AUSTRALIAN SUSTAINABLE BUILT ENVIRONMENT COUNCIL

PREPARING FOR CHANGE:

A CLIMATE CHANGE ADAPTATION FRAMEWORK FOR THE BUILT ENVIRONMENT

"We cannot afford to delay action on adaptation because decisions we are making today will affect our vulnerability to climate change in the future."

The Hon Greg Combet AM MP
Minister for Climate Change and Energy Efficiency
20 September, 2011

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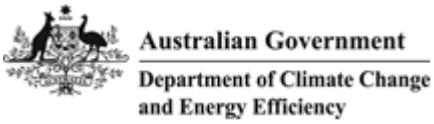

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PRESIDENT'S FOREWORD

I am proud of ASBEC's role in stimulating debate and securing policy initiatives to address important climate change issues impacting on our built environment.

Over recent years ASBEC has made a significant contribution to climate change mitigation and abatement issues as they relate to the built environment, and more recently, has delivered the first stage of a comprehensive strategy to promote a shift to low and zero emission housing in Australia.

In turning its mind to climate change adaptation, it quickly became apparent to the ASBEC Climate Change Task Group that while some adaptation activity in the built environment was occurring, it was happening piecemeal across the country.

In addition, our new buildings and suburbs are being built based on past climate information not on predicted future climate change.

This risks leaving a legacy of urban communities being underprepared for future climate change impacts.

The report *Preparing for Change: A Climate Change Adaptation Framework for the Built Environment* was initiated by the Task Group as a result of the need for a coordinated, strategic response to this issue.

We have witnessed a number of extreme weather events within Australia over recent years and the toll that these have had on the community, our built environment and our economy has been significant and long lasting.

It is incumbent upon all levels of government, industry, community and other stakeholders to work together to enhance the resilience of our built environment and community to extreme weather events and predicted future climate change impacts.

I commend this report as another milestone in ASBEC's contribution to public debate and in its efforts to improve the economic, social and environmental performance of the built environment.

The Hon Tom Roper
President, ASBEC

ABOUT ASBEC

ASBEC is the peak body of key organisations that are committed to a sustainable built environment in Australia.

ASBEC members include industry and professional organisations, academic institutions, non-government organisations and government observers who are involved in the planning, design, delivery and operation of our built environment and are concerned with the economic, social and environmental performance of the sector.

To contact ASBEC, please call (02) 8252-6707 or e-mail info@asbec.asn.au.

AUSTRALIAN SUSTAINABLE BUILT ENVIRONMENT COUNCIL

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"Adapting to the impacts of unavoidable climate change is critical to any effective climate change response. Along with efforts to reduce Australia's emissions and helping to shape a global solution, adaptation is one of the three pillars on which Australia's comprehensive climate change strategy is built."

Australian Department of Climate Change[1]

According to the Australian Treasury, climate change is "*the largest threat to the environment and represents one of the most significant challenges to economic sustainability*."[2]

Experts predict that, over coming decades, we are likely to witness an increase in general temperatures and more frequent extreme weather events, such as storms, floods, droughts, and bushfires.

Mitigation and abatement have long been the predominant response to climate change by public policy-makers and, with the imminent commencement of the carbon tax, this continues to be the case.

Yet if the effects of climate change are already being felt, if communities are already under threat, risk management principles would suggest that our focus needs to change from "how are we going to stop it?" to "how are we going to become resilient to it?".

Adaptation must clearly be given greater attention and support from governments.

A coordinated, well-resourced, and nationally consistent suite of policies is essential to ensure that the built environment – the location of most of our population and the platform for Australia's economic prosperity – is protected from predicted risks.

The Australian Sustainable Built Environment Council (ASBEC), a peak body of organisations committed to a sustainable built environment, believes that governments need to implement a comprehensive adaptation policy framework.

While industry and the community have their individual roles to play, it is government, the manager of Australia's regulatory and public policy systems, that needs to show leadership.

Governments should support the owners, managers, and inhabitants of our built environment – our buildings, precincts, and communities – and help them to make their regions resilient to the effects of climate change.

The benefits are likely to be significant: by implementing adaptation strategies now governments and individuals will save money in the longer term.

We will also be able to minimise the adverse impacts witnessed from recent extreme weather events – including death, displacement, and mental distress.

With an estimated replacement value in excess of $5.7 trillion, the built environment needs effective and targeted government strategies to ensure communities are protected.

ASBEC has developed a ten-point policy framework to help the three spheres of government deliver comprehensive adaptation strategies.

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[1] Department of Climate Change (2010): *Adapting to Climate Change in Australia: An Australian Government Position Paper*, p. 1

[2] Australian Treasury (2010): *Australia to 2050: future challenges*, p. vii

The Built Environment Adaptation Framework calls for leadership and coordinated policy development from our public sector, recommending that governments:

1. engage with industry;
2. lead by example;
3. sponsor applied research;
4. provide better access to information and tools;
5. invest in education;
6. provide incentives;
7. reform and improve regulation;
8. review building codes and standards;
9. improve planning systems and outcomes; and
10. improve insurance and financial services.

This ten-point provides a roadmap for government to work with all relevant stakeholder groups to ensure consistent, successful adaptation strategies can be introduced.

It is important, it is urgent, and it is what the Australian Government itself says is necessary.

THE BUILT ENVIRONMENT ADAPTATION FRAMEWORK

The Australian Sustainable Built Environment Council (ASBEC) proposes an Adaptation Policy Framework to improve the resilience of the built environment in the face of climate change.

This Framework aims to:

- protect the wellbeing of communities through targeted policy initiatives and better urban and building design;
- ensure appropriate institutional arrangements to facilitate adaptation;
- realise economic benefits from early adaptation through effective strategic planning and risk minimisation;
- advance sustainability through better resource and risk management strategies; and
- increase community education and awareness about climate change risks and adaptation.

It outlines ten ways government can work with industry to deliver effective adaptation strategies.

1. Engage with industry

The Australian Government should establish a National Built Environment Adaptation Council which would:

- report directly to the Minister for Climate Change;
- be comprised of representatives of industry and the three spheres of government;
- be supported by a dedicated and properly resourced secretariat that can coordinate cross-jurisdictional and cross-departmental action as appropriate;
- provide a platform for dialogue on climate change adaptation and mitigation policy and strategies for the built environment using this Framework as the basis for action;
- facilitate the exchange of information and closer collaboration on adaptation strategies;
- sponsor research into the impacts of climate change on the built environment and appropriate adaptation measures; and
- develop mechanisms for community engagement on adaptation needs and actions.

2. Lead by example

The three spheres of government should:

- set benchmarks to measure their performance in implementing adaptation strategies for their own operations;
- require the consideration of climate change impacts in tender documents for all relevant contracts;
- make all site relevant information, such as mapping, readily available through procurement processes, to support the assessment of climate change risks;
- streamline procurement processes to ensure there is minimal cost arising from any additional requirements;
- commit to undertaking adaptation work within their own facilities;
- work with private property owners to improve adaptation within properties leased by government, through the use of demonstration projects or ‘green’ lease clauses; and
- report annually on their performance against adaptation benchmarks.

3. Sponsor applied research

The Australian Government should:

- under new funding arrangements direct an organisation, such as the National Climate Change Adaptation Research Facility (NCCARF), to:
    - establish formal mechanisms to consult with, and act upon the advice of, industry, government, and the community on an ongoing basis about their applied research needs and the practical application of existing and future research projects;
    - conduct an annual review of leading local and international climate change adaptation policies, approaches, and solutions for the built environment, including: regulation and regulation reform; tools and techniques; innovative incentives; and education strategies; and
    - develop a robust assessment of the nature, timing, impact, and consequences of climate change for the built environment, including mapping the ongoing hazard exposure to identify priority areas for intervention and preventative hazard mitigation;
- commission the National Built Environment Adaptation Council to work with Australian and State/Territory Treasury and Finance departments to develop cost benefit methodologies that appropriately value climate change adaptation; and
- work with the developers of existing building rating tools to identify opportunities to recognise adaptation activity.

4. Provide better access to information and tools

The Australian Government should:

- develop a national climate change risk allocation framework for the built environment to help governments, businesses and communities recognise, understand, and manage the risks they face. This will clarify:
    - what government predicts the biggest risks are likely to be and in what timescale;
    - how climate change risks are currently identified and managed; and
    - who will bear the cost of disasters caused by extreme weather;
- establish a 'one stop shop' climate change adaptation web portal and make it freely available. This will:
    - provide information on national climate change data, such as expected temperature changes, flooding risk and other hazards, to facilitate adaptation decision making;
    - help people keep up-to-date with the most recent advice and data provided to government;
    - allow built environment professionals and communities to understand the predicted impacts of climate change for their local areas and to take appropriate action to enhance resilience; and
    - give stakeholders access to information, case studies and tools to help with adaptation;
- work with state, territory, and local governments, in consultation with industry, to prepare case studies of planning and building decisions and leading practice approaches to adaptation;
- work with organisations such as Green Cross on national programs to encourage residents in high risk areas to assess and manage environmental risks;
- establish key performance indicators for measuring adaptation and resilience for all sectors of the community as part of a framework for monitoring and evaluating performance in the built environment; and
- prepare guidance to help local governments consistently manage hazards in high risk areas, including flooding, bushfires, coastal inundation, cyclones and storm surge.

5. Invest in education

The Australian Government, in consultation with the National Built Environment Adaptation Council, should:

- institute a public education campaign on the likely impacts of climate change, such as increased extreme weather events, to encourage people to take adaptation action; and
- support funding programs for education and training for local government staff and built environment professionals in climate change adaptation strategies.

6. Provide incentives

The Australian Government should work with industry and its state, territory, and local counterparts to develop a suite of incentives to encourage early action on adaptation within the built environment, which might include:

- financial incentives for retrofitting existing building stock to greater resilience standards, such as:
    - targeted, interest-free loans;
    - grants;
    - accelerated depreciation;
    - stamp duty and land tax exemptions for buildings in high-risk areas that are being upgraded; and
    - assistance to reduce vulnerability for residents and businesses in high-risk areas ;
- alternative financing mechanisms;
- climate resilience assessments for buildings;
- 'green door' development application processes for householders or businesses implementing adaptation initiatives and green design elements (an example is the City of Chicago's Green Permit Program); and
- a possible buy-back program of vulnerable properties in high-risk areas where authorities might wish to discourage development or redevelopment.

7. Reform and improve regulation

The three spheres of government should work together to:

- review all existing climate change regulation relating to the built environment to minimise duplication and red tape while improving outcomes; and
- identify regulations that might be improved to rectify barriers to climate change adaptation.

8. Review building codes and standards

The Australian Government should:

- regularly review the content of the National Construction Code of Australia and its supporting standards to address climate change adaptation issues;
- improve the financial and logistical capacity of current building regulation and standards development processes to keep up to date with research and to ensure that potential climate change risks are continuously being addressed;
- reinforce the need for performance based approaches to building regulation to encourage innovations in products, building techniques, and design; and
- ensure through rigorous cost/benefit analysis processes that any changes to building regulations are reasonable, necessary, and cost-effective, and appropriately value climate change adaptation.

9. Improve planning systems and outcomes

The Australian Government should work with state, territory, and local governments to:

- determine, including through community consultation, the appropriate coverage of climate change adaptation strategies within planning frameworks;
- promote the development and implementation of nationally consistent planning principles, policies and strategies;
- promote innovative building and precinct designs to deal with future climate conditions; and
- integrate climate change considerations into strategic and precinct planning at the strategic planning and zoning stages, to provide certainty for industry and community.

10. Improve insurance and financial services

The National Built Environment Adaptation Council should commission work to develop options for:

- the insurance sector that:
    - recognise the roles and responsibilities of insurers and government in providing coverage for areas at risk from climate change;
    - increase transparency around insurance funding and risk assessment processes;
    - provide plain English information about risks and the potential to obtain coverage;
    - ensure that renters and low income residents have access to appropriate insurance; and
    - examine the appropriateness of a reinsurance pool or other government-backed mechanisms to encourage insurers to insure properties in flood, cyclone, storm surge, or bushfire prone areas; and
- the financial services sector that improves its investment and lending strategies and processes to value risk and adaptation activity appropriately.

INTRODUCTION

> ***"Adaptation policy is crucial for dealing with the unavoidable impacts of climate change […]."***
>
> ***The Stern Review***[3]

Climate change poses a significant risk for the built environment.

In Australia, extreme weather events – from widespread droughts and raging bushfires to destructive cyclones and devastating floods – are only expected to worsen.

International action may come too late to avoid these impacts, meaning mitigation policies alone are an insufficient response to the potential risks.

Yet such initiatives have been the predominant focus of public policy discussion to date, with limited attention given to strategies to help communities deal with the effects of a changing climate.

If Australian communities are to be resilient, adaptation must now become a primary public policy goal.

Background

The Australian Sustainable Built Environment Council (ASBEC) has taken a leading role in influencing policy on climate change mitigation.

Through its Climate Change Task Group (CCTG) and the *Second Plank – Building a Low Carbon Economy with Energy Efficient Buildings (*2008) and *Second Plank Update* (2010) reports, it has clearly quantified the significant emissions abatement potential of the built environment and proposed energy efficiency initiatives, some of which the Government has moved to implement.

But carbon abatement is only part of the story.

The Task Group's focus has now turned towards the problems the built environment faces in coping with climate change.

Increasingly extreme weather events both in Australia and overseas are demonstrating the growing urgency for government action on adaptation.

With an overall replacement cost for Australia's built environment estimated in excess of $5.7 trillion[4] the economic, social, and environmental risks posed by climate change are significant.

In his 2008 Climate Change Review, Professor Ross Garnaut reflected an increasingly accepted international position – that the opportunity costs of delaying decisions around mitigation are high, but they could be reduced by policies that support productive adaptation.[5]

Despite positive moves by government to address mitigation, adaptation remains low on the public policy agenda.

Yet the continuing prosperity of the nation is dependent on how resilient we are to changes in climate.

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[3] Stern, N (Baron Stern of Brentford) (2006): *Stern Review on the Economics of Climate Change*, Executive Summary, p. xxi

[4] Geoscience Australia (2011): *National Exposure Information System (NEXIS) metadata for State aggregated information*

[5] Garnaut, R (5 June, 2008): 'Measuring the Immeasurable: The Costs and Benefits of Climate Change Mitigation' *The Sixth H.W. Arndt Memorial Lecture*, Australian National University

Defining adaptation

The term 'adaptation' has been broadly defined according to the needs and perspectives of different stakeholders:

- **United Nations Environment Program's (UNEP) Intergovernmental Panel on Climate Change (IPCC)**[6]

  Adaptation *- adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation.*

- **United Nations Framework Convention on Climate Change (UNFCCC) Secretariat**[7]

  Adaptation *- practical steps to protect countries and communities from the likely disruption and damage that will result from effects of climate change. For example, flood walls should be built and in numerous cases it is probably advisable to move human settlements out of flood plains and other low-lying areas…"*

- **United Nations Development Program**[8]

  Adaptation *- a process by which strategies to moderate, cope with, and take advantage of the consequences of climatic events are enhanced, developed, and implemented*.

- **UK Climate Impact Programme (UKCIP)**[9]

  Adaptation *- the process or outcome of a process that leads to a reduction in harm or risk of harm, or realisation of benefits associated with climate variability and climate change.*

- **Productivity Commission**[10]

  Climate change adaptation *– action by households, firms, other organisations and governments to respond to the impacts of climate change that cannot be avoided through climate change mitigation efforts.*

- **Australian Department of Climate Change and Energy Efficiency**[11]

  'Climate adaptation' *refers to the decisions that people, communities, businesses and governments take to prepare for and respond to a changing climate. It also refers to the actions they take to manage climate impacts. It is similar in many respects to other actions or decisions that individuals or governments take every day to manage external shocks such as natural disasters or financial sector volatility.*

  'Effective adaptation' *is the ability to make and implement the best possible decisions. In dealing with climate uncertainty, these decisions need to be timely, creative and flexible.*

In essence, 'adaptation' is a process of managing and responding to perceived climate change risks in order to minimise their impacts.

It requires a proactive, collaborative, and coordinated approach from all stakeholders.

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[6] United Nations Environment Program (UNEP) Intergovernmental Panel on Climate Change (IPCC) (2001a): *Third Assessment Report*, p. 365

[7] Quoted on National Climate Research The Netherlands website: http://www.climateresearchnetherlands.nl/projects/keytermsclimatechange, accessed on 15 June, 2012

[8] Quoted on Victorian Centre for Climate Change Adaptation Research website: http://www.vcccar.org.au/content/pages/what-climate-change-adaptation, accessed on 15 June, 2012

[9] UK Climate Impact Programme (UKCIP) (2003): 'Climate adaptation: Risk, uncertainty and decision-making' in *Glossary of Climate Adaptation and Decision-Making* on People and Place website: http://www.peopleandplace.net/media_library/text/2009/5/19/glossary_of_climate_adaptation_and_decision-making, accessed on 15 June, 2012

[10] Productivity Commission (October, 2011): *Barriers to Effective Climate Change Adaptation: Issues Paper*, p. 3

[11] Department of Climate Change and Energy Efficiency (2011): *Barriers to Effective Climate Change Adaptation: A Submission to the Productivity Commission*, p. ii

Purpose and scope of the Built Environment Adaptation Framework

One of the key impacts of climate change will be a higher level of risk to the built environment.

This could be profound and could reduce the integrity and reliability of our built environment, for example:

- building materials could degrade or fail much faster in the event of higher temperatures and more frequent extreme weather events;
- foundations could be compromised by changes to soil composition through significant variations in rainfall, which could lead to collapses;
- buildings may be contaminated and deemed uninhabitable with increases in flood and inundation events;
- properties could be damaged or lost due to storm surges, increased coastal erosion, and higher sea levels, the impacts of which are being seen already in many Australian coastal settlements; and
- structural and other building components could fail sooner than anticipated as a result of increased atmospheric pressure loadings caused by more frequent and intense tropical storms and cyclones and damage from increased solar radiation.

These could render communities unliveable and undermine the productivity of Australian businesses.

Adaptation will help to minimise such impacts, reduce costs over the longer term, and deliver net benefits for business, government, and the community.

But without government support or a nationally coordinated policy, adaptation will occur slowly and only on a piecemeal basis.

ASBEC is therefore calling for a strategic approach to ensure that Australia is prepared to respond to these challenges and ensure the nation's ongoing prosperity and social viability beyond the 21st Century.

The Built Environment Adaptation Framework proposes solutions to facilitate adaptation.

It has been informed by surveys of ASBEC's membership about the gaps in policy and the specific needs of the built environment, and will help governments capture the significant potential benefits of early action.

The intention of this document is to propose a clear and comprehensive policy approach, by:

- starting a constructive discussion about the risks, impacts, and implications of climate change associated with the built environment;
- providing information on climate change risks and adaptation policy options, to improve understanding around the issues;
- creating a basis for governments and others across the built environment to implement a strategic public policy approach to adaptation; and
- establishing a dialogue and potential platform for joint action by industry and government on adaptation.

The framework acknowledges the role played by existing Australian Government policies, such as the National Urban Policy, and seeks to meet the COAG national objective to *"ensure Australian cities are globally competitive, productive, sustainable, liveable, and socially inclusive and well placed to meet future challenges and growth"*.

Although the term 'built environment' is usually used to describe both buildings and infrastructure, such as roads and utility services, this document has specifically focussed on strategies for residential and non-residential buildings and precincts.

ASBEC recognises the vital importance of protecting infrastructure against the effects of climate change.

We urge governments to work with the infrastructure sector to develop a coordinated approach to their adaptation requirements, using elements of this framework as a basis, as appropriate.

ENSURING RESILIENCE: THE CASE FOR ACTION

> ***"From a human perspective, the rate of climate change is already discernible to the present generation, and will be even more prominent in the lives of our children and grandchildren. It is leading to significant risks today, and more serious risks in the coming decades".***
>
> ***The Climate Commission***[12]

Considering the potential risks to Australia from climate change, a failure to act could have far-reaching consequences, such as:

- making our communities uninhabitable;
- damaging the competitiveness of our industries; and
- causing widespread environmental damage.

This is why the community is looking to government for leadership.

Yet, Australia is still underprepared to deal with this critical social, environmental, and economic issue:

> *"Even at the levels of mitigation that now seem to be the best possible, the challenges could be considerable. In the absence of mitigation, we can be reasonably sure that they would be bad beyond normal experience.*
>
> *We know that immense shocks unsettle basic institutions, with unfathomable consequences.*
>
> *We know that the possibilities from climate change include shocks far more severe than others in the past that have exceeded society's capacity to cope, and moved societies to the point of fracture."*[13]

Regardless of what mitigation action we take today, the effects of climate change are likely to be felt for some time to come.

This could be in the form of:

- higher temperature extremes – since 1950 there has been a decrease in the number of low and an increase in the number of high temperature extremes;
- increased rainfall and flooding;
- more frequent and intense bushfires, such as those in Canberra (2003) and Victoria (2009)[14];
- more severe weather events, such as tropical cyclones and hailstorms; and
- enduring risks to communities and infrastructure arising from predicted sea level rises[15].

And it would seem Australia is already witnessing some of these events – monitoring by the CSIRO in 2009 showed that *"some measures of climate change are tracking at or above the worst case scenarios considered possible just a couple of years ago"*[16].

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[12] Climate Commission (2011): *The Critical Decade*, p. 6

[13] Garnaut, R (2008): *Garnaut Climate Change Review Final Report*, p. xxvi

[14] Climate Commission (2011): *The Critical Decade*, p. 38

[15] Ibid.,p. 23

[16] National Research Flagships, CSIRO, Bureau of Meteorology (November, 2009): *Climate Change in Australia: Science Update 2009*, November, *Issue 2*, p. 2

If this is so, then there is clearly an urgent need for a comprehensive, nationally coordinated adaptation program to avoid the potential costs of ongoing climate change.

Climate change and the built environment

In 2008, the Garnaut Climate Change Review looked at the potential impacts of climate change on infrastructure and the built environment.

It found that Australian communities would experience varying levels of degradation from floods, storms and cyclones, storm surges, sea level rise, heatwaves, and bushfires over coming decades.

The consequences of such events on our communities can already be anticipated[17]:

Higher average temperatures and more extreme temperature events could:

→ increase thermal discomfort and the risk of heat stress for the population;

→ cause an upsurge in demand for air-conditioning, placing strain on energy supply networks and raising utilities costs;

→ compound heat in urban environments, creating 'heat island' effects on very hot days and putting additional pressure on infrastructure;

→ adversely affect people's comfort and productivity, as well as the health and safety of some of the most vulnerable in our communities;

→ have an effect on the structural integrity of buildings, increasing the risk of cracking or failure of building envelopes (roofing, cladding, window systems); and

→ cause soil to dry out and move, thereby undermining foundations.

Sea level rise and storm surges could:

→ lead to greater risk of flooding, resulting in water damage to buildings and their contents;

→ cause contamination from sewage, soil, and mud, rendering some buildings uninhabitable;

→ intensify coastal erosion, which might lead to the loss or damage of property;

→ ultimately undermine or destroy foundations, potentially leading to structural collapse; and

→ increase salt spray, affecting the durability of construction materials.

More intense tropical cyclones and storms could:

→ increase rain and the moisture penetration of buildings, leading to internal damage;

→ place stress on building loadings and materials leading to structural failures and the loss of roofing materials;

→ cause the structural failure of building components, leading to a higher potential for total building collapse and destruction; and

→ cause damage to other properties from flying debris.

The variation of short intensive wet spells and prolonged dry spells could:

→ increase ground and foundation movement and shrinkage from flooding events and changes in groundwater; and

→ ultimately cause the degradation and failure of pipe and waterway structures.

Increased solar radiation could lead to the degradation of plastics, wood and surface coatings.

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[17] Adapted from Snow, M, Prasad, D (February, 2011): 'Climate Change Adaptation for Building Designers: An Introduction' in *Environmental Design Guide, 66 MSa*, Australian Institute of Architects, Canberra

More frequent bushfires could:

→ cause total or partial fire, smoke, and water damage to building property and contents;

→ increase risk to the health and safety of occupants; and

→ place stress on the resources of emergency services.

As can be seen, the impact of the different predicted consequences of climate change will potentially be significant for buildings and communities.

The economic impacts of climate change

It is clear from the above that as the effects of climate change are increasingly felt, the cost to individuals, governments, and the community will escalate.

This will occur in two ways: a higher bill for responding to more frequent disasters and an increase in the cost of business as usual.

If recent extreme weather events are a benchmark, the impact of future disasters on the economy could be considerable, for example:

- the 2009 Black Saturday bushfires in Victoria caused the loss of 173 lives and were estimated to have cost $4.4 billion[18];
- floods in Brisbane, Victoria, and Tasmania in 2010-11 were calculated to have caused $5.6 billion damage[19]; and
- Cyclone Yasi in 2011 was estimated to have caused over $3.5 billion[20] in damage and lost business in Queensland.

These costs are borne by the whole community and minimising them should be a goal of any strategy.

Extreme events aside, the impacts of climate change on daily life will also be detrimental to the Australian economy.

If business and the community do not adapt to changing conditions they risk being hit with unsustainable cost increases.

This will undermine community resources and impact upon business profitability.

Buildings in coastal settlements

(From the Garnaut Climate Change Review Final Report (2008), Chapter 15, p. 379)

"As the climate changes in the absence of strong effective global mitigation, Australia's coastal communities and associated infrastructure would be subject to increasingly frequent and severe weather events, as well as impacts from sea level rise, storm surges and associated coastal flooding. The broad preference of Australians for living on the coast makes the ability of the coastal built environment to withstand climate change impacts a determining factor in the distribution of future human settlements.

Domestic and public infrastructure tends to be long-lived—for example, residential buildings typically have a design life of about 40 years (Maunsell 2008), although average actual lives are longer. Infrastructure planning for new and existing settlements should consider the potential climate change impacts on the entire life cycle of the proposed infrastructure. This can reduce future maintenance requirements, the need for premature replacement or abandonment, and the need for relocation of entire settlements in the case of increasingly severe weather events.

Steps can be taken to decrease the vulnerability of new buildings to climate change. These generally fall into three categories: changes in design, changes in materials, and changes in location (BRANZ Ltd 2007; CSIRO et al. 2006; Engineers Australia 2008).

For existing settlements, changes in both building design and materials can provide effective options for adaptation at reduced cost if retrofitting aligns with asset renewal. For new settlements, the foremost consideration is to avoid placing infrastructure in highly exposed positions.

By 2100 under a best-estimate no-mitigation case, measures for coastal protection may not be adequate to withstand the damaging impacts of climate change on buildings. The relocation of industries, activities and households away from certain coastal areas may be the only available adaptation response."

[18] Gray, D (1 August, 2010): 'Black Saturday cost $4.4 billion' in *The Age*, http://www.theage.com.au/victoria/black-saturday-cost-44-billion-20100801-11116.html, accessed on 23 June, 2012

[19] Levy, M (27 January, 2011): 'Levy to pay for $5.6b flood bill' in *The Brisbane Times*, http://www.brisbanetimes.com.au/business/levy-to-pay-for-56b-flood-bill-20110127-1a64x.html, accessed on 23 June, 2012

[20] *Reuters* (3 February, 2011): 'Cyclone Yasi to cost insurers AUS $3.5 bln – forecaster', http://www.reuters.com/article/2011/02/03/insured-losses-yasi-idUSLDE7121NR20110203, accessed on 23 June, 2012

The consequences of such an outcome have been examined by the Productivity Commission[21]:

> *"A number of studies have attempted to model the economic impacts of climate change globally. Estimated impacts in 2100 vary from a 1 per cent decrease in GDP to an 11 per cent decrease, depending on the assumptions used in the models.*
>
> *For Australia, studies such as Garnaut (2008b) and Gunasekera (2008) have estimated the impact of climate change in 2100 to be around a 5–6 per cent fall in GDP."*

If realised, a 5-6 per cent fall in GDP is likely to lead to increased unemployment, superannuation losses, and a fall in the nation's standard of living.

With such potentially adverse economic outcomes, it is in the mutual interests of government, industry, and the community to implement adaptation strategies that will help to minimise them.

The social impacts of climate change

Economic costs should not be the only driver for adaptation activity – the social impacts of climate change and extreme weather events should also be considered.

The liveability of our homes and communities is directly dependent upon their resilience in the face of changes in climate.

The potential to diminish the risk of extreme events and their consequent impacts upon the welfare of the population increases the importance of implementing adaptation strategies.

For example, *The Critical Decade* reported that an increase in mental health and related problems – such as depression, bereavement, post-traumatic stress, and other mood and anxiety disorders – was a long-term effect of the 2010-11 Queensland floods.

Other events showed similar results:

> *"The 2009 Victorian bushfires also led to considerable psychological distress, some of it prolonged, to those who experienced the fires and survived (A.J. McMichael, personal communication)".*[22]

Although climate change cannot be held solely responsible for such outcomes, an increase in extreme events is likely to bring about higher levels of psychological distress within the community.

The general welfare of the community is also affected by extreme weather events.

The Productivity Commission has found that the differing ability of sections of the community to identify and manage climate change risks could potentially exacerbate disadvantage and might require targeted solutions.[23]

Adaptation must be seen as an important part of the public policy response to these challenges.

The importance of our communities

> *"The built environment plays a fundamental economic, cultural and social role in our lives. Our residential, commercial and public buildings provide shelter and security. They affect our productivity, our health and our general well-being and amenity. Buildings are also relatively long-lived assets."*[24]

The built environment is the platform for Australia's economic success.

Cities and towns are centres for commerce and trade and are vital to the productivity, prosperity, and liveability of our country.

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[21] Productivity Commission (April, 2012): *Barriers to Climate Change Adaptation Draft Report*, p. 19

[22] Climate Commission (2011): *The Critical Decade*, p. 4

[23] Productivity Commission (April, 2012): *Barriers to Climate Change Adaptation Draft Report*, p. 17

[24] Maddocks (2011): *The role of regulation in facilitating or constraining adaptation to climate change for Australian infrastructure*, p. 47

80 per cent of the nation's economic activity occurs in our major cities[25].

As of 2010, 16,874,541 people lived in Australia's 18 largest cities (those over 100,000 people)[26], or 75.6 per cent of a total population of 22,328,847[27], the vast majority within 100 km of the coast.

But how big is Australia's built environment?

Geoscience Australia estimates that as at 2010 Australia had:

- 7,034,888 residential buildings with a replacement value of $2.9 trillion;
- 194,504 commercial buildings worth $2.5 trillion; and
- 127,399 industrial buildings worth $0.3 trillion.

In other words, the replacement cost of 7,356,791 buildings across Australia was approximately $5.7 trillion.[28]

Narrowing the focus a little, the Department of Climate Change and Energy Efficiency (DCCEE) made a preliminary estimate of coastal areas at risk from shoreline recession and erosion, finding the exposure of:

- between 5,800 and 8,600 commercial buildings, with a value ranging from $58 to $81 billion;
- between 3,700 and 6,200 light industrial buildings, with a value of between $4.2 and $6.7 billion; and
- between 187,000 and 274,000 residential buildings, with a value of between $51 and $72 billion dollars.[29]

So DCCEE expected anywhere between $113.2 billion and $159.7 billion worth of property would be at risk from rising sea levels and storm surges.

As those estimations were based on 2008 values, the potential costs would be significantly higher today.

Clearly there is a significant amount of property at risk from climate change with a very high replacement cost.

The built environment is central to the economic and social quality of life in Australia – risks from climate change need more than mitigation action if these communities are to be resilient to its effects.

The need to adapt

In 2008, Professor Garnaut suggested that the international community had taken too long to agree upon and implement effective mitigation policy, and it would not be possible to avoid damage from climate change.

He argued that the only option available to governments was to have a significant period of adaptation in order to maintain the quality of life we currently enjoy.

> *"Sound policy on adaptation involves costs, but in many circumstances can later reduce the costs of climate change impacts. […] Adaptation to some of the possible consequences of climate change would test humans and their values and preferences in profound ways."*[30]

To be successful, adaptation strategies will need to vary across Australia, reflecting local circumstances and involving significant public and private investment.

However, a greater understanding of, and adaptation to, climate change will inevitably lessen the consequent social and economic, because:

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[25] Major Cities Unit, Department of Infrastructure and Transport (2011): *State of Australian Cities*, p. 4

[26] Ibid., p. 17

[27] Australian Bureau of Statistics (2010): *Population by Age and Sex, Regions of Australia* (Catalogue No. 3235.0), http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3235.02010?OpenDocument, accessed on 15 June, 2012

[28] Geoscience Australia (2011): *National Exposure Information System (NEXIS) metadata for State aggregated information*

[29] Department of Climate Change and Energy Efficiency (2011): *Climate Change Risks to Coastal Settlements and Industry*

[30] Garnaut, R (2008): *Garnaut Climate Change Review Final Report*, p. xxvi

- it is generally less expensive to increase resilience prior to an event than to recover after one (whether that be repair or replacement); and
- mechanisms to increase resilience tend to be more cost effectively implemented early (through planning, design, or policy) than through subsequent retrofit.

In other words, acting now will reduce the ultimate cost of having to respond later to changes in climate.

Clearly these factors are not absolute, and any proposed adaptation measures should still be subjected to broad-based cost benefit analysis and rigorous risk assessment processes.

Benefits of proactive adaptation in the built environment

Buildings, settlements, and infrastructure were identified early on as areas which might benefit most from early adaptation planning.[31]

This is perhaps not surprising, given their high value and the length of time they are likely to be occupied.

Early adaptation is expected to deliver tangible benefits and savings over the longer term, including:

- reduced risks and liabilities from considering climate change in planning and management decisions;
- higher future asset values due to lower ongoing operational costs;
- lower repair and maintenance expenses, with a reduced need for retrofits;
- demonstrated due diligence for risks such as property damage and community health and safety;
- minimised investment in high risk areas;
- potentially, lower insurance premiums due to a reduced chance of damage to premises from climate change impacts; and
- decreased energy costs for assets that have been adapted to long-term temperature changes.

However, determining the financial quantum of those benefits has proved challenging.

An economic analysis in 2009 of climate change through a series of case studies[32] found that adaptation is often a good financial decision.

The studies also showed that:

- parts of the built environment in Australia are already being affected by weather impacts; and
- many adaptation solutions are 'no regrets' measures that have net benefits even in the absence of climate changes; and
- taking early action can help to reduce risk, decrease implementation costs (by incorporating action as part of a planned building or retrofit schedule rather than on an ad hoc basis), and minimise damage.

So, even if no definitive prediction can be made about the precise financial returns from adaptation, it is still an economically sensible decision.

These findings are backed up by independent work carried out by Martin Parry and his colleagues in 2009 for the Grantham Institute for Climate Change at the Imperial College, London.

Using a generalised adaptation cost curve, researchers suggested that adapting to initial damage (say the first 10 per cent) is likely to be disproportionately cheaper than for the remainder[33], noting variances between different sectors and in different locations.

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[31] Allen Consulting Group (March, 2005): *Climate Change Risk and Vulnerability: Promoting an efficient adaptation response in Australia*

[32] AECOM Australia (2010)

[33] Parry, M. et al. (2009): *Assessing the costs of adaptation to climate change*, Imperial College, Grantham Institute for Climate Change, p. 12

Ultimately, adaptation applied in a business-as-usual scenario was assessed to be 'very worthwhile' and likely to lead to a mean benefit-to-cost ratio of about 60:1.[34]

However, it is important to be clear about how much people are willing to pay for adaptation to avoid damages, because:

- it will probably be very inexpensive to avoid some impacts, but prohibitively expensive to avoid others; and
- some impacts cannot be avoided even if funds were unlimited, because the technologies to do so are not yet available.

Investment in adaptation is a vital part of our response to climate change, but like mitigation it should not be viewed as a cure-all:

> *"To understand the costs of adaptation one has to look at adaptation in its larger context. Adaptation is only one part of the overall response to (and therefore the costs of) climate change. The total burden of climate change consists of three elements: the costs of mitigation (reducing the extent of climate change), the costs of adaptation (reducing the impact of change), and the residual impacts that can be neither mitigated nor adapted to."*[35]

Furthermore:

> *"Investment in adaptation will not avoid all damages to infrastructure. The annual economic damage caused by large extreme-weather disasters, 1996–2005, was over $50 billion a year. This gives an indication of weather impacts that are currently not avoided by adaptation – even in countries where the population is served by protective infrastructure and good-quality buildings".*[36]

Thus the cost of adaptation must be considered alongside the risks posed and costs associated with a failure to act. [37]

There is no doubt that accurately determining the costs and benefits of adaptation is as difficult as estimating the economic impacts of climate change.

However, considering the importance and inherent value of the built environment, potential benefits of adaptation mean that any uncertainties should not be allowed to discourage early action.

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[34] Parry, M. et al. (2009): *Assessing the costs of adaptation to climate change*, Imperial College, Grantham Institute for Climate Change, p. 103

[35] Ibid., p. 20

[36] Ibid., p. 17, the $50 billion figure is calculated in US dollars and is the estimated annual global cost of large extreme weather disasters.

[37] Ibid., p. 11

THE NEED FOR COORDINATED GOVERNMENT ACTION

> ***"…the avalanche of science that tells us our climate is changing. The science is in. We know that our planet is warming. We know that that warming is changing our climate: causing sea levels to rise; meaning that there will be more days of extreme heat; meaning that we are at risk of more bushfires and droughts…"***
>
> ***Prime Minister Julia Gillard MP, 10 July, 2011***[38]

In *Barriers to Effective Climate Change Adaptation* the Productivity Commission wrote of the need for new approaches to manage climate change:

> *"Addressing climate change risks for existing areas of human settlement requires consideration of whether, how and when governments should 'protect' cities or towns, or relocate communities from high-hazard risk areas."* [39]

However, *"currently, there is no well-established policy response to this issue."*[40]

Governments have a critical responsibility for adaptation:

> *"Government, in its roles as manager of public land, national water and infrastructure assets, regulator of markets and other activities, and manager of equity issues, can provide support for this approach by creating the necessary conditions for effective and efficient decision making by communities, households and businesses as they begin (and continue) to adapt to climate change".*[41]

The lack of overarching policy is alarming – there is a patent need for a clear and nationally coordinated strategy, and significant leadership will be required.

Duplication is self-defeating

Policy setting at the Australian Government is poorly coordinated, with several different agencies and Ministers often developing their own statutes and reporting regimes.

In early 2011, ASBEC identified nearly forty policies, programs and initiatives within the Federal sphere covering sustainability in the built environment– and that figure does not include state, territory or local government activity.

The arguments for maintaining each of these initiatives are myriad, but the result is still unnecessary duplication and lots of red tape for very little benefit.

Adaptation activity across state, territory, and local governments is similarly inconsistent and uncoordinated, leading to wasted resources and higher costs for business.

Compliance with such a range of government activities prevents practitioners in the built environment from responding to climate change adaptation in a coordinated, effective manner.

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[38] Gillard MP, J (10 July, 2011): 'Transcript of joint press conference, Canberra', http://www.pm.gov.au/press-office/transcript-joint-press-conference-canberra-10, accessed on 23 June, 2012

[39] Productivity Commission (April, 2012): *Barriers to Climate Change Adaptation Draft Report*, p. 17

[40] Ibid., p. 17

[41] Garnaut, R (2008): *Garnaut Climate Change Review Final Report*, Chapter 15, p. 364

Coordination is essential

Dealing with climate change requires more than just regulation.

> *"The challenge that climate change presents for Australia's infrastructure and associated services cannot be overstated. There is a risk that existing regulatory frameworks might 'lock in' maladaptive action, which could compromise the short, medium and long-term resilience of our infrastructure. A new approach is needed to ensure that effective responses to climate change are embedded in relevant regulatory frameworks so that our infrastructure and associated services are resilient to climate change as we move into the future."*[42]

While new buildings need to be designed to withstand any possible changes in climate and existing buildings need to be made more resilient over time, regulation itself is not the solution.

Because, when it comes to the built environment, adaptation is complicated by a variety of factors (including the ownership, use, age, construction, and climatic location of Australia's buildings).

This raises the question *"as to whether the regulatory framework for buildings is capable of effectively responding to climate change while accounting for these complexities"*[43].

The Productivity Commission agrees that "*the expected impacts of climate change are diverse, complex, changing over time, subject to long timeframes, often highly uncertain and differ by individual, region and industry. Each of these characteristics poses challenges to adaptation decision making and policy making."*[44]

Australia needs a coordinated suite of policy initiatives designed to improve adaptation activity and make the built environment resilient to climate change, because:

> *"... without coordinated action, there is an increased chance of inefficient and wrongly focused adaptation—of actions that, while delivering short-term benefits, may exacerbate vulnerability to climate change over the longer term. The [National Climate Change Forum] concluded that national action was needed to enhance consistency in policy and regulatory settings across jurisdictions, and identified a number of key issues—sea-level rise planning benchmarks, risk guidance for planning and development, legacy issues and legal liability, building codes and standards, and integrated regional planning approaches."*[45]

Clear cross-jurisdictional adaptation strategies, guided by nationally agreed objectives and principles, would provide a consistency of approach allowing for differences in local climates.

In such a coordinated policy framework, the Australian Government has a leading role to play, by:

- recognising the built environment as a priority area of need in relation to adaptation;
- sponsoring research to inform the community and facilitate appropriate responses;
- communicating about adaptation with industry and community to raise awareness ;
- addressing regulatory and other barriers preventing adaptation activity in the built environment; and
- demonstrating leadership in how it addresses adaptation of its own built environment assets.

Adaptation needs funding

While the Australian Government has pointed to the urgency for action on climate change, to date its approach has focused largely on mitigation and on negotiating international agreements.

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[42] Maddocks (2011): *The role of regulation in facilitating or constraining adaptation to climate change for Australian infrastructure*, p. xiv

[43] Ibid., p. 47

[44] Productivity Commission (April, 2012): *Barriers to Climate Change Adaptation Draft Report*, p. 19

[45] Garnaut, R (2011): *The Garnaut Review 2011*. p. 108, following the report to the Australian Government by the Coasts and Climate Change Council in December 2010

If 'warming is changing our climate' and the effects are being felt, then adaptive strategies must be developed and implemented as a matter of urgency, regardless of the relative merits of a carbon tax.

Yet, the Government's current resource commitments to climate change adaptation are disappointing, with funding for the Climate Change Adaptation Program slashed in the Budget:

- from $126 million over five years for climate change adaptation in FY07, ending in June 2012;
- to a mere $3 million for FY13 financial year, with any further expenditure on adaptation predicated on the outcomes of the Productivity Commission's inquiry into Barriers to Effective Adaptation.

This decrease will have implications for many existing programs, including the National Climate Change Adaptation Research Facility and the Local Government Adaptation Pathways Program.

Deferring future funding until after the Productivity Commission delivers its report is not acceptable, because:

- the Government argues that climate change is happening now; and
- several reports have already highlighted the need for adaptation activity.

The Government does not need to wait for the Commission's imprimatur to assess worthwhile programs.

Adaptation strategies should not be put on hold for 12 months while the Minister waits for a report.

Because climate change won't wait.

A STRATEGY FOR ADAPTATION

> ***"Adaptation is about building resilience and reducing vulnerability. Adaptation is not simply a matter of designing projects or putting together lists of measures to reduce the impacts of climate change. A national policy response should be anticipatory, not reactive, and should be anchored in a country's framework for economic growth and sustainable development, and integrated with its poverty reduction strategies."***
>
> ***Global Leadership for Climate Action*** [46]

On page 7 of this report, ASBEC proposed a ten point public policy framework.

It puts government in a leadership position and creates a platform for collaborating with industry to deliver effective adaptation strategies.

The framework recognises the pivotal role governments need to play in driving successful outcomes, recommending that they:

1. engage with industry;
2. lead by example;
3. sponsor applied research;
4. provide better access to information and tools;
5. invest in education;
6. provide incentives;
7. reform and improve regulation;
8. review building codes and standards;
9. improve planning systems and outcomes; and
10. improve insurance and financial services.

Implementing this framework will maximise the opportunities from early action, capturing savings in the longer term by minimising risks in the short term.

Consultation, cooperation, collaboration

Successful climate change adaptation strategies require consultation and partnership with relevant stakeholders.

Creating an ongoing dialogue would enable government to seek direct input on new initiatives and make them more effective, rather than releasing regulation for 'public consultation' only to leave it largely unaltered.

Governments will achieve far more by listening to the views and needs of industry and the community and collaborating on appropriate solutions.

A National Built Environment Adaptation Council with broad representation and a properly resourced and dedicated secretariat could provide the Minister for Climate Change and Energy Efficiency the sounding-board and policy forum needed on adaptation issues, using the framework as the basis for action.

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[46] Global Leadership for Climate Action (2009), *Facilitating an International Agreement on Climate Change: Adaptation to Climate Change*

This would ensure that the adaptation strategies are appropriately targeted and coordinated across different jurisdictions to minimise waste and duplication.

The Council could share ideas and strategies on the most useful way to deal with the predicted effects of climate change, sponsor research, and communicate about this issue with the broader population.

By consulting and collaborating with industry through a properly resourced forum such as this, the Australian Government can ensure that public policy initiatives are appropriately designed and targeted to optimise results.

Practical leadership

Leadership on climate change is not merely a matter of setting regulations or introducing new initiatives for others.

The public sector should seek to lead by example to promote leading practice and drive model behaviour across business and community.

This requires practical thinking about how climate change will affect government activities and the strategies that might be necessary to deal with it.

Governments should:

- identify facilities that are at risk from sea-level rises, storm surges, bushfires, and even material degradation and develop plans to protect them from, or adapt them to, the anticipated changes;
- seek to upgrade any 'at-risk' properties they own – and work with the owners of buildings on any they lease – to improve their resilience;
- ensure government contracts and tenders anticipate and deal with the potential impacts of climate change; and
- apply specific metrics to their activities to help them assess and report annually upon their adaptation performance.

These should be achieved through streamlined procurement processes so that the costs of tendering are not significantly increased.

Adaptation strategies should be a fundamental component of government activity and not just a public policy goal it sets for the private sector.

By taking a proactive and practical approach governments can lead by example and demonstrate through their actions, rather than their statements, how the built environment can be made more resilient.

Robust research

Predictions of the potential impacts of climate change vary, from differences in sea level rises to the likely incidence of storms or droughts or the impacts of bushfires.

More applied research is needed, guided by formal feedback from stakeholders about their requirements, to create a reliable and accurate picture of what the community might expect.

Such analysis should be relevant, practical, accessible, and consultative, so that it is pitched at what stakeholders need to know, not what researchers would like to know, for example:

- predicting the risks and consequences of climate change and priority areas for action;
- identifying leading practice in adaptation;
- developing effective ways to assess adaptation performance in existing rating tools; and
- appropriately valuing climate change adaptation when measuring the costs and benefits of regulatory changes.

ASBEC recognises that some government funding has been allocated to encourage such research in the past, such as

the CSIRO's Climate Change Adaptation Research Facility and the National Climate Change Adaptation Research Facility (NCCARF).

However, there is an ongoing need for detailed research and continued government funding and support is a necessity.

Case study #1: UK Climate Impact Programme (UKCIP) http://www.ukcip.org.uk/

The UK Climate Impact Programme is a leading example of a well-developed toolkit that supports adaptation activity in the built environment.

Hosted by the Environmental Change Institute at the University of Oxford, the site provides free materials to help people understand what changes to the climate might occur and how they might prepare.

UKCIP works with stakeholders in the public, private and voluntary sectors to develop resources that can facilitate robust, evidence-based adaptation, such as:

- Case studies – a database of case studies shows how other organisations are approaching and dealing with climate change adaptation;
- Essentials – includes information about what climate change is, climate trends and what is meant by adaptation; and
- UKCIP tools – tools and methods to help users understand their current climate vulnerability and plan for future climate change, as outlined below.

UKCIP Tools

The site provides a range of tools, methods, and guidance to help users identify their exposure to climate change risk and implement solutions.

These include:

- **Adaptation Wizard** – takes a user through a process to determine vulnerability to climate change, identify key climate risks, and develop a climate change adaptation strategy. It is also a guide to all of UKCIP's information, tools and resources;
- **AdaptME toolkit** – provides tools to help users evaluate current adaptation activities;
- **AdOpt** – guidance that explores the nature of adaptation in the context of climate risk;
- **BACLIAT** (Business Areas Climate Impacts Assessment Tool) – helps users explore the implications of climate change for their business or sector;
- **CLARA** (Climate Adaptation Resource for Advisors) – aimed at helping business advisors to support small and medium enterprises (SMEs) in understanding and preparing for the impacts of climate change;
- **Costing the impacts of climate change** – a methodology for calculating the costs of climate impacts and how to compare these to the costs of adaptation measures;
- **LCLIP** (Local Climate Impacts Profile) – a resource that local authorities can compile so that they better understand their exposure to weather and climate.
- **Risk framework** – a step-by-step decision-making framework to help you judge the significance of your climate change risk compared to the other risks you face, so you can work out what adaptation measures are most appropriate;
- **SES** (Socio-economic scenarios) – these help explore what future worlds might look like and to consider how vulnerability to climate change and adaptation responses might vary with different future worlds; and
- **UKCP09** – offers background and key findings for the latest future climate change information, UK Climate Projections. Headline messages from the previous climate change scenarios are also available.

Information and tools

> *"… information is crucial both to manage risks in the current climate and to effectively adapt to climate change …. demands for climate change information are considerable and diverse. Individuals need information to help ensure their personal safety, to protect their property and their livelihoods and to maintain their wellbeing; businesses need information to make investments, to develop new products, to manage their assets and to protect their employees; and governments need information to provide public goods and services, to protect public assets and to make decisions about planning and land use."*[47]

Ready access to information, case studies, and appropriate tools will be essential if industry and the community are to adapt effectively to the impacts of climate change.

While some material already exists, it is difficult to find or (in some cases) has not been made available.

For example, the Australian Government committed to producing a five-yearly Climate Futures Report, to provide an assessment of how well Australia is placed to deal with climate change risks and evaluate the effectiveness of policy measures taken by governments to improve resilience.

The first report was due in 2010 but has not yet been released.[48]

Finding information about the risks of climate change and the costs and benefits of adaptation is a hit-and-miss exercise.

There is presently no single location to access consolidated guidance material or information about the likely impacts of climate change in Australia and how governments expect to respond.

This is compounded by a dearth of tools supporting adaptation in the built environment.

A centralised database – a 'one-stop shop' – that contains:

- relevant research information and results;
- case studies and tools that are tailored to meet the needs of industry and the community; and
- a national climate change risk allocation framework examining the government's expectations;

would greatly assist decision making.

Case Study #2: Cal Adapt – Exploring California's Climate Change Research (http://cal-adapt.org/)

The creation of Cal-Adapt was a key recommendation of the 2009 California Climate Adaptation Strategy (p. 9):

> *"The California Energy Commission will develop the Cal-Adapt Web site that will synthesize existing California climate change scenarios and climate impact research and to encourage its use in a way that is beneficial for local decision-makers."*

Cal-adapt is a web-based climate adaptation planning tool that allows the user to identify potential climate change risks in specific geographic areas throughout the state, with the ability to query by location or explore projected impacts on an interactive map.

It synthesizes volumes of climate change scenarios, presented in an easily available, graphical layout.

The application of projected climate impacts to California's geography allows planners to understand the implications for their area and develop strategies accordingly.

It is an excellent tool for encouraging action on climate change, as it offers a preliminary rendering of the extent of climate projections and impacts, and serves as a starting point for adaptation planning.

The site was designed to provide access to the wealth of data and information produced by the State's scientific and research community, together with visualisation tools, access and source data, studies, and opportunities to share information with online communities.

Its predictions are drawn from scenarios based on downscaled IPCC models that it uses to describe how climate may evolve in California.

Cal-adapt was developed by UC Berkeley's Geospatial Innovation Facility (GIF) with funding and advisory oversight by the California Energy Commission's Public Interest Energy Research (PIER) Program, and advisory support from Google.org.

[47] Productivity Commission of Australia (2012): *Barriers to Effective Adaptation Draft Report*, p. 94

[48] Ibid., Appendix B, p. 2

The UK Climate Impact Program (UKCIP)[49] (see case study #1) is an example of a tool-kit designed to promote adaptation.

It helps organisations learn how to deal with the impacts of climate change and provides free resources and guidance on what people can do.

The tools and much of the information on the site were developed with government funding assistance and are made freely available to all users.

Cal-Adapt[50] (case study #2), developed by the Californian Energy Commission, is another example of a useful public resource.

Web-based resources like these can be as part of a community awareness program like the Green Cross's *Harden Up – Protecting Queensland*[51] program (see Case Study #3).

This might be a worthwhile model for a nationally-run resource.

Websites and awareness programs might be backed up with:

- key performance indicators developed by government to monitor progress on adaptation; and
- ongoing assistance to local governments – such as the Local Adaptation Pathways Program – to help support local initiatives, particularly in high-risk areas.

Education

Building practitioners and the broader community will need to be better informed and trained if they are to implement effective adaptation strategies.

This could be achieved through:

- public education campaigns; and
- better investment in climate change adaptation training programs.

Public education campaigns will help to highlight the need for climate change adaptation in the built environment.

They can notify the general community about the expected impacts of climate change and strategies

Case study #3: Green Cross Australia:
Harden Up – Protecting Queensland (http://www.hardenup.org)

Green Cross Australia is an organisation that seeks to improve sustainability and community resilience to climate change through the use of digital projects in partnership with respected business, research, community, and government groups.

Harden Up – Protecting Queensland is one such project.

This website was developed to help users understand the climatic history of their region and prepare themselves to deal with future events.

It provides a searchable archive of 3,000 weather events in Queensland since the 19th Century, drawn from the Bureau of Meteorology records, the archives of the State Library of Queensland, ship logs, and other historical records to reveal climatic patterns.

The website advises users to:

1. "Be Aware: identify your personal risk exposure to cyclones, bushfires, floods, severe storms, and storm surges."

   People can search by town, suburb, or postcode to identify events dating back over 150 years to see the pattern of weather events that has occurred in their local area.

2. "Prepare Yourself: take practical actions to reduce hazard exposure."

   The website provides a practical step-by-step process to help users to develop emergency plans for themselves and their families.

3. "Help Others: build community resilience by getting involved in local volunteering programs."

   Users can share ideas and information with online and find out how to work more closely with their neighbours or community to prepare for future events.

The site was developed by Green Cross Australia in partnership with the Insurance Council of Australia, the CSIRO, the Bureau of Meteorology, the Queensland Climate Change Centre of Excellence, Network 10, the Federal Department of Climate Change and Energy Efficiency, the Property Council of Australia, the Local Government Association of Queensland, Suncorp, Emergency Management Queensland, the Residential Tenancies Authority, James Cook University, the State Library of Queensland and Volunteering Queensland.

It was funded by a grant from the Natural Disaster Resilience Program through the Queensland Department of Community Safety.

[49] http://www.ukcip.org.uk/, accessed on 25 June, 2012

[50] http://cal-adapt.org, accessed on 25 June, 2012.

[51] http://www.hardenup.org, accessed on 25 June, 2012.

for dealing with them, give advice about ways to cope with bushfires or floods, and provide an explanation of the benefits of early action.

They can also point to the location of additional tools, information, and services.

Training and education programs are another key component of any adaptation framework.

Adaptation skills training will give built environment professionals the expertise they need to respond to the challenges posed by climate change.

To ensure adaptation is embedded throughout the education process, governments will need to coordinate with tertiary and vocational educational institutions, as well as professional associations, to create dedicated training modules.

These modules should give professionals a firm grounding in risk analysis and management, so that they might identify the potential impacts upon their projects and develop flexible solutions to them.

The Australian Government's Climate Change Adaptation Skills for Professionals Program is a good example of how such training might be supported.

This provided funding for organisations to revise or develop their training packages to include climate change adaptation components.

The program was a good start, but more investment in this area is needed.

Incentives for early action

The Australian Government has previously recognised the benefits of using incentives to achieve desired outcomes.

Regulation alone will not drive climate change adaptation in existing buildings and settlements.

Case study #4: The City of Chicago's Green Permit Program

The City of Chicago formed a Green Steering Committee of Commissioners to plan for the possibility of extreme heat and precipitation and anticipate threats to the city's building, infrastructure and ecosystems.

Partnering with civic and community leaders, the Committee provides the public with substantive information about the impacts of climate change, assists business to identify vulnerabilities, and promotes responses to these problems.

The City of Chicago Climate Action Plan was developed to implement initiatives that support this work – one such initiative is the Green Permit Program.

Green Permit Program - incentives for developers to invest in green strategies and technology

Chicago's Department of Buildings developed the Green Permit Program, which encourages developers to incorporate green roofs and other green design elements (selected from a menu of options) into new buildings and retrofits.

The incentive is an expedited permit process, through which developers can save both time and money.

It has enhanced the image of the city and helped to incubate businesses specialising in technologies such as green roof installation and LEED certification.

To qualify for a green permit, projects must employ certain green strategies or green technologies that can be found on the 'Green Permit Menu'.

Commercial projects must verify their performance by being certified under the LEED rating system, while smaller residential projects must be certified under LEED for Homes or against the Chicago Green Homes Program checklist based rating system.

Green Permit Menu Items include:

- exceptional energy performance;
- the installation of a green roof;
- the use of on-site renewable energy, including solar hot water and solar electric, wind, biomass, and biogas;
- creating extra housing affordability by providing affordable residential units meeting the Chicago Department of Housing standards or developing in 'Transit-Oriented and Difficult to Develop Areas';
- providing natural ventilation;
- exceptional water management, both by reducing consumption and managing storm water runoff;
- providing exceptional bike parking
- achieving excess LEED Certification or excess Chicago Green Homes ratings; and
- using innovation.

A range of market-based incentives will be needed to address the legacy of previous planning and building decisions, and overcome barriers to action.

Incentives complement regulation by encouraging voluntary action beyond minimum standards, helping to achieve positive results far earlier than would occur under normal circumstances.

Previous Australian Government initiatives such as the Green Building Fund tapped into this philosophy by giving support to industry to undertake early action and thus produce substantial environmental benefits.

The proposed Tax Breaks for Green Buildings program would have also delivered benefits, but its axing before commencement has removed an incentive for action.

Although both of these initiatives were targeted at mitigation, ASBEC believes there is now a strong need for a suite of similar incentives aimed at encouraging early adaptation action.

These might include financial incentives to assist with retrofitting existing stock, alternative financing mechanisms, climate resilience assessments, accelerated development application processes (such as the City of Chicago's Green Permit Program[52], see case study #4), and the potential for governments to purchase property in areas considered to be high risk.

Delivering an array of incentives is one of the best ways to encourage proactivity and deliver tangible early benefits.

Regulation reform

In its 2011 report for the Australian Department of Climate Change and Energy Efficiency, Maddocks law firm reviewed the capacity and appropriateness of regulating for climate change adaptation.

They found that *"designing a regulatory framework that effectively facilitates adaptation of Australia's infrastructure to climate change is a complex and challenging exercise."*[53]

This is because there is considerable uncertainty about the type, timing, severity, and location of climate changes and their impacts over the lifecycle of infrastructure.

Responding to such changes will require a level of flexibility that is not usually possible with regulation, which by its very nature tends to be prescriptive or proscriptive.

Regulatory instruments generally establish minimum compliance standards, but rarely encourage action beyond business as usual.

Of greater concern is the duplication mentioned earlier, which is inherent in the climate change space – for example, in greenhouse and energy reporting.

Property sector companies are required to report on their energy use and greenhouse gas emissions in many different ways under a handful of reporting regimes.

These include the National Greenhouse and Energy Reporting Act, the Energy Efficiency Opportunities Act, the Commercial Building Disclosure scheme, and various state and territory reporting programs.

They will be joined by a second Energy Efficiency Opportunities reporting regime covering new buildings in July, 2013.

These systems have been developed by different departments for different purposes, each working to their own rules, goals, and regulatory imperatives.

They are then implemented with little discussion or coordination with other departments, let alone other governments or the private sector.

The result is often reporting for its own sake, rather than a coordinated and cohesive strategy to deliver better climate change policy.

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[52] http://www.cityofchicago.org/city/en/depts/bldgs/provdrs/green_permit.html, accessed on 25 June, 2012

[53] Maddocks (2011): *The role of regulation in facilitating or constraining adaptation to climate change for Australian infrastructure*, p. 10

If industry and the community are to implement effective adaptation initiatives, they need to be freed up from unnecessary regulatory requirements and instead be given support to take early action.

Regulation should be reserved to achieve strategic outcomes, such as guiding appropriate development through:

- applying zoning and overlay controls to high-risk areas;
- promoting the use of designs and materials that increase climate change resilience; or
- improving building tolerances against high wind speeds, bushfires, or temperature changes.

A revision and rationalisation of climate change regulation would ensure that barriers to adaptation created inadvertently through existing rules can be minimised and opportunities identified to encourage action.

Building codes and standards

The building regulation and standards development processes are slow and reactive.

This is perhaps understandable, considering that changes to these documents are required to be supported by evidence, cost-effective, and subject to regulatory impact assessment.

However, regular review processes are needed to enable building codes and standards to reflect, in a timely way, new climate change research and industry feedback, by:

- reinforcing the current performance-based approach of the National Construction Code, which provides flexibility and encourages the innovative use of design, construction techniques, and building products;
- using reliable data on the latest climate change predictions to inform updates to codes and standards and focus attention on useful solutions to perceived problems; and
- ensuring that any amendments are still subject to rigorous cost-benefit analysis to ensure that they are reasonable and achievable, using assessment models that appropriately value climate change adaptation.

This will require additional government resources.

Planning reform

> *"… there is no consistent approach across Australia's jurisdictions regarding the use of the planning system to respond to the impact of climate change. In some jurisdictions, the planning framework explicitly acknowledges predicted impacts of climate change, but primarily only in relation to coastal hazards and sea level rise. In other jurisdictions, while climate change may not be explicitly acknowledged, the framework's inherent flexibility has provided decision makers with the opportunity to take account of climate change and its impacts."*[54]

Australia's planning systems are not adequately geared towards timely amendment.

This is partly because *"planning and building regulation in Australia has in the past been based solely on historical information – for example '1 in 100 year' events are often used as a benchmark for planning decisions."*[55]

Such an approach to planning poses a significant impediment to climate change adaptation, but this does not necessarily need to be the case.

With more readily available data and a greater commitment to ensuring planning systems are regularly updated, governments would find it easier to anticipate and deal with the effects of climate change and make local communities more resilient.

Rigorous consultation would ensure that any amendments are both appropriate and strongly supported and form the basis of discussion with the community about attitudes towards accommodation, acceptance, and retreat measures as solutions to climate change.

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[54] Maddocks (2011): *The role of regulation in facilitating or constraining adaptation to climate change for Australian infrastructure*, p. 62

[55] Productivity Commission of Australia (2012): *Barriers to Effective Adaptation Draft Report*, p. 138

Despite traditionally being a state or local government responsibility, planning for climate change should be pursued through the prism of nationally consistent principles and policies.

This is because the impacts are not going to observe state or council boundaries, political opinions, or socio-economic differences.

Using strategic and precinct planning, state and local authorities can take account of official data and apply it consistently across their communities through master plans and zoning changes, learning from other jurisdictions about the fairest, most effective, most innovative solutions and designs.

This will deliver certainty for stakeholders about what they can and can't do in certain locations and demonstrate that governments are planning appropriately for predicted conditions.

Insurance and financial services

> *"Financial mechanisms can contribute to climate change adaptation.*
>
> *The insurance sector – especially property, health and crop insurance – can efficiently spread risks and reduce the financial hardships linked to extreme events.*
>
> *Financial markets can internalise information on climate risks and help transfer adaptation and risk-reduction incentives to communities and individuals (ABI, 2004), while capital markets and transfer mechanisms can alleviate financial constraints to the implementation of adaptation measures.*
>
> *To date, most adaptation practices have been observed in the insurance sector. As a result of climate change, demand for insurance products is expected to increase, while climate change impacts could also reduce insurability and threaten insurance schemes (ABI, 2004; Dlugolecki and Lafeld, 2005; Mills et al., 2005; Valverde and Andrews, 2006).*
>
> *While these market signals can play a role in transferring adaptation incentives to individuals, reduced insurance coverage can, at the same time, impose significant economic and social costs.*
>
> *To increase their capacity in facing climate variability and change, insurers have developed more comprehensive or accessible information tools, e.g., risk assessment tools in the Czech Republic, France, Germany and the United Kingdom (CEA, 2006).*
>
> *They have also fostered risk prevention through: (i) implementing and strengthening building standards, (ii) planning risk prevention measures and developing best practices, and (iii) raising awareness of policyholders and public authorities (ABI, 2004; CEA, 2006; Mills and Lecomte, 2006).*
>
> *In the longer term, climate change may also induce insurers to adopt forward-looking pricing methods in order to maintain insurability (ABI, 2004; Loster, 2005.")*[56]

As the above extract explains, the financial services and insurance industries play significant roles in climate change adaptation.

Together they can provide the funding and support needed to help the community implement changes and ensure that buildings are protected against the risks.

However, while they can help to drive behaviour it is only on a limited and individual basis and these services should not, of themselves, be considered as providing appropriate solutions to climate change risk management.

There are significant potential consequences for the insurance industry arising from climate change.

[56] Adger, W N, et al (2007): 'Assessment of adaptation practices, options, constraints and capacity' in *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Parry, M, et al, Eds., Cambridge University Press, Cambridge, UK, p. 723

The Productivity Commission's draft report 'Barriers to Effective Adaptation' highlighted some of these impacts, such as:

- *"changes in the types of natural hazards or level of risk faced by the community could increase demand for insurance;*
- *more frequent or severe extreme weather events could lead to larger, and more variable, insurance payouts;*
- *losses might become more correlated across geographic areas, or affect a larger portion of policyholders, making it more difficult for insurers to diversify risks; and*
- *changes in climatic trends could mean that historical data become less useful for estimating the risks that policyholders face, and insurers may need to rely more on climate projections and models."*[57]

If larger, more frequent losses occurred, insurers would need more capital or be compelled to purchase reinsurance to cover payments, most likely a difficult exercise with the uncertainty around climate change.

Higher premiums or increased unwillingness to insure for particular hazards or in specific areas would be the ultimate outcomes.

Insurance is a necessity, not a luxury.

Consumers need to be able to obtain adequate and reliable coverage that explains the risks and a policy holder's rights clearly, transparently, and in plain English.

Legal wrangling over definitions, such as occurred following the Brisbane floods, puts stress on families and does not paint the insurance industry in a positive light.

ASBEC believes that insurance should be broadly available, regardless of an applicant's ownership or socio-economic status.

Measures should be introduced to make insurance easier to obtain and more reliable when a claim is submitted.

The National Built Environment Adaptation Council should be commissioned to explore options for insurance (and the finance sector) that let consumers obtain easily understandable coverage while allowing insurers to remain solvent.

A study of potential government-backed mechanisms that might encourage insurers to provide appropriate coverage for areas at risk would greatly assist the community.

To this end, the Australian Reinsurance Pool Corporation, which was established to underwrite terrorism insurance for the property sector after the terrorist attacks in New York on September 11, 2001, might be a useful starting point for the Council's investigations.

[57] Productivity Commission of Australia (2012): *Barriers to Effective Adaptation Draft Report*, p. 228

CONCLUSION

> ***"Above all, reducing the risks of climate change requires collective action. It requires co-operation between countries, through international frameworks that support the achievement of shared goals. It requires a partnership between the public and private sector, working with civil society and with individuals. It is still possible to avoid the worst impacts of climate change; but it requires strong and urgent collective action. Delay would be costly and dangerous."***
>
> ***The Stern Review***[58]

ASBEC recommends the Built Environment Adaptation Framework to the Australian Government as a strategic, nationally coordinated approach to adaptation in the built environment.

It is a public policy roadmap which should be implemented with ongoing collaboration between the three spheres of government, industry and the built environment professions, and representatives of the community.

Next steps

The formation of a National Built Environment Adaptation Council is an essential first step that will help to place a spotlight on the benefits and opportunities of climate change adaptation.

Initiatives to encourage adaptation are urgent and necessary, as it is generally less expensive to increase resilience prior to an event than to fund a recovery.

We recognise that the range of solutions in this document will be achieved over differing time periods, but now is the ideal time to take decisive action and begin to lay a foundation for the future.

ASBEC therefore recommends that the Australian Government commit this year to:

1. recognise the significant risk of climate change to the built environment and identify this sector as a public policy priority;
2. establish the National Built Environment Adaptation Council;
3. commission research into the true costs and benefits of climate change adaptation;
4. increase funding for climate change adaptation projects in the Department of Climate Change and Energy Efficiency; and
5. publicly commit to a timeframe for reviewing and responding to this report.

Industry is ready and willing to work closely with the Australian Government and its state, territory, and local counterparts to deliver robust and effective adaptation strategies and protect our built environment from climate change.

[58] Stern, N (Baron Stern of Brentford) (2006): *Stern Review on the Economics of Climate Change,* Executive Summary, p. xxvii

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