Climate Change Risk

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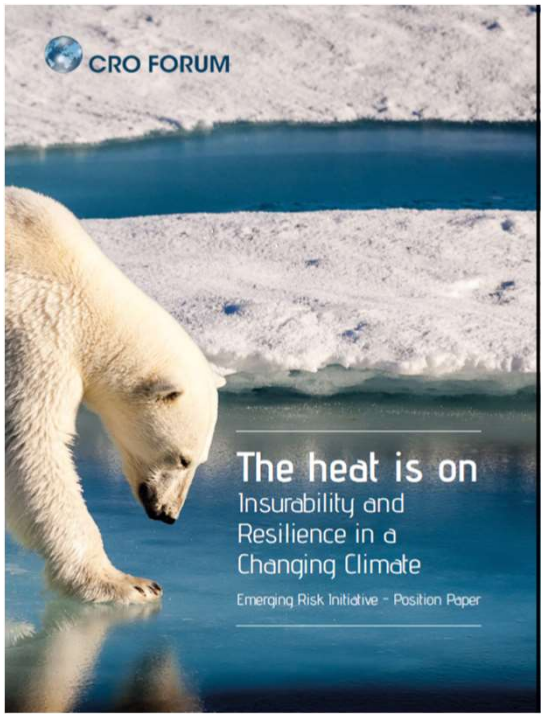
Based on the work of the

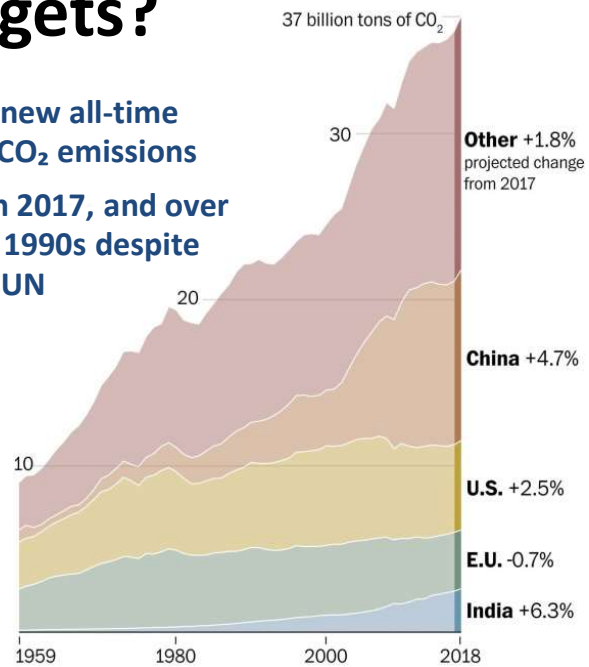
CRO Forum Emerging Risk Initiative

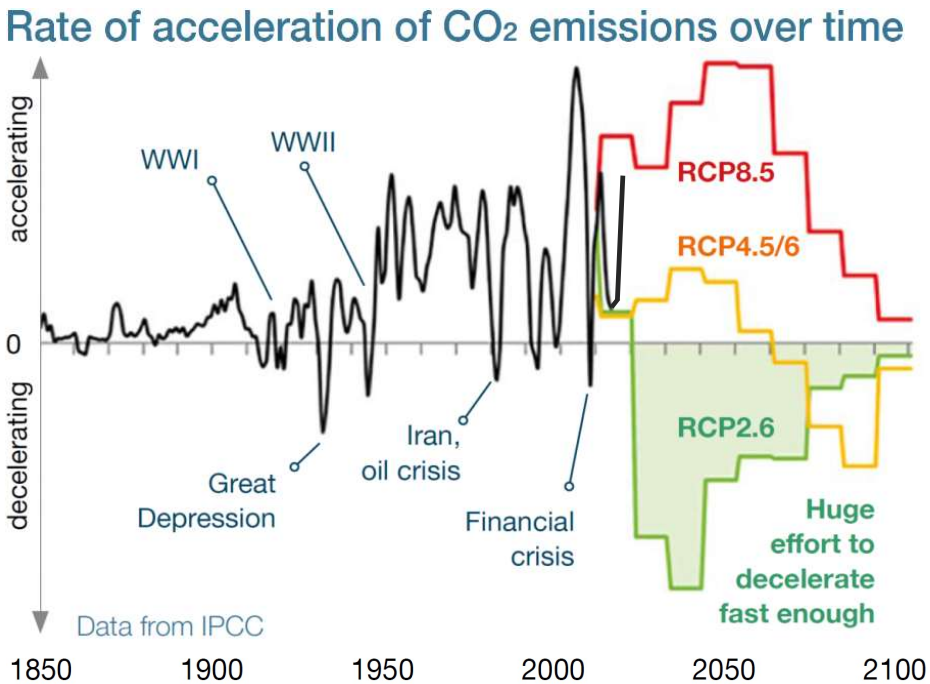


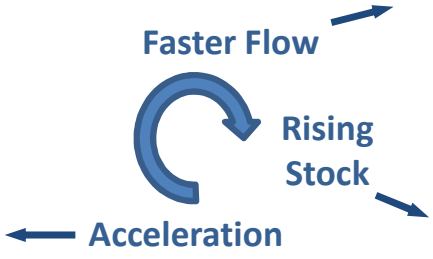
Is it rational to believe we'll stick to the Paris targets?

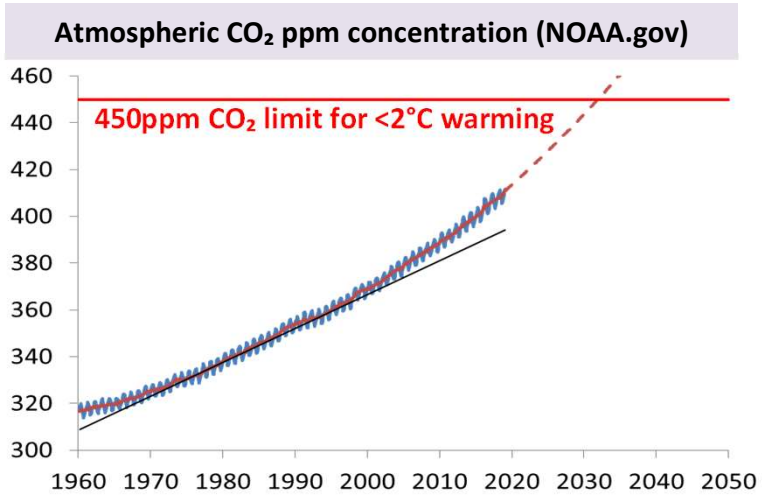
- 450ppm limit for CO_2 (for <2°C warming) looks unlikely
- Lifetime emissions of existing kit already exceed the 2°C budget
- Efforts of a generation have not yet 'moved the dial'
- Profound cuts to emissions defy current economical models
- The deceleration to come dwarfs any previous experience
- It needs major changes to energy, industry, freight, heating, farming etc, sustained and extended every year through 2020 to 2070

- 2018 set a new all-time record for CO_2 emissions
- Up 2.7% on 2017, and over 50% up on 1990s despite pledges at UN





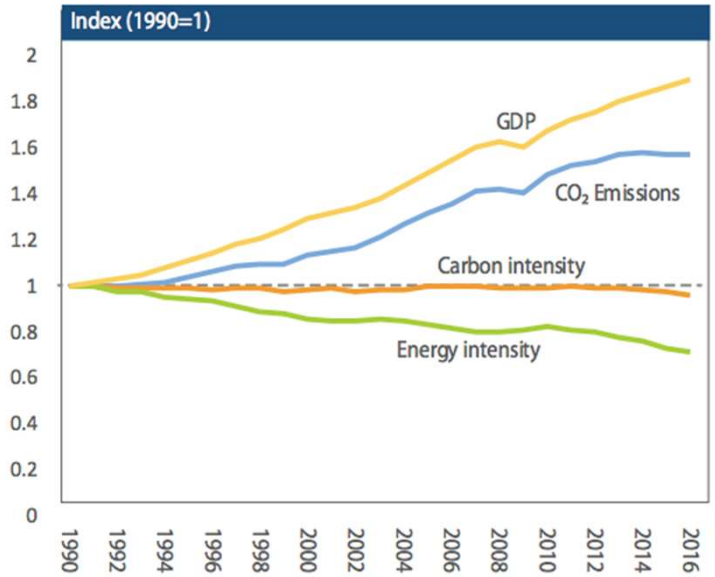




Why is CO_2 still accelerating? Where have all the green efforts gone?

- GDP growth is faster than improvements in carbon efficiency
- Jevons paradox: efficiency drives demand up via robust rebound effects
- No material carbon price agreed, to change behaviour via market forces
- Most clean technologies are not on track. Transition pace needs to treble
- Hard-to-abate sectors remain (heavy transport, steel, cement, farming etc)

Decomposition of CO_2 Emissions



Source: UN/DESA staff estimation, based on IEA (2018), "World energy balances", IEA World Energy Statistics and Balances (database)
Note: Carbon intensity is carbon emissions per unit of energy consumed; Energy intensity is energy consumed per unit of output produced.

Summary of progress

www.iea.org/tcep/

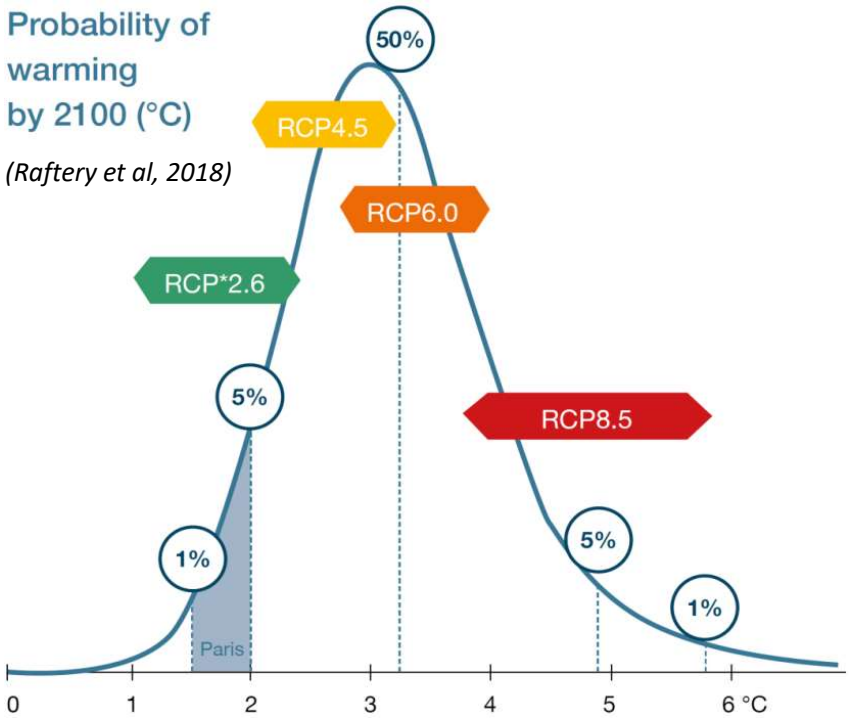
Key Not on track | Improvements but more effort needed | On track but sustained support and deployment required to maintain progress

CO_2 reduction share by 2012*	On track?	Technology	Status compared with progress needed to stay below 2°C
36%		High efficiency coal power	Efficient coal technology is being deployed, but almost 50% of new plants in 2010 used inefficient technology
		Nuclear power	2025 capacity projections 15% below pre-Fukushima expectations
		Renewable power	More mature renewables are nearing competitiveness in a broader set of circumstances. Progress in hydropower, onshore wind, bioenergy and solar PV are broadly on track with 2°C objectives
			Less mature renewables (advanced geothermal, concentrated solar power (CSP), offshore wind) not making necessary progress
		CCS in power	No large-scale integrated projects in place against the 38 required by 2020 to achieve the 2°C objective
23%		CCS in industry	Four large-scale integrated projects in place, against 82 required by 2020 to achieve the 2°C objective; 52 of which are needed in the chemicals, cement and iron and steel sectors
		Industry	Improvements achieved in industry energy efficiency, but significant potential remains untapped
18%		Buildings	Huge potential remains untapped. Few countries have policies to enhance the energy performance of buildings; some progress in deployment of efficient end-use technologies
22%		Fuel economy	1.7% average annual fuel economy improvement in LDV efficiency, against 2.7% required to achieve 2°C objectives
		Electric vehicles	Ambitious combined national targets of 20 Million EVs on the road by 2020, but significant action required to achieve this objective
		Biofuels for transport	Total biofuel production needs to double, with advanced biofuel production expanding four-fold over currently announced capacity, to achieve 2°C objectives in 2020

Note: * Does not add up to 100% as 'other information' represents 1% of CO2 emission reduction to 2020

Has social appetite for destruction or existential threat been tested yet?

- **Research indicates that 3-4°C warming is most likely, passing irreversible tipping points**
- **Most people don't yet realise how bad the risk is**
- **There is a risk of >5°C warming which would be catastrophic for all humanity, maybe existential**
- **This seems taboo or psychologically challenging**



Environmental	Potential Impacts	Human
Indicative findings from selected research	6°C	End of civilisation?
Mass extinction of >95% of species	5°	
Global food productivity collapses		General social breakdown: survival
Majority of agricultural land lost		
Coasts eroded, flooded, aquifers saline	4°	Conflict / war: resource competition
Widespread drought US, Africa, Med, India		Many deaths from weather disasters
Biosphere switches to net emitter of CO_2		Global GDP materially reduced
Loss of majority of Amazon rainforest	3°	Repeated famines, mass migration
c.20% loss of crop productivity		Infectious diseases spread
End of coral and base of marine food webs		
Committed to full ice-cap melt (sea-level eventually up +100ft/31m @2m/century)	2°	Widespread hunger and water stress
		Significant food and water stress
Ice lost: S.Asia dry-season river flow -70%		
Happening now: worse floods, wildfires, windstorms, droughts, heatwaves. 70% loss of insect biomass in 30 years	1°	Rising tensions over resources
	0°	

Predictable physical risk, unpredictable transition risk (social effects)

Physical Risk Scenarios – evolve gradually

- The physical path for next 10-20 years is already set
- This is due to lags in the system, whatever we do now
- Physical trends are strongest for water risks, i.e.
    - intense downpours (including tropical storms)
    - river flooding
    - droughts (and associated wildfires)
- Data on physical risk trends is surprisingly hard to find: some extremes are getting worse at 2-3% per annum

Transition Risk Scenarios – could be non-linear

- Transition may be **orderly** (e.g. Energy Transition Commission)
    - driven by market forces
    - supported by incremental policy shifts
    - gradual increases in carbon pricing
- Or it may be **disorderly**, and step-change at any time
    - Triggered by strong shifts in social attitude (see below)
    - Potentially public protests and social unrest
    - Political upheaval, new governments
    - New economic paradigm, disrupted financial markets

A recent research area: socio-economic tipping-points:

Possible triggers for a rapid shift in social attitude

- Shocking **human tragedy** from weather catastrophes that are seen as climate change: viral public response
- International **media hit** convincingly shows the horrors of a 4°C world
- **Eco-activism** gains public support. Social pressure to boycott brands, avoid waste or frivolous flights etc
- **Charismatic political leaders** who champion climate action and social wellbeing over GDP growth
- **Religious leaders** galvanise strong sense of moral duty for urgent climate action

Accelerate transition priorities to reduce consumption

- $100/tonne carbon price; end fossil fuel subsidies
- Decarbonise electricity and retire coal and gas plants early
- Electric cars, buses, trucks, trains
- Denser urban living; promote mass transit
- Decarbonise ships; reduce demand for aviation
- Electric heating (not oil/gas boilers); better insulation
- Reduce food waste at all stages; veganism
- Re-use construction materials; design goods to be repaired
- Huge scale CCS or forestation (implausible)

What happens to insured perils?

Warming is on track to reach 1.5-2°C in the next 2-3 decades. Effects are likely to include:

- More and stronger **heatwaves**, affecting people, livestock, infrastructure, productivity
- **Drought years** much more likely, especially in SW USA, Mediterranean and Southern Africa:
  - **Wildfires** expand and extend: US has doubled
- Downpour and river **flood damage** will double
- Tropical storm **deluge** becomes more common (up to 1000mm as with Harvey and Florence)
- **Wind**: slightly fewer cyclones, but more powerful, and expanding away from equator
- **Sea-level** rise threatens $11tn of coastal property
- Geographic range of **diseases** will expand, such as malaria, yellow fever, Lyme disease

Multipliers:

- Evidence is emerging that extreme weather patterns may become more **prolonged**.
- Natural mitigants destroyed (forest, wetlands etc).
- Climate drag on global economy may mean less resources are available to mitigate and adapt.

Warming by 2100

Physical impacts		<2 °C	
		1.5 °C	2 °C
Sea-Level Rise (cm)		0.3-0.6 m	0.4-0.8 m
Coastal assets to defend ($tn)		$10.2tn	$11.7tn
Chance of ice-free Arctic summer		1 in 30	1 in 6
Tropical cyclones:	Fewer (#cat 1-5)	-1%	-6%
	Stronger (# cat 4-5)	+24%*	+16%
	Wetter (total rain)	+6%	+12%
Frequency of extreme rainfall		+17%	+36%
Increase in wildfire extent		x1.4	x1.6
People facing extreme heatwaves		x22	x27
Land area hospitable to malaria		+12%	+18%

Range of Responses by the Insurance Sector

Corporate Activities

Low Carbon Corporate Footprint

- Reducing companies' impact on environment

Planning Ahead

- Sustain the real economy by planning ahead for resilience with governments, industry and society
- Sustaining capital strength

Improved Disclosure

- Task Force on Climate-related Financial Disclosures (TCFD)
- Disclosure of financial and strategic risks
- Carbon footprinting

Investing Wisely

- Apply ESG frameworks to investment
- Reducing investment in carbon heavy activities or exposed zones
- Long-term investment in green finance and infrastructure
- Investing in new green technologies

Active Investor Actions

- Using investor rights to influence other companies

Insurance Activities

Maintain Insurability and Managing Portfolios

- Protect against physical perils
- Research to deepen understanding of climate change risks
- Apply ESG frameworks to underwriting
- Underwriting effectively
- Portfolio management, avoiding certain risks
- Developing new products
- Develop modelling capabilities – new and better hazard models

Support Prevention and Adaptation

- Risk management advice: mitigation, resilience, adaptation
- Influencing building / planning regulations and government policies

Data Insights and Driver for Societal Changes

- Public campaigns to share data and shift behaviour
- Influencing societies understanding and perception of risk
- Working with government and public bodies

Sustainable Sourcing

- Reduce carbon intensity of claims supply chain

Potential Economic winners and losers

Economic Risks

- **Demand reduction** reinforces stagnation / "Japanification"
  - Social reaction: targeted boycotts or behaviour change
  - Cumulative burden from repeated weather disasters
  - Transition efforts may constrain economic growth
- Uneven impacts by country may provoke **trade wars** or actual or threatened **military action**
- **Increasing political interventions** can be disruptive
- Growing flood risk for some **Property assets** – sea-level rise, deluge, aquifer depletion, loss of natural mitigants; e.g. Jakarta

Economic Opportunities

- Opportunities from **new or growing products / asset classes**, e.g.
  - Huge infrastructure investment e.g. UK grid to double by 2050
  - Renewable power x4, ammonia/hydrogen, industrial CCS, EVs
  - European rail (passenger and freight) up 80% by 2050
- **Services sector**:
  - Engineering and design innovation – new materials, design for ease of repair / upgrade, reduce cement/steel/aluminium use
  - Green finance; rental vs ownership of idle assets
  - Fintech (e.g. carbon tracking via payments, asset sharing)

Five **'toes'** to personal carbon footprint:

- Transport (flying, single-occupancy car)
- Food (beef/lamb, air freight, uneaten food)
- Heat (gas boilers, poor insulation)
- Consumption (short life products, rural life)
- Pension/Investing [ESG, for households with savings]

Transition priorities (*+ possible behaviour changes*)

- Transport (electric cars, trucks, rail) *less flying/driving*
- Food (reduce waste) *less red meat*
- Heat (electric / hydrogen, insulate) *turn heat down*
- Industry (electrify, less steel/concrete) *design to repair*
- Energy (renewables, expand grid, deploy CCS) *less growth*

Any Questions?

Thank You