4th INDONESIAN ACTUARIES SUMMIT 2019

"ACTUARY AND BUSINESS ETHICS"

CLIMATE RISKS

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READI

Risk Management, Economic Sustainability and Actuarial Science Development in Indonesia

NOVOTEL LAMPUNG, 28th -29th MARCH 2019

Agenda

What are climate risks?

Metrics and timelines

TCFD disclosures

Roles of actuaries

What if warming +1,5^{o}C, +2,0^{o}C, +3,0^{o}C or +5,0^{o}C

Follow the links for more information on climate risks

Just released

https://www.bappenas.go.id/id/berita-dan-siaran-pers/pembangunan-rendah-karbon-pergeseranparadigma-menuju-ekonomi-hijau-di-indonesia/

Global warming increases risks

- Rising global average temperatures, primarily caused by human made emissions of greenhouse gases (GHGs), are increasing the risk and intensity of
  - extreme weather events, sea rise
  - eco-system and economic disruption
  - impacts on health, food and water security,
  - uncertainty in transition and sustainability

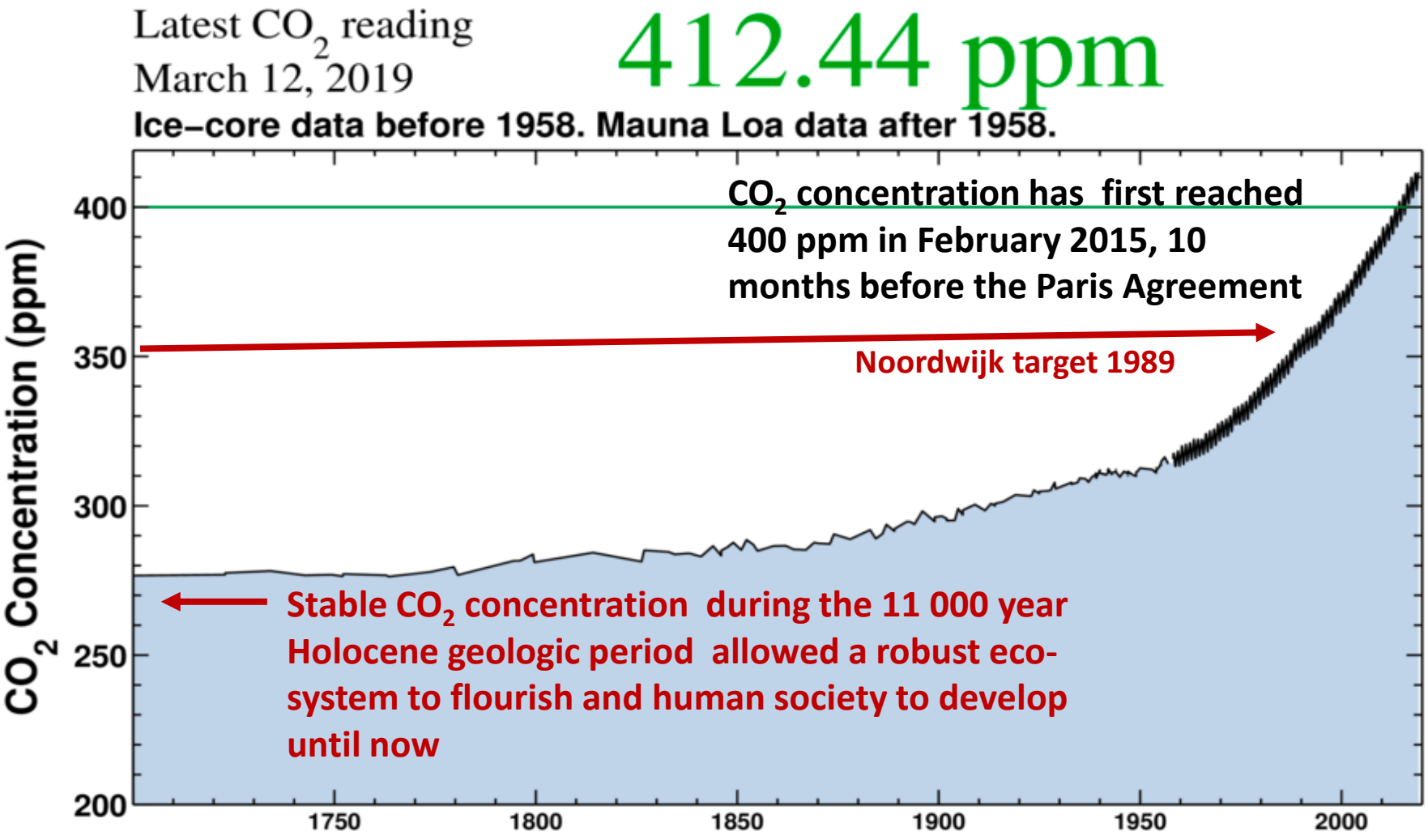
- GHGs are mainly CO_2 from burning fossil fuels but also Methane from agriculture and others, translated in $eGtCO_2$

Intergovernmental Panel on Climate Change (IPCC). 2014. *Climate Change 2014: Synthesis Report.* Geneva: IPCC.
https://www.ipcc.ch/site/assets/uploads/2018/05/SYR_AR5_FINAL_full_wcover.pdf

Multiple Early Warning Signals

- 1824: Joseph Fourier, a French physicist, derived the green house effect from applying the Laws of Thermodynamics to our planet
- 1896: study on GHG effects by Svante Arrhenius, a Swedish chemist
- 1958: Scripps scientist Charles David Keeling starts measuring daily CO2 concentration using infrared gas analyzers at the NOAA weather station in Mauna Loa. First day reading was 313 parts per million (ppm)
- 1979: First World Climate Conference held in Geneva
- 1988: UN creates the Intergovernmental Panel on Climate Change(IPCC) to produce regular Assessment Reports on climate change

Keeling curve



Keeling, Ralph F. and Charles D. Keeling. 2017. " *Scripps CO2 Program Data*. https://scripps.ucsd.edu/programs/keelingcurve/

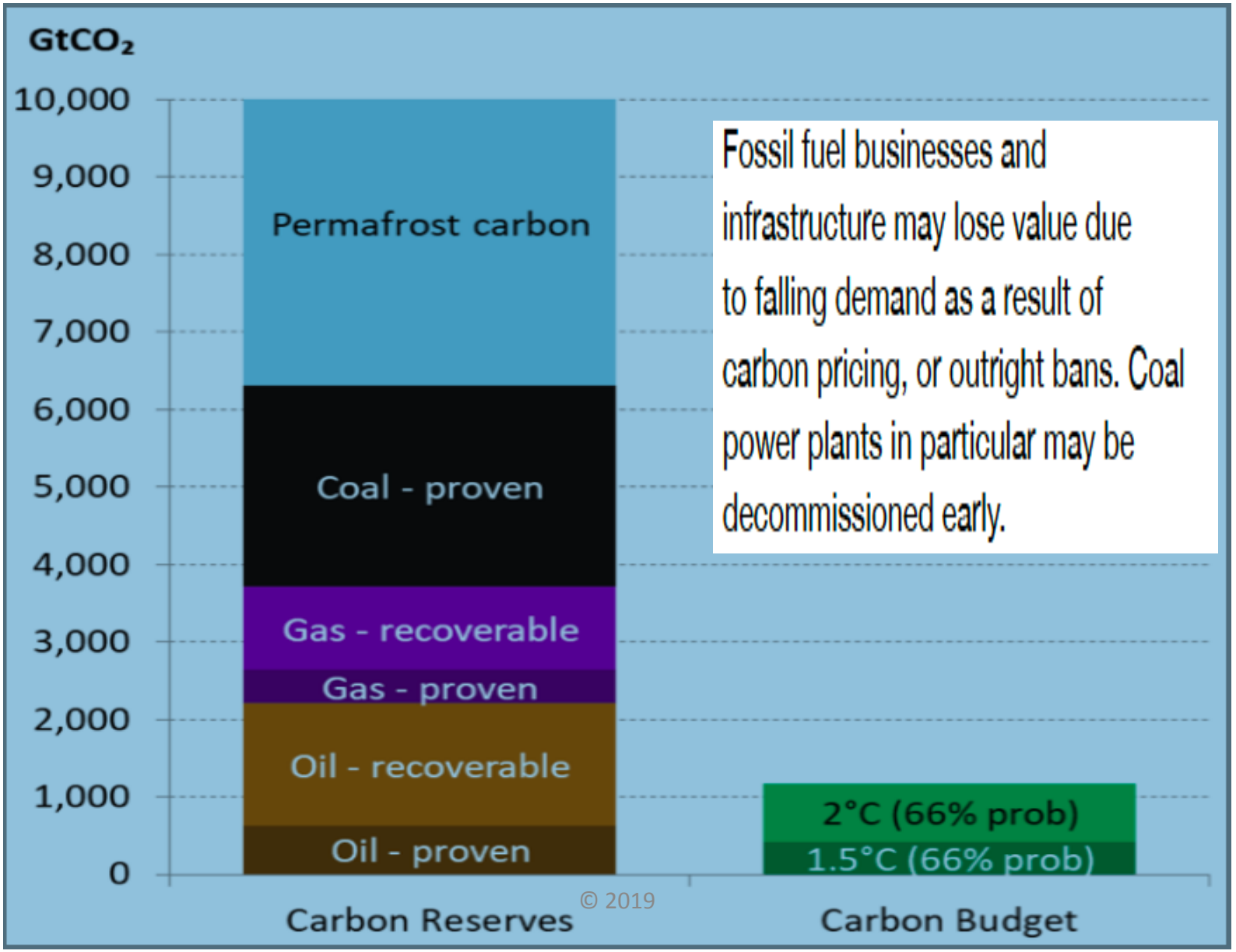
Potential impacts are pervasive

- Increased frequency and magnitude of extreme weather events affect the insurance industry, causing greater damage and higher loss volatility for life, non-life and health insurance
- Financial services industry impacted by portfolios' vulnerability to fossil fuels, switch to low carbon economy and renewable energy sources
- Extreme climate and weather events may threaten the proper functioning of pipelines, communications, electricity grids, and transport infrastructure
- Weather-sensitive sectors include agriculture, forestry, fisheries, tourism, hydroelectricity, transportation, and mining
- Impacts on human health expand the need for and add stress to existing healthcare systems
- Economic development and productivity may decline

Metrics and Timeline

- According to Climate scientist models preserving a 2/3 likelihood of warming not exceeding + 2°C above pre-industrial level of about 280ppm requires reducing net GHG emissions to zero before CO_2 atmospheric concentration reaches **450 parts per million (ppm).**
- The annual mean CO_2 concentration in 2018 was 408,6 ppm, having increased by over 10 ppm in just four years.
- The post 2010 **carbon budget** was **1000 Giga tons** CO_2 thus emissions need to decrease rapidly from near 55Gt/yr to stabilize asymptotically at **zero net emissions**
- Fossil fuel reserves are converted into **stranded assets**
- Greater sense of urgency needed: **Time is running out!**

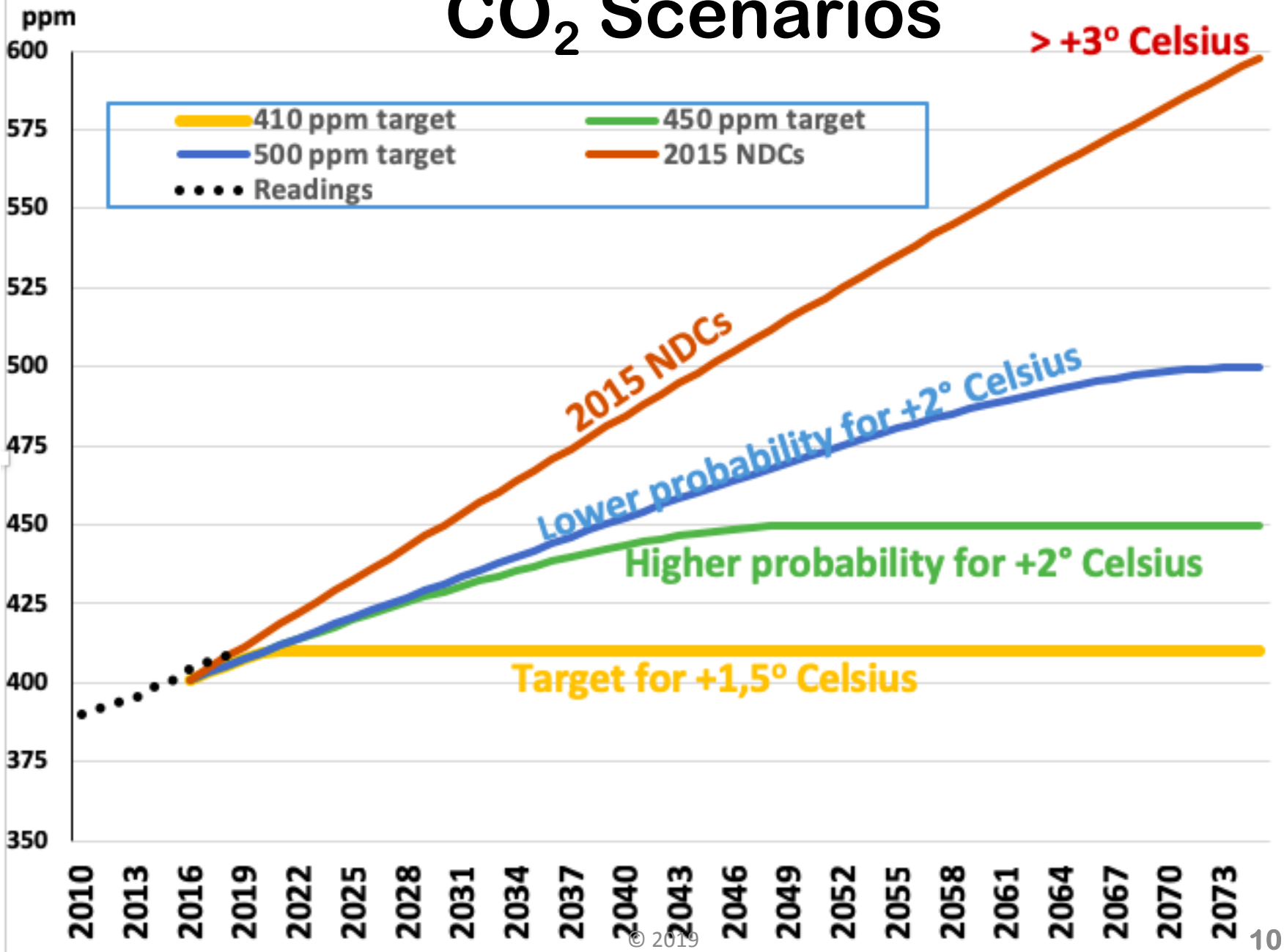
Stranded assets



Nationally Determined Commitments (NDCs)

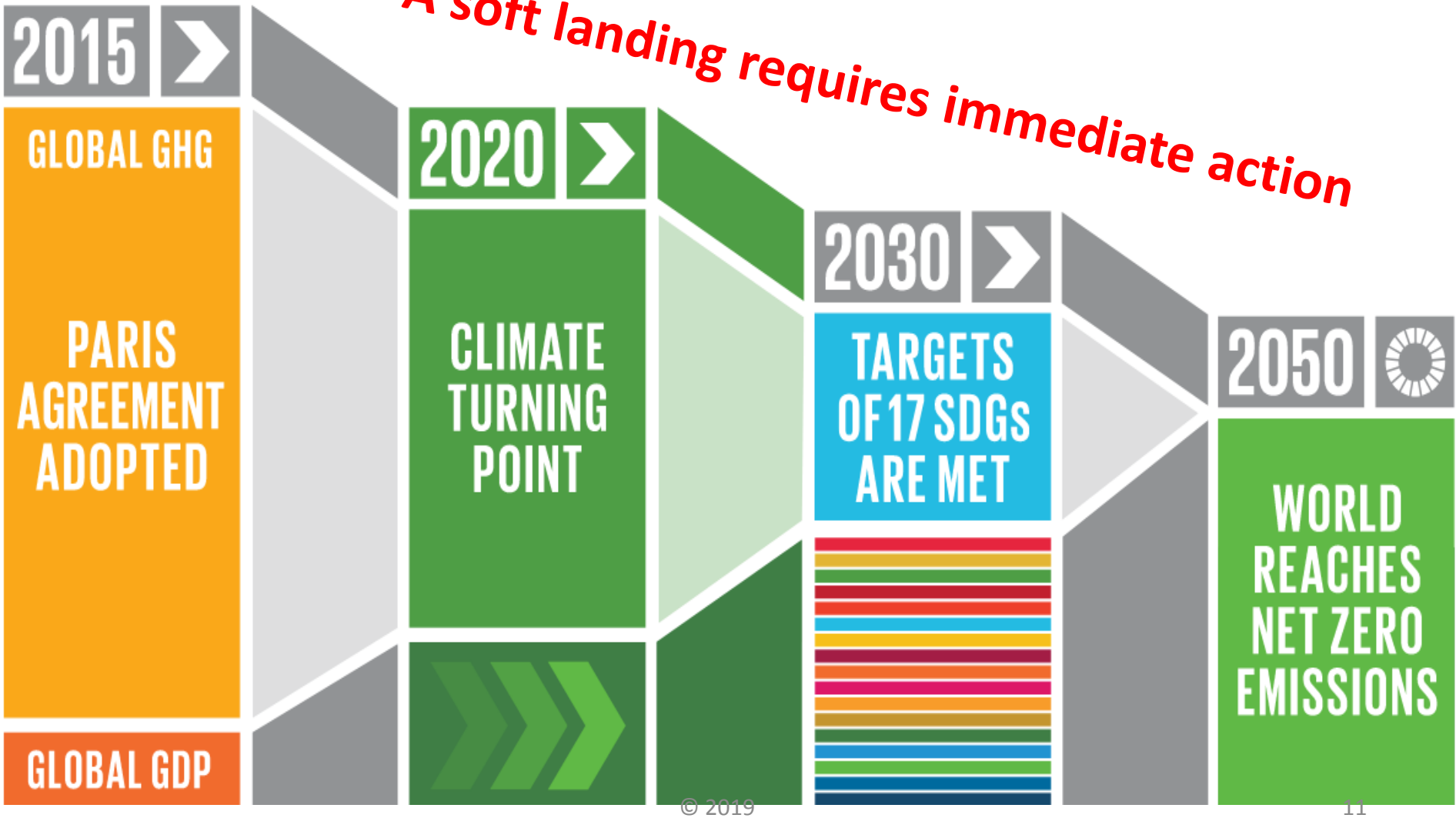
- The world's collective priority agreed by 197 countries that signed the 2015 **Paris Agreement** is to limit global warming to well below 2 degrees Celsius.
- 188 countries have submitted Nationally Determined Commitments (NDCs) stipulating reductions in GHG emissions expressed in $eGtCO_2$
- The NDCs are not legally binding, only reporting is mandatory
  - United Nations Framework Convention on Climate Change (UNFCCC). 2015. *The Paris Agreement*. https://unfccc.int/sites/default/files/english_paris_agreement.pdf

CO_2 Scenarios



A call for action

A soft landing requires immediate action



Outcomes, timeline, impacts uncertain

- Multiple physical effects to be expected: not only warming but sea rise, rain, wind, flood, drought, etc…
  - Intensity and timing depend on voluntary decisions by a large number of independent parties: governments, investors, individuals
- When will emissions peak, how long to reach zero net emissions, at what warming level?
- Governments can use taxes, quota, regulations, incentives and direct interventions to rebalance adaptation and mitigation in reaction to emerging outcomes
- Cost and effort to shift to a low carbon economy are short term pains for economic agents and individuals, to reach a future equilibrium where humanity can survive, enjoy and prosper
- A *'too little, too late'* scenario, where significant action is taken, but too late to achieve climate goals, could result in the most severe financial risks crystallising in the banking and insurance sectors.

TCFD* focus is on "orderly"

- According to G20 and the Financial Stability Board
  - *"Warming of the planet caused by greenhouse gas emissions poses serious risks to the global economy and will have an impact across many economic sectors.*
- The key hurdle is achieving, despite the voluntary features of the Paris Agreement, an *orderly* transition to a low carbon economy but:
  - *Wthout effective disclosure of these risks, the financial impacts of climate change may not be correctly priced.*
  - *As the costs eventually become clearer, the potential for rapid adjustments could have destabilizing effects on markets. "*
- An orderly market transition to a low-carbon world will minimise Financial risks from climate change, but the window for an orderly transition is finite and closing.

**https://www.fsb-tcfd.org/publications/*

TCFD an indispensable tool

- The TCFD is the essential risks management dual purpose tool:
  - helping stakeholders and decision makers assess their own risk exposure, which is a pre-requisite to control and manage risks at a single entity level
  - making available to the global community of strategic decision-makers the information necessary to facilitate convergence on optimal pathways that offer cost-efficient mitigation of climate change
- The disciplined approach, including scenarios, underlying TCFD disclosures helps entities identify, measure, prioritize and take action to reduce the exposure of business models and life style to climate risks while it enhances the transparency and utility of the information by making reports comparable.
- Private sector entities are called upon to demonstrate that they are aware of the impeding climate risks and are taking appropriate measures to adapt or mitigate climate risks

Disclosures to be mandatory

- 513 organizations had expressed their support for the TCFD at the One Planet Summit held in New York on September 26, 2018. Even not mandatory, TCFD recommendations become a tool to apply peer pressure through comparative analysis
- In many jurisdictions, companies with public debt or equity have a legal obligation to disclose material risks in their financial reports —including material climate-related risks
- TCFD recommendations provide a compliance strategy that reduces risks associated with non-disclosure and a narrow interpretation of fiduciary duties due to herd effects
- Recommendations can become mandatory if adopted by regulatory bodies or governments making them enforceable.

A New Frontier for Actuaries

- Actuaries as experts in risk management and in the use of long-range models and scenarios combining financial impacts and probabilities, can help with costing, asset valuations and assist as preparers for TCFD disclosures
  - discounting a stream of uncertain climate financial impacts over a long period is akin to valuing pension cash flows, a familiar actuarial task.
- Comparisons are facilitated by methodologies inspired from the model to normalize pension expenses across different financing paths.
  - Additional guidance is available at
    - Principles for Sustainable Insurance
      - https://www.unepfi.org/psi/
    - Principles for Responsible Investment (ESG)
      - https://www.unpri.org/

Risks categories under TCFD

https://www.fsb-tcfd.org/publications/final-recommendations-report/

Role of the actuarial profession

- Ensure that actuaries, the public, and decision-makers are well informed about sustainability risks that climate change entails
- Support disclosure of climates risks, explain the degree of uncertainty, even in the short term and the need to plan over an horizon in decades, not quarters.
- Maintain insurability, enhance resilience, promote innovation in the development of new markets, products, and strategies to respond to new needs
- Anticipate the need for efficient instruments to mitigate, transfer, and share climate risks, including insurance and other risk management tools

Canadian Institute of Actuaries
(draft proposal)

- ”We call on governments to require **mandatory financial disclosure of climate-related risks and opportunities** under the TCFD by 2021 and for corporate entities to adopt the TCFD framework voluntarily.
- We call on the federal government to **undertake national data collection and disclosure** related to the financial impacts of climate-related events such as floods and wildfires.
- We call on investors and business leaders to **include environmental, social, and governance (ESG) factors** in their decision-making.
- We call on all individuals to act responsibly and **advocate for concrete action** on the causes and impacts of climate change before it is too late.”

Role of actuaries

- Keep apprised of the potential impact of emerging factors that can affect assumptions and projections, so as to always be providing high-quality professional services
- Anticipate the potential impact climate risks on liabilities and counterpart assets (valuation and returns)
- Fulfil their responsibility of protecting the sustainability of businesses, insurance companies, and private and public plans, as well as the equity between the end users and the payers
- Refrain from rendering professional services for which they are not adequately qualified

Complying with IAA Art.2.2.2 a) iv

Institute and Faculty of Actuaries

May 2017

RISK ALERT
Climate-Related Risks

KEY MESSAGE
Actuaries should ensure that they understand, and are clear in communicating, the extent to which they have taken account of climate-related risks in any relevant decisions, calculations or advice.

- Recognizing their responsibility to promote the well being of the society as a whole, four North American actuarial associations joined forces to publish an Actuaries Climate Index (ACI) and an Actuaries Climate Risks Index (ACRI)
- The Actuarial Climate Index (ACI) provides information about the variations of six types of climate events in terms of standard deviations from a 1961-1990 database covering North America:
  1. High temperature
  2. Heavy rainfalls
  3. Violent winds
  4. Low temperature
  5. Long drought
  6. Sea level
- Shows climate change can affect our lives in myriad ways
- Evolving in ways that might seem random over the short term but cumulatively makes our planet more at risk
- He information and infographics are free and accessible at www.ActuariesClimateIndex.org
- An Australian index became available recently at https://www.actuaries.asn.au/microsites/climate-index

IAA Resources and Environment Work Group

Decarbonization: A Briefing for Actuaries - September 2018 - This paper provides an introduction to the topic of decarbonization for actuaries around the world. Aspects covered include: the main types and sources of greenhouse gas emissions; relevant international agreements; commitments made; the policies adopted; likely future developments; and, observations on potential actuarial implications. While decarbonization will increasingly affect every economy and will transform how and what goods are produced and services are provided, the timing and progress of change is highly uncertain.

webex

-Climate Change and Mortality November 2017 & Webinar

-Climate Change, Insurance and Vulnerable Populations”

Climate related financial risks

- Financial risks from climate change present unique challenges and require a strategic approach to risk management.
  - Far-reaching in breadth and magnitude: full impact on the financial system larger than for other types of risks, and potentially non-linear, correlated and irreversible.
  - Uncertain and extended time horizons: full impact may crystallise outside of many current business planning horizons. Using past data may not be a good predictor of future risks.
  - Foreseeable nature: high degree of certainty that financial risks from some combination of physical and transition risk factors will occur.
  - Dependency on short-term actions: the magnitude of future impacts will be determined by actions taken today by governments, firms, and a range of other actors.
- Source: Consultation Paper October 2018 UK Prudential Regulation Authority

A missed opportunity in 1989

- The 1979-89 decade yielded great progress in the recognition of the challenge posed by Global warming but in November 1989, the Noordwijk Ministerial Conference on climate in Netherlands rejected a proposal to freeze GHG at their 1990 levels by year 2000.
- Nevertheless the Kyoto Protocol was adopted in December 1997 but not ratified until February 2005, indicating that the momentum of the previous decade had een lost.
- However the Paris Agreement adopted in December 2015 was promptly ratified in November 2016 signaling that climate risks were taken more seriously but over two decades GHG emissions had continued to grow unabated
- A Pulitzer supported article published by New York Times on August 1st 2018 entitled *"Losing the Earth: The decade we almost stopped climate change"* describes how the science signals were overcome by political noise. See https://www.nytimes.com/interactive/2018/08/01/magazine/climate-change-losing-earth.html

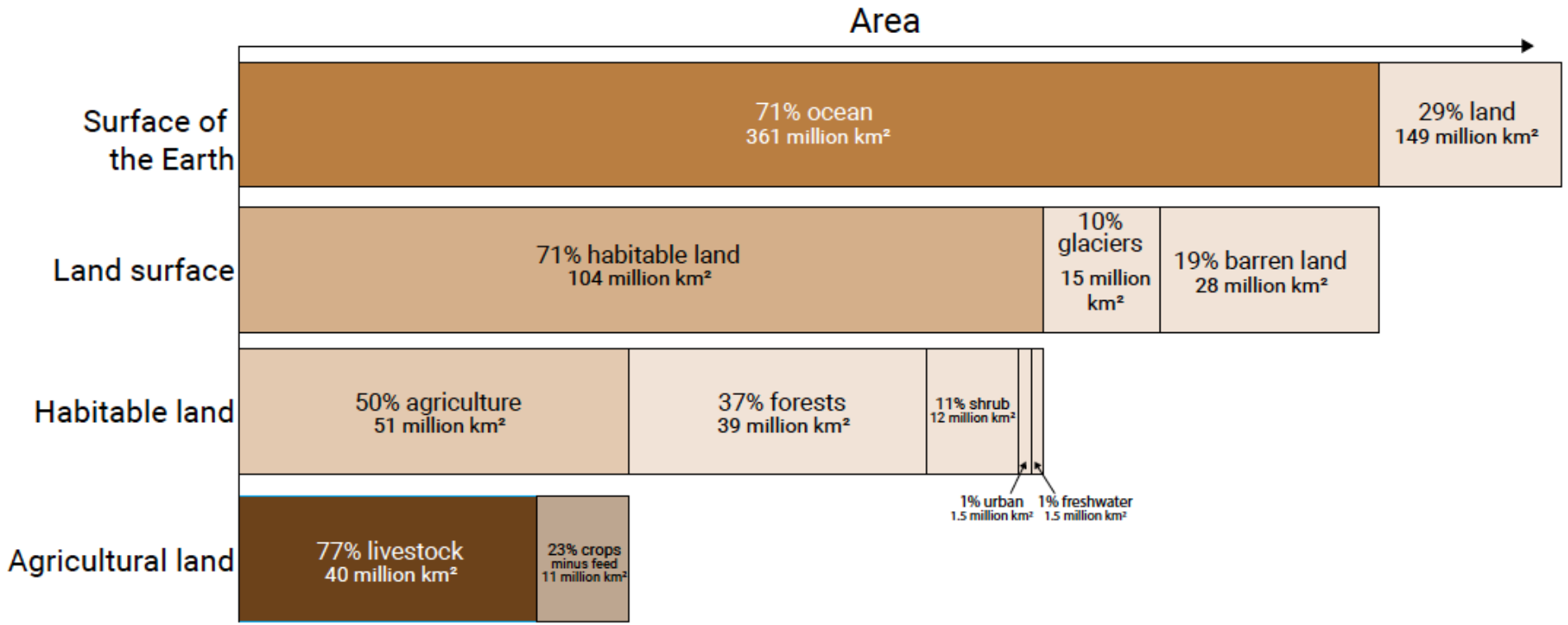
2018 UNEP and IPCC Reports

- According to the 2018 UNEP Emission Gap report, GHGs global emissions show no signs of peaking.
- Total annual GHGs emissions, including from land-use change, reached 53,5 $eGtCO_2$ in 2017, an increase of 0,7 $eGtCO_2$ over 2016.
- Global GHG emissions in 2030 need to be approximately 25% and 55% lower than in 2017 to put the world on least-cost pathways limiting global warming to 2^{o}C and 1.5^{o}C respectively.
- IPCC Special Report on Global Warming of 1,5^{o} C, approved on 8 October 2018, finds that limiting global warming to 1.5°C would require "*rapid and far-reaching*" transitions in land, energy, industry, buildings, transport, and cities.

SHARING ONE PLANET

Figure SPM.4. Global surface area allocation for food production

The breakdown of the surface of the Earth by functional and allocated uses, down to agricultural land allocation for livestock and food crop production, measured in millions of square kilometres. The area for livestock farming includes land for animals, and arable land used for animal feed production.



Source: Food and Agriculture Organization of the United Nations (2017).

https://wedocs.unep.org/bitstream/handle/20.500.11822/27652/GEO6SPM_EN.pdf?sequence=1&isAllowed=y

Potential for reducing emissions

Figure 12 **Total emission reduction basic potentials compared to the current policy scenario in 2030**

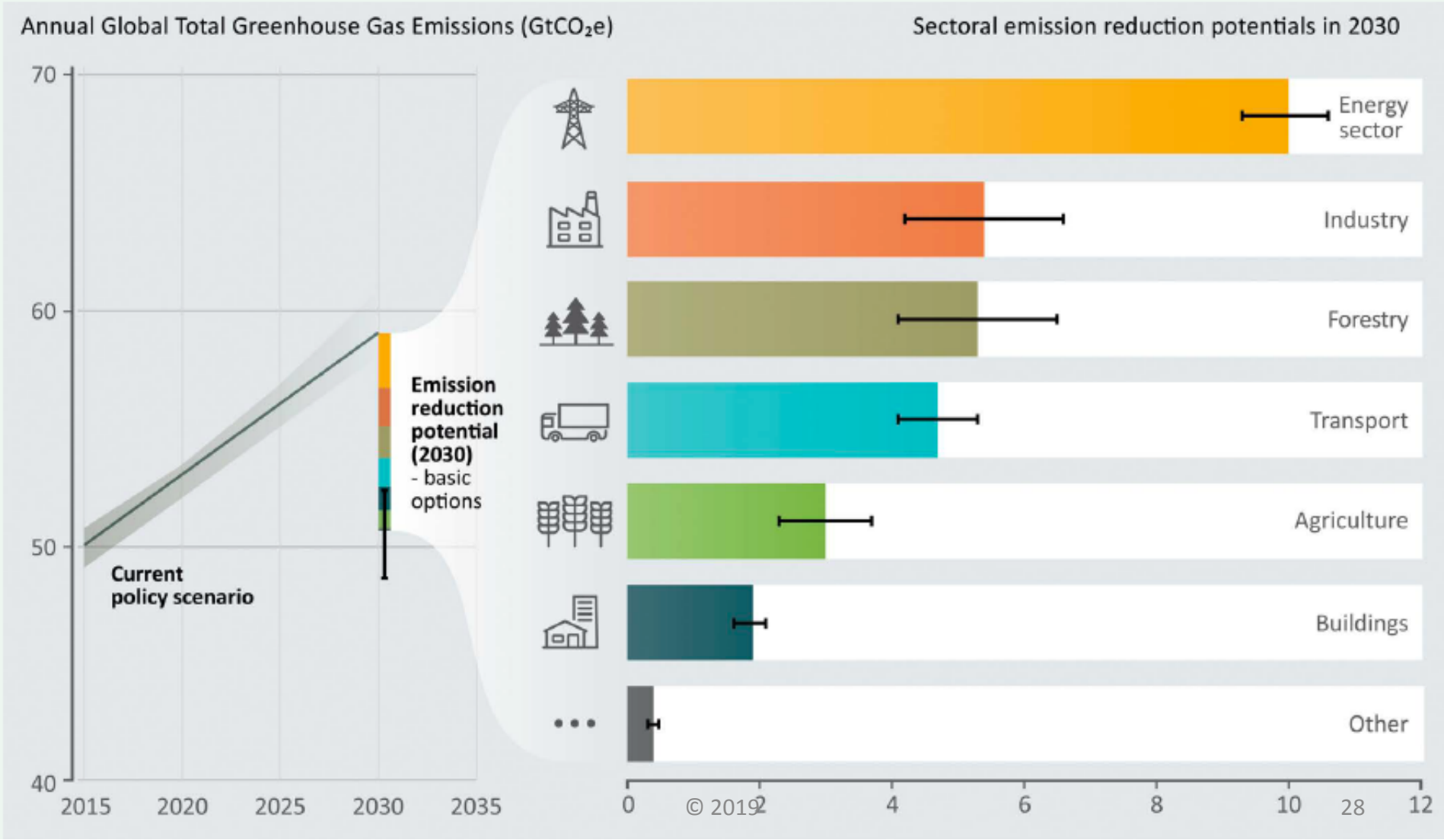
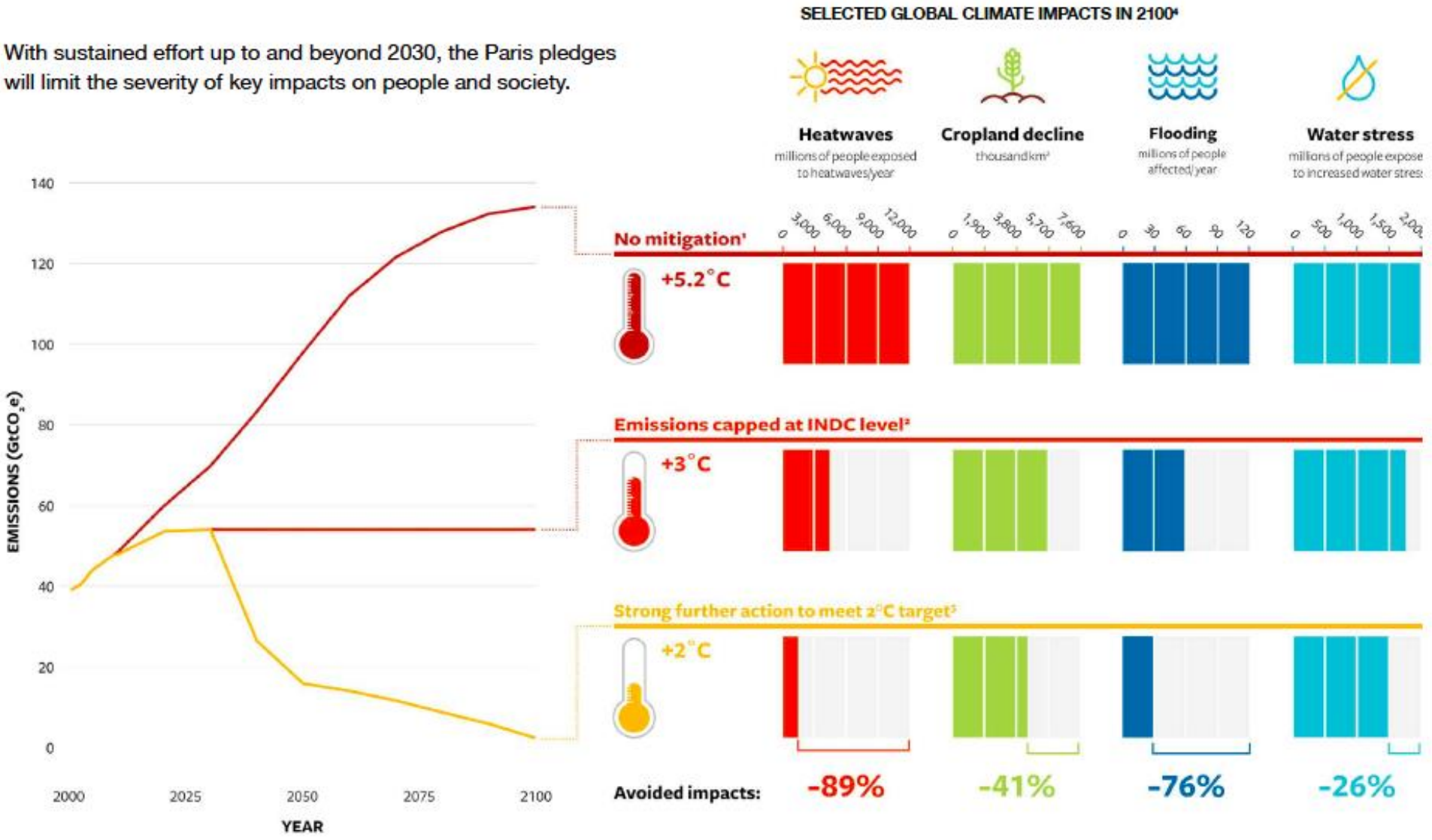


Figure 7 **Avoiding the impacts of dangerous climate change**

With sustained effort up to and beyond 2030, the Paris pledges will limit the severity of key impacts on people and society.



https://www.thecroforum.org/wp-content/uploads/2019/01/CROF-ERI-2019-The-heat-is-on-Position-paper-1.pdf

Warming by 2100		<2 °C		3 °C	5 °C
Physical impacts		1.5 °C	2 °C		
Sea-Level Rise (cm)		0.3-0.6 m	0.4-0.8 m	0.4-0.9 m	0.5-1.7 m
Coastal assets to defend ($tn)		$10.2tn	$11.7tn	$14.6tn	$27.5tn
Chance of ice-free Arctic summer		1 in 30	1 in 6	4 in 6 (63%)	6 in 6 (100%)
Tropical cyclones:	Fewer (#cat 1-5)	-1%	-6%	-16%	Unknown
	Stronger (# cat 4-5)	+24%*	+16%	+28%	+55%
	Wetter (total rain)	+6%	+12%	+18%	+35%
Frequency of extreme rainfall		+17%	+36%	+70%	+150%
Increase in wildfire extent		x1.4	x1.6	x2.0	x2.6
People facing extreme heatwaves		x22	x27	x80	x300
Land area hospitable to malaria		+12%	+18%	+29%	+46%
Economic impacts					
Global GDP impact (2018: $80tn)		-10%	-13%	-23%	-45%
Stranded assets		Transition: fossil fuel assets (supply, power, transport, industry)		Mixed: some fossil fuel assets mothballed, some physical stranding	Physical: uninhabitable zones, agriculture, water-intense industry, lost tourism etc
Food supply		Changing diets, some yield loss in tropics		24% yield loss	60% yield loss, 60% demand increase
Insurance opportunities		New low-carbon assets and infrastructure investment (e.g. CCS)		Increasing demand to manage growing risks	Minimal: recession, tensions, high and unpredictable risks

The Global Commission on the Economy and Climate

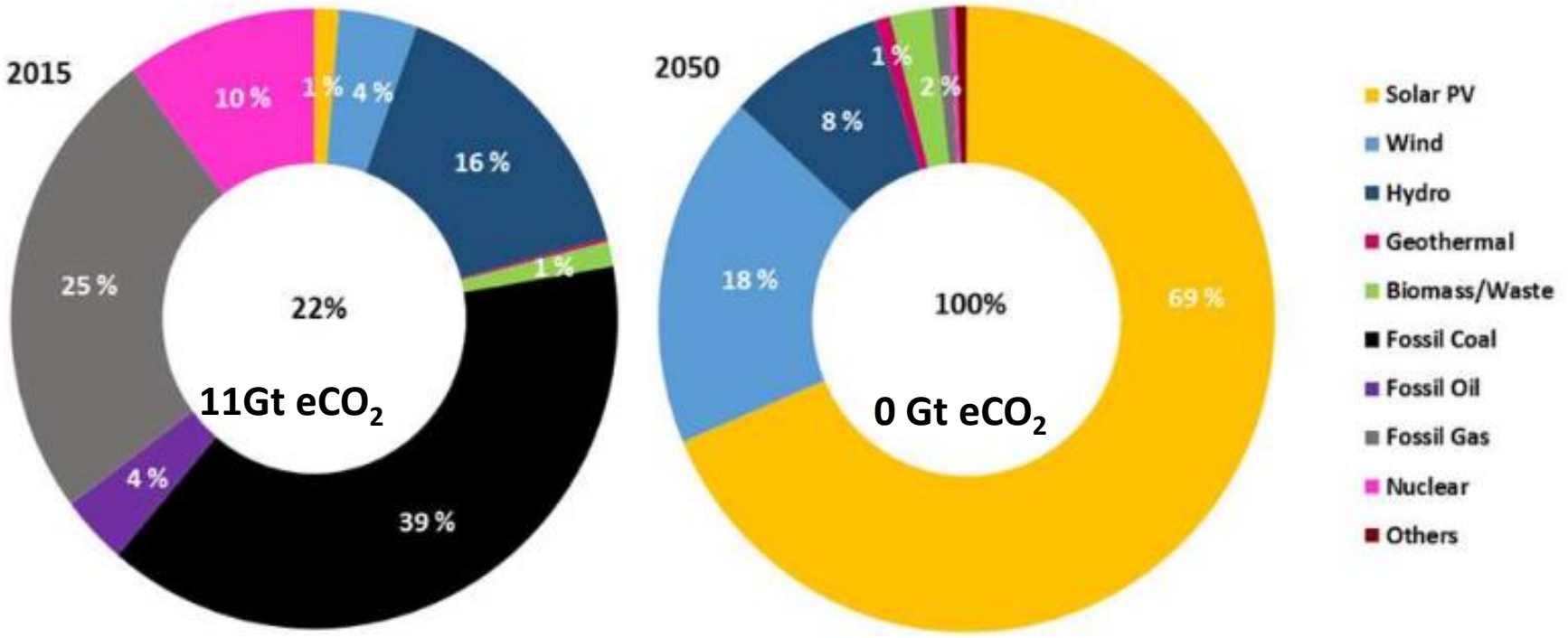
The Global Benefits of a Decisive Shift to a Low-carbon Economy when compared with Business-as-usual. Note: The US$26 trillion in direct economic benefits are cumulative for the 2018-2030 period. Other data points are for the year 2030.

Source: Forthcoming. Major Opportunities for Growth and Climate Action: A Technical Note. A New Climate Economy contributing paper. 2018.

http://newclimateeconomy.net content/technical-notes-and-fact-sheets.

Proposal submitted to COP23

Figure ES-1: Share of electricity generation from renewable sources in 2015 and 2050. Gas capacities in 2050 only use renewable based gas. In 2050, nuclear power still accounts for a negligible 0.3% of the total electricity generation, due to the end of its assumed technical life, but could be phased out earlier.



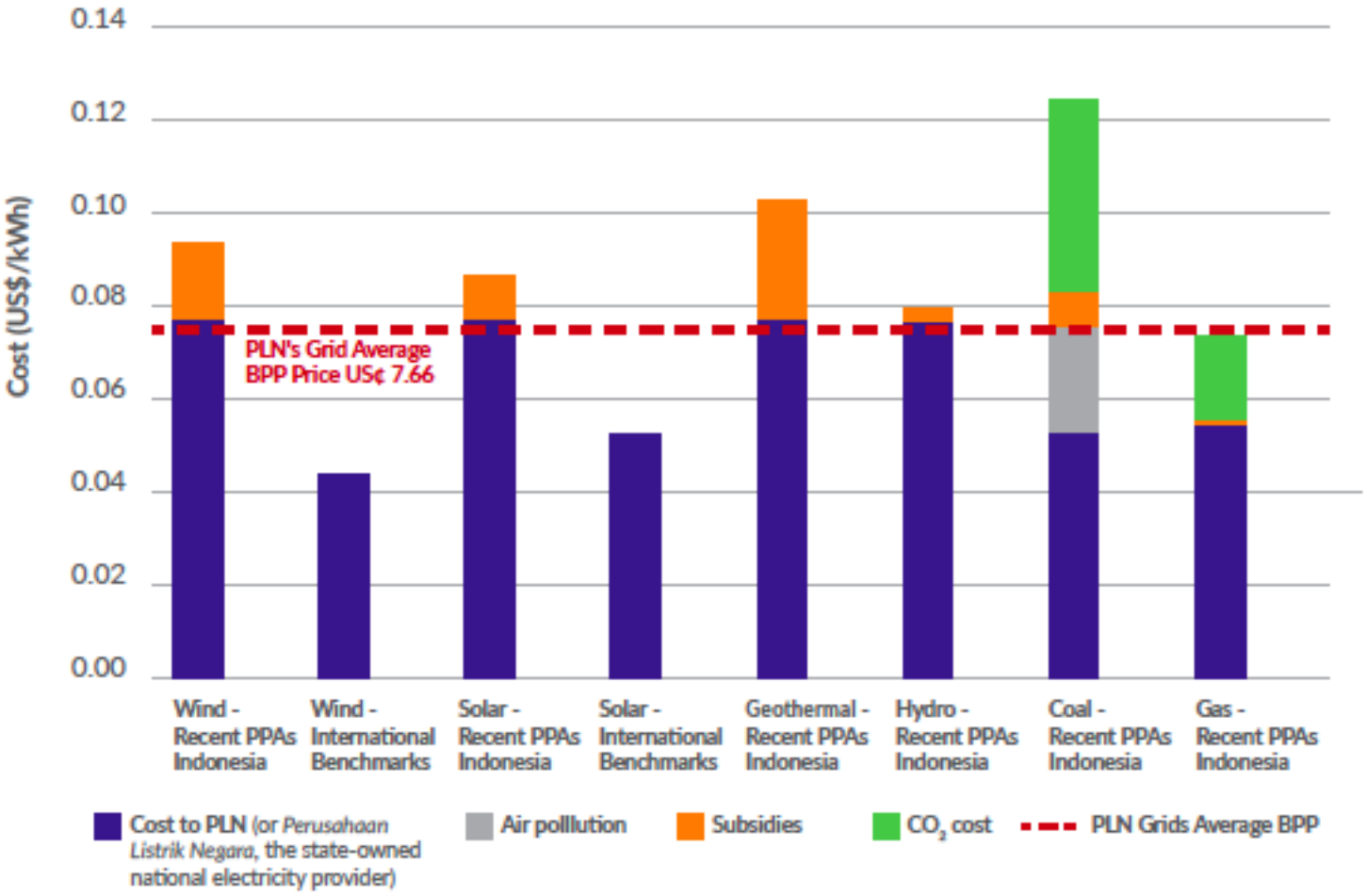
Source:

LUT Lappeenranta University of Technology

ENERGYWATCHGROUP

The context in Indonesia

The Low Carbon Development Report: A Paradigm Shift Towards a Green Economy in Indonesia



100% renewable electricity by 2050

- Technically possible thanks to more cost efficient wind turbines, solar panels and batteries
  - Reduces demand for fossil fuels, especially coal
- But requires favorable political framework
  - Phase out of state subsidies to fossil fuels
  - Replace emission trading system by carbon taxes
  - Tax exemption for investments in renewable energy
- Gradual transition & proper planning needed for both production and delivery

Removing GHGs?

- Methane, nitric dioxides and other non CO_2 gases removed by natural processes if emissions stop
  - Natural bio-processes remove CO_2 reforestration/afforestration would work but require enormous land areas
  - Stopping deforestration is an obvious option
- Technologies exist that can remove and sequester CO_2 but existing processes still too costly and impractical at global scale
- Would reduce “stranded assets” but betting on potential technological large scale breakthroughs requires a high risk appetite
- Proposals to reduce warming by geoengineering have been discussed but entail high risks and major global governance issues