



What 'emergency'?!

Climate change through a finance & liability risk lens

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FinPro Professional Development Seminar 21 February 2020

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Today: overview to empower you to help us to help you...

1. Climate evolution: from 'environmental' to 'financial' issue



a. The three categories of climate-related financial risk

2. Economic transition



a. Policy and regulatory
b. Technological
c. Stakeholder expectations: equity investors, debt markets, regulators, insurers & society

3. Liability



a. Tort
b. Contract
c. Duties & disclosure

4. What should we do?



a. When will climate change be relevant?
b. Practical tools



1.

Climate change: the evolution

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Climate change: undeniably a foreseeable financial risk issue



Three categories of climate-related financial risks



Physical

ecological impacts: gradual onset + extreme catastrophic



Economic transition



market impacts driven by policy, technology, social responses to those physical risks



Liability

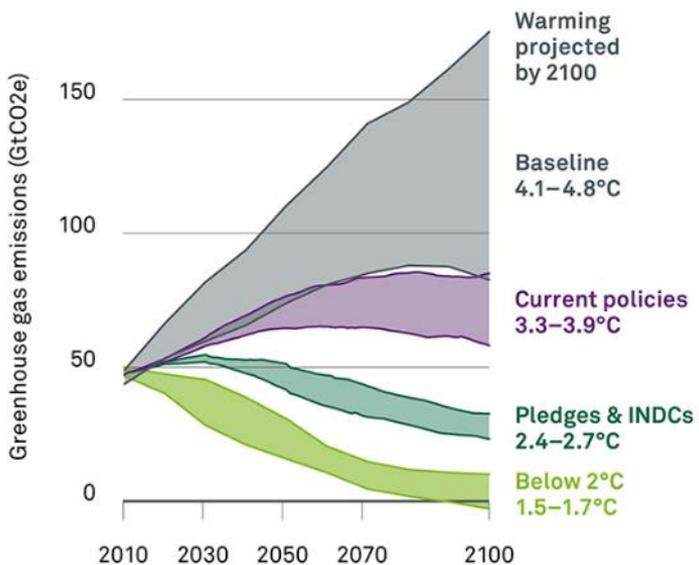


failure to mitigate, adapt or disclose

These risks manifest within mainstream investment horizons – including the shorter term

Physical risk: so what?

Potential climate pathways to 2100



Black Rock Investment Institute, Sept 2016

+1.1°C
now

Significant increase
in extreme heat
days

Sea level rise
20cm+ (3.4mm per
year)

Increased variability
in rainfall

Increased drought,
fire conditions

2,000 species
rendered extinct
due to climate
change in last half
century (8% of total
25,000 species
extinctions)



1.5°C
As early as
2024

14% of global
population subject to
extreme heat

8% plants >50% range
6% insects >50%
range

90% decline coral reefs

1.5m tonne decline in
fisheries catch

Sea levels 40cm+

4% global land
ecosystems transform



2°C
As early as
2036

37% global pop'n
subject to extreme
heat

16% of plants lose
>50% range

18% insects lose
>50% range

99% decline reefs

3m tonne decline in
fisheries catch

Sea levels 50cm+

13% global land
ecosystems
transform



4+°C
2100 – locked
in mid-century

Highest temperatures
in 30 million years

Glacial melt
compromises fresh
water sources

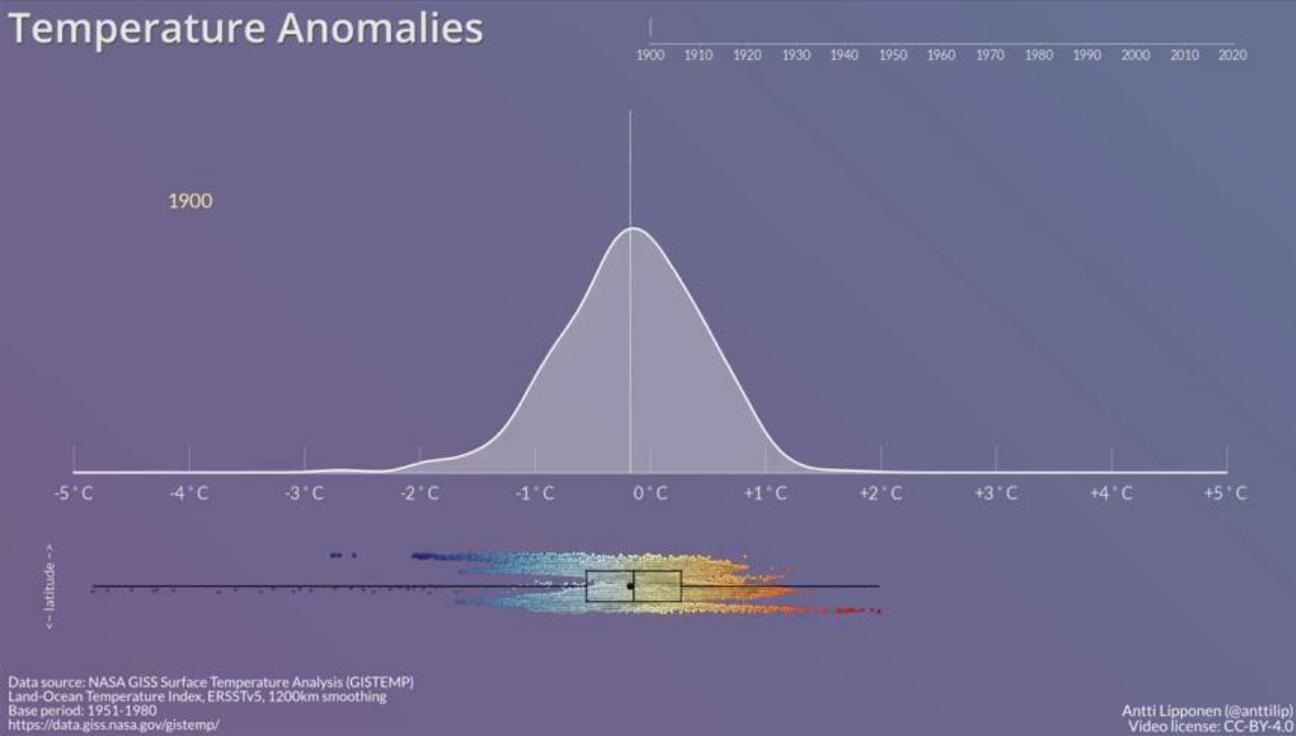
Drought over 40%
inhabited land

Sea level rise 6 feet+

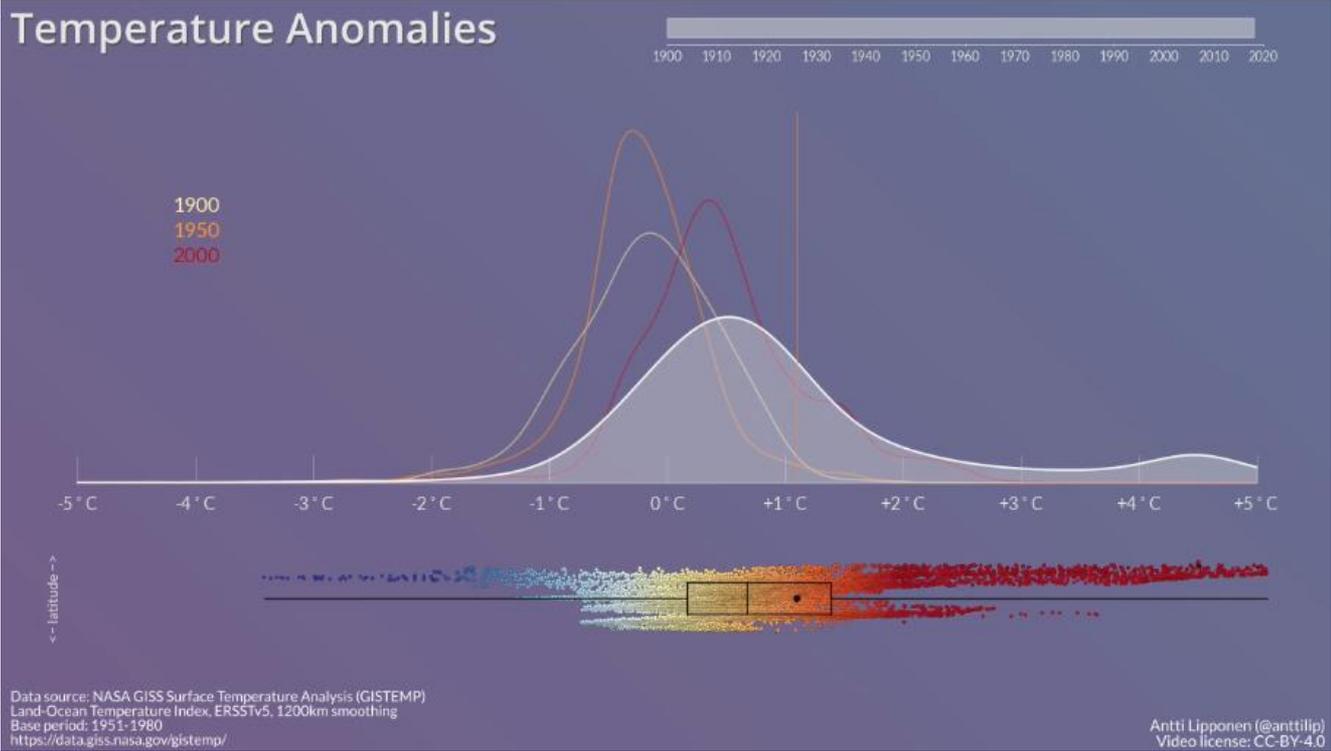
Extinction of >50% of
all known terrestrial
and marine species



Changes are *already* here...



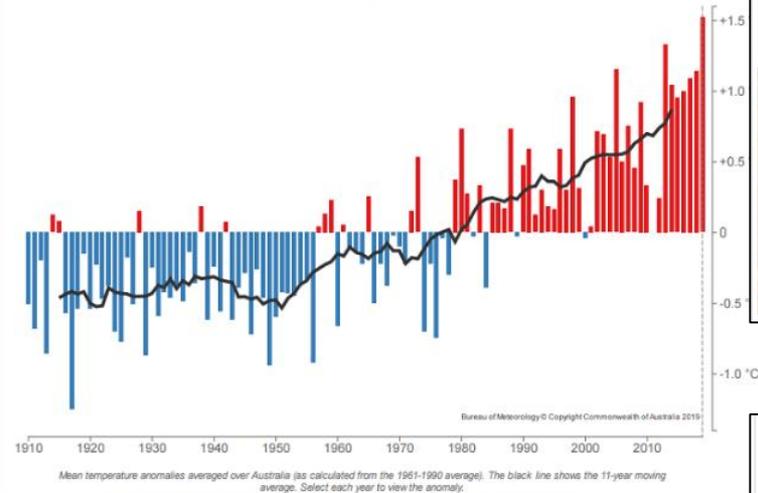
Changes are *already* here...



2019: The year of extreme weather

Australian mean temperature anomaly

2019 +1.52 °C



Bureau of Meteorology © Copyright Commonwealth of Australia 2019

INFOGRAPHIC: There has been a clear upward trend in average temperatures over the past century. (Supplied: Bureau of Meteorology)

Australia records its hottest day ever - one day after previous record

Average maximum reaches temperature of 41.9C or 107.4F on Wednesday - a full degree above previous mark set the day before

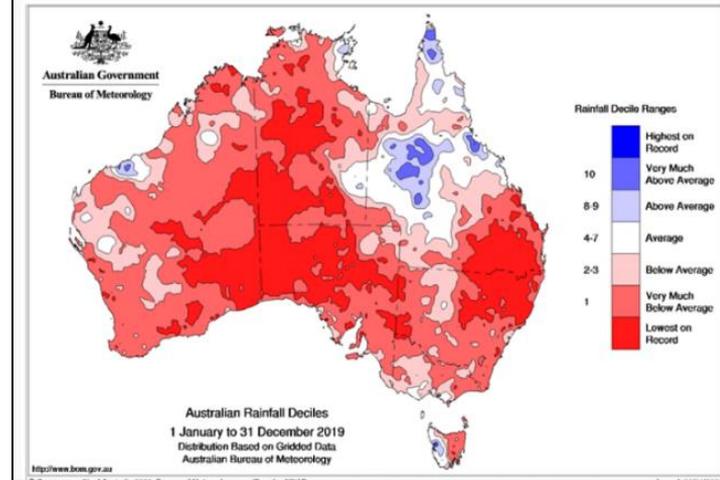
● NSW and Qld fires: South Australia also faces catastrophic bushfires risk as PM apologises for holiday - live



2019 was Australia's hottest year on record - 1.5C above average temperature

Bureau of Meteorology data shows average temperature record across the country beat previous high of 2013

Yes, climate change is involved



Australia has 'hottest, driest' year on record as 2019 named second-hottest year worldwide, WMO says

Updated 16 Jan 2020, 9:36am



BOM review shows 2019 was a year of weather extremes

ABC Weather By Kate Doyle

Updated 9 Jan 2020, 10:19am



As Australia's hottest year ever. A dead sheep lies in a dry and dusty field of a failed crop due to ongoing near Parkes, NSW. Photograph: Dean Lewins/EPA

Impacts are non-linear: e.g. Sandy



Two bodies are taken away by the NYC Medical Examiners from a driveway in Ditmas Park in New York City on Tuesday, October 30. Curtis Means/Ace Pictures/Zuma



Climate change is a *threat multiplier*

THE APPROXIMATELY 20 CENTIMETRES OF SEA-LEVEL RISE AT THE SOUTHERN TIP OF MANHATTAN ISLAND INCREASED SUPERSTORM SANDY'S SURGE LOSSES BY 30% IN NEW YORK ALONE. Further increases in sea-level in this region may non-linearly increase the loss potential from similar storms. Catastrophe models that dynamically model surge based on current mean sea level already factor this increased risk into their

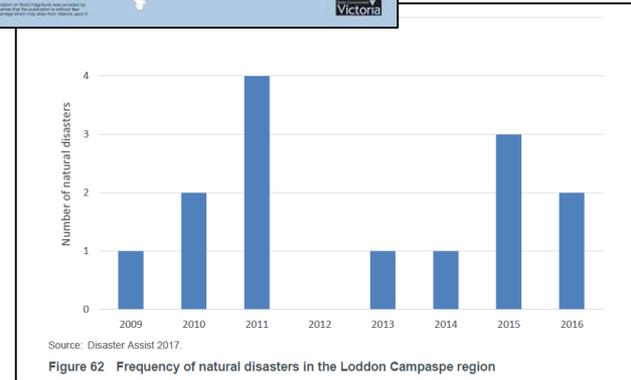
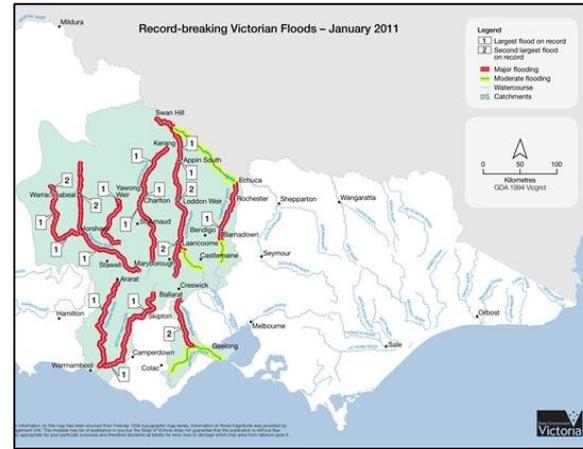


**CATASTROPHE MODELLING
AND CLIMATE CHANGE**

LLOYD'S

What does this mean for...

- Council infrastructure & asset damage? *Storm water, sewerage, roads?*
- Community impacts? *Disaster recovery? Insurability? Physical and mental?*
- Private property damage? *Pressure on council to protect / support?*
- *Financial sustainability?*



Damage and increased threats



Murrindindi LGA: post Black Saturday

History is not a valid analogue for the future.

Built environment and supply chains?

- **Capital & maintenance planning** - gradual onset & the new normal for extreme catastrophic?
- **Emergency management and evacuation plans?**
- **Infrastructure & asset damage and availability?** Buildings, storm water & sewerage, utility services, transport infrastructure, access? Beyond prevailing planning & development regimes?
- **Valuation** – impact on useful lives, capital maintenance & upgrades?
- **Design** including cross-dependency assessments?
- **Materials** selection & performance integrity?
- **Contractual risk** allocation & management (including force majeure)?
- **Asset efficiency & operation?**
- **Supply chain disruption?**
- **Workplace** – performance, safety, WHS liabilities?
- **End of life** – decommissioning?
- **Finance & insurability?**



So, this is not just about *physical* health impacts...?

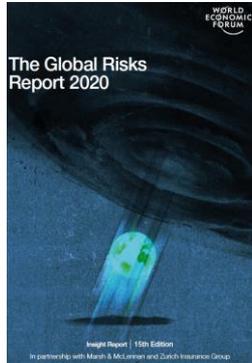
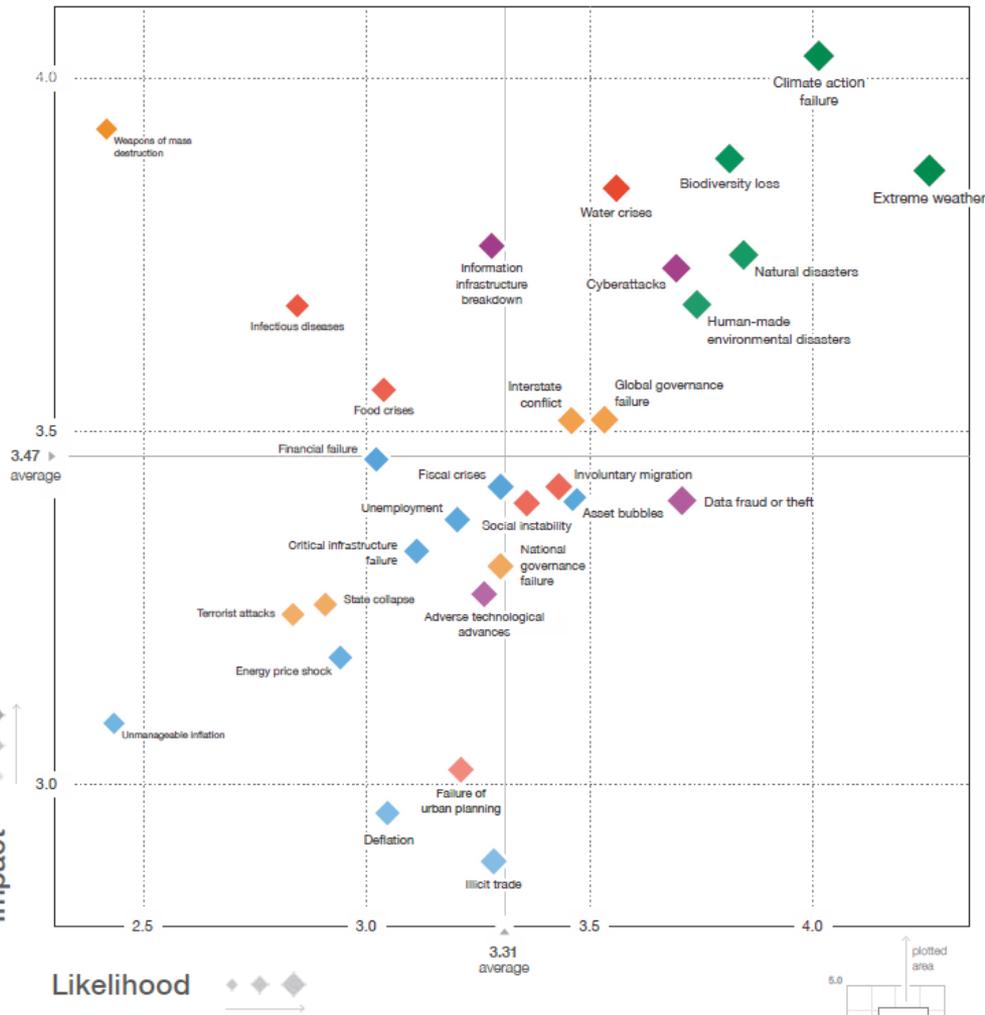


Figure 1: The Evolving Risk Landscape, 2007-2020



Research and Economics of WEF, 2007-2020. Global Risk Review

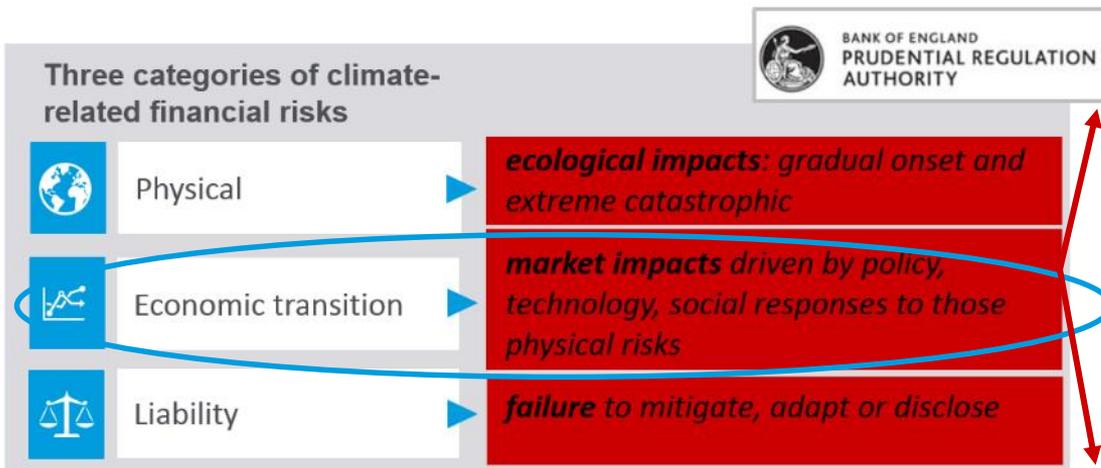




2. Economic transition impacts

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Economic transition risks & opportunities



- Policy & regulatory shifts

- Technological dev'ts

- Shifts in stakeholder preferences

- Equity investors
- Debt markets
- Insurers
- Prudential & securities regulators ('soft law')
- Social preferences

Policy & regulatory?

Agriculture Bill



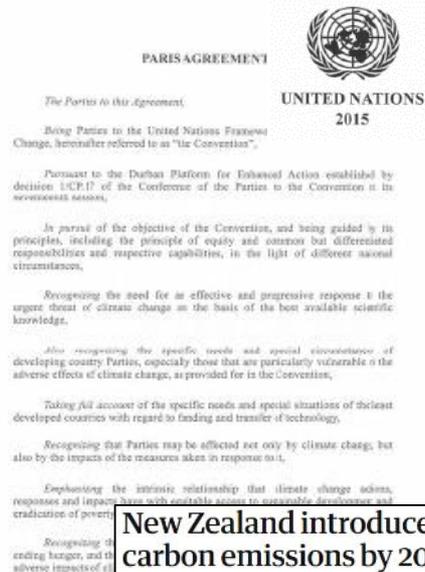
www.parliament.uk

EXPLANATORY NOTES

Explanatory notes to the Bill, prepared by the Department for Environment, Food and Rural Affairs, are published separately as Bill 7-EN.

WORLD EUROPE CLIMATE POLICY

Zero emissions: UK aims to be first of G7 with 'ambitious' target



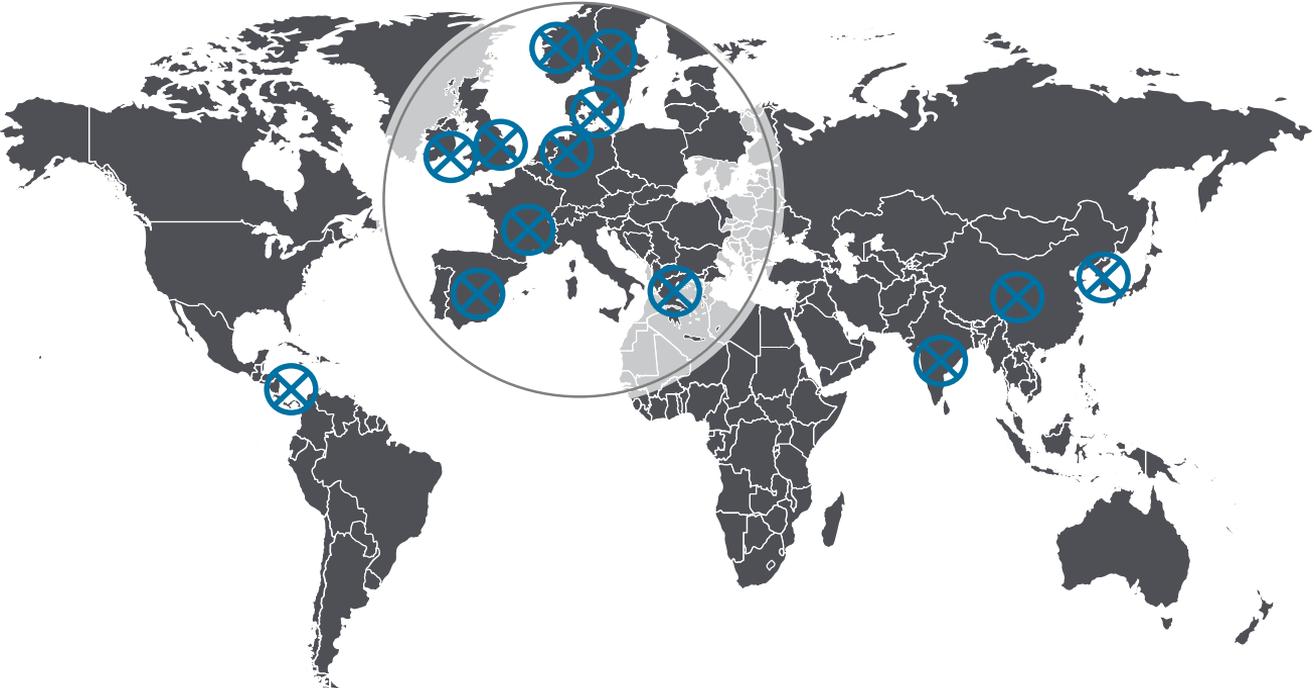
New Zealand introduces bill for zero carbon emissions by 2050

Jacinda Ardern says law will address climate change but faces opposition from farmers over plans to reduce methane emissions



▲ The New Zealand National party says methane reduction targets for the country's huge dairy sector are too high. Photograph: William West/AFP/Getty Images

Policy meets technology: internal combustion engines?



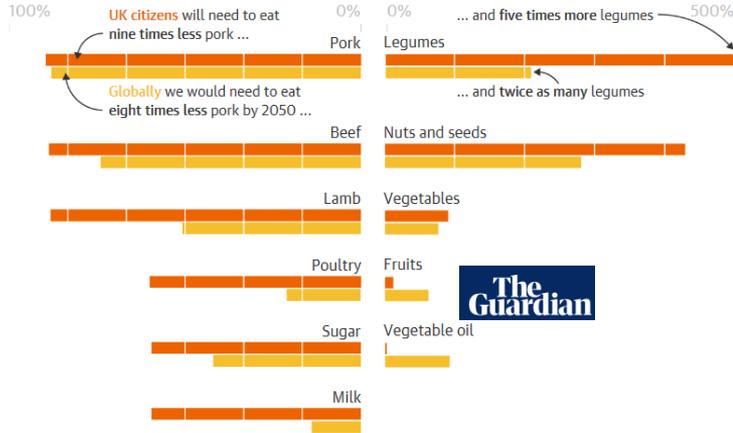
Stakeholder preference shifts – consumer issues



Plant-based diets

To keep global temperature rises to under 2C by 2050, we need to eat much less of these foods ...

... and much more of these



Guardian graphic. Source: Nature

Fibre: Shift to circular economy

Zara, ASOS and other fashion giants pledge to a circular fashion future

Leading fashion companies including Zara, ASOS, H&M and global luxury group Kering have pledged to foster circularity and boost sustainability in the fashion industry.

Animal welfare, factory farming & live export



Plastics & petrochem



"Dirty, Difficult, And Dangerous": Why Millennials Won't Work In Oil

By Tsvetiana Paraskova - Jul 19, 2017, 6:00 PM CDT



Deforestation / land clearing & habitat loss



Food miles & footprint labelling

Food
Quorn to be first major brand to introduce carbon labelling

Carbon footprint data will help customers understand environmental impact of food

Rebecca Smithers
19 10 Jan 2020 09:28 AEST

Central banks



BIS
BANQUE INTERNATIONALE
D'ÉCOLOGIE
EUROSYSTÈME

The green swan

Central banking and financial stability in the age of climate change

Patrick BOLTON - Morgan DESPRES - Luiz Awazu PEREIRA DA SILVA
Frédéric SAMAMA - Romain SVARTZMAN

January 2020

Financial Stability Review

OCTOBER 2019

RESERVE BANK OF AUSTRALIA

Box C Financial Stability Risks From Climate Change

Climate change is exposing financial institutions and the financial system more broadly to risks that will rise over time, if not addressed. According to the Intergovernmental Panel on Climate Change (IPCC), it will take significant effort to limit global warming to 1.5°C above pre-industrial levels, as targeted in the Paris Agreement. Even if targets are met, this level of warming is likely to be accompanied by rising sea levels and an increase in the frequency and intensity of extreme weather (including storms, heatwaves and droughts). Some of these outcomes are already apparent (Graph C.1). These changes will create both investors and institutions to take account of and manage these risks.

- physical:** disruptions to economic activity or reductions in asset values resulting from the physical impacts of climate change.
- transitional:** the impact of changes in regulation or pricing introduced to facilitate a transition to a low-carbon economy; or
- liability:** an inadequate response to these risks also raises the potential for reputational and legal risk.

While climate change is not yet a significant threat to financial stability in Australia, it is becoming increasingly important for investors and institutions to take account of and manage these risks.

Climate change poses some material risks to Australian financial institutions. The physical effects of climate change can have a significant impact on Australian financial institutions. As an example, inflation-adjusted insurance claims for natural disasters in the current decade have been more than double those in the previous decade. This impact is likely to grow over time.

An increase in the frequency and severity of natural disasters will increase the incidence of damage to, or destruction of, physical assets that are insured or used as collateral. Assets that are exposed to increasing physical risk (such as property located in bushfire-prone or coastal areas) could decline in value,

This box focuses on the financial risks arising from climate change, particularly for Australian financial institutions. These risks can be classified as either:

Graph C.1
Number of Extreme Heat Days in Australia¹

¹Source: Bureau of Meteorology, *State of the Climate Report*, 2019.



'Green swans' will trigger the next crisis: BIS

Matthew Cranston
Economics correspondent

Jan 20, 2020 — 11.00pm

Moving too fast or too slowly to mitigate climate change risks, dubbed "green swan" events could trigger the next systemic financial crisis the Bank of International Settlements says.

The world's bank for central banks warns about the risks of economic and financial losses from increasing frequency and severity of extreme weather, in a new report *Central banking and financial stability in the age of climate change*.

Monetary policy in a changing world

Örebro University and Kommuninvest, Örebro

13 November 2019

Martin Flodén
Deputy Governor

FINANCIAL REVIEW

Debt markets? Credit ratings



- Physical geography; transition industry/commodity; company-specific (exposure + preparedness)

FitchRatings

MOODY'S

S&P Global

MOODY'S
INVESTORS SERVICE  Print

Announcement of Periodic Review: [Moody's announces completion of a periodic review of ratings of Exxon Mobil Corporation](#)

06 Dec 2019

MOODY'S
INVESTORS SERVICE

Rating Action: [Moody's places Vietnam's Ba3 rating under review for downgrade](#)

09 Oct 2019

“The negative outlook also reflects the emerging threat to oil and gas companies’ profitability and cash flow from growing efforts by many nations to mitigate the impacts of climate change through tax and regulatory policies that are intended to shift global demand towards other sources of energy and conservation.”

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chief driver of overall event risks for the sovereign.

ENVIRONMENTAL, SOCIAL, GOVERNANCE CONSIDERATIONS

Environmental risks are material to Vietnam's sovereign rating. Its credit profile is exposed to climate change risks because of the magnitude and frequency of economically disruptive climate events, combined with the limited fiscal space to mitigate the impact of such events when they occur, as identified in Moody's report on environmental risks and their impact on sovereigns. Of particular note, Vietnam is susceptible to rising sea levels, which will over time, leave a significant proportion of its land and population exposed to submerision and act as a drag on economic activity.

Social considerations are inherent to the sovereign's overall economic strength. On the back of the Doi Moi reforms in the late 1980s,

 Bloomberg

Moody's Warns Cities to Address Climate Risks or Face Downgrades

By **Christopher Flavelle**
29 November 2017 08:00:00 pm

CBA 2018 Annual Report



Estimated annual average losses to customers from physical risks

Impact

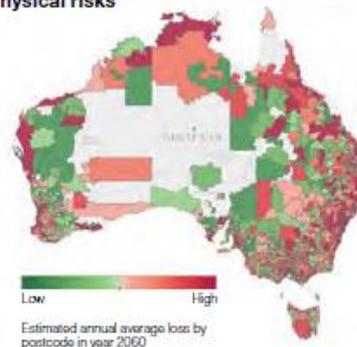


Customers facing increasing repair and replacement costs for physical damage to their properties.

Findings

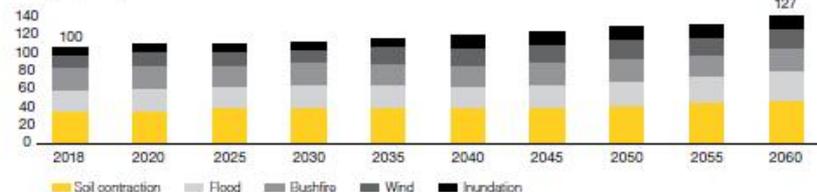


Under the high emissions (RCP 8.5) scenario, if we were to continue to lend in these areas, the estimated annual average losses to customers across our home lending portfolio are expected to increase by 27% by 2060 – this is less than 1% per annum. The largest contributor to these losses currently arises from soil contraction, but the modeling shows that coastal inundation losses could increase by 71% by 2060, primarily due to sea level rises.



Estimated annual average loss by peril

Index (2018 = 100)



High risk properties

To better understand our potential credit risk, we have estimated the part of our current portfolio which may be high risk, where this is located and how it could change over time. We have considered high risk to be properties where the increase in insurance costs from 2018 as a result of climate change have the potential to create

Estimated % of portfolio (outstanding balance) considered high risk



There are also likely to be implications for insurance

- Widening gap between natural disaster damage and private insurances
- Flow-through to mortgage defaults and property prices – and therefore health outcomes
- High-risk pools?
- Financial lines?
- *Government as the 'insurer of last resort'*

Insurance?



Climate change on track to make world 'uninsurable': IAG

FINANCIAL REVIEW

The Sydney Morning Herald

POLITICS FEDERAL BUSHFIRES

Bushfires may crimp living standards long term as insurance costs hit \$2b

If we don't rapidly reduce greenhouse gas emissions, by 2030 about 1 in every 19 properties could have effectively unaffordable insurance premiums.

Climate change and extreme weather are projected to reduce property values by \$571 billion by 2030, \$611 billion by 2050 and \$770 billion by 2100.



Opportunities - the sustainable finance (r)evolution

GREEN BONDS

GREEN LOANS

SDG BONDS/LOANS

CLIMATE - LINKED
MORTGAGES

**SUSTAINABILITY-LINKED
LOANS**



3. Liability considerations

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Beyond the planning & environment norms



BANK OF ENGLAND
PRUDENTIAL REGULATION
AUTHORITY

Three categories of climate-related financial risks



Physical



ecological impacts: gradual onset + extreme catastrophic



Economic transition



market impacts driven by policy, technology, social responses to those physical risks



Liability



failure to mitigate, adapt or disclose

These risks manifest within mainstream investment horizons – including the shorter term



- 
- *‘Even the most impassioned eco warrior has nothing on a homeowner facing negative equity’*

- Myles Allen

Beach home owner laments: why did nobody tell me?

By **SIMONE FOX KOOB**, JOURNALIST and **MARK COULTAN**
12:00AM JUNE 9, 2016 •  138 COMMENTS

One of the owners of a multi-million-dollar storm-devastated Collaroy property on Sydney's northern beaches is threatening to take legal action against the local council, claiming he wasn't warned about the risks.

The threat comes as a legal storm over who is to blame for the lack of a sea wall, and who will pay for it, is brewing after extensive damage to 10 homes along the beach over the weekend left them uninhabitable. Owners face paying up to \$140,000 each towards construction of a sea wall, which could cost up to \$10 million.

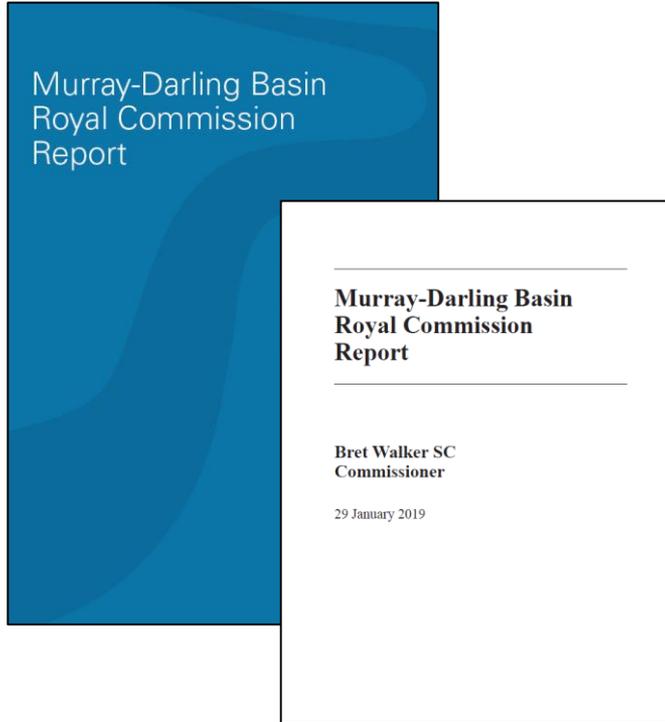
Home owner Tony Cagorski said he would "follow every course he can" to take the council and the real estate agents who sold him his waterfront property to court, claiming he wasn't told about the risks to his home when he bought it.



Increasing legal exposures? – *beyond planning environmental laws and/or emissions pricing*

- WHS and duty of care?
- Failure to adapt: negligence & nuisance?
 - Failure to adapt contributes to third party property damage
Illinois Farmers, ExxonMobil
- Contract: force majeure? *SA Power*
- Governance & securities laws
 - Duties of directors and officers? *Poland Ostroleka, REST*
 - Misleading disclosure? *PG&E, ExxonMobil*
 - Statutory authorities? *MDBA*

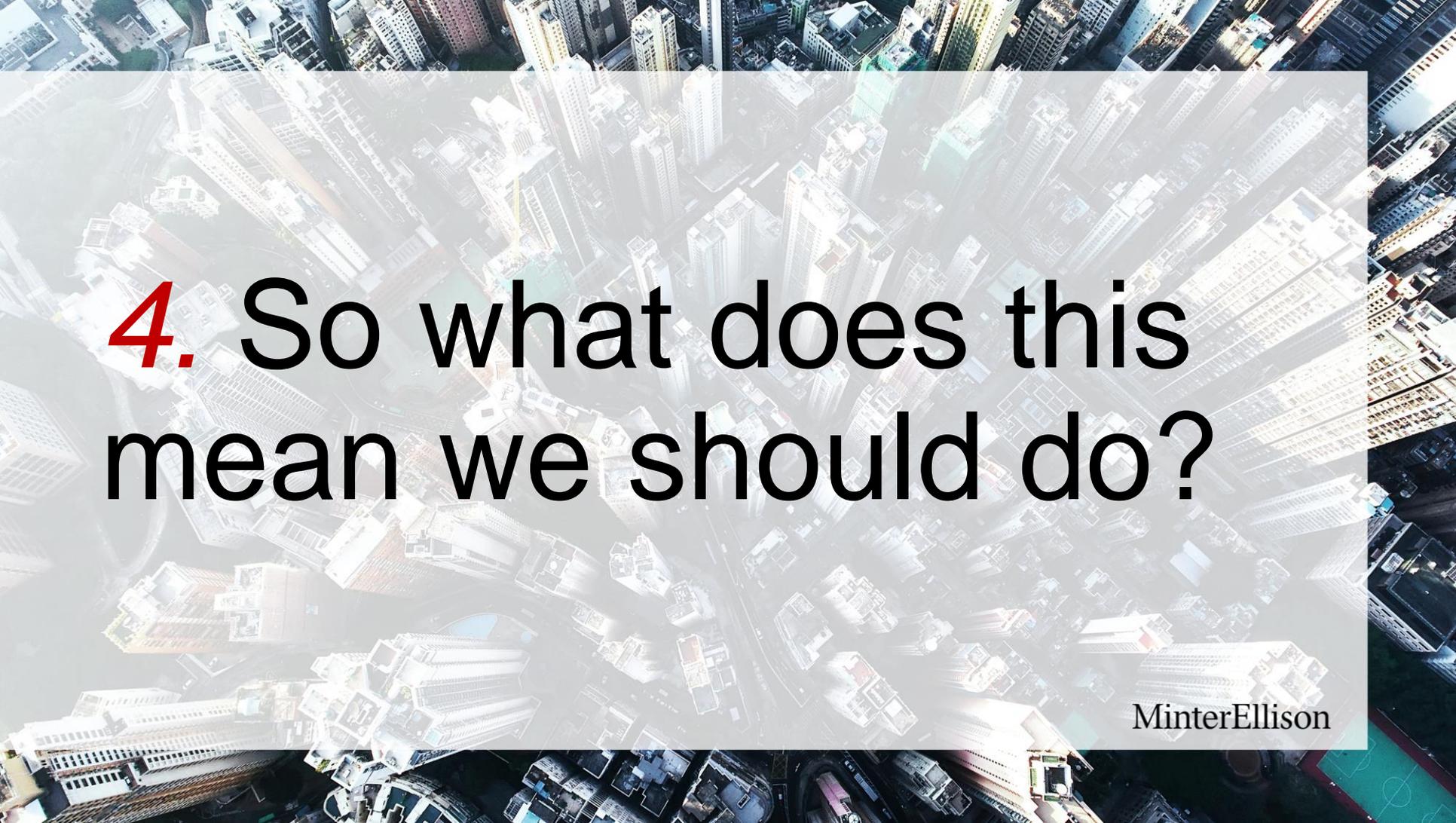
The OTHER Royal Commission



- ‘...climate change...appears to be regarded by the MDBA as a factor to be dealt with by the same mundane operational flexibility as the system always has displayed in order to cope with **‘normal’ variability.**’
- ...**Science, as that term should be understood, was not used.** The MDBA has failed to disclose key matters, such as its modelling. Science is open, available, and can be critiqued and checked. It can be validated or invalidated.
- [The MDBA’s failure to conduct] any review of climate change risks to the Basin... demonstrates **ongoing negligence by the MDBA. It is a dereliction of its duties. It is not just indefensible, but incomprehensible...**’

A few more choice words...

- 'Politics rather than science ultimately drove the setting of the Basin-wide SDL and the recovery figure of 2750 GL. The recovery amount had to start with a '2'. This was not a scientific determination, but one made by senior management and the Board of the MDBA. It is an unlawful approach. It is maladministration.
- In 2011, management of the MDBA improperly pressured the CSIRO to alter parts of the CSIRO's 'Multiple Benefits' report. This rendered parts of that report misleading, as they no longer reflected the views of, at the very least, Dr Matthew Colloff, who was one of the authors. The CSIRO should not have agreed to the changes that were made. This conduct too represents maladministration.
- The assertion by the MDBA that climate change projections could not be incorporated into the modelling because they were too uncertain is rejected.
- [The MDBA's failure to conduct] any review of climate change risks to the Basin... demonstrates ongoing negligence. It is a dereliction of its duties. It is not just indefensible, but incomprehensible.
- Any assertion by the MDBA that climate change can be incorporated into the Basin Plan modelling at its 10-yearly review, or at some later date, is misplaced. Climate change is happening now, and can occur quickly. Deferral to a later date...is nonsensical in a policy sense as well as unlawful.



4. So what does this
mean we should do?

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For individual councils

- The legal imperative for robust consideration is clear
- Consider implications across Council functions – decisions/approvals, design, strategic & risk management, tenders & procurement, public services & works, infrastructure and economic development, projects and contracts, land & facilities management etc
- *Core issue: how robust are scenarios and assumptions used in strategy, policy and planning? How will the decisions we make now position our economy and society for this disruption?*
- *Stress-testing and scenario-planning across the plausible range of climate futures is essential - planning based on historical norms instead of future scenario planning is a red flag.*



Recommendations
of the Task Force
on Climate-related
Financial Disclosures

December 14, 2016

Physical risk: stress-testing & scenario planning over a plausible range of climate futures (not just base case or 'mediums') is key

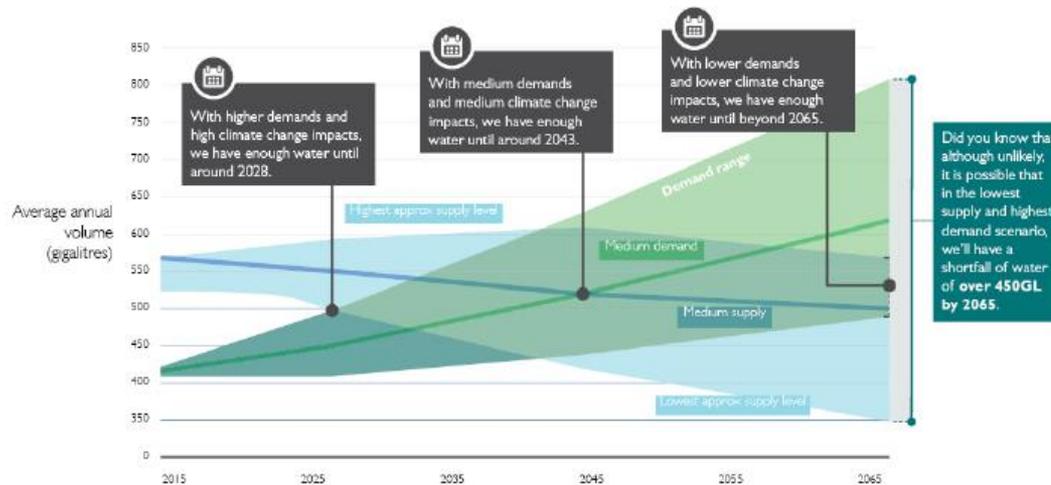


Figure 4: Long-term water supply and demand (Source: *Water for a future-thriving Melbourne*, 2017)

Beyond individual Councils: regional industries & communities



- Transition risk goes *far* beyond each Council's individual energy and waste-based emissions (*although this is not unimportant*)
- Physical impacts do not respect municipal boundaries – and individualised adaptation approaches may compound issues for other LGAs
- Industry downturns, regional unemployment and population exodus
 - irregular property price impacts: damage and/or uninsurability
 - credit ratings pressures
 - rate revenue pressures (relative ratepayer burden, approved funding vs capital spending pressures)

Multi-pronged approach & collaboration across municipal boundaries



- Technology and engineered infrastructure
- ‘Sponge cities’ – urban and peri-urban design and social resilience
- Working *with* nature to fortify flooding defences





floating house in Amsterdam. / CBS NEWS

WORLD ECONOMIC FORUM

 *water*

Sponge Cities

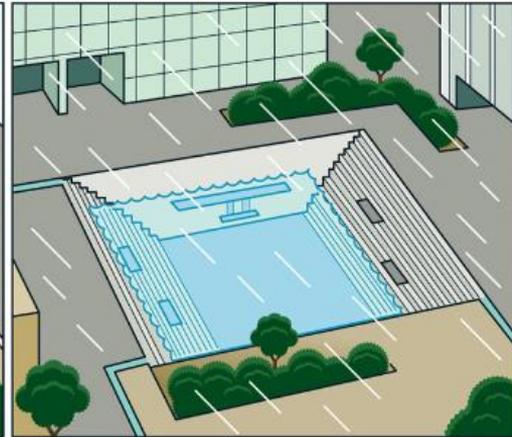
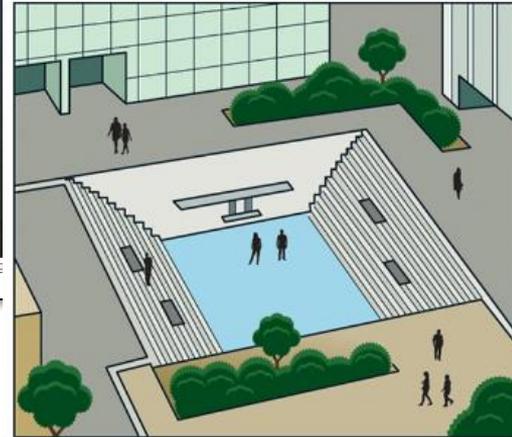
Emerging Approaches,
Challenges and Opportunities

Edited by
Mingliang Chen, Dafang Fu and Assela Pathirana

Special Edition of the Special Issue Published in *Water*



A massive storm surge barrier called the Maeslantkering, or Maeslant Barrier, was completed in 1986 in Rotterdam, Europe's largest port. / CBS NEWS



The important intangible – shake the tambourine



A key ingredient of Rotterdam's success is attitude. The current mayor, Ahmed Aboutaleb, claims his city's residents "do not view climate change as a threat, but rather as an opportunity to make the city more resilient, more attractive and economically stronger". In the mayor's view, climate adaptation is a window of opportunity to upgrade infrastructure, increase biodiversity and more meaningfully engage citizens in city life. A few years ago, the city launched a [Climate Change Adaptation Strategy](#) to make Rotterdam "climate proof" by 2025. Across the Netherlands, cities like Rotterdam are converting ponds, garages, parks and plazas into part-time reservoirs. They're also revitalizing neighborhoods and improving equity to [build social resilience](#) to future water threats.

Contacts – *who's who in the CRG zoo*



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