



Australian
National
University

The economic costs of climate change



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The energy transition

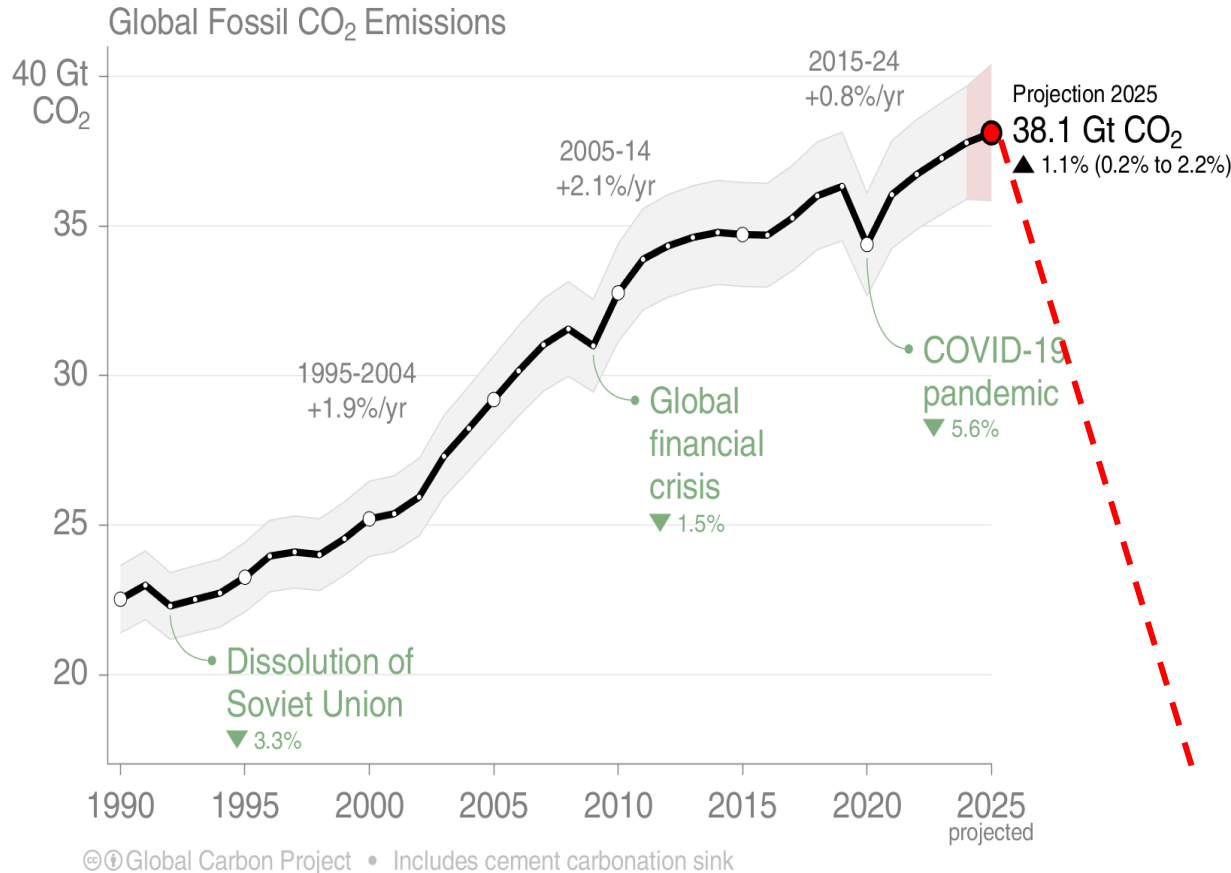
- Obviously a critical issue but it's implications for monetary policy have been well-covered previously, particularly short-term transition costs vs long-term stability
- Mostly we are still fixated on electricity supply *via* fossil fuels vs renewables and storage BUT this is currently just 30% of our GHG emissions profile...
- Problematic assumption that the new systems increase costs of both production and energy (with consequent inflationary impacts) and co-benefits are often omitted
- Largely ignore that the energy transition is impacted by physical risk
- Complicated by AI, data centres and new geopolitical risks
- We now know a lot about policies that work

Clarity on which policies work reliably

- **Carbon pricing and taxation:** taxes across sectors, emissions trading schemes, congestion charges and fossil fuel excise taxes
- **Energy efficiency and standards:** building energy codes, air emission standards, minimum energy performance standards
- **Renewable energy and research:** R&D expenditure on carbon capture, hydrogen, energy efficiency and renewables and planning for renewable expansion and auction schemes
- **Reporting and accountability:** greenhouse gas emissions reporting requirements across sectors
- **Subsidy reduction:** eliminating fossil fuel subsidies
- *Multiple pathways exist and some countries have implemented robust policy mixes*



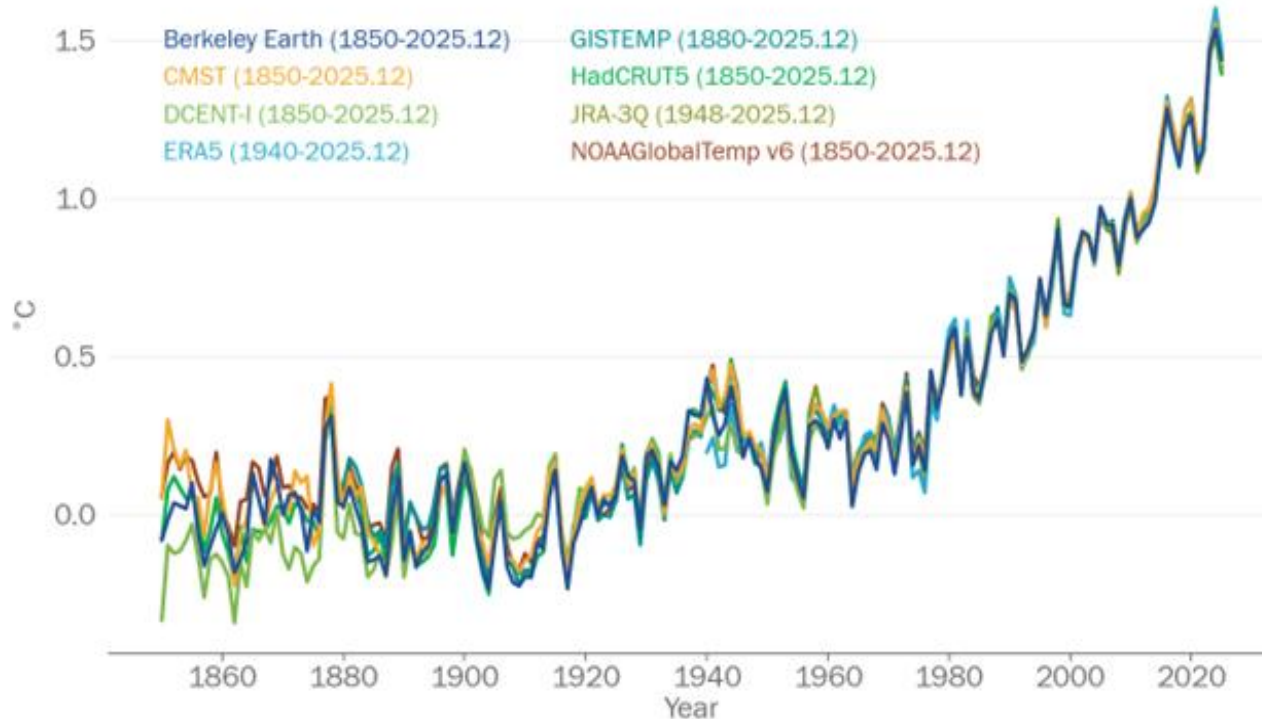
Record GHG emissions (again)



- Record CO₂ concentrations (433ppm): up by 3ppm and above 1.5°C-consistent pathways
- Record levels of methane, nitrous oxide and other GHGs
- Our carbon budget for 1.5°C is running out very quickly (about 3 years left): GHG emission reduction is urgent

Accelerating global warming

Global Mean Temperature Difference ($^{\circ}\text{C}$)
Difference from 1850-1900 average

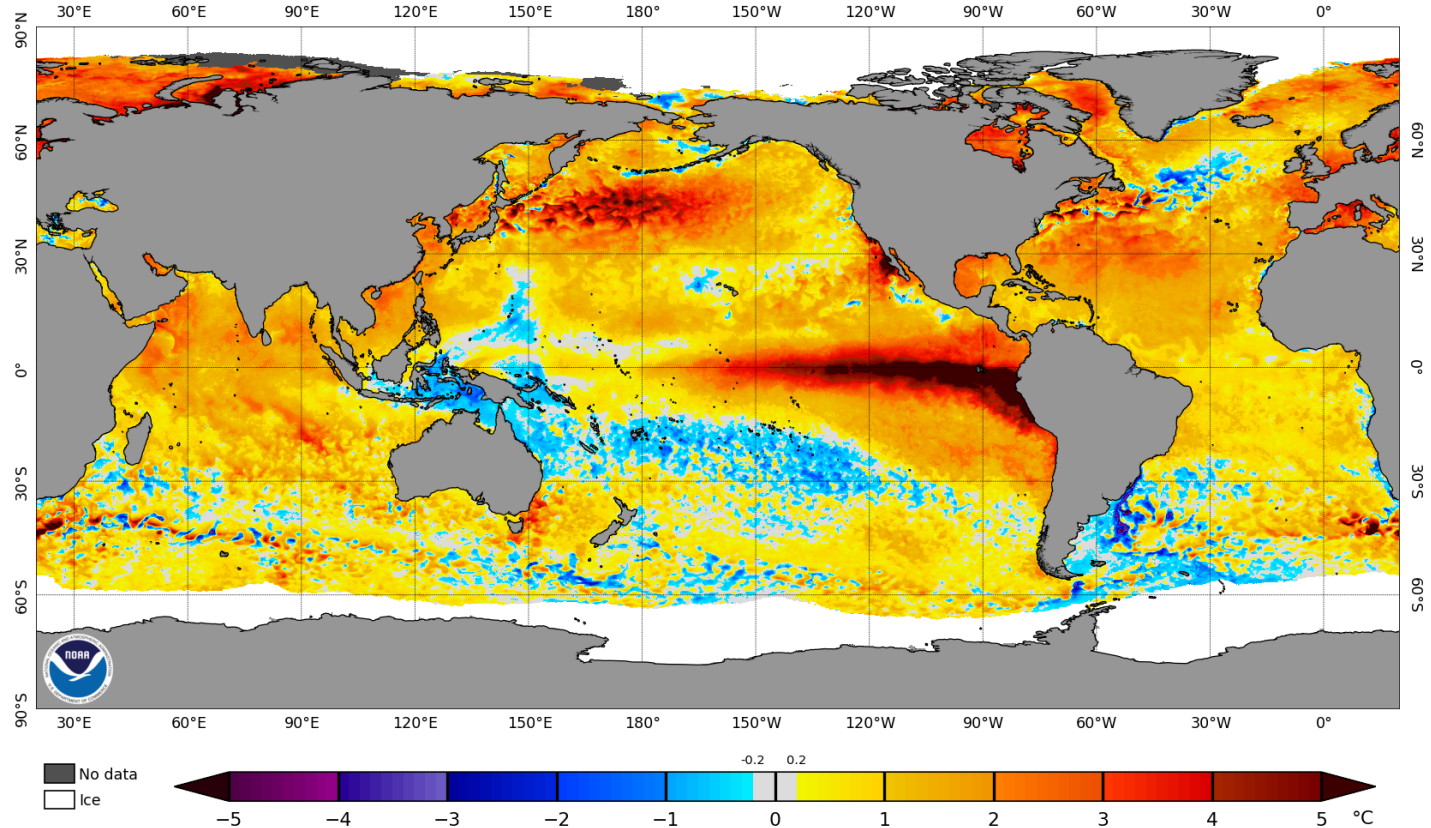


- Warming is going up faster and faster over time
- For the first time, the 3-year average temperature was over 1.5°C
- 2026 and 2027 likely to be new records – uncharted territory
- Significant **certainty**



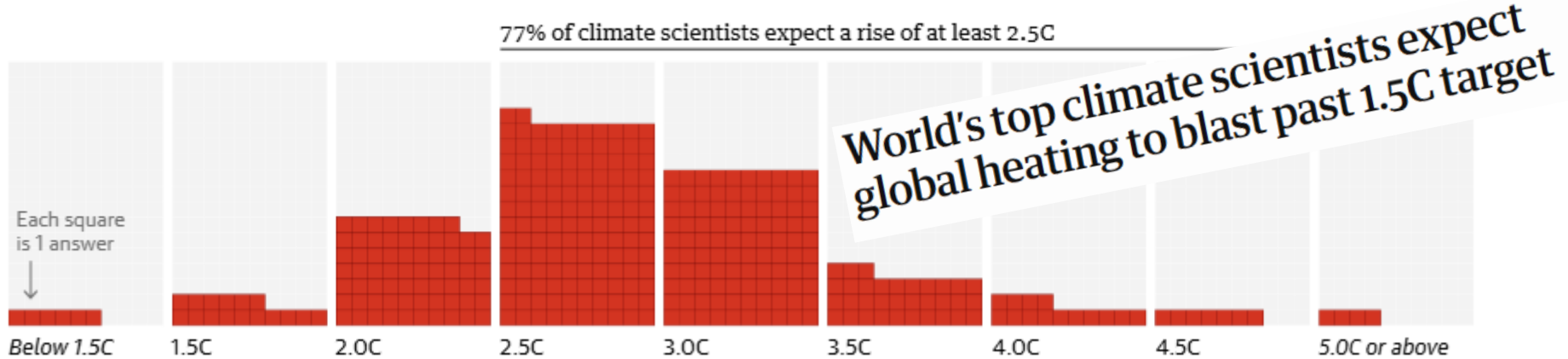
Global warming, pervasive but variable

NOAA Coral Reef Watch Daily 5km SST Anomalies (v3.1) 4 Oct 2026



Climate scientists assess likely warming

Count of answers given by IPCC climate experts



- Nearly 80% foresaw at least 2.5°C of global heating and almost half anticipate at least 3°C. Only 6% thought the 1.5°C goal would be met
- Almost three-quarters blamed a lack of political will whilst 60% also blamed vested corporate interests

Climate change impacts already hitting

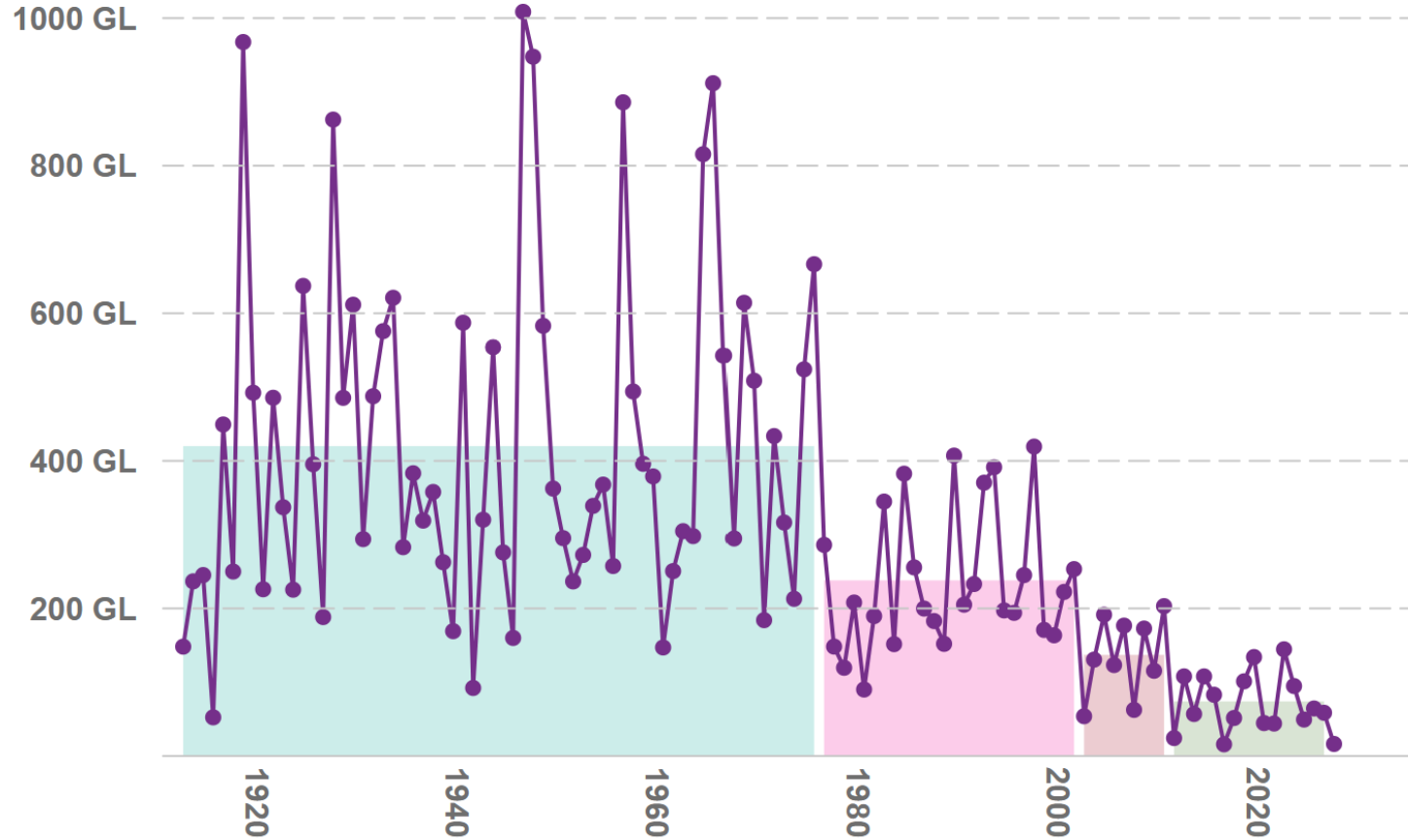
- heatwaves on land and in the sea
- increased bushfire and drought risk
- stronger, more damaging floods, storms and cyclones
- overall less water in our rivers in southern Australia
- lower and more variable agricultural production, animal welfare issues
- increased pest and disease issues
- increasing physical and mental health issues
- rising sea level and coastal erosion
- loss of biodiversity & ecosystem function
 - 1st mammalian climate-change extinction
- costing Australia about \$38B annually

More emissions makes all these worse





Climate impacts: Perth dam inflows



Changes in Perth's water sources

	Streams and dams	Groundwater	Desalination	Groundwater replenishment
1960's	88	12	-	-
1980's	65	35	-	-
2000's	32	61	7	-
Now	28	34	32	6
2035	3	25	65	7

Climate change impacts already hitting

- heatwaves on land and in the sea
- increased bushfire and drought risk
- stronger, more damaging storms
- over 100 million people at risk of displacement
- low water levels in the Amazon
- increased bushfire risk
- increased risk of drought
- rising sea levels
- loss of biodiversity
- 1st mammalian climate-change extinction
- costing Australia about \$38B annually

More emissions makes all these worse

**We can finally measure the
damage each new coal, gas or
oil project will do to people and
nature**

<https://carbonimpactstracer.com/>

ssues



Intergenerational Report 2026

- Has climate change as a consistent but under-developed thread
- It reverts to the much-used '*Climate change impacts are highly uncertain*' as a rationale for side-stepping it
- Uses a framework and approach that underplays the significance for monetary policy trade-offs
 - 'GDP reductions of 1% with a 3°C scenario'

'Negligent' to talk about long-term risks to Australia without examining cost of climate crisis, experts say

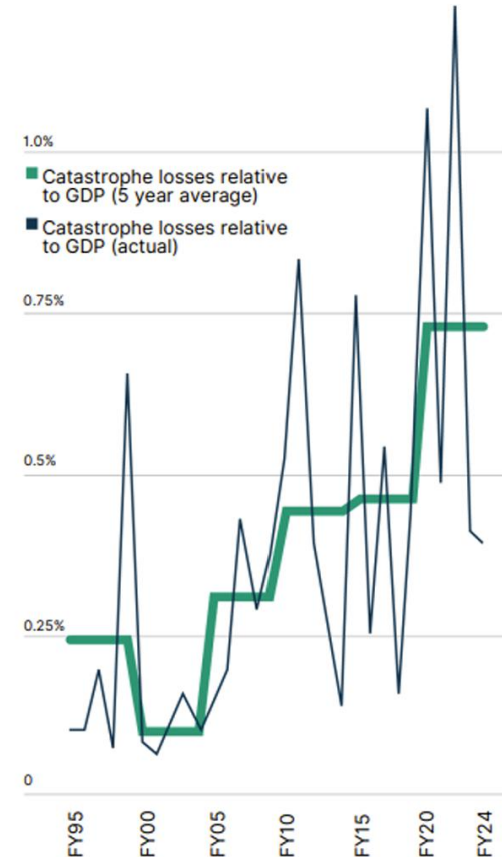
An Australian government **snapshot of life in 40 years** has been sharply criticised for underplaying the economic and social damage expected due to the worsening climate crisis.

IGR 2026: climate change and agriculture

- IGR: By 2066 crop yields may be reduced by 3.6% for a 3°C scenario and 1.2% for a 'Paris-aligned' scenario
- BUT Australia's crop yields have already been pushed down about 21% by just 1.5°C of climate change !
- IGR ignores reductions in cropped area, increased yield volatility, price implications, non-linear increases in risk with global warming, changes in water availability, increases in pest, disease and weed pressure, degradation of soil due to enhanced erosion and loss of soil cover etc
- Additionally, recent analyses have shown that global agricultural risk is amplified by 'multiple breadbasket failures'

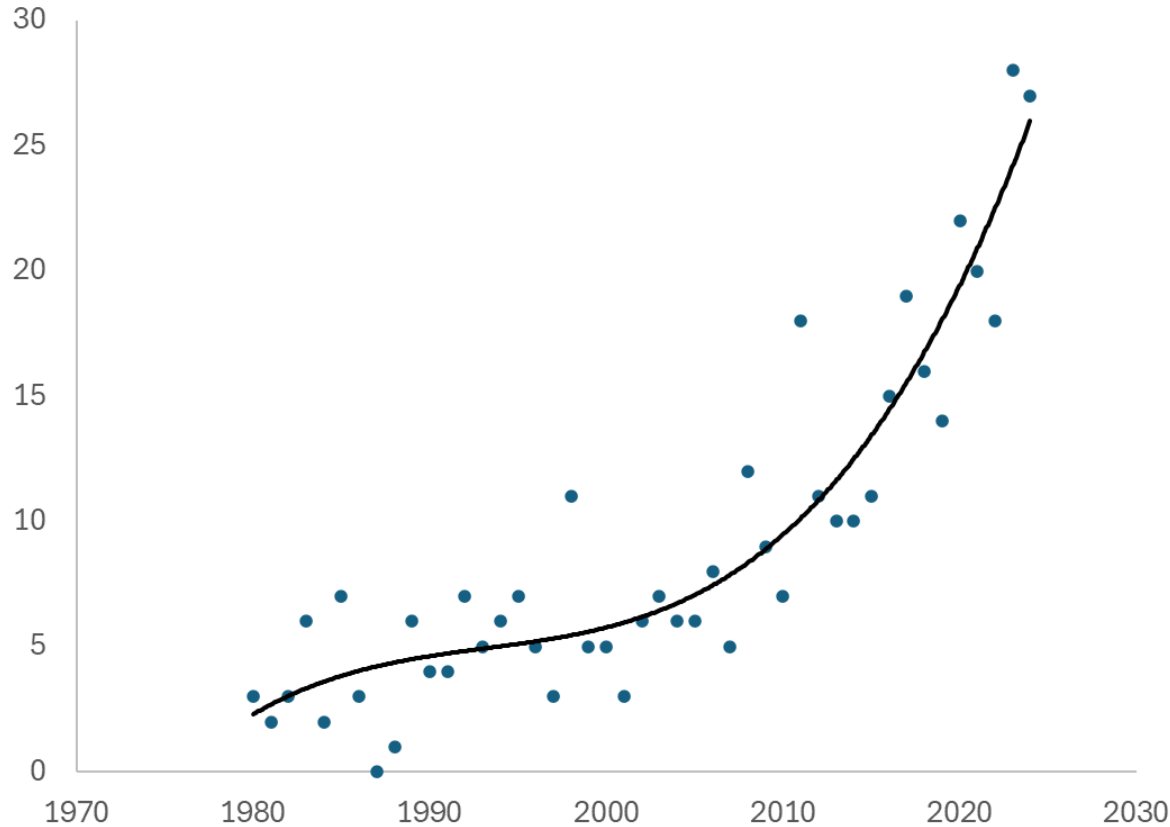
IGR 2026: disaster expenditure

- IGR: the DRFA shows marginal impacts from climate change - about a 12% increase for a 3°C scenario vs a 'Paris-aligned' one
- But Australia's DRFA spend has tripled relative to GDP over the past two decades
- IGR: appears to ignore the highly non-linear nature of damage from growing extremes





Annual US disasters each costing more than \$1B





‘Chronic’ risks are likely to grow too

Droughts

change under RCP6.0**
relative to 1976–2005



Moderate-severe

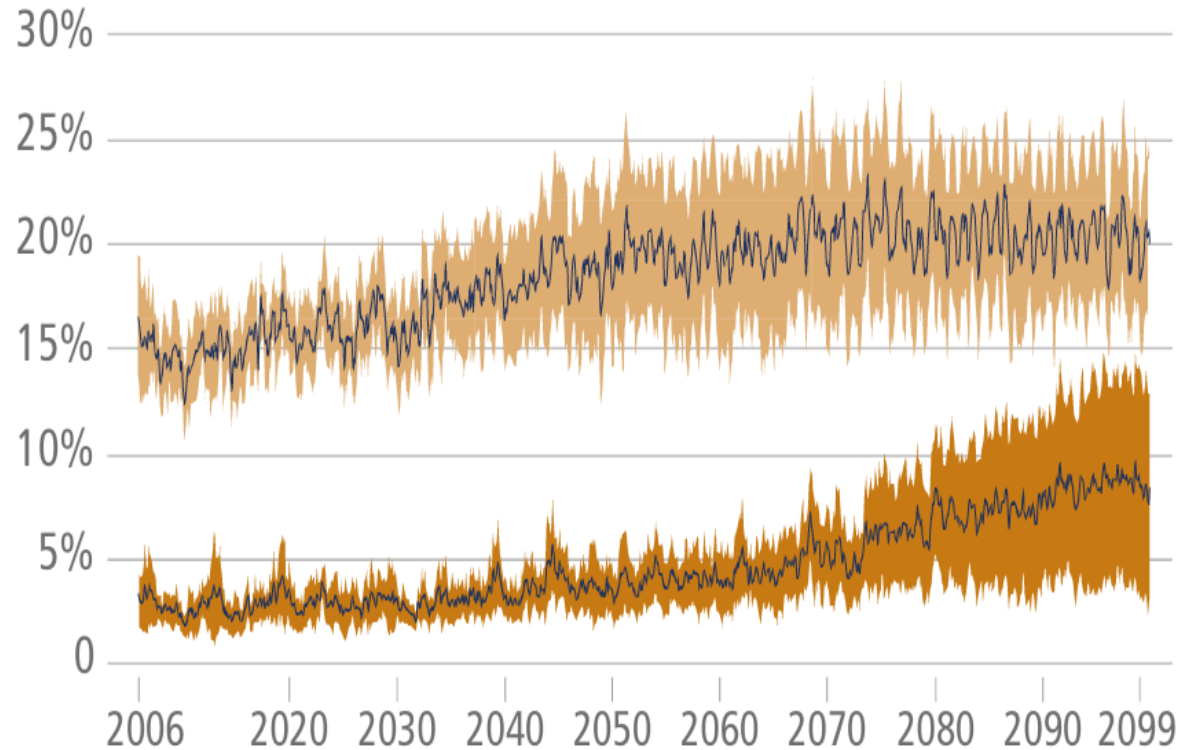


Extreme-exceptional

* = Population projections based
on Shared Socio-Economic
Pathway 2 (SSP2)

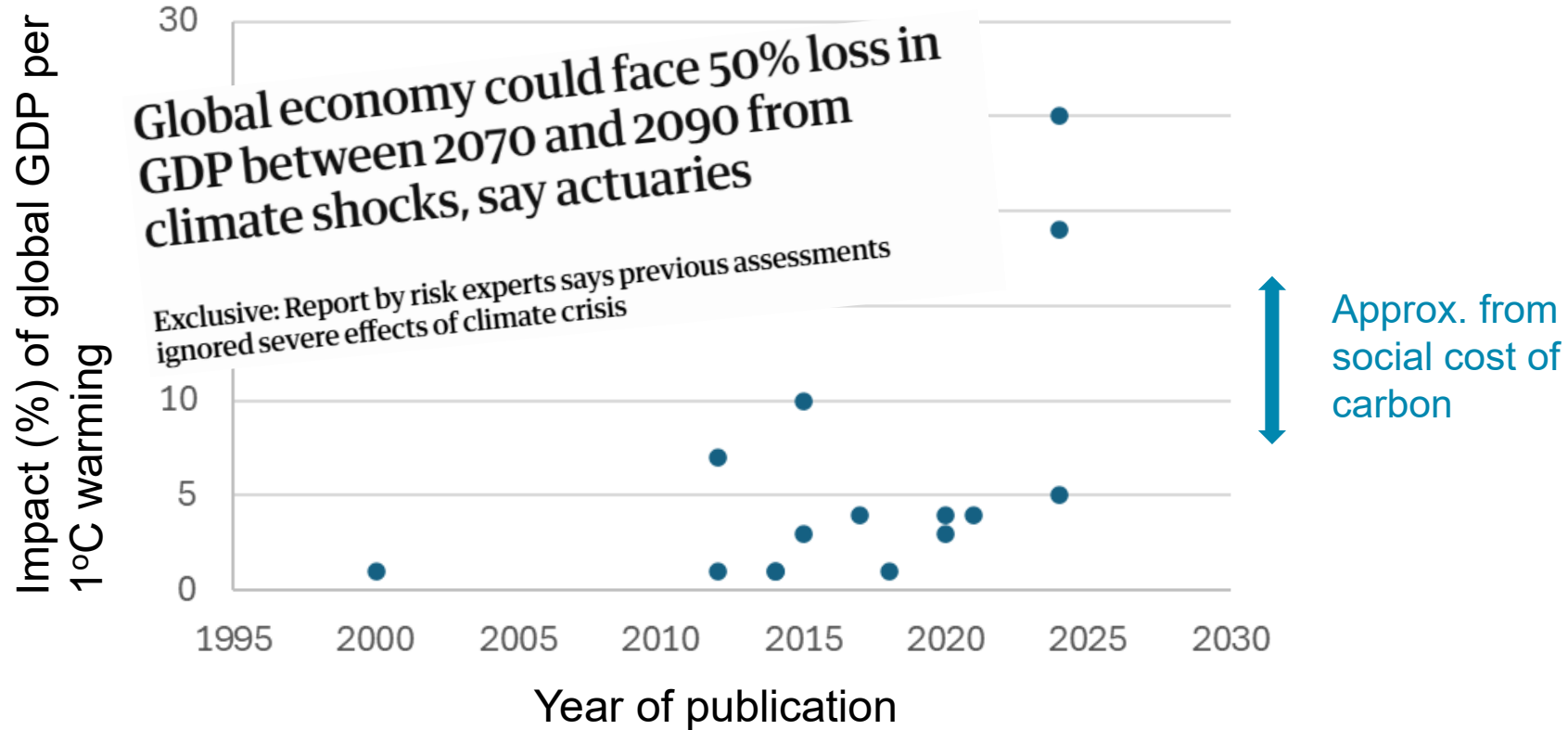
** = ~1.3°C to 2.5°C Global
Warming Level
between 2041–2060

Percentage of global land area

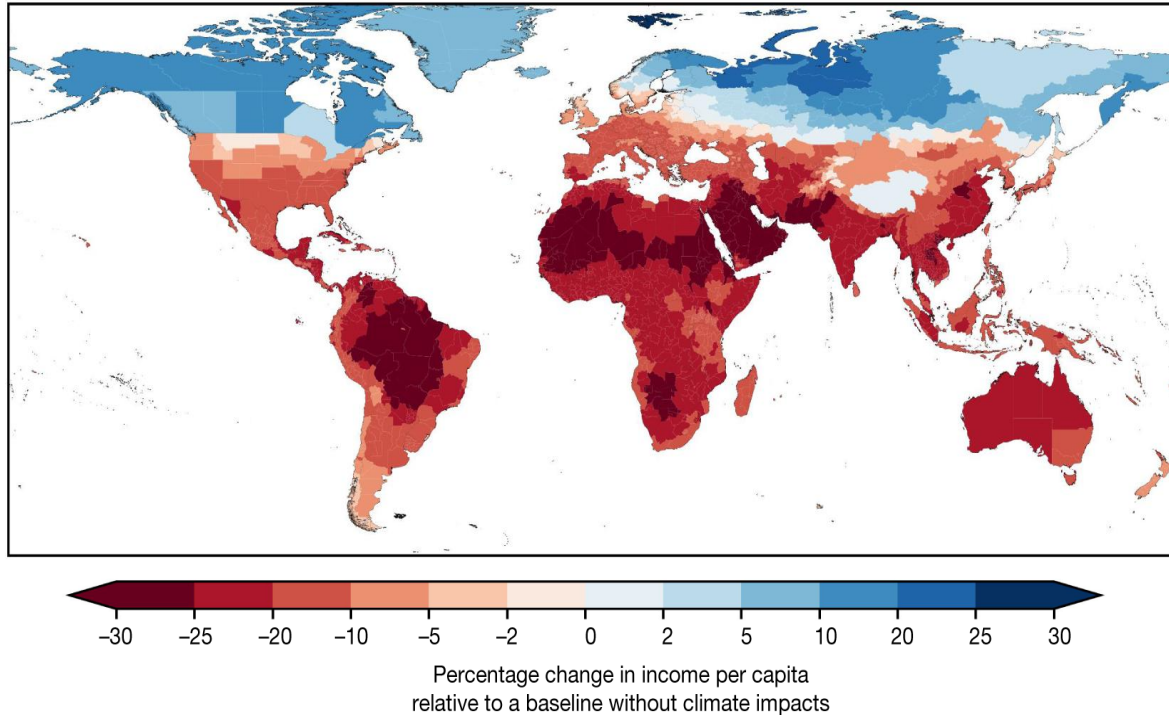




Economic costs of climate change increasing



Economic impacts vary globally



The median committed climate damages are greater than the median mitigation costs by about a factor of six

Costs and benefits of adaptation

- Avoided costs of climate change impacts, increased productivity, new opportunities, often multiple co-benefits, empowerment
- Adaptation relatively poorly quantified at large scale
 - highly contextual and diverse
 - largely ignored by policy
- Often up-front costs which can be significant
- Some estimates of benefit – every dollar spent on adaptation now will return \$2 to \$17 (average around \$10)
 - in one study across 12 countries, future potential returns US\$1.4 trillion over 10 years, with average annual returns of 27% (some sectors more – e.g. health with 78% return)

A more comprehensive approach is needed

- The costs and benefits of emission-reduction, plus
 - The costs and benefits of climate impacts, plus
 - The costs and benefits of climate adaptation, plus
 - The cost and benefits re: other factors (e.g. sustainable development, security, insurance, inequity, social disruption etc)
-
- Financial markets and policy that better internalise the net costs of climate change *sensu lato* (as above) will provide strong incentives for effective and informed climate change investment
 - If well-designed and implemented, adaptation could be anti-inflationary and enhance economic productivity and political stability

The national (and global) interest ?

Australia: Inaction could cost at least between \$3.4T and \$6.8T and 880k jobs over the next 25-50 years whilst action could lead to a \$680B bigger economy and 250k more jobs

Globally: Inaction cost \$178T but action generates a \$43T boost

\$6.8 trillion GDP hit if renewable energy transition is delayed

Implications for monetary policy trade-offs

- ‘Looking through’ shocks will be increasingly unjustifiable – more frequent, severe and complex extreme events plus ongoing ‘chronic’ changes will tend to push up inflation and slow down economic activity, requiring new approaches
- Investment in adaptation (options, capacity and policy scaffolding) will increasingly be critical in moderating the inflationary pressures and maintaining productivity
 - but in Australia we are largely failing to invest in this
- Pro-active approaches are needed now to avoid undesired costs and take advantage of opportunities

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Every year matters
Every part of a degree matters
Every choice matters

Howden and Colvin 2018