

Research series

Climate change and good corporate governance



AUTHORS

Dr Nick Wood and Kate Mackenzie

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This report has been commissioned by the Governance Leadership Centre (GLC) as part of a GLC update on governance and climate change risks. It is written by Dr Nick Wood of Climate Policy Research and Kate Mackenzie of The Climate Institute, with contributions from Stella Whittaker, Principal, Sustainability and Climate Change at Ramboll Environ, and Lil Bianchi, CEO of Lucsan. The authors acknowledge the assistance of Professor Andy Pitman and Sarah Barker, Special Council at Minter Ellison. Any errors or omissions are the responsibility of the authors.

Disclaimer

This report should be read in conjunction with the disclaimer included on page 28. The opinions expressed in this report do not necessarily represent the views of the Australian Institute of Company Directors.

Executive summary

Climate change presents a significant change in the external environment for all organisations in the coming years and decades. Many businesses have already been affected either directly or indirectly.

The science of climate change itself is now well established.

The science of what is required to avoid climate change is also now well established.

International commitments in response to the need to avoid climate change are now clear, and these commitments imply significant and potentially rapid changes in emissions, including in Australia. This will have implications for many sectors.

The science of probabilistic impacts of climate change are advancing rapidly and allows directors and their advisors to obtain a far more granular view of likely exposure than has ever been possible before.

This technological development in itself poses a risk and an opportunity to directors, who can either exploit or ignore new sources of data. Competitors and other external parties such as investors and researchers may be able to access a far more granular risk data on a third party's physical assets.

There is now a substantial and rapidly growing body of research and expertise on the material financial implications of climate change – through direct impacts, transition measures, and related pathways including legal liability risk and technological disruption.

Financial actors and authorities are now voicing an expectation for increasingly clear disclosure of climate risks. This has accelerated rapidly in the past 12 to 18 months and is continuing to evolve today, both in Australia and among international markets.

How to use this guide

We have designed this report to work on three levels:

- A)** Quick start guide – for directors new to the topic of climate change risk;
- B)** Boardroom brief – for directors more familiar with the risks and issues
- C)** Strategy resource – for directors to draw on in the development of more detailed board strategies for engagement with climate change risk.

Section 1: Introduction

Climate change is a challenging topic for directors.

It is often seen as an issue for the far distant future or one that only affects a few industries or locations.

Yet its effects are already being felt, and responses are being formulated by institutions and companies around the world.

The governance implications of climate change are evolving even more rapidly than the climate itself.

A phenomenon that was once only understood in broad forward-looking generalisations can now be analysed with granularity. International agreements and policies that once seemed ineffective are now having observable effects.

Markets, too, are responding, as investors and other stakeholders – customers, suppliers, the public – make decisions based on risks, opportunities and convictions.

Climate change is complex and pervasive. It will affect the operating environment of many organisations, and it will increase uncertainty, both via its effects in the physical world, and via society's responses to it.

It is also a story of innovation, and the disruptive power of what can happen when the physical world meets the digital world.

The challenges can seem daunting. However, there is a large and growing body of resources to assist decision makers in addressing climate change.

Directors who understand how climate change may affect their organisation, and who can identify and harness relevant and up-to-date sources of information and use them in their decision-making, will be vastly better equipped to meet the emerging challenges and opportunities.

Section 2: The global context for climate change risk

Climate change: A brief overview

"Emerging risks are no longer well described by the probabilities and frequencies and severity of weather events in the past. New science points to an increasing level of volatility and an increasing rate of change in some extreme events. There is already evidence in observations of extreme events that had previously never occurred and evidence suggests we will see increasingly common events that are unprecedented over the course of recorded human history. The level of risk and the scale and specifics of any physical and subsequent financial impact can now be teased out of modern computer simulations of the future climate."

– Professor Andy Pitman

Director, ARC Centre for Climate Science and UNSW

The basics of climate change will be familiar to most directors: human activity, especially combustion of fossil fuels and changes in land use, over the last 100 – 150 years has led to a very rapid increase in the level of greenhouse gases in the global atmosphere.

These gases trap energy from the sun in the atmosphere and the oceans. As the average concentration of carbon dioxide, a key greenhouse gas, has risen from about 280 parts per million in the pre-industrial era to a likely average of 400 ppm in 2016¹.

Atmospheric physics had long indicated that this would change the earth's climate (Source: NASA)



¹ Kahn, Brian, Climate Central/Scientific American, September 27, 2016 - <https://www.scientificamerican.com/article/earth-s-co2-passes-the-400-ppm-threshold-maybe-permanently/>

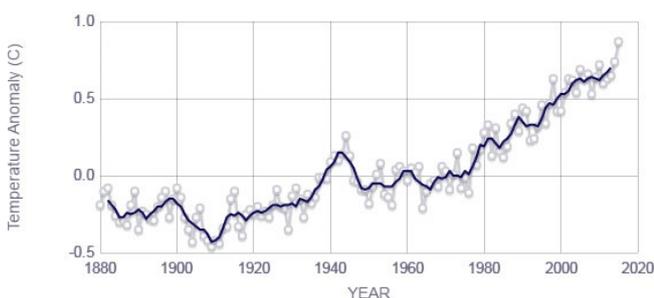
A delicate balance

This climate in which humans have thrived for millennia is the result of a balance of atmospheric gases. Human-induced emissions are causing changes that are extremely fast on geological timescales, and are also taking average temperatures higher than they have been in human history².

Human-induced emissions alter the concentration of greenhouse gases in our atmosphere, which drives change in our climate patterns in numerous and often interconnected ways.

Evidence that the climate is changing rapidly is “unequivocal” and it is 95-100 per cent certain that humans have been the main cause of climate changes in the past 60 years.

Temperature anomaly over time³



Source: climate.nasa.gov

Greenhouse gases accumulate in the atmosphere and it can take centuries to be removed from the atmosphere via trees, land and other “carbon sinks”.

Note: The different greenhouse gases such as carbon dioxide, methane and refrigerants are quantified using the common unit of tonnes of carbon dioxide equivalent (tCO₂-e) and referred to in shorthand as “carbon”.

Important points about climate change for directors

Although the very brief above is fairly widely understood, awareness of important recent developments in current climate science, and its continuing limitations, is less widespread.

Some of these have important implications for directors wanting to understand how climate change may affect their role:

The climate has already warmed. In Australia, temperatures are now 0.9C higher than they were in 1910⁴.

The climate will continue to warm this century even if emissions ceased tomorrow, because emissions take some time to affect the climate⁵.

Australia is particularly exposed to effects of climate change itself.⁶ Effects will include: rising snow lines (very high confidence), more frequent hot extremes, less frequent cold extremes (high confidence), and increasing extreme rainfall related to flood risk in many locations (medium confidence). Annual average rainfall is expected to decrease in southwestern Australia (high confidence) and elsewhere in most of far southern Australia⁷.

Climate is not weather: Climate models are not predictions, but provide us with likelihoods of outcomes, and varying levels of confidence. Weather cannot be predicted more than a few days in advance; this is a “fundamental dynamical property of the atmosphere”... For this reason, climate models are probabilistic, not deterministic. However, this does not mean models are not useful:

“As an analogy, while it is impossible to predict the age at which any particular man will die, we can say with high confidence that the average age of death for men in industrialised countries is about 75.”⁸

2 <http://climate.nasa.gov/evidence/> and IPCC Fourth Assessment Report, Summary for Policymakers, p. 5

3 Intergovernmental Panel on Climate Change, 2014 b – https://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf

4 CSIRO and BoM, 2014; Climate Change in Australia

5 IPCC, AR5, 2013-14

6 Hennessy et al, 2007, (IPCC Assessment Report 4, Working Group 2, pp.510 – <https://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter11.pdf>)

7 IPCC, Assessment Report 5, Working Group 2, Chapter 25 – https://www.ipcc.ch/pdf/assessment-report/ar5/wg2/WGIIAR5-Chap25_FINAL.pdf

8 National Oceanic and Atmospheric Administration, <http://oceanservice.noaa.gov/education/pd/climate/factsheets/whatrelationship.pdf>

A 2°C increase does not mean we will experience similar weather to today, only 2°C warmer. Much climate science to date has focused on global annual averages; which implicitly means the effects on specific regions and extremes will vary. A 2°C annual average increase will be higher in some parts of the world, and higher still during extremes. Recent research, for example, has indicated that the "angry summer" of 2012/13 in Australia will likely be "a typical event" by 2035⁹.

Feedback effects are downside risks that are not yet well understood. Increases in atmospheric greenhouse gases can trigger effects that in turn accelerate warming, known as "positive feedbacks". Climate systems are extremely complex and feedback loops are only partially understood. For example, melting polar ice can mean more heat is absorbed by oceans, instead of being reflected back into the atmosphere by the ice. That in turn promotes more warming and melting¹⁰. Another natural counter to global warming is soil carbon sequestration; a new synthesis of 49 studies found that warming temperatures are likely causing a net increase in CO₂ and methane emissions¹¹. These effects have not been included in climate models used by the IPCC¹².

Confidence levels vary around different effects of climate change. Confidence is highest in relation to temperature changes and sea level rise (SLR), because there is a great deal of historical and observational data on these. Confidence around precipitation changes is next highest. Confidence around the climate effects on localised events such as storms is more challenging in part because these are rarer events, but also due to their structure and composition.

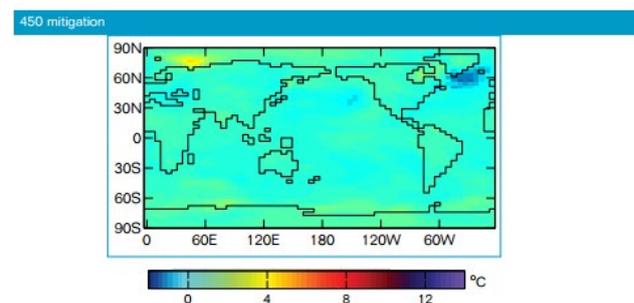
Climate change cannot be assumed to advance in a smooth, gradual or incremental way. It is likely that climate change will increase the uncertainty and unpredictability of some weather patterns and events.

What climate science tells us, and what it hasn't yet told us

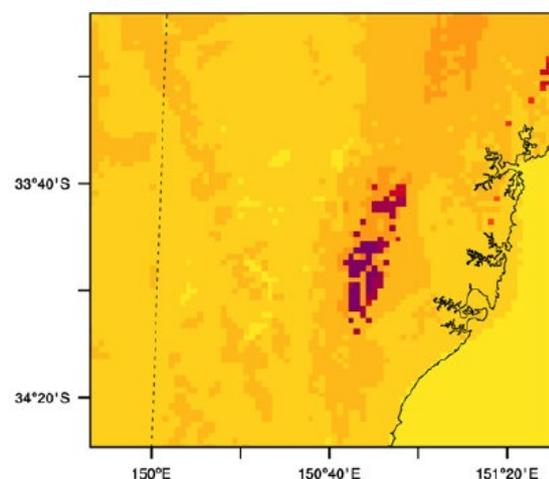
Coincident impacts may emerge – for example, it is possible that droughts in southern Australia will occur simultaneously with storms and other large precipitation events in northern Australia has been identified (CCIA)

High resolution modelling is now possible. This means that better understanding of future risks from physical impacts of climate change can now be teased out of modern computer simulations of the future climate. An example can be found in a 2015 paper by UNSW scientists looking at the effects of climate change and urban development in western Sydney.

2006 modelling¹³



2015 modelling¹⁴



- 9 Lewis, SC, King, AD, and Perkins-Kirkpatrick SE, 2016, "Defining a new normal for extremes in a warming world", *Bulletin of the American Meteorology Society*, <http://journals.ametsoc.org/doi/abs/10.1175/bams-d-16-0183.1>
- 10 Forster et al, 2007 (IPCC AR4 WG1, full citation at: <http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter2.pdf>)
- 11 Crowther, TW, et al, 2016, "Quantifying global soil carbon losses in response to warming," *Nature*, doi:10.1038/nature20150
- 12 Mooney, Chris, 2016, "Scientists have long feared this "feedback" to the climate system. Now they say it's happening", *Washington Post*, November 30, 2016.
- 13 Phipps, S.J. 2006, CSIRO Mk3L Climate System Model
- 14 Argüeso D, Evans JP, Pitman AJ, Di Luca A (2015) Effects of City Expansion on Heat Stress under Climate Change Conditions. *PLoS ONE* 10(2):e0117066. doi:10.1371/journal.pone.0117066

Specific extreme weather events can now be attributed to climate change. With varying levels of confidence, individual events can now be probabilistically attributed to human-induced climate change. Much of this is coordinated by the World Weather Attribution project¹⁵, which collaborates with scientists at University of Melbourne, Oxford University, Netherlands' Royal Meteorological Institute, and Red Cross. The “angry summer” of 2012-13 in Australia was found by multiple teams of scientists to be almost certainly attributable to climate change¹⁶ and “Australia’s record-breaking 2015 summer temperatures will be normal by 2035 - according to the majority of the models we looked at.”¹⁷

Economic impacts

Climate change is also emerging as a future driver of larger economic losses across many different areas of national economies¹⁸.

Earlier studies such as the Stern Review¹⁹ and the Garnaut Review²⁰, sought to weigh the economic risks of climate change against the economic costs of action.

While economists differ in methods of valuing climate change risks, and the benefits of mitigating it (for example, William Nordhaus, Robert Pindyck, and Richard Tol), authoritative analyses based on scientific knowledge almost invariably conclude that mitigation is less costly, and thus far preferable, to adapting to the future impacts of climate change itself. In fact, a recent survey indicates that the majority of economists who have published work on climate change believe that these economic models systematically understate the importance of action, via means such as a too-high discount rate²¹.

Indeed, adapting to a changed climate above 2°C presents so many unknowns and so much downside risk that these easily overshadow the costs of most realistic proposals to address it²².

15 www.climatecentral.com

16 Lewis, S and Karoly, D, 2014: Ch 9, http://www2.ametsoc.org/ams/assets/file/publications/bams_eee_2013_full_report.pdf

17 Lewis, Sophie, 2016, <https://theconversation.com/2015s-record-breaking-temperatures-will-be-normal-by-2030-its-time-to-adapt-68224>

18 Houser, T, Hsiang, S, Kopp, R, & Larsen, K, 2015, 2015, Economic risks of Climate Change: An American Prospectus, Columbia University Press

19 Stern, N. H. 2007. The economics of climate change: the Stern review. Cambridge, UK: Cambridge University Press

20 Garnaut, Ross, and Ross Garnaut. 2011. The Garnaut review 2011: Australia in the global response to climate change. Cambridge: Cambridge University Press

21 <http://policyintegrity.org/files/publications/ExpertConsensusReport.pdf>

22 Wagner, G, & Weitzman, M, 2015, “Climate Shock”, Princeton University Press

Mitigation efforts

Although the link between greenhouse gas emissions and climate change was confirmed in the 1980s, and the Intergovernmental Panel on Climate Change established in 1988²³, global emissions have continued to rise in almost every year since building on the cumulative volume and concentration in the atmosphere²⁴.

This is despite majority public support for action on climate change, even in countries such as the United States and Australia²⁵.

There are numerous reasons for this lack of progress, but fundamentally, mitigating climate change is extremely difficult. Many aspects of contemporary human society evolved around the highly concentrated energy contained in recoverable and transportable fossil fuels.

However, some encouraging steps towards abatement have been made.

The global emissions growth rate has stalled in the past three years²⁶, indicating emissions increases are decoupling from economic growth. Much of this is attributable to falling coal consumption in China. However, this global emissions plateau is nowhere near adequate to reduce the concentration of these gases in the atmosphere back down to pre-industrial levels. The physics of climate change mean that substantial reductions in the rate of emissions need to occur to remain within a safe range of warming.

The Paris Agreement

The objective of the Paris Agreement is to limit global warming above pre-industrial levels to <1.5-2°C. As it notes the importance of “the best available science”, it implies zero net emissions from developed countries²⁷ around 2050.

The Paris Agreement, which was reached in December 2015 after years of multilateral negotiations, marked a turning point in the global efforts to address climate change.

Virtually every country in the world – 193 – signed the agreement, which committed to “holding the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels”.²⁸

Previous agreements under the Kyoto Protocol had limited emissions mitigation to developed countries and promoted low emissions activities in developing countries through the use of international trading mechanisms. The Paris Agreement commits all countries to play a role, albeit a differentiated one based on historic responsibility for their contribution to the problem, relative wealth and level of economic development.

The Paris Agreement was more ambitious than many had expected, as it not only targeted 1.5°C of increase, it also clearly referred to the scientific knowledge of what is necessary to meet this goal: net zero carbon emissions in the second half of the century.

Despite this level of ambition, the agreement also came into effect much more quickly than had been anticipated. The agreement required at least 55 countries accounting for at least 55% of emissions to ratify before it came into effect; although it was widely assumed would not go into effect until 2018,²⁹ this in fact happened in early November 2016.

23 “Organization History”, IPCC website, http://www.ipcc.ch/organization/organization_history.shtml

24 Intergovernmental Panel on Climate Change, 2014, Climate Change 2014 – Impacts, Adaptation and Vulnerability: Part A: Global and Sectoral Aspects. Cambridge University Press

25 Australia <http://www.csiro.au/en/Research/LWF/Areas/Social-economic/Climate-change/Climate-attitudes-survey>; US - <http://www.gallup.com/poll/190010/concern-global-warming-eight-year-high.aspx>

26 http://www.globalcarbonproject.org/carbonbudget/16/files/UK_UEA_GCPBudget2016.pdf

27 Article 4 of the Agreement implicitly recognises that developing will take longer to achieve this goal than developed countries like Australia. For scenarios consistent with Paris Agreement objectives, different allocation approaches indicate that countries that were in the OECD in 1990 should reduce emissions by between 80 to 160 per cent below 2010 levels by 2050. Source: See: L. Clarke, K. Jiang, K. Akimoto, et al., 2014, Assessing Transformation Pathways, in: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, [O. Edenhofer, R. Pichs-Madruga, Y. Sokona, et al. (eds.)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA; N. Höhne, M. den Elzen, D. Escalante, 2014, Regional GHG reduction targets based on effort sharing: a comparison of studies, Climate Policy, 14:1, 122-147, doi: 10.1080/14693062.2014.849452.

28 Paris Agreement text: <https://unfccc.int/resource/docs/2015/cop21/eng/l09.pdf>

29 The Climate Institute, COP 22: Getting to Zero, http://www.climateinstitute.org.au/verve/_resources/TCI_COP22_FINAL04112016.pdf

Critically, the Paris Agreement is a dynamic and durable agreement. Every five years, starting in 2019-20, countries revisit their targets and actions. This is informed by an assessment of global progress towards achieving the objectives of the treaty, and accountability and transparency provisions that examine the impact of the actions a country is taking. Every new target must be stronger than the last one and countries should justify their commitments against limiting warming to 1.5-2°C. Finally, countries are expected to define 2050 emissions pathways no later than 2020. Germany, Mexico, Canada and the US have already submitted their 2050 strategies. China, UK, EU, Japan, and France are other G20 countries initiating their own plans and these are expected by 2018.

Australia's role

Australia was not among the first countries to ratify the agreement, but it announced it would ratify the Paris Agreement on November 10, 2016, despite the election of Donald Trump in the US two days earlier raising some doubt about that country's ongoing role. In announcing the ratification, Prime Minister Malcolm Turnbull noted that early entry into force is "a powerful signal of nations' intentions to follow through on their Paris commitments".³⁰

In advance of Paris, the government committed to reduce emissions by 26-28% on 2005 levels by 2030. The ALP has committed to at least 45% reductions over the same

time period. The government will revisit its 2030 target in 2019-20 as part of the Paris process described above.

In addition, the government has committed to examine its post-2030 emissions pathway in 2017. The national ALP, and the states of NSW, Victoria, South Australia and ACT have stated their objective is to reduce emissions to net zero by 2050.

Foreseeable transitions: Limits to future fossil fuel use

The Paris Agreement commits Australia and the world to pursuing what had been indicated by scientific work since the mid-1990s: the rate of anthropogenic greenhouse gas emissions, particularly from fossil fuels, would need to decline sharply within decades in order to stay within the boundaries of safe atmospheric change³¹.

Human-induced emissions are accumulating faster than existing systems (such as trees) can draw them out of the atmosphere.

These extra emissions accumulate in the atmosphere, meaning the world's budget for future emissions is determined by our past emissions. The possible future rate of "flows" are determined by the existing "stocks" which have built up since industrialisation began.

For this reason, two key concepts are: **the emissions trajectory** and **the carbon budget**.

Table 1: Global net zero emissions and carbon budgets capable of limiting global temperature rise to 1.5-2°C

Temperature goal		Carbon budget (2016 - 2050, Gt)	Per capita emissions in 2050 (t/person)	Year of global net zero emissions
Paris consistent >85% chance 2°C, >50% chance of 1.5°C,	CO2 only	680 to 795	<0.1	2024-2050
	All GHGs	1280	1.5	2060-2080
Only 2°C consistent >66% chance 2°C, >low chance of 1.5°C,	CO2 only	390 to 1140	1.2	2055-2070
	All GHGs	1580	2.8	2080-2100

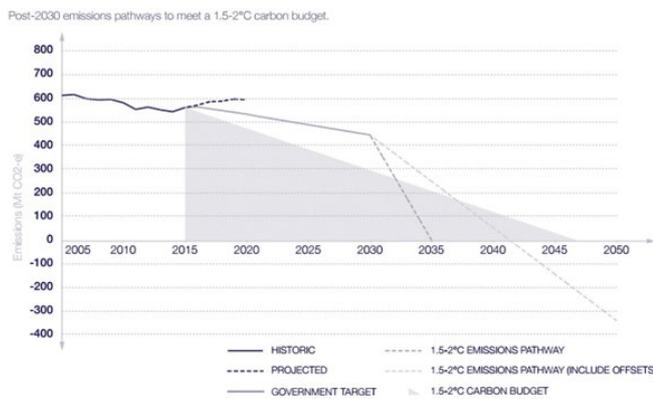
30 <http://malcolmturnbull.com.au/media/ratification-of-the-paris-climate-agreement> NB this quotes his actual words which departed from the prepared remarks here. Delivered remarks can be found in this video: <https://www.theguardian.com/australia-news/video/2016/nov/10/malcolm-turnbull-announces-australia-has-ratified-paris-climate-change-agreement-video>

31 Second Assessment Report, Working Group 1, full report

Also shown for comparison is a scenario that gives >66 per cent chance of limiting warming to 2°C, but is inconsistent with the Paris Agreement because it is unlikely to achieve the 1.5°C goal. Under the current suite of global emissions scenarios that are consistent with limiting warming to 1.5°C by 2100, global temperatures peak above 1.5°C before returning to below these levels later in the century.

The Climate Institute has analysed the policy implications of Australia's commitment to the Paris Agreement, which the government announced on November 11, 2016 would be ratified:

Australia's carbon budget:



Source: The Climate Institute

The chart above draws upon analysis by the Commonwealth Government's Climate Change Authority (CCA).

The Hutley opinion, drawing on the same CCA report, noted "The Authority concluded that, to meet Australia's emissions reductions goals, emissions will need to decline more steeply in coming years than they have in the past," and added that "A change in the regulatory environment is foreseeable, and probably inevitable."³²

How does the carbon budget present a risk?

The carbon budget implies that there will be losses from the transition away from high dependence on fossil fuels.

There have been numerous analyses of the financial implications of the carbon budget, led by the UK think-tank Carbon Tracker Initiative and by other institutions such as Oxford University's Smith School for Enterprise and the Environment, as well as mainstream financial institutions from Citigroup³³ to Blackrock³⁴.

The implications of this are explored in Section 3.

32 Hutley SC N and Hartford-Davis S 2016: "Climate Change & Directors' Duties" Memorandum of Opinion at www.cpd.org.au Hutley SC N and Hartford-Davis S 2016: "Climate Change & Directors' Duties" Memorandum of Opinion at www.cpd.org.au
 33 Citigroup 2015: Energy Darwinism II - Why a low carbon future doesn't have to cost the earth www.citi.com/citigps
 34 <https://www.blackrock.com/investing/literature/whitepaper/bii-climate-change-2016-us.pdf>

Defining “climate risk”: A typography

Broadly, there are two categories of climate risk: the actual climatic changes, and the responses to it. Emerging consensus (PRA, 2015; CISL, 2016; FSB TCFD, 2016) is to describe these as follows:

1. "physical" risks – arising from the effects of climate change itself; and
2. "transition" risks – arising from the efforts to mitigate and avoid climate change.

Many financial analyses also focus specifically on tertiary risks arising from the above categories, such as policy risk (changes in regulations that may affect businesses), liability risk (in particular, over failure to act), and technology risk (such as electric vehicles or cheaper solar panels affecting incumbent businesses and industries).

We find the following table, derived from a Cambridge University paper written for the G20, a useful framework for considering the combination of risks (and opportunities):

		Financial risks			
		Business	Credit	Market	Legal
Sources	Physical				
	Transition Policy Technology Sentiment				

References:

1. Bank of England Prudential Regulatory Authority, 2015, The Impact of climate change on the UK insurance sector, September 2015 - <http://www.bankofengland.co.uk/pradefra0915.pdf>
2. Centre for Sustainable Finance, Cambridge University, 2016, “Environmental risk analysis by financial institutions: A review of global practice; An input paper for the G20 Green Finance Study Group”. <http://www.cisl.cam.ac.uk/publications/sustainable-finance-publications/environmental-risk-analysis-by-financial-institutions-a-review-of-global-practice>
3. Carney, Mark, 2015 “Breaking the tragedy of the horizons”, speech to Lloyd’s of London, September 2015, <http://www.bankofengland.co.uk/publications/Documents/speeches/2015/speech844.pdf>

Section 3: The context for climate change risk as a governance challenge

Climate change is an opportunity and a risk

In January 2016, the World Economic Forum's annual risk survey identified³⁵ "failure to mitigate and adapt to climate change" as the global risk in the next decade with the biggest impact and the second-highest likelihood (after large-scale involuntary migration). The survey draws on 750 experts and decision-makers around the world from business, academia, civil society, and the public sector.

The WEF survey also identified "climate change" as the "global trend" with the most connectivity to risks. "Unlike risks, trends are occurring with certainty and can have both positive and negative consequences," the WEF says.

Private sector responses have been widespread leading up to and since the Paris Agreement

In the 2000s, corporate strategies relating to climate change were a mixture of piecemeal opportunism and "green" marketing. GE's famous "Ecomagination" strategy is perhaps the best-known example – it incorporated a marketing and branding exercise, but also a successful strategy to tap into new markets for low- and zero-carbon technologies³⁶.

Others fared less well; BP's "Beyond Petroleum" branding was quietly dropped, along with most of the company's renewable investments.

Some companies, meanwhile, tried to hold back the tide of climate mitigation policies by advocating against emissions pricing or anything else that might damage short-term profits.

In recent years, however, corporate responses to climate change have changed dramatically.

Among leading companies, climate strategies are less about branding and image, and more about managing risk and recognising opportunities. This is evident even among oil majors³⁷.

Several of the biggest European electricity generators have spun off or are selling their coal and even gas fired assets to focus on renewables³⁸.

35 <http://www3.weforum.org/docs/Media/TheGlobalRisksReport2016.pdf>

36 Makower, Joel, 2015, "Ecomagination at 10: A status report", Greenbiz.com, May 11, 2015

37 Ryan, Joe, 2016, "Big Oil Unexpectedly Backing Newest Non-Fossil Fuels", Bloomberg.com, May 10, 2016; Crooks, Ed, 2015, "Energy groups nod to climate of opinion", Financial Times <https://www.ft.com/content/ede0412c-0780-11e5-9579-00144feabdc0>

38 Steitz, Christopher, 2014, "German utility E.ON to split to focus on renewables, grid", Reuters, December 1, 2014, <http://uk.reuters.com/article/uk-e-on-divestiture-idUKKCNOJE0TZ20141201> [Stothard, Michael, 2016, "Low energy prices here to stay, says utility CEO", Financial Times, May 15, 2016 - <https://www.ft.com/content/4bdf5a4e-1a84-11e6-8fa5-44094f6d9c46>

In Australia, AGL has created a \$3bn renewable energy investment fund (Macdonald-Smith, Angela, 2016, "QIC joins AGL Energy in \$3bn renewable energy fund")³⁹.

On the policy side, the inevitability of the shift towards a low-carbon and zero-carbon future has led most businesses to seek certainty. Numerous initiatives have been launched to support climate policy that clearly acknowledges the 2°C limit. This is driven by self-interest as much - if not more - than altruism: when science, international agreement and public opinion are all supportive of a rapid drop in greenhouse gas emissions, the lack of a clear policy pathway adds risks and uncertainty (IPCC AR5, WG3, Ch2).

Below are several examples of large companies calling for policymakers to set a pathway to a <2°C increase in emissions:

International:

- In November 2015, the CEOs of 79 businesses (including Microsoft, Tata Sons, and Dow Chemical Company) representing \$2.1tn in revenues in December signed a letter urging "governments to take bold action at the Paris climate conference" in December.

In Australia:

- In June 2015, organisations including the Business Council of Australia, AiGroup, ACOSS and the ACTU joined in calling for Australia to play its fair part in avoiding 2°C of global warming.
- In September 2015 the CEOs of Westpac, BHP Billiton, AGL Energy, Qantas, GE, Mirvac, Santos, Unilever, and Wesfarmers supported Australia's bipartisan commitment to limit global warming to less than 2°C, and noted that "Australia can play its fair part in these global efforts", to ensure Australia played its fair part in keeping warming to below 2°C.

In the US:

- Low Carbon USA: 365 members including Unilever, Dupont, Mars, Levi Strauss, General Mills, Starbucks. Members called on US president-elect Donald Trump to uphold the US' climate commitments made in the Paris Agreement, and to continue to participate in the Agreement in order to attain its goal of keeping climate change below 2°C.

Investor initiatives

The Global Investor Coalition on Climate Change is made up of 4 regional organisations around the world, whose members in asset owners and asset managers have funds totalling almost \$24tn.

The coalition has recently announced new expectations of auto sector companies, and updated its expectations for the energy sector – in both cases as a direct result of the Paris Agreement. The investor coalition members have also made clear that company directors will be asked about their involvement in a climate strategy:

"Going forward, asset owners and fund managers will need to know how oil and gas companies – and particularly the boards accountable for overseeing them – see the future impact of climate change on their activities and how they plan to align their business model with the greenhouse gas reductions required to deliver binding international agreements."

Stephanie Pfeifer, CEO of the Institutional Investors Group on Climate Change (Europe) on the revised oil & gas industry engagement guide.

Investors are applying pressure via different means, including divestment, engagement and enforcement. For example, Norway's sovereign wealth fund, the world's biggest equities owner, has sold off holdings in more than 50 companies that rely on coal for more than 30 per cent of operations or revenue. Insurance firms AXA and Aviva have committed to similar thresholds. BlackRock, the world's largest asset manager (US\$5.1 trillion under management) is increasingly focusing on board-level management of climate risks.

Shareholder resolutions:

“Sustainability” is reportedly the fastest-growing category of shareholder resolutions, with climate-related resolutions especially highlighted⁴⁰.

Decarbonisation pledges:

Investors managing \$600bn of assets have pledged to completely decarbonise their portfolios⁴¹.

Many large investors including the Norwegian oil fund, AXA, Aviva have committed to selling their shares in companies that depend heavily on thermal coal for either revenues or operations.

Company decisions being influenced:

“Mr Kerr said that while there may be opportunities in coking coal, investor concerns around climate change meant it was unlikely to expand in the thermal variant, which is used in power stations.” Henry Sanderson, “South32 on the hunt for more coal deals”, Financial Times, November 25, 2016⁴².

Analytical tools for transition risk

Key points:

- Existing mandatory and voluntary disclosure regimes are generally considered inadequate for these purposes by researchers
- However, in the absence of good disclosure rules or practices, researchers are conducting systematic analyses of climate transition risk across companies in several sectors – often using a combination of publicly-available information, satellite data and commercial corporate data providers.
- Many powerful stakeholders are pushing for mandatory climate risk disclosure.

Tools for whole-of-portfolio analysis of transition risk:

Tools for assessing transition risk across entire investment portfolios already exist, and more about in development.

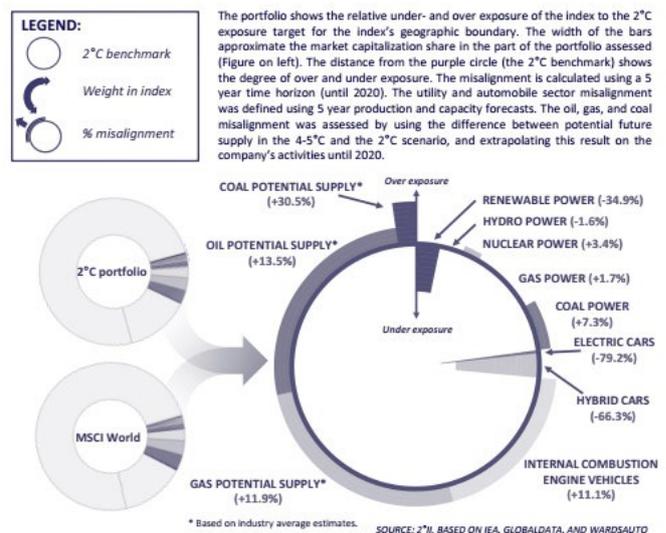
Bloomberg’s Carbon Risk Valuation Tool

This tool, available to Bloomberg data terminal subscribers, can apply five different future transition scenarios, which can be modified by end users⁴³.

SEI Metrics tool

A consortium of not-for-profits, research institutions and corporate data providers led by Paris-based 2 Degree Investing Initiative are developing a “Sustainable Energy Investment Metrics” or SEI Metrics tool, in order to assess multiple companies against future energy scenarios derived from the International Energy Agency and other authoritative sources. The tool will be released in December 2016, covers multiple sectors, and has been tested by investment managers over the course of this year⁴⁴.

The developed market equity universe: 2°C benchmark and MSCI world



40 Serafeim, George, 2016, “The fastest-growing cause for shareholders is sustainability”, George Serafeim, Harvard Business Review, July 2016 <https://hbr.org/2016/07/the-fastest-growing-cause-for-shareholders-is-sustainability>
 41 <http://unepfi.org/pdc/latest-annual-report-27-investors-representing-over-600bn-in-decarbonization-commitments-detail-progress-made/>
 42 <https://www.ft.com/content/b581b296-b23a-11e6-a37c-f4a01f1b0fa1>
 43 https://data.bloomberglp.com/bnef/sites/4/2013/12/BNEF_WP_2013-11-25_Carbon-Risk-Valuation-Tool.pdf
 44 2degrees-investing.org

Understanding data on physical impacts

Climate change – physical risks and opportunities in context

Most organisations have yet to conduct detailed analysis of their specific risks and opportunities from the impacts of climate change itself.

The usefulness of climate modelling and data projections for business purposes has advanced more rapidly than many in the private sector are aware.

Much of the climate data of 10 years ago was too broad to be of direct use to company directors.

For example, a statement such as “By 2030, annual average temperature over Australia will be around 1°C above 1990 levels” (from the Garnaut Review) gives only a broad sense of long-term risks in the external environment, with little insight into company-specific risks.

That is no longer the case. As outlined in Section 2, recent developments mean that climate change data is rapidly becoming a critical input for many business decisions.

In particular:

- climate impacts are being observed
- climate change data has advanced, and continues to advance, in its usefulness and sophistication.

Geo-location data is critical

For businesses with real-world assets and exposures, geographical data is the key to understanding risks and opportunities.

Businesses with a large footprint in the physical world are likely to have more apparent exposure to physical risks than those with a small or mobile footprint, such as services companies that operate primarily online – although the latter would not necessarily be unaffected, for example via their markets.

In order to engage with the risks a business will need a clear and unambiguous data on the location of its physical assets.

Opportunities

Location-based risks can also be a source of opportunity, particularly where decisions can be made about relocating key resources.

For example, several Australian winemakers have reportedly either purchased or are looking to purchase land further south, as their existing vineyards suffer from warmer temperatures and other unfavourable climate shifts, such as changes in precipitation. e.g. Treasury Wine Estates⁴⁵

A wine business would know where its vineyards are. However, climate data could assist in evaluating prospective new sites, by providing information on the future climate outlook of a specific region.

The best examples of businesses with strong understanding of the sensitivity of their financial performance to climatic conditions can be found in the agricultural sector. The Australian agricultural sector is already one of the most sophisticated in the world and has a strong track record in the development and use of “on-farm decision tools” designed to assist farmers to manage the risks associated with the unique features of the regional climate, dominated as it is by inter-decadal variance imposed by the El Nino Southern Oscillation (ENSO). They have been among the first to integrate the information on risks and opportunities into the biophysical models of farm systems. This has allowed them to firstly work out what the financial impact of changes in rainfall and temperature would have on the farm productivity and secondly to integrate this information into the models of farm profitability.

⁴⁵ <http://www.reuters.com/article/us-australia-wine-climatechange-idUSKCN0US2QU20160114> and others interviewed by CSIRO researchers <https://publications.csiro.au/rpr/download?pid=csiro:EP116233&dsid=DS3>

Climate change data: sources and use

Key points:

- Climate data is improving in usefulness and specificity
- It is open source
- Datasets are very large, which can present challenges
- Specialist skills are required to interrogate the data, presenting a potentially large barrier to entry

Over the last few years there has been a great advance in the usefulness of climate data and immense improvements in making the latest information available to end users. For example, regional climate models can now be used to generate probabilistic predictions for areas as small as 2km squared.

A feature of climate data that may come as a surprise to business is that it is all “open source”; anyone with the right skills can access it. The open source nature of this data creates some interesting challenges to the tradition models of risk management. We discuss this aspect of fiduciary duty in Section 5.

Primary climate modelling data involves very large sets of data. For example, the NASA global data sets of daily average maximum, average minimum temperatures and precipitation projected out to 2099 is stated as being 12 Terrabytes in size⁴⁶. However rapid increase in computing power, and decreasing costs, means businesses that already engage in “big data” analysis can undertake this level of analysis.

The ability of a business to engage effectively with these large data sets will be a key factor for both the management of risk and the creation of opportunities.

Examples of public climate change data

The Earth Systems and Climate Change Hub (ESCC) – nesclimate.com.au/

The ESCC Hub is a Commonwealth Government initiative tasked with engaging with existing and prospective end users of climate science. It has a mandate to engage with the end users of climate change data and includes a stakeholder advisory group through which business can directly engage with research teams. Current ESCC research activities include:

- The development of regional and sub regional scale models
- A better understanding of the impacts of climate on water resources
- Aspects of food security and improving the resilience of Australian agriculture
- The develop of detailed projections and tools to better understand coastal hazards
- Identifying the severity and frequency of extreme weather in the future

The Climate Change in Australia (CCIA) web portal – climatechangeinaustralia.gov.au

The CCIA is an open access resource for detailed climate data, both historical and projections. The data set is an ensemble developed from the detailed assessment of the “skill” of climate change models used by global research and scientific organisations. The CCIA aims to assist the Australian agriculture and primary resources sector with climate adaptation.

NASA Earth Exchange Global Daily Downscaled Projections (NEX-GDDP) – nex.nasa.gov/nex/projects/1356/

NASA's NEX-GDDP data set has global spatial coverage, runs from 1950 to 2100 and provides climate projections downscaled from the 200km grids of the 21 original climate simulation to a 25 by 25 km grid. This is a powerful ensemble data set and is provided under open access terms to researchers and society.

The Intergovernmental Panel on Climate Change (IPCC) – [ipcc.ch](https://www.ipcc.ch)

The IPCC was formed in 1988 by the UN Environment Program and the World Meteorological Organization. It has a membership of 195 countries which decide its work program and its processes of reviewing, recommending and adopting its reviews. The IPCC does not conduct its own scientific research; it reviews and assess the scientific, technical and socio-economic information worldwide that is relevant to climate change. It is coordinated by a small secretariat based in Geneva and most of the work of compiling its reports is conducted by scientists around the world; largely on a voluntary basis. (The Working Group I part of its 5th Assessment Report was written by 209 lead authors, 50 reviewers, and has 9,200 citations.) However, the IPCC's multi-year publication cycles means that it does not necessarily represent the latest scientific observations or the most advanced modelling. For example, the IPCC's latest Assessment Report on climate science was published in 2013.

46 <https://cds.nccs.nasa.gov/nex-gddp/>

Section 4: Insights on good practice for directors addressing climate risk

Context

Developing a board response to climate change means engaging with a complex and rapidly evolving body of work.

The examples below are described as *emerging* best practice because we believe that governance practice in relation to climate change is still in its very early stages of development, a view borne out in recent reviews⁴⁷. Nevertheless, these case studies serve to illustrate the breadth of ideas and approaches that can inform good governance practice in relation to climate change.

Good practice can be viewed as either:

- A *relative* comparison to what is being done by others, or
- An *absolute* comparison to what is objectively required

There are a number of sustainability rankings and ratings systems in existence that use relative comparisons (Global Reporting Initiative, Dow Jones Sustainability Index) and many large Australian businesses submit voluntary disclosures to the CPD (formerly the Carbon Disclosure Project).

Being “best in class” in a sustainability ranking may not be the same thing as demonstrating best practice when it comes to the consideration of the fiduciary duty of directors on climate change risks.

The absolute view of good practice is based upon what the global agreements and underlying science dictate. The need for alignment to this is openly expressed by stakeholders throughout the business and investment worlds.

Key features of “good practice” on climate change

The following is a list of characteristics we have observed through our work and conversations with directors and members of boards that are engaging with climate change risks in detail. They have:

- Done the ground work to educate themselves either through their own efforts or through conversation with appropriate experts
- Used their detailed knowledge of the business to build an understanding of how the risks and opportunity sit across their operations
- An understanding that the risks can be business-wide
- Recognised that climate risks and opportunities are not limited to those explicitly designated as “carbon pricing” or “climate policy”
- Understood that the timeframe for engagement is now and that it will be on-going and become part of business as usual
- Not underestimated the scale of the task involved
- A willingness to confront both the “good” and the “bad” news

Examples of organisations acting on climate change risks

AGL: A clear recognition of transition

AGL are one of Australia's largest integrated energy companies with assets ranging from the brown coal fired power station at Loy Yang in Victoria through to large scale renewable generation such as the Nyngan solar plant in NSW and the Macarthur Wind Farm in Victoria.

AGL's commitments on the transition aspects of climate change risk are clearly articulated in its publication "AGL Greenhouse Gas Policy"⁴⁸.

AGL also published in 2016 a scenario analysis of how it would be affected if Australia were to meet its Paris Agreement commitments.

The good practice features include the following:

- It is evident that both risk and opportunities have been considered.
- The business strategy covers both the improvement of existing assets and the investment in new technologies.
- It covers the whole business from the upstream generation to the downstream customers.
- It includes the use of carbon price as a technique for aligning the business capital investment with the overall transition trajectory.

AGL commits to being a transparent and constructive stakeholder. Our public policy advocacy and internal approach to GHG mitigation will be reported in our Annual Sustainability Report. AGL specifically makes the following commitments:

- AGL will continue to provide the market with safe, reliable, affordable and sustainable energy options.
- AGL will not build, finance or acquire new conventional coal-fired power stations in Australia (i.e. without CCS)¹.
- AGL will not extend the operating life of any of its existing coal-fired power stations.
- By 2050, AGL will close all existing coal-fired power stations in its portfolio.
- AGL will improve the greenhouse gas efficiency of our operations, and those in which we have an influence.
- AGL will continue to invest in new renewable and near-zero emission technologies.
- AGL will make available innovative and cost-effective solutions for our customers such as distributed renewable generation, battery storage, and demand management solutions.
- AGL will incorporate a forecast of future carbon pricing into all generation capital expenditure decisions.
- AGL will continue to be an advocate for effective long-term government policy to reduce Australia's emissions in a manner that is consistent with the long-term interests of consumers and investors (see Appendix 1 for AGL's approach to public policy).

¹ The term conventional is used to refer to coal-fired power plants that have a higher lifecycle emissions intensity than a combined cycle gas turbine (CCGT).

Ramboll's Copenhagen Cloudburst modelling – Climate Adaptation in Practice at a City-Wide Scale⁴⁹



In July 2011 the capital of Denmark, Copenhagen, was hit by the worst and most destructive rainfall event in the city's history when 150mm of rain fell on the city in two hours. Many homes and shops were severely damaged by the flooding. The damage caused by this extreme rainfall event ended up costing approx. \$US1.1bn. In fact there have been five such extreme rainfall events during the last 5 years and the insurance claim for damages were in the range of \$US0.5-1bn for each event. The city also each time experienced additional socio economic losses in the same cost range, as well as severe pollution and spread of associated diseases across the city.



The expected changes in climate by 2100 are predicted to be:

- Increase in extreme rainfalls at 40%
- Sea level rise of 0.6-1.2 m plus increased storm activity
- Temperature increase of 1.7-3.7 °C
- Longer periods of drought
- More frost/thaw shifts

The City of Copenhagen is now investing heavily in protecting the City against extreme weather in the future. The protection of the City will be the catalyst for creating a 'climate resilient city' with higher recreational values, more urban quality and increased biodiversity. Ramboll worked on the Danish capital's 'Cloudburst Management Plan' in close collaboration with several municipalities of the City of Copenhagen.

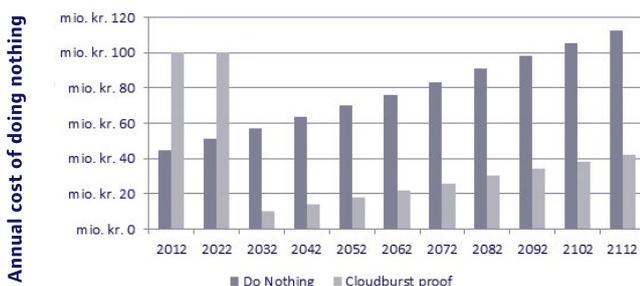
General principles of the adaptation solutions being progressed by the City include:

- New and upgraded city infrastructure to handle extreme rainfall events in a manner that causes the least possible damage
- Infrastructure solutions that combine water, biodiversity and natural areas (Blue/Green)
- Upgrading of the quality of the urban public space
- Synergistic urban development
- Flexibility to accommodate changes as climate conditions and predictions change

Practically this has meant the Danish Government with the City has introduced new legislation to facilitate co-funding arrangements. The City has commissioned approximately 700 M USD of new capital works (over 300 individual 'cloudburst' projects to be implemented over 20 years). These works will provide protection for a 1 in 10 year flood level, have reduced impervious areas by 30%, created 30% more green spaces, harvested rainwater in new or enlarged retention ponds, built new wetlands and constructed a new carpark under the harbour to take the cars of the city streets to make way for the 'green street' of wetlands and other soft infrastructure.



The investment was justified by economic modelling of the cost of direct damages from insurance claims, the cost of direct damages to infrastructure owners and municipal buildings etc. and the loss of revenue from shops, companies, traffic as well as the benefits from synergies. The annual cost of ‘doing nothing’ compared to ‘climate proofing’ the City was calculated. (Exchange rate Krone to AUD = 1:5.2 – 30 Nov 2016)



The good practice features observed here include the following:

- Recognition that the probabilities of future events are no longer reflected in historical data.
- A long term, integrated view of the macroeconomic and physical risks to property and infrastructure.
- An understanding that an economically diverse and physically resilient city is important for the generation of wealth term in the long term.
- The commitment of a budget of sufficient size to fund the adaptation measures identified.

Dairy: A sector already responding to climate risk

The Australian agriculture sector has a long history of dealing with the continent’s variable climate and has developed some very sophisticated information and decision tools to assist farmers. The sector’s approach to climate change risks leverages its detailed knowledge of how different climate conditions impact its operations to build future ready systems.

The dairy sector has been selected as a case study as it provides a user-friendly route into the more sophisticated aspects of dealing with climate risk and also because it provides a number of key insights for Directors. These include:

- That risk and opportunity are actually two views of the same underlying aspect: change.
- That successful engagement can only be built upon a detailed understanding of how the business/systems operate. (There is no short cut and the business is the expert in what it does).
- That business will need the ability to access and work with detailed data on climate change.
- Data resources are available from a number of different sources.

How the dairy sector is engaging with climate change risks

From changes in climate to changes in milk yield

The basic production activity of dairy is to convert grass into milk and then into a range of foods. The rate of growth of grass can be impacted by changes in temperature and moisture and the rate of production of milk is impacted by the effect that increased ambient temperature has on cows' metabolism.

The building block for the capability to manage climate change risks is the detailed understanding of the biophysical basis for the impacts.

From changes in milk yield to farm profitability to adaptation strategies

The capability to model the potential changes in the underlying business provides the sector with the ability to work at the level of individual farms and to understand the potential financial impacts of the projected changes in climate. The objective of this is to identify potential adaptation options, the point in time where they may be best implemented and the benefit and cost metrics.

Detailed research supported by the Australian Government and led by Dairy Australia, University of Melbourne and the Tasmanian Institute of Agricultural Research has identified three generic type so adaptation each with different costs and benefits. These are:

Simplify – smaller herds, lower cost and simpler systems

Adapt – more irrigation to allow for summer production

Intensify – full use of irrigation, bigger herds, higher costs

Using the expertise of the sector the research was able to derive the benefits and costs for the different options. This information was then integrated into the financial models to calculate the rate of return under different levels of farm debt⁵⁰.

Section 5: Emerging legal views, disruptive technology/data and disclosure

This section of the report explores climate change risks in the context of fiduciary duty and other legal issues. It introduces some key matters on how information technology challenges risk management models and practices, and can expose lack of action on climate risks by businesses. Lastly, it provides a brief overview of where climate-related matters can already fit into existing disclosure requirements, and of developing disclosure initiatives that may see climate change increasingly specified in such requirements.

This is not intended to be a comprehensive view of either liability or disclosure related matters for directors, but rather to examine where technological and industry developments may intersect with such requirements.

Emerging legal views: Climate risks are foreseeable

There have been a number of recent developments highlighting questions about what is a reasonable level of due care and diligence for a director when it comes to action on climate change risk.

A recent legal opinion provided by Noel Hutley SC and Sebastian Hartford-Davis found that many climate change risks “would be regarded by a Court as being foreseeable at the present time” and that Australian company directors “who fail to consider ‘climate change risks’ now could be found liable for breaching their duty

of care and diligence in the future”⁵¹.

The legal implications of these developments have been examined for company boards (Barker, 2015) and for pension/superannuation trustees (McAlister, 2015)⁵².

Technological disruption and information access

The rapid advance in capacity and falling cost of technology for generating, storing and managing digital data are disrupting many long-established business practices.

Data sets on climate impacts, derived from authoritative models developed by public research institutions around the world, are available in a number of open source formats.

This can be conducted by external parties, without participation of the businesses that may actually own or use the asset.

Publicly-available information and satellite imagery are already being used by third-party data providers in multiple industries.

High profile examples include using remote infra-red sensors to gauge the volume of crude oil in storage tanks, and satellite imagery to count cars in retail parking lots⁵³.

51 Hutley opinion, Source: <http://cpd.org.au/wp-content/uploads/2016/10/Legal-Opinion-on-Climate-Change-and-Directors-Duties.pdf>

52 Sarah Barker, Mark Baker-Jones, Emilie Barton & Emma Fagan, 2016, *Journal of Sustainable Finance & Investment* - <http://www.tandfonline.com/doi/abs/10.1080/20430795.2016.1204687> - full text at <http://igcc.org.au/resources/Pictures/Climate-Change-and-the-Fiduciary-Duties-of-Pension-Fund-Trustees-lessons-from-the-Australian-law.pdf>

53 Rothfeld, Michael and Patterson, Scott, 2013, “Traders Seek an Edge With High-Tech Snooping”, *Wall Street Journal*, December 8, 2013 - <http://www.wsj.com/articles/SB10001424052702303497804579240182187225264>
The Economist, “The Watchers: Alternative data firms are shedding new light on corporate performance” August 18, 2016, <http://www.economist.com/news/business/21705369-alternative-data-firms-are-shedding-new-light-corporate-performance-watchers>
RF Metrics, “About Us” - <https://www.rsmetrics.com/about-us/>

Example 1: Residential housing risk

An online information tool currently under development by ClimateValuation.com. (ClimateValuation.com, 2016) is designed to provide home buyers with a “climate adjusted” value for properties.

“Climate Valuation computes the statistical risk of climate change hazards occurring to any specified property, and a climate adjusted value. It then reports the projected increase in insurance premiums over the course of a mortgage. The service is specifically designed for home-buyers who wish to ensure they do not have unexpected insurance costs or a devaluing property, and for home owners looking to reduce vulnerability and increase value when renovating”.

Example 2: Integrating Water Stress into Corporate Bond Analysis

An example of the projected exposure approach observed in the corporate finance sector is the tool for incorporating water stress into corporate bond credit analysis for mining and beverage companies. The German Federal Ministry for Economic Cooperation and Development funded the research report Integrating Water Stress into Corporate Bond Credit Analysis (Ridley & Boland, 2015) and the tool is based upon that work. A demonstration version of the credit analysis tool is available from Bloomberg⁵⁴.

The fully functioning version of the tool is available to subscribers to the Bloomberg financial data service.

Disclosure

As the legal opinion by Noel Hutley, SC, and Sebastian Hartford-Davis points out, “directors who determine that climate change does pose risks to their business should also consider the degree to which those risks are disclosed by the company”. Disclosure of such risks must be considered regardless of whether or not the directors chose to take any action.⁵⁵ In the US, ExxonMobil is the subject of investigations by several state Attorneys-

General, the Securities and Exchange Commission, and now prospective class action by shareholders over its disclosure (or lack thereof) of climate risks to the public and to its own business⁵⁶.

In 2015 Peabody Coal, the largest publicly-traded coal company in the world (now in Chapter 11 bankruptcy protection), reached a settlement with the New York Attorney-General over its statements to the public and investors “regarding financial risks associated with climate change and potential regulatory responses”⁵⁷.

Disclosing transition risk: Regulations, voluntary disclosure and carbon footprints

In most jurisdictions, including Australia, the need for disclosure of material risks is mandated by corporate regulations and board governance charters.

For example, the ASX Corporate Governance Council’s Principles and Recommendations “A listed entity should disclose whether it has any material exposure to economic, environmental and social sustainability risks and, if it does, how it manages or intends to manage those risks.”

ASIC states that a listed company’s Operating Financial Review should be used to disclose any forward looking risk,⁵⁸ and it specified in February guidance update that this should include anything that may adversely affect the company, including environmental⁵⁹.

Powerful stakeholders are pushing for stronger, mandatory climate risk disclosure in Australia.

Ahead of the Senate Standing Economics Committee’s Inquiry into carbon risk disclosure, submissions by the Financial Services Council (FSC) and the Chartered Accountants Institute of Australia and CPA Australia⁶⁰ among others, called for thorough mandatory disclosure of climate-related risks, noting that the existing NGERs reporting system for large emitting companies was inadequate.

54 Bloomberg L.P. (2015, September). Water Risk Valuation Tool. Retrieved October 23, 2015 from Bloomberg Sustainable Business and Finance: 11 <https://www.bloomberg.com/bcause/new-tool-integrates-water-risk-considerations-in-equityvaluation-process>

55 Hutley opinion, Source: <http://cpd.org.au/wp-content/uploads/2016/10/Legal-Opinion-on-Climate-Change-and-Directors-Duties.pdf>

56 <http://www.ag.ny.gov/press-release/new-york-supreme-court-orders-exxonmobil-comply-ag-schneidermans-subpoena> and re SEC [<http://www.nytimes.com/2016/09/21/business/energy-environment/exxon-climate-change.html>]

57 Press release, <http://www.ag.ny.gov/press-release/ag-schneiderman-secures-unprecedented-agreement-peabody-energy-end-misleading>

58 <http://asic.gov.au/regulatory-resources/find-a-document/regulatory-guides/rg-247-effective-disclosure-in-an-operating-and-financial-review/>

59 <http://www.asic.gov.au/media/3547422/rep469-published-26-february-2016.pdf>

Senate submission <http://www.aph.gov.au/DocumentStore.ashx?id=4da7200e-320c-4f0f-9714-6224a78224e4&subId=411589>

60 <http://www.aph.gov.au/DocumentStore.ashx?id=e443bc07-7de8-46b5-aaea-204af23b1fff&subId=411590>

Section 6: Takeouts for Directors

Connecting good governance with good outcomes

In the section below we provide a series of short suggestions for questions directors can ask, themes to explore and notes of caution that we hope will assist the unwary and provide ideas for the more practiced.

The three themes that we use are:

- Questions to ask of the business, its board, the management team and staff.
- Matters to investigate within the business, its plans, resources and actions to date.
- Ideas to explore that can provide insights, challenge existing ways of thinking and open up new opportunities.

This section is by no means intended to be exhaustive, and each company and organisation will have its own particular governance risks and opportunities in relation to climate change.

We have referenced the AICD's guiding principles of good governance throughout, in particular with specific reference to Principles 1, 2, 3, 4, 5 and 6.⁶¹

Questions to ask

Asking the right questions is essential for good governance. Below are examples of questions that directors and boards may consider in understanding the relevant implications of climate change:

- What is the attitude of the board towards climate change risks, both physical and transition? Principles 1 & 2.
- How are we keeping abreast of developments in relation to climate transition and impacts? Principles 4 & 6.
- Do we have access to accurate, timely and relevant information? Principle 6.
- Do we have sufficient the knowledge and expertise to practice good governance over these issues? Principles 3 & 4.
- How detailed is our asset-level data, relative to what is possible and reasonable?
- Do we understand both our transition and physical risks across our operations – from supply chains to markets? Principle 3.
- Do we understand our legal risks and regulatory obligations? Principle 5.
- Do we have an up-to-date understanding of investor and other stakeholder expectations in relation to climate change? Principle 1.

⁶¹ AICD, <http://aicd.companydirectors.com.au/-/media/resources/director-resource-centre/governance-and-director-issues/guiding-principles-of-good-corporate-governance.ashx>

- If the business had to reduce its absolute level of emissions by 40% in 15 years and still grow, how might we do that?*
- Climate change risk is now foreseeable; can we demonstrate that we have given it adequate attention and consideration?

The purpose of these high-level questions is to establish how climate change risk is reflected in the organisations vision, purpose and strategies. It can be observed through examination of such sources as the Carbon Disclosure Project and individual company sustainability reports that many Australian businesses are engaged with transition aspects and report their level of emissions and their commitment to renewable energy and clean technology.

There is far less evidence that detailed engagement with the physical impacts (as understood from climate change data) is common business practice.

**A key observation here is that the legal opinion by Noel Hutley included the following “The Commonwealth Government’s Climate Change Authority... concluded that, to meet Australia’s emission reduction goals, emissions will need to decline more steeply in coming years than they have in the past”.*

Key matters to investigate

In order to exercise independent judgement and oversight of climate change risk Directors should enquire and examine a number of different aspects of the business. These would include:

- Capabilities: The extent of existing capabilities to monitor, measure and report on key metrics and trends as defined by the current understanding of climate change risk. These are likely to include as a minimum data on emissions and energy consumption for the business itself and some level of estimation for significant materials in its supply chain. Potential gaps may include a lack of capability to access climate risk data and to integrate it into existing risk management frameworks and tools.
- Plans: The plans in place to prepare the business for foreseeable challenges on transition and physical impacts, including the timeframe and the specific actions. It would be important to understand whether

the substance of the plan relied upon a specific and tested set of underlying assumptions.

- Actions to date: The actions and steps that may have already been taken in response to currently understood risks and opportunities. There are a number of different aspects that could be investigated here but overall the purpose is to understand how effective the organisation has been in its actions to date.

Ideas to explore

How can the business use climate change data to manage risks and identify opportunities?

There are many good sources of information that explain the underlying science and describe the projected physical impacts such as sea level rise and changing weather patterns.

The Australian Government website Climate Change in Australia is an education and data portal was developed jointly by CSIRO and the Bureau of Meteorology to assist business in the natural resources sector build their capacity to adapt.

CoastAdapt and Coastal Risk Australia (currently under development). Information resources and on line decision tools and interactive maps that show how projected sea level rise would impact coastal communities.

Advanced resources

Publicly-funded climate change research in Australia comes under the Commonwealth Government’s National Environmental Science Programme (NESP) and is delivered by the Earth Systems and Climate Change Hub (ESCC Hub). The ESCC’s current research programme is focused on getting a better understanding key factors, such as the frequency of extreme weather events, that have direct relevance for risks and opportunities in sectors including insurance, property, agriculture and tourism.

There are a number of contact points listed on the ESCC website and one of the authors of this report, Dr Nick Wood, is the Chair of the ESCC stakeholder advisory group and can be contacted directly.

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For further information

t: 61 2 8248 6600

e: glc@aicd.com.au

w: companydirectors.com.au/glc
