Chapter 3

Understanding risk and informing decisions

3.1 A theme in much of the evidence received during this inquiry is the need to ensure decision-makers at all levels, ranging from individual property owners to governments, have access to the reliable information necessary to make informed decisions about managing climate risks. Furthermore, it is reasoned that collecting and publicising further information about climate risks will facilitate more timely action that will reduce the costs which will inevitably be faced in the future. For example, the Investor Group on Climate Change (IGCC) observed:

> The longer Australia waits to implement effective adaptation planning and infrastructure solutions the more expensive it will become to adapt. Currently the economic costs are not being adequately assessed or consistently measured.[1]

3.2 When considering the implications of climate change for infrastructure, it was also emphasised that there are unique considerations. These relate to the interconnectivities and interdependencies between different types of infrastructure assets and the significant flow on effects associated with disruption. For example, as Dr Lauren Rickards observed in her submission, 'transportation services cannot operate without energy'. Dr Rickards argued that infrastructure networks 'with critical interdependencies are at an increased risk of failure from external shocks or stresses', and that it is important 'to understand the extent of interdependencies and climate related risks faced by infrastructure systems so that adaptation solutions can be developed or tailored accordingly'.[2]

3.3 Ms Emma Herd, Chief Executive Officer, IGCC, provided similar observations about the interdependences between business assets and essential utilities and transportation networks. Ms Herd commented:

> This question of interdependency is so key in terms of effective adaptation and resilience planning. For a lot of businesses, their key physical climate change risk may not be in the asset that they have direct control over. When I say 'key climate change risk', I mean their financial impact might be in an associated value chain or supply chain area. For example, if you're a data centre and you're in an area subject to heatwave conditions, your biggest vulnerability is in the resilience of the electricity network. If you think that through, if you're a financial institution which has data centres concentrated in areas of increased heatwave conditions, potentially one of the banks' biggest vulnerabilities in terms of physical risk is in the resilience of their data centre. Alternatively, if you're a property asset, you may have invested significantly in resilience measures on site, but in fact your biggest

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1 Investor Group on Climate Change (IGCC), *Submission 55*, p. 3.

2 City of Melbourne, *Submission 43*, p. 2.

> physical risk is then associated with the arterial roads to get to your asset, public transport infrastructure to bring your employees in, or precinct-level measures to protect from increased flooding or inundation if you're in a coastal area.[3]

3.4 This chapter considers the evidence received about how decision-makers could be better informed, such as by conducting analysis that considers worst-case climate projections, identifying the most at-risk infrastructure, undertaking further research and through the public disclosure of climate risks.

Planning for worst-case scenarios

3.5 The previous chapter summarised some of the climate change projections currently utilised by Australia's key research institutions and government agencies. The analysis and emissions pathways framework developed by the Intergovernmental Panel on Climate Change (IPCC) was also briefly outlined.

3.6 These projections are based on scientific data and rigorous analysis, however, they reflect scientific understanding at a point in time. Advances in scientific understanding of changes in the climate system have been achieved, yet knowledge gaps remain. Future emissions levels also cannot be predicted with certainty.

3.7 There is some concern that the existing approach to developing climate projections is overly conservative. The Breakthrough National Centre for Climate Restoration (Breakthrough) argued that IPCC assessments have taken an excessively cautious approach to climate change projections and have 'underplayed high-end possibilities'. Breakthrough partly attributed this to the consensus approach taken to compiling the IPCC's reports, which it argued results in insufficient attention being given to low-probability, high-impact risks that are 'greater than we would expect under typical statistical assumptions'.[4]

3.8 Breakthrough presented several arguments as to why it considers the global climate models are deficient. One of the reasons is that the models do not adequately account for carbon cycle feedback.[5] Another is that the rate of polar ice-mass loss is underestimated. Alternative studies were cited indicating that, even if just the Antarctic ice sheets are considered, there is the potential for multi-metre sea level rises this century rather than the up to 1.5 metre average rise referred to in Chapter 2.[6]

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3 Ms Emma Herd, Chief Executive Officer, IGCC, *Committee Hansard*, 23 November 2017, p. 16.

4 Breakthrough – National Centre for Climate Restoration, *Submission 62*, pp. 23.

5 Breakthrough – National Centre for Climate Restoration, *Submission 62*, p. 7.

6 D Spratt and I Dunlop, *What lies beneath: The scientific understatements of climate risk*, September 2017, p. 19; provided in Breakthrough – National Centre for Climate Restoration, *Submission 62*, p. 34.

3.9 Professor Ross Garnaut AO, who in 2007 was appointed to undertake a comprehensive climate change review by the state and territory governments, and then the Australian Government, has also discussed the potential for climate risks to be understated. In a 2011 paper, Professor Garnaut commented that there is a possibility of such an outcome due to scholarly reticence and publications lags, with the pattern of increasing concerns in the scientific community about climate risks supporting this conclusion. Professor Garnaut wrote:

> It is remarkable that the review of developments in the science—new observations and results of new research—have all either confirmed established scientific wisdom, or shifted the established wisdom in the direction of greater concern. This continues a pattern that has been present for some time. As noted earlier in this paper, the fourth assessment by the IPCC embodied more concern than the third, the third than the second and the second than the first.[7]

3.10 Professor Garnaut argued that the possibility of risks being understated is 'not a reason to clutch for knowledge outside the mainstream wisdom'; he emphasised that 'if our discussion ceases to be grounded in the established science, we have no firm, common ground from which to work on the most difficult policy problem of our times'. However, the professor concluded that when considering measures for climate change mitigation and adaptation, there is likely merit in taking stronger action. Professor Garnaut concluded:

> We should…be alert to the possibility that the reputable science in future will suggest that it is in Australians' and humanity's interests to take much stronger and much more urgent action on climate change than might seem warranted from today's peer-reviewed published literature. We have to be ready to adjust expectations and policy in response to changes in the wisdom from the mainstream science.[8]

3.11 Given the possibility of climate projections being overly cautious, Breakthrough argued that a prudent risk management approach requires 'a tough and objective look at the real risks to which we are exposed'. Breakthrough added that there is a particular need to consider:

> …those high-end events whose consequences may be damaging beyond quantification, and which human civilization as we know it would be lucky to survive. It is important to understand the potential of, and plan for, the worst that can happen, and be pleasantly surprised if it doesn't. Focusing on "middle of the road" outcomes, and ignoring the high-end possibilities, may result in an unexpected catastrophic event that we could and should have seen coming.[9]

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7 R Garnaut, *The science of climate change*, Garnaut Climate Change Review – Update 2011, Update Paper No. 5, March 2011, www.garnautreview.org.au/update-2011/update-papers/up5-the-science-of-climate-change.pdf (accessed 2 May 2018), p. 53.

8 R Garnaut, *The science of climate change*, p. 55.

9 Breakthrough – National Centre for Climate Restoration, *Submission 62*, p. 3.

3.12 Dr Craig James from CSIRO suggested that there is a problem with people becoming 'relaxed' about climate change reaching a certain level, such as the consequences of the world warming by a global average of 2°C. Dr James remarked that this is 'a dangerous space to be in, quite frankly'. Dr James noted that a global average increase of 2°C presents significant problems for all nature-based systems and that there is 'a lot of necessary adaptation between here and two degrees, let alone anything beyond that'.[10]

3.13 The committee also received evidence indicating that the private sector does not comprehend the risk climate change presents to their activities. Mr Andrew Petersen, Chief Executive Officer, Sustainable Business Australia, provided the following comments about this:

> Warren Buffett, that well-known raconteur, has built a fortune on that interface between risk and reward. One of his most famous quotes was that risk comes from not knowing what you are doing. The evidence suggests, from the private sector at least, that it doesn't actually fully understand the complexity of the risks that it faces and therefore does not know yet how to respond. A recent review of corporate disclosure reports revealed that 72 per cent of suppliers say that climate risk could actually significantly impact their business operations through revenue or expenditure yet only half of those are currently managing that risk.[11]

Assessment of existing and emerging risks to infrastructure

3.14 To help understand the implications of climate change and to enable decision-makers to focus on the most at-risk infrastructure assets, it was suggested that a national assessment or audit of existing infrastructure could be undertaken. Essentially, the evidence received identified two areas in which a national study could add value:

- by calculating the overall total anticipated cost of climate change and the investment in adaptation measures that will be required; and
- by identifying the most at-risk assets to enable adaptation responses to be prioritised.

3.15 A vocal advocate for undertaking a national assessment of the anticipated cost of climate change and the necessary investment in adaptation measures is the IGCC. Ms Emma Herd, Chief Executive Officer of the IGCC, explained that despite climate change already affecting infrastructure and resulting in additional costs for business

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10 Dr Craig James, Research Program Director, CSIRO, *Committee Hansard*, 22 March 2018, p. 7.

11 Mr Andrew Petersen, Chief Executive Officer, Sustainable Business Australia, *Committee Hansard*, 23 November 2017, p. 9. Similarly, Breakthrough argued that '[s]uccessful risk management requires thinking "outside the box" to avoid a failure of imagination, but not doing so is widespread at the senior levels of government and global corporations'. Breakthrough – National Centre for Climate Restoration, *Submission 62*, p. 4.

and government, 'no comprehensive estimate seems to exist on the cost of climate change impacts on Australia and the likely level of investment required for adaptation measures'. Ms Herd noted that an accurate understanding of the potential exposure of investments to climate risks and the ways in which business assets can be managed to reduce exposure are key concerns for investors. Ms Herd explained, however, that the absence of comprehensive information about the overall risk 'makes cost benefit analysis of climate change adaptation at an aggregated level impossible to quantify'.[12]

3.16 Ms Herd provided the following further comments in support of developing rigorous estimates about the costs associated with implementing the adaptation measures that are likely required:

> No matter which way you look at it, climate change has a cost. So, the question then becomes: do you want to invest in mitigation to reduce the absolute cost of adaptation, or do you want to defer investment in mitigation and just pay the bill for adaptation on the other side? And at the moment we're having a policy discussion whereby we're calculating only half of that equation, which is the cost of mitigation. We're not actually calculating the full cost–benefit analysis of climate change for Australia, which is: which side of that ledger will we pay more on, and where do we get the most economic benefit in terms of increasing our investment?[13]

3.17 Ms Herd continued:

> …the Paris Agreement sets out quite ambitious goals of limiting global warming to two degrees or less—we're not currently anywhere near meeting two degrees. At best, we're at 2.6, but that's if everybody does everything that they currently say they're going to do. We're more likely, currently, to hit three-plus. That has huge cost implications for Australia, and we don't know what the bill is for that current projected change. We don't even know what the bill is for two degrees of change at the moment. So, it definitely feels as though we're having a policy discussion with only half the information we need, and part of the need for that national assessment of value at risk is the need to have a fully informed public policy discussion.[14]

3.18 Ms Herd added that businesses are undertaking assessments to understand the potential consequences for their assets; however, they 'have to pay an awful lot of money for it…and it's not publicly available and it's not added up at a national level to

12 Ms Herd added that the last available estimate (undertaken in 2011) found that the replacement cost of coastal buildings and infrastructure at risk from climate change was estimated to be at least $226 billion (in 2008$) under a 1.1 metre sea level rise scenario. Ms Herd observed that science 'has advanced considerably in the years since, while new proprietary risk assessment tools and integrated datasets have also become available and are currently being applied but on an ad hoc basis'. Ms Emma Herd, IGCC, *Committee Hansard*, 23 November 2017, p. 15.

13 Ms Emma Herd, IGCC, *Committee Hansard*, 23 November 2017, p. 18.

14 Ms Emma Herd, IGCC, *Committee Hansard*, 23 November 2017, p. 18.

give a view of the macroeconomic impacts'. Accordingly, Ms Herd argued there is a preference for a whole-of-economy approach to obtaining this information.[15]

3.19 Professor Lesley Hughes from the Climate Council of Australia similarly drew the committee's attention to the absence of an up-to-date national assessment of climate change risks.[16] The Queensland Tourism Industry Council argued that a risk assessment to examine the overall consequences of climate change should be undertaken that considers the 'costs for defending buildings and infrastructure, environmental issues, and associated socio-economic benefits'.[17]

3.20 Others focused on how a national audit could inform the prioritisation of adaptation work by identifying the assets most at-risk from climate change. The Australian Sustainable Built Environment Council (ASBEC) submitted:

> There would be great benefit in a comprehensive national audit project to identify the core assumptions and technical parameters used in the design and delivery of infrastructure. This should fundamentally inquire as to whether climate change predictions have been incorporated into these assumptions.[18]

3.21 During the inquiry, the committee sought details about the information currently available to government about the climate risks to infrastructure. Dr Russell Wise from CSIRO explained that the National Exposure Information System (NEXIS) operated by Geoscience Australia provides 'a reasonably good understanding of current infrastructure and their exposure to coastal inundation'. However, Dr Wise acknowledged that further work would be useful. In particular, Dr Wise observed that scenarios regarding socio-economic development (such as population size and the location of infrastructure assets in the future) are not as advanced as climate change projections.[19] Other CSIRO representatives similarly agreed that a national audit of at-risk infrastructure would be of value to assist further research and planning about climate change adaptation.[20]

3.22 In considering a national assessment, it is evident that the scale of the task could potentially be overwhelming. For example, CSIRO's evidence suggested that studies of infrastructure would identify that 'enormous numbers of houses and dollar values of structures are going to be affected'.[21]

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15 Ms Emma Herd, IGCC, *Committee Hansard*, 23 November 2017, p. 17.

16 Professor Lesley Hughes, Councillor, Climate Council of Australia, *Committee Hansard*, 23 November 2017, p. 31.

17 Queensland Tourism Industry Council, *Submission 10*, p. 6.

18 Australian Sustainable Built Environment Council (ASBEC), *Submission 26*, p. 3.

19 Dr Russell Wise, Senior Research Scientist, CSIRO, *Committee Hansard*, 22 March 2018, p. 2.

20 Dr Craig James, CSIRO, *Committee Hansard*, 22 March 2018, p. 8.

21 Dr Craig James, CSIRO, *Committee Hansard*, 22 March 2018, p. 2.

3.23 The IGCC acknowledged that a national assessment of adaptation costs would be 'complicated'. To approach it successfully, the IGCC suggested it could be undertaken as part of each IPCC cycle; that is, after the IPCC's work has been undertaken and peer-reviewed, a national study could be undertaken with private sector participants to take the IPCC's analysis 'down to the level where it's investable and workable and plannable'.[22] Ms Herd referred the committee to New Zealand where a regularly updated report on projected climate change implications is prepared on a cyclical basis alongside the IPCC's work cycle. Ms Herd added that this report is supplemented by other reports focusing on specific risks, such as the implications for coastal infrastructure, natural capital reserves, forestry and the agriculture sector.[23]

3.24 Ms Kirsty Kelly from the ASBEC suggested that a national assessment of at-risk infrastructure would not need to involve testing assets. Rather, the assessment could add value by reviewing the standards applied in the construction of those assets and considering 'whether those standards are based on the frequency and intensity of weather events that we are seeing now'.[24]

3.25 International approaches to undertaking national risk assessments could be instructive. Recently, researchers have considered how an appropriate framework for undertaking a national assessment of climate risks to infrastructure could be developed for the United Kingdom. In a paper published in April 2018, they argued that due to the interconnectivities and interdependencies of infrastructure sectors, 'collective consideration' of the multiple infrastructure sectors is warranted. The paper identified the following approach for undertaking a national assessment to prioritise adaptation actions:

> A starting point will be agreement of a common baseline, some standardized socio-economic and adaptation scenarios to provide common reference points (but not limit development of other scenarios), and improved records and metadata about adaptation actions. However, to fully tackle the issues…a national capability needs to go further and must ultimately provide a common and internally coherent analytical framework that enables different risks to be fairly compared. It must be able to analyse the impact of 'persistent' events (e.g. repeated sequence of storms or floods, in the same or multiple locations) and simultaneous hazards (e.g. wind storm coupled with flooding). This can only be achieved by producing a national database of the location, function, design and condition of assets, and a record of any adaptation to these assets in order to provide a reliable assessment of current and future infrastructure performance.[25]

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22 Ms Emma Herd, IGCC, *Committee Hansard*, 23 November 2017, p. 18.

23 Ms Emma Herd, IGCC, *Committee Hansard*, 23 November 2017, p. 16.

24 Ms Kirsty Kelly, Representative, ASBEC, *Committee Hansard*, 23 November 2017, p. 45.

25 RJ Dawson et al, 'A systems framework for national assessment of climate risks to infrastructure', *Philosophical Transactions of the Royal Society A*, vol. 376: 20170298, 2018, http://rsta.royalsocietypublishing.org/content/376/2121/20170298 (accessed 2 May 2018), p. 16.

Research and data

3.26 Stakeholders generally agreed that a key role for government, particularly the Australian Government, is to ensure that adequate and reliable data, analysis and guidance is available to guide responsible decision-making. For example, the Climate Council of Australia submitted that:

> In order to climate proof infrastructure, the design, building, financing and maintenance of infrastructure must use the best available climate science and adaptation information available from premier agencies such as CSIRO and [the Bureau of Meteorology].[26]

3.27 Generally, comments from local governments and other stakeholders about the need to be informed about how they can adapt to climate change called for information to be updated more regularly, widely disseminated and publicised, and utilised consistently by all levels of government. For example, Hobsons Bay City Council submitted:

> To effectively plan for and manage extreme weather events, climate projections are needed that are based on the best available science and are relevant to the local area. This information should be widely disseminated and readily accessible to inform emergency management planning. It should also inform minimum legislative standards and planning decisions to ensure houses, buildings and infrastructure are designed and built to reduce the risk to human life and wellbeing.[27]

3.28 Corporate Australia also uses data collected by Australian Government agencies to guide decision-making. Wesfarmers explained that it uses CSIRO data to inform climate resilience planning and to improve its 'understanding of the material climate change issues that face our divisions', including physical, regulatory, reputational and competitive risks.[28] Sydney Airport referred to its participation in workshops presented by the Australian Climate Change Adaptation Research Network for Settlements and Infrastructure (ACCARNSI), which is hosted by the National Climate Change Adaptation Research Facility (NCCARF) and funded by the Australian Government.[29]

3.29 Mr Andrew Petersen, Chief Executive Officer, Sustainable Business Australia, emphasised there is a need for the Australian Government to provide ongoing financial support for research institutions, as well as sharing of the data collected to assist companies and governments to make decisions about the need for, and location of, future infrastructure. Mr Peterson argued that continually collecting

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26 Climate Council of Australia, *Submission 40*, p. 12.

27 Hobsons Bay City Council, *Submission 7*, p. 5.

28 Wesfarmers, *Submission 20*, p. 3.

29 Sydney Airport, *Submission 33*, p. 3.

data and maintaining datasets and making them available to all decision-makers in the economy would help build 'resilience into our economic system'.[30]

3.30 This section examines government support for climate research generally. This is followed by a discussion of the evidence from stakeholders that called for research to be used to develop specific products to assist with planning or for existing guidelines to be updated more frequently. This discussion is based on the evidence received during this inquiry. Relevantly, however, the Australian Research Council (ARC) recently provided funding for a new centre for excellence relating to climate change. The ARC Centre for Excellence for Climate Extremes at the University of New South Wales opened in April 2018.[31] As this occurred after submissions to this inquiry were received, the evidence outlined below does not consider this development.

Australian Government support for the National Climate Change Adaptation Research Facility

3.31 Submitters highlighted changes made by the Australian Government to the funding of climate change research. In particular, submitters referred to funding reductions for the NCCARF at Griffith University.

3.32 The NCCARF was established by the Australian Government and commenced operating in 2008. Since it was created, the Australian Government has provided $56 million in funding.[32] However, based on current funding announcements, from 2018–19 the Australian Government will not be directly funding the NCCARF.[33]

3.33 Submitters commended the work undertaken by the NCCARF and other research organisations such as CSIRO that provided resources to assist communities, businesses and governments to adapt to climate change effectively. For example, Mr Andrew Petersen, Chief Executive Officer, Sustainable Business Australia, commented that, over the last decade, this work has been 'instrumental to a number of

30 Mr Andrew Petersen, Chief Executive Officer, Sustainable Business Australia, *Committee Hansard*, 23 November 2017, p. 11.

31 Australian Research Council, 'ARC Centre of Excellence for Climate Extremes', *Media release*, 10 April 2018, www.arc.gov.au/news-media/media-releases/arc-centre-excellence-climate-extremes (accessed 2 May 2018).

32 Department of the Environment and Energy, Bureau of Meteorology, Great Barrier Reef Marine Park Authority, Attorney-General's Department, Department of Agriculture and Water Resources, and Geoscience Australia, *Submission 39*, p. 2.

33 The last funding announcement made by the Government was the provision of $0.6 million to the NCCARF and CSIRO in 2017–18. See Australian Government, *Budget 2017–18: Budget Measures—Budget Paper No. 2*, May 2017, p. 94.

businesses' in various sectors, including finance, insurance, infrastructure and construction.[34]

3.34 The Local Government Association of Queensland (LGAQ) also highlighted the importance of the work undertaken by the NCCARF. It submitted:

> While the Climate Council and a few other not for profit organisations undertake pieces of research and prepare publications about the implications of climate change on the matters of concern to this inquiry, there is currently only one organisation, the…NCCARF…that provides peer reviewed and credible synthesis of research outcomes specifically for practitioners.
>
> This service is vitally important to facilitating the uptake of leading thinking by time poor practitioners who are not climate change specialists, but have content expertise e.g. coastal engineers, urban and regional planners and policy and regulation makers.[35]

3.35 The Australian Coastal Councils Association (ACCA) and Professor Lesley Hughes from the Climate Council of Australia called on the Government to provide further funding to support the NCCARF and for funding for climate change adaption generally to be stable and ongoing.[36] Sydney Airport also submitted that it would 'encourage the ongoing work' of ACCARNSI and the NCCARF.[37]

3.36 The ACCA focused on the CoastAdapt tool to illustrate the importance of the work undertaken by the NCCARF and the need for the Australian Government to provide the NCCARF with ongoing funding. The Association submitted:

> The cut in funding means that NCCARF will be unable to continue its adaptation research activities including research to further develop the CoastAdapt web tool, which was launched in September 2016 to assist coastal councils respond to rising sea levels and other climate impacts.
>
> The CoastAdapt web tool quickly became established as a vital source of information and guidance for coastal councils attempting to minimise the impacts of a changing climate on their local communities and environment. The decision to cut funding for climate adaptation research was a major disappointment to coastal councils and other agencies attempting to deal with the imminent threat of a changing climate.[38]

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34 Mr Andrew Petersen, Sustainable Business Australia, *Committee Hansard*, 23 November 2017, p. 11. See also Ms Emma Herd, IGCC, *Committee Hansard*, 23 November 2017, p. 17.

35 Local Government Association of Queensland, *Submission 11*, p. 7.

36 See Professor Lesley Hughes, Climate Council of Australia, *Committee Hansard*, 23 November 2017, pp. 32, 34; Australian Coastal Councils Association (ACCA), *Submission 61*, p. 4; Mr Alan Stokes, Executive Director, ACCA, *Committee Hansard*, 15 March 2018, p. 24.

37 Sydney Airport, *Submission 33*, p. 3.

38 ACCA, *Submission 61*, p. 4.

3.37 The LGAQ expressed concern that the CoastAdapt could become obsolete without ongoing funding to maintain and update the tool. The LGAQ called on the Government to provide funding to maintain the tool and to expand it to include modules on bushfire, heatwave and flooding.[39]

Australian Rainfall and Runoff Guidelines

3.38 Concerns were expressed about the approach taken to updating the Australian Rainfall and Runoff guideline (ARR). The ARR is prepared by Geoscience Australia and is used by designers and engineers 'for the estimation of design flood characteristics in Australia'.[40]

3.39 The ARR was first published in 1987 and was not updated until 2016. While submitters welcomed the 2016 update, there was general concern about the time that elapsed between updates, particularly as climate change was not considered in the original version. For example, a joint submission from a group of engineers and scientists stated:

> The 1987 edition of ARR did not address potential impacts of climate change at all, so approaches to incorporating climate change prior to the release of the 2016 edition of ARR varied considerably between studies, where climate change was considered at all.[41]

3.40 To help ensure that infrastructure can be designed to be resilient to the effects of climate change, Consult Australia called for the Australian Government to ensure that Geoscience Australia has adequate resources to update documents such as the ARR more regularly.[42] Consult Australia also suggested that resources should be made available to Geoscience Australia and other relevant bodies to develop material similar to the ARR for other climate-related matters, such as temperature, wind and bushfires.[43]

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39 Local Government Association of Queensland, *Submission 11*, p. 7.

40 Consult Australia, *Submission 44*, p. 10.

41 Dr Phillip Jordan, Mr Michael Wrathall, Dr Richard Cresswell, Dr Katherine Daniell, Ms Penelope Springham, Dr William Glamore and Mr Andrew Herron, *Submission 48*, p. 7.

42 Similarly, Hobsons Bay City Council, which described the recent update to the ARR as being an 'important first step', submitted that 'further work is needed to strengthen the process for considering climate impacts in flood modelling and make it business as usual'. Hobsons Bay City Council, *Submission 7*, p. 4.

43 Consult Australia, *Submission 44*, p. 10.

Mapping and other datasets of at-risk areas

3.41 High-level projections and simulations of flooding and coastal inundation were identified in Chapter 2. Other examples of tools developed to assist local governments to gain a more detailed understanding of the interactions between flooding and different management measures were provided, including a tool developed by CSIRO to assist local governments located along the Port Phillip coastline.[44]

3.42 Floodplain Management Australia (FMA) highlighted the importance of useful flood risk information compiled by a respected source for informed decision-making. The FMA submitted:

> Having access to flood risk information underpins effective flood management and our ability to reduce the flood vulnerability of communities. Educating and engaging the broader community on their vulnerability to the impact of flooding and other natural hazards is also essential to building resilience. FMA supports transparency and education around flood risk.[45]

3.43 Mapping information is also valuable for the insurance sector.[46]

3.44 Overall, it was acknowledged that governments have undertaken work to gather data and to ensure that relevant data are available to businesses and communities.[47] It was also noted that large amounts of data have already been collected. Given this, Ms Megan Motto from Consult Australia indicated that there is a need to identify 'what we need, how to make use of it, how to make sense of it [and] how to analyse it in a way that's useful for us in designing the buildings and roads and rail of the future'.[48]

3.45 However, local governments and other owners of infrastructure need more detailed and tailored information to consider and plan for risks. For example, the committee was advised that the publication of risk mapping at a local level would help inform decision-making. By ensuring reliable information was freely available, it was suggested that governments could then require investors to take responsibility for any subsequent decisions to build in at-risk areas, enabling future governments to resist future pressure for resources to protect such properties.[49]

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44 Hobsons Bay City Council, *Submission 7*, p. 3.

45 Floodplain Management Australia, *Submission 35*, p. 5.

46 The implications of climate change for the insurance sector are examined in Chapter 5.

47 Mr Andrew Petersen, Sustainable Business Australia, *Committee Hansard*, 23 November 2017, p. 11.

48 Ms Megan Motto, Chief Executive Officer, Consult Australia, *Committee Hansard*, 23 November 2017, p. 25.

49 Regional Development Australia – South West, *Submission 15*, p. 5.

3.46 CSIRO submitted that there is 'insufficient data for sophisticated urban modelling', and suggested that there 'may be benefits from having standardised nationwide high-resolution information, including tide, rainfall and terrain data'.[50] Dr Russell Wise from CSIRO advised that Emergency Management Australia is 'exploring the development of a national capability on disaster risk information to understand what's required now and into the future and the changing nature of the natural hazards that will be causing disasters'. Dr Wise suggested that this work, which is focused on natural hazards, 'could be much more broadly applied to other forms of the more insidious chronic changes caused by climate change'.[51]

3.47 Hobsons Bay City Council submitted that, in its view, at present there is 'a significant gap in information available for coastal planning and sea level rise'. The Council detailed its concerns and suggestions for improvement as follows:

> The national first pass assessment of sea level rise is at a high resolution with limited usefulness for land use planning. Effective mapping that shows likely sea level rises over a range of time periods is needed at a scale that can inform land use decisions. It is most effective to undertake this mapping at a federal or state level due to the scale of the problem and to ensure a consistent approach between regional agencies and include local councils.
>
> Mapping should be refreshed at regular intervals (e.g. every decade) and incorporate the latest scientific information. Mapping should clearly communicate the probability of the risk occurring in a way that is clear to the community. For example: 'based on the best available science at the time there is a 10 per cent chance that sea level rise will be less than this and a 90 per cent chance it will be greater than this.' Such an approach will enable the community to understand the risk and will limit the temptation for modelling to be based on lower level risks due to political pressure.[52]

3.48 Hobsons Bay City Council advised that the continued funding of key projects, such as the CSIRO modelling of coastal and land-based flooding around Port Phillip referred to in paragraph 3.41, 'is a priority to coastal communities'.[53] Similarly, Lake Macquarie City Council called on the Australian Government to continue to invest in science that contributes to improved climate change projections regarding sea level rises and associated coastal hazards'.[54] It was also suggested that existing

50 CSIRO, *Submission 45*, p. 12.

51 Dr Russell Wise, CSIRO, *Committee Hansard*, 22 March 2018, pp. 2–3.

52 Hobsons Bay City Council, *Submission 7*, p. 3.

53 Hobsons Bay City Council, *Submission 7*, p. 3.

54 Lake Macquarie City Council, *Submission 29*, p. 2.

work undertaken to better understand the effects of climate change in particular regions should be better publicised.[55]

3.49 The Climate and Health Alliance also urged increased 'investment in vulnerability mapping programs to identify and map vulnerable populations and infrastructure to inform climate adaptation strategies and emergency response plans'.[56]

3.50 In addition to calls for continued investment in risk mapping, including the development of more detailed maps tailored to particular regions, broader concerns about the need for coordination and government leadership were put forward. The FMA argued for the development of a national approach to how information about flood risk associated with climate change should be prepared and published. The FMA argued that a national approach would be useful to overcome resistance in some locations about how the public release of such information could affect property values. The FMA explained:

> We acknowledge that many of our Local Government members face political and public pressure due to perceptions—warranted or otherwise—about the impact of releasing flood risk information about property values, development opportunities and insurance premiums. A national approach to how climate change flood risk information should be prepared and publicly disseminated, and how such information should be applied in the planning of existing and new areas, would go a long way to diffusing parochial reluctance in dealing with the issue.[57]

3.51 Ms Megan Motto, Chief Executive Officer, Consult Australia, commented that there are also issues with the interoperability of the systems that store data.[58]

3.52 Although several stakeholders commented on the value of information being make public, it was argued that enhancements to how public information is released are also necessary in some instances to maximise the utility of the information. For example, Mr Mark Leplastrier, Senior Manager, Natural Perils, IAG, referred to the Australian Tropical Cyclone Database managed by the Bureau of Meteorology. Mr Leplastrier commented:

> Every man and his dog is basically picking up that dataset and trying to make sense of it to understand cyclone risk. If we could put much more

55 RDA South West explained that Geoscience Australia and the Western Australian Department of Planning have undertaken work on coastal risk in the south west of Western Australia but that although this work is publicly available, RDA South West considers it is not publicised. See Regional Development Australia – South West, *Submission 15*, p. 5.

56 Climate and Health Alliance, *Submission 16*, p. 8.

57 Floodplain Management Australia, *Submission 35*, p. 5.

58 Ms Megan Motto, Consult Australia, *Committee Hansard*, 23 November 2017, p. 25.

> scientific effort into establishing a much better source of truth there, we'll start being able to have aligned views of risk and what to do about it.[59]

3.53 Mr Leplastrier added, however, that Geoscience Australia is developing a Tropical Cyclone Risk Model (TCRM) that is 'basically digesting historical cyclone tracks' and has the ability to produce a risk model that could be used in insurance or planning. Mr Leplastrier explained that a key feature of the TCRM is that it has been set up to enable researchers to 'contribute to the model and improve on it'. Mr Leplastrier observed that this model:

> …might be an interesting thing to take forward, if we can actually really focus scientific attention into that model. It's a bit like a local government flood study, which is a very good set of scientific information. If we could do that with these other important hazards and then have that available for people like insurers or engineers to pick up, that would be very, very good.[60]

3.54 Mr Neil Plummer from the Bureau of Meteorology commented that, although there is 'a lot of data and information available with which to make better decisions…there is a need for more accessible, nationally integrated datasets'.[61]

3.55 Despite it being acknowledged that governments understand the need for publicly available data, there are apparent issues with proprietary data. Mr Karl Sullivan from the Insurance Council of Australia explained that the insurance sector has struggled to access certain datasets at a reasonable price. Mr Sullivan stated:

> There are a number of datasets, even some residual flood datasets, where we are still negotiating, after a decade, to try to obtain those datasets at a reasonable cost and reasonable price, considering that anything you purchase has to be passed on to your customers at some point.[62]

3.56 Mr Dwayne Honor from the FMA noted that it is difficult to get information from all infrastructure asset owners that is needed to 'understand the interconnected nature of our critical infrastructure', such as the information held by local governments and telecommunications providers. Mr Honor explained that the information can be obtained, but 'sometimes it is not an easy process'. Mr Honor continued:

> It depends on the resources of the other asset owners, and then whether they want to share it with you. Some of them are pseudo-private organisations

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59 Mr Mark Leplastrier, Senior Manager, Natural Perils, IAG, *Committee Hansard*, 23 November 2017, p. 53.

60 Mr Mark Leplastrier, IAG, *Committee Hansard*, 23 November 2017, p. 53.

61 Mr Neil Plummer, General Manager, Community Forecasts, Bureau of Meteorology, *Committee Hansard*, 22 March 2018, p. 8.

62 Mr Karl Sullivan, General Manager, Policy Risk and Disaster, Insurance Council of Australia, *Committee Hansard*, 23 November 2017, p. 53. Ms Kirsty Kelly from the ASBEC also identified that access to proprietary data is a key issue: see *Committee Hansard*, 23 November 2017, p. 39.

> and aren't as willing to share information as government agencies can be. Oftentimes it is just ignored because it is too hard to get the information…[63]

3.57 Mr Honor suggested that a protocol could be developed to which relevant organisations could sign up that would enable information sharing and address concerns about sensitive information being disclosed.[64]

3.58 Mr Sullivan emphasised that the public release of previously cost-prohibitive datasets in the past has also resulted in beneficial and innovative outcomes. Mr Sullivan noted that the release of the geocoded national address file, which previously cost around $20,000 a year for each individual licence, resulted in 'a huge amount of innovation not just from the insurance industry, who were suddenly able to access it more freely, but from small start-up companies, innovators and app developers'.[65]

3.59 Ms Megan Motto, Chief Executive Officer, Consult Australia, also noted that there is an issue with data being 'held in disparate locations and places and by different authorities', such as local, state and the Australian governments, as well as private businesses. Ms Motto noted that this issue is receiving attention with the cities reference group established in 2017 by the Australian Government reviewing how to bring together data from both the public and private sectors.[66]

3.60 Finally, another issue when considering data is the potential for confusion about the various types of datasets available. Mr Neil Plummer from the Bureau of Meteorology commented that 'I think there is, at times, uncertainty amongst planners and other agencies about just what datasets are available and the best ones to use'. In particular, Mr Plummer noted that there is a danger in solely relying on historical data given the current trends in climate variables.[67]

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63 Mr Dwayne Honor, Queensland Director, Floodplain Management Australia, *Committee Hansard*, 23 November 2017, p. 6.

64 Mr Dwayne Honor, Floodplain Management Australia, *Committee Hansard*, 23 November 2017, p. 6.

65 Mr Karl Sullivan, Insurance Council of Australia, *Committee Hansard*, 23 November 2017, pp. 53–54.

66 Ms Megan Motto, Consult Australia, *Committee Hansard*, 23 November 2017, p. 25.

67 Mr Neil Plummer, Bureau of Meteorology, *Committee Hansard*, 22 March 2018, p. 8.

Disclosure and management of climate risk by corporate Australia

3.61 The committee received evidence discussing the importance of disclosure by companies about their exposure to climate change to enable accurate pricing of risk. In particular, the findings of the Taskforce on Climate-related Financial Disclosures established by the G20's Financial Stability Board and chaired by Michael Bloomberg were noted.[68]

3.62 The IGCC noted that it is increasingly recognised that Australian businesses have 'an obligation to identify and manage material climate change impacts for their operations and disclose material risks and impacts to the market'.[69] The IGCC argued that investors are forcing change by reviewing their investments and expecting that 'ASX300 companies which they invest in (or are currently assessing with a view to potentially invest), to have developed climate change adaptation strategies'.[70]

3.63 In addition, the need for directors and boards to consider climate risks carefully was noted. The legal opinion provided by Mr Noel Hutley SC and Mr Sebastian Hartford-Davis in 2016 that climate change risks should be considered by company directors and that these risks may be relevant to a director's duty of care and diligence was referred to in several submissions.[71]

3.64 The Senate Economics References Committee recently considered carbon risk disclosure practices within corporate Australia. In its April 2017 report *Carbon risk: a burning issue*, that committee concluded that 'carbon risk reporting was not sufficiently prevalent amongst Australian firms, and that when information was provided it was often of variable quality'. The committee recommended that the Australian Government 'commit to implementing the recommendations of the Financial Stability Board Task Force on Climate-related Financial Disclosures where appropriate, and undertaking the necessary law reform to give them effect'.[72]

3.65 In its March 2018 response to the report, the Government welcomed the release of the final report of the Financial Stability Board Task Force on Climate-related Financial Disclosures and encouraged stakeholders to consider the recommendations. However, the Government argued that law reform is not required

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68 IGCC, *Submission 55*, p. 6. The Taskforce was established to develop 'voluntary, consistent climate-related financial risk disclosures for use by companies in providing information to investors, lenders, insurers, and other stakeholders' (see www.fsb-tcfd.org/about/). The final recommendations of the Taskforce can be viewed here: www.fsb-tcfd.org/wp-content/uploads/2017/06/FINAL-TCFD-Report-062817.pdf

69 IGCC, *Submission 55*, p. 6.

70 IGCC, *Submission 55*, p. 10.

71 For example, see Environment Institute of Australia and New Zealand, *Submission 36*, pp. 7–8.

72 Senate Economics References Committee, *Carbon risk: a burning issue*, April 2017, p. 28.

because the *Corporations Act 2001* is principles-based and does not stop stakeholders from implementing the recommendations.[73]

73 Australian Government, *Response to Senate Economics References Committee report—Carbon risk: a burning issue*, March 2018, p. 3.