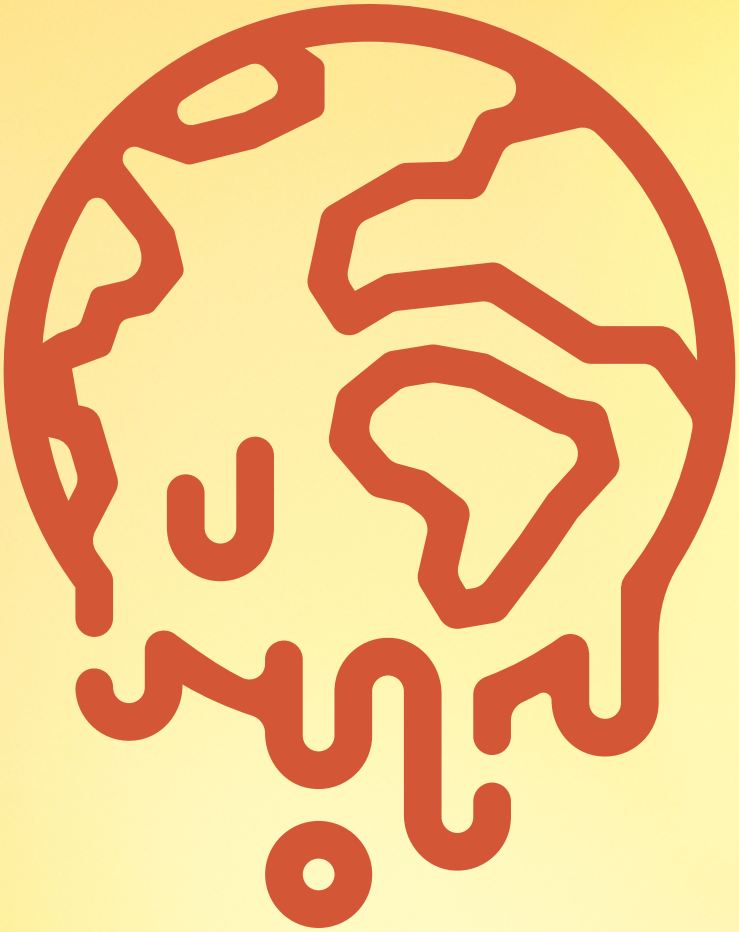


FUTURE EARTH AUSTRALIA

CLIMATE SCIENCE IN INDUSTRY:

GOVERNANCE, STANDARDS AND ACCESSIBILITY

futureearth AUSTRALIA | Australian Academy of Science

CLIMATE KIC AUSTRALIA KNOWLEDGE INNOVATION COMMUNITY

THE UNIVERSITY OF SYDNEY

Future Earth Australia's second flagship program —Climate risk and equity—commenced in November 2018 with an event held in conjunction with Climate-KIC Australia and the Sydney Environment Institute. The day consisted of two introductory lectures and two open panel sessions in the morning followed by a closed, invite-only roundtable in the afternoon. This document offers an abridged synthesis of the morning events.

OPENING LECTURES

To kick off the day's events, Dr Nick Wood, ESCC Hub stakeholder group chair, and Professor Andy Pitman, Director ARC Centre for Excellence in Climate Extremes, gave a climate science perspective on the challenges of providing physical climate data that industry can use in decision making.

Climate models have developed dramatically since they first emerged at the turn of the millennium, and they can be helpful for answering global policy questions. Yet most businesses are interested in local-scale changes in climate, which so far have proven difficult to model. Current efforts are aimed at running climate models at spatial resolutions as small as 5 km squared, which would offer a highly granular understanding of weather records and the ability to model climate extremes. These advances, in turn, could drive the development of index-based climate insurance, risk pricing for lending, location-specific adaptation bonds, and climate risk weighting of sovereign bonds.

However, these technologies may not be fully developed for another decade. Current solutions, such as running models at coarser resolutions and downscaling, as has been done with the NSW and ACT Regional Climate Modelling (NARCLiM) project, are a good step forward. However, this method only provides snapshots over a 20-year period and doesn't allow sampling of risk or assessing the uncertainty of risk.

Businesses are often interested in climate extremes, as these can have negative impacts on business costs and operations. For instance, those in the agriculture sector might be interested in the cost of extreme heat days to the industry, requiring predictions of the intensity, frequency, and duration of concurrent extreme heat days. Yet extremes can be difficult to capture. Daily extremes, for instance, reflect large-scale trends interwoven with regional and local-scale feedbacks, making them difficult to predict. Similarly, compound events, when multiple drivers cause events to coincide in time or location, are currently too challenging to model. Compound events can exceed the resilience of, or even break, systems and must be studied in greater detail.

Ultimately, there is a profound knowledge gap between what climate models can do—in terms of climate projections—and the sorts of information that business needs to assess financial risk. Climate science can help bridge that gap, but not necessarily within the time frame that business wants. The solution is to build partnerships between industry and government that foster the translation of data into useful products for companies and stakeholders.

PANEL ONE: HOW IS CLIMATE SCIENCE BEING APPLIED IN INDUSTRY?

To describe how climate science is currently being applied in industry, a panel chaired by Dr. Tanya Fiedler of the University of Sydney Business School was convened. The panel included Karl Braganza, head of climate monitoring, Bureau of Meteorology (BOM); Amber Johnston-Billings, director of climate change & sustainability, KPMG; John Manning, VP and senior credit officer, Moody's; and Zoe Whitton, head of ESG Research, Citigroup.

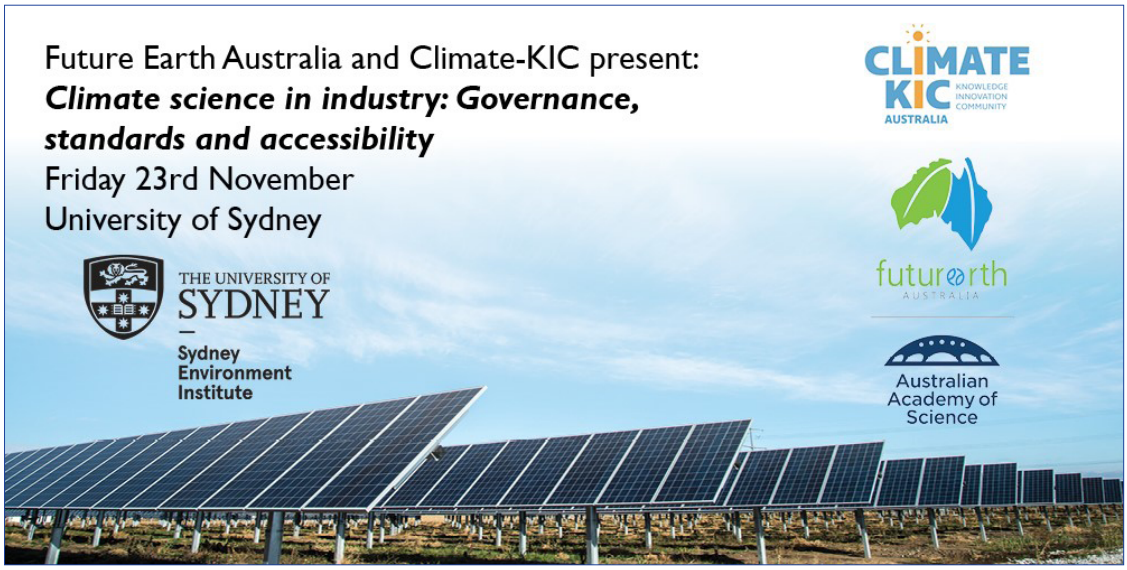
For asset-based companies, physical impact data is valuable for making predictions. For instance, the National Electricity Market in Australia covers an area over the east coast that is sensitive to extremes, and incorrect predictions about daily temperature extremes can result in the company needing an additional gigawatt of electricity. Thus, supply and demand are intrinsically tied to the weather, meaning that accurate predictions are crucial. BoM, CSIRO, and AEMO have been building a risk tool to better predict temperature extremes for entities like the National Electricity Market.

While physical impact data can be useful, KMPG has found that climate scenarios are more useful when they also incorporate societal narratives. In developing these scenarios, they have had to determine the most material impacts for individual assets, while also talking to broader strategic problems that companies may face. Societal issues are inherent within climate scenarios and can create aggregate effects that are difficult to predict. For instance, capital expenditures may change as assets that were previously taken for granted lose their security. Furthermore, while many companies develop alternative plans to deal with climate risk, such as selling to different markets, they must consider how other companies are mitigating their risks. If every company chooses the same plan B, then they are all competing for a smaller percentage of the remaining market.

From the perspective of determining credit risk, a major challenge is assessing how long-term data plays out at the economy level as well as at the level of individual sectors. The solution so far has been to develop a series of heat maps that determine physical risks by sector, at the sovereign, state, and industry levels. These heat maps inform a framework on determining the key challenges and risks for a sector. This method is useful for determining trends, but not individual hazards or events. Ultimately, while climate has been integrated into public ratings, it is not the sole driver of ratings changes.

There was a discussion about the appropriate models to use when discussing climate risk, with some maintaining that 4-degree warming, though extreme, is useful because it represents an "Armageddon" scenario that increases companies' willingness to consider risks and take action. Conversely, others use baselines of 1.5, 2, or 2.5 degree warming to offer companies different alternatives and to help them choose how to respond and how to allocate capital. Australia is uniquely positioned to respond to the changing climate because of its diverse economy, while other countries with higher reliance on industries like agriculture may struggle to adapt.

The limitations of current risk systems were also highlighted. For instance, financial markets rely heavily on modelling, which is a useful method for describing capital expenditure adjustments under different climate scenarios. However, models cannot capture societal impacts like water scarcity and the mass migrations that might ensue or predict which businesses will survive across a sector. Additionally, while some businesses have moved towards filling out Task Force on Climate-related Financial Disclosures (TCFD), ostensibly to address climate risk, in reality many energy companies have filled out TCFDs that say they will be fine or better. This represents a systematic inconsistency in which everyone assumes they will have the best outcome, which must be addressed to ensure TCFDs are fulfilling their purpose.



PANEL TWO: STANDARDS, FUNDING AND FAIRNESS WITHIN CLIMATE SCIENCE AND GOVERNANCE

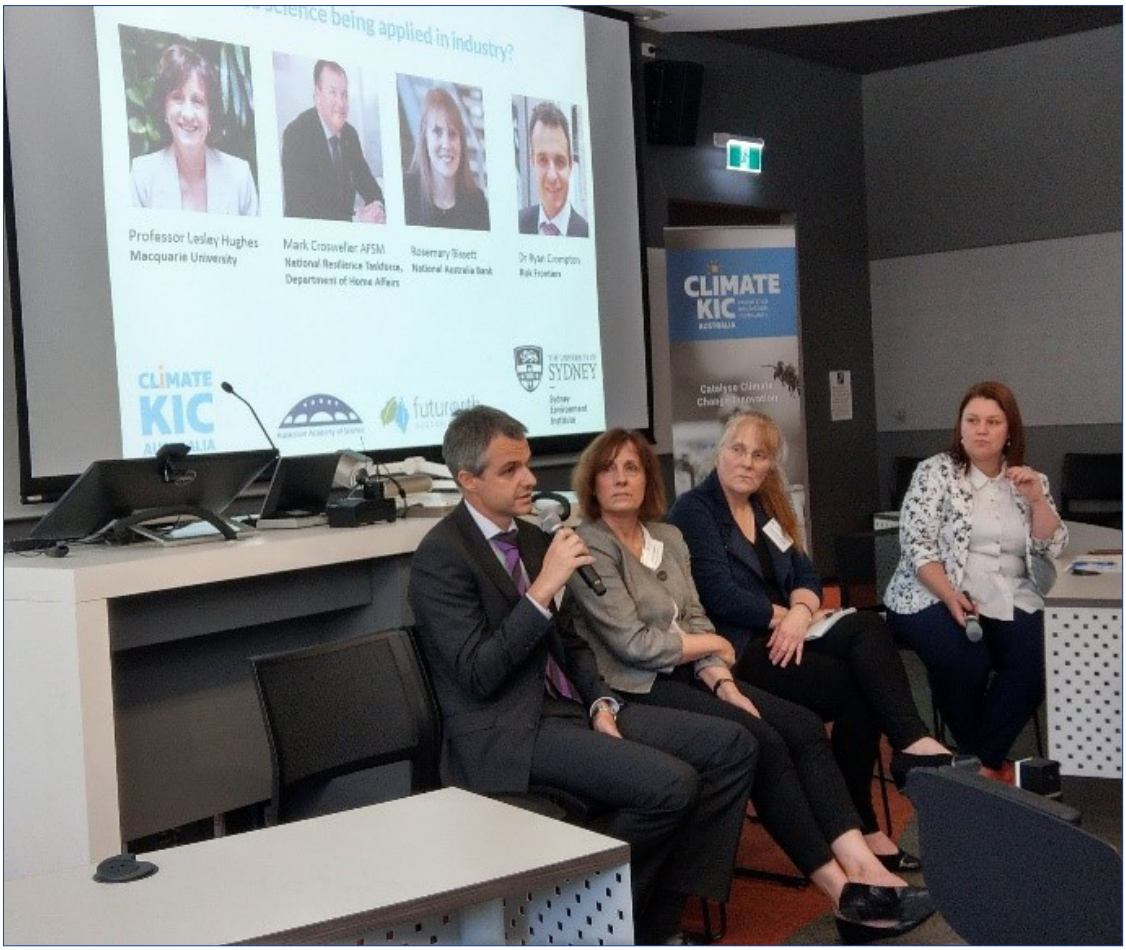
The second panel encouraged members to talk about standards within climate science and governance. The panel members included Rosemary Bissett, Head of Sustainability Governance and Risk, NAB; Professor Lesley Hughes, Pro Vice-Chancellor at Macquarie University; Ryan Crompton, General Manager, Modelling and Research Solutions at Risk Frontiers; and Mark Crosweller of the National Risk Resilience Taskforce.

The history of catastrophe loss modelling began in the late 1980s in America, but it was not until Hurricane Andrew made landfall in Florida in 1992 that the true power of such modelling was recognised. In response, several companies formed to develop loss models to assess risk, but their models did not meet Australia's local needs to address agriculture, bush fires, cyclone, hail, and earthquakes. Risk Frontiers was created to fill this gap, and developed models specific to Australia. These models encompass hazard models, exposure models that determine the location and worth of assets, and vulnerability which describes the potential damage to an asset by a given peril.

Although these catastrophic event models exist, government often does not plan for severe events because they are rare. Yet rarity does not reduce consequence, and catastrophic events must be addressed. In response, the National Resilience Taskforce is developing a framework to reduce existing risk in the landscape, and to provide strategic guidance on resilience methods. Additionally, opening the data on national disaster risk information services would improve equitable responses to climate and disaster risk, but as of yet the government has not committed to open data.

Within businesses, there can be a considerable lack of understanding about basic climate science, particularly at the level of CEOs. This ignorance should be addressed at the outset with formalized training for CEOs that incorporates climate, but for now most businesses represent a collection of shareholders, employees and board directors who all need to know about climate change and climate risk. To communicate the severity of risks, it may be necessary to use strong language, like "emergency" and "crisis" rather than "change". However, while fear can be effective in motivating change, it is important to balance fear with opportunities to move forward. Indeed, while climate represents a major risk, it can also be viewed as an opportunity to move towards adaptation and resilience, which is why companies like NAB have made financing low carbon transitions and building renewal capacity a key part of their strategy.

The understanding of climate risk and liability has shifted in recent years, with company directors concerned about liability for ignoring climate risks. This could result in questions of disclosures to market and whether they are delivering on fiduciary duties. There are also ongoing changes to contracts, and possible effects on force majeure and tort law. Given these changes, businesses need to stop waiting for better models and act now. Waiting on sophisticated models is an easy excuse to delay acting. The one factor that could quickly improve models would be better access to data, and there is a push within industry at the platform level to share data. Yet sharing can allow other companies to profit from novel work, which is seen as unattractive to many businesses. Nevertheless, it is clear that there is an appetite in the private sector to manage physical climate risk.



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