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Climate change: what challenges and risks for central banks?

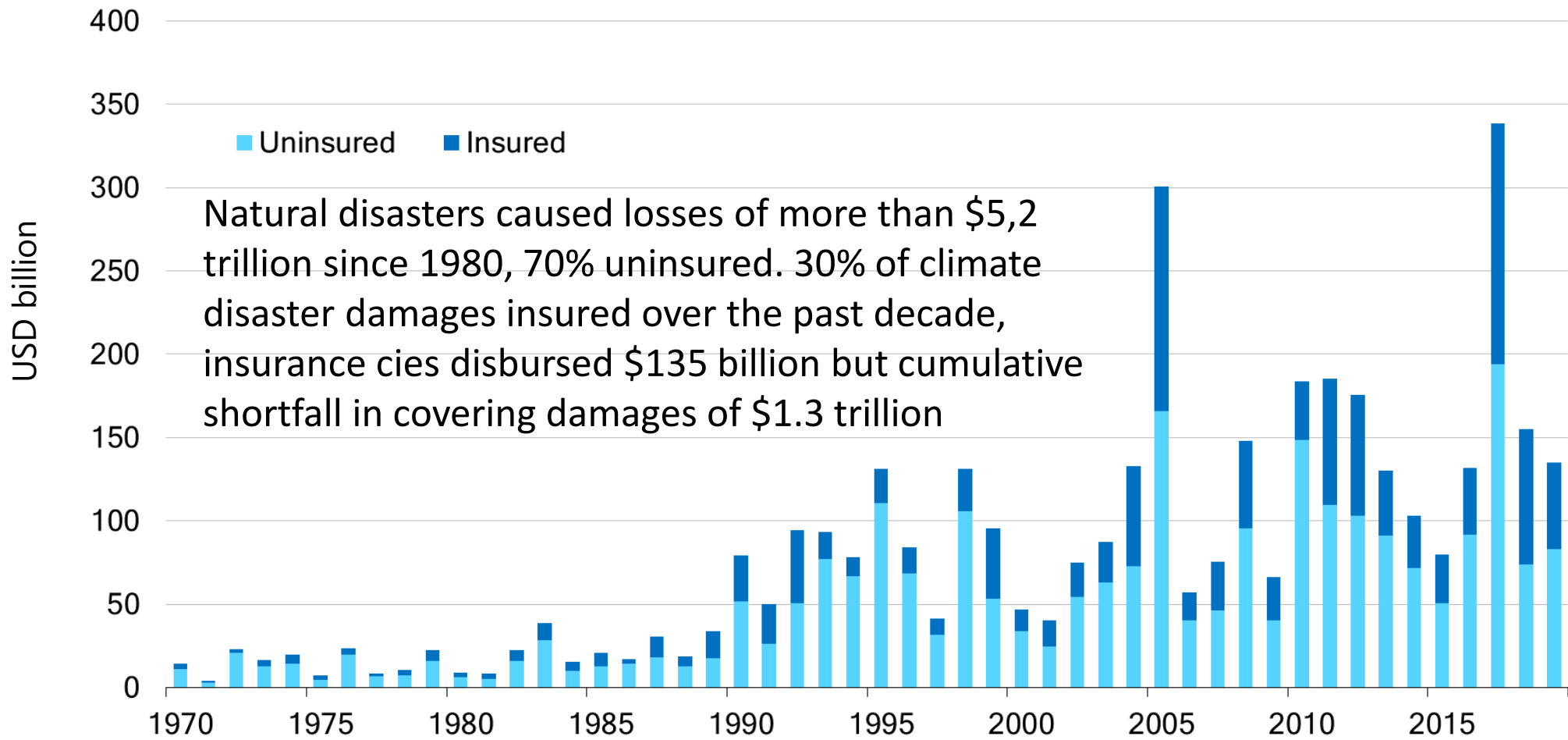
Luiz Awazu PEREIRA DA SILVA (*) – Presentation 5 December 2022 –

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Outline

- Growing evidence of increasing losses / costs due to climate change
- Risks will have systemic consequences for global economy, cascading and non-linear: Green Swans
- Carbon budget is limited, time to address risks is of the essence
- What challenges / risks for central banks

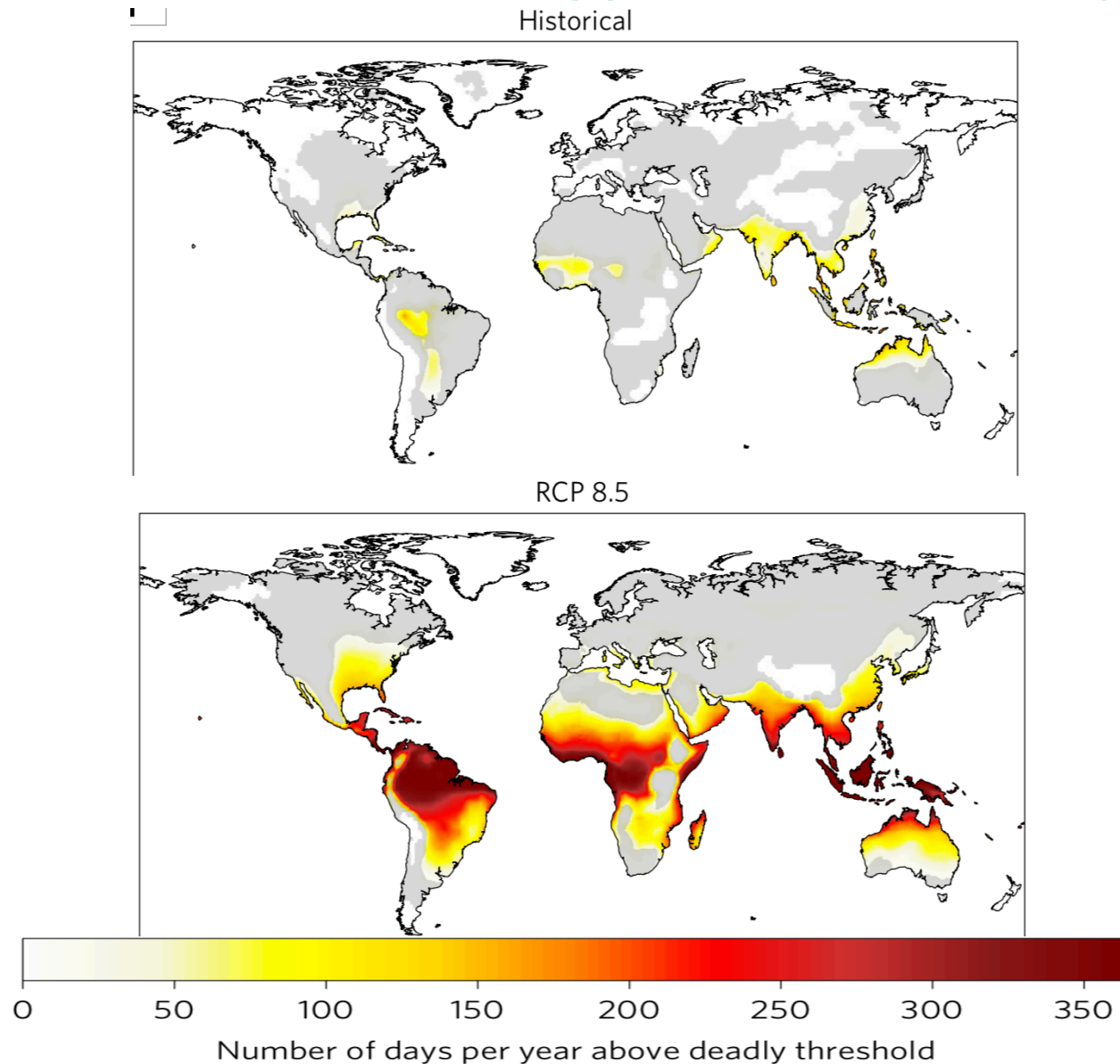
Climate change linked to large and growing losses & cost (uninsured weather related disasters), insurance industry says



Economic losses = insured + uninsured losses

Source: Swiss Re Institute

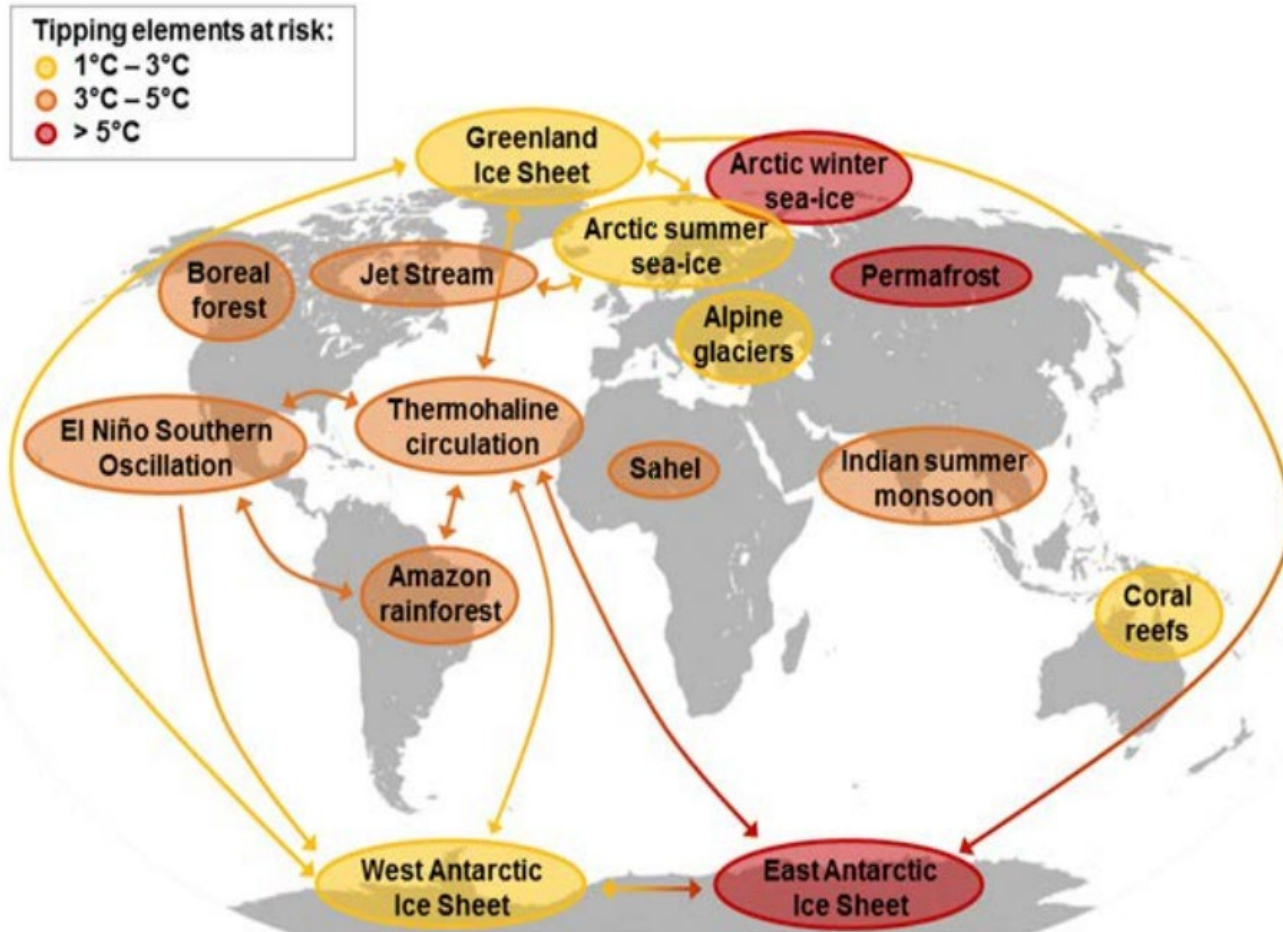
GHG emissions impact temperatures on where we could live → trigger complex new systemic risks



- **In the 2000s, this was already a severe risk:**
 - 13.2% of the planet's land area where 30.6% of the population resides...
 - was exposed to 20 or more days when temperatures and humidity surpassed the threshold beyond which such conditions become deadly.
- **By the end of the century, in a BAU scenario, entire regions of the world would be inhabitable.**
- **This is likely to cause massive migrations from these regions to Northern hemisphere**

- Source: Mora et al, "Global Risk of Deadly Heat", *Nature Climate Change*, vol 7, issue 7, June 2017
- Groundswell, Preparing for internal climate migration, World Bank Group, 2018
- Internal displacement monitoring centre database 2017

Quantifying these physical and transition global risks is complex..... Mis-pricing is linked to ramifications of radical uncertainty



Impacts on socioeconomic systems are multiple:

- Tipping points are complex, trigger irreversible consequences with nonlinearity, cascading effects...
- Add global inequality effects, migrations, conflicts, etc...

The individual tipping elements are colour-coded according to estimated thresholds in global average surface temperature. Arrows show the potential interactions among the tipping elements that could generate cascades, based on expert elicitation.

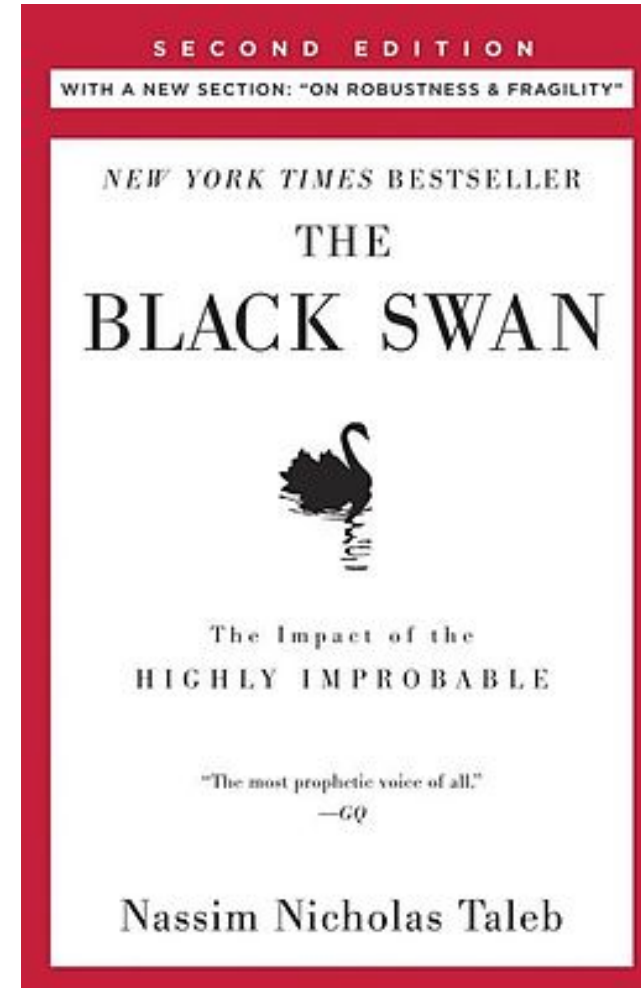
Source: Steffen et al. (2018)

Book on these Climate Change (CC) related risks called “Green Swans” i.e. very large global risks or global negative externalities; inspired but different from Nassim Taleb’s Black Swans of the Global Financial Crisis

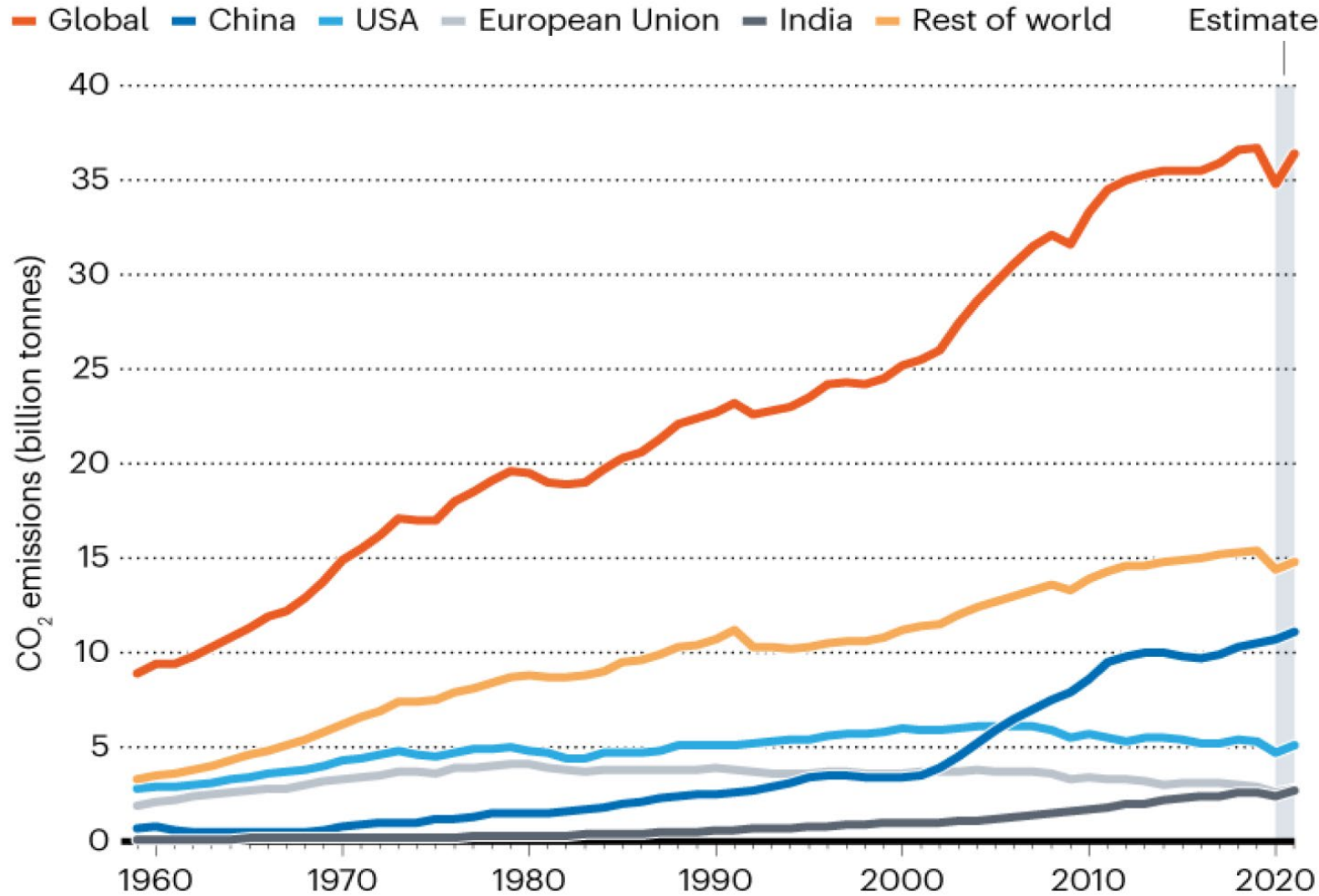


The green swan

Central banking and financial stability
in the age of climate change



GHGs emissions, after 5% fall due to Covid, are trending up again



- Global fossil CO₂ emissions: about 30-40 GtCO₂ per year projected from 2020, 61% over 1990
- Fossil CO₂ emissions will likely be more than 5% higher in 2021 than the year of the Paris Agreement in 2015

Source: Nature, Global Carbon Projects

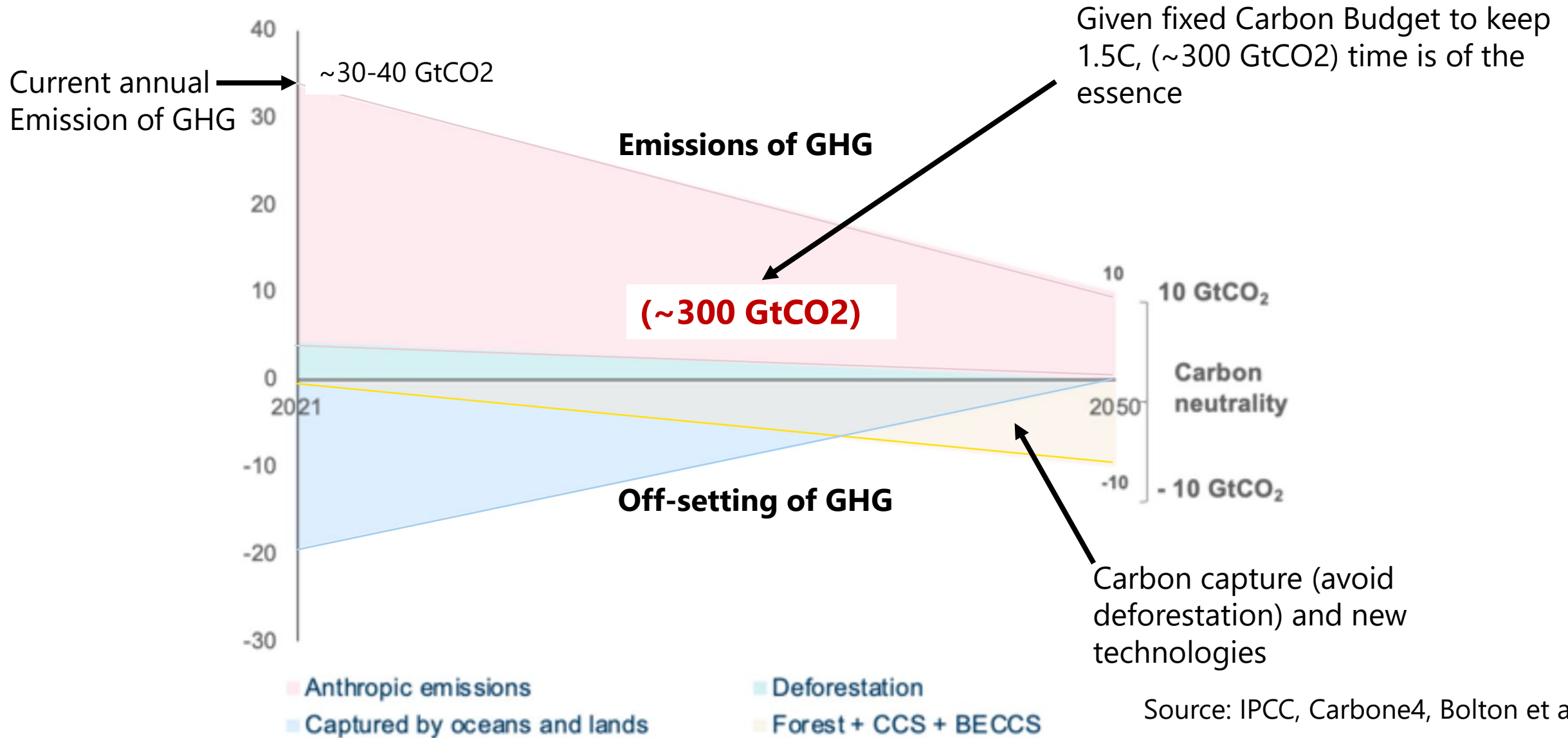
Estimation of remaining carbon budgets from early 2020

	(2) ... with a probability of ...				
	17%	33%	50%	67%	83%
(1) to limit warming to...	(3) there remains an available carbon budget of (in GtCO₂):				
+ 1.5 °C	900	650	500	400	300
+ 1.7 °C	1450	1050	850	700	550
+ 2.0 °C	2300	1700	1350	1150	900

As a reminder, total CO₂ emissions have been around 40 Gt/year on average since 2015.

Source: Boissinot J, "La Finance Verte" (Dunod, 2002) based from data in GIEC, AR6, WG1 report (SPM).

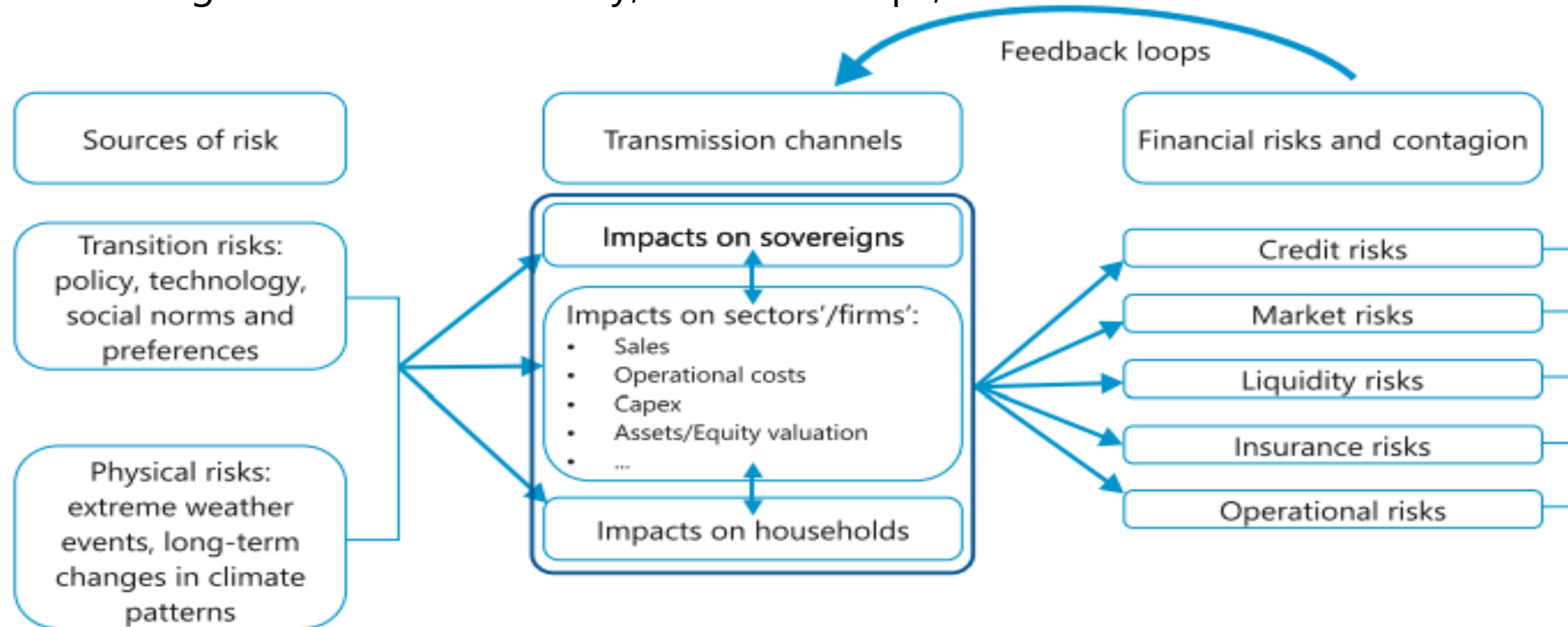
How to implement trajectory to net zero emissions for remaining carbon budget



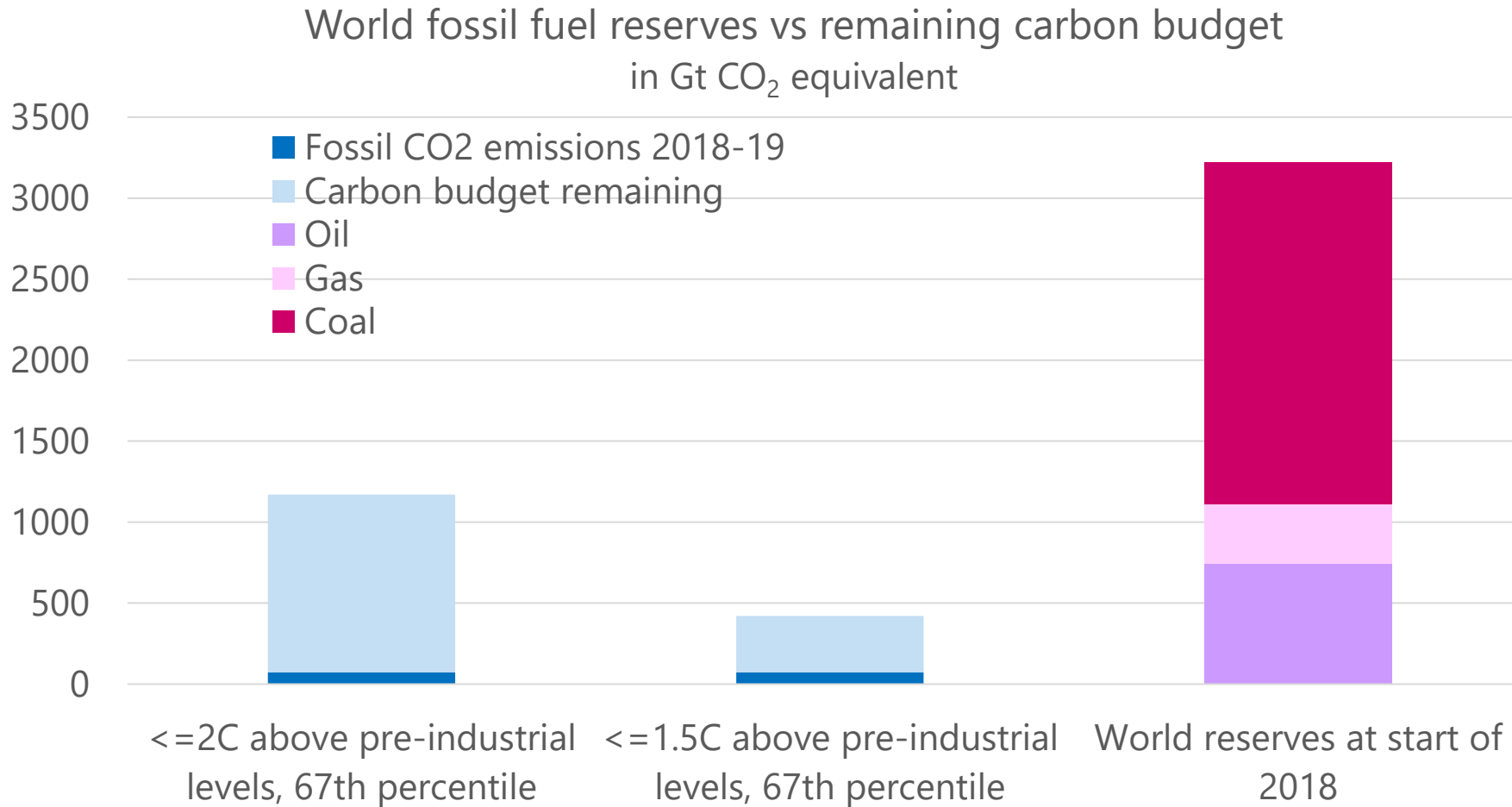
Source: IPCC, Carbone4, Bolton et al

Challenges / Risks for central banks: transmission of CC-related risks into economic & financial systems → affect price and financial stability

- **Analytical challenge:** understand how financial stability risks transmits
 - **Development of new models** (IAMs, general equilibrium or disequilibrium, links to human migration, global effects → some risks “not-diversifiable”, etc)
 - **Complexity of transmission of CC**, irreversible “tipping-points”, non-linearity, “cascading effects” into economy, feedback loops, etc.



Example: pricing of potential “exploitable” assets neglect potential change / enforcement of CC agreements or new regulation → potential financial instability



Much of the existing reserves would be potentially “unburnable”, thus “stranded”

Sources: IPCC SR15 (2018); Global Carbon Project “Carbon Budget 2019”; BP Statistical Review of World Energy; EPA and EIA; author’s calculations

Thank You