

# Climate Change and the Insurance Industry

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Building a better  
working world

# What I would like to do during this presentation

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- ▶ Dispel the commonly held point of view

*“It’s just about increasing payouts for property.  
It can be addressed through higher premiums”*

- ▶ Argue that climate change is a financial threat to insurance companies’ asset-liability management and balance sheet



# Climate change as major financial risk

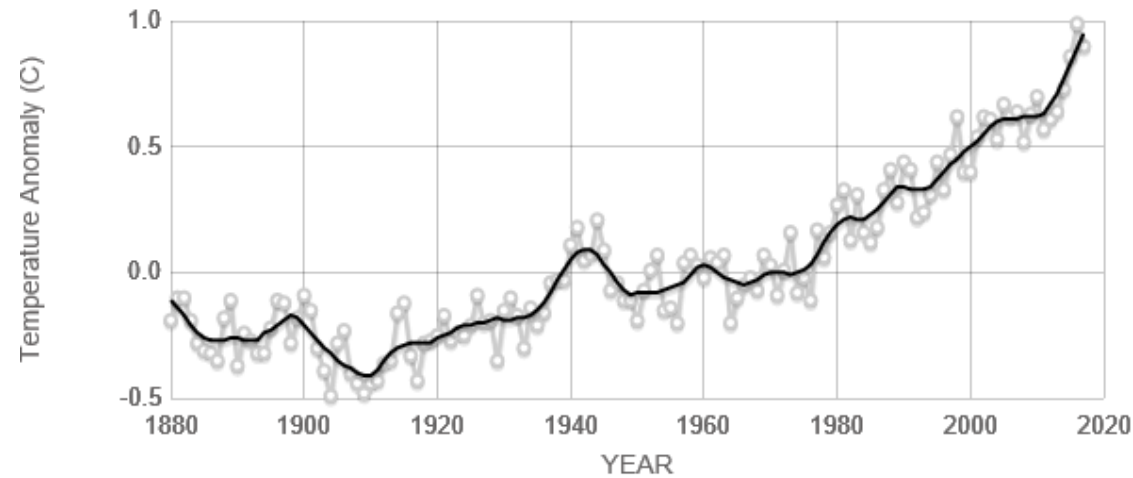


# A warming world

Jack Lemmon Marilyn Monroe Tony Curtis

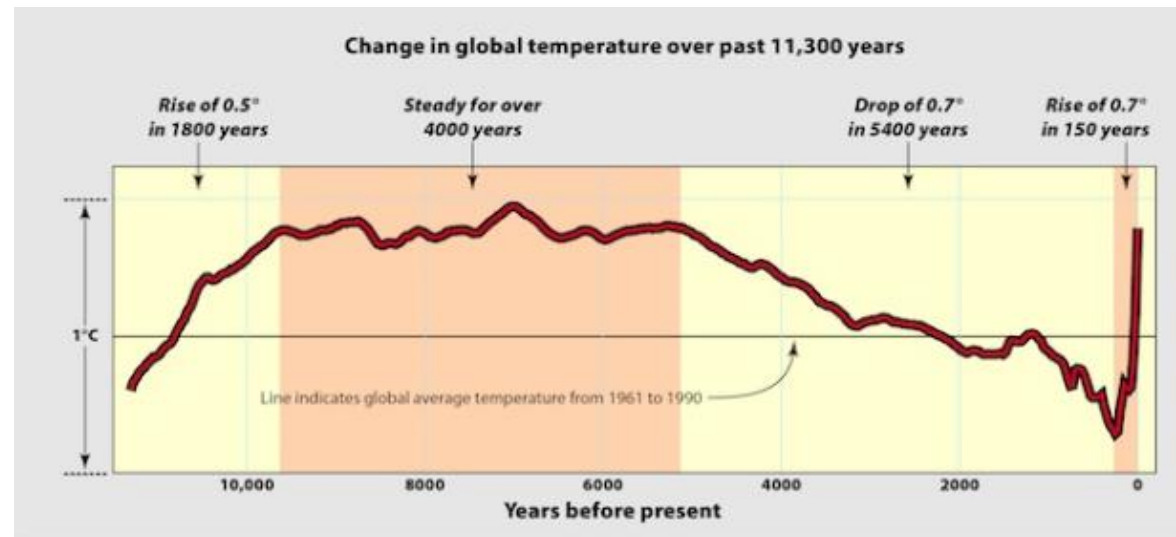


Billy Wilder's  
**SOME LIKE IT  
HOT**



Steady rise in global average temperatures since the 1970s  
The last 3 years are the warmest on record

Source: climate.nasa.gov



Temperature increases have happened before – but never so fast

Marcott & al., Science, 2013 (reconstruction by proxy)

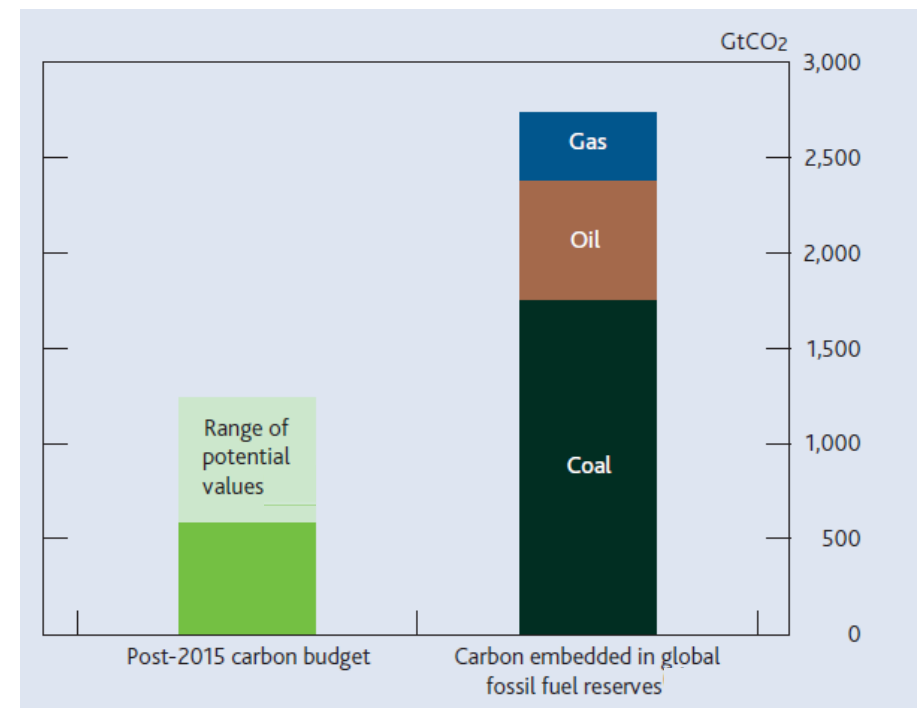
# Going over budget

## ▶ Carbon budget

- ▶ 2015 Paris Agreement: 2°C limit for non-catastrophic warming
- ▶ Meaning that roughly  $\frac{3}{4}$  of fossil fuel reserves must be left in the ground

## ▶ Reality of carbon burning

- ▶ Most countries lag behind their pledges. USA pulled out in 2017
- ▶ Fossil fuel companies have a fiduciary duty to shareholders to profit from fossil fuel reserves
- ▶ At current emission rates, the 2°C-limit will be reached in 15 years (*Nature, 2017*)
- ▶ Without drastic action, global average temperatures will likely increase by 4 to 6°C by 2100



*Bank of England, 2017*

# Climate change in action

Type of events impacting insurers	Recent examples
Heat waves	Europe, 2003 (about 70'000 casualties)
Floods	United Kingdom, June 2016
Sea-level rise	Existential risk to Miami and Maldives by 2100
Landslides	Graubünden, August 2017
Hurricanes	Harvey, Irma & Maria, August & September 2017
Droughts	California, 2011-2017 (followed by floods)
Wildfires	Europe & North America, summer 2018
Liability suits linked to climate inaction	Juliana vs. United States, Carvalho vs. EU (ongoing)
Conflicts linked to water, crop decline and migrations	Droughts in Syria triggering internal migrations
Climate-related pandemics (e.g. mosquito habitat changes)	Spread of Lyme disease areas



*The Fifth Plague of Egypt*  
Turner, 1800

# Typology of climate-related financial risks

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- ▶ Landmark speech from Mark Carney (governor of the Bank of England and chairman of the G20's Financial Stability Board) at Lloyd's of London, September 2015:



*“Breaking the tragedy of the horizon”*

- ▶ **Physical risks** linked to extreme weather events and long-term climate shifts
  - ▶ Direct (e.g. property destruction, human casualties)
  - ▶ Indirect (e.g. business interruption, impact on financial markets)
- ▶ **Liability risks** from parties seeking compensation for climate change losses
  - ▶ Directly (fossil fuel extractors, carbon emitters, governments)
  - ▶ Indirectly for insurers providing liability cover
- ▶ **Transition risks:** effects on financial markets from moving to a lower-carbon economy, prompting the reassessment of a large range of asset values

# Increasing incentives for insurers to act





# Insurers – between Scylla and Charybdis

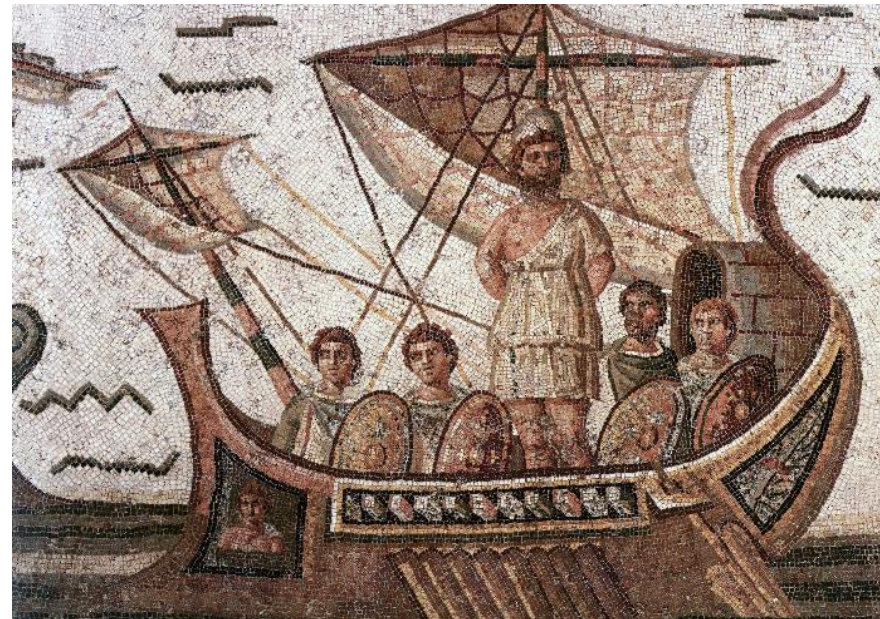
## ▶ To burn

- ▶ Regulation does not step in. Fossil fuel reserves are burned. Catastrophic climate change
- ▶ Frequency and severity of **climate change-related claims** increase
- ▶ Insurers increase premiums, but this ultimately creates **un-insurability**
- ▶ Related financial market crises

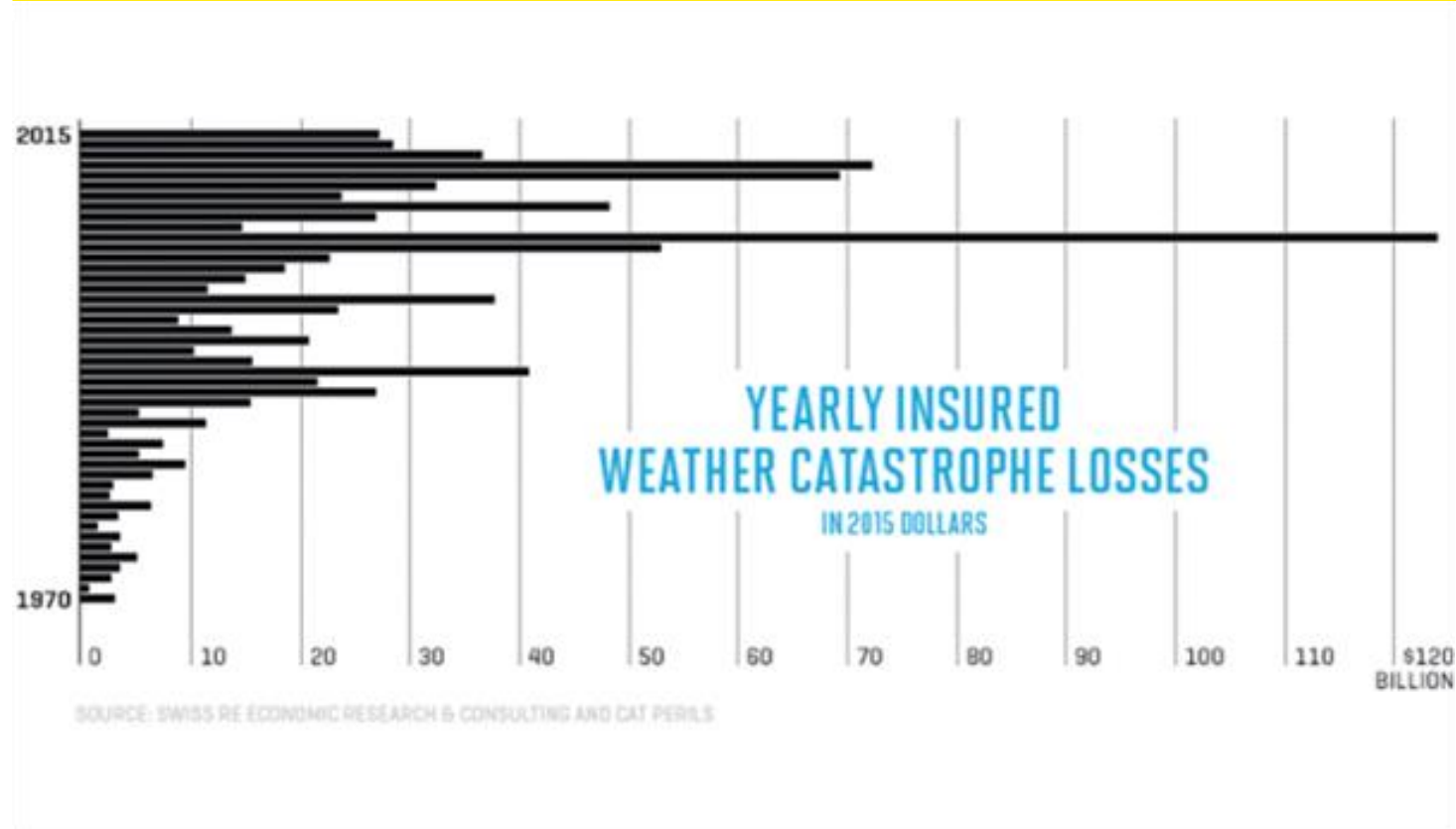
## ▶ Not to burn

- ▶ Regulation is enacted. Rapid energy transition. Significant fossil fuel reserves left in the ground
- ▶ Climate change-related claims remain compatible with insurability
- ▶ Investments in carbon-intensive sectors depreciate and become **stranded assets**

➔ Climate change as major **asset-liability management** threat



# Mounting climate-related claims

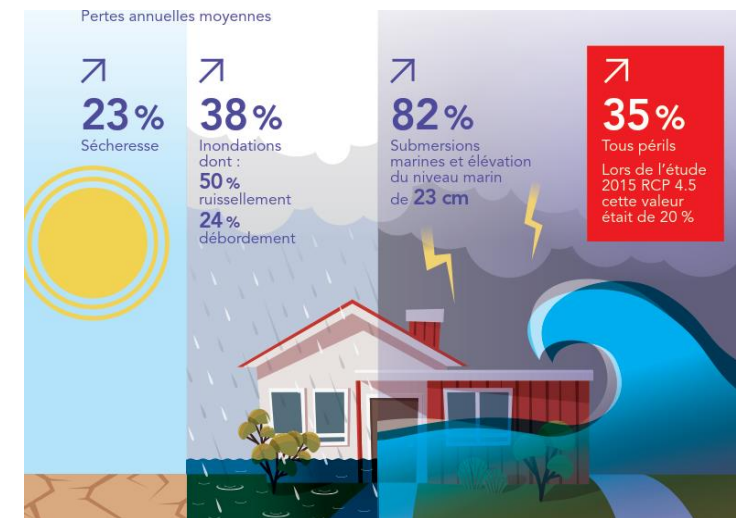


- ▶ 9 of the 10 highest weather-related insurance losses since 1970 occurred in the last 15 years (Sources: Swiss Re, Aon)
  - ▶ Including 3 “hundred-year” hurricanes in 2017 alone (Harvey, Irma, Maria)

# Climate change or exposure growth?

- ▶ Analysis of global insured losses growth (1980-2014) *(Aon, 2014)*
  - ▶ 85% explained by economic growth and migration to more exposed areas (coasts, cities)
  - ▶ 15% explained other factors, prominently climate change
- ▶ Impact of hurricane Sandy in New York (2012) *(Lloyd's, 2014)*
  - ▶ Sea-level rise increased coastal flooding damages (storm surge) by 30%
  
- ▶ Forecast: expected insured losses in France by 2050 *(Sources: CCR & Météo France, 2015 & 2018)*

Scenario	IPCC reference	Temperature increase by 2100	Loss increase due to climate-change alone
Paris agreement succeeds	RCP4.5	≈ 2°C	20%
Business as usual	RCP8.5	≈ 4°C	35%



# Underwriting – short-term optimum

*“Insurance policies are customarily written for one year and repriced annually to reflect changing exposures. Increased possibilities of loss translate promptly into increased premiums.*

*[...] Paradoxically, the upward march in loss costs has made insurance companies far more valuable.”*



*Warren Buffet, annual shareholder letter, February 2016*

## ▶ Typical underwriting responses

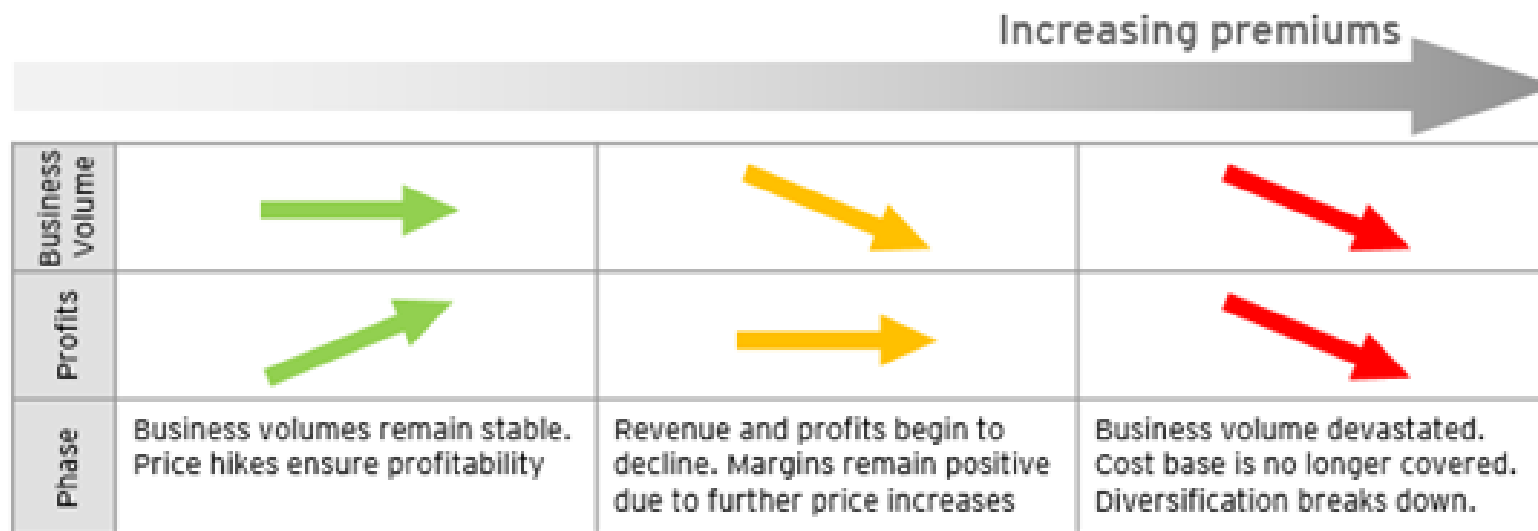
- ▶ Increase premiums of annual contracts
- ▶ Drop riskier covers
- ▶ Hollow out coverage (deductibles, limits, exclusions)

*Example: US carriers like State Farm and Allstate cutting back on writing homeowners' insurance policies in Florida*

- ▶ For a given insurer acting without coordination with other players and maximizing their next annual profits, games theory agrees that it is the easiest solution

# Long-term effects – shrinking spiral

- ▶ Over time, expensive risk covers may become un-insurable (or simply unaffordable for all but the wealthiest), shrinking business volume



- ▶ Insurers cannot remain society's risk manager if they avoid rather than actively manage climate risk
  - ▶ Increasing state intervention is likely (mandatory covers, pooling mechanisms etc.)

# The divestment movement is gaining momentum

- ▶ Hundreds of institutions in many countries have committed to divest from fossil fuels
  - ▶ Latest divestment pledges include the Catholic church and New York City
  
- ▶ Pension funds and insurers represent the largest sectors committing to divestment (in particular coal, including underwriting)
  - ▶ Examples: pledges from Allianz, AP7 (Swedish state pension fund), AXA, Swiss Re
  
- ▶ Public scrutiny and shareholder activism are increasing

	COAL UNDERWRITING	COAL DIVESTMENT	OTHER CLIMATE LEADERSHIP
Swiss Re (Switzerland)	👍	👍	👍
Zurich (Switzerland)	👍	👍	👍
AXA (France)	👍	👎	👍
SCOR (France)	👎	👍	👍
Aviva (U.K.)	N/A	👎	👍
Allianz (Germany)	👎	👎	👍
Munich Re (Germany)	👎	👎	👍
Legal & General (U.K.)	N/A	👎	👍
Lloyd's (U.K.)	N/A	👎	👍
Generali (Italy)	👎	👎	👎
MetLife (U.S.)	N/A	👎	👎
Sompo (Japan)	👎	👎	👎
XL Catlin (U.S.)	👎	👎	👎
AIG (U.S.)	👎	👎	👎
Axis Capital (U.S.)	👎	👎	👎
W.R. Berkley (U.S.)	👎	👎	👎
Berkshire Hathaway (U.S.)	👎	👎	👎
Chubb (Switzerland)	👎	👎	👎

Unfriend Coal (NGO) scorecard, 2017

# Other threats to carbon assets

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- ▶ Governments are increasing climate-related regulation
  - ▶ Restrictions on the sale of “dirty” cars in European countries
  - ▶ Pledges to close coal plants from France, UK and Canada by 2030
  - ▶ 50 countries pledged to source all their energy from renewables by 2050
- ▶ Technology is helping reduce the need for fossil fuels
  - ▶ Advances in renewable energies and storage
  - ▶ Electric cars + sharing economy (fewer car sales)
  - ▶ “Smart” cities reducing energy consumption
  - ▶ Use of drones replacing carbon-intensive fleets in agriculture and deliveries

*“I do not want to sit by and then discover in the near future that insurance companies’ books are filled with stranded assets that have lost their value because of a shift away from the carbon-based economy, jeopardizing their financial stability and ability to meet their obligations, including paying claims to policyholders.”*

**Commissioner Dave Jones, California Department of Insurance**

# Non-financial disclosures

## European directive 2014/95/EU on non-financial and diversity information

Includes disclosure of environmental details and greenhouse gas emissions for large companies.

Local regulation in France, Sweden (state pension funds) and California goes further

## The Montréal Carbon Pledge

Voluntary commitment to measure and disclose the carbon footprint of investment portfolios on an annual basis.

Signatories include major insurers and pension funds e.g. Aviva, AXA or CalPERS

## Recommendations of the G20's TCFD (Task force on Climate-related Financial Disclosures)

Voluntarily disclosure of climate-related details in annual financial reports, including the impact of a 2°C scenario.

## No constraint or mandatory stress testing for insurers and pension funds in Switzerland so far

Asset stress-testing: free voluntary pilot project in 2017 for insurers and pension funds to test their equity and corporate bond portfolio's compatibility with a 2°C warming scenario.

Result: investments in carbon-intensive assets are consistent with a 6°C warming (!)



# Insurers' asset exposure

- ▶ No comprehensive study available at this time
- ▶ Exposure of financial institutions' balance sheet to carbon-intensive assets

Netherlands: 2017  
"Waterproof" study

- ▶ Banks: 11%
- ▶ **Pension funds: 12%**
- ▶ **Insurers: 5%**

France: disclosures  
following the 2015  
Energy Transition Law

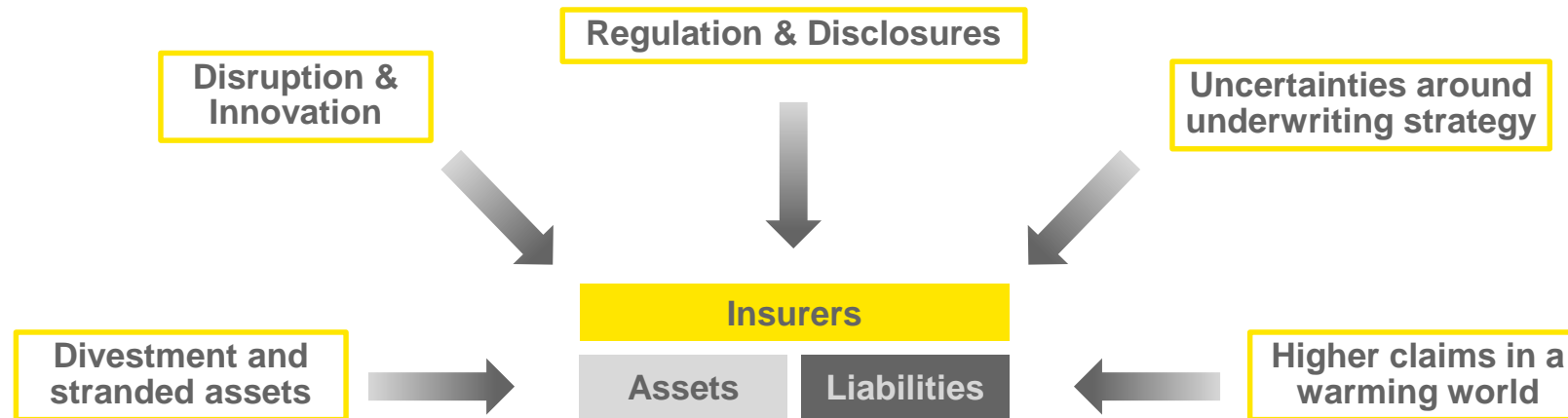
- ▶ Banks: 13%



AXA's equity portfolio  
would lose 4% in a 2°C  
scenario (AXA's climate-related  
disclosures, April 2018)

A 6°C scenario could wipe  
out **up to 30% of all  
assets worldwide** (*The  
Economist Intelligence Unit, 2015*)

# Increased pressure on insurers' balance sheets



- ▶ Insurers have both a high exposure to climate change and a unique perspective, due to their combination of underwriting and asset management activities
- ▶ How will insurance companies react:
  - ▶ Increasing liabilities, depreciated assets, shrinking revenue, shareholders revolt?
  - ▶ Or active risk mitigation, increased resilience, better brand, new opportunities?

# Opportunities to adapt



# Active climate risk management

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- ▶ In the past
  - ▶ Insurance companies founded fire brigades
  - ▶ Lobbying for safer building codes
- ▶ Going forward
  - ▶ Investments in climate-resilient infrastructure
  - ▶ Climate change education, innovation and research



**TOKIO MARINE**

*Example #1:*

Mangrove restoration project designed to offset the company's carbon footprint and improve protection of insured infrastructure against storms



**ZURICH**

*Example #2:*

Flood-resilience measurement framework. Water Window Challenge, funding the best ideas with USD 10m

# Setting the right policyholder incentives

- ▶ Encouraging climate-friendly behaviour
  - ▶ Premium discounts for drivers of hybrid/electric cars (Farmers)
  - ▶ Cheaper mortgage rate for energy-efficient homes (Fortis)
- ▶ Smart claim payments
  - ▶ Resilient reinstatement of property damage instead of simple like-for-like replacement

Property location	Value (USD )	Number of floodings	Total claims
Baton Rouge, LA	56k	40	428k
Saint Louis, MO	90k	34	608k
Houston, TX	120k	16	1m

Source: USA Today, 2017

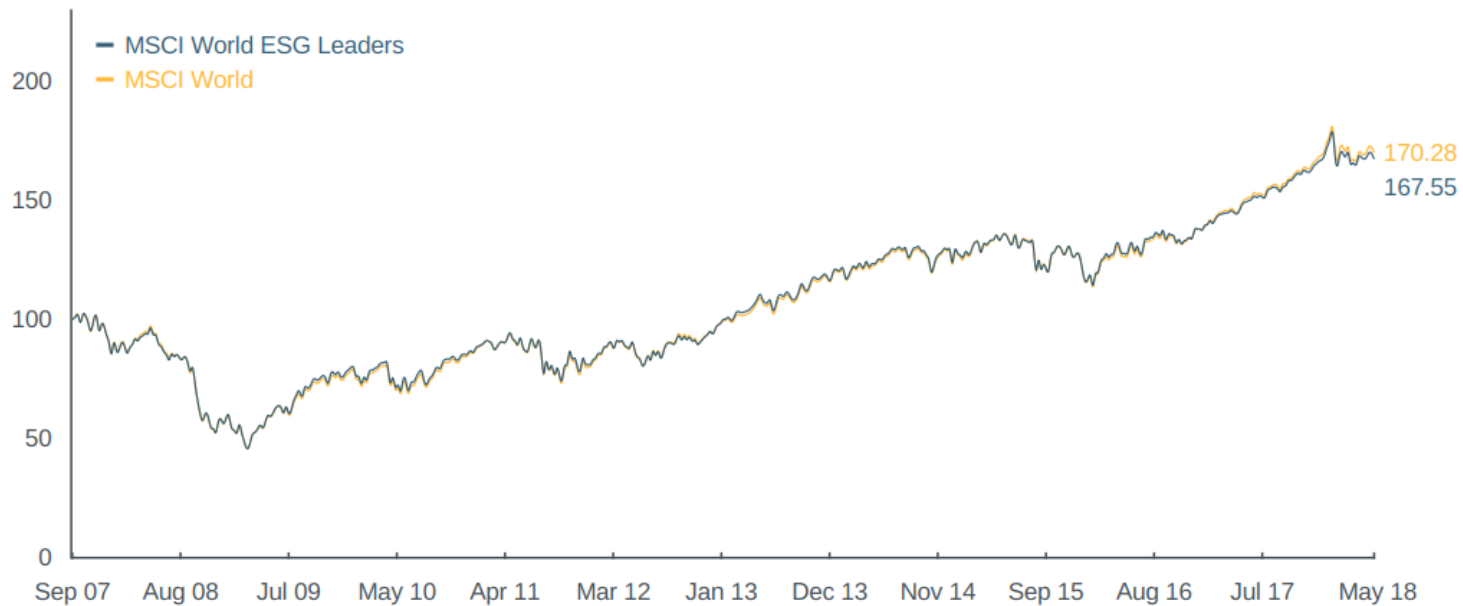
- ▶ Blueprint: **multi-year property insurance**
  - ▶ Tied to the property, not the owner
  - ▶ The property value would include the price of the insurance (climate-resilience being worth more)
  - ▶ Limits flexibility for policyholders and increases risk for insurers, so this would need regulatory or industry support



# Acting through investments

- ▶ Fast growing volume of “green” bonds (earmarked for environmental projects)
  - ▶ Zurich Insurance: \$2.4bn current investments (with a target of \$5bn of total impact investment)
- ▶ “Climate-friendlier” benchmarks
  - ▶ Swiss Re (\$130 bn investment in MSCI ESG index)

**CUMULATIVE INDEX PERFORMANCE - GROSS RETURNS** (USD) (SEP 2007 – MAY 2018)



# New business opportunities

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- ▶ Enormous investments on clean energy and other climate responses
  - ▶ Opportunity for insurers to provide innovative products for energy users or providers
  
- ▶ Combined expertise in risk analysis and finance
  - ▶ Insurers as natural participants in carbon markets
  - ▶ Leveraging expertise in data collection, catastrophe modelling, and risk analysis



Munich Re Green Tech Solutions insures performance warranty for solar panel producers



Allianz Climate Solutions insures shortfalls in CO2 emission certificates



AXA Matrix Risk Consultants' engineers support the installation of green electricity generation

# Other benefits of investing in climate change action

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- ▶ Brand and reputation
  - ▶ Reduce the risk of hostile investor activism
  - ▶ Help recruit and keep the best talents
  - ▶ Attract new customers
- ▶ Asset risk management
  - ▶ Put to better use money currently invested at very low interest rates
  - ▶ Earn liquidity premiums (e.g. infrastructure)
  - ▶ Manage the transition to a lower-carbon economy
- ▶ Sustainable underwriting
  - ▶ Reduce exposure to climate risk
  - ▶ Avoid unintended concentration risks between assets and liabilities (ALM)
  - ▶ (Collectively) Prevent insurance from becoming unaffordable, or even un-insurability
- ▶ Promote healthier economies
  - ▶ Encourage other stakeholders to embrace resilience
  - ▶ (Collectively) Benefit from the overall improved business environment and growth



# Conclusion



# The perfect storm

- ▶ Climate change poses an existential threat to the insurance business
  - ▶ Increasing frequency and severity of losses
  - ▶ Price increases and selective underwriting could send the sector into a shrinking spiral
  - ▶ Assets depreciating either as a result of climate inaction (catastrophes) or action (transition risk)
  - ▶ Public, customer and shareholder opinion also risks turning against insurance companies



- ▶ Insurers do have options to react, maybe even thrive
  - ▶ Most opportunities may lie outside their traditional comfort zone
  - ▶ Strategies will be easier to implement either for larger companies with sufficient scale and expertise, or collectively as coordinated industry effort

# Why the “tragedy of the horizon” is so hard to break

- ▶ We (as individuals, insurers and actuaries) are ill-equipped to tackle climate change

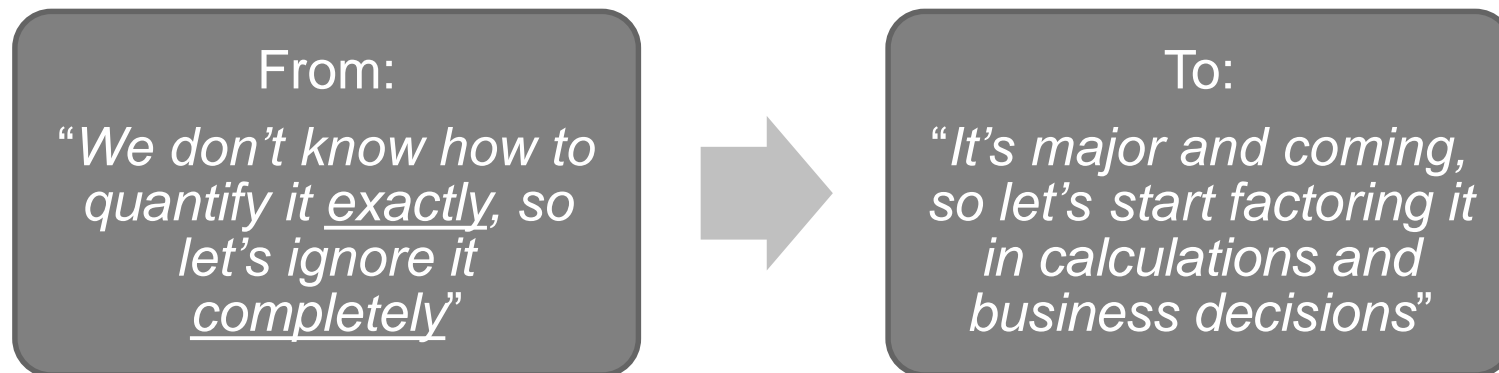
What we typically like	What we have
Abundant, reliable past data	Emerging risk
Clear trends with few outliers	Natural fluctuations leave room for interpreting individual events
Political agreement translating into regulation	Vested interests of legacy industries
Individual incentives through short-term rewards	Necessary collective action for long-term benefit



# What can we do as actuaries?

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- ▶ Climate risk indices
  - ▶ Currently being developed by the actuarial associations of USA & Canada
- ▶ Regulatory hopes?
  - ▶ Several supervisors expressed interest in using ORSA to engage with insurers on climate change risks (*IAIS Issues paper, 2018*)
  - ▶ Why not a regulatory stress test? The SST / Solvency II already include longevity stresses for this conceptually similar long-term risk
  - ▶ Open the debate about the capital charge for green investments?



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