

# What is Climate Risk?

**Assembly of Investment Chairs 2019: Sustainable  
Finance and Climate Risk**

**University of Otago Auckland Centre, 27 November**

**Ivan Diaz-Rainey**

# Introduction

- Director of CEFGroup & AP in Finance
  - Technical WG Sustainable Finance Forum > recommend report
- First session: Build up approach
  - Climate risk: me
  - Sustainable Investing: A-M
  - CEFGroup – Research; teaching & looking forward
- Thanks
  - **Funding** OBS (Robin) & NZ Super. **Organising team:** Craig; NZ Super (Catherine, Conor, AM); UoO (Vickey and Seb)
  - Externals: Simone (RBNZ); Simon (RIAA); Fiona (Jarden); David (AUT)
  - Participants: Learn from you & initiate dialogue

■ August 13, 2018, 10:00 PM GMT+12

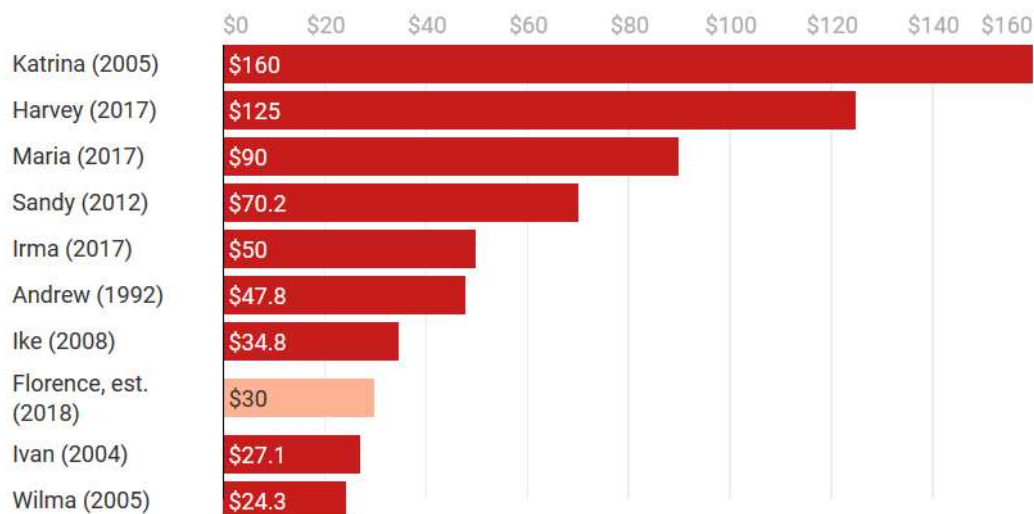
# Facing \$17 Billion in Fire Damages, a CEO Blames Climate Change

By Mark Chediak

- PG&E's Geisha Williams pushes for change in liability law
- Critics say the utility was negligent in 2017 wildfires

- Heat waves
  - Drought
  - Fires
  - Health impacts
- Storms & flooding
- Sea level rise

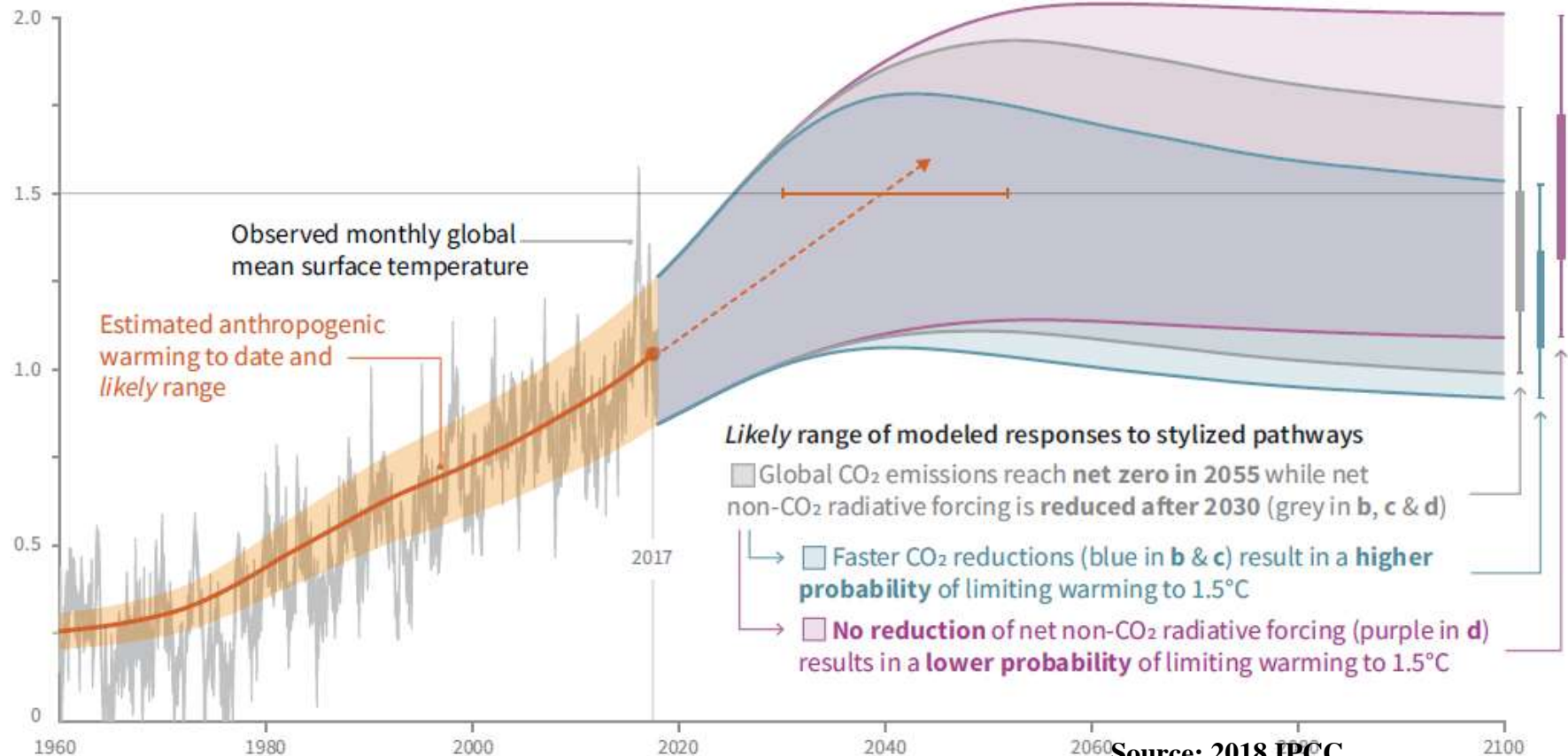
Adjusted for inflation, in billions.



# Limiting temperature rise to 1.5

a) Observed global temperature change and modeled responses to stylized anthropogenic emission and forcing pathways

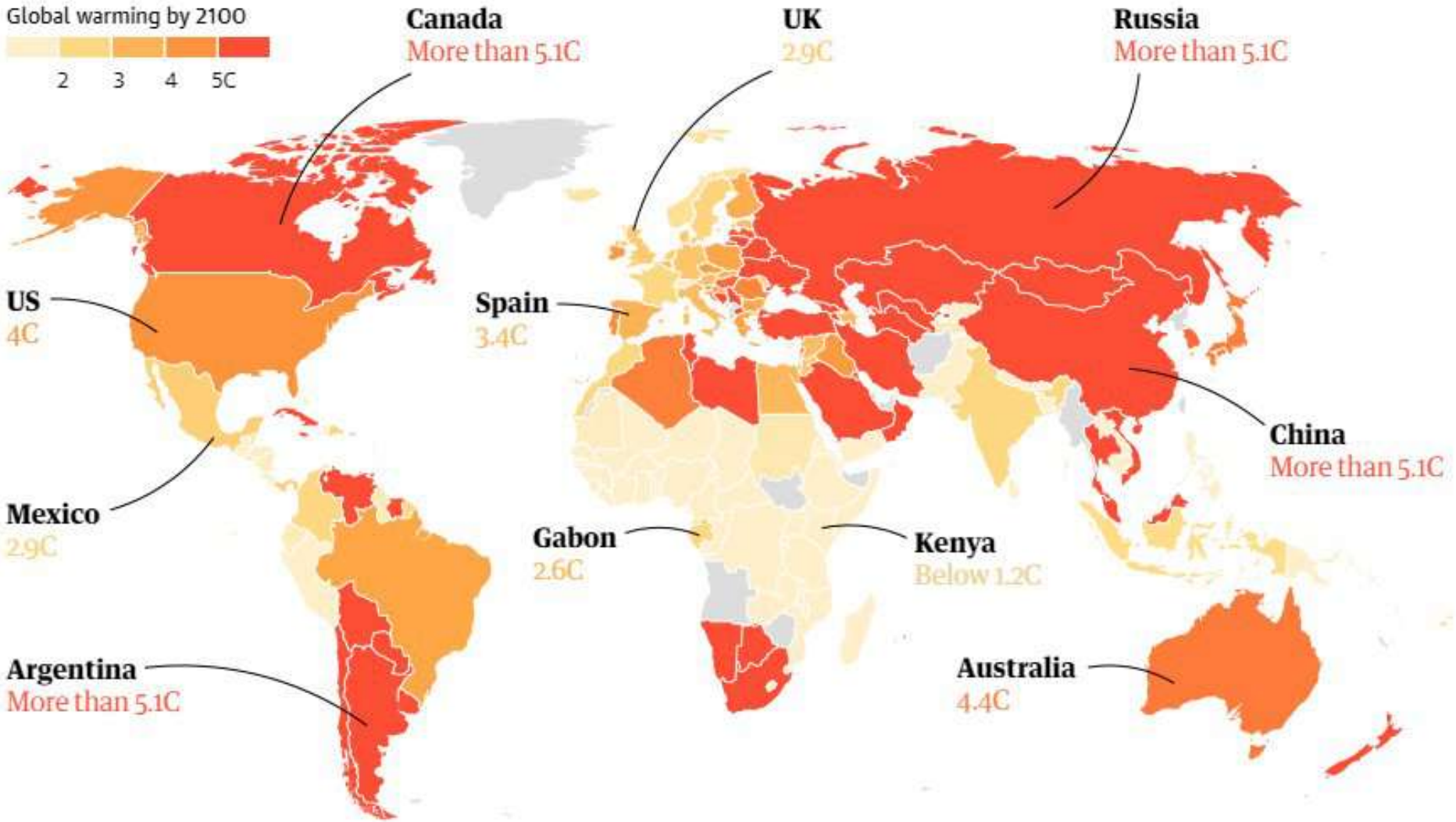
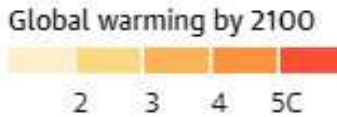
Global warming relative to 1850-1900 (°C)



Source: 2018 IPCC

# Climate goals are off course. Which countries are to blame?

New study shows China leading world to 5.1C of global warming, US to 4C and EU to 3.2C

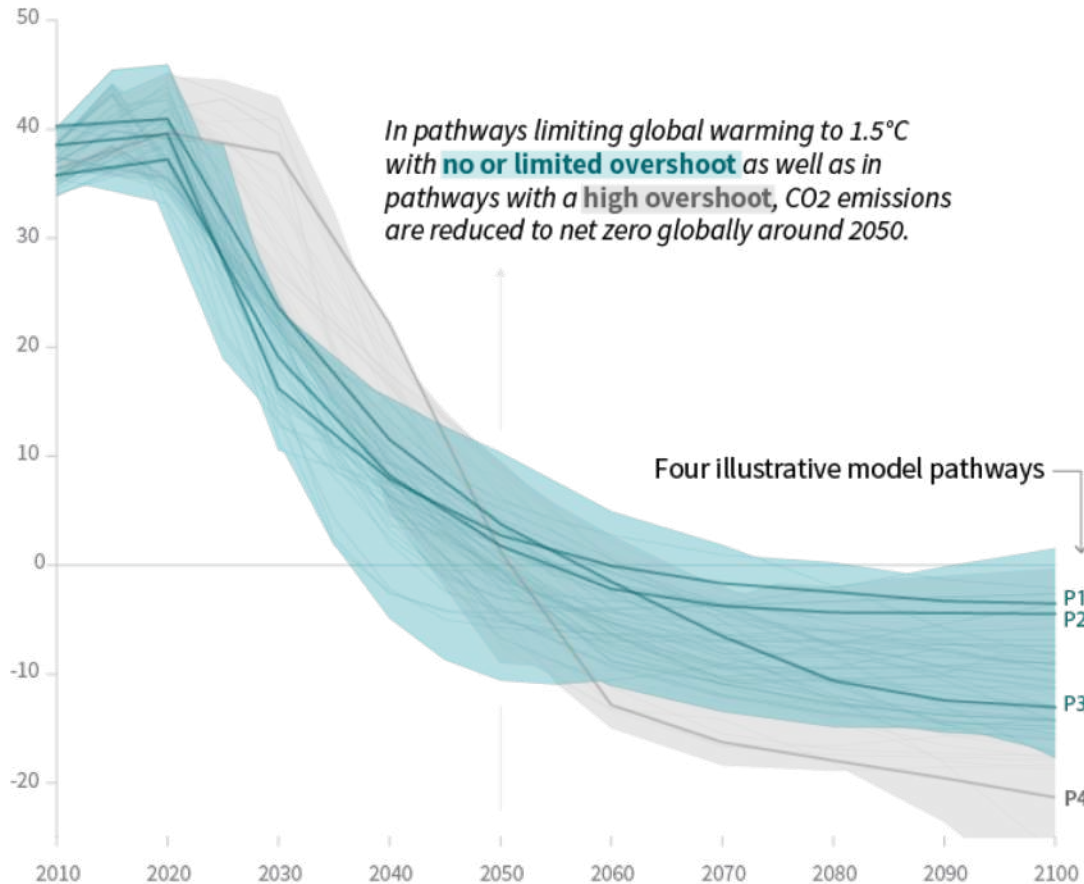


Guardian graphic | Source: Nature Communications

# GHG Reductions Needed

## Global total net CO<sub>2</sub> emissions

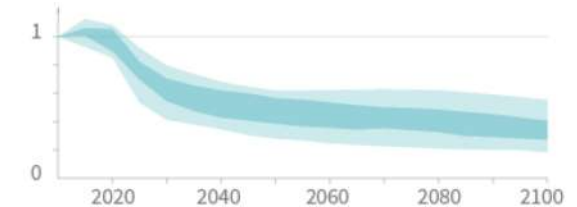
Billion tonnes of CO<sub>2</sub>/yr



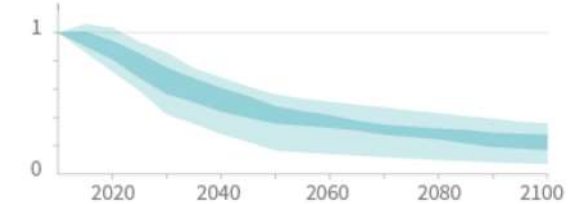
## Non-CO<sub>2</sub> emissions relative to 2010

Emissions of non-CO<sub>2</sub> forcers are also reduced or limited in pathways limiting global warming to 1.5°C with **no or limited overshoot**, but they do not reach zero globally.

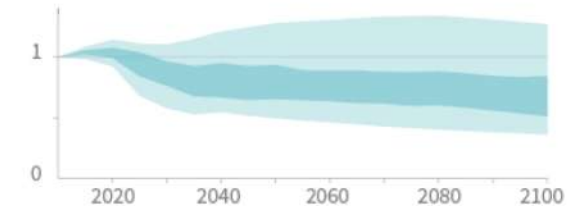
### Methane emissions



### Black carbon emissions



### Nitrous oxide emissions



# Massive Investment Need

- CERES 2014 “The Clean Trillion”
- IPCC 2018 “limiting global warming to 1.5°C are projected to involve the annual average investment needs in the energy system of around **2.4 trillion USD** 2010 between 2016 and 2035”
- So this creates a *financing opportunity*
- But in terms of *secondary markets there will be winners and losers*

# Climate Risk: Who is involved

## ASSETS



EXPOSED TO  
DIFFERENT  
ENVIRONMENTAL  
RISKS AND  
OPPORTUNITIES

## COMPANIES



OWN  
EXPOSED  
ASSETS

## ASSET MANAGERS



OWN  
COMPANY  
DEBT AND  
EQUITY

## ASSET OWNERS



ALLOCATE  
CAPITAL TO  
ASSET  
MANAGERS  
OR ACT AS  
ASSET  
MANAGERS  
THEMSELVES

## POLICYMAKERS AND REGULATORS



MANAGE  
MICROPRUDENTIAL  
RISK, SYSTEMIC  
RISK, ECONOMIC  
GROWTH, AND  
WANT TO  
IMPLEMENT NDCs  
SUCCESSFULLY







# Mark Carney: on Climate Change [[Video](#)]

“... Climate change is the tragedy of the horizon. We don’t need an army of actuaries to tell us that the catastrophic impacts of climate change will be felt beyond the traditional horizons of most actors – It imposes a cost on future generations that the current generation has no direct incentive to fix...”

Mark Carney, Bank of England Governor, Speech given at Lloyd’s of London (2015)

# CLIMATE FINANCE RISKS

## Physical Risks

-  Flooding
-  Drought
-  Sea level rise
-  Heat stress
-  Wind



Physical assets, agriculture, workers



↓ Lower asset valuation  
Lower productivity

## Transition Risks

-  Policy
-  Technology
-  Consumer Preferences

Firms in sector affected by the transition



↑ ↓ Impact on demand  
Impact on profit

## Liability Risks

-  Insurance claims
-  Legal actions

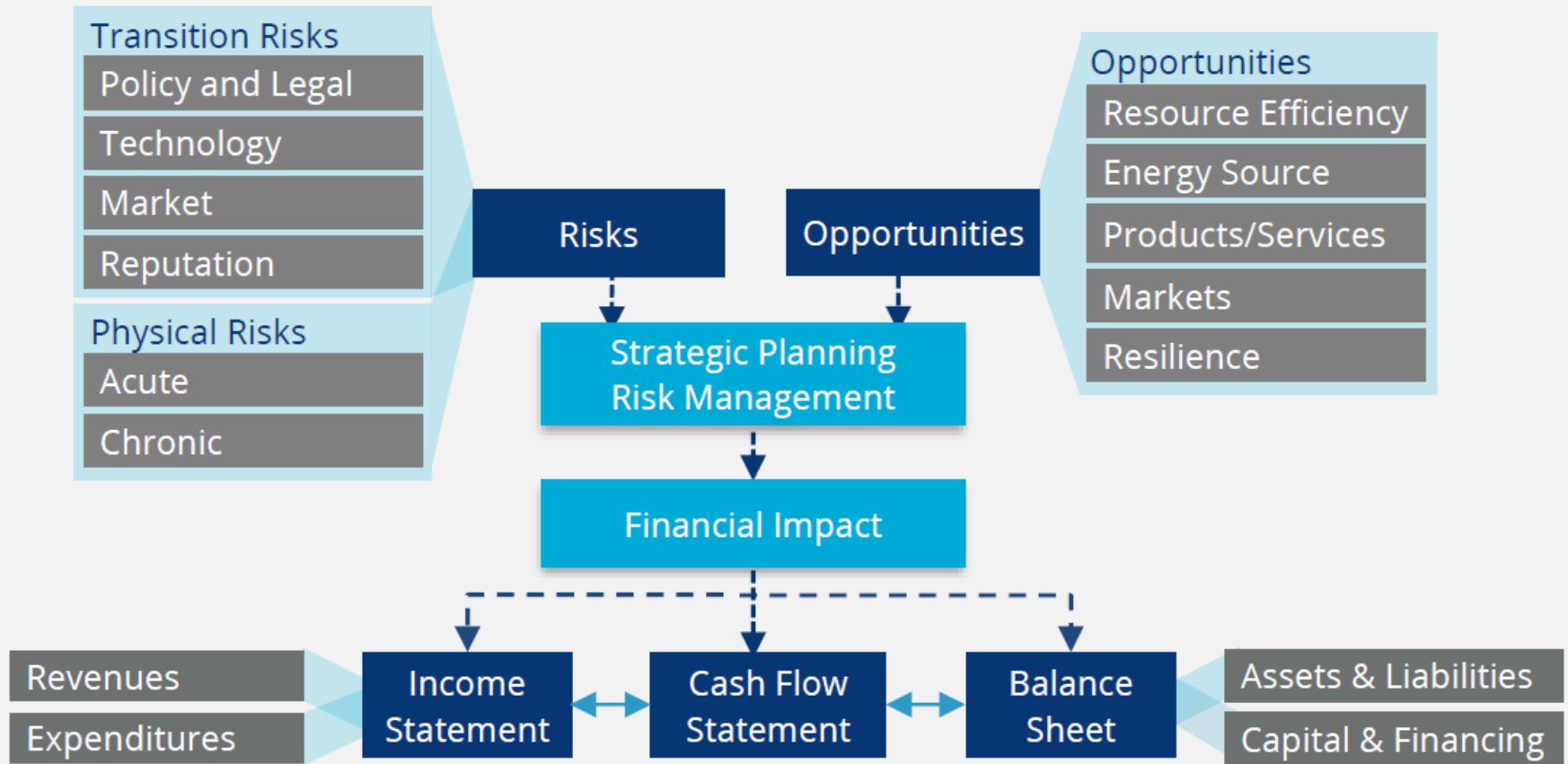
Financial Institutions

Banks, insurers,  
institutional investors



Bank of England Quarterly Bulletin, 2017

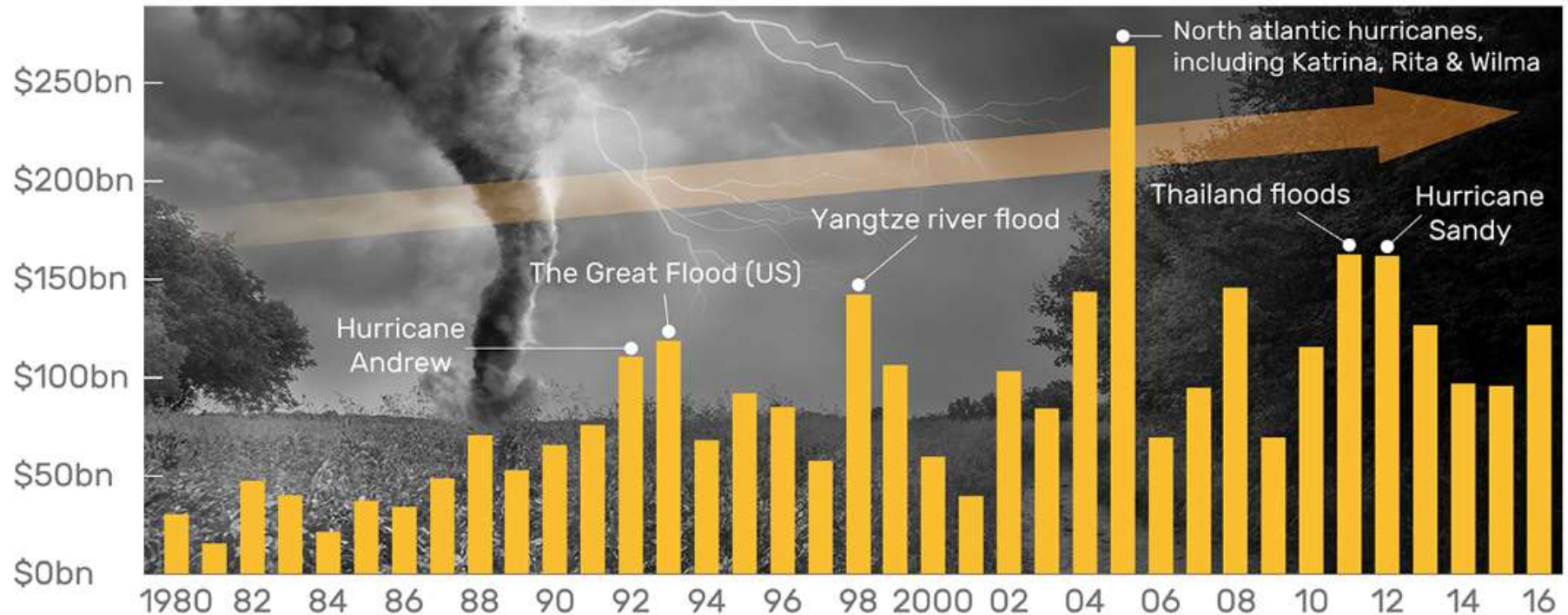
# Climate-Related Risks, Opportunities, and Financial Impact



# Physical Risk

Global economic losses from extreme weather events have increased

Insured & uninsured losses



Note: The labelled events contributed significantly but not exclusively to losses in those years.

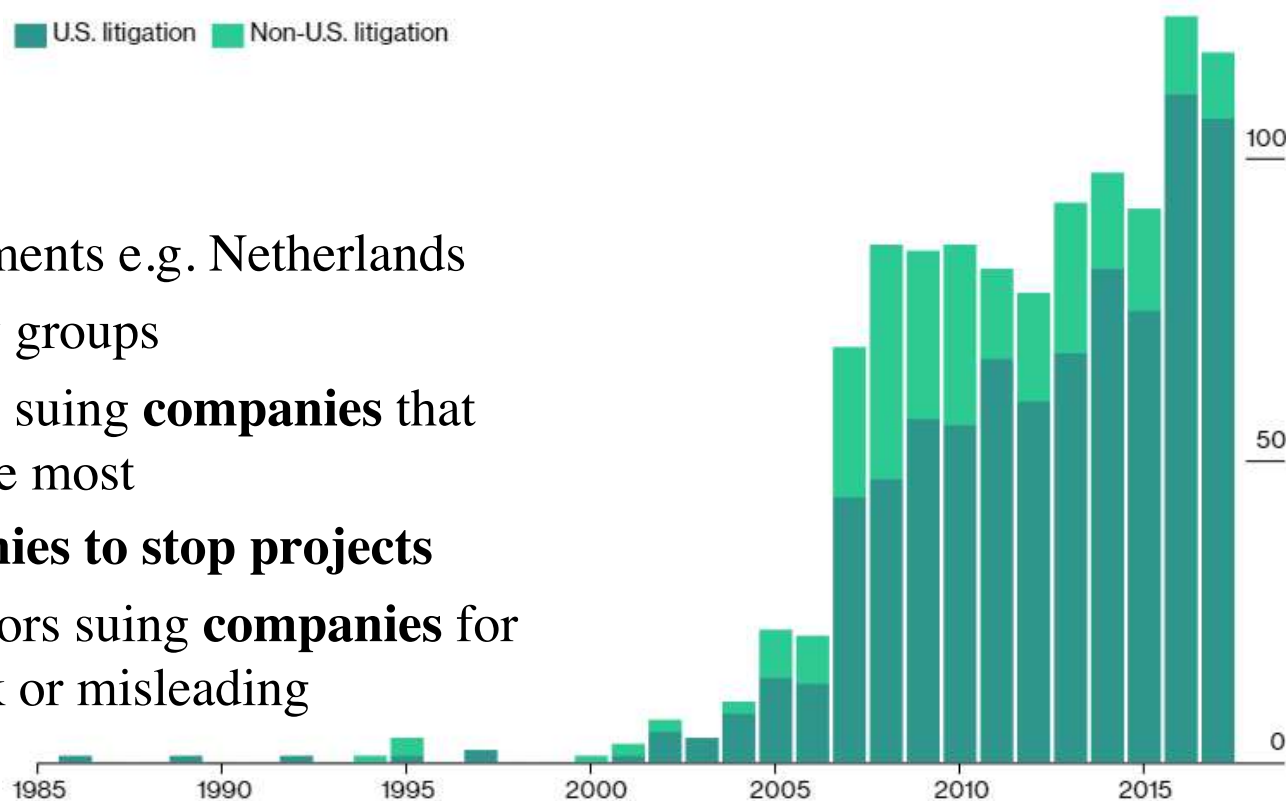


# Litigation Risk



Number of climate change lawsuits by year

■ U.S. litigation ■ Non-U.S. litigation



Sources: Sabin Center, Arnold & Porter, Grantham Research Institute

- Citizen suing governments e.g. Netherlands
- Scientists suing lobby groups
- Those affected by CC suing **companies** that have been emitting the most
- NGO's suing **companies to stop projects**
- Regulators and investors suing **companies** for failure to disclose risk or misleading investors/public

# Securities law (examples)

FT Trading Room **Financial & markets regulation**

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## Peabody Energy misled on climate change, says NY regulator

US coal producer forced to revise statements after regulatory probe

Exxon Mobil Corp

+ Add to myFT

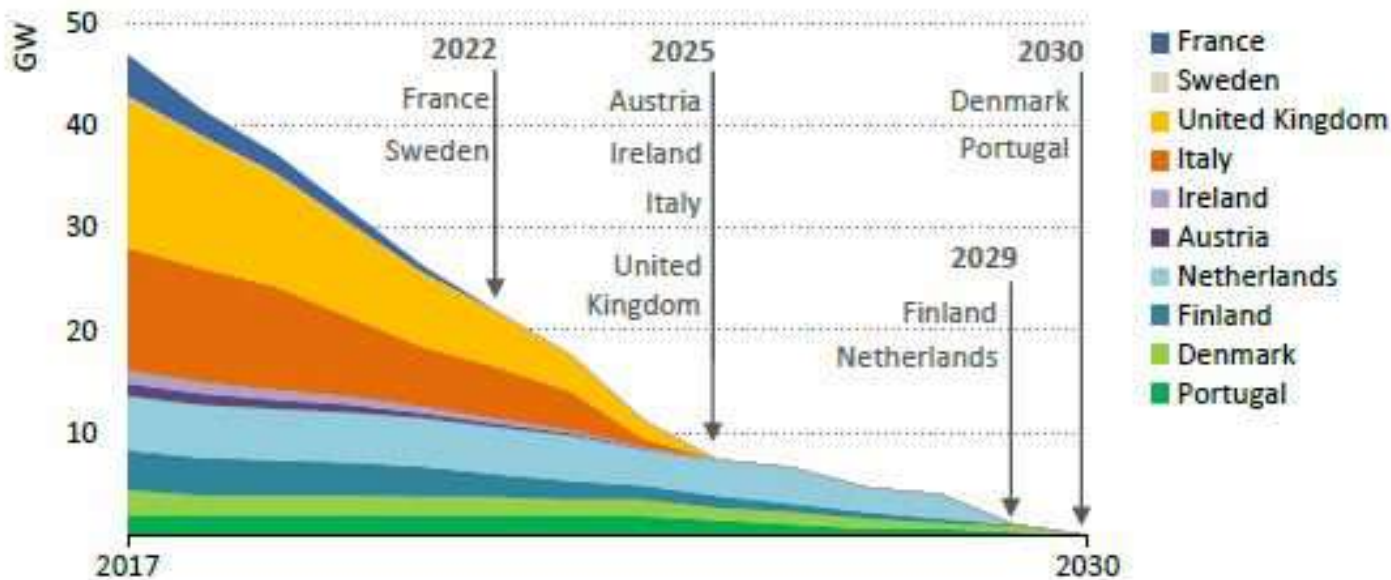
## New York sues Exxon for misleading investors on climate change risks

Oil company accused of being deceptive about the emissions threat to its business

# Transition Risk

*Transition Risk = Winners & Losers*

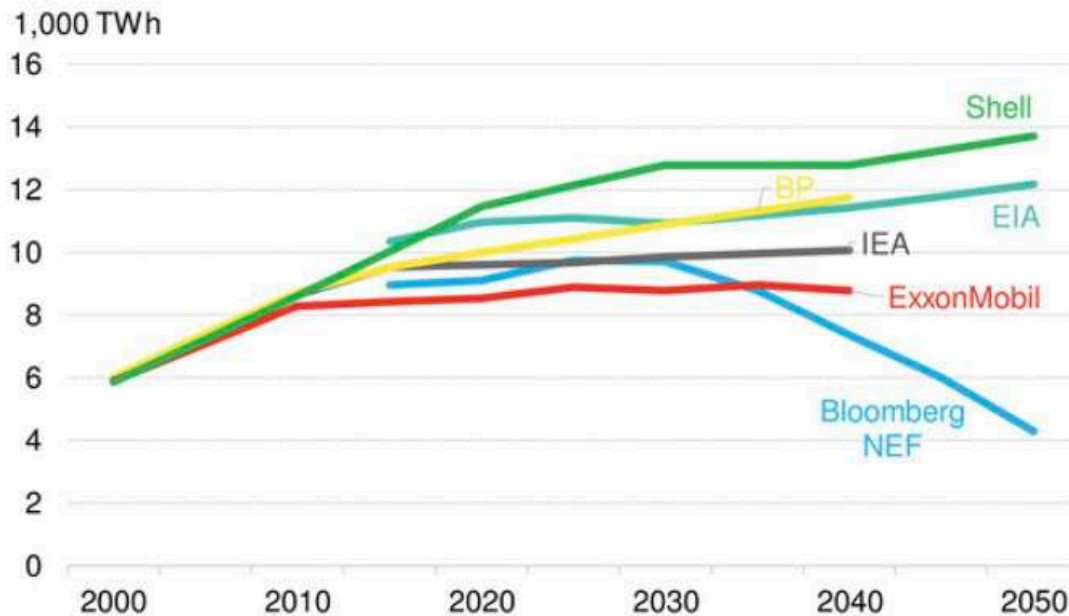
**Figure 8.29** ▶ Plans to phase out coal in the European Union



By 2030, 28% of the existing coal-fired fleet will be retired in line with recent policy announcements

- Extent of winners/losers depends speed of transition
- Investor rely on market forecasts of speed of transition
- But increased uncertainty related to the future (contrasting forecast)

## Electricity generation from coal by long-term outlook



Source: Bloomberg NEF, IEA, EIA, BP, ExxonMobil, Shell, Newell et al. 2017

Switch to renewables means lower utilization of coal generating plant = *stranded assets*



THE WALL STREET JOURNAL.

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### Coal Company Blackjewel on Brink of Liquidation After Chapter 11 Loan Disappears

Blackjewel lawyer said the company could be liquidated after planned loan from CEO falls through

By Jonathan Randles  
Updated July 1, 2019 6:29 pm ET



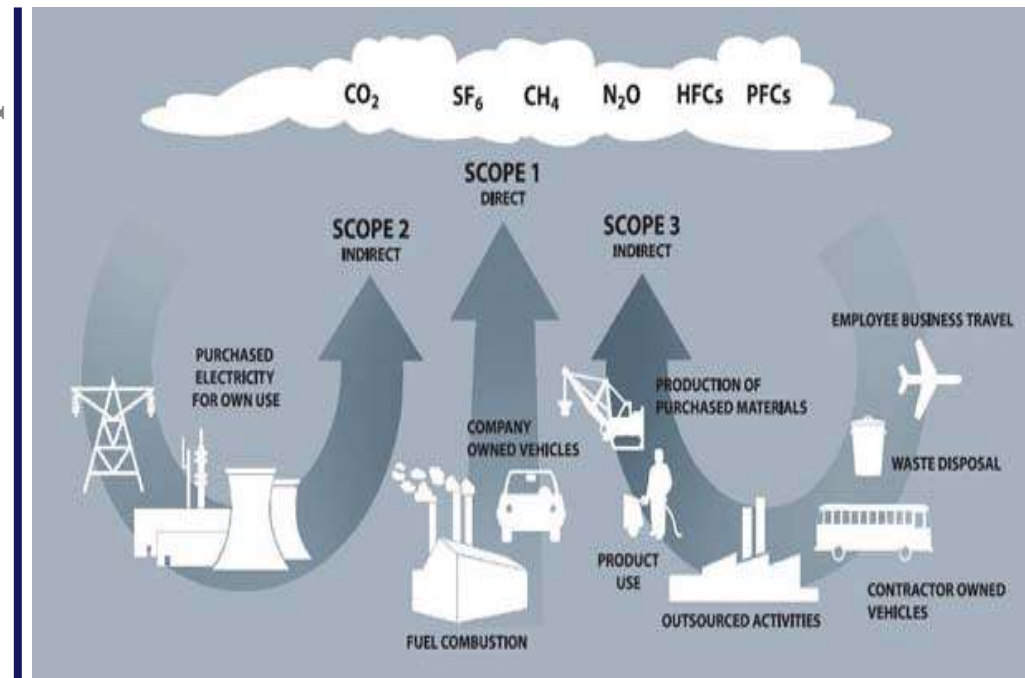
# A Definition of Corporate Carbon Footprint

## Definition

“Carbon Footprint is a measure of the exclusive total amount of carbon dioxide (CO<sub>2</sub>) that is directly and indirectly caused by an activity or is accumulated over the life stages of a product”  
(Wiedmann and Minx, *Ecological Economics Research Trends*, 2008, p. 5)



## Scope



# The Greenhouse Gas Protocol [[Video](#)]

## **Scope 1: Direct GHG emissions**

Direct GHG emissions occur from sources that are owned or controlled by the company, e.g. boilers, furnaces, vehicles, etc.; emissions from chemical production in owned or controlled process equipment.

## **Scope 2: Electricity indirect GHG emissions**

Scope 2 GHG emissions from the generation of purchased electricity. Scope 2 emissions physically occur at the facility where electricity is generated.

## **Scope 3: Other indirect GHG emissions**

Scope 3 is an optional reporting category. All other indirect emissions.

Ranganathan et al (2004). The greenhouse gas protocol: a corporate accounting and reporting standard (revised edition). *Washington, DC: World Resources Institute and World Business Council for Sustainable Development.*

# Hypothetical Carbon/GHG Liability

- Rough estimate of carbon liability given by
  - Total Scope 1 & 2 x \$ Carbon Price = \$ Carbon Liability
  - Deduct from Profit Before Tax
  - But cost pass-through (CPT) in reality (can be high)
  - So real Liability = \$ Carbo liability x (1-CPT)

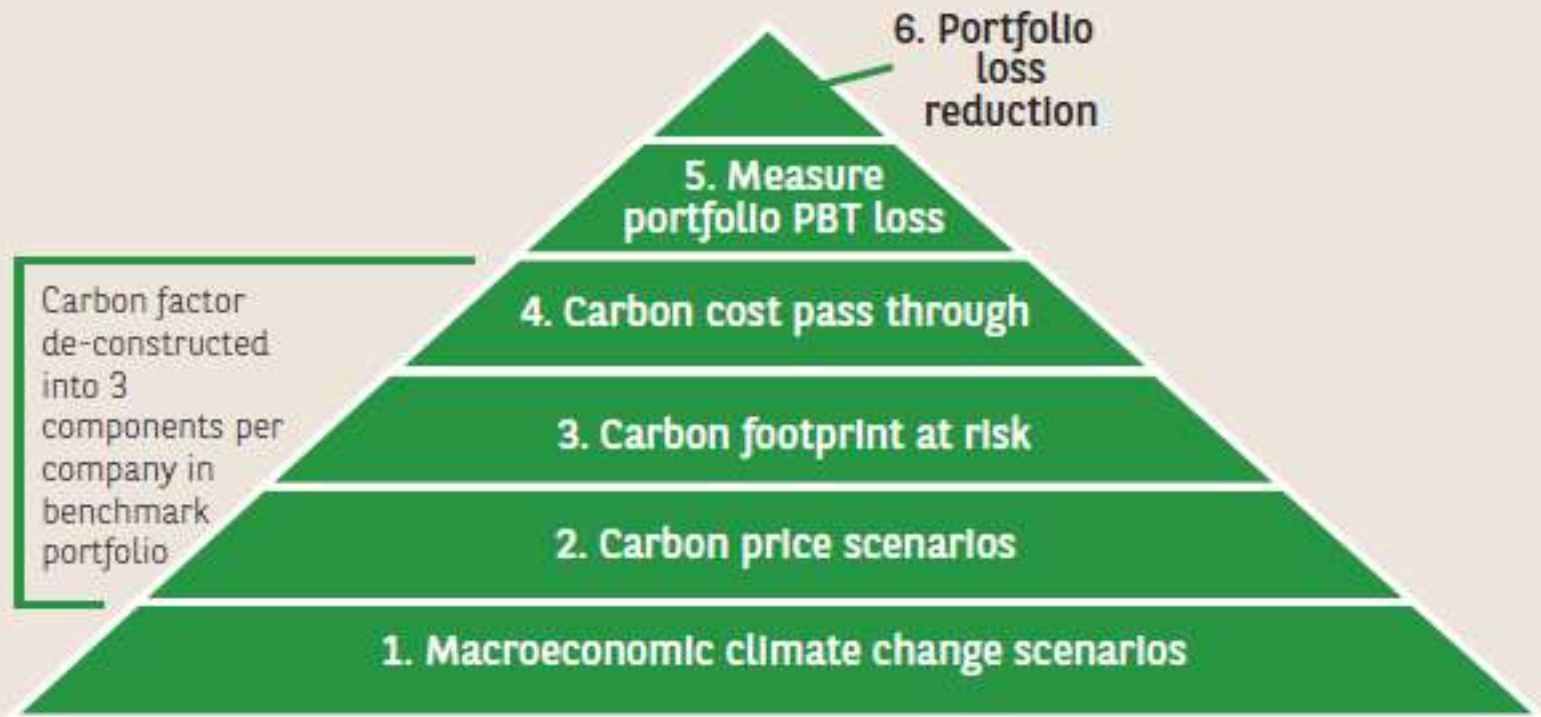
	Scenario 1	Scenario 2	Scenario 3
Cost pass-though (to consumers)	0%	0%	75%
Carbon Price	25	85	85
Total Scope 1 and 2 Emissions (mil CO <sub>2</sub> -e tonne)	15	15	15
\$ Carbon Liability (million)	375	1275	318.75
Profits Before Tax (Million)	750	750	750
PBT after carbon liability	375	-525	431.25

# Social Cost of Carbon

- But which carbon price?
  - Some countries don't have one
  - Those that have, have weak ones (generally)
- “Social cost of carbon” or true economic cost of carbon
  - “economic cost associated with climate damage (or benefit) that results from the emission of an additional tonne of carbon dioxide” (Ricke et al 2018 p895)
  - Discounted valuation of the marginal impacts of climate change
  - Range from US \$10 to \$1,000
  - US EPA in 2013 US\$12 to \$62 for discount rates of 5% and 2.5%
  - Latest estimate from climate scientist and economists
    - US\$150 to \$200 (Ricke et al 2018 p895)

# Impact on Portfolios

## Carbon price impact stress-testing approach



Source: BNP Paribas & Avalerion