

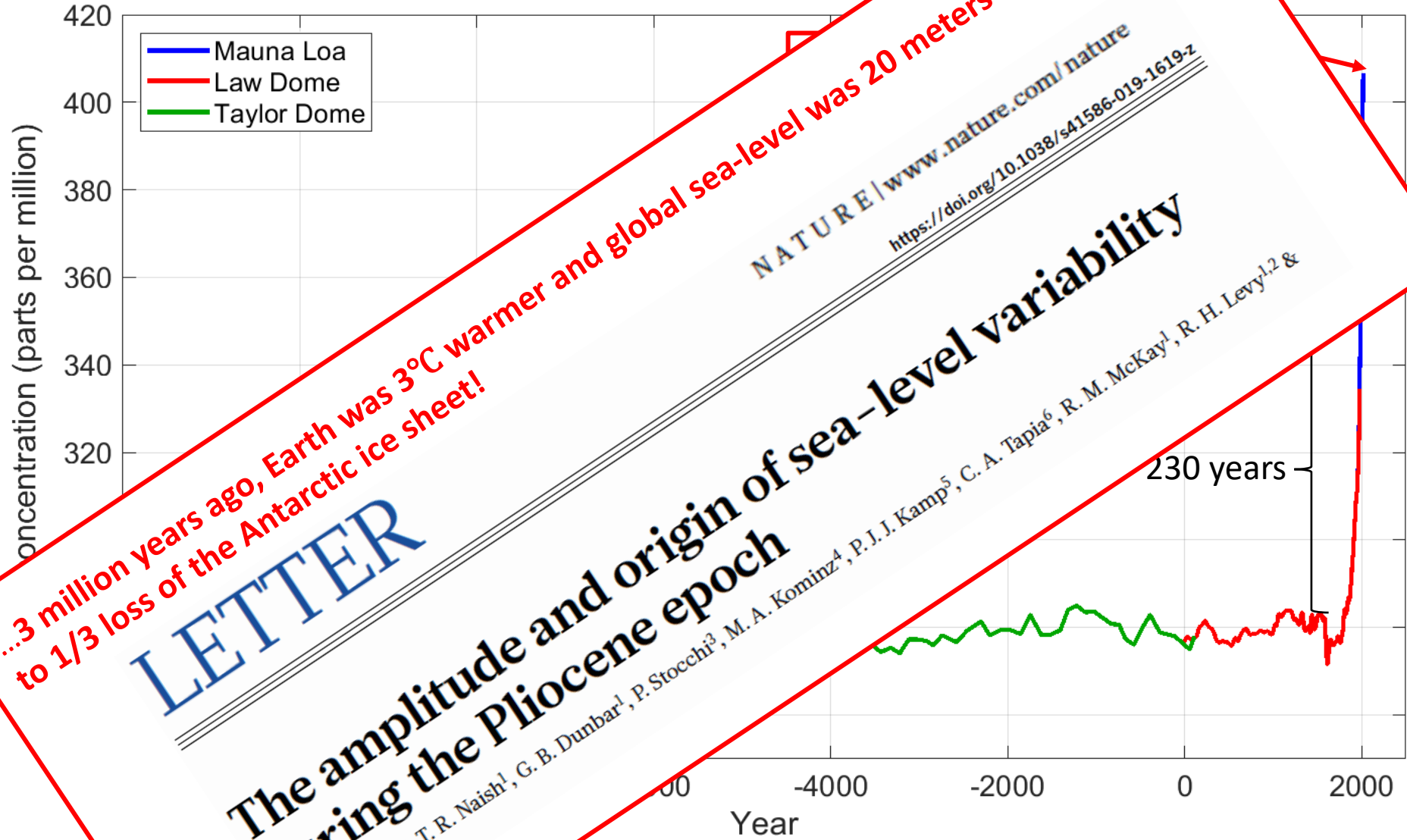
The things every company needs to know: physical, economic, and operational implications of climate change



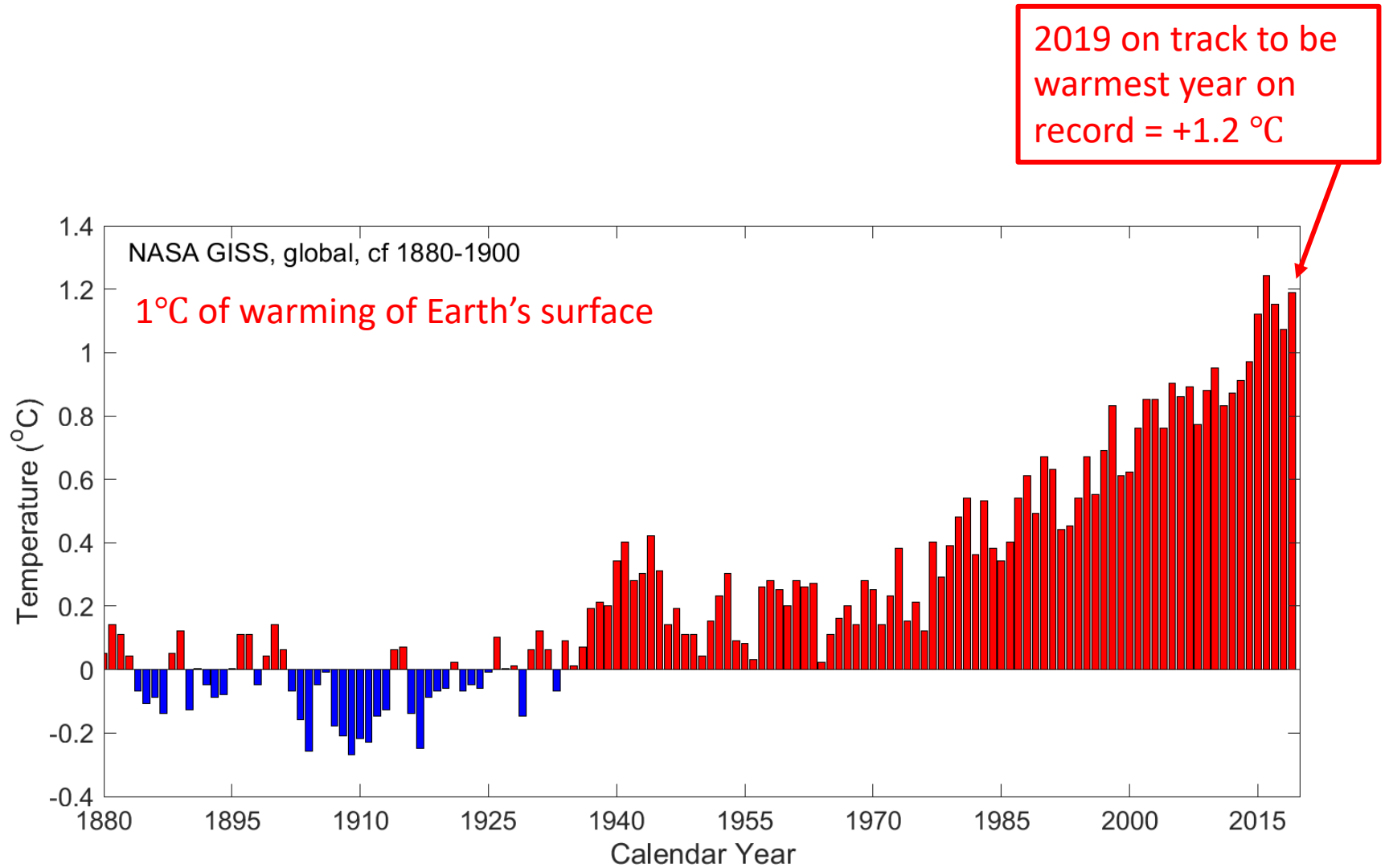
Tim Naish

TCFD workshops: Practical steps for implementation
16 October 2019–17 October 2019

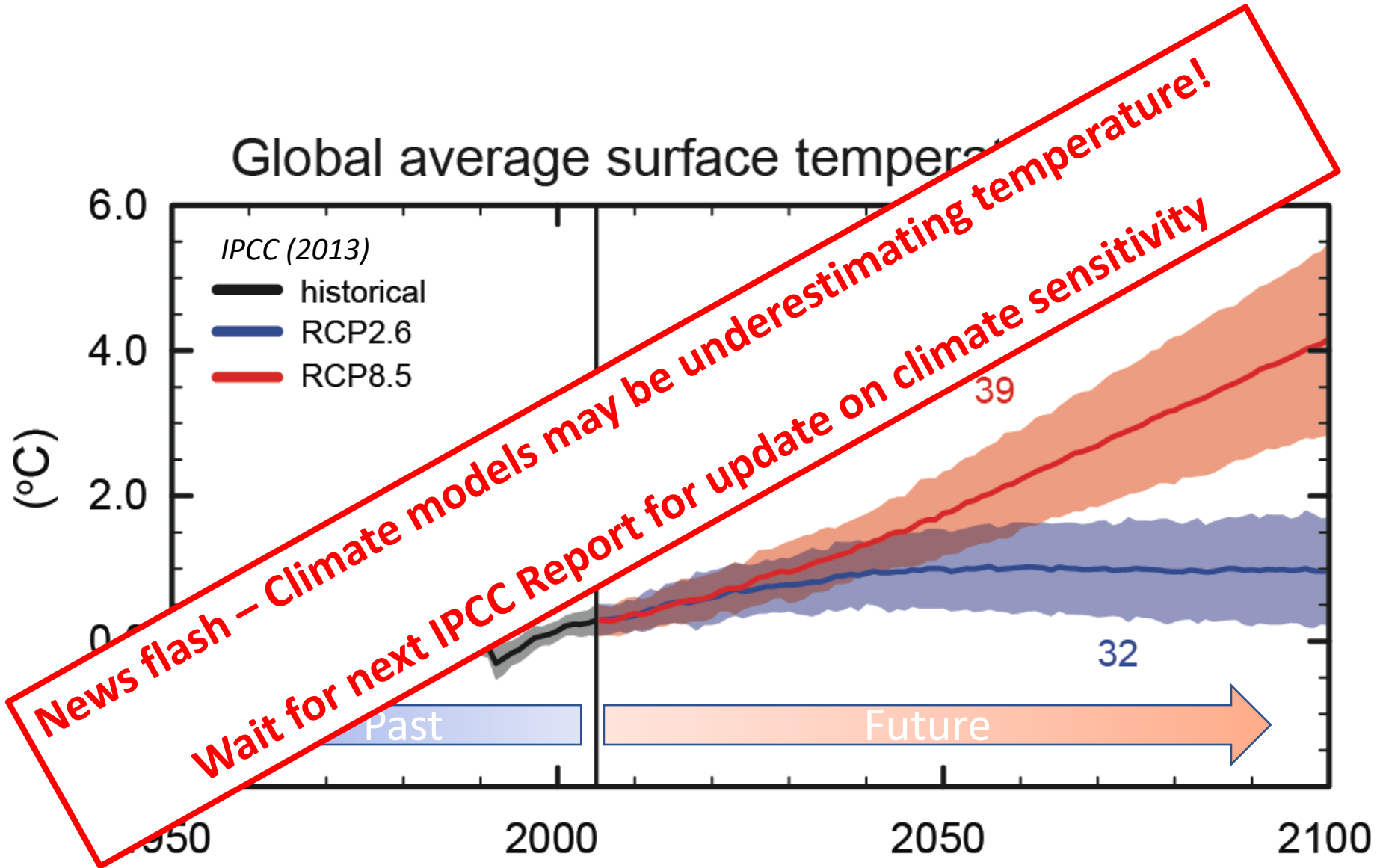
Atmospheric carbon dioxide continues to rise



Global temperature continues to increase



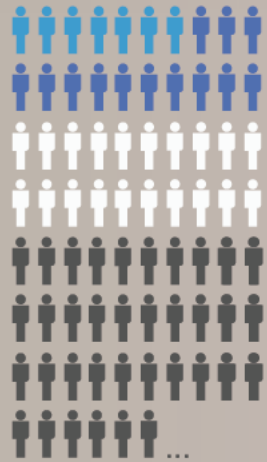
Where to from here?



IPCC SPECIAL REPORT

ON THE OCEAN AND CRYOSPHERE IN A CHANGING CLIMATE

OF THE WORLD'S 7.6 BILLION PEOPLE ...



 Live in low-lying coastal zones

 Live on coasts

 Rely on freshwater from the Hindu Kush Himalayas

 = 100 million

680

MILLION PEOPLE LIVE IN LOW-LYING COASTAL AREAS

66%

OF HINDU KUSH HIMALAYAN GLACIERS MAY BE LOST BY 2100



GLOBALLY, SEA LEVELS ARE RISING AND THE RATE OF RISE IS ACCELERATING.

3.6MM
PER YEAR SINCE 1993

Flood losses of up to \$1 trillion per year may occur in the largest coastal cities within 30 years.



15 DEVELOPING COUNTRIES ARE HOME TO 90% OF THE WORLD'S LOW-LYING RURAL POOR.

18
MILLION PEOPLE

... could be displaced in the country of Bangladesh alone by sea-level rise before 2050.

WHAT COULD OUR FUTURE LOOK LIKE?

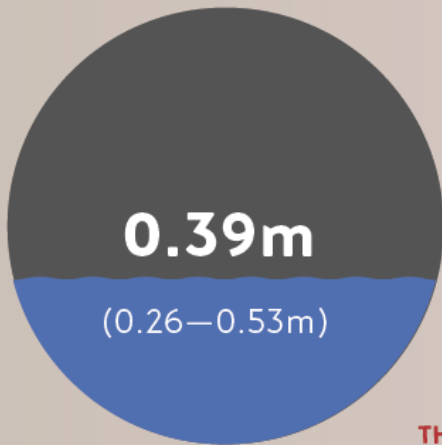
WELL, IT DEPENDS. BY CUTTING EMISSIONS, RISKS CAN BE REDUCED OR AVOIDED, AND ADAPTATION MADE EASIER AND MORE EFFECTIVE. BUT THAT MEANS “RAPID, FAR-REACHING AND UNPRECEDENTED CHANGES” IN ALL ASPECTS OF SOCIETY.

“A 66% chance of limiting
global warming to 2°C”

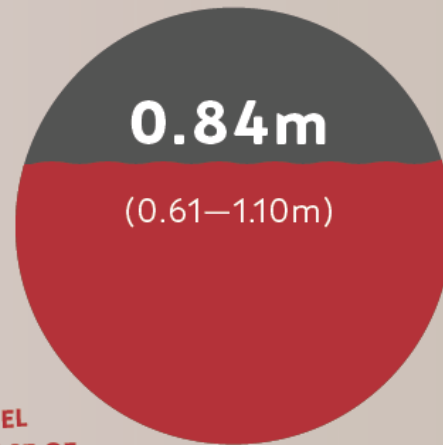
LOW EMISSIONS

HIGH EMISSIONS

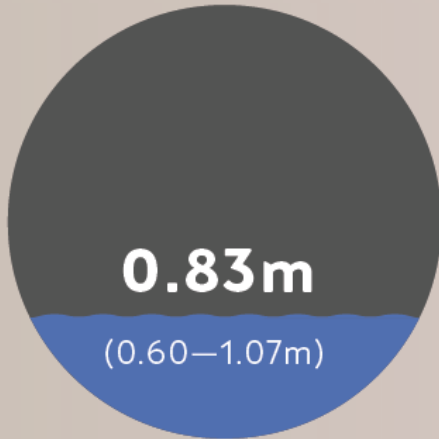
Continued and sustained growth
in atmospheric GHG emissions.



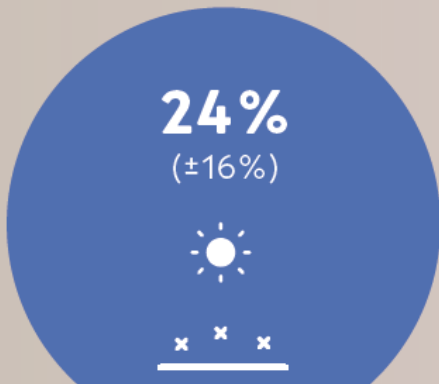
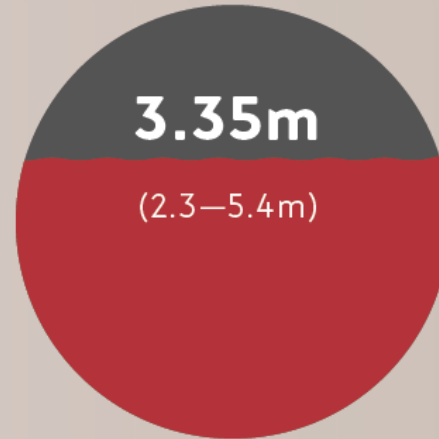
**SEA-LEVEL
RISE BY 2100**



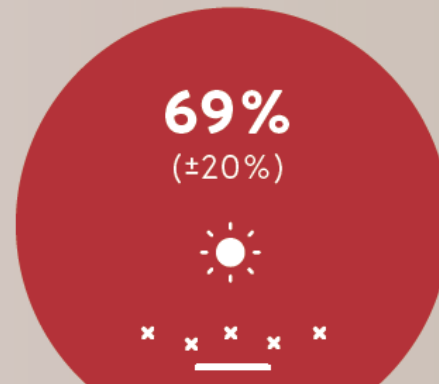
THERE IS A 17% CHANCE THAT SEA-LEVEL RISE COULD EXCEED 1.1m. WHILE AN INCREASE OF MORE THAN 2m "CANNOT BE RULED OUT".



**SEA-LEVEL
RISE BY 2300**



**LIKELY DECREASE
IN PERMAFROST
AREA BY 2100**



70-90%
destroyed



**WARM-WATER
CORAL REEFS**

99%
destroyed



CORALS ARE ACUTELY SENSITIVE TO INCREASED TEMPERATURES AND OCEAN ACIDIFICATION. THEIR DECLINE WILL "GREATLY COMPROMISE" FOOD PROVISION, COASTAL PROTECTION AND TOURISM.

x20



**FREQUENCY
OF MARINE
HEAT WAVES
BY 2081-2100**

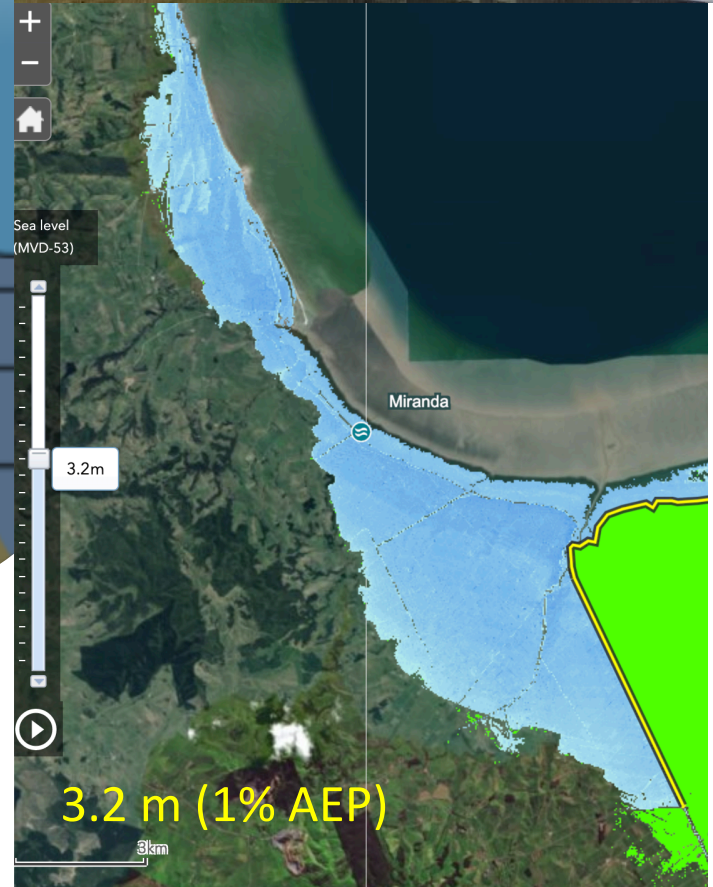
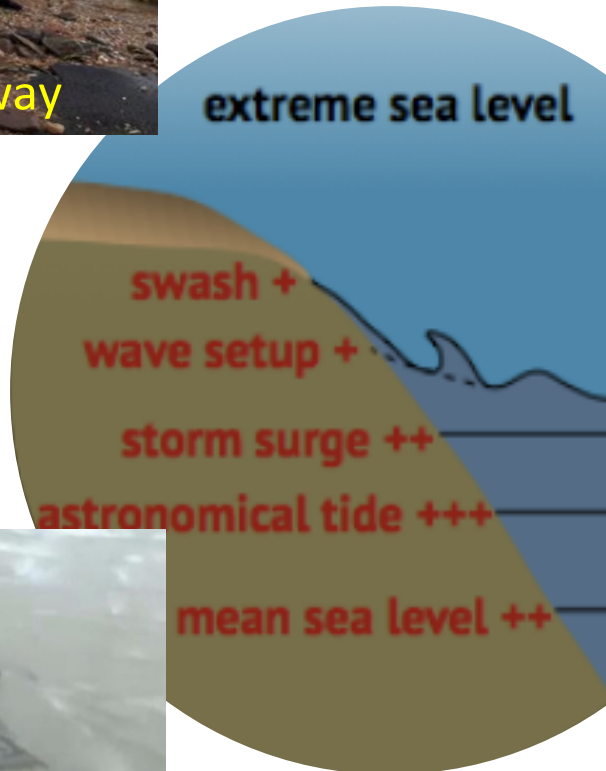
x50



Firth of Thames coastal flood, 5 January 2018

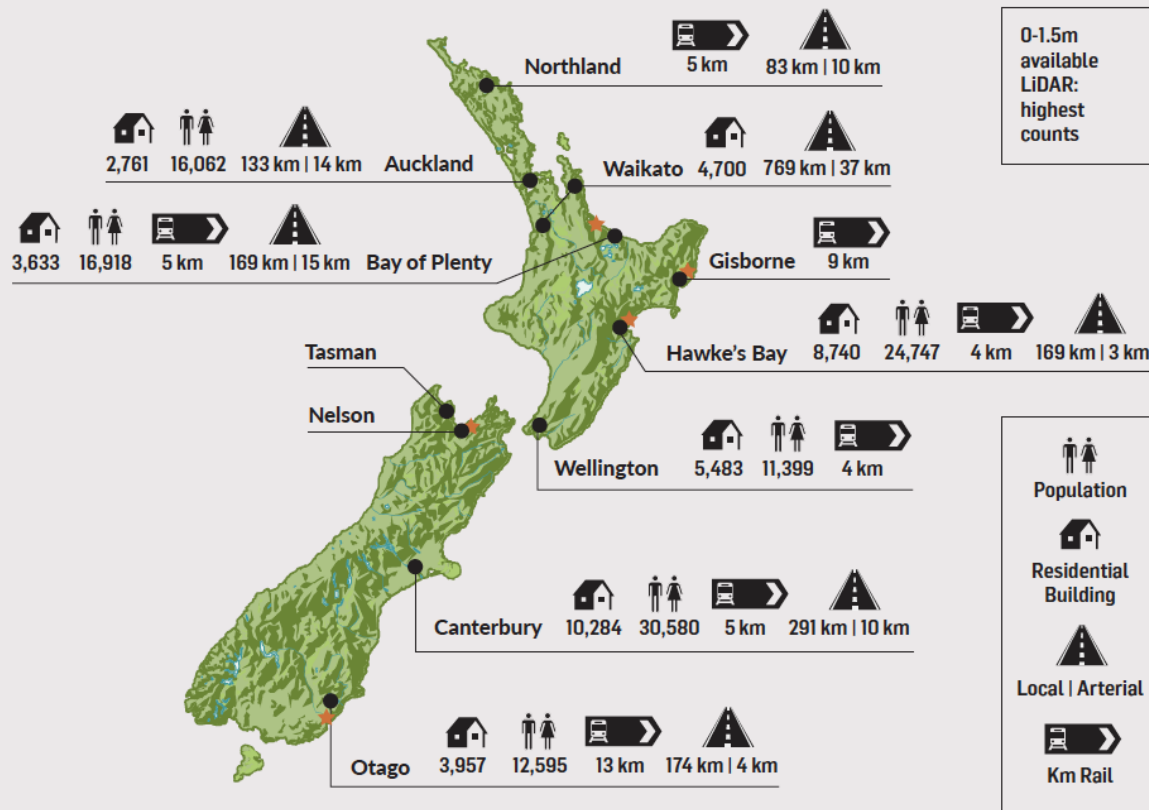


The 100 year storm will be an annual event with 40cm of sea-level rise



Impacts from sea-level rise





Risk exposure of + 1.5m sea-level rise around New Zealand



\$19B (2011)
Replacement cost of all buildings

43,680
Total number of residential buildings

68,170
Total number of all buildings

133,265 (Census 2013)
Total resident population

National Infrastructure

382 critical-facility buildings

5 airports ★

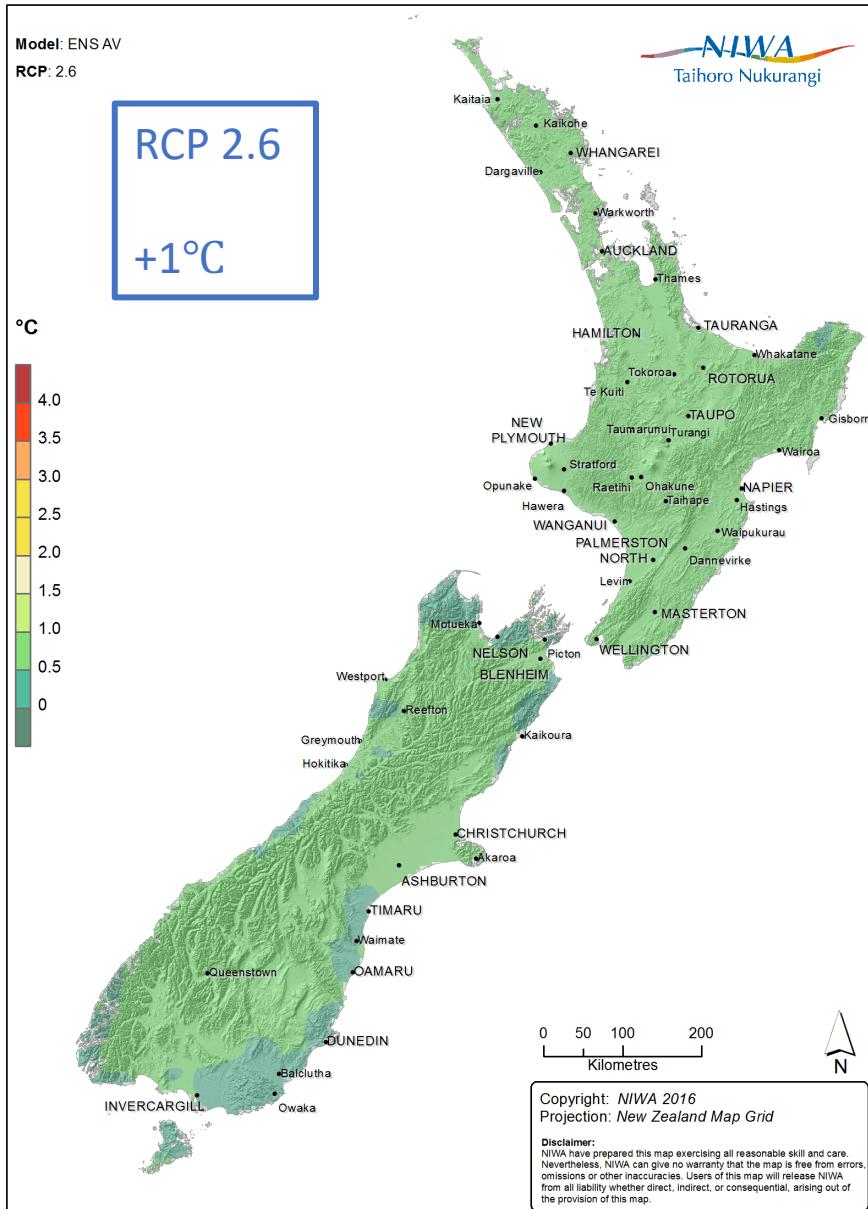
1,547 jetties & wharves

2,121 km of roads
(1,930 km local roads)

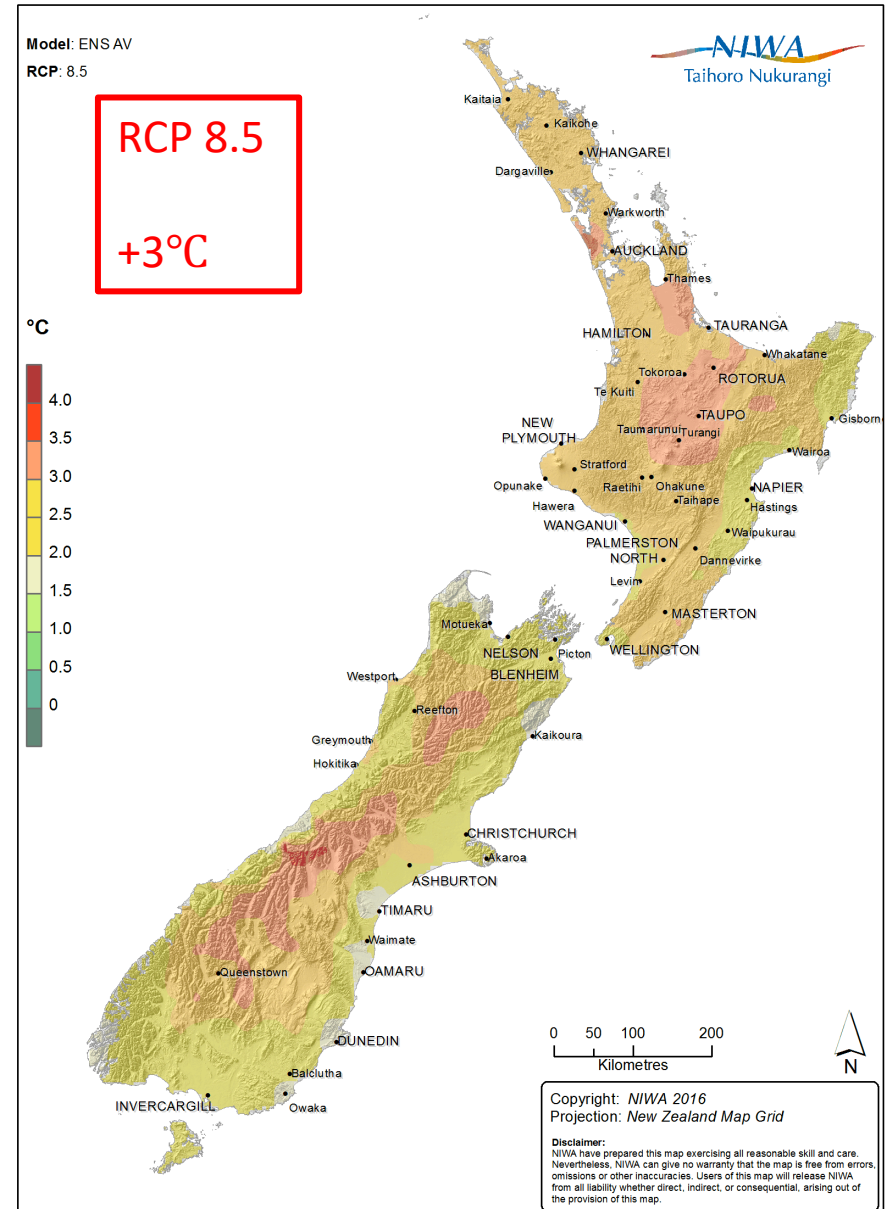
46 km railway

Mean annual temperature increases by 2100

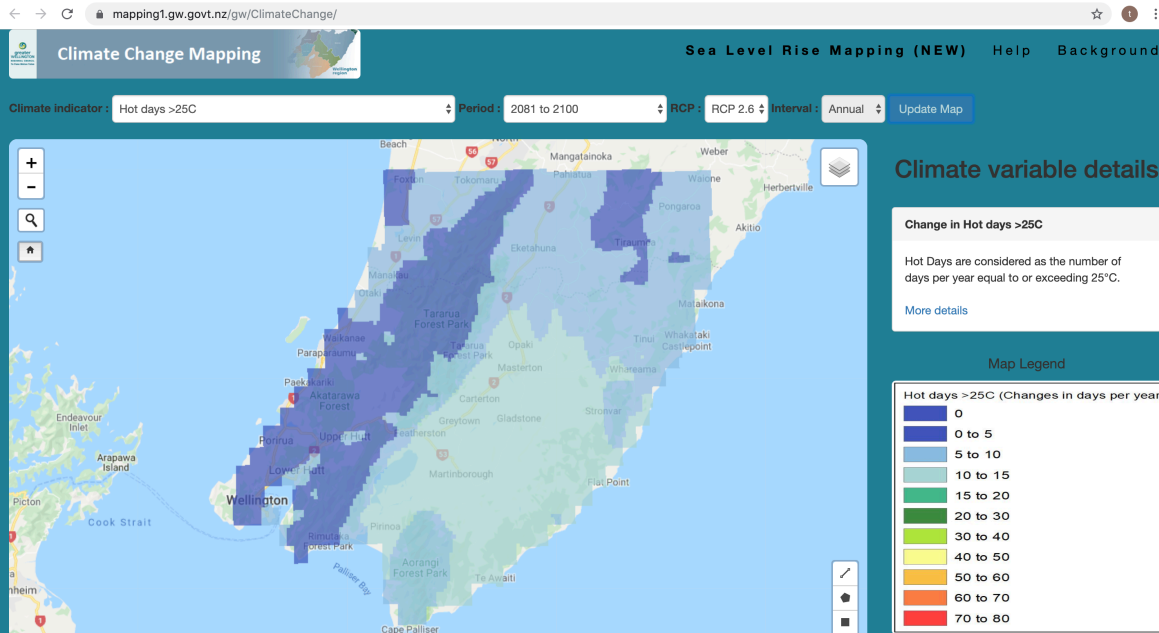
Annual Mean Temperature Change Between 1995 and 2090



Annual Mean Temperature Change Between 1995 and 2090



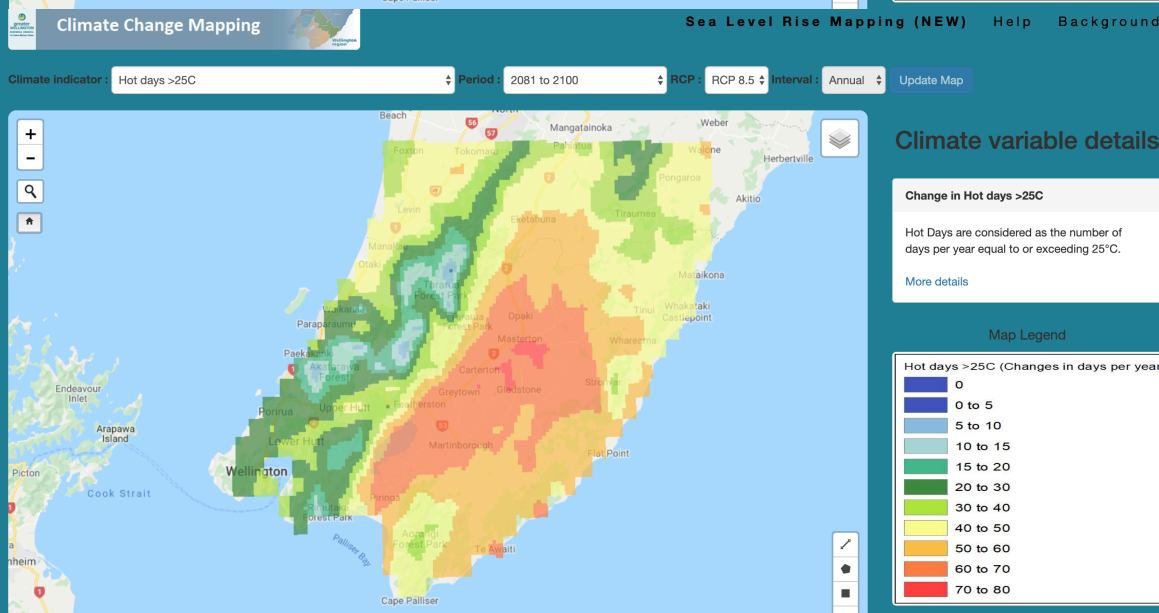
Hot days increases



RCP 2.6

10-15 more hot days
above 25°C

40% increase



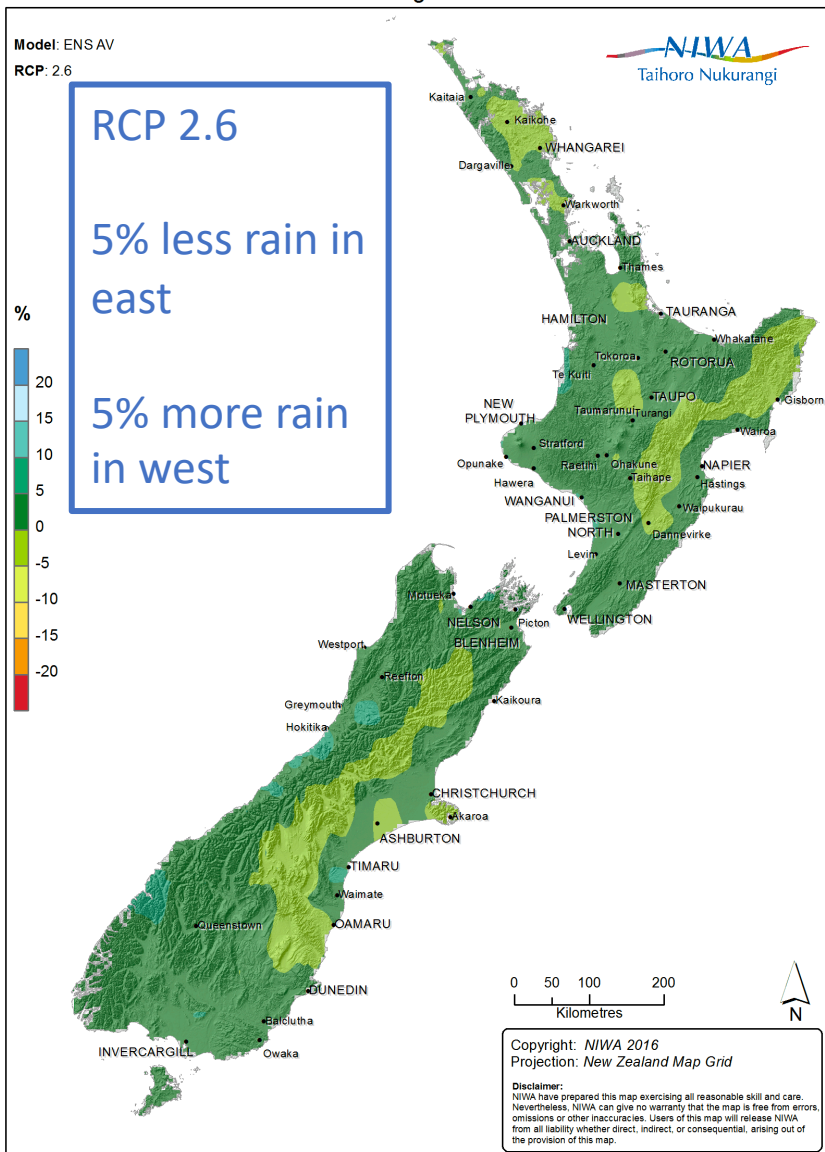
RCP 8.5

50-60 more hot days
above 25°C

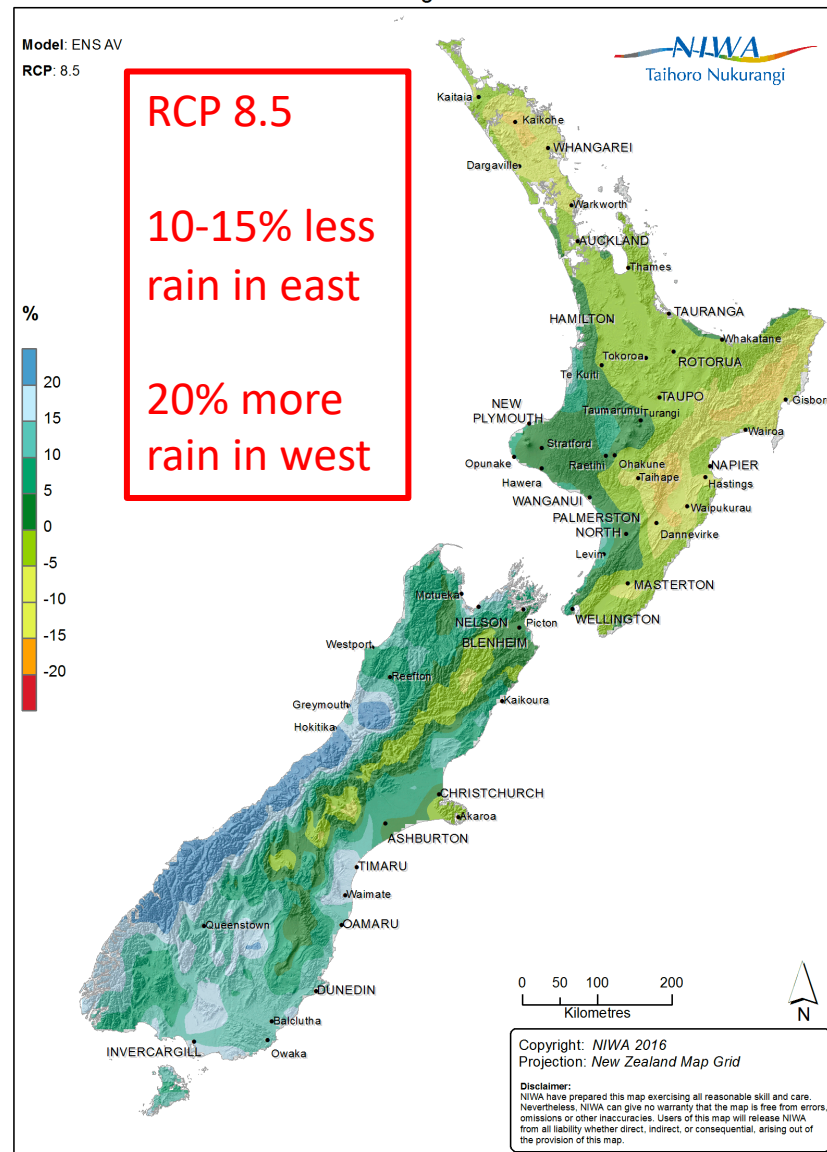
300% increase

Rainfall & drought occurrence increase

Annual Mean Rainfall Change Between 1995 and 2090



Annual Mean Rainfall Change Between 1995 and 2090



Aotearoa New Zealand's climate change consequences at 2°C

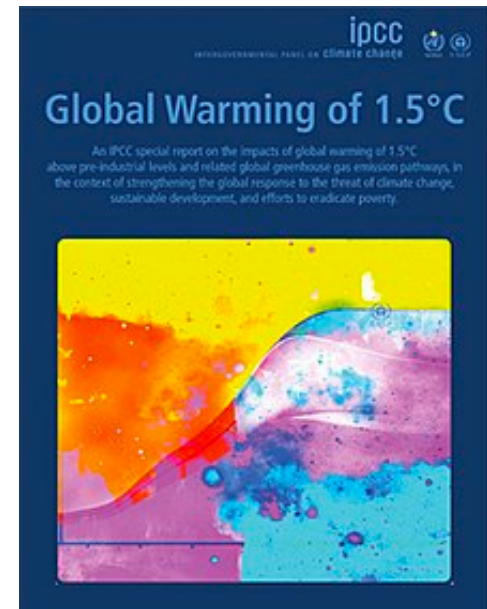
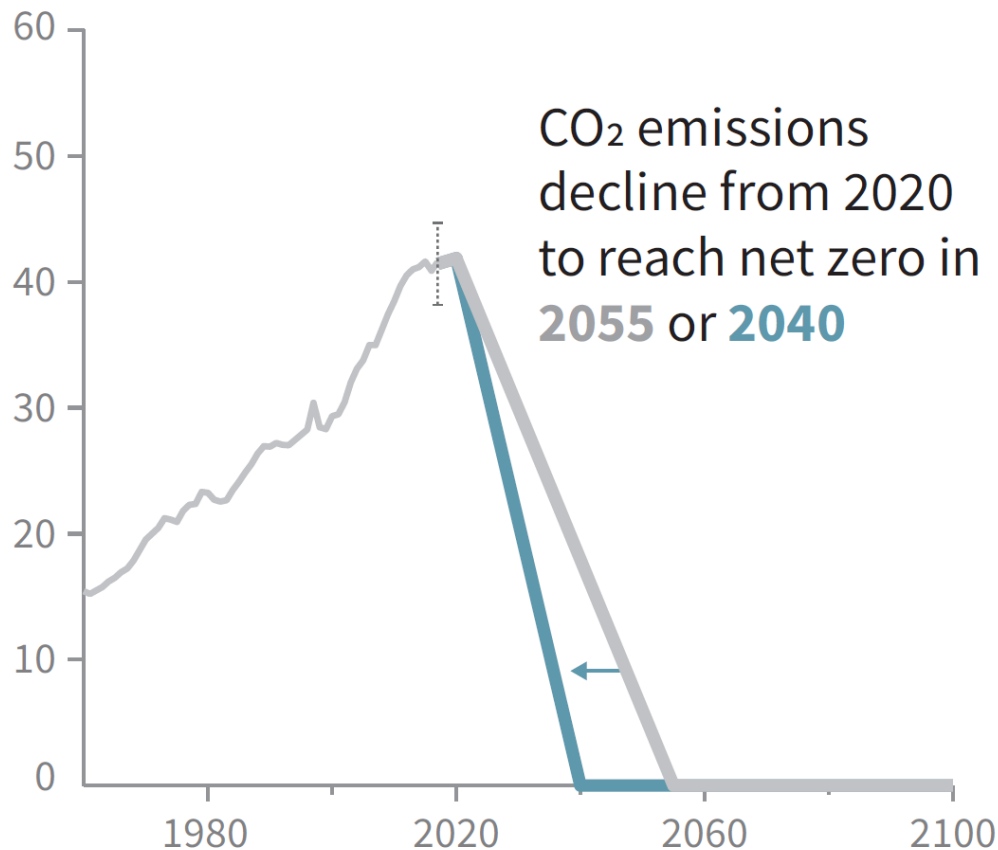


- 2°C warming...
 - 40% more hot days (>25 °C)
- 50cm sea-level rise (30cm by 2060)
 - 100 year flood occurs every year
- Plus 5-10% less rain in east...
 - Tripling drought occurrence - agriculture horticulture
 - 4-6 months extreme fire danger, all of eastern NZ - forestry

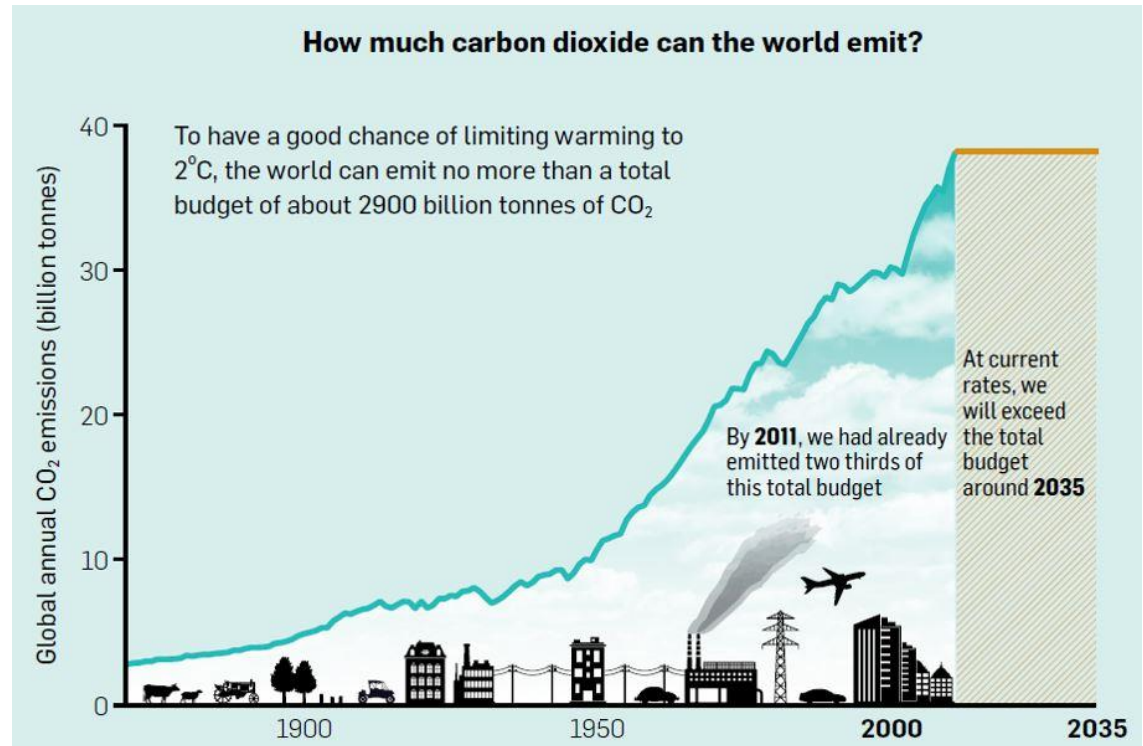
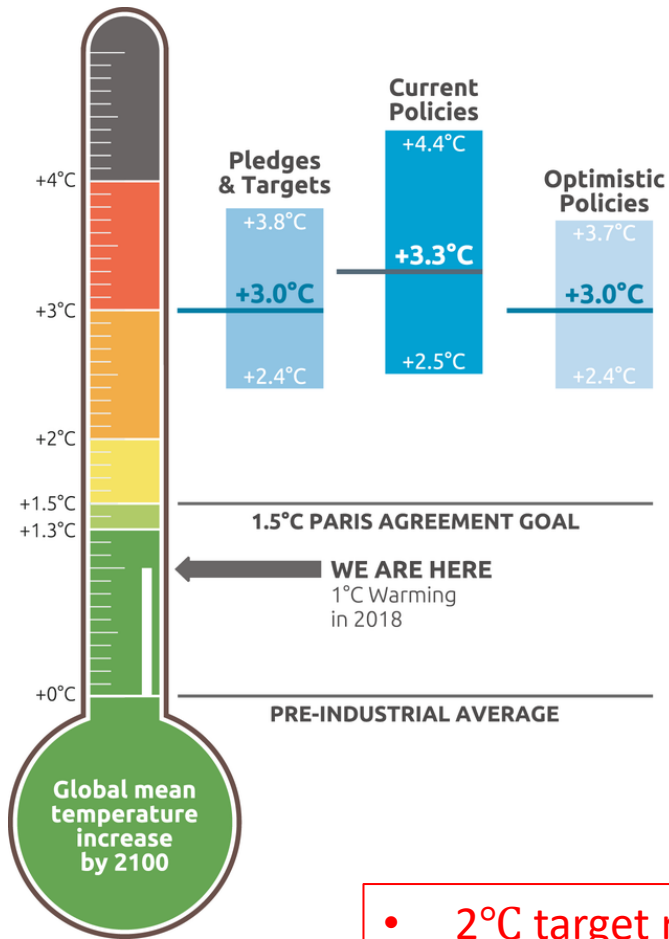


Mitigation – what is required for 1.5°C?

Pathways limiting global warming to 1.5°C with no or limited overshoot **would require rapid and far-reaching transitions** in energy, land, urban and infrastructure (including transport and buildings), and industrial systems (*high confidence*). These systems transitions are **unprecedented in terms of scale, but not necessarily in terms of speed**, and imply deep emissions reductions in all sectors, a wide portfolio of mitigation options and a significant upscaling of investments in those options (*medium confidence*). {2.3, 2.4, 2.5, 4.2, 4.3, 4.4, 4.5}



How are we doing globally?



- 2°C target requires carbon zero by 2070
- 1.5°C target requires carbon zero by 2050
- At current rates we will be 2°C on 25 years

How is New Zealand doing?

- Currently 7.5 tonnes CO₂ per capita
- Based on trend....we are not on track for 1.5°C or even 2°C!

