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Climate Emergency – tipping the odds in our favour

Sandy Trust

Panmure House, May 2023





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CCAG
Climate Crisis
Advisory Group

Climate Emergency – tipping the odds in our favour

A climate-change policy briefing for COP27

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Pathways to
Sustainability
November 2022



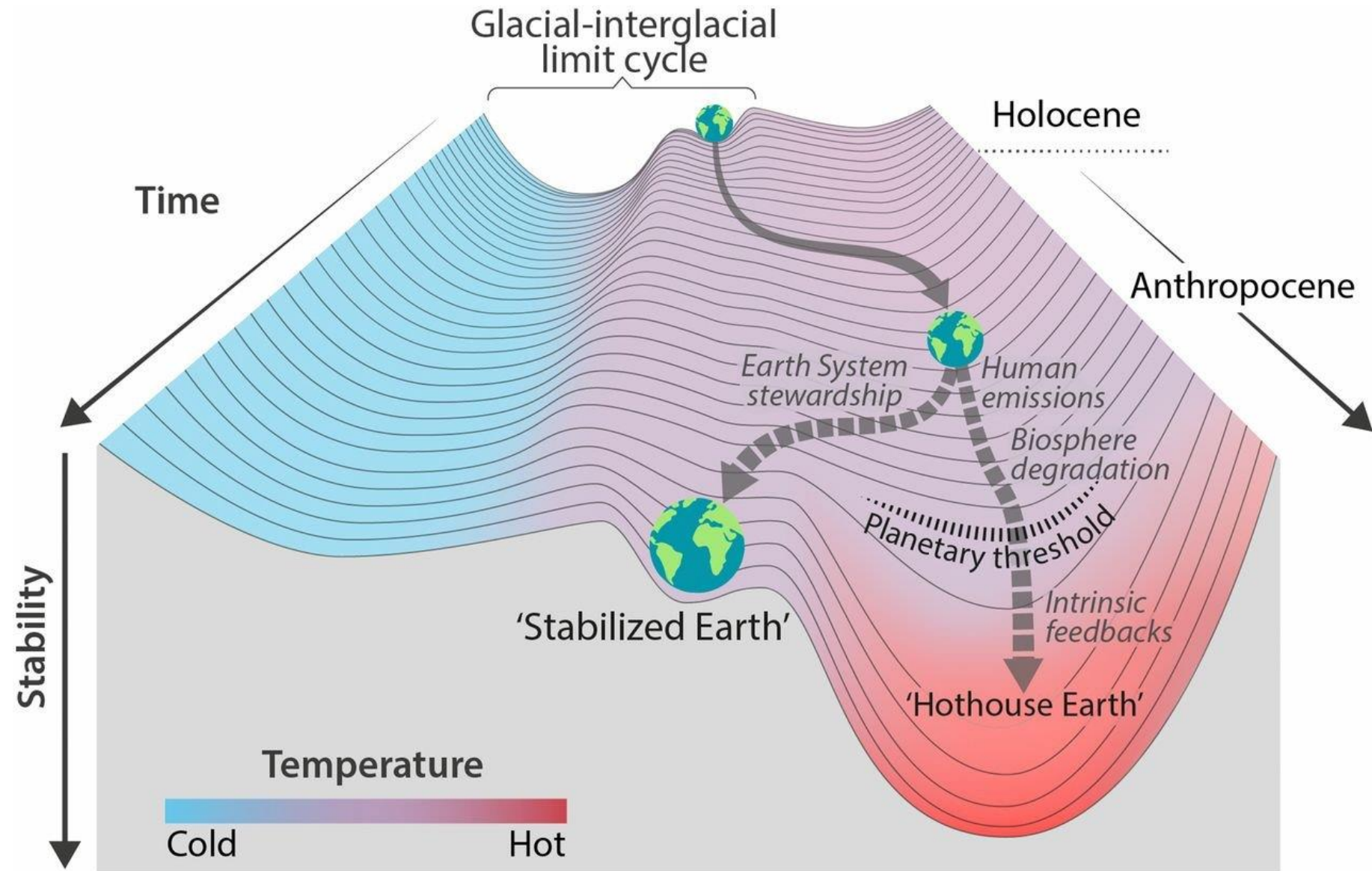
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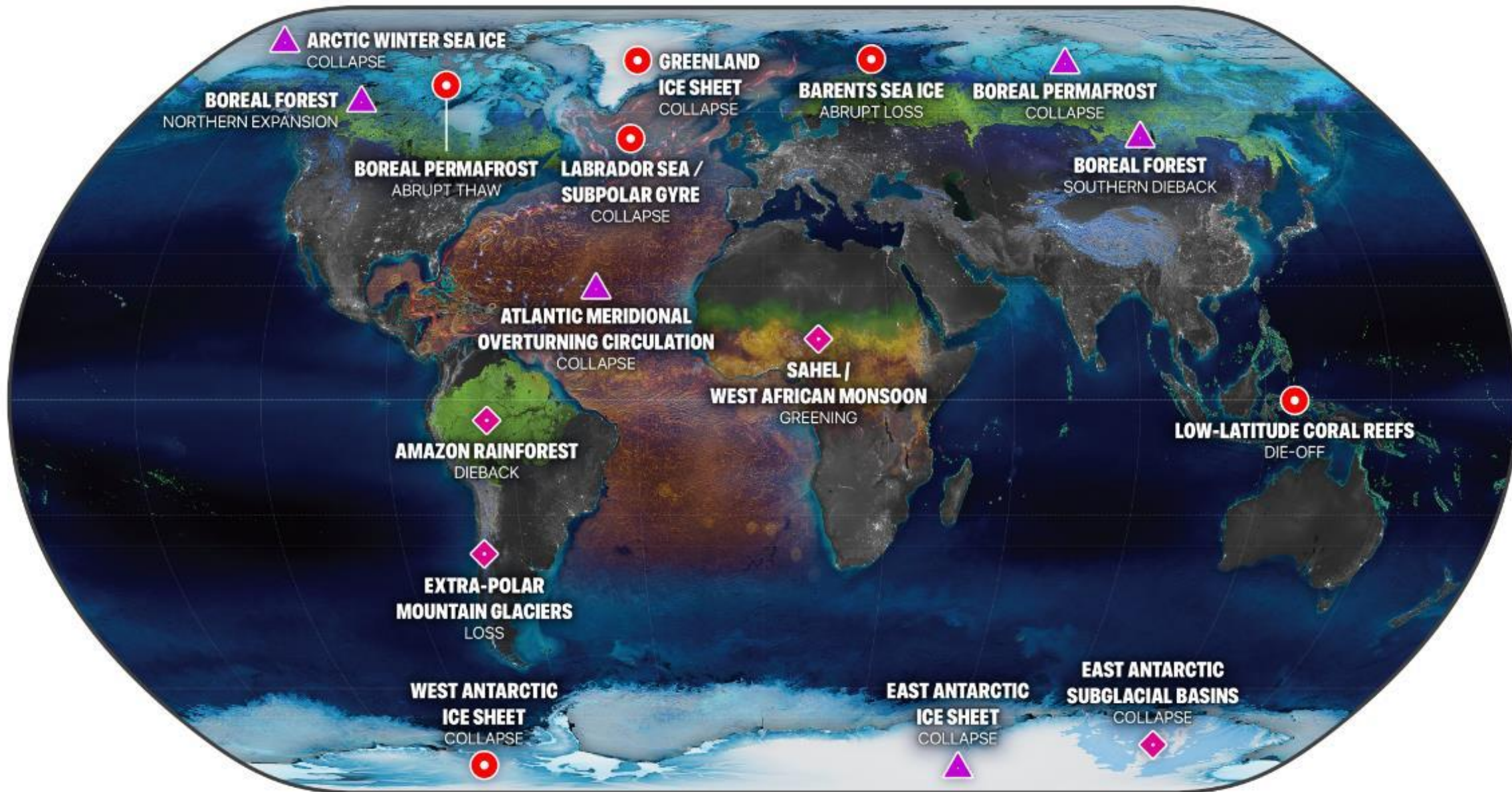
**There is a level of warming that will cause
a 100% loss of GDP.**

**We have not yet taken sufficient action to
eliminate that as a possibility.**



"The impacts of a Hothouse Earth pathway on human societies would likely be massive, sometimes abrupt, and undoubtedly disruptive."





GLOBAL WARMING THRESHOLDS



Map by Earth Commission/Globaia based on data from [Armstrong McKay et al. \(2022\)](https://climatetippingpoints.info/2022/09/09/climate-tipping-points-reassessment-explainer/). Available online at: <https://climatetippingpoints.info/2022/09/09/climate-tipping-points-reassessment-explainer/>

What are climate tipping points?

A **critical threshold** that when crossed becomes **self-perpetuating** leading to **substantial** and **widespread** system impacts.

- Driven by **positive feedback loops**
- Often described as **non-linear** or **abrupt**
- Most tipping points are **irreversible**

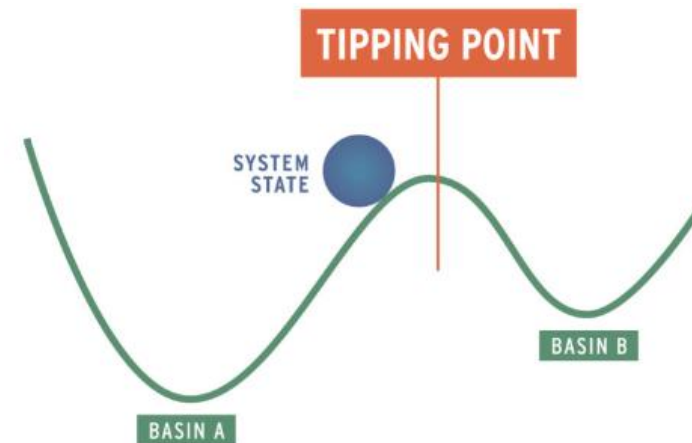
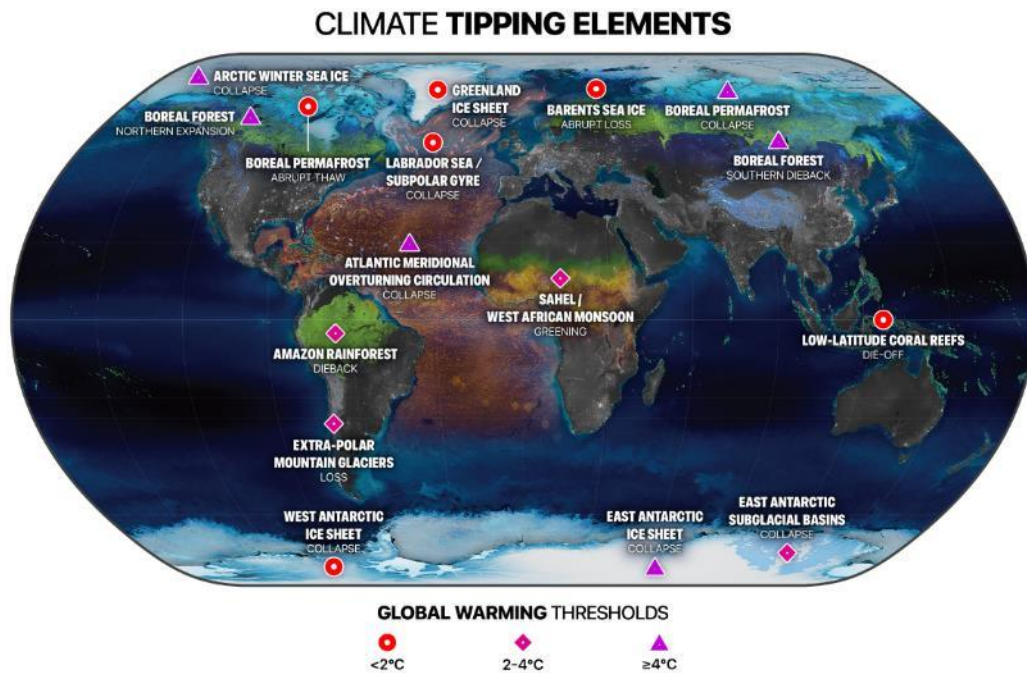
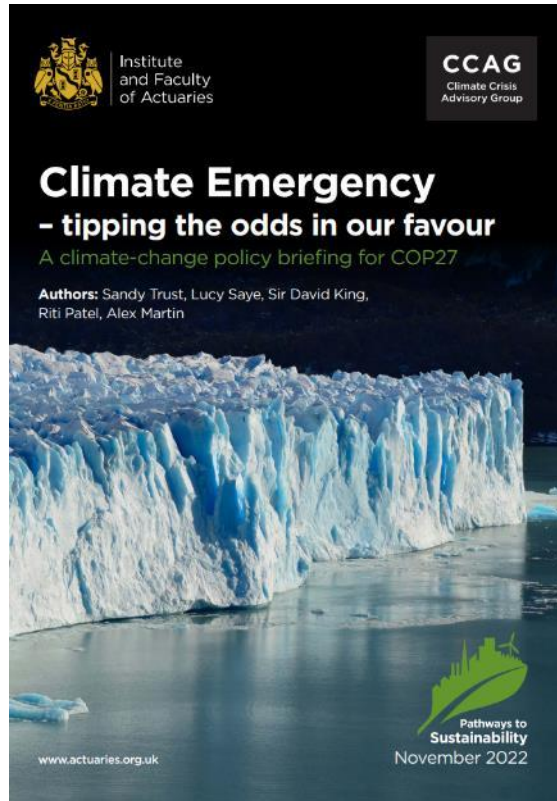


Illustration available online at: <https://ensia.com/articles/tipping-point-resilience-regime-change/>



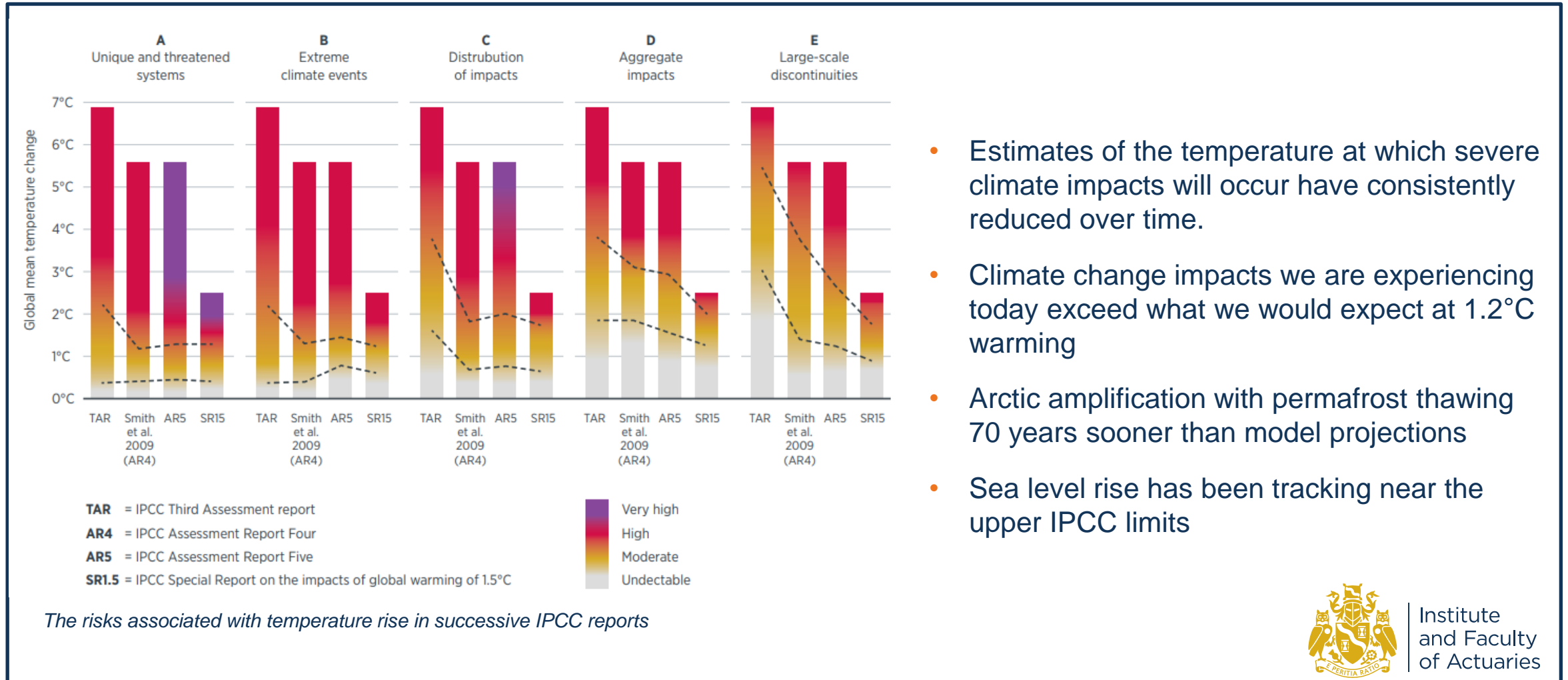
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Key Findings



1. We have underestimated climate change. It is progressing faster than expected, driving severe impacts which we need to adapt to as further warming occurs.
2. Multiple climate change tipping points, which may be irreversible, are likely to be triggered at 1.5°C.
3. Net-zero carbon budgets only give a 50% chance or less of limiting warming to 1.5°C, which represents an unreasonable risk of not meeting our objectives.
4. Delivering a stable climate will require removing GHGs from the atmosphere. It will be overwhelmingly economically and socially positive to mitigate climate change.
5. Tipping points mean there is even more uncertainty which we need to plan for by exploring tail risks and introducing prudence.

Climate change is progressing faster than expected



- Estimates of the temperature at which severe climate impacts will occur have consistently reduced over time.
- Climate change impacts we are experiencing today exceed what we would expect at 1.2°C warming
- Arctic amplification with permafrost thawing 70 years sooner than model projections
- Sea level rise has been tracking near the upper IPCC limits



Multiple climate change TPs likely to be triggered at 1.5°C



- Six CTPs likely to be triggered in Paris Agreement range (1.5-2°C)
- Tipping points are not independent – tipping cascades
- Tipping points accelerate climate impacts, climate change or both



Net-zero budgets give 50% chance or less of limiting warming to 1.5°C

IPCC scenario statistics

Scenario	Temp rise 2100 (°C) (50th (5th-95th) percentile values)	Peak temp rise (°C) (50th (5th-95th) percentile values)	Likelihood of staying below (%)			2000 year sea level rise
			<1.5°C	<2°C	<3°C	
SSP1-1.9 (very low)	1.3 (0.8-1.5)	1.6 (1.3-1.6)	38	90	100	2-3m for 1.5°C
SSP1-2.6 (low)	1.6 (1.1-1.8)	1.7 (1.4-1.8)	20	76	99	
SSP2-4.5 (intermediate)	2.7 (2-2.9)	2.7 (2-2.9)	0	8	71	4-10m for 3°C
SSP3-7.0 (high)	3.5 (2.5-3.9)	3.5 (2.5-3.9)	0	0	22	12-16m for 4°C
SSP5-8.5 (very high)	4.2 (3.3-5)	4.2 (3.3-5)	0	0	4	19-22m for 5°C

- Large margins for error: 420GtCO₂ +/-650GtCO₂
- Assume no surprises
- May already be zero

- Low probability of limiting warming to 1.5°C
- Reliance on negative emissions and GHG removal



Sneak preview – the Emperor’s New Climate Scenarios



University
of Exeter

Global Systems
Institute

**The earth’s climate may be more sensitive
than we thought**



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Why don't these results make sense?

Sample TCFD results from UK investors, impact on portfolio returns per annum, long term

Institution	Orderly	Disorderly	Hot House
Institution 1	-0.2%	-0.2%	-0.1%
Institution 2	-0.1%		-0.1%
Institution 3	-0.1%		-1.0%
Institution 4	0.7%		-0.5%
Institution 5	-0.1%	-0.5%	-0.4%
Institution 6	0.0%		-0.2%



The devil is in the detail – limitations and assumptions

Illustrative climate scenario modelling process



➤ *What will the level of emissions be?*

➤ *How much will we warm – and how fast?*

➤ *What damages will be incurred?*



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As an actuary you must be clear on this

“*Actuaries have been warned by external parties and their profession about the need to appropriately consider climate change in their professional advice, a warning reinforced by the FRC’s updated Technical Actuarial Standards , which specifically call out climate change as a material external factor that may influence actuarial work.*”

TAS100 – Principles for Actuarial Work to support the Reliability Objective

- Practitioners must ensure actuarial information, **including communication of inherent uncertainty**, is relevant, based on transparent and appropriate assumptions, complete and comprehensible
- Risk ID: A1.2 “Relevant material factors to be allowed for...in technical actuarial work should include all internal or external environmental factors that have the potential to influence the technical actuarial work either directly or indirectly...**External factors may, for example, include climate change.**”



Chance

THIS CARD MAY BE KEPT
UNTIL NEEDED OR SOLD

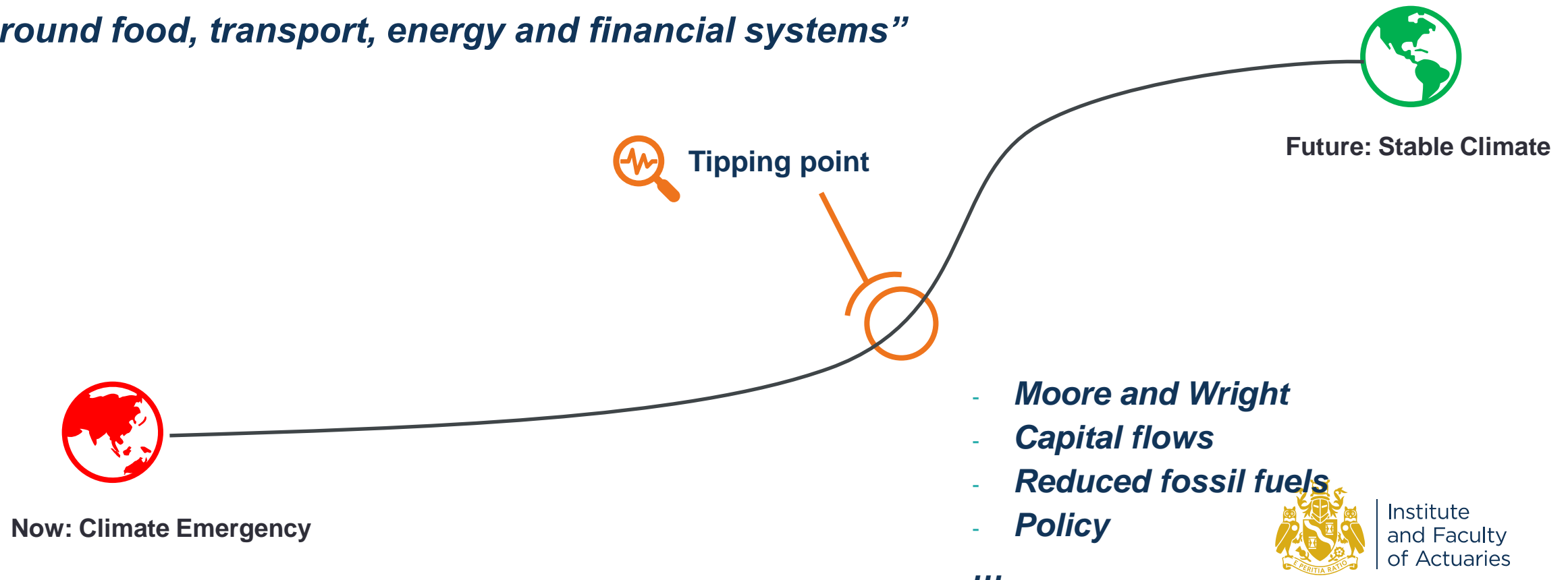
GET OUT OF JAIL
FREE



©1935 Halpern

Get out of jail card: positive tipping points

“*Solutions that are now scaling and positive tipping points around food, transport, energy and financial systems*”



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We have agency

“*Drive it like you own it...*”



Humans are now the dominant force of change on the planet, giving rise to a new epoch:

➤ *the Anthropocene*



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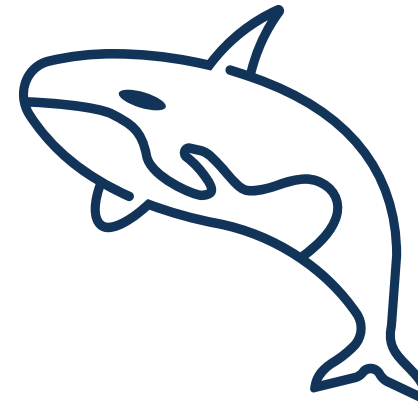
We have a powerful ally in nature



“ Nature has absorbed around half of our emissions while the ocean has absorbed 90% of the excess heat”

Case study: Marine biomass regeneration

- Restoring marine populations in all its biodiversity
- CO2 removal equivalent to tens of Gt



Accelerating Action

“With agency, powerful allies and solutions, we must act decisively to accelerate the transition”

1. We have agency; we can choose to drive the planet responsibly



2. We have solutions that are now scaling, and positive tipping points around food, transport, energy and financial systems



3. We have a powerful ally in nature, which we must help to repair



4. Societal tipping points are also being reached on climate action



5. We must enable a just transition



Actuaries have a huge role to play

Global vital signs – a warming planet



Earth System Impacts

- Floods
- Wildfires
- Storms
- Droughts
- Sea Level Rise
- Tipping Points
- etc

Society and the economy

Physical, transition and liability risks
Mitigation and adaptation opportunities



Accelerate



Mitigate

Finance

Questions

Comments

Expressions of individual views by members of the Institute and Faculty of Actuaries and its staff are encouraged.

The views expressed in this presentation are those of the presenter.



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Thank you

