Australian Government
Department of Climate Change and Energy Efficiency

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Submission

In response to the Productivity Commission Draft Report *"Barriers to Effective Climate Change Adaptation"*

Department of Climate Change and Energy Efficiency
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Executive Summary

The Draft Report of the Productivity Commission's inquiry into regulatory and policy barriers to effective climate change adaptation raises some important considerations for government and the community. The Department of Climate Change and Energy Efficiency (DCCEE) supports many elements of the approach set out in the Commission's Draft Report, including building on our capacity to manage current climate variability and the use of flexible approaches to manage future climate risks.

This submission sets out four broad areas where we consider the Draft Report could benefit from further analysis and consideration. These are (a) in the assessment of climate uncertainty and its implications for decision-making; (b) the Commission's assessment of how much adaptation is already taking place and the quality of that adaptation; (c) the Commission's interpretation of 'real options' analysis in the report; and (d) the consequences of the foregoing for the Commission's conclusion on the appropriate role of government in adaptation. The points we make below build on the framing and analysis of our original submission to the Commission, and should be read in that context.

The Draft Report could be improved by a more rigorous analysis of climate uncertainty. For climate impacts such as temperature and sea level rise, the likely trends and timeframes in which they will occur are well understood. There is certainly sufficient evidence now available on which to make certain long-term adaptation decisions, for example on the robustness and location of public infrastructure.

Unavoidable climate change impacts are a significant risk to Australia's wellbeing. The Draft Report would benefit from an analysis of the nature, scope and magnitude of these risks. Effective adaptation may be thought of as the set of measures that is most likely to manage risks to Australia's wellbeing from climate change impacts. The report does not systematically assess what this set of measures might look like. Instead, the draft report assesses the individual merits of various proposed adaptation measures in the absence of an overall framework.

DCCEE is concerned by the Commission's conclusion that there are few systemic barriers to climate change adaptation[1]. This does not match DCCEE's experience or the evidence of surveys which have been conducted on current adaptation activity (these are outlined in this submission). In fact, the relatively low awareness about climate vulnerability and low take-up of adaptation action suggests that information and other barriers are still prevalent.

The draft report correctly emphasises the need for a flexible approach to decisions under uncertainty. DCCEE agrees that 'real options' analysis is a useful method for identifying the benefits of flexible adaptation strategies and that the most beneficial strategies may often involve delaying action. However, the draft report often seems to assume rather than demonstrate that delaying action is an optimal strategy. There is emerging evidence that in some cases early action may be more beneficial than delaying action. Finding the best adaptation strategy will require rigorous analysis on a case-by-case basis.

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There is a need to devote substantial resources to systematically analysing and dealing with barriers to adaptation. Analysis should focus on areas where choices made today will strongly influence future options to manage risks from climate change impacts. The effect of current decisions on future options to manage risks should be considered from both technical and practical perspectives.

We do not agree with the Commission's view on national coordination of adaptation action. Governments have a core responsibility to secure the wellbeing of their populations. Given what we know about future climate risks and the lack of general awareness and action (except in certain sectors) on managing climate risks, there is a prima facie case for national government action. As in the case of many other community initiatives – indigenous policy or national security policy, for example – there is a case for national-level coordination of the whole of government effort. This ensures efficient prioritisation of effort and use of resources. From the Federal Government perspective, there is value in a single organisation, such as DCCEE, driving the policy framework and acting as a single point of contact and approach to States and Territories and other actors.

Climate uncertainty: now and in the future

The Department recommends that the Commission's final report include a more rigorous analysis of climate uncertainty. Some aspects of the future climate can be predicted with high confidence. Where there is uncertainty, risks are overwhelmingly on the high side. High side risks are an incentive for strong action. Our reasons are set out below.

The current climate is a changing climate

The climate has already changed.

Australia's annual mean surface air temperature has increased by about 0.9˚C over the past 100 years. We experience more hot days and fewer cold nights (Alexander et al. 2006). There has been an increase in warm spells across southern Australia (Alexander and Arblaster 2009). The incidence of extreme fire weather in south-eastern Australia has increased (Lucas et al. 2007).

During the 20th century, sea levels around Australia rose by about 1.2mm per year (Church et al. 2006).

Rainfall has declined by about 15 per cent in south west Western Australia (Bates et al, 2008) and stream flow into Perth's dams between 1976 and 2000 almost halved as a result (Water Corporation of Western Australia 2009). The weight of scientific evidence indicates that anthropogenic greenhouse gases contributed to this trend (Cai and Cowan 2006; Ryan and Hope 2006; Van Ommen and Morgan 2010). There is also evidence that reduced rainfall in south-eastern Australia – Victoria and the southern part of South Australia – cannot be explained by natural variations alone (Cai and Cowan 2008a; Cai and Cowan 2008b).

Changes in extreme rainfall events are more difficult to detect and attribute to specific causes. There is evidence that heavy precipitation has declined in many areas. On the other hand, recent research by Evans and Boyer-Sauchet (2012) indicates that evaporation resulting from record high sea surface temperatures off northern Australia probably added around 25 per cent to total rainfall associated with the 2010 Queensland floods.

The historical record is no longer a reliable guide to current climate. Measures to increase resilience to the climate today must consider the uncertainty about current climate and the increased risk associated with the climate change we have already experienced.

In identifying reform priorities the Draft Report characterises current climate risks as having a 'high degree of certainty' compared to future climate risks, which have 'significant uncertainty'[2]. This binary classification is contestable and is not a sound basis for making judgements about reform priorities.

Uncertainty of climate projections

It is important to acknowledge uncertainty in climate projections. However, key sections of the Draft Report discuss future climate risks as if they were almost uniformly subject to the same high degree of uncertainty.[3] In reality, some aspects of future climate can be predicted with high confidence.

Adaptation planning can proceed with greater confidence where the direction of climate change is certain. Both temperature and sea level are certain to rise, as are associated extremes such as the frequency and intensity of heatwaves, bushfire weather, and extreme sea level events. The likely direction of rainfall changes is known with high confidence in some regions, such as south west Western Australia (where further drying is almost certain). There is also a moderate degree of confidence that south eastern Australia will get drier.

For decisions with long-term consequences (such as land use planning or major infrastructure investment) an alternative formulation of climate projections is to consider that some level of change is certain with the only question being when that level will be reached. For example, 50 cm of sea level rise (relative to pre-industrial levels) may be certain within the design life of a new port development.

Both the rate and direction of change is uncertain for rainfall changes in much of Australia. There is significant uncertainty about how extreme rainfall events will change. Projections show a tendency for extremes to become more intense except where mean precipitation declines substantially.

Risks are on the high side

While climate projections are uncertain to varying degrees, risks are overwhelmingly on the high side. Low-end projections are dependent upon effective global action to reduce greenhouse gas emissions. Recent evidence suggests this will be challenging (IEA WEO 2011). On the other hand, there is the potential for high-end climate projections to be exceeded, either because of failure to manage global greenhouse gas emissions or because of the response of the climate system.

Projections of sea level rise illustrate high-side risk. The Commission's Draft Report notes that the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4) (2007) projected sea level rise of 18-59 cm (relative to 1990) by 2100. However, AR4 noted that ice sheet dynamics could add 10-20 cm to the high end of projections and larger values cannot be excluded. Subsequent research has suggested that global average sea levels could rise by up to 2 m with extreme climate forcing. Steffen (2011) concluded that 'a

2 See, for example, table 13.1 and page 246 'The current climate poses risks that are known…'

3 See, for example, Box 1 on page 3 and page 45: 'This cascade of uncertainties means that the impacts of climate change on a given ecosystem, community or industry are seldom clear.'

plausible estimate of the amount of sea level rise by 2100 compared to 2000 is 0.5 – 1.0 m'.

The response of human and natural systems to climate thresholds can also give rise to high-end risks. Climate thresholds for natural systems are well documented. Coral bleaching and loss of habitat for alpine and montane tropical rainforest species are examples.

Built environments are also subject to threshold effects. For example, a study of the January 2009 heatwave in south-eastern Australia (QUT, 2010) found that '[t]he electricity system operates with little spare capacity or redundancy, and has a consequent lack of resilience to unexpected perturbations such as the heatwave. The heat-induced shutdown of Bass Link (from which Victoria gets about 6 per cent of its power supply) seriously compromised the supply capacity.'

High-end risks are an important reason for adaptation action. For example, Garnaut (2008) notes in relation to reducing greenhouse gas emissions that: 'Humans tend to be risk averse when the outcomes include the possibility of a large loss … In such cases mitigation has additional insurance value. What would we be prepared to pay to avoid a small probability of a highly damaging or possibly catastrophic outcome?' The same argument can be applied to high-side adaptation risks.

How much adaptation is already taking place?

Interest in adaptation to climate change has increased over the last five years. As noted in the Draft Report, there are examples where private companies and local governments are already considering the risks of climate change and of reforms that promote resilience to climate change impacts. The Department's programs and activities have contributed significantly to this progress.

Notwithstanding recent progress, the Department's assessment is that adaptation is still in transition from a marginal concern to a mainstream consideration. We submit that the level of current adaptation activity is inconsistent with the Commission's conclusion that there are few systemic barriers to climate change adaptation. We further submit that the Commission should adopt a more systematic approach to assessing risks to Australia's well-being from climate change impacts and the adaptation measures that might be necessary to effectively manage those risks.

The evidence on which this assessment is based is set out below.

Adaptation to historical climate

The Commission notes that Australia has a long history of coping with climate variability and, consequently, suggests that households, businesses and other organisations are capable of managing the climate variability and the risks they face[4]. It is unclear what substantive evidence the Commission used to reach this general conclusion. Nor is it clear how this conclusion can be reconciled with the observation that there is broad scope for reforms to improve management of current climate variability[5].

In fact, there is considerable evidence that we do not always handle the current climate well. Historical (and ongoing) development in high flood and bushfire risk areas is an example. The floods of 2010 came at an estimated cost to the Australian Government of $5.6 billion, with significant private losses and a reduction in GDP of 0.5% (CBA Economics: Update 2011).

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The current level of insurance premiums can, in some circumstances, reflect that development has taken place without proper consideration of the historical climate. For example, although the availability of flood coverage in insurance policies is increasing, the cost of flood insurance is very high in some areas, reflecting the level of flood risk to which properties in those areas are exposed. One major insurer recently decided to stop offering flood cover in two Queensland towns unless additional flood mitigation works are carried out (ABC News 2012). That we have, as a community, allowed development in such areas, might be said to reflect a failure to appropriately manage the historical climate well.

Rising insurance premiums, or the choice of individuals to live in areas where insurance cover is unavailable, are not necessarily a problem if individuals and businesses choose to accept those risks However, recent flood events illustrate that, in practice, it is often difficult for governments to allow individuals to bear the full risk.

The Draft Report cites recent drought policy reforms as an example of successful management of adaptation to climate variability. However, the long lead time for drought reform highlights the difficulty of changing behaviour to increase climate resilience. Similar barriers may affect climate change adaptation.

The fact that Australia is not well adapted to many aspects of our historical climate is one reason to believe that current action to prepare for the impacts of climate change is also inadequate.

Surveys

In 2008 and 2010, CSIRO and the Department conducted an adaptation benchmarking survey covering several hundred organisations across a range of sectors (Gardener et al. 2010). Fewer than half the organisations surveyed had conducted a vulnerability assessment, and only around 35 per cent were engaged in adaptation planning or other relevant preparation for climate impacts. Further, much adaptation action is restricted to vulnerability or risk assessment and there is still considerable confusion between adaptation and mitigation.

The Department's observation and experience in programs such as the Local Adaptation Pathways Program (LAPP) is that most businesses and local governments that are considering the risks of climate change are doing so through risk and vulnerability assessments and by developing action plans. The Department's programs contributed significantly to local government progress in this area. For example, $2.38 million of LAPP funding was provided to 94 local governments from 2008 to 2010 to increase capacity to adapt to the impacts of climate change. However, the 2011 review of LAPP by WalterTurnbull noted that actual implementation of adaptation strategies developed under the LAPP program was still at an early stage.

A report by the Australian Institute of Superannuation Trustees and the Climate Institute (2011) found that:

- 65 per cent of funds have not recognised the impact that climate change will have on investment portfolios;
- 83 per cent of super funds replied "no" to the question: "Do you believe that systemic risks like climate change are currently being priced in asset valuations properly?'

We are not aware of any other broad-ranging, quantitative survey work on the level of adaptation activity in Australia. An AECOM online survey in 2010 was restricted

to member organisations of the Australian Sustainable Built Environment Council. This survey found that most (82 per cent) respondents were taking climate change into account. However, the results also indicated a high level of confusion between adaptation and reducing greenhouse gas emissions (AECOM 2011).

The Draft Report notes a range of government requirements to consider climate change impacts when building new infrastructure. However, such requirements are difficult to implement in practice because the necessary expertise, guidance and information is lacking. For example, Infrastructure Australia does not have clear, implementable procedures for taking climate change impacts into account in its decisions.

Conclusions about the level of adaptation activity in the Draft Report appear to be based on submissions and roundtable discussions. This limited and unrepresentative sample is unlikely to reflect the true level of adaptation activity.

For example, the Draft Report states 'there is evidence that private sector infrastructure providers are considering climate change risks in their investments (box 9.3)'. Box 9.3 provides three anecdotal examples. One of these is that that the Environmental Impact Statement for the Queensland Curtis LNG (QCLNG) Project assesses climate change and climate change related issues. However, assessing climate change was a mandatory requirement under Queensland State legislation and, therefore, should not be considered evidence of voluntary consideration of adaptation in private infrastructure investments (QCLNG Environmental Impact Statement Terms of Reference 2009).

Overseas experience

The second national adaptation progress report (2011) of the UK Adaptation Sub-Committee (ASC) assessed progress in land use planning, water resources management, and building design and renovation. The report found that there has been no specific investment to address the impacts of climate change on water supply or demand, even though water company plans suggest that some additional investment is necessary. The ASC also found limited evidence of uptake of low regret actions for buildings (for example, water efficiency measures), but that there is scope for further action, particularly with respect to existing homes. The report concludes that climate risks do not appear to be fully incorporated into major strategic decisions in land use planning and water infrastructure investment, and that guidance on investment planning does not fully account for the uncertainty associated with climate change.

In addition, a recent OECD empirical analysis of companies' management of their climate risk concluded that "self-interest alone has not been sufficient to overcome barriers to adaptation" (Agrawala et al. 2011). A review of companies' climate risk disclosures (based on responses to the 2009 Carbon Disclosure Project (CDP) questionnaire) indicated that while 75 per cent of surveyed companies acknowledged climate risks to their business, only 25 per cent assessed the extent of their risks or possible risk management options, and only 5 per cent actually implemented risk management actions. Further, analysis by Agrawala et al (2011) indicated most companies assessed risks from current climate variability and extreme weather events, but fewer also assessed risks from future climate change.

The OCED analysis also noted "the lack of action is a particular concern in the case of economically significant sectors, those

that are climate-sensitive and ones where investment decisions have long-term implications. For these reasons, the provision and management of infrastructure is a vital area for adaptation to climate change, both in terms of the need for additional investment for addressing climate risks and the need to climate-proof existing infrastructure and ongoing investments."

Assessing the effectiveness of adaptation

The Draft Report's treatment of effective adaptation is superficial. For example, the report says that 'effective adaptation should be interpreted to mean adaptation actions that enhance the wellbeing of the community'. However, there is no systematic analysis by the Commission of the link between adaptation and the well-being of the Australian community. A systematic analysis would consider the scope, magnitude, and nature of risks to community wellbeing from climate change impacts and identify the most effective measures to manage those risks. This analysis could include measures to take advantage of opportunities as well as measures to ameliorate harm.

The report asserts (without proof) that 'in most cases, autonomous management of climate risks by households, businesses and communities will lead to outcomes that improve the wellbeing of the community as a whole'. This statement assumes, rather than proves, that there are no significant barriers to adaptation arising from lack of coordination between parties (businesses, individuals, local governments i.e. high transaction costs) or the public good nature of some goods and services.

There is a clear link between evaluating the effectiveness of measures to manage risks from climate change impacts (i.e. adaptation) and assessing barriers to adaptation. If adaptation is effective it would be reasonable to conclude that there are few significant barriers to adaptation. On the other hand, if adaptation is not effective there would be grounds to think that there are significant barriers to adaptation.

Australia lacks a framework to assess the extent and effectiveness of adaptation. Such a framework might, for example, specify what 'effective adaptation' looks like in terms of outcomes and process. It would certainly be necessary to explore community wellbeing in detail rather than assuming that the aggregate of autonomous individual actions automatically maximises community wellbeing.

The Draft Report appears to take an *ad hoc* approach to identifying potential reforms. For example, page 77: 'Based on research, consultation with stakeholders and evidence received in submissions, the Commission identified a number of areas where reforms to address barriers could have broad effects.' A clear framework for assessing whether current adaptation is effective would bring greater analytical clarity.

The key question for adaptation policy is whether our current institutions and policies are consistent with promoting wellbeing in the presence of a changing climate. A decade ago the Australian Treasury developed a framework which took a broad view of wellbeing (Treasury 2004). The framework identified five elements that contributed to wellbeing. These were consumption possibilities, distribution, risk, complexity and opportunity and freedom. The challenges presented by climate change have important implications for each of these elements.

In assessing the effectiveness of adaptation options, it is also worth considering path dependency, both technical and political.

Political path dependency recognises that once a government has made a decision (or in some cases has chosen not to make a decision), it can be very hard to reverse that position. Once rights, or implicit rights, are allocated, it is typically very difficult for governments to alter the rules for allocation for those rights (see attached speech http://www.climatechange.gov.au/en/media/speeches/20120626-Comley.aspx)

Decision-making under uncertainty

To make good decisions under climate uncertainty it is necessary to identify strategies that offer net benefits over a range of plausible futures. This is discussed in the adaptation literature under the rubric of 'robust decision-making'. Robust strategies offer good performance in most or all plausible futures rather than optimal performance under one or two scenarios.

Key features of 'robust' strategies include: flexibility or reversibility; use of 'soft' options (for example, the institutionalisation of long-term planning horizons or financial tools such as insurance schemes); incorporation of safety margins; and strategies that reduce decision-making time horizons (Hallegatte 2009).

The Department recommends that the Commission take a more rigorous approach to analysing the benefits and costs of specific reform measures. In doing so, the Commission should take greater account of emerging evidence that there are some situations where early action is more beneficial than delaying action. Our reasons are set out below.

The 'real options' approach

The Department agrees that real options analysis is useful for assessing potential adaptation strategies.

Real options is a method for assessing the value of deferring action until better information becomes available (the option value). It allows decision-makers to compare adaptation options that offer modest highly certain net benefits today with options that offer high but uncertain returns in the future.

Robust adaptation strategies will often involve delaying action. Real options analysis will assist in identifying 'low regret', or reversible, adaptation strategies that involve taking some action now and delaying other more costly action. However, there are practical limitations. For some infrastructure investment decisions, prolonged delay is not possible. For example, augmenting water supply in response to rapidly rising demand cannot simply be delayed by decades (Hallegatte 2009).

A further limitation is that some theoretically available options may not be implementable in practice. For example, as discussed above the draft report considers an example where a local council permits development on land vulnerable to sea level rise but builds into the planning permission an 'option' that would give the council the right to impose restrictions on the use of the land once certain 'trigger points' were reached. Concerns about the allocation of risks, the complexity of choices facing individuals, and the distribution of opportunities might make it difficult for the council to exercise the 'option', potentially after several decades in which different owners have enjoyed the use of the land.

Also, there is no point in delaying action until there is more certainty in cases where uncertainty in climate projections is irreducible. Similarly, strategies that delay action until 'trigger points' (ie specific impact thresholds) are reached may not be feasible where risks arise from irregular, unpredictable events such as extreme rainfall, cyclones, heat waves or drought.

There is also some evidence that regional climate regimes may shift abruptly – as happened, for example, with the decline in rainfall in southwest Western Australia in the 1970s.

More fundamentally, the availability of a technique for valuing the benefits of delaying action does not in itself mean that action *should* be delayed. Rather, the merits of different adaptation strategies must be compared on a case-by-case basis.

There is emerging evidence that in some cases acting now may be more beneficial than delaying action. For example, a CSIRO (2011) study of a number of locations in south-east Queensland found that preventing development and urban densification in unsuitable areas is likely to be the most cost effective protection against the impacts of sea level rise (Fletcher et al. 2011). Case studies applying a real options economic analysis framework to adaptation options to manage increased coastal inundation at Narrabeen Lagoon and the impact of heat waves on Melbourne's Metropolitan Rail Network found that early anticipatory adaptation strategies can deliver net benefits under a plausible range of future climate scenarios (AECOM 2012).

It is unclear what evidence the Productivity Commission used to assess the benefits and costs of potential policy reforms proposed in the Draft Report. Simple arguments based on climate uncertainty and the co-benefits of addressing vulnerabilities to the historical climate may suggest a rough ordering of reform priorities but are not capable of establishing that any particular reform is more beneficial than another. Further work appears to be required to develop greater understanding of likely costs and benefits of policy reforms proposed.

Rather than recommending deferring consideration of anticipatory adaptation measures until 'better information' becomes available, it would be useful for the Commission to outline a program to generate the empirical evidence required to assess whether such reforms are likely to deliver net benefits under a plausible range of climate change scenarios. A generic methodological approach should not become a device to avoid thinking in a sophisticated way about the many dimensions of complex and diverse climate impact problems, and finding risk-specific solutions.

Managing the current climate

There are good reasons for giving priority to adaptation strategies that increase resilience to the current climate.

Increasing resilience to current climate is an opportunity to address risks that were unacceptable under the historical climate, yielding an immediate 'adaptation dividend'. For example, implementing policy reforms such as correcting historical over-allocation of water resources and developing more open water markets in the Murray-Darling Basin is likely to be a robust strategy that delivers good outcomes over a range of possible climate scenarios. Similarly, improving resilience to natural disasters, particularly in areas where hazards are already high, will reduce both current and future risks.

Focusing on improved management of current climate hazards also has the advantage of building on existing skills, experiences and institutional arrangements.

However, preparation for current climate *per se* is not necessarily adaptive[6] and could be maladaptive if the changing climate is not recognised. Of particular concern is that natural disaster mitigation works and increased community resilience may encourage intensified development of areas where climate hazards are likely to become difficult to manage in coming decades.

For example, investment in natural disaster mitigation works such flood levees designed to manage current climate risks may provide incentive for increased development in high flood risk areas. However, over the long-term, this strategy may not provide adequate protection if the frequency and magnitude of flood events increases due to climate change. This strategy may turn out to be maladaptive because increased development may significantly increase the cost of alternative strategies such as managed retreat in the future.

Providing national leadership on adaptation

An important national leadership role for the Australian Government

There is a strong national interest in ensuring that Australia is adapting effectively to the impacts of climate change. Failure to adapt will have serious economic, social and environmental consequences. There could also be serious fiscal consequences for the Australian Government.

Whether governments need to implement reforms to promote effective adaptation will depend on how much action the private sector is taking and the normative question of how much action is necessary to ensure the well-being of Australians in a changing climate.

As noted above (under *how much adaptation is already taking place)*, the Department's assessment is that the level of adaptation activity across Australia is still relatively low.

At the recent Informing Adaptation Policy workshop[7] a broad range of stakeholders and practitioners from the community, industry and all levels of government agreed that:

- The level of maturity of adaptation response in Australia is low overall and patchy
- Across all levels of government and other sectors there is a clear need for more effective sharing of knowledge, experience and research findings
- More overt, clearly communicated, consistent and coordinated Commonwealth adaptation policy leadership and intent is required

The Australian Government's role includes providing reliable information to support adaptation where that information has public good characteristics; ensuring climate change is taken into account in its own activities; and ensuring the policy and regulatory environment supports effective adaptation. In this latter role, the Australian Government will need to consider its own policies and regulations and coordinate policy responses in areas where cooperation between levels of government is required.

The need for coordination within and across government

Governments will not play their role in adaptation effectively without strong

6 The Draft Report seems to suggest that improving risk management in the current climate is adaptive under all circumstances. See for example pages 246-247.

7 NCCARF, DCCEE, ANU Informing Adaptation Policy Report for Policy Makers

national level coordination. As with the private sector, the extent and quality of adaptation activities across the Commonwealth agencies is highly variable. This is a new, complex policy challenge with broad economic, social and environmental consequences. The need for coordination may diminish over time as policy-makers become more accustomed to formulating policy for a changing climate, appropriate skills are more fully developed and decision-support tools become widely available.

Coordination priorities for adaptation include policy coordination, monitoring and evaluation, driving reform, and efficient production and dissemination of common-use information.

Some aspects of adaptation will require coordination between agencies and between levels of government. For example, not all Commonwealth interests in coastal zone adaptation lie within a single portfolio. It will also be important for governments to have clear advice about priorities for adaptation. For example, adaptation in the coastal zone is a higher priority than adaptation in the tourism sector.

The ability to make and implement the best possible decisions in the context of a changing climate will require new capabilities and information across government. It is efficient for a single agency to coordinate efforts to build the capacity of decision makers and provide decision support tools including appropriate climate change scenarios to be considered in decision making.

Monitoring and evaluation: the Commission's Draft Report illustrates the paucity of information about current adaptation progress. It will be difficult for governments to understand whether Australia is adapting effectively without a systematic approach to monitoring and evaluating progress.

Driving reform: adaptation is a complex emerging policy agenda. Individual agencies are unlikely to unilaterally develop appropriate and complementary approaches to adaptation. For example, in the UK, the Department of Environment, Food and Rural Affairs plays the role of a central agency in coordinating the integration of adaptation into other portfolios.

Information: much of the information needed to adapt to climate change is common across many sectors. It is efficient to produce and disseminate this information centrally rather than by duplicated effort across jurisdictions and industry sectors. Experience with climate change science suggests that research agencies are unlikely to produce information that is relevant to the government's policy agenda without effective leadership from a central point in government. For example, it is important to ensure climate change projections are scientifically robust, applied in a consistent manner across all levels of government, and presented in a manner that is relevant to decision-makers.

The Department of Climate Change and Energy Efficiency currently fulfils these central roles within the Australian Government. The Department is working with other Commonwealth agencies to build common understanding of future climate risks, identify national priorities and assess effective ways to promote adaptation. The Department also provides guidance to other agencies on decision-making under uncertainty, particularly efficient and effective strategies to build resilience.

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