

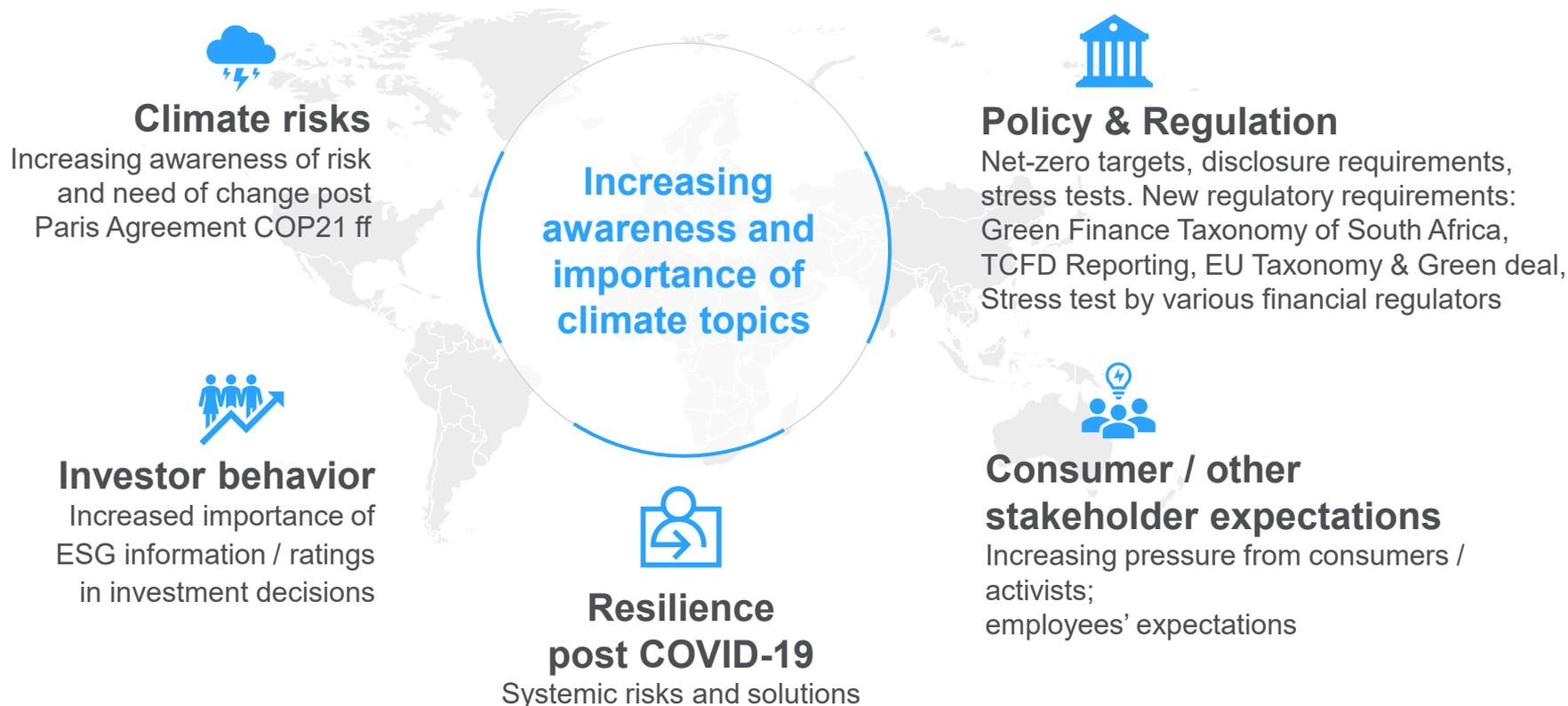


Climate change from a (re-)insurer's perspective: main drivers of action

As of August 2021

Main market drivers of climate-related action (2021)

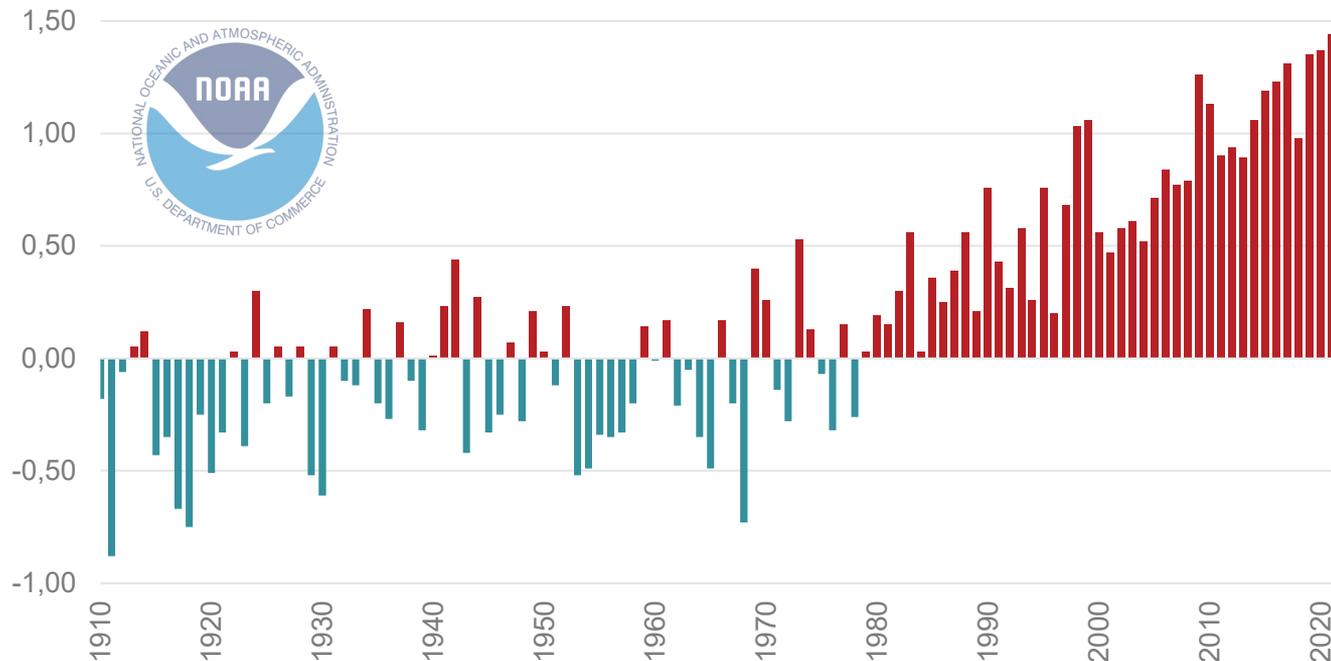
Awareness and expectations push the climate agenda: Policy & Regulation most relevant



Climate change in Africa: primary effect

Global warming trend since 1910 $>1^{\circ}\text{C}$

Surface temperature anomalies in Africa with respect to the 20th century average

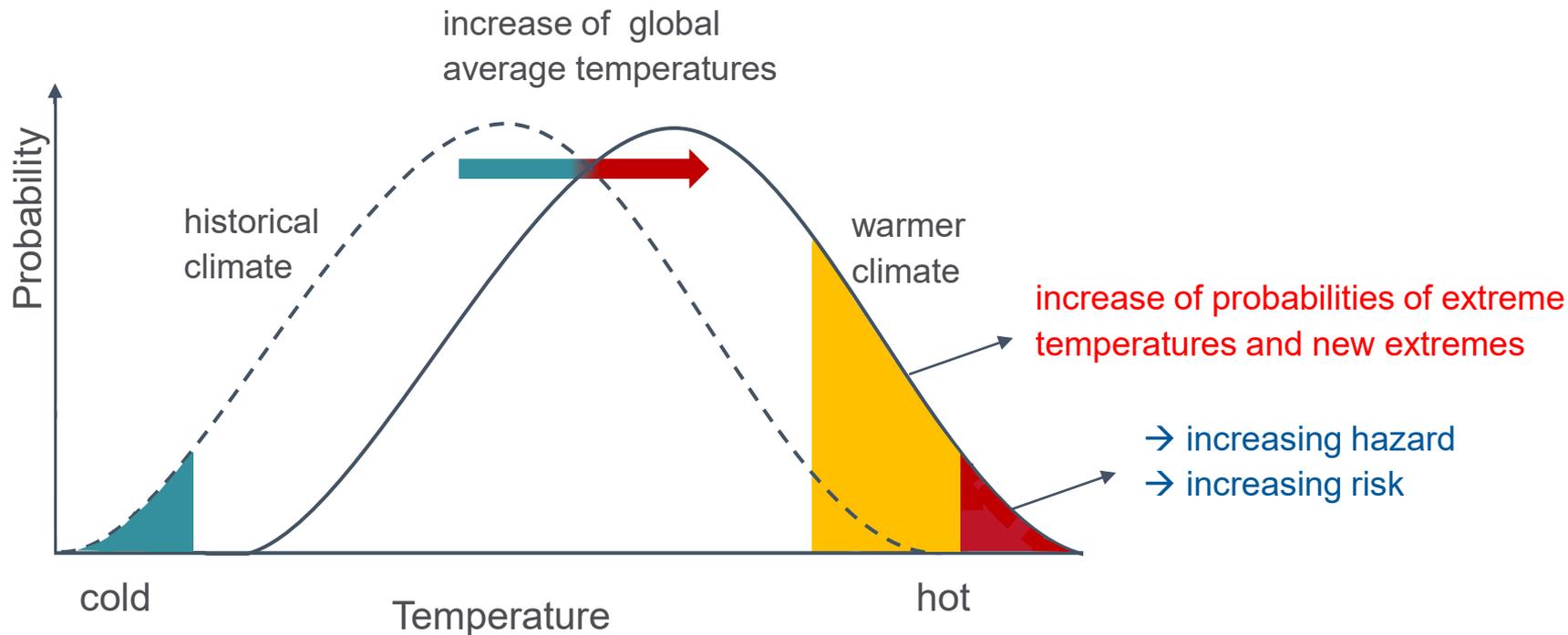


Climate science:

- man-made contribution $>> 50\%$
- but also natural climate variability on different time scales

Secondary effect: changing probability distributions

Small increase of average temperatures → large increase of extremes

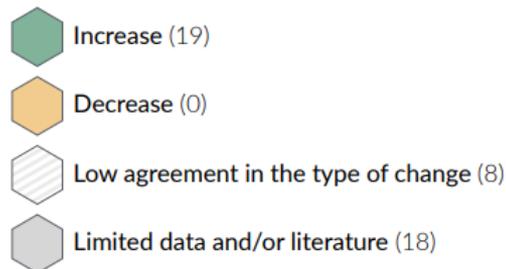


Changes in heavy precipitation increase due to climate change

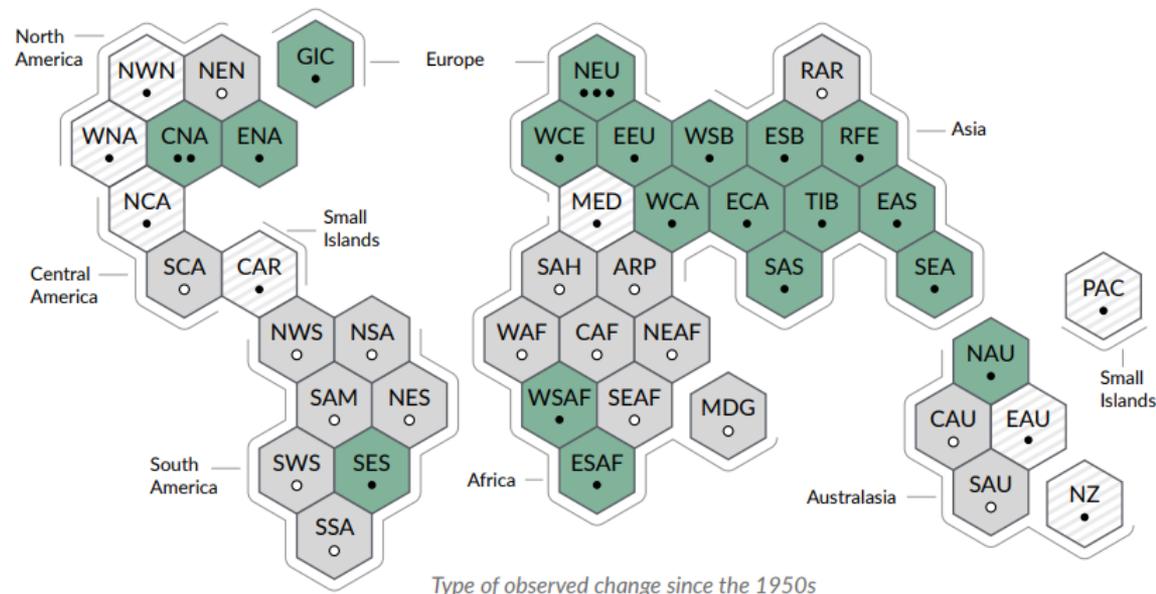
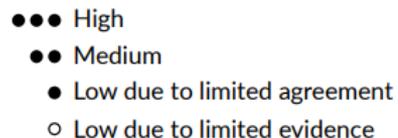
Frequency and severity of extreme weather events will increase differently for African nations

Synthesis of assessment of observed change in **heavy precipitation** and confidence in human contribution to the observed changes in the world's regions

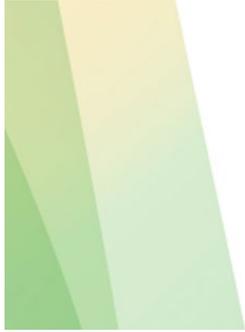
Type of observed change in heavy precipitation



Confidence in human contribution to the observed change



Policy & Regulation: COP21, Paris 2015: “well below 2°C limit” COP26, Glasgow 2021: “accelerating emissions reductions”



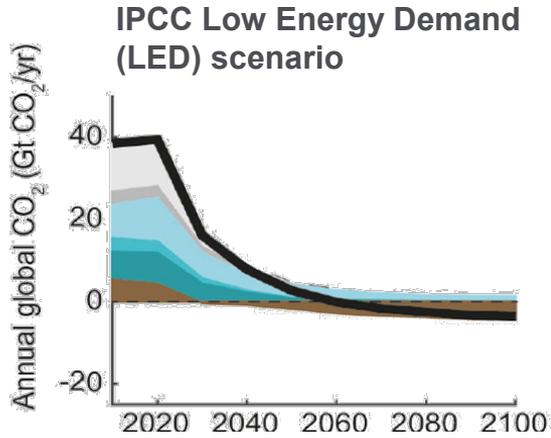
- Recognition of 195 UN nations to limit global warming to well below 2°C
- targeting 1.5°C



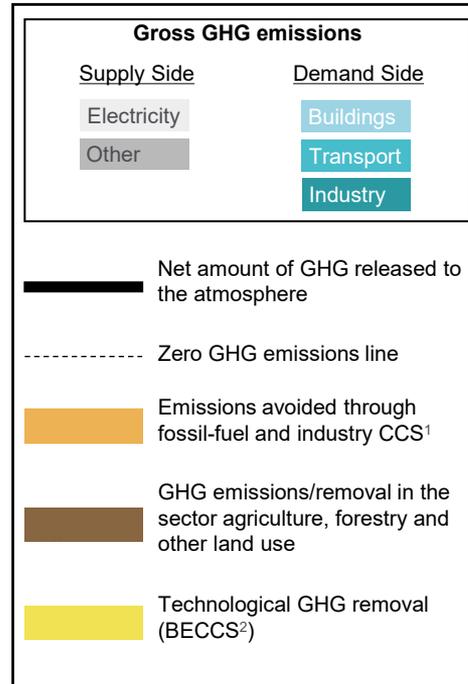
- Finalizing the Rules of the Paris Agreement
- Building Resilience and Addressing Loss and Damage
- Scaling-Up Finance for Vulnerable Countries
- Increasing Ambitions of CO₂ reductions

“well below 2°C” path needed to reach “net zero” by 2050

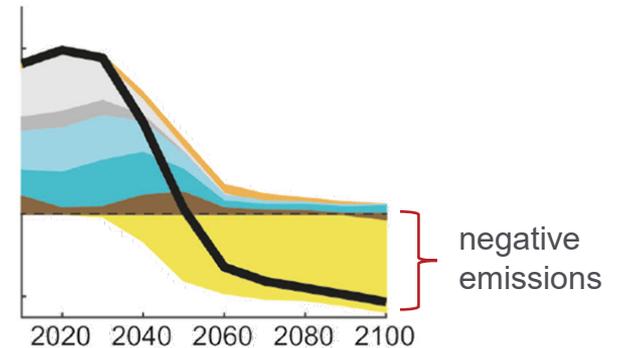
IPCC S5 scenario = Munich Re baseline; disruptive emission reductions assumed



- gross zero in 2050
- rapid phase-out of fossil energy starting in 2020
- used by Net Zero Asset Owner Alliance and many NGOs



IPCC S5 Shared Socio-economic Pathway (SSP)



- net zero in 2050
- rapid phase-out fossil energy from 2030
- massive GHG removal (e.g. CCS) from 2025

1) CCS = Carbon capture and storage. 2) BECCS = Bioenergy with carbon capture and storage. 3) S5 scenario reports the building and industry sector emissions jointly.
 Source: IPCC (10/2018), [Global warming of 1.5°C](#), p. 113; Munich Re ESP.

Climate Policy Targets: increasing political ambitions

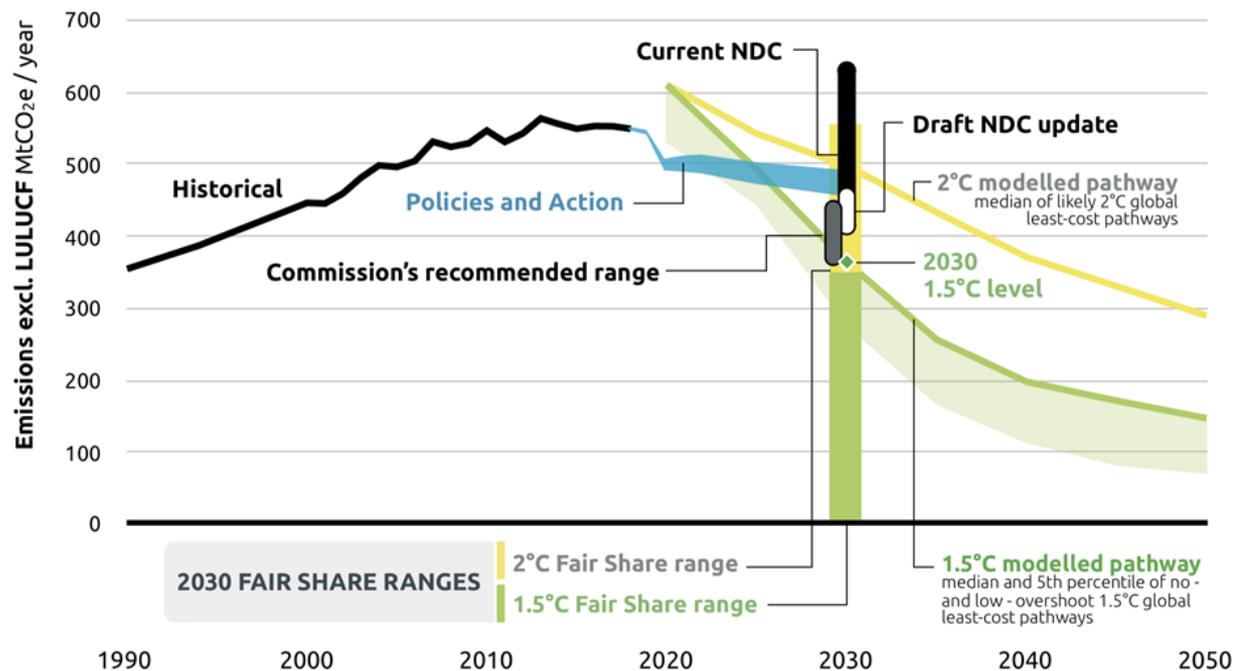
...but supporting policy measures not yet clear (date: 08/2021)

African Union		South Africa		China		USA		EU		Japan	
2030	2063	2030	2050	2030	2060	2030	2050	2030	2050	2030	2050
Incorporated in NDC's of African Nations	Environment ally sustainable and climate resilient economies and communities.	+17-29% (vs 1990) officially announced at COP26	-35% below to +25% above (vs 1990)	Peak of emissions; carbon intensity target -65% (vs 2005)	Net zero	Target will be announced at COP26	Net zero	-55% (vs 1990)	Net zero	-26% (vs 2013)	Net zero

Sources: European Commission, MEE.Gov., METI, US State Gov., White House, African Union, Republic of South Africa

Climate Policy Targets of South Africa

New draft of NDC mitigation target range closer to 1.5°C



Updated mitigation NDC proposes significant reduction in GHG → will be announced at COP26

New 2030 target range consistent with South Africa's fair share

Upper range of the proposed 2030 target range represents a 28% reduction in GHG emissions from the 2015 NDC targets

Development of policy regulations in South Africa

First national Green Finance Taxonomy by South African National Treasury (2021)

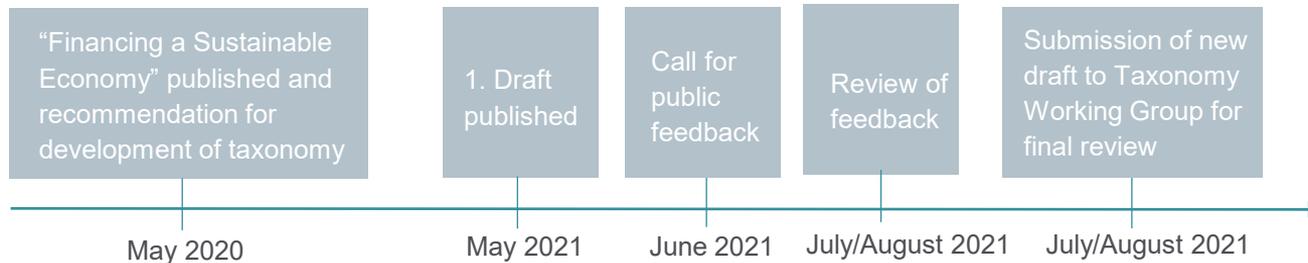
Green Finance Taxonomy – Definition

Official classification that defines minimum criteria for assets, projects, and sectors that are eligible to be defined as "green" in line with international best practice and national priorities.

→ address climate change, while also seeking to reduce social risks and enhance social impacts

Finds application for:

1. Economic activities that are intrinsically aligned to and/or are expected to make a substantial contribution to the future South African green economy.
2. Economic activities that presently have significant detrimental environmental impact but are needed as part of the future South African green economy and for which there are presently no know alternatives.



Climate change: Munich Re's strategic elements

Disabling and focus on enabling / business development



“Disabling”: Munich Re examples

CO₂ emissions reduction in business operations and on both sides of the balance sheet

	ASSETS <i>Financed CO₂ emissions</i>	LIABILITIES <i>Insured CO₂ emissions (primary, direct, fac.)</i>	OWN CO ₂ EMISSIONS <i>From operational processes</i>		
Today	<p>No investment in companies with revenue:</p> <ul style="list-style-type: none"> ▪ Thermal coal >30% ▪ Oil sands >10% 	<p>No insurance for</p> <table border="1"> <tr> <td> <p>Thermal coal: new coal mining, power plants, related infrastructure²</p> </td> <td> <p>Oil and gas (exploration/production): new and existing oil sand sites, related infrastructure²</p> </td> </tr> </table>	<p>Thermal coal: new coal mining, power plants, related infrastructure²</p>	<p>Oil and gas (exploration/production): new and existing oil sand sites, related infrastructure²</p>	<p>Reducing our direct impact</p> <ul style="list-style-type: none"> ▪ Carbon neutral since 2015 ▪ Reduction by 44% per employee since 2009
<p>Thermal coal: new coal mining, power plants, related infrastructure²</p>	<p>Oil and gas (exploration/production): new and existing oil sand sites, related infrastructure²</p>				
2025	<p>Emissions¹:</p> <ul style="list-style-type: none"> ▪ Total: -25% to -29% ▪ Thermal coal: -35% ▪ Oil and gas: -25% 	<table border="1"> <tr> <td> <p>-35% emissions³</p> </td> <td> <p>-5% emissions Utilising the expertise of HSB Solomon</p> </td> </tr> </table>	<p>-35% emissions³</p>	<p>-5% emissions Utilising the expertise of HSB Solomon</p>	<p>-12% emissions per employee of Munich Re Group</p>
<p>-35% emissions³</p>	<p>-5% emissions Utilising the expertise of HSB Solomon</p>				
2050	<ul style="list-style-type: none"> ▪ Total: net-zero (2050) ▪ Thermal coal: full exit (2040) 	<table border="1"> <tr> <td> <p>Full exit (2040)</p> </td> <td> <p>Net-zero emissions (2050)</p> </td> </tr> </table>	<p>Full exit (2040)</p>	<p>Net-zero emissions (2050)</p>	<p>Net-zero emissions (2030)</p>
<p>Full exit (2040)</p>	<p>Net-zero emissions (2050)</p>				

1 Based on sub-portfolio of equities, corporate bonds and real estate at the end of 2019

2 Minor exceptions apply such as sites in countries with <90% electrification rate

3 “Produced tonnes of thermal coal / MW capacity insured” used as proxy for emissions: base year 2019

Investor behavior: Net Zero Asset Owner Alliance (2020)

exit investments with positive GHG emissions by 2050

- Net-Zero Asset Owner Alliance under the umbrella of the UNEP Finance Initiative
- Alliance seeks to make investments climate-neutral by 2050 and thus to meet the aims of the Paris Climate Agreement to limit global warming to 1.5°C.
- Munich Re has joined this initiative and adopted the objective of transitioning its investment portfolio to net-zero greenhouse gas emissions by 2050

As of May 2021, 42 members with more than \$ 6.000 bn assets under management, these include:



Munich Re's climate-related solutions



- Innovative and renewable (energy) solutions
 - Technology and performance coverages
 - Solar, wind, geothermal, hydrogen, etc.

(<https://www.munichre.com/en/risks/renewable-energy-and-energy-efficiency.html>)



- Know how transfer
- Consulting services
- Tool-based solutions and consulting (e.g., Climate Hazard Scores + NATHAN, IoT by Relayr)



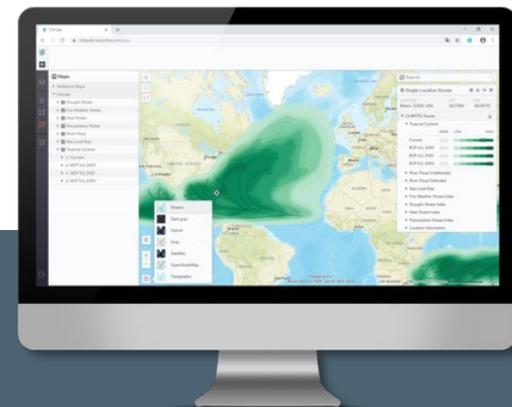
- „Traditional“ nat cat insurance
- Trigger based solutions
- Public-private partnerships
- Investment in Green Bond

„Enabling“: software-as-a-service – MR’s Climate Change Edition

sharing know-how and data with innovative software solutions (risk intelligence platform)



Munich Re’s tool analyses how assets may be impacted by physical climate risks, based on scientific scenarios under different CO₂ emission pathways.



Climate hazard scores

Acute		Tropical Cyclone
		River Flood
Chronic		Sea Level Rise
		Heat Stress
		Precipitation Stress
		Fire Weather Stress
		Drought Stress

Sectors

Insurance
 Financial Services
 Real Estate Management
 Infrastructure Management
 Manufacturing
 Supply Chain Management

Target user

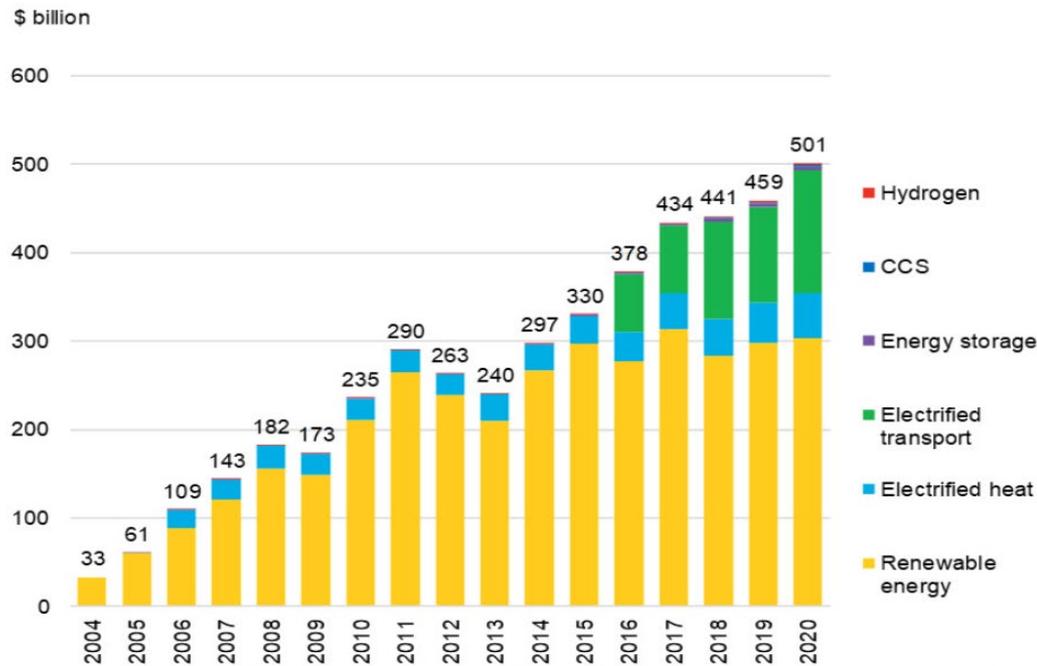
Portfolio Manager
 Underwriter
 Risk Manager
 ESG Manager
 Asset Manager
 Strategic Investors

Benefits

Sustainability Reporting
 Regulatory Stress Tests
 Risk Management

Renewable energy and low carbon technologies are key

Investment in low carbon and renewable energy technologies >US\$ 500 bn in 2020 (globally)



Source: BloombergNEF. Note: electrified heat figures begin in 2006; electrified transport in 2016; hydrogen and CCS in 2018.

“Greentech”

Renewable energies, battery, hydrogen, fuel cells

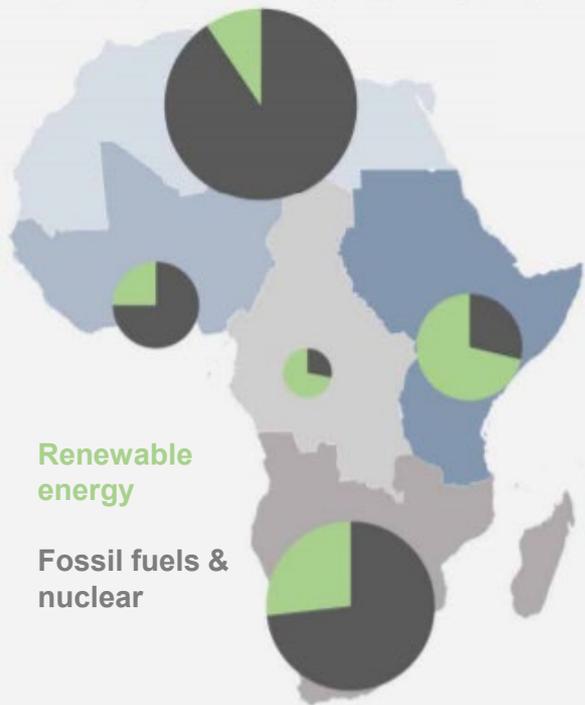
Negative-emissions

Carbon Capture & Storage (CCS)
Carbon Capture & Utilization (CCU)
→ circular economy, afforestation

22% renewable electricity generation capacity in Africa in 2019

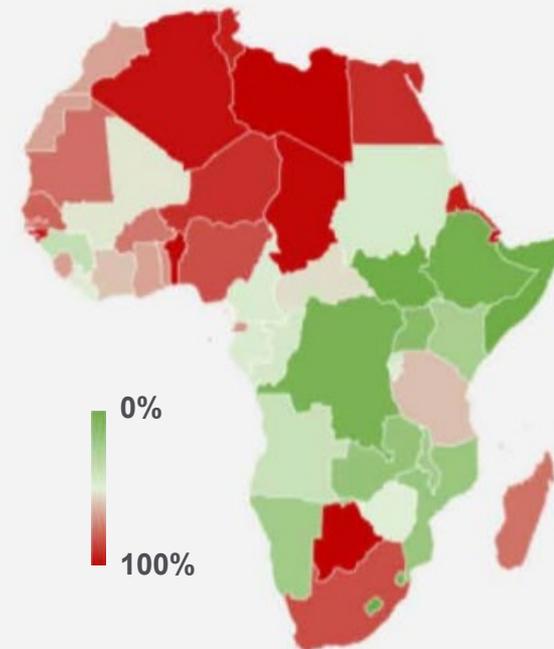
Share of renewable energy in the generation mix by country and region

installed renewable and fossil fuel generation capacity in Africa by region (2019)



Overall	232 GW Total installed	51 GW from renewables	22% renewable share
Northern Africa	115 total GW installed	11 GW from renewables	9% from renewables
East Africa	15 total GW installed	11 GW from renewables	71% from renewables
Central Africa	6 total GW installed	4 GW from renewables	72% from renewables
West Africa	24 total GW installed	6 GW from renewables	25% from renewables
Southern Africa	72 total GW installed	19 GW from renewables	27% from renewables

Share of renewable energy (% of installed capacity, 2019)



A look into the future of South Africa

Growing energy demand and expansion of renewable energies

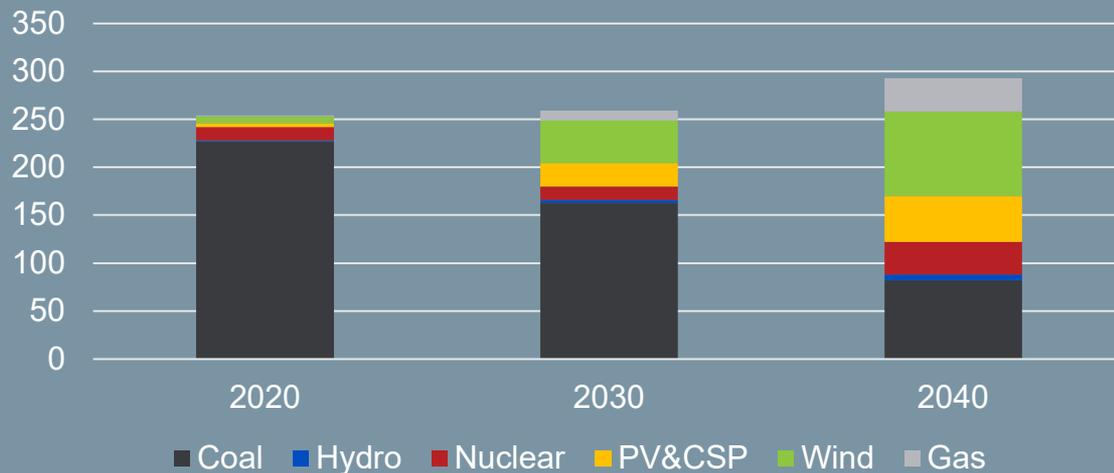
Primary energy demand



2030: 132 TWh

2040: 140 TWh

Current and stated policy energy mix of South Africa (TWh)



„Enabling“: Munich Re Green Tech Solutions coverages for innovative and renewable technologies

- Risk transfer of technology and performance risks up to 25 years

Uniqueness

- High technical expertise with all renewable technologies
- Partnerships with research and certification institutes

Benefits

- Competitive advantage with Munich Re as Business Partner
- Improving bankability and investability of new technologies



Photovoltaic



On- and Off-Shore Wind



Geothermal Energy



Battery Performance & Fuel Cells

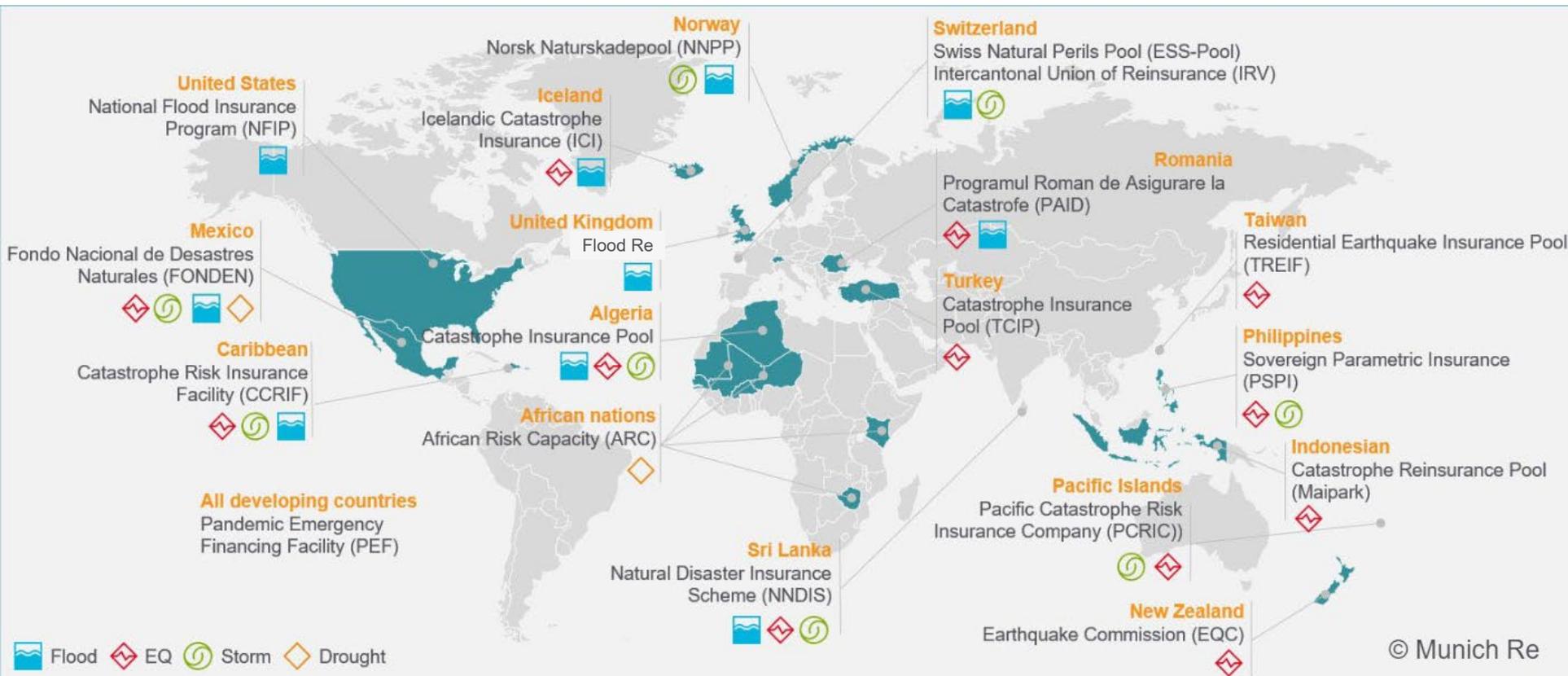


Bioenergy & Waste-to-Energy



Hydrogen

„Enabling”: Public-private partnership solutions improving insurability in high-risk areas and reducing the insurance gap



„Enabling“: Public-private partnership solutions

AEGF and ARC as two examples of African Public-private partnership solutions

African Energy Guarantee Facility (AEGF)

supports **new private sector investments** in **renewable energy** and **energy efficiency** projects in 25 sub-Saharan African countries

AEGF products insure contractual compliance with state and local power purchase obligations. These include for example: Breach of contract, expropriation, currency non-convertibility, war

African Risk Capacity (ARC)

Specialized Agency of the African Union

established to help African governments improve their capacities to better plan, prepare, and respond to **extreme weather events** and **natural disasters**

enables countries to strengthen their **disaster risk management systems** and access rapid and predictable financing when disaster strikes to protect the food security and livelihoods

→ Solutions of risk sharing between insurers, reinsurers and international (financial) institutions

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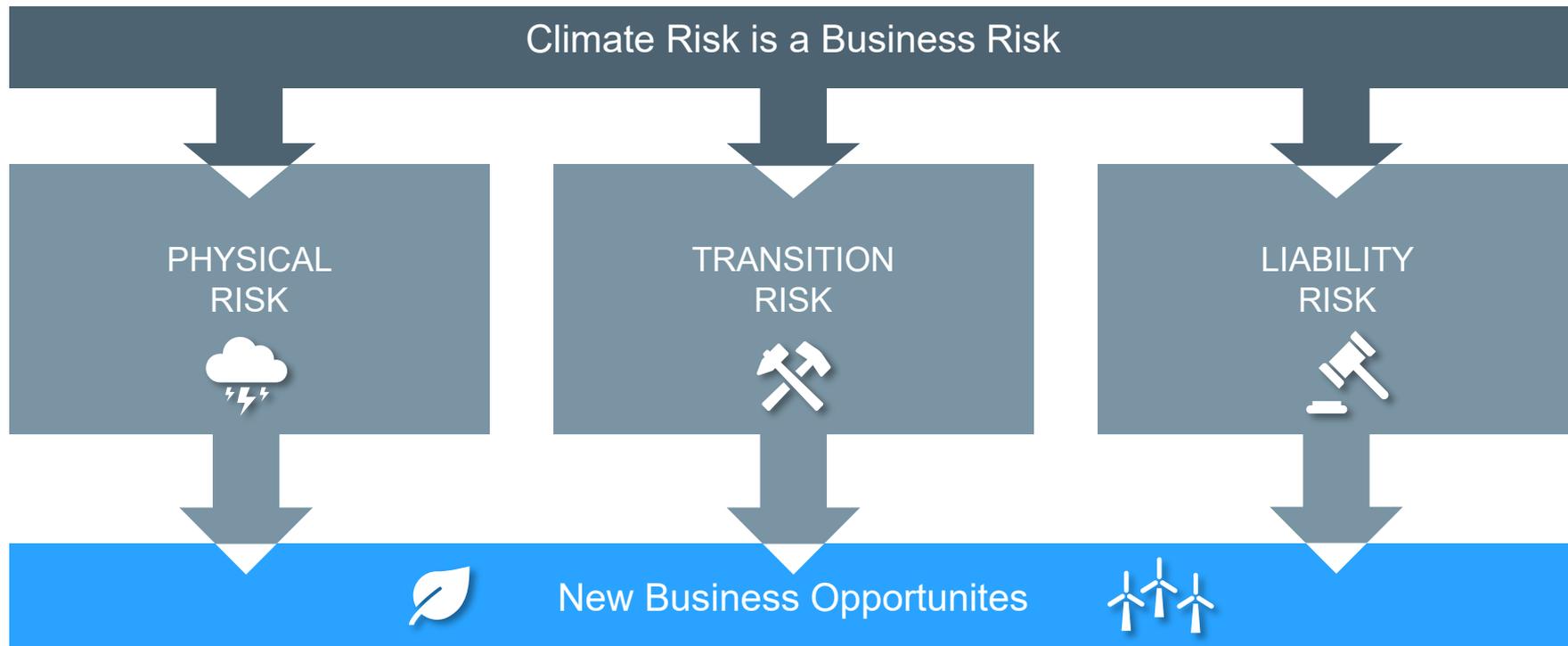
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Thank You!

Policy & Regulation: Climate risk is a business risk

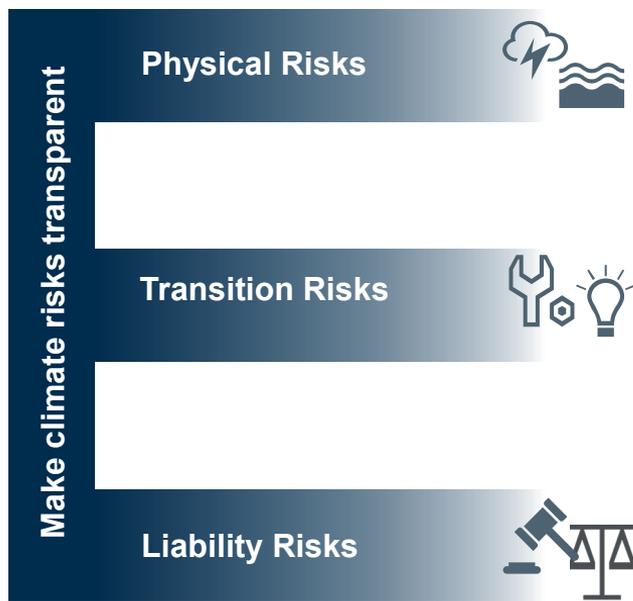
Task force on Climate-related Financial Disclosures (TCFD): systemic risk?



Policy & Regulation: TCFD (Task force on climate-related financial disclosure)

Climate change as a systemic financial risk?

Risk landscape in focus of TCFD

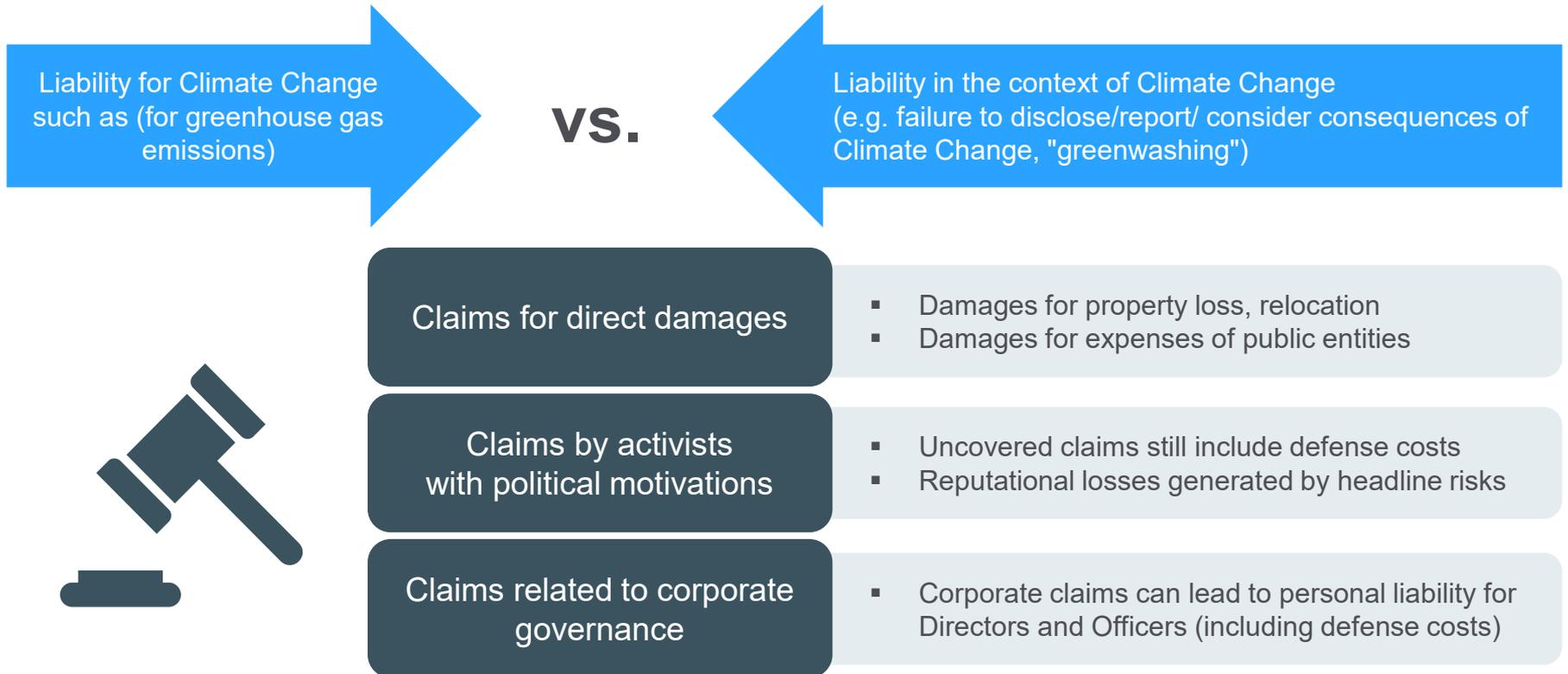


Core elements of climate-related financial disclosures



Liability Risks: Different varieties of Climate Change liability

Third party and D&O liabilities



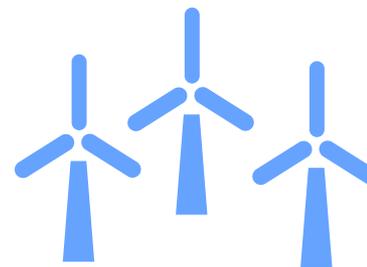
Transition risks: new technologies and political decisions

Potential systemic risk for investments / assets

Technology

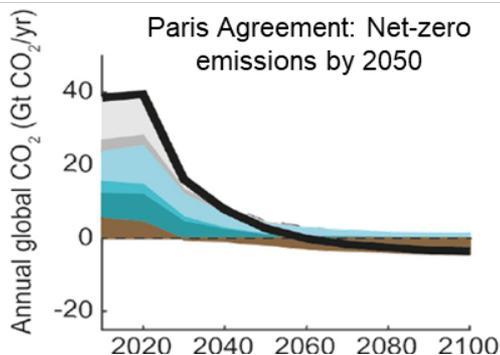


High Emission
Fossil Fuels



Low Carbon
Technologies

Regulation



EU Green Deal