.

PATHWAY

State and territory governments should research and trial programs to complement energy efficiency obligation schemes, that would provide deep retrofits to existing homes at scale. Priority should also be given to low-performing assets in the social and community housing sector, which could act as the launching market for these solutions with a view to later scale to the private homeowner market.

NATIONAL

ENERGY EFFICIENCY OBLIGATION SCHEMES IN SA, VIC, NSW & ACT

South Australia's Retailer Energy Efficiency Scheme, Victoria's Victorian Energy Upgrades Program, the ACT's Energy Savings Scheme and NSW's Energy Savings Scheme allows householders to benefit from subsidised home energy efficiency upgrades including draught-proofing external doors and windows, upgrades to space heating and cooling, installing energy-efficient lighting, replacing inefficient fittings, and installing insulation and solar PV.

INTERNATIONAL

THE NETHERLANDS' ENERGIESPRONG PROGRAM

The Dutch Energiesprong ("Energy Leap") program is a whole-house refurbishment and funding approach that seeks to achieve affordable zero energy building retrofits. The initiative involves wrapping houses with insulated panel facades, installing insulated roofs with high-efficiency solar panels in addition to heat pumps, hot water storage tanks and ventilation units, over the course of 10 days. The program is now present in four countries – Netherlands, France, Germany and the UK has recently been adopted in the US.

RECOMMENDATION 2.6

OFFICE BUILDING RETROFITS

Shift the mid-tier office building market to better performance

BUILDING TYPE:

Commercial

LIFECYCLE STAGE:

Retrofit

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

Mid-tier buildings – those classed as non-A Grade or non-Premium Grade – account for around 80 per cent of Australia's office buildings and 50 per cent of floor space. These buildings lag significantly behind in implementing energy efficiency upgrades and retrofits, for reasons such as lack of awareness, difficulty in accessing capital and information, lack of networking among owners and tenants, split incentives and lack of skills and expertise amongst industry professionals. Given the size of the sector, mid-tier buildings present one of the largest untapped policy opportunities for governments, and research has shown that the savings potential in mid-tier office buildings is significant and feasible.

PATHWAY

State and territory governments should accelerate energy efficiency for mid-tier buildings, focusing on information, incentives and research. These include establishing targeted tax incentives to encourage building upgrades, setting targets for the performance of government tenancies, and investing in research to further quantify and understand the mid-tier sector.

NATIONAL

VICTORIA'S BETTER COMMERCIAL BUILDINGS PROGRAM

Sustainability Victoria's Better Commercial Buildings program offers matched funding assistance of up to $30,000 for commercial building owners, to conduct energy audits, implement energy efficiency upgrades and measure and verify building efficiency improvement. The program can also facilitate access to third-party finance to assist with upgrades.

RECOMMENDATION 2.7

SECTOR LEADERSHIP

Provide support for distinct market segments through sectoral leadership strategies

BUILDING TYPE:

Commercial

LIFECYCLE STAGE:

All stages

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

The breadth and diversity of the built environment is a major challenge for policy development. Targeted approaches for particular market segments can be a way to overcome this challenge, and the Government should explore collaborative approaches in particular sectors to build on successes and consolidate learnings. Industrial, health and retail are among the sectors where a body of leading organisations with substantial market presence exists, and governments can play a role in coordinating industry-led groups to accelerate action in these sectors, build on successes and consolidate learnings.

PATHWAY

State and territory governments should actively support the creation of leadership groups in the industrial, health and retail sectors to drive innovation, demonstrate opportunities, connect stakeholders, generate awareness of best practice and develop industry skills and capability.

NATIONAL

BETTER BUILDINGS PARTNERSHIP

The Better Buildings Partnership is a leading collaboration of property owners, managers and key influencers that play a pivotal role in improving the performance and sustainability of existing buildings in the City of Sydney area and across Australia. Much of the BBP's work aims to streamline and enable conversations between tenants and landlords, whether by driving demand for high performing buildings, creating clauses for best practices leases, or developing resources. The BBP has collaborated with a number of industry bodies and programs to expand its reach, such as the CitySwitch program to engage and educate tenants on the business case for choosing high performing buildings.

INTERNATIONAL

US CARBON LEADERSHIP FORUM

The Carbon Leadership Forum is an industry-academic collaboration hosted at the University of Washington. Supporters include product manufacturers, building owners, general contractors, architects, engineers and policy makers. Members of the Forum work together to understand and reduce embedded carbon – leading by testing methods, developing standards, sharing results and motivating each other to improve. Examples of the Forum's work include leading research projects, promoting education and awareness and implementing strategies into practice.

THEME 3
MINIMUM STANDARDS

MINIMUM STANDARDS

3.1 Support a Zero Carbon Ready building code

3.2 Improve compliance, monitoring and enforcement of the National Construction Code

3.3 Support renters with minimum energy efficiency standards for rental properties

3.4 Undertake a review to investigate energy performance improvements for existing buildings

3.5 Accelerate targeted retrofits for worst performing and highest risk housing stock

RECOMMENDATION 3.1

ZERO CARBON READY CODE

Support a Zero Carbon Ready building code

BUILDING TYPE:

All buildings

LIFECYCLE STAGE:

Design | Construction | Retrofit

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

Progress in improving energy efficiency across the building sector has been slow, with overall energy intensity improving between 2-5 per cent over the decade from 2005 to 2015. This is despite market leaders driving world-class innovation in low-energy buildings, suggesting a widening gap between industry leaders and the rest of the market. Minimum energy requirements for new buildings and fitouts, with a forward trajectory for strengthened requirements over time, can play a role in closing this gap. A forward trajectory for energy performance targets in existing buildings will also provide a regulatory signal to consumers and industry, thereby encouraging innovation and investment in new technology, design and construction practices.

PATHWAY

Working with their state counterparts and the Federal Government through the COAG Energy Council and the Building Ministers Forum, state and territory governments should inform the development of a national trajectory for future upgrades to minimum energy performance requirements in the National Construction Code (NCC), starting with a step change for residential buildings in 2022. The ABCB has commenced work to develop a case for these performance changes. The trajectory should have broad industry support, and be aligned with the long-term goal of a net zero emissions economy by 2050.

NATIONAL

LOW ENERGY BUILDINGS TRAJECTORY

In 2019 Australian Energy Ministers through the COAG Energy Council requested that the Building Ministers Forum (BMF) consider opportunities to strengthen energy efficiency within the NCC. The BMF have subsequently tasked the Australian Building Codes Board (ABCB) with this action which is now being progressed. The ABCB is exploring cost-effective increases to the residential and commercial codes for the next update of the NCC in 2022, and in each subsequent update of the NCC until 2030.

INTERNATIONAL

US MODEL ENERGY CODES

The US updates its model energy codes on a three-yearly cycle, and states have two years to revise the energy efficiency provisions of their codes to meet or exceed the model codes. The Federal Department of Energy has set a target for all new commercial buildings to be net zero emissions by 2030, and all commercial buildings to be net zero emissions by 2050. The Department provides technical assistance to state and territory, and local governments to help facilitate adoption, implementation and compliance processes. This support includes tracking state adoption status, coordinating activities among stakeholders, technical analysis and the development of materials and tools, including those to document and verify compliance with the energy codes.

RECOMMENDATION 3.2

IMPROVED CODE COMPLIANCE

Improve compliance, monitoring and enforcement of the National Construction Code

BUILDING TYPE:

All buildings

LIFECYCLE STAGE:

Design

Construction

Retrofit

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

Non-compliance with National Construction Code (NCC) is an ongoing issue that is not only unlawful but also undermines the rights of building purchasers and occupants who are not receiving what they are legally entitled to and provides an unfair advantage to operators who cut corners. Whilst non-compliance impacts a number of different areas, there is a need for a specific focus on energy efficiency compliance if the NCC is to support the transition of new buildings to a low carbon economy.

PATHWAY

Working with the Federal Government and industry, state and territory governments should immediately address issues relating to compliance and enforcement highlighted through the Shergold Weir Building Confidence report. Whilst focused primarily on safety issues, many of the recommendations from the review have relevance to energy efficiency. State and territory governments should ensure an explicit focus is incorporated into the Australian Building Codes Board's program of work developing model regulation and nationally consistent implementation of the report's recommendations which have relevance to energy efficiency. These include but are not limited to registration and training of building practitioners, publication of state and territory government audit strategies and identification of defects, consistent requirements for documentation of performance solutions involving complex energy modelling, and on-site inspections timed to ensure compliance with energy efficiency provisions can be verified.

NATIONAL

VICTORIAN BUILDING INSPECTIONS

To deliver on its Energy Efficiency and Productivity Strategy, the Victorian Government is working with the Victorian Building Authority to undertake a targeted program of inspections to improve building industry compliance with energy efficiency regulations.

INTERNATIONAL

US BUILDING ENERGY CODES PROGRAM

To support the compliance process for model building codes in the US, the Department of Energy worked with researchers from the Pacific Northwest National Laboratory (PNNL) on the Building Energy Codes Program. PNNL provided technical assistance to states and localities working to improve energy code compliance by analysing compliance data, and developing educational materials and other resources to support compliance and enforcement efforts. In addition, PNNL developed the REScheck and COMcheck™ software, which is used by designers, builders, and building officials across the U.S to verify and document energy code compliance.

RECOMMENDATION 3.3

ENERGY EFFICIENT RENTAL STANDARDS

Support renters with minimum energy efficiency standards for rental properties

BUILDING TYPE:

Residential

LIFECYCLE STAGE:

Sale/lease

Retrofit

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

Australia does not have minimum energy efficiency standards for rental properties, which can be typically less energy efficient than owner occupied premises. This places renters in a difficult position as they have limited ability to make changes to the properties they live in and landlords have little incentive to invest in upgrades that do not benefit themselves. Introducing minimum energy performance standards for rental properties would help to overcome the landlord-tenant split incentive, and ensure that all households have an acceptable level of energy efficiency. This would also benefit low income and disadvantaged households, who are more likely to live in inefficient homes and have less efficient appliances.

PATHWAY

State and territory governments should work to develop and implement a nationally consistent approach to deploying minimum energy efficiency standards for existing rental properties These standards could include requirements for basic, cost effective measures, such as insulation, draught sealing and low-flow shower heads. Alongside these standards, governments should review mechanisms for tenants to initiate upgrades to rental properties, and investigate incentives that encourage landlords to upgrade rental properties, as well as safeguards to avoid any unintended consequences around housing affordability, such as significant rent increases.

NATIONAL

STATE MINIMUM STANDARDS FOR RENTAL PROPERTIES

South Australia, Tasmania and Victoria currently have legislation covering minimum standards for rental properties. However, these standards do not specifically cover energy efficiency standards. The Victorian Government's recent review of the Residential Tenancies Act saw the introduction of provisions that enable minimum energy performance standards going forward.

INTERNATIONAL

NEW ZEALAND'S HEALTHY HOMES GUARANTEE ACT

In 2017, the New Zealand Government introduced the Healthy Homes Guarantee Act, which requires rental properties to meet minimum standards for heating, insulation, ventilation and drainage. Landlords were given several years to bring their properties up to the standard with ceiling and underfloor insulation to become compulsory from 1 July 2019. Once the standards become compulsory, landlords that fail to comply with the standards will be liable for penalties of up to NZ $4,000.

RECOMMENDATION 3.4

BETTER EXISTING BUILDINGS

Undertake a review to investigate energy performance improvements for existing buildings

BUILDING TYPE:

All buildings

LIFECYCLE STAGE:

Commissioning

Retrofit

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

While Australia's National Construction Code (NCC) is vital to ensuring that new buildings perform to a minimum standard, it only affects existing buildings when they are substantially upgraded or rebuilt. Recently, the International Energy Agency's review of Australia's energy policies stated that energy efficiency in existing buildings deserves more attention at both national and state levels because of the long lifetime of buildings.

PATHWAY

State and territory governments should undertake a review to investigate the need, options, benefits and costs of improving minimum energy performance for existing buildings. Possible considerations include strengthening the requirements of the NCC to apply to a greater number of major renovations in existing homes, as well as optimisation practices such as commissioning and ongoing tuning.

NATIONAL

NATIONAL CONSTRUCTION CODE

The NCC covers existing buildings undergoing major renovations which includes refurbishments but excludes alterations and additions that are exempted from seeking formal building approval. The line that distinguishes between refurbishments and minor additions and alterations is determined by the provision of each state and territory's individual building regulations, and the applicability of the NCC to renovations differs significantly between jurisdictions.

INTERNATIONAL

SINGAPORE'S GREEN MARK STANDARDS FOR EXISTING BUILDINGS

Singapore, which is widely considered a world leader in setting minimum standards for existing buildings, requires all commercial buildings with gross floor area of at least 15,000 square metres to meet minimum Green Mark certified standards at the point of installation or replacement of cooling and ventilation systems. In addition to this, these buildings are required to undertake three yearly energy audits of their cooling system, ensuring the system continues to operate efficiently and comply with the standards.

RECOMMENDATION 3.5

HIGH PERFORMING COMMUNITY HOUSING

Accelerate targeted retrofits for worst performing and highest risk housing stock

BUILDING TYPE:

Residential

LIFECYCLE STAGE:

Retrofit

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

Poor energy performing homes affect not only Australians' health and comfort, but they also have an impact on the economy overall through increases in public health spending. Low income and disadvantaged households are more likely to live in inefficient homes and have less efficient appliances, putting them at risk of higher energy bills as well as increased allergies, respiratory diseases and mortality. A high priority should be given to upgrading the worst performing public and community housing stock, which is essential to improve health, wellbeing and energy costs for those most disadvantaged in the community.

PATHWAY

State and territory governments should lead the acceleration of performance upgrades to Australia's worst performing public and community housing stock. Upgrades should be targeted at areas with the highest temperature variation, areas with high risk factors and dwellings that require large amounts of energy for heating and cooling and could include insulation, shading, draught proofing and more efficient fixed appliances.

NATIONAL

NSW'S CLIMATE CHANGE FUND

The NSW Government, through its Climate Change Fund is providing $50.2 million for up to 16,500 dwellings in community, public and Aboriginal housing to upgrade items such as heating, cooling, hot water, lighting, insulation, sealing and solar PV.

INTERNATIONAL

THE NETHERLANDS' ENERGIESPRONG PROGRAM

The Energiesprong program of deep passive house retrofits was recently piloted in the UK through the Nottingham City Homes in partnership with Nottingham City Council. In addition to radically improving the energy efficiency of homes, the pilots were used to test the concept and trial different technologies to maximise efficiencies and their ability to integrate with each other.

THEME 4
ENERGY MARKET REFORM

ENERGY MARKET REFORM

4.1 Unlock the potential of distributed energy

4.2 Ensure energy users are paid for the services they deliver to the grid

4.3 Invest in the best mix of demand-side and supply-side measures

4.4 Expand the mandate of the Energy Security Board to drive energy productivity across the economy

RECOMMENDATION 4.1

REDUCED BARRIERS FOR EMERGING ENERGY STRUCTURES

Unlock the potential of distributed energy

BUILDING TYPE:

All buildings

LIFECYCLE STAGE:

All stages

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

It is widely acknowledged that Australia's regulatory environment imposes barriers to innovation and alternative utility infrastructure and supply. For instance, Australian companies that wish to deploy district-based utilities face many 'first mover' costs, including overcoming regulatory complexities, substantial delays, ad-hoc processes and costs for connecting to the grid. This has created many barriers to the uptake of distributed generation, embedded networks and demand response in Australia.

PATHWAY

Reforms that address barriers to the connection of distributed energy, embedded networks and demand response should be adopted, including a nation-wide consistent approach on how standards for connection are set, governed and applied. State and territory governments should work with the Federal Government to implement recommendations from the Property Council and Clean Energy Finance Corporation's joint report, *Distributed energy in the property sector: unlocking the potential* which identifies barriers to distributed energy in property, and proposes solutions to address them.

RECOMMENDATION 4.2

INCENTIVISE DEMAND MANAGEMENT

Ensure energy users are paid for the services they deliver to the grid

BUILDING TYPE:

All buildings

LIFECYCLE STAGE:

All stages

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

Households and businesses can reduce their energy demand through better energy management by reducing their energy use and shifting demand away from peak periods. Whilst these measures can deliver considerable network savings, consumers are currently not properly incentivised to provide these services. A number of reviews in recent years have recommended the development of a system that can support and incentivise consumers to adjust the energy use demand in response to prices in the wholesale electricity market. Not only would this increase the stability and affordability of the energy market, it would also reduce the volume of emergency capacity that is required.

PATHWAY

State and territory governments working with the Federal Government should ensure the Australian Energy Market Commission implements its draft determination for a wholesale demand response mechanism. The mechanism should enable residential customers and businesses to sell demand-response capacity into the wholesale electricity market on an equal basis with generation when it formally commences.

NATIONAL

WHOLESALE DEMAND RESPONSE MECHANISM

Over the last decade, the need for a wholesale demand response mechanism has been identified in a number of federal reviews. In mid-2019, the AEMC released a new draft rule for public consultation on the creation of a wholesale demand response mechanism. The new rule would allow non-retailers to offer demand response directly into the wholesale market for the first time.

INTERNATIONAL

PENNSYLVANIA NEW JERSEY MARYLAND ENERGY MARKET

In the US, the Pennsylvania New Jersey Maryland energy market extends over 13 states and services around 65 million people. The PJM pays generators for the amount of energy that they dispatch into the market, but also operates a forward capacity market which pays generators and demand response providers to be available for dispatch during periods when demand exceeds normal supply.

RECOMMENDATION 4.3

ENERGY EFFICIENCY FIRST

Invest in the best mix of demand-side and supply-side measures

BUILDING TYPE:

All buildings

LIFECYCLE STAGE:

All stages

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

Australia's energy market has invested heavily in supply-side infrastructure, but less action has been taken to balance this investment with smarter energy use that reduces demand.
To address this supply-side bias, many overseas governments have committed to invest in the most cost-effective mix of supply-side and demand-side measures, and some have adopted the principle of 'Energy Efficiency First' to address biases against demand-side investment.

PATHWAY

State and territory governments should support an independent review to determine what actions are required to adopt the Energy Efficiency First principle in Australia, to ensure that demand-side measures are considered first before planning for investments. The review could examine changes that can be made at multiple levels, including governance, strategy and policy, and system planning and investment.

NATIONAL

DEMAND-SIDE BLIND SPOT

In Australia, the distortion between demand-side and supply-side measures has led to under investment in the former and over investment in the latter. This has contributed to recent increases in electricity prices, with the average residential electricity bill increasing by 35 per cent between 2007–08 and 2017–18.

INTERNATIONAL

US INTEGRATED RESOURCE PLANNING

In the US, utilities in 38 states are required to undertake integrated resource planning which involves forecasting future demand for energy, identifying potential supply and demand-side options and determining the mix of measures that will meet consumer demands at lowest cost.

RECOMMENDATION 4.4

INDEPENDENT AUTHORITY TO ADDRESS ENERGY MARKET BARRIERS

Expand the mandate of the Energy Security Board to drive energy productivity across the economy

BUILDING TYPE:

All buildings

LIFECYCLE STAGE:

All stages

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

Australia's energy market rules and regulations have a strong impact on the ability of built environment stakeholders to implement energy efficiency and distributed energy in buildings. However, the processes by which these rules and regulations are set are extremely complex, limiting the ability of non-technical experts in the built environment to participate. The establishment of an independent authority to investigate and address issues experienced by distributed energy, energy efficiency and built environment stakeholders over time would help ensure that these processes support and do not disincentivise cost-effective uptake of energy efficiency and distributed energy.

PATHWAY

State and territory governments should support the creation of an independent authority to investigate and recommend solutions to address energy market barriers experienced by distributed energy, energy efficiency and built environment stakeholders over time, and voice their concerns in the context of energy market processes and reforms. This authority should participate on the Energy Security Board in the same capacity as existing energy market authorities.

THEME 5
GOVERNMENT LEADERSHIP

GOVERNMENT LEADERSHIP

5.1 Lead through government owned and leased buildings

5.2 Ensure infrastructure decisions align with emission reduction targets and address climate risk

5.3 Consistent planning pathways that support innovation

5.4 Advocate for a national built environment energy efficiency and emissions education and training agenda

5.5 Advocate for a national built environment energy efficiency and emissions research and innovation agenda

5.6 Drive the broader application of trusted, robust and credible building rating systems such as Green Star and NABERS in government projects

5.7 Support low income and vulnerable households and consumers with targeted assistance and tools

5.8 Inform consumers on residential energy efficiency

RECOMMENDATION 5.1

HIGH PERFORMING GOVERNMENT BUILDINGS

Lead through government owned and leased buildings

BUILDING TYPE:

Government

LIFECYCLE STAGE:

All stages

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

State and territory governments can use their strong market presence as building owners and tenants to drive improvements in building energy performance. This would not only deliver significant financial savings for the public sector and taxpayers, but also contribute to emissions reduction and build skills and capability in the market. A review of existing accommodation and leasing policy presents an opportunity for leadership in the transition towards net zero buildings, as well as a longer term vision to support business certainty and confidence.

PATHWAY

State and territory governments should commit to a trajectory of performance requirements for publicly owned and leased properties over time with the aim of achieving net zero emissions for new buildings by 2030, and existing buildings by 2050. Measures could include strong minimum standards for new buildings and fitouts, targets for onsite energy efficiency and requirements around renewable energy, offsite renewable energy and offsets. The benefits of NABERS energy ratings should be augmented with a holistic building rating through Green Star, and mechanisms to improve compliance and implementation should be introduced or enhanced.

NATIONAL

NSW'S GOVERNMENT RESOURCE EFFICIENCY POLICY

The NSW Government's Government Resource Efficiency Policy aims to reduce the operating costs of NSW Government agencies and ensure that they provide leadership in resource productivity. The GREP requires agencies to incorporate resource efficiency considerations in all major decisions, focus on the challenge presented by rising costs for energy, water, clean air and waste management, seek to leverage their purchasing power when procuring resource efficient technology and services and publish annual statements of their performance against the policy.

INTERNATIONAL

SINGAPORE'S GREEN MARK STANDARDS FOR PUBLIC BUILDINGS

Singapore's Green Mark building sustainability rating tool is a central pillar of the government's economy-wide emissions reduction goals. To meet the national target of greening at least 80 per cent of the country's buildings by 2030, all new public buildings must achieve a Platinum rating, and all existing buildings with a minimum air conditioned floor area must achieve Gold Plus rating by 2020.

RECOMMENDATION 5.2

BEST PRACTICE PROCUREMENT

Ensure infrastructure decisions align with emission reduction targets and address climate risk

BUILDING TYPE:

All buildings

LIFECYCLE STAGE:

All stages

IMPACT: ☑ ☑ ☑

EASE: ☑ ☑ ☑

COST EFFECTIVENESS: ☑ ☑ ☑

CURRENTLY

Government investment in infrastructure represents an opportunity to maximise resilience and climate change outcomes for the community. Currently, methodologies for business case development are inconsistently applied, often based on limited evidence, out of date information and poor quality data. To enhance government capability around project management and delivery, national guidelines should be developed to provide a shared understanding of best practice procurement. This would ensure value for money for the tax-payer through consideration of the project's whole of life costs and also help with measurement and benchmarking for key urban regeneration projects such as City Deals, ensuring that the desired outcomes and targets are met across projects.

PATHWAY

State and territory governments should embed project evaluation and benefits realisation within decision making processes, as a condition of funding and as a component of project scoping. Social, economic and environmental objectives should be systematically, and consistently embedded into strategic procurement practice. In collaboration with other levels of government and Infrastructure Australia, state and territory governments should support and adopt a nationally consistent approach to business case development for social and transport infrastructure. The application of this approach should be secured through treasuries, line agencies and infrastructure delivery bodies, as prerequisites for infrastructure funding and through government reporting on major projects.

NATIONAL

BAYSWATER LEVEL CROSSING REMOVAL PROJECT

The Bayswater Level Crossing Removal Project was completed in 2018 as part of the Victorian Government's wider level crossings removal program. The project has reduced carbon emissions by 30 per cent during construction and a projected 43 per cent over the operational life of the new station compared to a base case. Embodied carbon reduction was achieved through using recycled waste products in the concrete mix, but also by designing the new station in a way that required less materials. The project achieved a 4 star Green Star rating, and an ISCA rating of 93.5.

INTERNATIONAL

BUY CLEAN CALIFORNIA

Buy Clean California was initiated in 2016 to advance policies that ensure California's procurement processes for infrastructure support the state's goals for reducing climate change pollution. The initiative takes into consideration suppliers' emissions performance when an agency is contracting to buy steel, flat glass, and mineral wool (insulation) for infrastructure projects.

RECOMMENDATION 5.3

REDUCE EMISSIONS THROUGH PLANNING

Consistent planning pathways that support innovation

BUILDING TYPE:

All buildings

LIFECYCLE STAGE:

Design

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

Land use planning policy and regulation is critical to delivering low emissions buildings, infrastructure and precincts in our cities and communities. However, there remains a significant opportunity to deliver emissions reduction through state planning instruments that align with a national trajectory towards zero carbon ready buildings.

While policies around sustainability and the built environment are broadly present in state and regional level strategic planning documents, they can be inconsistently implemented by local governments.

PATHWAY

Planning tools need to be streamlined with consistent and transparent outcomes across state and local boundaries to support industry buy-in.

Energy performance targets need to align with a national plan for net zero emissions buildings by 2050, supported by adequate post-development monitoring and enforcement.

State and territory, as well as local governments should lead the development and implementation of consistent planning policies that facilitate and incentivise the delivery of net zero emissions buildings. These policies should be consistent with the delivery of net zero buildings through a national trajectory of upgrades to energy efficiency requirements in the National Construction Code. Focus should be given to developing accelerated pathways to recognise and reward innovative projects that lead by example.

Working collaboratively across government boundaries with industry and the community will support the delivery of this objective.

NATIONAL

SYDNEY'S PLANNING PATHWAY TO NET ZERO BUILDINGS

The City of Sydney is enabling coordination between industry, state and territory, and local governments in New South Wales to establish ways to achieve low-carbon, high-efficiency buildings and precincts which contribute to the NSW target of net zero emissions by 2050. The Greater Sydney Commission's most recent planning document, the *Greater Sydney Region Plan – A Metropolis of Three Cities*, identifies building efficiency as one of the most importance pathways towards net zero emissions in Greater Sydney. All District Plans contain a priority to reduce carbon emissions and manage energy, water and waste efficiently. Through this collaboration, the City of Sydney will help lead the development of a planning pathway to net zero energy multi-unit residential, office, hotel and mixed-used development.

INTERNATIONAL

CALIFORNIA'S NET ZERO ENERGY BUILDING GOALS

California's building standards in 2016 set net zero energy requirements for all new residential buildings by 2020, for new commercial buildings by 2030, for new state buildings and half of major retrofits by 2025, and for half of existing commercial buildings by 2030. The new standards include a basic set of mandatory requirements for all buildings, a set of performance requirements that vary by building type and climate zone, and a set of prescriptive packages as an alternative to the performance-based approach.

RECOMMENDATION 5.4

ENERGY EFFICIENCY & EMISSIONS TRAINING AND EDUCATION

Advocate for a national built environment energy efficiency and emissions education and training agenda

BUILDING TYPE:

All buildings

LIFECYCLE STAGE:

All stages

IMPACT: ☑ ☑ ☑

EASE: ☑ ☑ ☑

COST EFFECTIVENESS: ☑ ☑ ☑

CURRENTLY

The transition to low-carbon, high performing buildings cannot be achieved without improving the skills and capacity of local supply chains. To grow the market for sustainable buildings, Australia needs a consistent base of knowledge across the construction supply chain that is accessible and can be tailored to the needs of each industry subsector and jurisdiction. Training and education can support industry capacity building, the benefits of which include local economic development, regulatory compliance and driving the industry to aspire to higher standards for building performance.

PATHWAY

Working with the Federal Government, states should support the development of a national education and training agenda for building energy efficiency and emissions reduction. Priority should be placed on ensuring effective compliance with minimum standards through skills training and incentives, and improved mechanisms for dispute resolution. Market transformation programs should be tailored for specific characteristics in each state and territory and be delivered locally to suit different building techniques, industry contexts and capabilities as well as climate zones.

In addition to operational emissions, the agenda should also support a nationally coordinated strategy to achieve net zero embodied carbon (see Recommendation 7.2).

NATIONAL

ZERO NET CARBON HOMES PROGRAM

The Victorian Government has provided funding to Sustainability Victoria for a pilot program to develop and market zero net carbon homes in collaboration with volume builders. This pilot program will provide technical and marketing expertise to each of the builders to facilitate the development, marketing and sales of leading-edge zero net carbon homes, which incorporate a range of features, including double glazing, high-efficiency heating, cooling, water heating, lighting and solar PV.

INTERNATIONAL

EU'S BUILD UP SKILLS PROGRAM

BUILD UP Skills was a strategic initiative which started in 2011 to help achieve European energy targets through skills development and uplift in the construction sector. The project sought to increase the number of qualified workers across Europe to deliver building renovations which offer high-energy performance as well as new, nearly zero-energy buildings. As part of the initiative, projects were funded across a number of EU countries to develop national qualification platforms and roadmaps to train the building workforce to meet energy targets for 2020 and beyond. Based on these roadmaps, the second phase of the initiative involved piloting new qualification and training schemes as well as upgrading existing ones.

RECOMMENDATION 5.5

ENERGY EFFICIENCY & EMISSIONS RESEARCH

Advocate for a national built environment energy efficiency and emissions research and innovation agenda

BUILDING TYPE:

All buildings

LIFECYCLE STAGE:

All stages

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

Research, development and demonstration can unlock further opportunities for energy savings and distributed energy in the built environment, including the development of new technologies and innovative business models. Australia currently lacks a cohesive research agenda on energy and emissions issues, and faces many gaps in the support for built environment innovation.

As a result, there is no nationally agreed program to prioritise and deliver low carbon construction methods or technologies, or to consider future opportunities for the built environment and other sectors like transport that will become increasingly connected in a two-way energy system.

PATHWAY

Working with the Federal Government, states should support the creation of an independent national research body dedicated to promoting a higher performing, low-emissions built environment. The Cooperative Research Centres program can be adapted to serve this purpose and CRCs can be tasked with developing, delivering and coordinating Australia's research agenda and take responsibility for data gathering, developing new technologies and facilitating research and learnings.

NATIONAL

ARENA, CEFC, CSIRO AND COOPERATIVE RESEARCH CENTRES

Australia has a number of well-developed research and innovation entities that are progressing work related to energy efficiency and low carbon buildings, including the Australian Renewable Energy Agency, the Clean Energy Finance Corporation, and the CSIRO. With the Corporative Research Centre for Low Carbon Living recently completing its work, there is also a bid underway to establish a new CRC for Future Cities, which will build on the achievements of CRCLCL through its own research.

INTERNATIONAL

THE UK BUILDING RESEARCH ESTABLISHMENT

The UK's Building Research Establishment (BRE) provides impartial research advice, training, testing and certification services for local and national government as well as businesses and private sector organisations. Owned by the BRE Trust, its work is funded through commissioned research, commercial programs and by a number of digital tools for use in the construction sector. Among its services, the BRE carries out research and data generation in support of national and international standards and building codes.

RECOMMENDATION 5.6

SUSTAINABLE BUILDING RATING SYSTEMS

Drive the broader application of trusted, robust and credible building rating systems such as Green Star and NABERS in government projects

BUILDING TYPE:

All buildings

LIFECYCLE STAGE:

All stages

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

Voluntary rating and benchmarking systems such as Green Star and NABERS have long been embraced by the private sector to establish design parameters for and verify performance of high-quality buildings. However, their adoption by the public sector has been uneven. By leveraging these tools through procurement processes, governments can integrate requirements that will help lower emissions in for major products, drive broader transformation across the supply chain and improve community facilities.

PATHWAY

State and territory governments should use robust building rating systems such as Green Star and NABERS to drive sustainable outcomes in public projects. These rating systems should be adopted at the state level through procurement of publicly owned and leased buildings including and beyond office buildings (to include assets such as community housing), capital works projects and urban regeneration projects. Government should also support industry adoption of these rating systems to drive greater transformation across the sector.

NATIONAL

BUILDING UP AND MOVING OUT

In 2017, the Federal House of Representatives Standing Committee on Infrastructure, Transport, and Cities undertook an inquiry into the role of Australian governments in the development of cities. The findings were tabled in a report released in 2018, titled *Building Up and Moving Out*. Among the findings, the Committee noted that a successful transition to best practice urban development will create vibrant, sustainable and prosperous Australian cities, and recommended that the Australian Government support the broader application of rating systems, such as Green Star, to urban regeneration.

INTERNATIONAL

FRANCE'S E+C- VOLUNTARY LABELLING SYSTEM

In 2016, Alliance HQE-GBC launched the E+C- (energy plus and low-carbon buildings) voluntary labelling system in conjunction with the French Government as part of the strategy to meet climate change ambitions. The certified E+C- label covers all energy uses during building operation, including energy consumed by equipment owned by occupants, as well as on-site production of renewable energy and emissions linked to building energy demand (both operational and embodied carbon from construction and buildings equipment). The label also provides results in terms of a life cycle assessment of environmental indicators and also includes GHG emissions due to refrigerant leaks.

RECOMMENDATION 5.7

TARGETED SUPPORT FOR VULNERABLE CONSUMERS

Support low income and vulnerable households and consumers with targeted assistance and tools

BUILDING TYPE:

Residential

LIFECYCLE STAGE:

Occupation

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

More and more, consumers need to engage with the energy retail market if they want to reduce their energy bills. While many benefits can flow to informed consumers, those who are more at risk of energy stress, such as low-income or disadvantaged consumers need tailored, ongoing support to engage with their energy use. This is due to barriers that may be related to a lack of capital, language and literacy challenges, split incentives or geography. Better informing and educating consumers about their bills, energy usage and the energy market can help to overcome these barriers.

PATHWAY

State and territory governments should provide user-friendly information and tools to educate consumers of the long-term benefits of energy efficiency and to encourage improved energy choices. Working with local governments, states should also provide ongoing assistance programs to inform and enable disadvantaged households to engage with the energy market. Where possible, these programs should strengthen relationships between disadvantaged households, support services, advocates and energy retailers.

NATIONAL

QUEENSLAND'S ENERGY SAVVY PROGRAM

The Queensland Government, with Ergon Energy Retail, QCOSS and CitySmart operate the Energy Savvy Families Program, which helps low income families learn about their electricity usage and manage their bills. The program offers eligible participants a digital meter at no extra cost and the convenience of monthly e-billing that makes it easier to budget.

It also includes access to valuable tools and information to understand and monitor how electricity is used at home, plus personalised support from a local community champion. More than 5,500 families have taken part in the program.

INTERNATIONAL

HOME ENERGY SCOTLAND

Home Energy Scotland are a network of local advice centres across Scotland with a mission to help residents create warmer homes and reduce energy bills. The program is funded by the Scottish Government and managed by the Energy Saving Trust, and provides a number of services and tools providing free, impartial advice on energy saving, keeping warm at home, renewable energy, greener travel and reducing waste.

RECOMMENDATION 5.8

ENERGY EFFICIENCY INFORMATION & AWARENESS

Inform consumers on residential energy efficiency

BUILDING TYPE:

Residential

LIFECYCLE STAGE:

All stages

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

Knowledge limitations can lead to market failures when consumers are not able to make informed choices about the energy efficiency of their homes, and there is growing research showing that consumers are confused by the plethora of sustainability jargon in the residential sector and what they promise to deliver. Consumers also find it difficult to choose from the diversity and complexity of technology options and recommended behaviours, and tend to seek decision-making shortcuts that may include withdrawal or deferring to government to 'solve the problem'.

PATHWAY

Working with other governments, industry and academia, state and territory governments should drive awareness and behaviour change around sustainable housing, by providing information and social support to homebuyers and renovators at key moments of their decision making. This information, which could include details of available financial incentives and mechanisms (see Recommendations 2.2 and 2.4) must consider timing and context to ensure effectiveness. Government should consider the use of programming in mainstream broadcast media, social media and commercial product placement, to accelerate the adoption of high-performance homes and support early adopters to enter the market at scale.

NATIONAL

RENOVATE OR REBUILD

The CRC for Low Carbon Living's *Renovate or Rebuild* is a lifestyle TV show that promotes sustainable homes as comfortable, affordable, efficient and healthy. The project uses popular storytelling – in the form of reality TV – alongside a 'call to action' website and an 'impact community'. The impact community – modelled on the War on Waste and The Block television shows – includes research partners, peak industry bodies, residential volume builders and developers, construction material suppliers, industry media, utilities, real estate, finance providers and other state, territory and federal government departments. These stakeholders promote engagement through social media and provides partner content for the website.

INTERNATIONAL

JAPAN'S SETSUDEN CAMPAIGN

The Japanese Government ran a 'Setsuden' (saving electricity) campaign following the 2011 tsunami which saw the closure of generators that had provided 30 per cent of the country's electricity capacity in 2010. The campaign encouraged households to voluntarily reduce their energy demand and set businesses targets to reduce their energy use. Whilst the campaign wasn't intended as a long-term measure, it was hugely successful, reducing peak electricity demand in the Tokyo region by 19 per cent.

THEME 6
ROBUST RATING TOOLS FOR DIFFERENT BUILDING TYPES

ROBUST RATING TOOLS FOR DIFFERENT BUILDING TYPES

6.1 Empower owners, buyers and renters with a single national rating scheme for home energy performance

6.2 Support mandatory performance disclosure for homes at the point of sale or lease

RECOMMENDATION 6.1

A NATIONAL RATING SCHEME FOR HOMES

Empower owners, buyers and renters with a single national rating scheme for home energy performance

BUILDING TYPE:

Residential

LIFECYCLE STAGE:

Occupation

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

Australian homeowners and renters value sustainability, but lack a credible and widely accepted benchmark to easily assess the sustainability of homes. A single rating scheme consistently applied across the country would not only make it easier to compare the efficiency of homes, but would also create an incentive for building upgrades, whilst providing added consumer protection for buyers and tenants.

PATHWAY

Working with the Federal Government, state and territory governments should adopt a single, nationally consistent rating scheme to facilitate disclosure of performance in residential buildings, that includes:

- Providing benchmarks for market comparison of best practice sustainability performance; and
- A best practice governance model based on NABERS that brings the Commonwealth, state and territory governments together to collectively manage benchmarks for new homes.

NATIONAL

NATIONAL ENERGY PRODUCTIVITY PLAN MEASURE 5

Through Measure 5 of the National Energy Productivity Plan, all Australian Governments are working collaboratively to improve residential building energy ratings and disclosure. Though not including work to develop a single national rating, this program is considering different tools to improve information on residential buildings.

INTERNATIONAL

NEW ZEALAND'S HOMESTAR RATING TOOL

In New Zealand, Homestar is a comprehensive, independent rating tool managed by the Green Building Council of New Zealand that measures and rates the performance of homes. It awards points across the categories of energy, health and comfort, water, waste, materials, site, home management and an optional innovation category. Houses, apartments or multi-unit residential developments are rated on a 1-10 scale. There are two stages for a Homestar rating: the design phase which rates the development's full and final plans; and the built phase which occurs after a home is constructed, and certifies that the features in the design rating have been fully implemented.

RECOMMENDATION 6.2

NATIONAL RESIDENTIAL MANDATORY DISCLOSURE

Support mandatory performance disclosure for homes at the point of sale or lease

BUILDING TYPE: Residential

LIFECYCLE STAGE: Sale/lease

IMPACT: ☑ ☑ ☑

EASE: ☑ ☑ ☑

COST EFFECTIVENESS: ☑ ☑ ☑

CURRENTLY

Australia has an established disclosure scheme for commercial office buildings, but lacks one for residential properties. This means that many homeowners and tenants are choosing homes to buy or rent without adequate information about their expected energy performance, comfort and likely future energy costs. Introducing disclosure at the point of sale or lease can unlock the power of the market by ensuring that buyers and tenants who are willing to pay more for efficient homes can find these properties. In combination with other policies such as minimum rental standards and financial incentives, it would also help to overcome multiple barriers to energy efficiency upgrades.
The introduction of mandatory residential disclosure requires first an established rating scheme for homes (see Recommendations 6.1).

PATHWAY

Working with the Federal Government, state and territory governments should implement mandatory disclosure of energy performance in residential buildings, that includes:

- Setting minimum regulatory performance standards in new buildings, that covers building energy, thermal comfort, water and other sustainability issues;
- Developing a program and training for the residential building sector to market these benchmarks;
- Supporting training for real estate agents, volume home builders and land developers to deliver a sales narrative that underscores the benefits of these benchmarks; and
- Delivering communication messages explaining the value of sustainability features to renovators and homebuyers, including at the point of sale and lease.

NATIONAL

CIVIL LAW (SALE OF RESIDENTIAL PROPERTY) ACT 2003

The ACT Government requires all homes being sold or leased to carry an energy efficiency rating. Research has shown that homes in the ACT that have higher ratings have higher market values, and 50 per cent of sellers in the ACT claim they have undertaken works to enhance the energy efficiency of their dwelling.

INTERNATIONAL

EU ENERGY PERFORMANCE OF BUILDINGS DIRECTIVE

The EU Directive on the Energy Performance of Buildings was first adopted in 2002, and recast in 2010 to strengthen energy performance of buildings and reduce the impact of climate change. Its principal aim is to make the energy efficiency of buildings transparent by requiring an energy performance certificate showing the energy rating of buildings. An important feature of the 2010 revision is that certification should also include recommendations on how to improve the building's energy performance. The Directive suggests that recommendations should include all cost effective improvements and should provide an estimate of the range of payback periods or costs and benefits over each measure's economic life cycle.

THEME 7
TRANSFORM MARKETS FOR MATERIALS AND PRODUCTS

TRANSFORM MARKETS FOR MATERIALS AND PRODUCTS

7.1 Support Australian leadership in high performing building products

7.2 Support a nationally coordinated strategy to achieve net zero embodied carbon

7.3 Grow the availability of cost-effective low emissions building materials

RECOMMENDATION 7.1

HIGH PERFORMING PRODUCTS & MATERIALS

Support Australian leadership in high performing building products

BUILDING TYPE:

All buildings

LIFECYCLE STAGE:

Design

Construction

Retrofit

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

Materials and products selection contributes greatly to a building's overall emissions impact, including its operational emissions. Government support can draw new products, practices and services into the market faster at scale through positive financial incentives combined with engagement, information, tools and assistance. State and territory governments should work together with industry to drive the uptake of high-performing products that reduce operational emissions by facilitating product innovation and technology improvements, and helping consumers make informed choices.

PATHWAY

Working with industry, state and territory governments should develop market transformation initiatives to support the early adoption of advanced materials and best practice technologies, such as high performance glazing and heat recovery ventilation systems. These initiatives should directly compliment the national energy efficiency and emissions research and innovation agenda (see Recommendation 1.2).

NATIONAL

TASMANIA'S ENERGY EFFICIENCY LOANS SCHEME

The Tasmanian Government's Energy Efficiency Loans Scheme offered zero interest financing for up to 36 months on a range of energy efficiency products from $500 up to $10,000. The scheme supported a range of technologies, including but not limited to solar panels, double/triple glazing, energy efficient fridges, freezers and washing machines, and could be used to partially fund purchases that exceeded $10,000, such as small business building upgrades.

INTERNATIONAL

US HIGH INSULATING WINDOWS VOLUME PURCHASE PROGRAM

The US Department of Energy's High Insulating Windows Volume Purchase Program was set up in 2009 with the primary goal of reducing the average incremental costs of high performing windows and raising public awareness of their value. The program included developing specifications for approved high performance windows, undertaking a tender process and entering into an agreement with manufacturers meeting these specifications, developing a website from which customers could access and purchase these products, tracking sales of products and providing an additional information campaign to raise awareness of the benefits of high performing windows.

RECOMMENDATION 7.2

NET ZERO EMBODIED CARBON STRATEGY

Support a nationally coordinated strategy to achieve net zero embodied carbon

BUILDING TYPE:

All buildings

LIFECYCLE STAGE:

All stages

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

Research shows that embodied carbon will be responsible for half of the entire carbon footprint of new construction between now and 2050. As operational carbon in buildings is reduced, this embodied carbon will also grow as a proportion of a building's total emissions. Addressing this requires a new response that sees action taken across the value chain. State and territory governments can support a national approach to driving down embodied carbon by facilitating collaboration and stimulating market demand.

PATHWAY

Working with other levels of government and industry, state and territory governments should support the implementation of a national strategy to achieve net zero embodied carbon. Key actions include:

- Defining a clear strategy and policy pathway for government, which includes baselines at jurisdiction level, timeline of climate objectives with targets for the built environment sector, embodied carbon disclosure requirement for large public projects, policy incentives and legislation to require and support embodied carbon reductions and consideration of the greatest embodied carbon reduction opportunities at different levels of government;
- Developing joint commitments and sharing knowledge through intergovernmental networks, organisations, partnerships and stakeholder forums; and,
- Supporting industrial research and development.

NATIONAL

GREEN STAR RATING SYSTEM

The Green Building Council of Australia's Green Star building sustainability rating scheme provides targets for lifecycle assessments in order to calculate embodied carbon emissions, and rewards projects for improvements against a benchmark or from a reference design. Green Star is progressively moving towards addressing operational and embodied carbon emissions equally. In 2020, Green Star will be introducing a mandatory 10 per cent reduction of upfront carbon emissions for projects seeking a rating.

INTERNATIONAL

ARCELORMITTAL CARBON NEUTRALITY COMMITMENT

ArcelorMittal has committed to achieving carbon neutrality in Europe by 2050 in line with the objectives of the Paris Agreement and the science-based trajectory for emissions reductions in the steel sector. To reduce emissions within the timeframe needed, ArcelorMittal is exploring opportunities for combining different innovative technologies that use more clean power, involve circular sources of carbon, prioritise carbon capture, utilisation and storage. ArcelorMittal has invested in R&D for these technologies and the company has also set out clear policy recommendations at both the global and European level that will create the right market conditions to support its transition.

RECOMMENDATION 7.3

BETTER BUILDING MATERIALS

Grow the availability of cost-effective low emissions building materials

BUILDING TYPE:

All buildings

LIFECYCLE STAGE:

Design

Construction

IMPACT:

EASE:

COST EFFECTIVENESS:

CURRENTLY

Embodied carbon can represent around 50 per cent of a building's total emissions over a 30 year period. Reducing this source of emissions therefore has a significant impact on the total lifecycle emissions of buildings. Many solutions for reducing carbon emissions in building materials are already known, and there is a large pool of research that exists indicating these solutions need to be rapidly scaled with government support through the right policy settings.

PATHWAY

As part of a national strategy to achieve net zero embodied carbon, state and territory governments should work with manufacturers and suppliers to implement carbon reduction strategies, including maximising process energy efficiency, switching to low carbon and renewable energy sources, minimising use of virgin materials through design optimisation, using recycled materials and avoiding producing waste, exploring and implementing circularity principles such as maximising design life, product to services switching and product take back schemes, and design for deconstruction and re-use.

Government should also encourage the development and publication of Environmental Product Declarations to help product consumers to make informed choices, and work closely with manufacturers to explore the right finance and policy settings that will enable broader market transition.

NATIONAL

CARBON OFFSET STANDARD FOR BUILDINGS

In October 2017, the Federal Government launched a National Carbon Offset Standard for Buildings. The Standard was developed in close collaboration with sector stakeholders, and provides best practice guidance on how to measure, reduce, offset, report and audit emissions from building operations. It uses well established rating programs such as Green Star and NABERS as pathways to demonstrate compliance and sets rigorous requirements for achieving carbon neutrality by reducing energy demand in buildings, procuring renewable energy and purchasing carbon credits to offset any remaining emissions.

INTERNATIONAL

CITY OF OSLO 2030 STRATEGY

By 2030, the City of Oslo intends to reduce carbon emissions by 95 per cent from the 1990 baseline and become completely fossil fuel-free. This includes zero emissions construction sites, which are one focus of the city's Smart Oslo Strategy. The City is working towards reducing its greenhouse gas emissions in dialogue with construction contractors with the goal of defining a zero emissions standard for tender specifications for public projects. A quantitative embodied carbon target is being investigated.

APPENDIX:
SOURCES

Introduction

Australian Sustainable Built Environment Council (ASBEC) (2016). *Low Carbon, High Performance*

Green Energy Markets, Energy Efficiency Council, Energy Savings Industry Association (2019) *Energy Efficiency Employment in Australia*

Theme 1: Net zero buildings plan

California Public Utilities Commission (2019) Energy Efficiency Strategic Plan, Accessed 12 October 2019, https://www.cpuc.ca.gov/General.aspx?id=4125

BRE Trust, BRE – About us. Last accessed on 12 October 2019 https://www.bregroup.com/about-us

Low Carbon Living CRC (2017) *Best Practice Policy and Regulation for Low Carbon Outcomes in the Built Environmen*t, p.55

Theme 2: Incentivise High Performance

Brisbane City Council. *Brisbane. Clean, Green Sustainable* 2017-2031. P.57

Tokyo Metropolitan Government (2014, updated 2015) *Urban Efficiency, A Global Survey of Building Energy Efficiency Policies in Cities*, p.28

City of Adelaide (2019) Sustainability Incentives Scheme. Last accessed 12 October 2019 https://www.cityofadelaide.com.au/about-council/grants-sponsorship-incentives/sustainability-incentives-scheme/

Bendigo Bank (2019) Home Loans. Last accessed 12 October 2019 https://www.bendigobank.com.au/personal/home-loans

Department of Energy, Environmental Protection Agency, Tax Credits for Home Builders. Last accessed 12 October 2019 https://www.energystar.gov/about/federal_tax_credits/federal_tax_credit_archives/tax_credits_home_builders

International Energy Agency/International Renewable Energy Agency. Energy Policy Act of 2005 (Energy Bill) Last accessed 12 October 2019

Arup and Institute for Sustainability (2013) *Delivering and Funding Housing Retrofit: A Review of Community Model*s, p.18

Low Carbon Living CRC (2017) *Best Practice Policy and Regulation for Low Carbon Outcomes in the Built Environment*, p.119

Australian Government COAG Energy Council (2015) *National Energy Productivity Plan* 2015-2030

Energy Efficiency Council (2019) *The World's First Fuel - How Energy Efficiency is Reshaping Global Energy System*s, p.29

Sustainability Victoria (2019) Better Commercial Buildings. Last accessed 12 October 2019 https://www.sustainability.vic.gov.au/betterbuildings

Sustainability Victoria (2019) Victorian Healthy Homes Program. Last accessed 13 October 2019 https://www.sustainability.vic.gov.au/Grants-and-funding/Victorian-Healthy-Homes-Program

Better Buildings Partnership (2019) About the Partnership. Last accessed 12 October 2019 https://www.betterbuildingspartnership.com.au/about/objectives/

World Green Building Council et al (2019) *Bringing embodied Carbon Upfront*, p.44

Theme 3: Minimum standards

COAG Energy Council (2018) Trajectory for Low Energy Buildings, Last accessed 12 October 2019 http://coagenergycouncil.gov.au/publications/trajectory-low-energy-buildings

Low Carbon Living CRC (2017) *Best Practice Policy and Regulation for Low Carbon Outcomes in the Built Environment*, p.56

Department of Environment, Land, Water and Planning (2017) *Victorian Energy Efficiency and Productivity Strategy*, p.40

Low Carbon Living CRC (2017) *Best Practice Policy and Regulation for Low Carbon Outcomes in the Built Environment*, p.129

Ministry of Housing and Urban Development (2019) Healthy Homes Standards. Last accessed 12 October 2019 https://www.hud.govt.nz/residential-housing/healthy-rental-homes/healthy-homes-standards/

Centre for Clean Air Policy, *Improving Building Efficiency with the Green Mark Scheme*, p.2

NSW Department of Planning, Industry and Environment (2019) NSW Climate Change Fund Programs. Last accessed 12 October 2019 https://www.environment.nsw.gov.au/topics/climate-change/nsw-climate-change-fund/programs

Theme 4: Energy Market Reform

American Council for an Energy Efficient Economy (ACEEE) (2010) *State Energy Efficiency Resource Standard Activity*

7 Hlecdik, R. & Faruqui, A. (2015) *Valuing Demand Response: International Best Practices, Case Studies and Applications*, Brattle Group, Cambridge MA.

Theme 5: Government Leadership

Office of Environment and Heritage (2019) *NSW Government Resource Efficiency Policy*

Centre for Clean Air Policy, *Improving Building Efficiency with the Green Mark Scheme*, p.2

Level Crossing Removal Authority (2017) *Bayswater Level Crossing Removal Project – Sustainability Report*

World Green Building Council et al, (2019) *Bringing embodied carbon upfront*, p.32

City of Sydney (2019) Net zero energy development, last accessed 12 October 2019 https://www.cityofsydney.nsw.gov.au/development/planning-controls/draft-plans-and-current-studies/net-zero-energy-development

Global Alliance for Buildings and Construction (2016) *Towards zero emissions efficient and resilient buildings – Global Status Report*, p.16

Parliament of the Commonwealth of Australia - House of Representatives Standing Committee on Infrastructure, Transport and Cities (2018) *Building Up and Moving Out*

World Green Building Council (2017) *Global Status Report* 2017, p.35

Queensland Government (2019) Energy Savvy Families Program, Last accessed 12 October 2019 https://www.qld.gov.au/housing/buying-owning-home/energy-water-home/electricity/digital-meters/energy-savvy-families

Energy Saving Trust (2019) Home Energy Scotland, Last accessed 12 October 2019 https://www.energysavingtrust.org.uk/scotland/home-energy-scotland

Australian Sustainable Built Environment Council (ASBEC) (2019) *Growing the Market for Sustainable Homes: Industry Roadmap*, p.29

Energy Efficiency Council (2019) *The World's First Fuel - How Energy Efficiency is Reshaping Global Energy Systems*, p.19

Australian Government COAG Energy Council (2015) *National Energy Productivity Plan* 2015-2030

New Zealand Green Building Council (2019) Homestar. Last accessed 12 October 2019 https://www.nzgbc.org.nz/homestar

Instinct and Reason, (2011) *Impact of Residential Mandatory Disclosures Schemes Market Research Report,* p.5

Low Carbon Living CRC (2017) *Best Practice Policy and Regulation for Low Carbon Outcomes in the Built Environment*, p.55

Theme 6: Robust rating tools for different building types

Australian Government COAG Energy Council (2015) *National Energy Productivity Plan* 2015-2030

New Zealand Green Building Council (2019) Homestar. Last accessed 12 October 2019 https://www.nzgbc.org.nz/homestar

Instinct and Reason, (2011) *Impact of Residential Mandatory Disclosures Schemes Market Research Report*, p.5

Low Carbon Living CRC (2017) *Best Practice Policy and Regulation for Low Carbon Outcomes in the Built Environment*, p.55

Theme 7: High Performing Products and Materials

Tasmanian Government (2018) Media Statement from Guy Barnett, Minister for Energy – "Tasmanian Energy Efficiency Loan Scheme"

Low Carbon Living CRC (2017) *Best Practice Policy and Regulation for Low Carbon Outcomes in the Built Environment*, p.137

Commonwealth of Australia (2017) *National Offset Standard for Buildings*

Oslo Kommune (2017) Oslo Smart City Strategy: Zero-Emissions Construction Sites, Last accessed 13 October 2019 https://www.oslo.kommune.no/politics-and-administration/smart-oslo/projects/zero-emission-construction-sites/

World Green Building Council et al, (2019) *Bringing embodied carbon upfront*, p.55

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