Break in the Ice: Climate Risk and the Insurance Industry

OFFICE of the INSURANCE COMMISSIONER
WASHINGTON STATE

CLIMATE IMPACTS GROUP
UNIVERSITY of WASHINGTON
College of the Environment

Join the conversation for today's summit

#WAclimatesummit

WA OIC

- Twitter: @WA_OIC
- Facebook: www.facebook.com/WSOIC

UW CIG

- Twitter: @CIG_UW

Opening

The Honorable Charlene Nelson,
Chairwoman of the Shoalwater Bay Tribe

1 p.m. – 1:10 p.m.

Welcome and introduction

Mike Kreidler,

Washington State Insurance Commissioner

1:10 – 1:30 p.m.

Climate and its impacts on the Northwest

Dr. Joe Casola,

Deputy Director, UW Climate Impacts Group

1:30 - 1:45 p.m.

COLLEGE OF THE ENVIRONMENT
UNIVERSITY of WASHINGTON

Climate Impacts and Adaptation Planning in Washington State

Joe Casola, PhD
Deputy Director, Climate Impacts Group
University of Washington

CLIMATE IMPACTS GROUP

Climate Science in the Public Interest

What we know…

CLIMATE MATTERS

What we know…

CLIMATE MATTERS

CLIMATE CHANGE IS EXPECTED

What we know…

CLIMATE MATTERS

CLIMATE CHANGE IS EXPECTED

WE CAN TAKE ACTION TO PREPARE

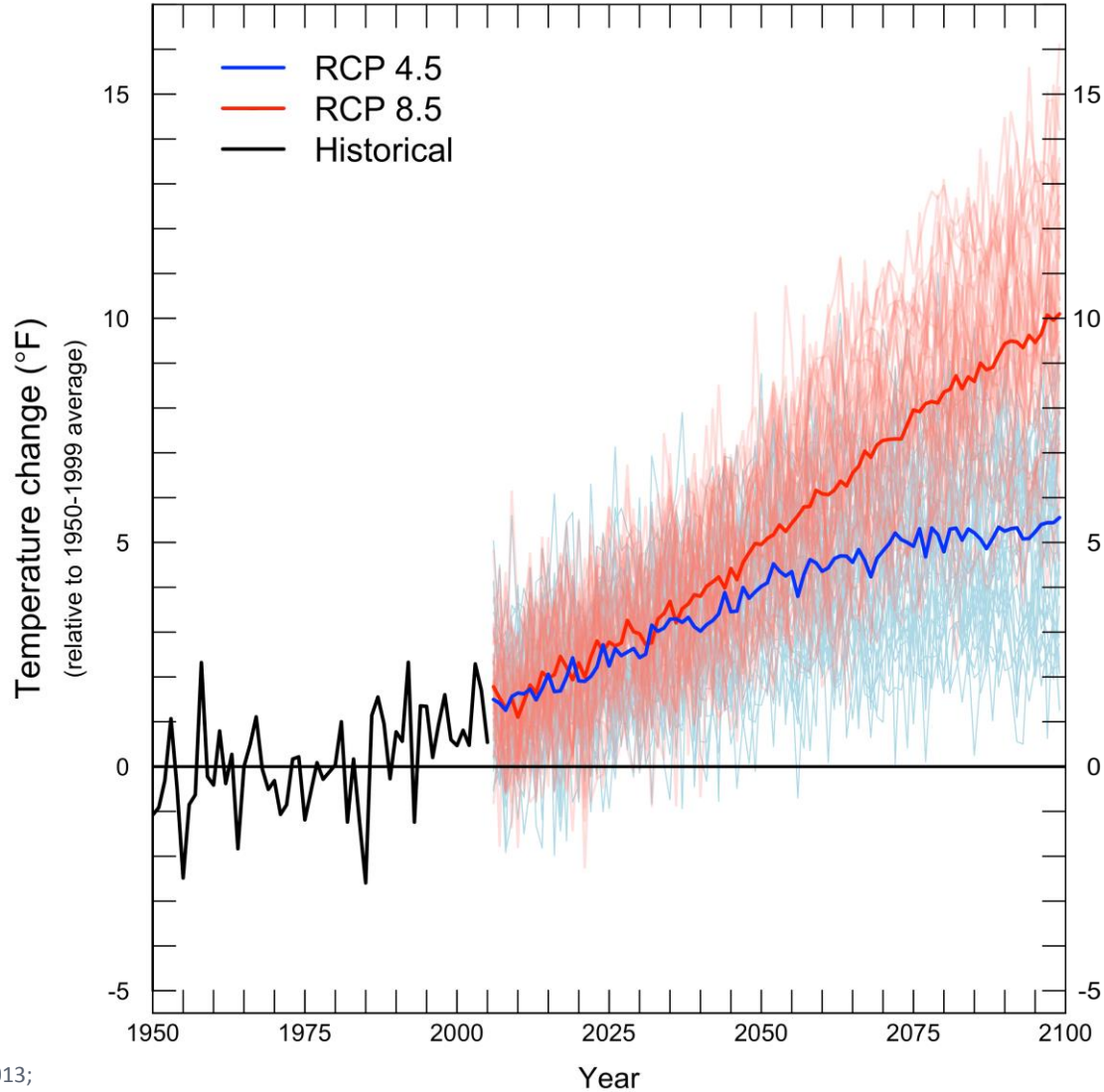
The future is unlikely to resemble the past…

- Warmer
- Changes in the hydrologic cycle
- Changes in our landscape

These changes present challenges and opportunities for communities and businesses

Rapid Warming Projected

Projected Change in Average Annual PNW Temperature (relative to 1950-1999 average)

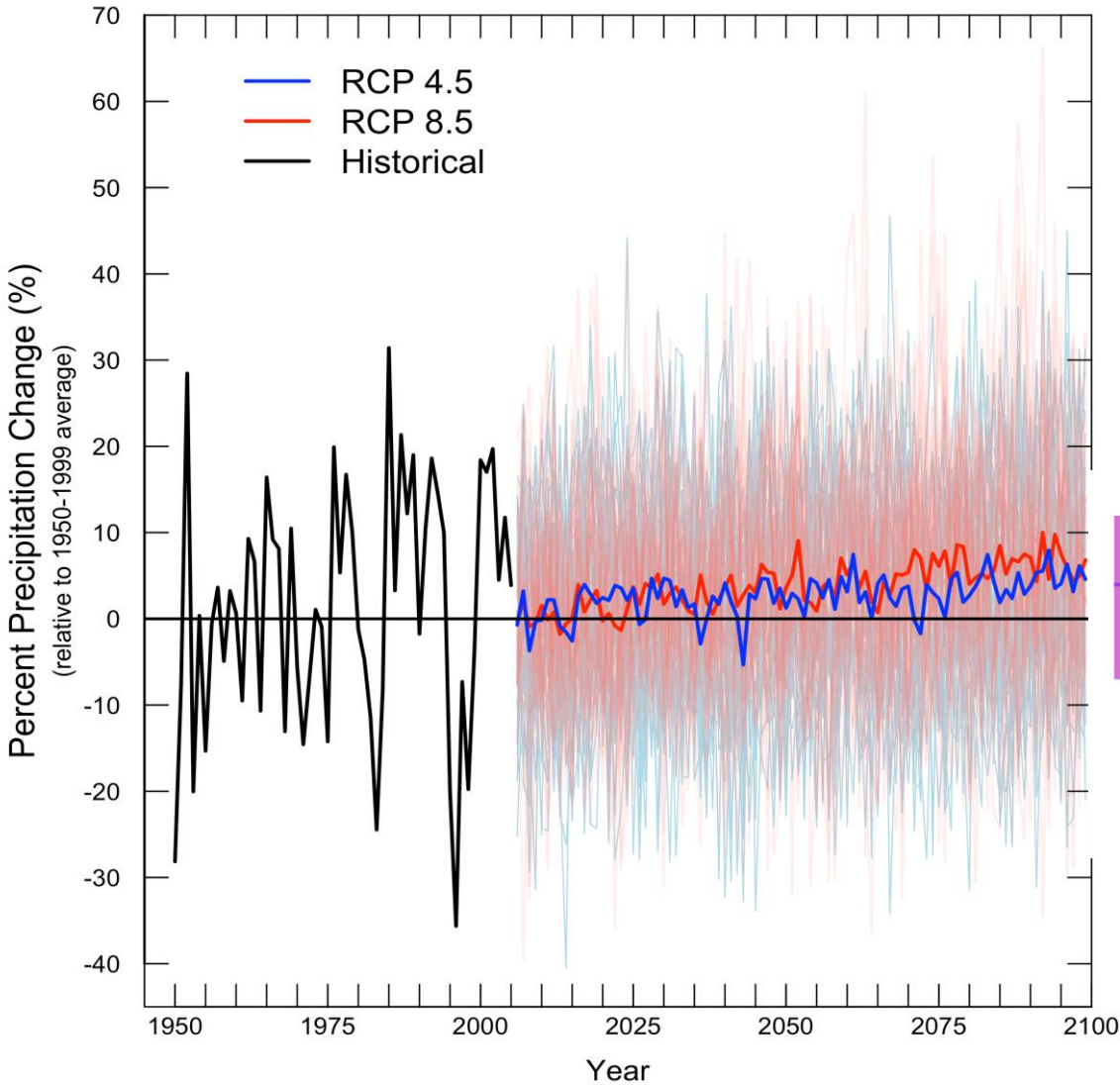


Median warming ~4-6°F by 2050, but could exceed 8°F

Figure source: Climate Impacts Group, based on projections used in IPCC 2013; 2050 projections from Mote et al. 2013

Continued Variability in Precipitation

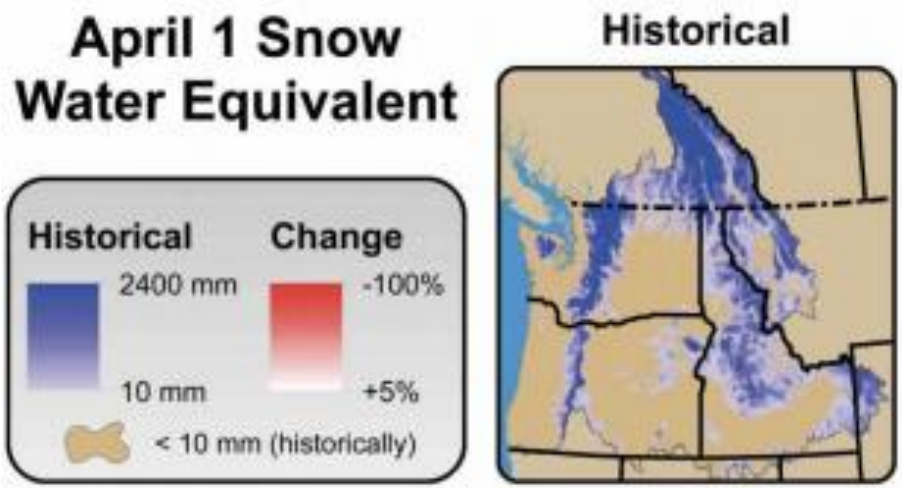
Projected Change in Average Annual PNW Precipitation (relative to 1950-1999 average)

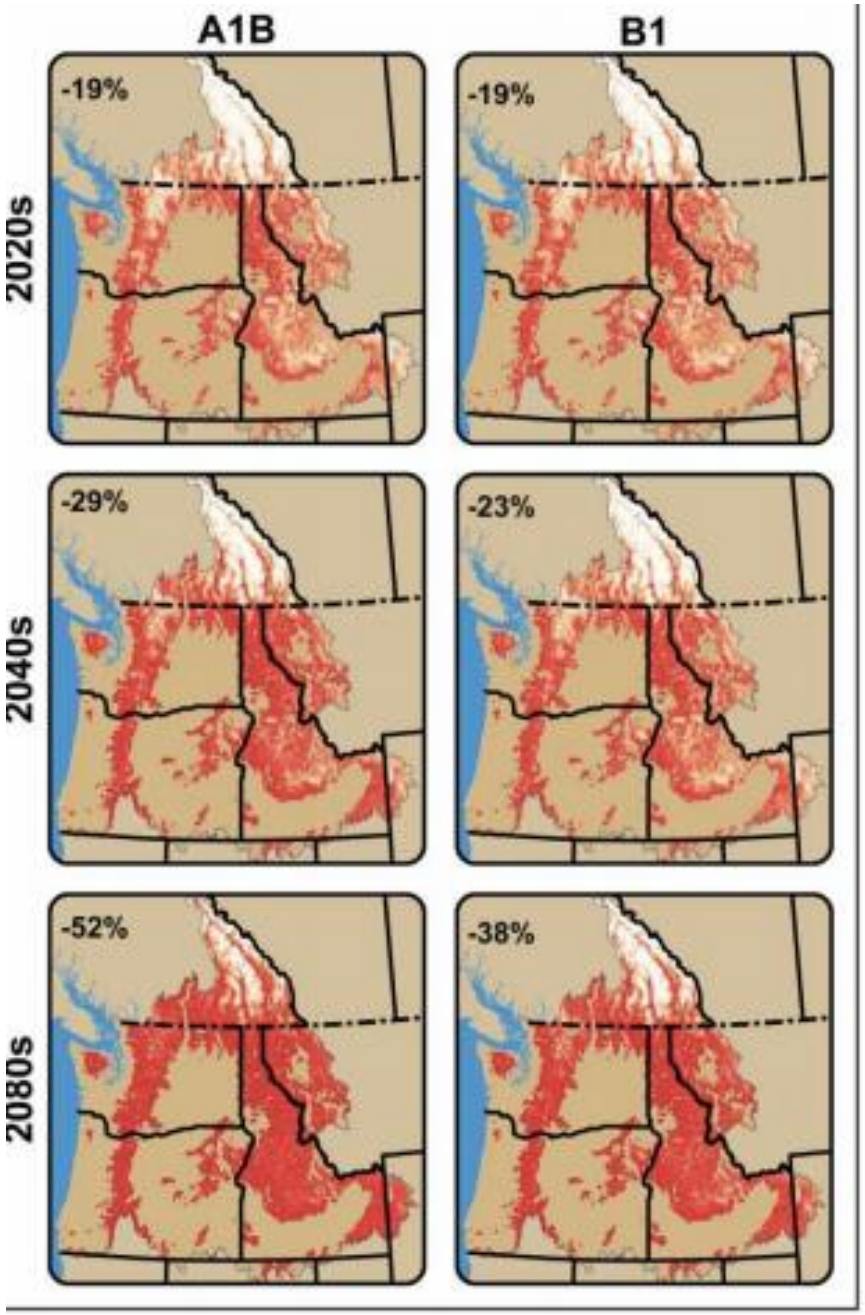


Modest increases in average *annual* precipitation, but change is smaller than year-to-year variability

Figure source: Climate Impacts Group, based on projections used in IPCC 2013

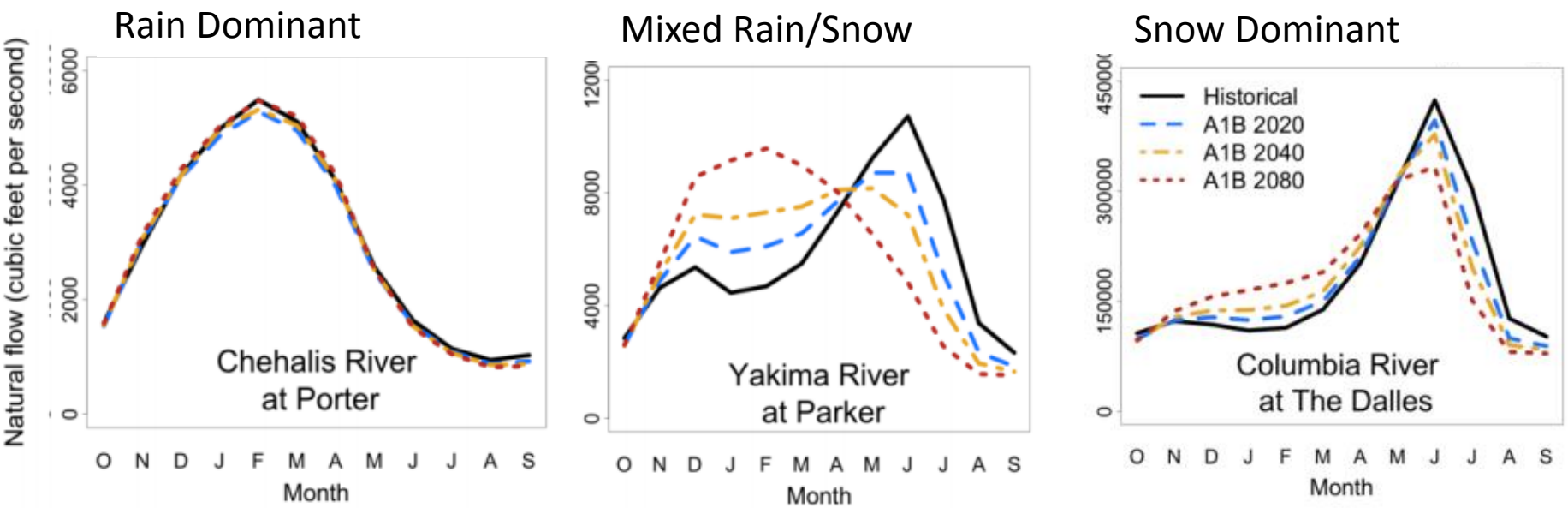
Vanishing Snowpack





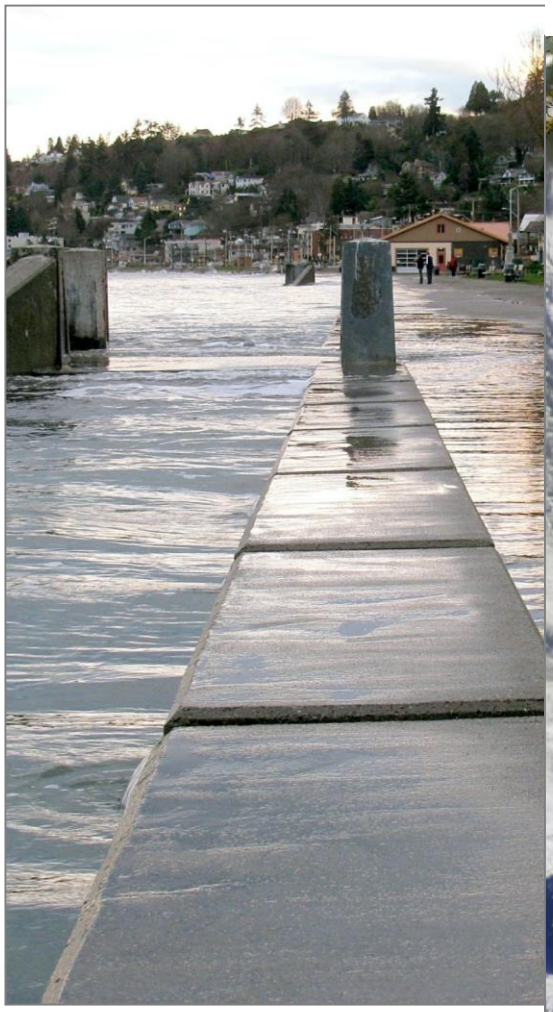
Hamlet et al. 2013, *AtmosphereOcean*, 51:4, 392-415

Hydrology is most affected in basins that historically accumulated snow

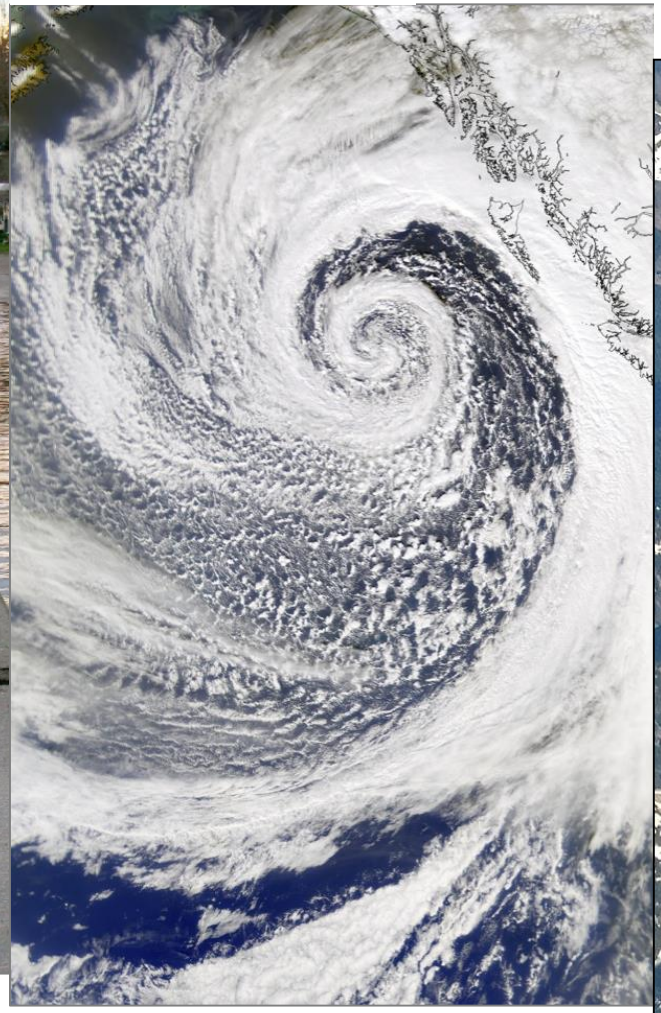


Increasing winter flood risk

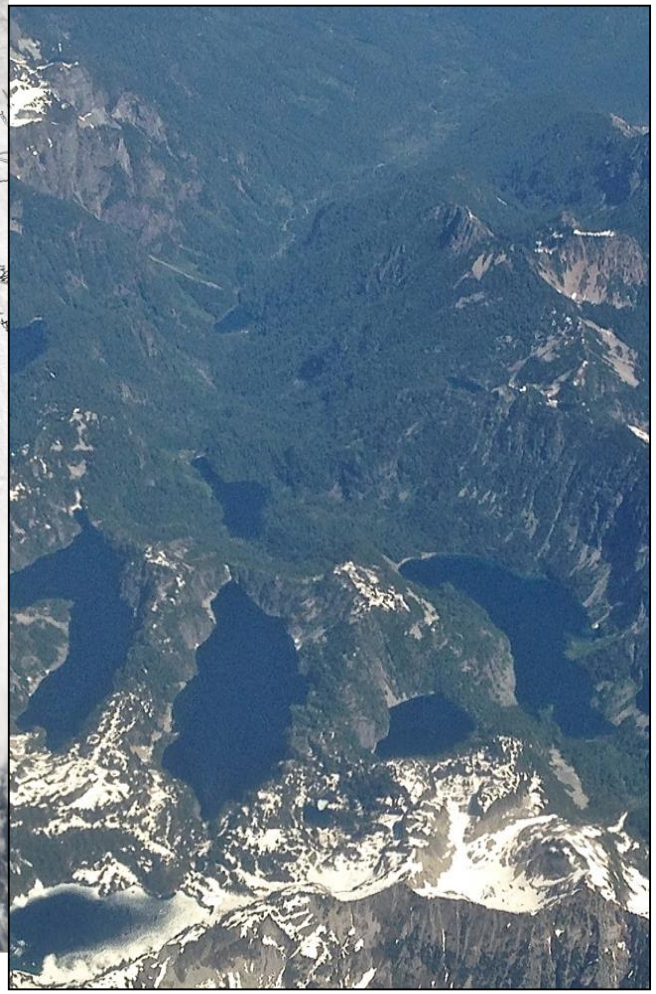
Sea Level Rise



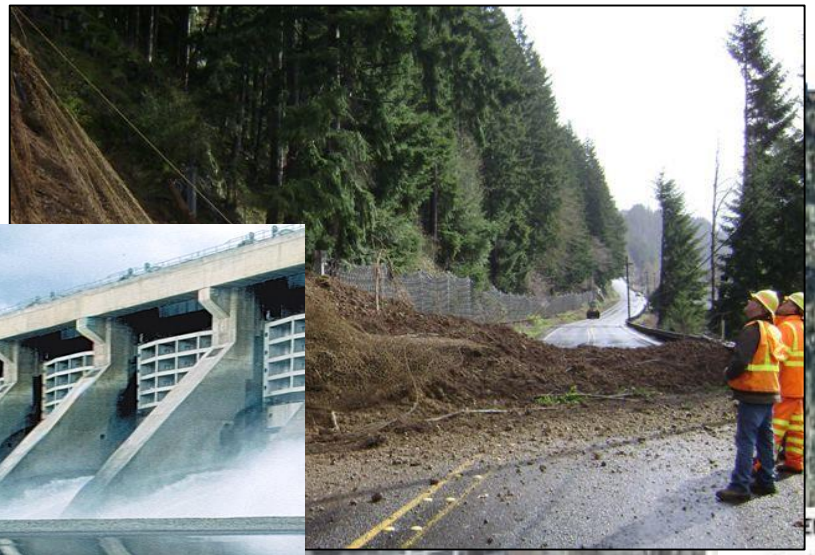
Heavier Rains

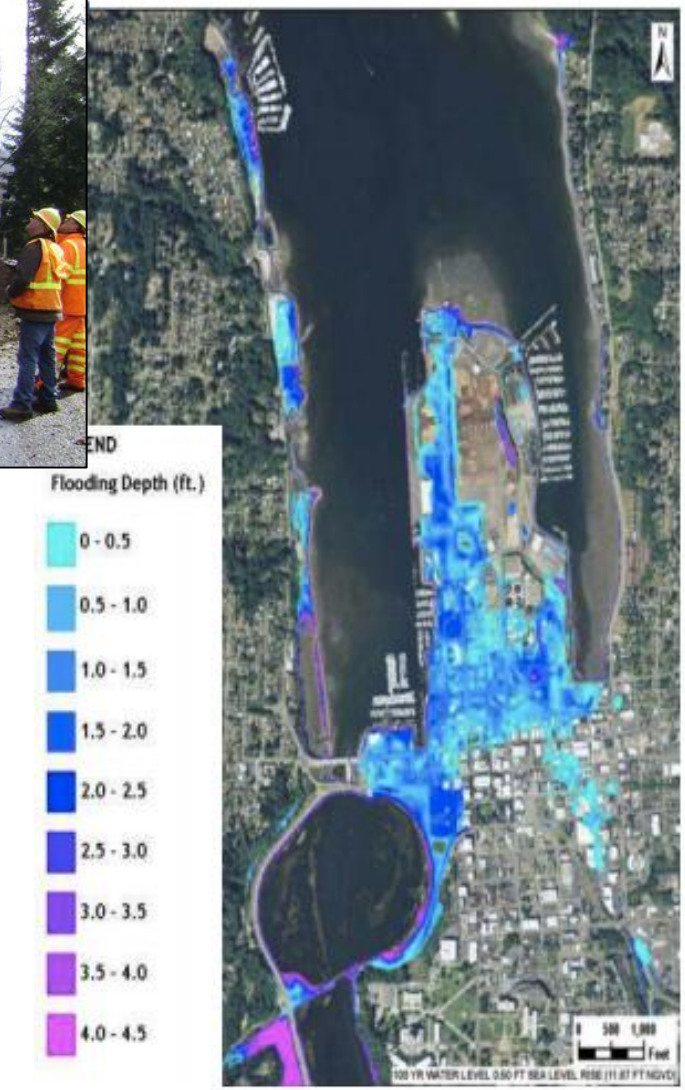


Declining Snowpack



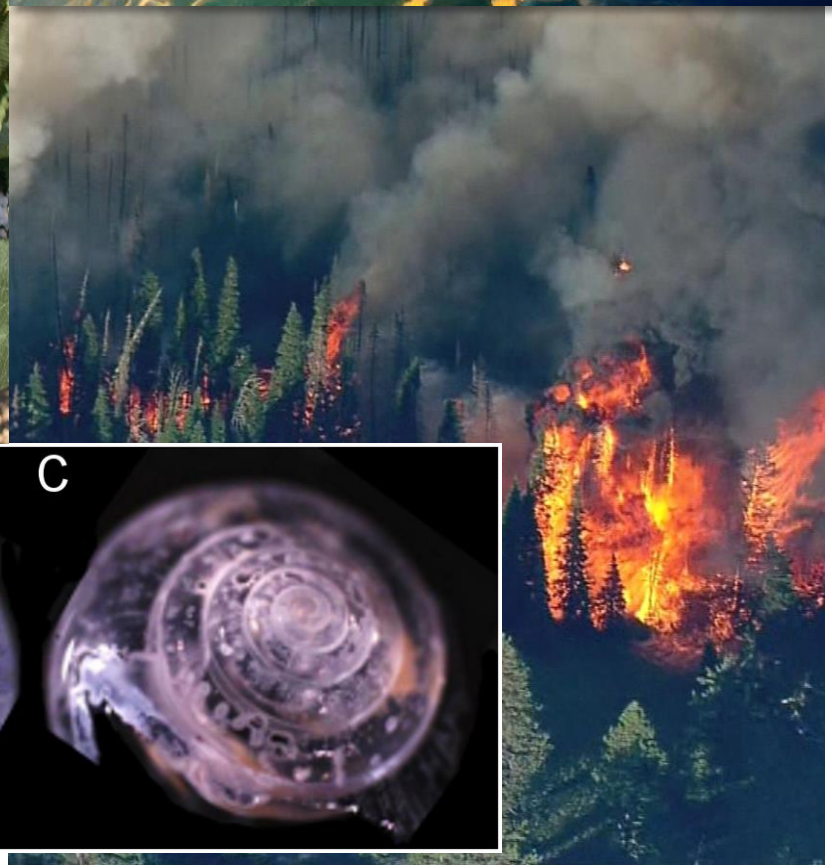
Infrastructure Impacts

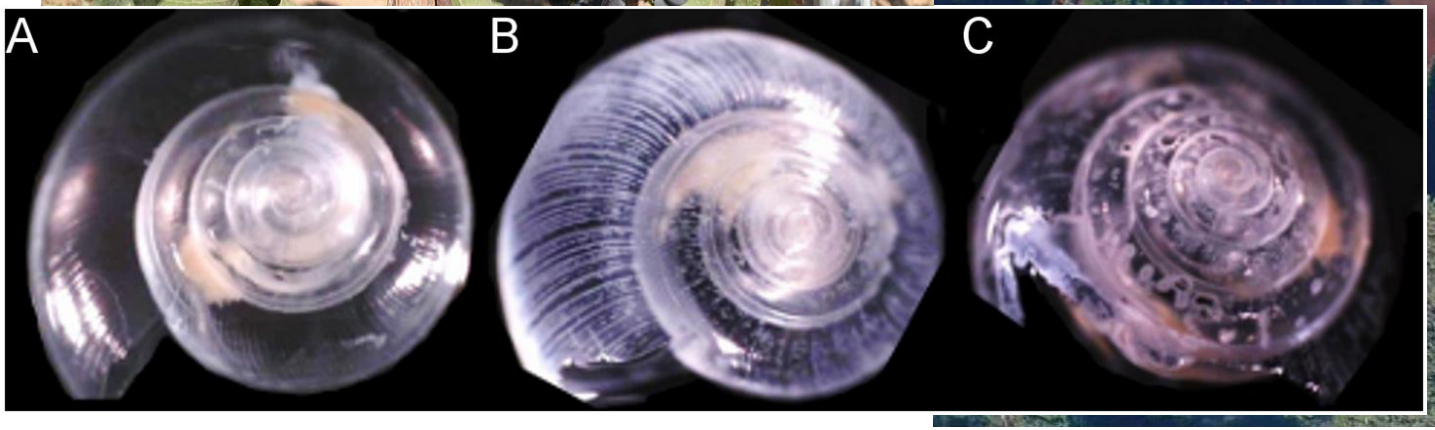




Top: DNR; Bottom: https://twitter.com/LigaDos32

Agriculture and Ecosystem Impacts





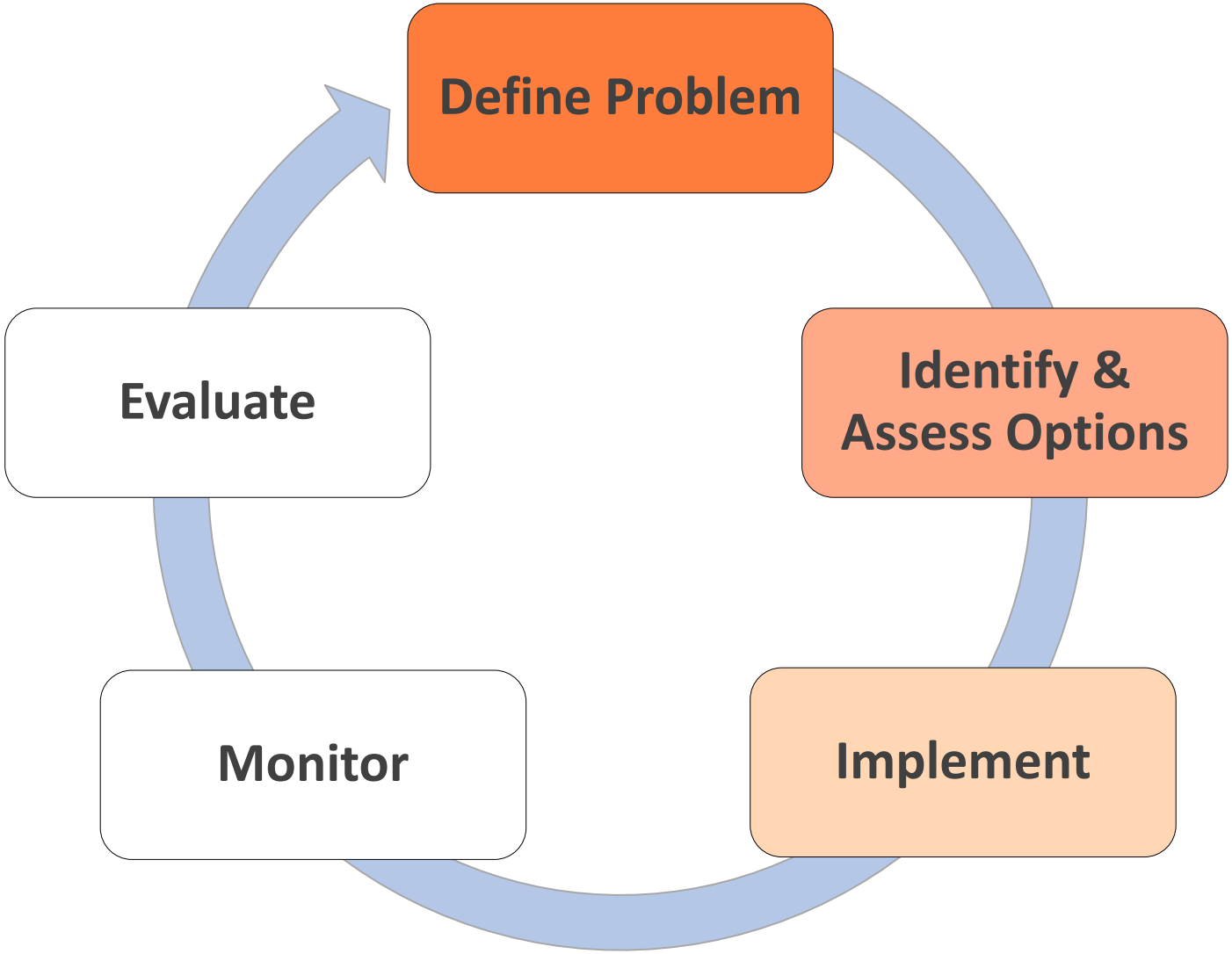
Human Dimensions of Impacts

Heat waves, flooding, and impacts on shellfish all have repercussions for human health

Resources that constitute cultural identity for Tribes can be at risk

Who is Working on Adaptation in Washington?

Where are we within the Adaptation Cycle?



To motivate our discussion

CLIMATE MATTERS

CLIMATE CHANGE IS EXPECTED

How can the insurance/re-insurance industries catalyze action to prepare

The Climate Impacts Group
www.cses.washington.edu/cig

Joe Casola
jcasola@uw.edu

COLLEGE OF THE ENVIRONMENT
UNIVERSITY *of* WASHINGTON

Climate and its impacts on investment portfolios

Alex Bernhardt

Principal, Responsible Investment Group, Mercer

1:45 – 2:00 p.m.

WA OIC EVENT
INVESTING IN A TIME OF CLIMATE CHANGE

JUNE 1, 2016

Alex Bernhardt
Principal, US Head of Responsible Investment

MERCER
OVERVIEW

MERCER INVESTMENTS SERVICES

TEAM OF OVER 2,200 ● 20 COUNTRIES ● 59 CITIES ● 40+ YEARS' EXPERIENCE

TOOLS & RESEARCH

- Global Investment Manager Database
- MercerInsight Platform
- Global Research 'Boutiques'

6,000+ MANAGERS
COVERED

ADVICE

- Investment strategy
- Asset allocation
- Portfolio construction
- Manager selection
- Responsible investment
- Transitions, custody, FX

$9.1 TRILLION
UNDER ADVICE

2,600+ Consulting Clients

SOLUTIONS

- Implemented Consulting
- Single Sector Multi-Manager
- Diversified Portfolios
- Transition Solutions

$136 BILLION
UNDER MANAGEMENT

823 Discretionary Clients

Insource — **Service Spectrum** — Outsource

*Assets under advisement includes aggregated data for Mercer Investment Consulting LLC and its affiliated companies globally ("Mercer"). Data is derived from a variety of sources, including, but not limited to, third-party custodians or investment managers, regulatory filings, and client self-reported data. Mercer has not independently verified the data. Where available, data is provided as of 30 June 2015 ("Reporting Date"). If data was not available as of the Reporting Date, information from a date closest in time to the Reporting Date, which may be of a more recent date than the Reporting Date, was included. Data includes assets of clients that have engaged Mercer to provide project-based services within the 12-month period ending on the Reporting Date, and assets of clients that subscribe to Mercer's Manager Research database.

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MERCER'S RI TEAM
MARKET LEADING INTEGRATED ADVICE

UNRIVALLED EXPERTISE

- Global team established in **2004**
- **12** specialists globally
- Original consultant and founding signatory to the **PRI**
- **SUSTAINABILITY** is one of mercer's five core investment beliefs

AMBITIOUS ASSET OWNER CLIENTS

Environment Agency Pension Fund

CALSTRS

NEW ZEALAND SUPERANNUATION FUND

Allianz

BT PENSION SCHEME

FÖRSTA AP-FONDEN

PROACTIVE MEMBER

UKSIF
UK Sustainable Investment and Finance Association

IIGCC
Institutional Investors Group on Climate Change

PRI

GIIN
GLOBAL IMPACT INVESTING NETWORK

INNOVATIVE ADVICE

CLIMATE CHANGE
INVESTMENT RISK MANAGEMENT

THE MATERIALITY OF CLIMATE CHANGE
REASONS TO ACT

"Our analysis shows that if the impact of climate change is gradual, it will erode insurers' capital adequacy by about 0.5% per year…[and] ***the investment impact appears to be more material*** *than the weather-related impact across all…types of insurers."*

– S&P*

Market Trends Underpinning Prospective Investment Impacts

- Renewable energy investments are at all-time highs
- Fossil fuel divestment campaigns continue unabated with notable acolytes
- Regulatory agreement, scrutiny and action continues to increase
- Oil price volatility continues to be a concern for fossil fuel/carbon-intensive sectors
- The threat of climate litigation looms
- Scientific/academic research points to potentially significant economic impacts

*Source: Insurers Anticipate a Smooth Road Ahead on Climate Change, But Their View May be Restricted, Dec. 2015

HOLISTIC CLIMATE RISK MANAGEMENT
PORTFOLIO RISK ASSESSMENT METHODS

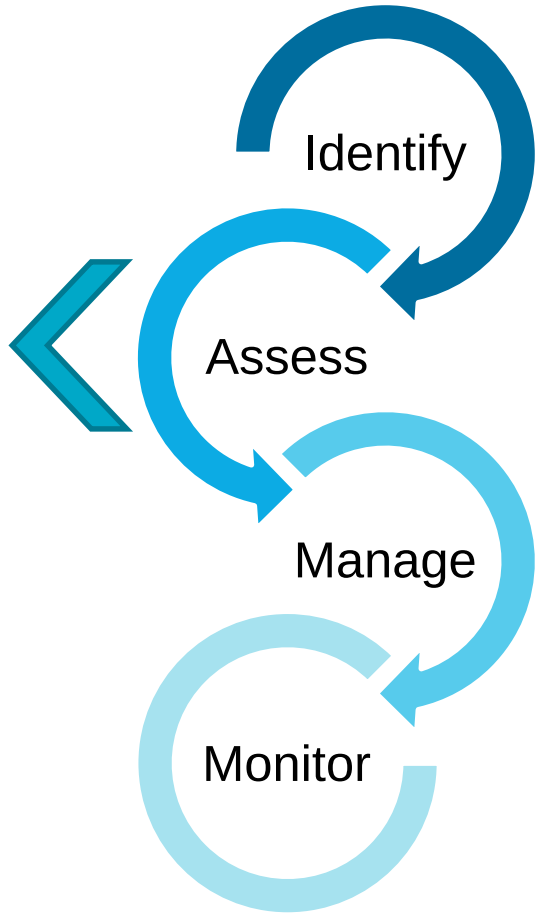
Top-down

- Asset-Liability Modeling
- Manager Monitoring / Selection Process

Investment Risk Management Strategy

Bottom-up

- Company, Sector and Geographic Analysis
- Direct investment process



- Accept
- Avoid
- Mitigate

INVESTING IN A TIME OF CLIMATE CHANGE

"The report …is, to date, the most comprehensive from an asset-allocation perspective…"

The New Economics of Climate Change, The New Yorker, July 2015

16 Investor Partners

2 Sister Companies

NERA Economic Consulting

GUY CARPENTER

13 Expert Advisors

2 Public Partners

IFC International Finance Corporation WORLD BANK GROUP

UKaid from the British people

Federal Ministry for Economic Cooperation and Development

Department of Energy & Climate Change

A novel top-down framework for considering climate change risks

MERCER'S MODELING PROCESS
ASSESSING CLIMATE CHANGE RISK

ADDITIONAL LITERATURE

EMISSIONS PATHWAYS

ECONOMIC DAMAGES

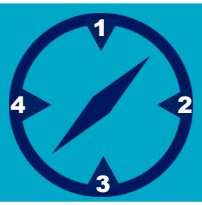
PORTFOLIO IMPLEMENTATION

INVESTMENT IMPLICATIONS

'TRIP' RISK FACTORS

SCENARIOS

1. TRANSFORMATION
2. COORDINATION
3. FRAGMENTATION (LOWER DAMAGES)
4. FRAGMENTATION (HIGHER DAMAGES)



CLIMATE MODELS / MODELING

INTEGRATED ASSESSMENT MODELS (IAMs)

ESTIMATING THE COST OF MITIGATION, ADAPTATION AND PHYSICAL DAMAGES

ANSWERING THE BIG QUESTIONS

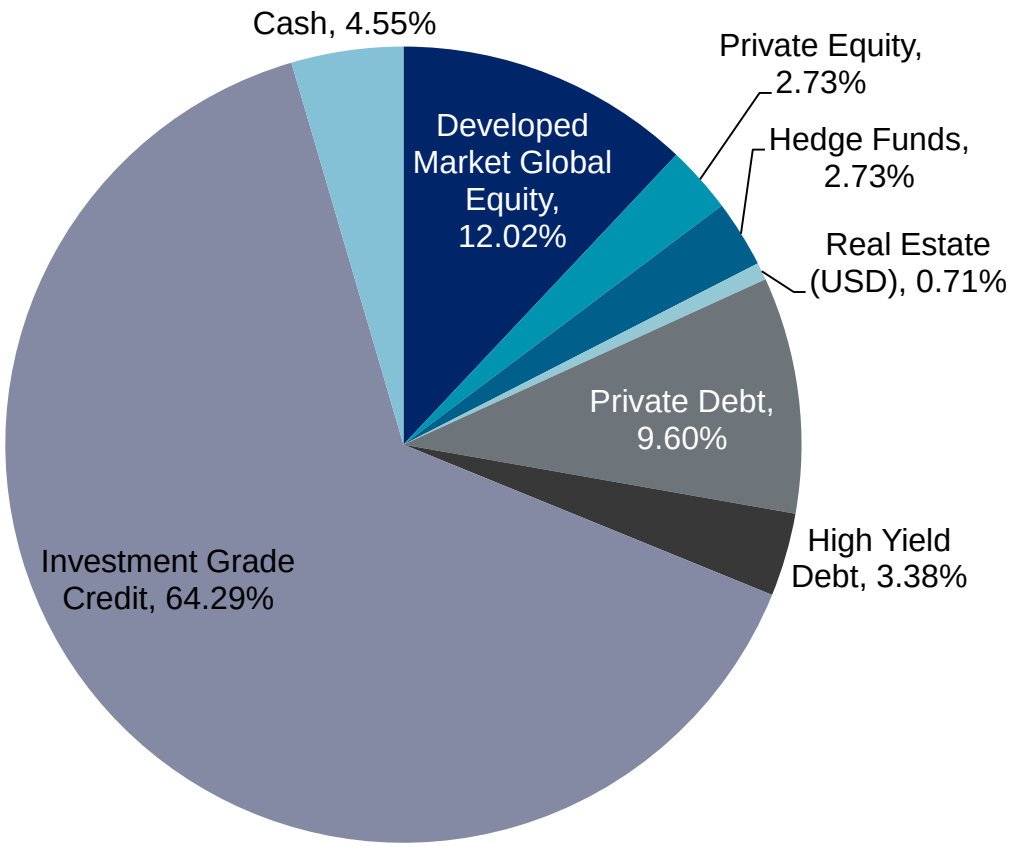
KEY FINDING #1
Climate change will have an impact regardless of scenario.

KEY FINDING #2
Sector impacts are most meaningful – particularly over 10 years.

KEY FINDING #3
Asset class impacts also material – and vary by scenario.

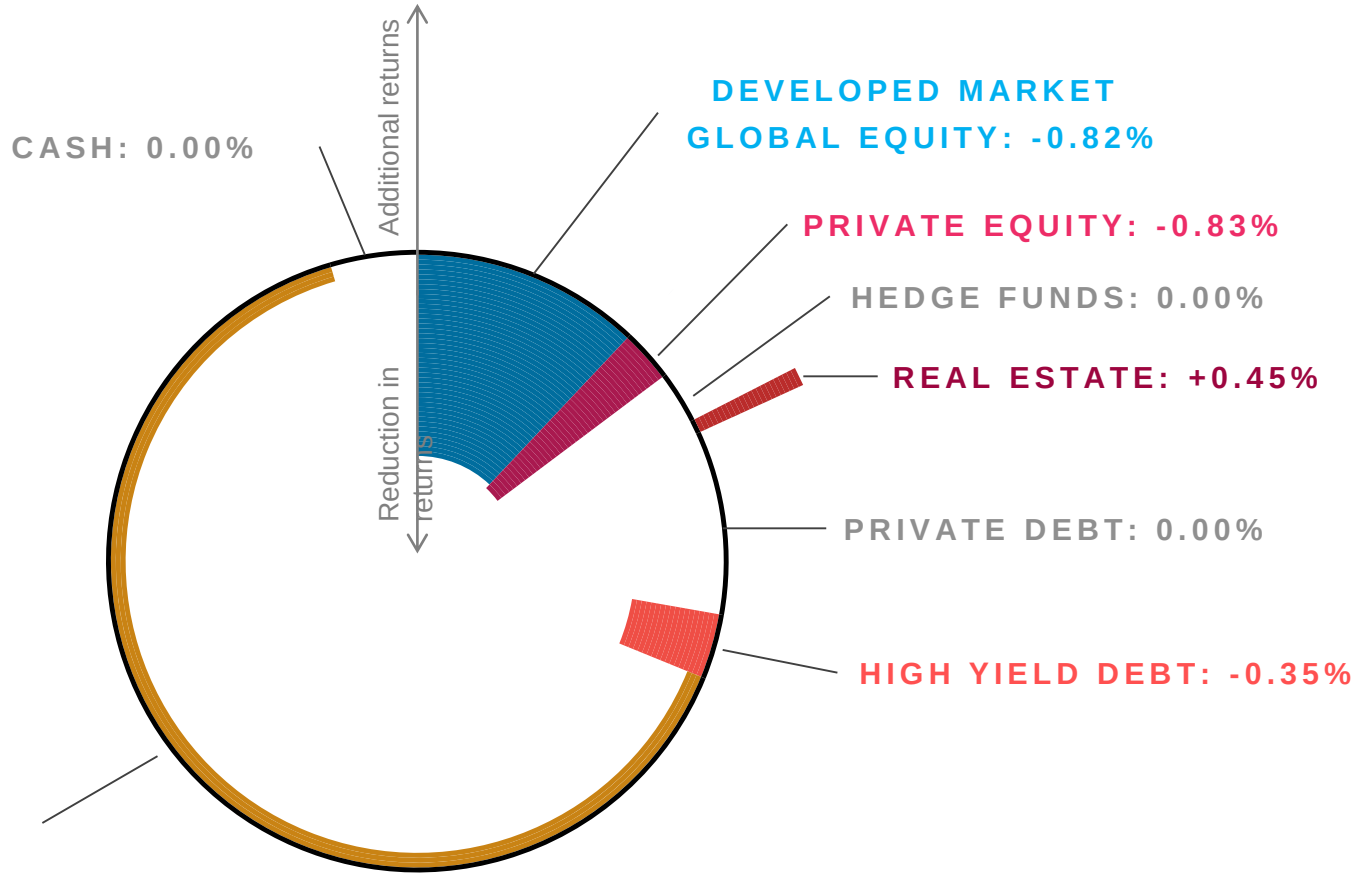
KEY FINDING #4
A 2°C scenario does not harm overall returns out to 2050.

ESTIMATING PORTFOLIO IMPACTS
'ABC INSURANCE' ASSET ALLOCATION*



*Source for sample Asset Allocation: http://naic.org/capital_markets_archive.htm - 6/22/15 edition & http://www.naic.org/capital_markets_archive/140506.htm

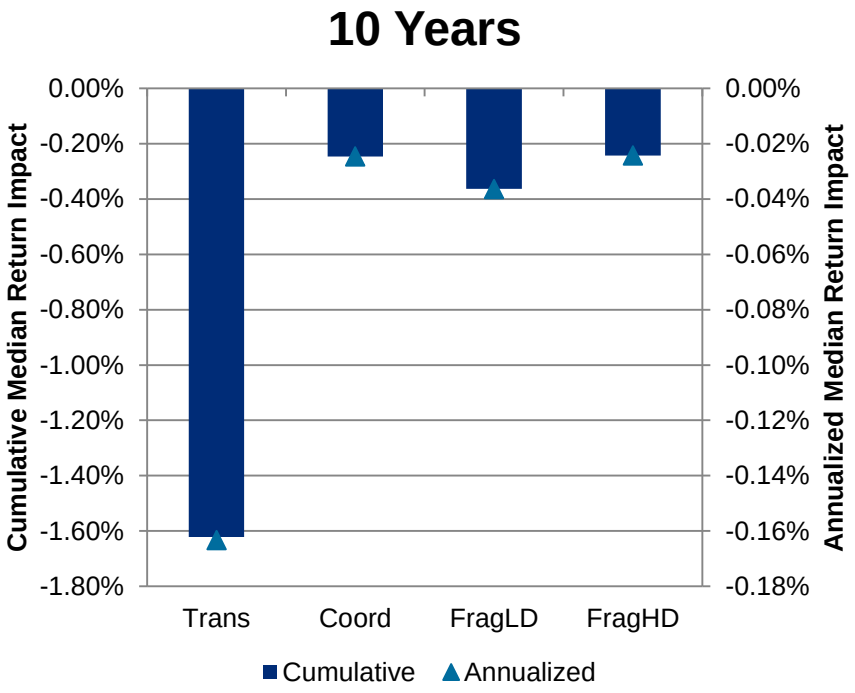
TRANSFORMATION
PORTFOLIO IMPACTS – ASSET CLASSES
(MEDIAN ANNUAL RETURN IMPACT OVER 10 YEARS)*



*Source: Mercer Climate Risk Model

CUMULATIVE RETURN IMPACT

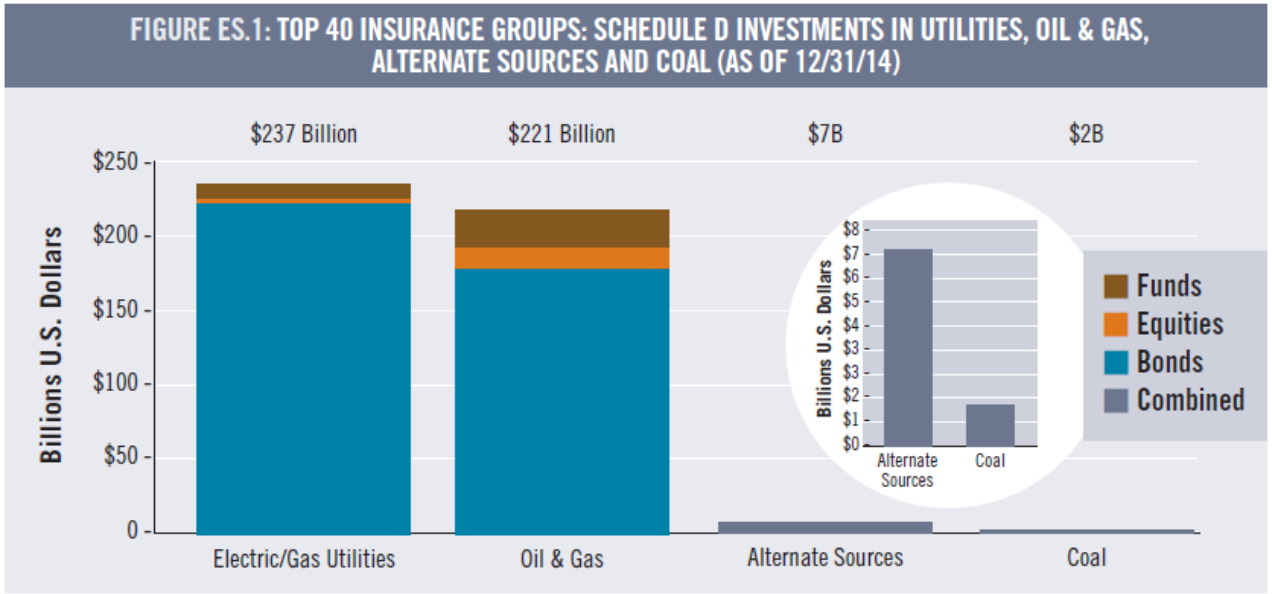
- Cumulative loss on $5T invested today under a Transformation scenario…
  - ***…$144B or nearly a full year's worth of US L/H industry investment income*.***



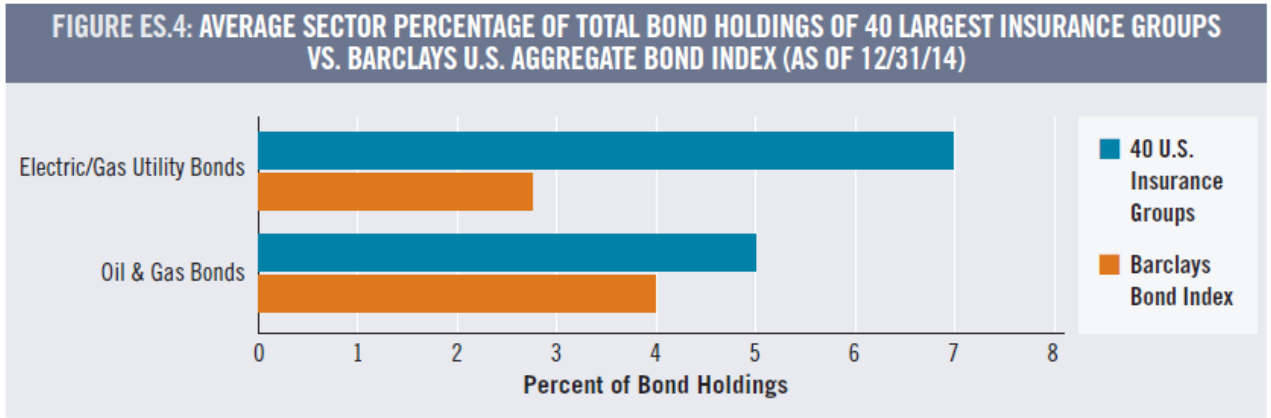
*Source: Mercer Climate Risk Model

BOTTOM-UP CARBON ASSET RISK
LARGEST 40 US INSURERS

- Insurers in aggregate have minimal exposure to renewable energy and minimal exposure to coal



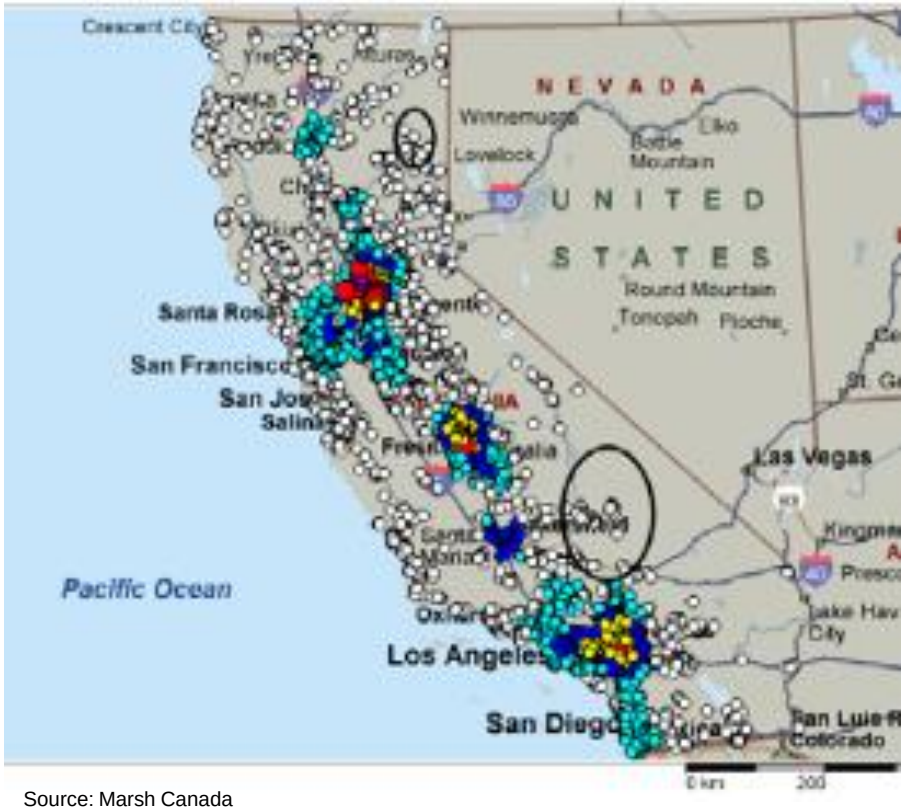
- Insurers maintain higher fossil fuel and utility sector exposures in bond portfolios than the Barclays US Aggregate Index



Note, absolute investment amounts are likely understated for all sectors since Schedule BA data was excluded from analysis; Source: http://www.ceres.org/press/press-releases/ceres-report-u.s.-insurance-sector-heavily-invested-in-fossil-fuel-sectors-despite-growing-awareness-of-climate-change-risks

DON'T FORGET…
…CLIMATE RISK INCLUDES PHYSICAL RISK

Geographic Investment Portfolio Review



Source: Marsh Canada

Q : Where are *your* real asset investments located, and what is your aggregate weather/climate risk exposure?

A: Most asset owners don't know.

- The insurance sector uses a variety of tools to map holdings and assess aggregate natural catastrophe / environmental risk across a portfolio of assets
- Investors are growing their real asset exposures, yet such tools are un(der)utilized; risk management/due diligence is undertaken largely asset by asset
- Mercer and Marsh are providing a joint service to address this gap

ALLOCATING TO SUSTAINABILITY

WHAT ACTION SHOULD INVESTORS TAKE?
CLIMATE CHANGE AND PORTFOLIOS

"The challenges currently posed by climate change pale in significance compared with what might come… The more we invest with foresight; the less we will regret in hindsight."

Mark Carney, Governor of the Bank of England, September 2015

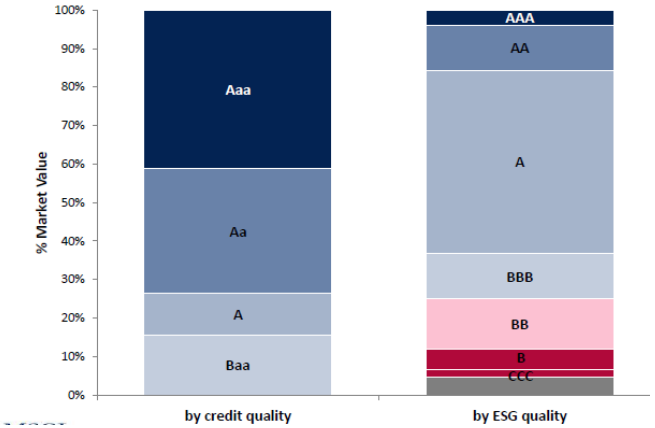
Risk assessment: total portfolio + sector/carbon exposure + real assets by location

Reduce Risk	Capture Opportunities	Engage
High ESG rated strategies	Sustainability themed equity & debt	Strategy & leadership
Low carbon passive indexes	Sustainability themed alternatives	Resource scarcity & physical impact

ESG IN FIXED INCOME

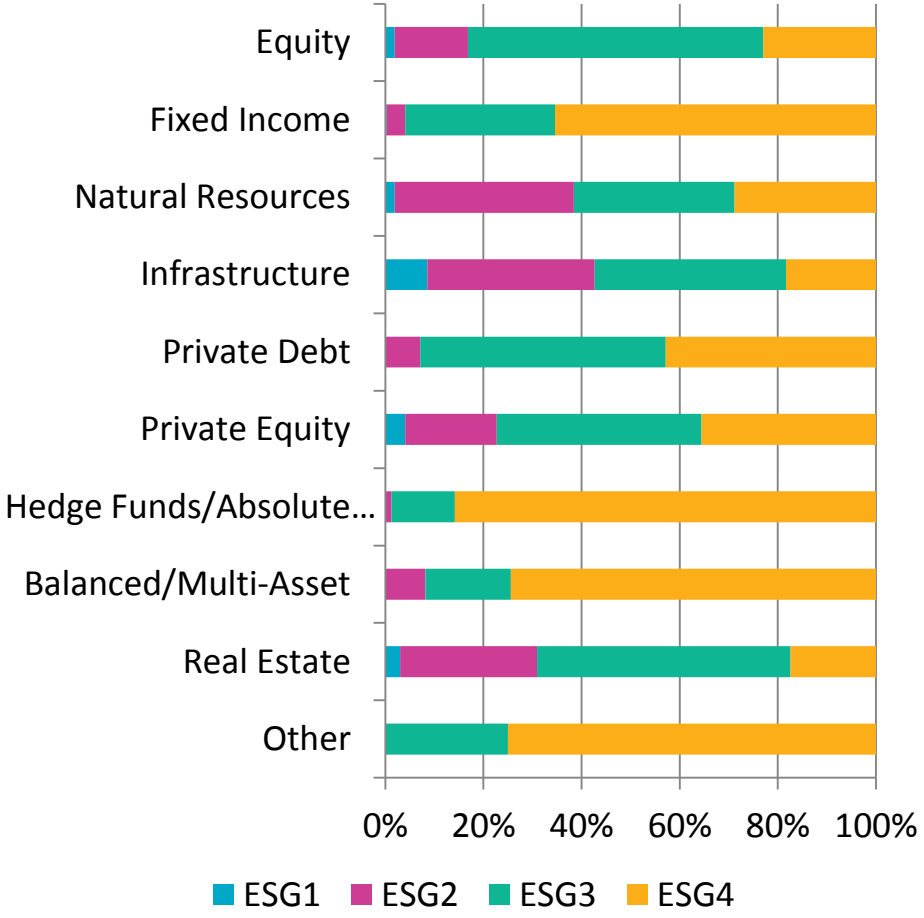
- ESG integration lags in Fixed Income vs. other asset classes
- Green bond issuance continues to increase
- Growing body of academic/manager research shows positive connection between ESG factors and bond performance
  - ESG quality and credit quality are not the same thing

Barclays Global Aggregate Index – Credit Quality vs. ESG Quality



Source: MSCI ESG Research

Mercer ESG Rating Distribution by Asset Class



Mercer ESG Ratings as of 3/31/15
n~5,500 across asset classes

PORTFOLIO CLIMATE RESILIENCE
SUSTAINABLE OPPORTUNITIES

Typically Defensive (Downside Protection)

Sustainability Overlay
- Carbon tilting
- Engagement overlay

SUSTAINABILITY OVERLAY

PURE PLAY

Pure play allocations
- Water
- Renewable energy
- Timber
- Agriculture

ASSET CLASS

High ESG-rated strategies
- Identify managers that actively integrate ESG and climate issues

ESG-RATINGS

BROAD SUSTAINABILITY

Broad sustainability
- Strategies that target a range of environmental and social trends

Typically Opportunistic (Upside Capture)

There are over 200 strategies with sustainable opportunities now available in GIMD

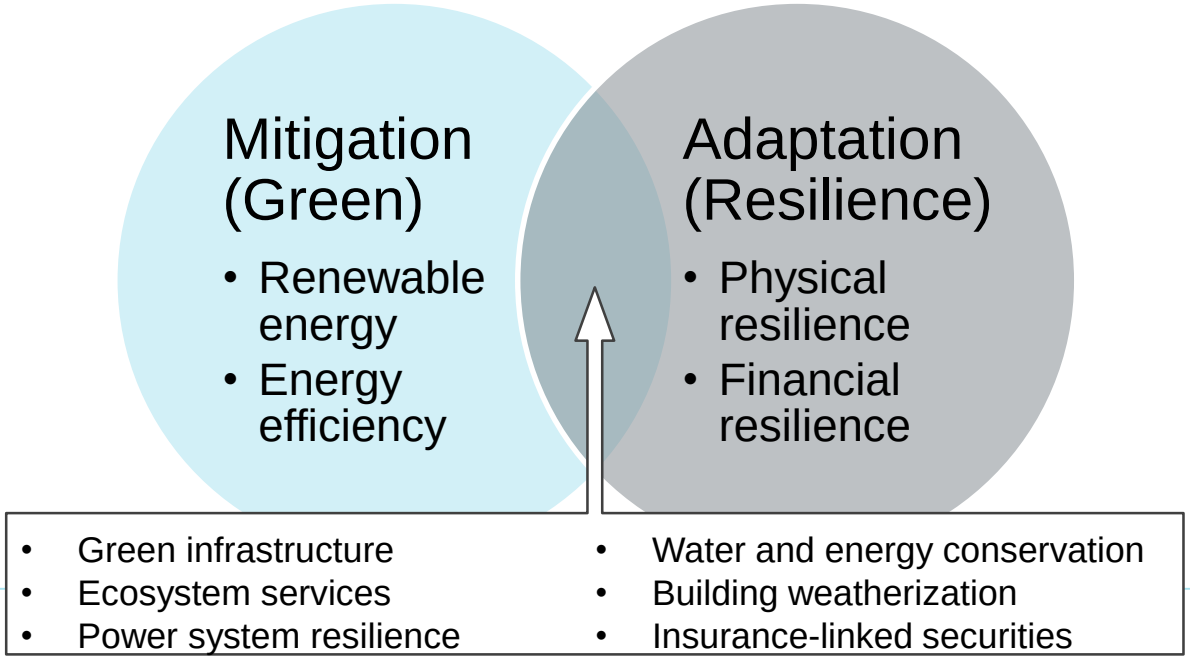
CLIMATE CHANGE INVESTMENT OPPORTUNITIES FOR INSURERS

Asset Classes

- *Fixed Income*: EM Debt / Multi-Asset Credit / Unconstrained Debt / Infrastructure Debt / Green Bonds
- *Alternatives*: Private Infrastructure, Real Estate and other Real Assets (e.g. Agriculture; Timber)

Themes

- Financing climate change mitigation (green) and adaptation (resilience)



MERCER

MAKE TOMORROW, TODAY

APPENDIX A
REGULATORY AND INDUSTRY CONTEXT

THE PARIS AGREEMENT ON CLIMATE CHANGE
KEY FEATURES

Temperature Goal: An aim to limit overall global warming to less than 2°C, and possibly even down to 1.5°C. This will require a significant ramp up of national pledges to reduce emissions by 2030.

Net Zero Emissions Goal: It was agreed that the world would reach "net zero" emissions in the second half of the century (by balancing carbon released with an equivalent amount sequestered (captured) or offset).

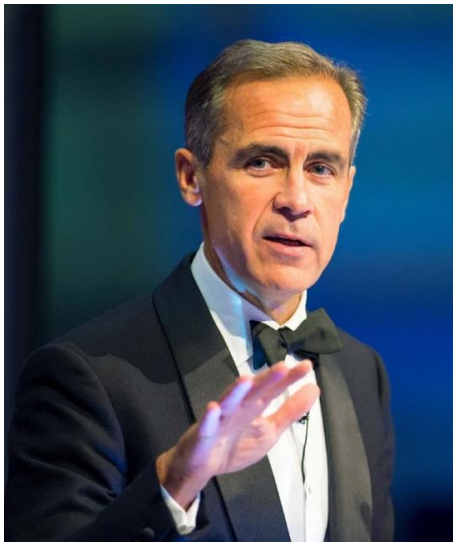
Five Year Review Cycle: Pledges to reduce emissions will need to ratchet up over time, with countries re-submitting every 5 years. Submissions can only be strengthened (i.e. no backtracking on prior pledges) and long-term targets are encouraged.

Climate Financing: To provide financial support to poor countries on the cost of the transition, the agreement has a climate finance goal of $USD 100 billion per year by 2020. This amount is a floor so it is anticipated that it will increase over time.

Legal Status: Emission reduction plans are not legally binding, but the reporting mechanisms (yet to be determined) and the 5 year review process are. There will be a strong role for non-state actors in 'policing' the agreement.

Comes into Force: Once at least 55 countries accounting for 55% of global emissions have formally signed it. Signing commences in April 2016 for a period of 12 months.

FINANCIAL STABILITY & CLIMATE CHANGE



The past is not prologue and that the catastrophic norms of the future can be seen in the tail risks of today.

Risks to financial stability will be minimised if the transition begins early and follows a predictable path, thereby helping the market anticipate the transition to a 2 degree world.

Mark Carney, Governor of the Bank of England

Speech to Lloyds of London, September 2015

The impact of climate change on the UK insurance sector

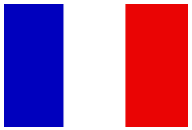
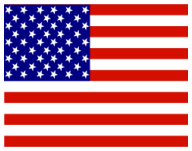
A Climate Change Adaptation Report by the Prudential Regulation Authority

September 2015

- **Physical risks** (e.g. extreme weather)
- **Transition risks** (e.g. stranded assets)
- **Liability risks** (e.g. litigation, damages)

Source: http://www.bankofengland.co.uk/publications/Pages/speeches/2015/844.aspx

NOTABLE INTERNATIONAL REGULATORY AND FINANCIAL INDUSTRY RESPONSES TO DATE

	Institutional investors in France required to disclose how they are managing climate change risks.
	California's insurance commissioner calls for voluntarily thermal coal divestment and will require disclosure of related company holdings.
	SEC issues interpretive guidance on disclosure related to climate change (2010) and insurance commissioners in six states continue to administer NAIC climate risk disclosure survey.
	The Financial Supervisory Authority in Sweden calls on the financial sector in Sweden to develop stress tests to capture climate change risks.
	The Dutch Central Bank calls for more transparency (carbon foot-printing and energy transition plans) to help FIs assess climate risks.
	European Systemic Risk Board report suggests that a “sudden-transition policy scenario” should be included in macroeconomic scenarios and in stress tests of financial institutions and the financial system as a whole.

INSURERS TAKING ON CLIMATE CHANGE
CLIMATEWISE

1. Lead in risk analysis
2. Inform public policy making
3. Support climate change awareness among customers
4. **Incorporate climate change into our investment strategies**
5. Reduce the environmental impact of our business
6. Report and be accountable

ClimateWise
Insuring a sustainable future

ClimateWise CEOs call for more action in building resilience to climate change

CEOs of ClimateWise welcome the Prudential Regulation Authority's assessment of the impact of climate change on the insurance industry, yet warn that more needs to be done to improve resilience

1 October 2015

ClimateWise is the global insurance industry's leadership group driving action on climate change risk , representing 32 insurance organisations across 4 continents.

Source: http://www.cisl.cam.ac.uk/business-action/sustainable-finance/climatewise

INSURERS TAKING ON CLIMATE CHANGE
PRINCIPLES FOR SUSTAINABLE INSURANCE

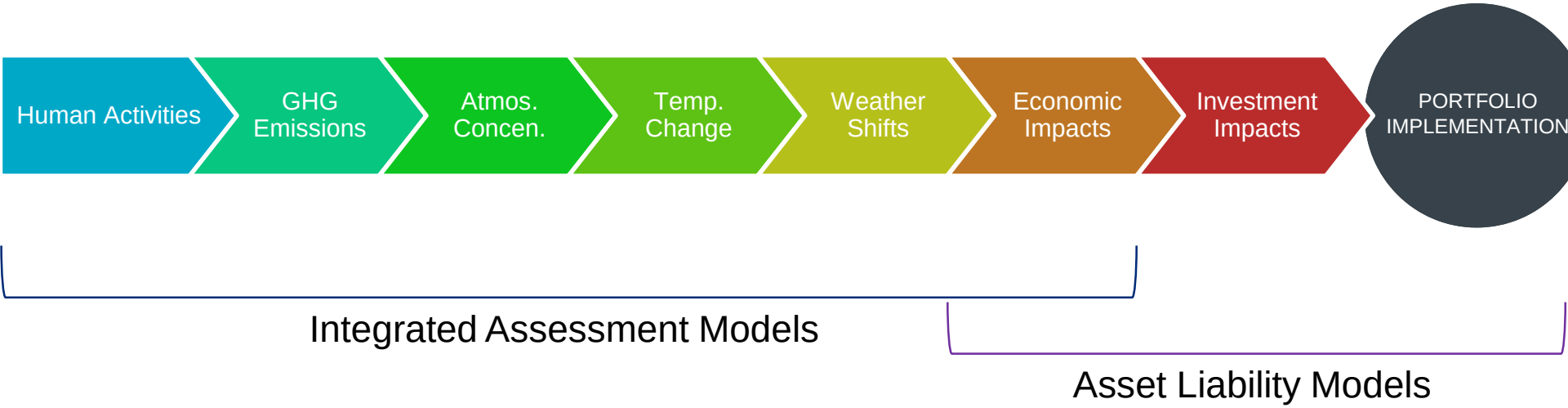
- **Principle 1** - We will embed in our decision-making environmental, social and governance issues relevant to our insurance business.
  - **Investment management** - Integrate ESG issues into investment decision-making and ownership practices (e.g. by implementing the Principles for Responsible Investment ("Principles"))
- **Principle 2** - We will work together with our clients and business partners to raise awareness of environmental, social and governance issues, manage risk and develop solutions.
- **Principles 3** - We will work together with governments, regulators and other key stakeholders to promote widespread action across society on environmental, social and governance issues.
- **Principle 4** - We will demonstrate accountability and transparency in regularly disclosing publicly our progress in implementing the Principles.

83 organisations have adopted the Principles, representing approximately 20% of world premium volume and USD 14 trillion in assets under management.

APPENDIX B

CLIMATE CHANGE MODELING PROCESS DETAIL

THE CHALLENGE
MANAGING THROUGH UNCERTAINTY



SCENARIOS
A BROAD RANGE OF POTENTIAL OUTCOMES

- The future is uncertain, thus scenarios are a useful tool
  - Current policies have us on a pathway to **Fragmentation** (+4ºC)
  - Existing national pledges positions **Coordination** (+3ºC) as a high probability
  - Ambitious goal in Paris of 1.5ºC suggests **Transformation** is increasingly possible
- Most funds focus on the impact of +2ºC and/or +4ºC for planning purposes

	MITIGATION	PERCENTAGE FOSSIL FUELS*	EMISSIONS PEAK	TEMPERATURE**
TRANSFORMATION	STRONG	<50%	AFTER 2020	+2ºC
COORDINATION	SUBSTANTIAL	75%	AFTER 2030	+3ºC
FRAGMENTATION***	LIMITED	85%	AFTER 2040	+4ºC

* As % of energy mix by 2050

** By 2100, since pre-Industrial era

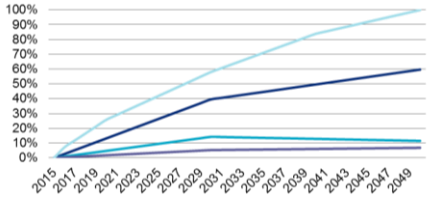
*** The study models two variants of this scenario

RISK FACTORS
SECTOR AND ASSET CLASS SENSITIVITY

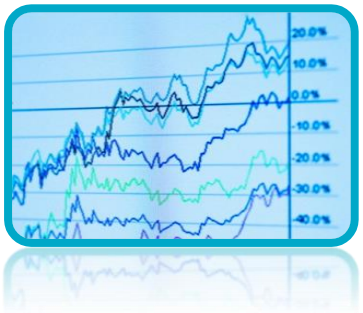
	T TECHNOLOGY	R RESOURCE AVAILABILITY	I IMPACT	P POLICY
OIL	-0.50	-0.75	-0.75	-0.75
GAS	<0.25	-0.50	-0.75	<0.25
COAL	-0.50	-0.75	-0.75	-1.00
RENEWABLES	0.50	-0.25	-0.25	1.00

ESTIMATING CLIMATE IMPACT ON RETURN
QUANTIFYING MODEL INPUTS

CLIMATE SCENARIOS X **CLIMATE RISK FACTORS** = **INVESTMENT IMPACTS**

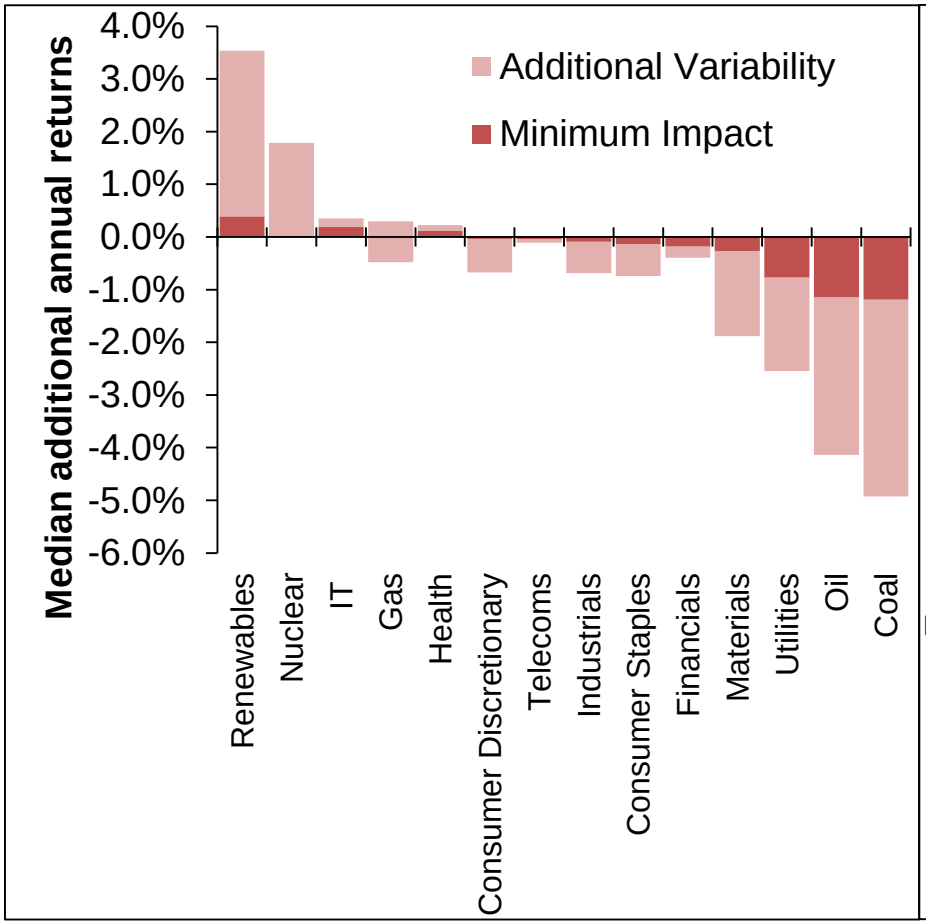


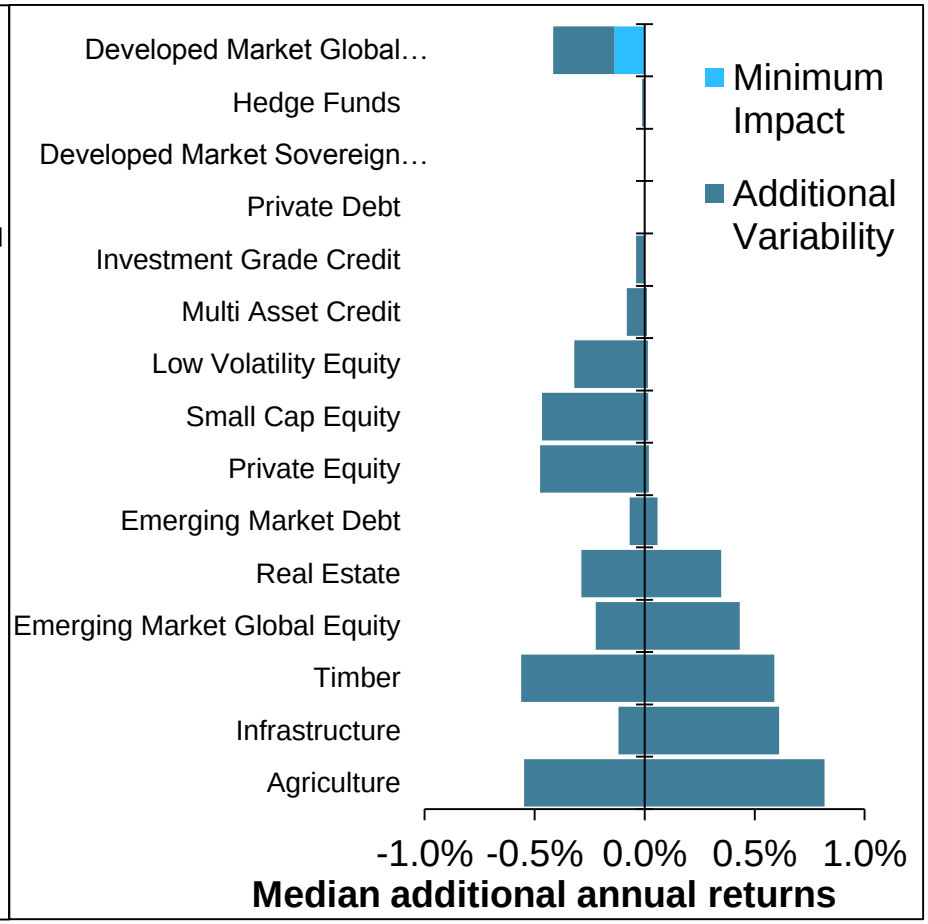
T	R	I	P
-0.25	-0.75	-0.75	-0.75
-0.50	-0.75	-0.75	-0.75
<0.25	-0.50	-0.75	<0.25
-0.50	-0.75	-0.75	-1.00
0.50	-0.25	-0.25	1.00
0.50	-0.75	-0.25	0.50



CLIMATE IMPACT ON RETURNS

MEDIAN RETURN IMPACT BY SECTOR/ASSET CLASS (35 YEARS)





Source:

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MERCER

MAKE TOMORROW, TODAY

Financial and Investment Risks Panel

Moderator: Alex Bernhardt, Mercer

Panelists:

- Mike Kreidler, Insurance Commissioner
- Pat McNaughton, Chief Financial Examiner, OIC
- Marcie Frost, Chair, State Investment Board
- Theresa Whitmarsh, Director, State Investment Board
- Cynthia McHale, Insurance Program Director, Ceres
- Stephen Scofield, Director, South Pole Group

Break

Enjoy refreshments in the lobby

Reinsurers' perspective on climate risks from an underwriting and investment perspective

Dennis Burke

Vice President, Reinsurance Association of America

3:00 – 3:15 p.m.

Reinsurer panel

Moderator: Steve McElhiney, President, EWI Re., Inc.

Panelists:

- Alex Kaplan, Sr. VP of Global Partnerships, Swiss Re
- Dennis Burke, VP, Reinsurance Association of America

EWI REINSURANCE

Break in the Ice: Climate Risk and the Insurance Industry-Reinsurance Panel

Steve McElhiney, MBA, CPCU
CEO
EWI Re
Dallas, Texas & London, Uk

EWI REINSURANCE

MUST we change?

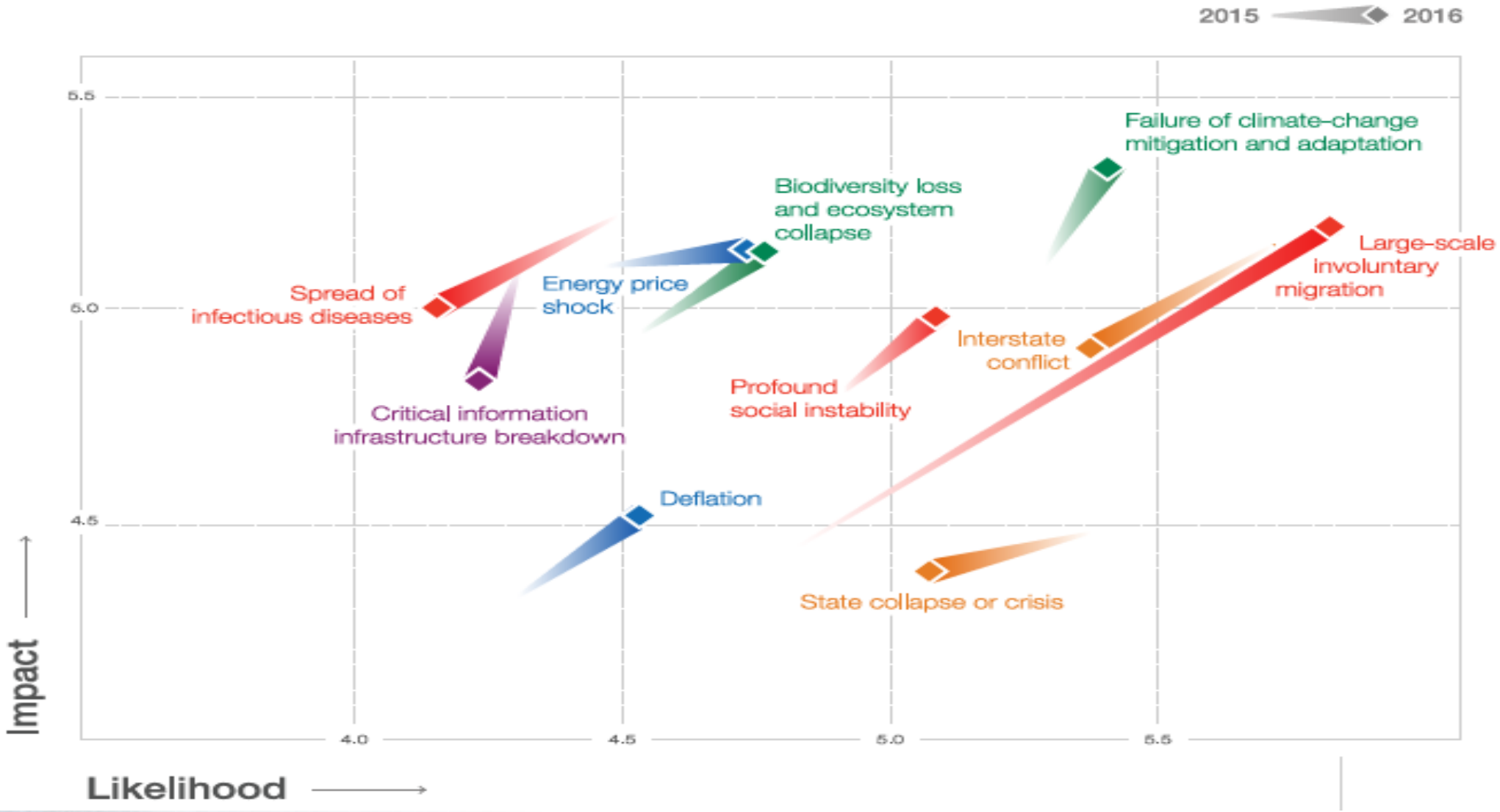
Top 5 Global Risks in Terms of Impact

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
1st	Asset price collapse	Asset price collapse	Asset price collapse	Asset price collapse	Fiscal crises	Major systemic financial failure	Major systemic financial failure	Fiscal crises	Water crises	Failure of climate-change mitigation and adaptation
2nd	Retrenchment from globalization	Retrenchment from globalization (developed)	Retrenchment from globalization (developed)	Retrenchment from globalization (developed)	Climate change	Water supply crises	Water supply crises	Climate change	Rapid and massive spread of infectious diseases	Weapons of mass destruction
3rd	Interstate and civil wars	Slowing Chinese economy (<6%)	Oil and gas price spike	Oil price spikes	Geopolitical conflict	Food shortage crises	Chronic fiscal imbalances	Water crises	Weapons of mass destruction	Water crises
4th	Pandemics	Oil and gas price spike	Chronic disease	Chronic disease	Asset price collapse	Chronic fiscal imbalances	Diffusion of weapons of mass destruction	Unemployment and underemployment	Interstate conflict with regional consequences	Large-scale involuntary migration
5th	Oil price shock	Pandemics	Fiscal crises	Fiscal crises	Extreme energy price volatility	Extreme volatility in energy and agriculture prices	Failure of climate-change mitigation and adaptation	Critical information infrastructure breakdown	Failure of climate-change mitigation and adaptation	Severe energy price shock

Economic Environmental Geopolitical Societal Technological

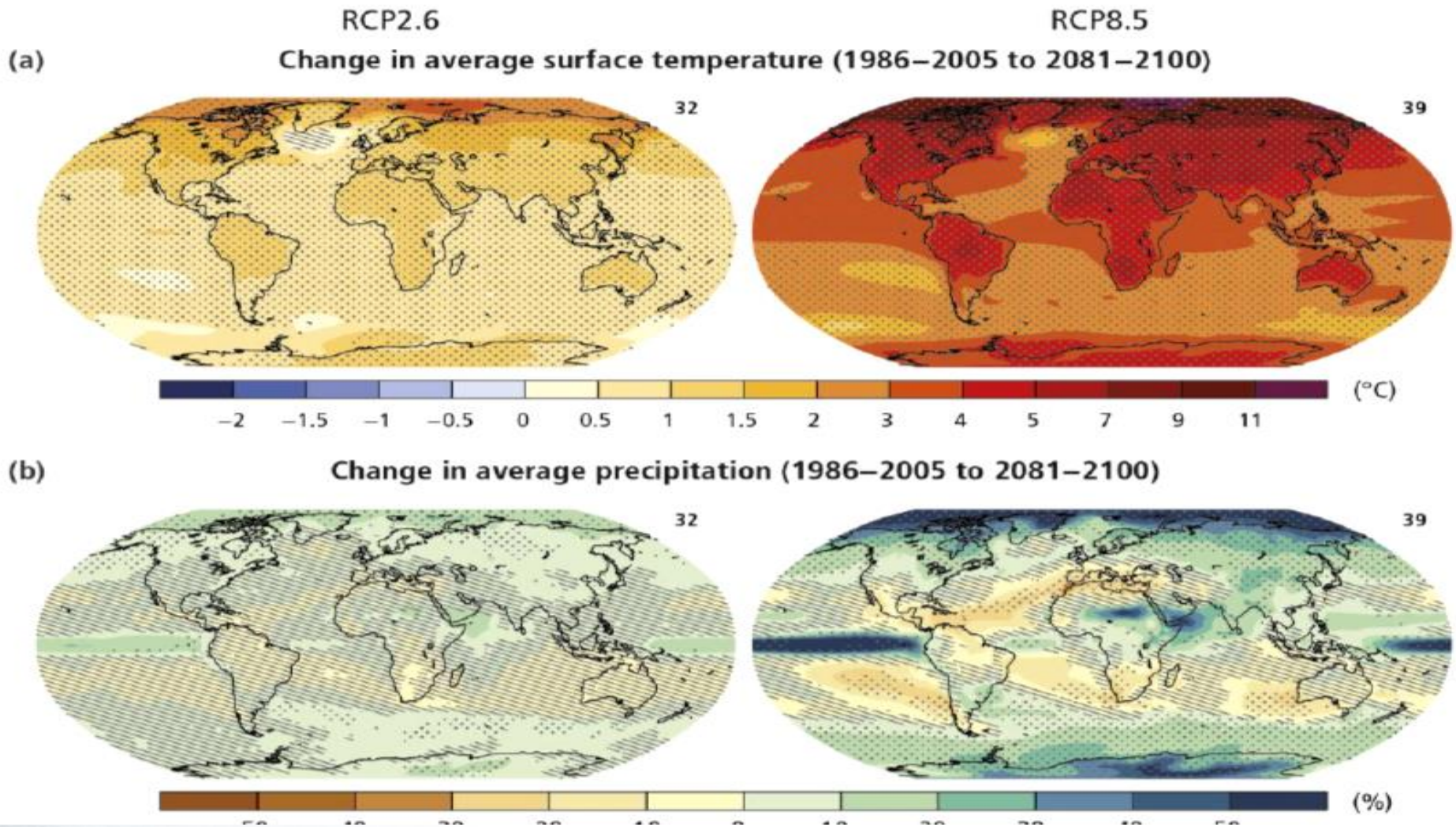
Source: 2016 World Economic Forum Annual Report

The changing Global Risks Landscape 2005-2016: The 10 Most Changing Global Risks



Source: 2016 World Economic Forum Annual Report

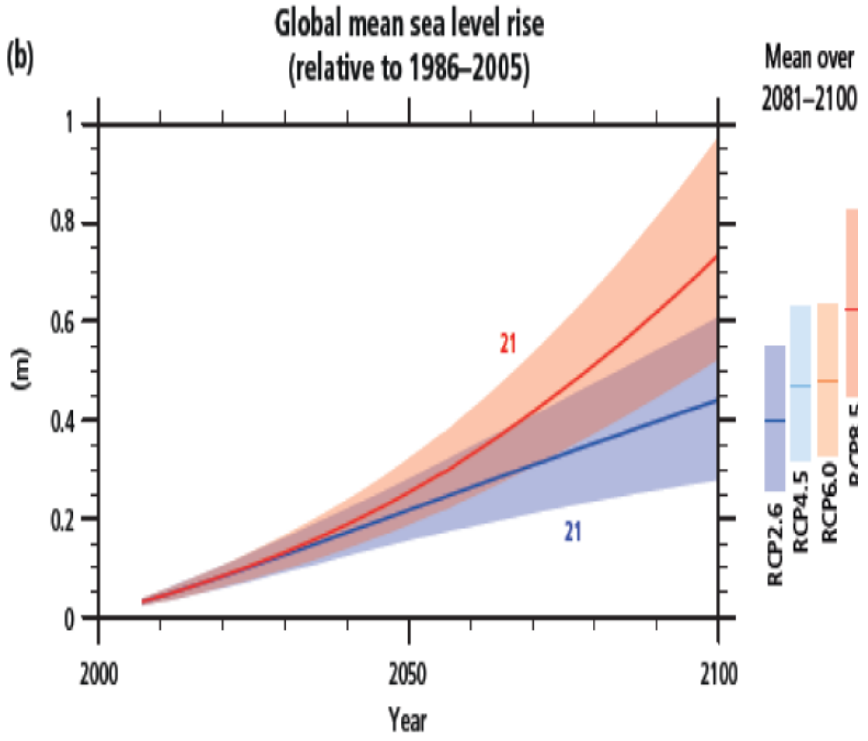
Change in average Surface temperature and Change in average precipitation

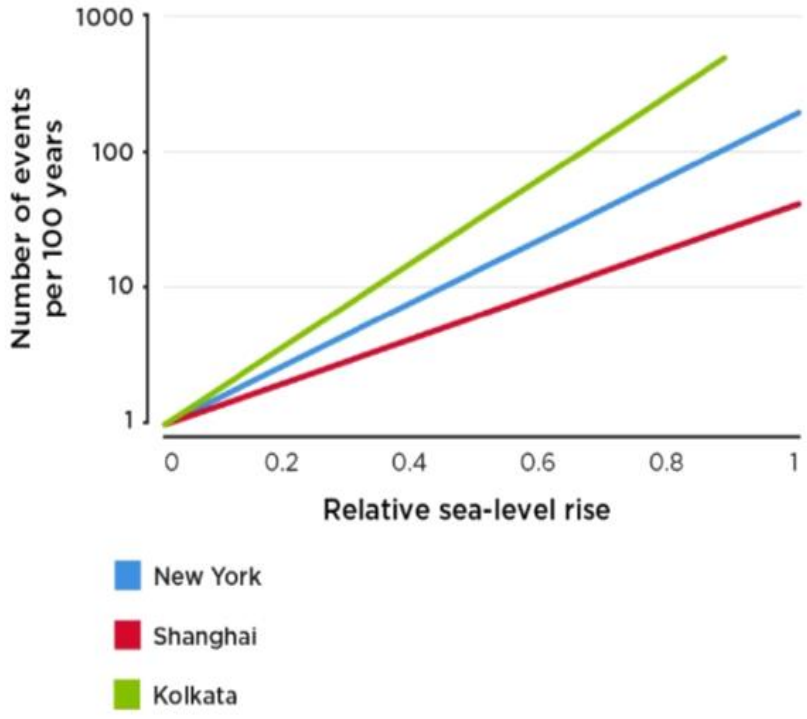


Source: The Impact of climate change on the UK insurance sector September 2015

Global Mean Sea Level Rise

The increase in frequency of present 100-year events (in the base year) as relative sea levels rise in three major coastal cities



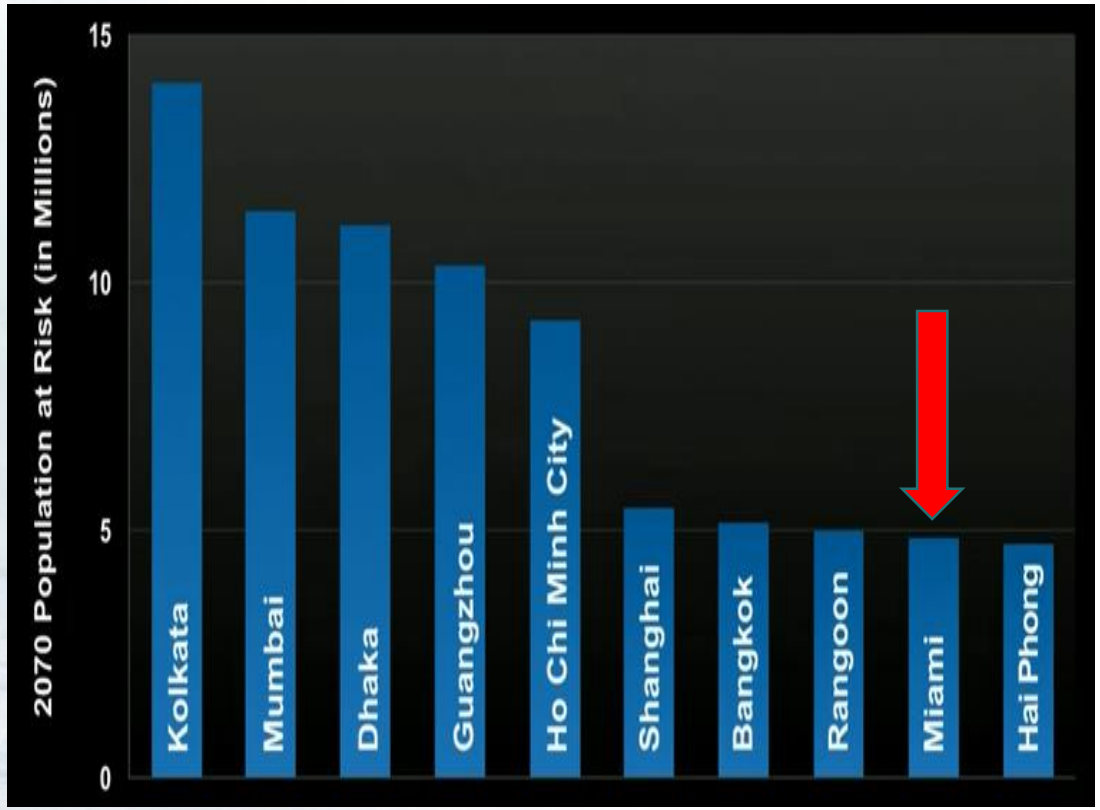


Source: Nicholls *et al* in King *et al* (2015).

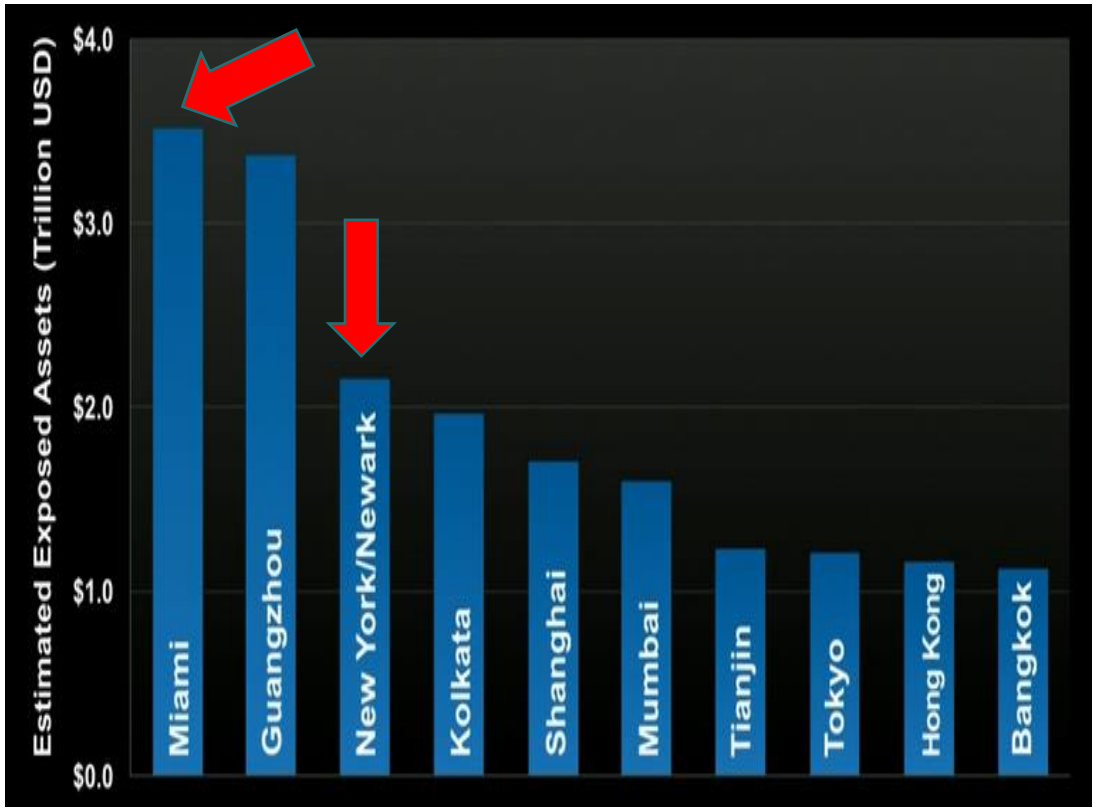
Source: The Impact of climate change on the UK insurance sector September 2015

Top 10 Cities at Risk from Sea level rise in 2070

By Population at Risk

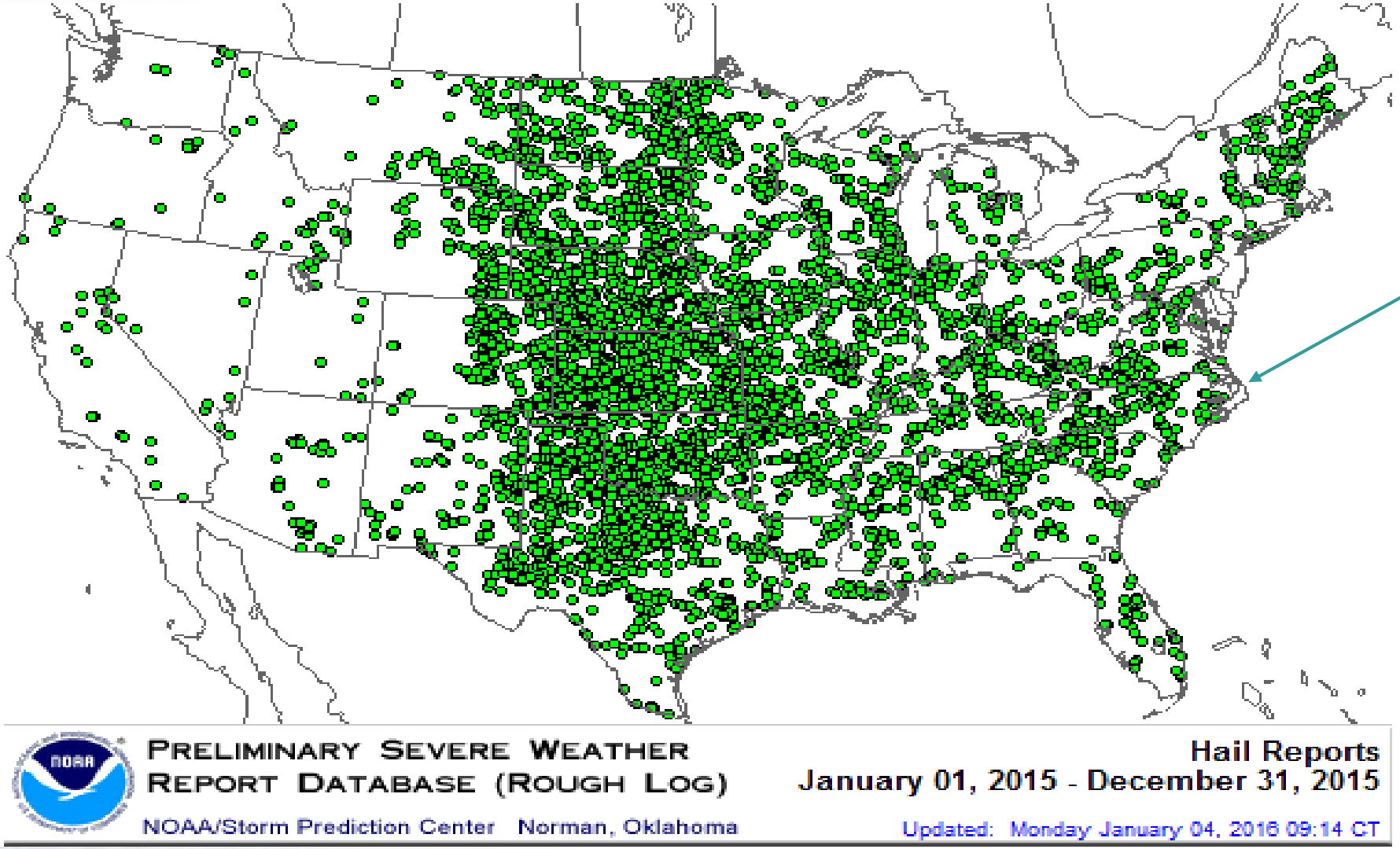


By Assets at Risk



Source: Nichols et al., 2007. OECD

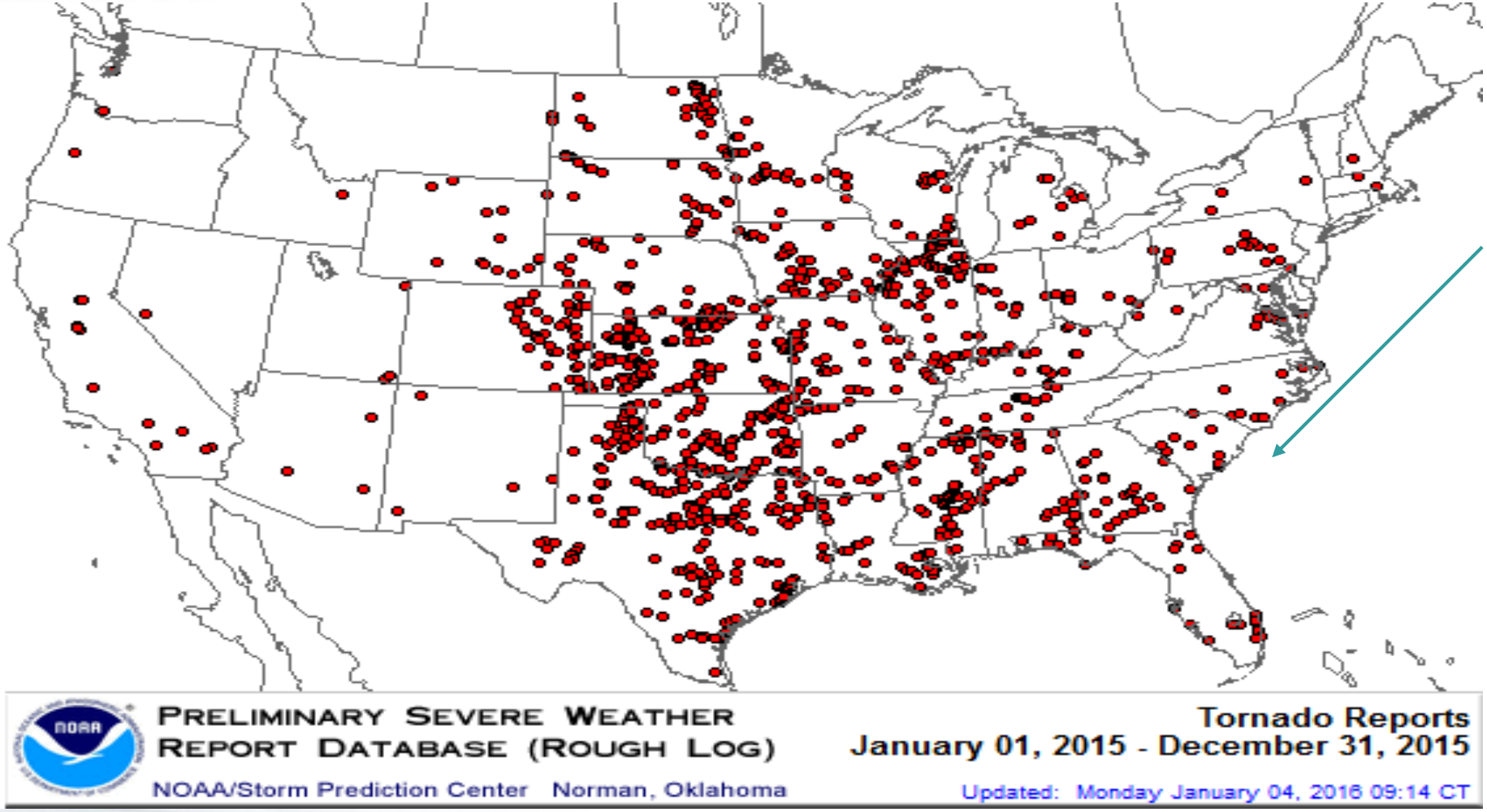
U.S. Hail Storms in 2015-



There are 5,412 reported hails in 2015.

Source:http://www.spc.noaa.gov/climo/online/monthly/2015_annual_summary.html#

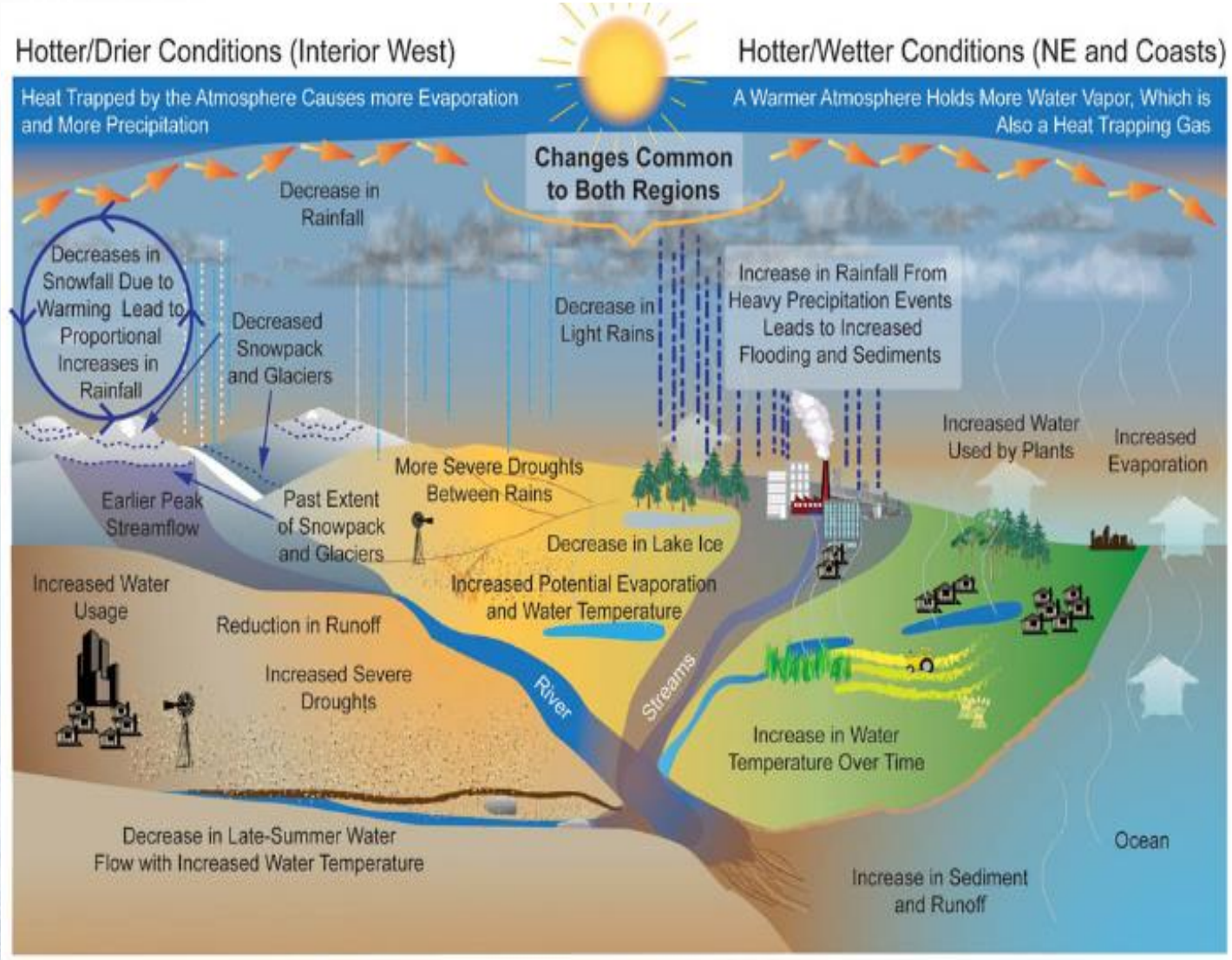
U.S Tornadoes in 2015



There are 1,259 reported tornadoes in 2015.

Source: http://www.spc.noaa.gov/climo/online/monthly/2015_annual_summary.html#

Climate Impacts on Water Resources in the U.S.



- Warming temperatures, changes in precipitation, and sea level rise have affected and will likely continue to affect water supply and quality.
- Changes will vary in different regions of the United States; potential effects include increased flooding and drought, water quality impairment, and salt water intrusion to coastal water supplies.
- Changes to our water resources affect many sectors, including energy production, infrastructure, human health, agriculture, and ecosystems.

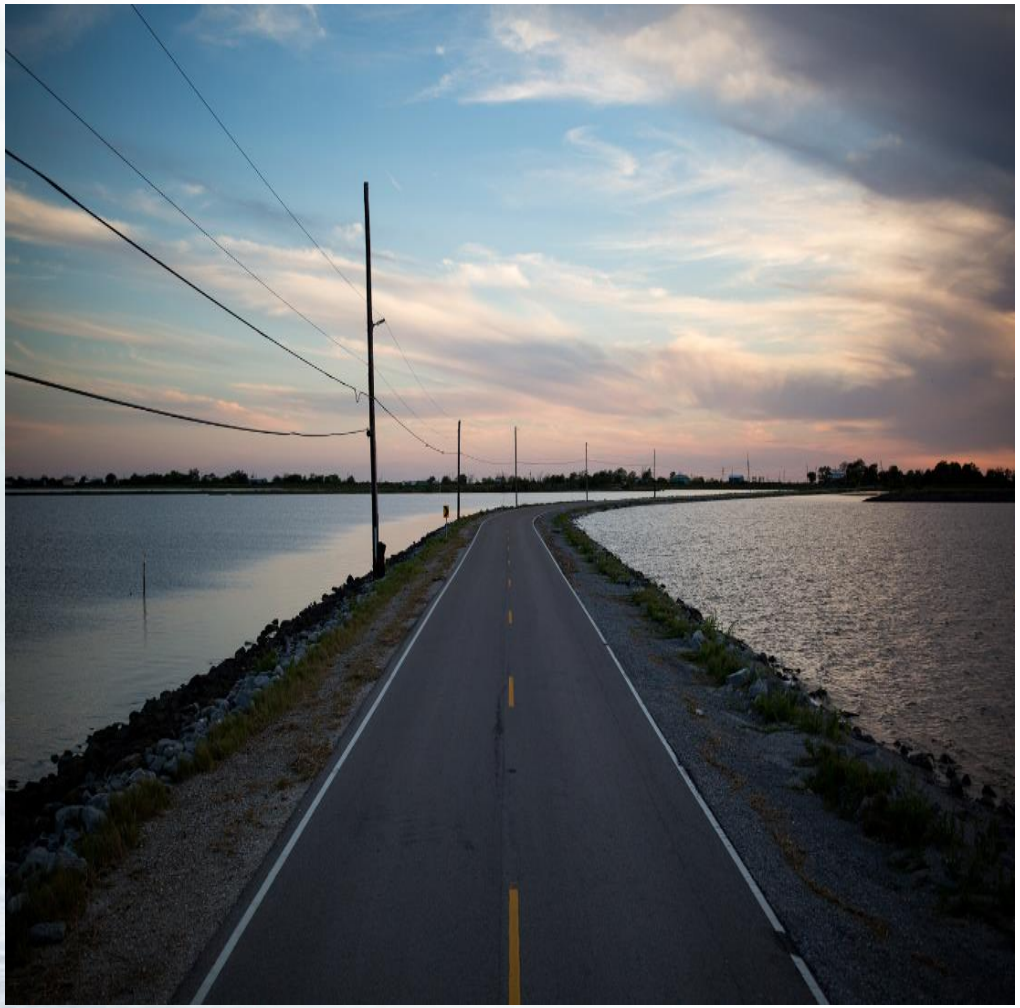
Source: https://www3.epa.gov/climatechange/impacts/water.html

Climate Change Impacts in the Northwest of the U.S.

- 40% of the nation's hydropower is generated in the Northwest. Lower streamflows will likely to reduce hydroelectric supply and large economic losses in the region
- In the coastal zone, the effects of sea level rise, erosion, inundation, threats to infrastructure and habitat, and increasing ocean acidity collectively pose a major threat to the region.
- The combined impacts of increasing wildfire, insect outbreaks, and tree diseases are already causing widespread tree die-off and are virtually certain to cause additional forest mortality by the 2040s and long-term transformation of forest landscapes. Under higher emissions scenarios, extensive conversion of subalpine forests to other forest types is projected by the 2080s.
- While the agriculture sector's technical ability to adapt to changing conditions can offset some adverse impacts of a changing climate, there remain critical concerns for agriculture with respect to costs of adaptation, development of more climate resilient technologies and management, and availability and timing of water.

Source: https://www3.epa.gov/climatechange/impacts/water.html

Resettling the First American 'Climate Refugees'



- In January 2016, the Department of Housing and Urban Development announced grants totaling $1billion in 13 states to help communities adapt to climate change.
- One of those grants, $48 million for Isle de Jean Charles in Louisiana is the first allocation of federal tax dollars to move an entire community struggling with the impacts of climate change.

Source: http://www.nytimes.com/2016/05/03/us/resettling-the-first-american-climate-refugees.html?_r=0

The Cost of Carbon

Source: Al Gore: The case for optimism on climate change

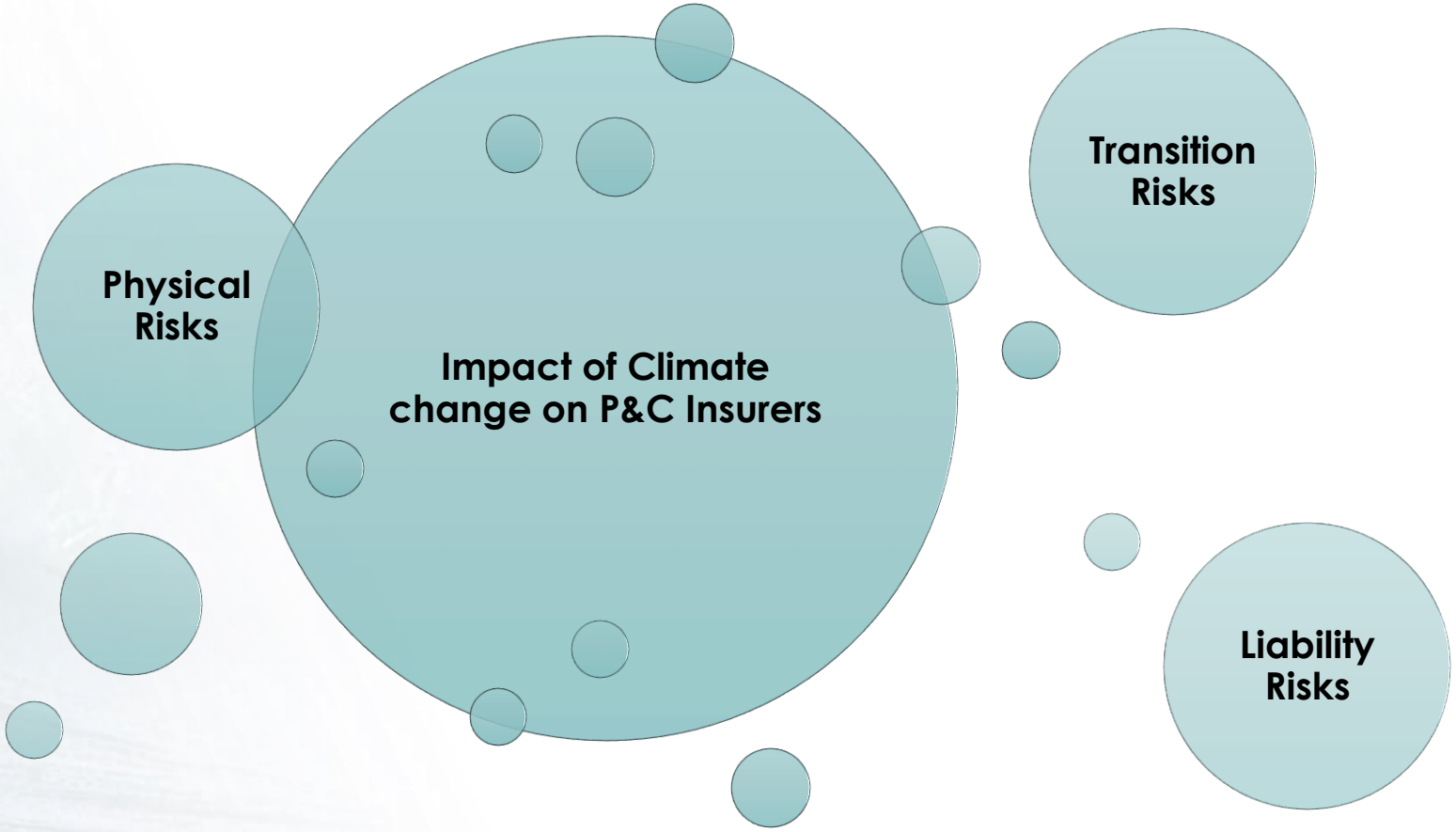
CA Climate Risk Carbon Initiative?

- CA Climate Risk Carbon Initiative is a multi-pronged initiative. Currently the initiative includes:
  - A request that California licensed insurance companies divest from thermal coal enterprises; and
  - Required financial disclosure of insurance companies' investments in fossil fuel enterprise through a data call seeking additional information about insurance company's exposure to other fossil fuel investment risk.
  - The initiative covers investments reported in Schedule D, and Schedule BA of the 2015 Annual Statement. This initiative does not include separate accounts or assets held in trust for reinsurance.
  - Divestiture is voluntary. Companies that decline to divest will be publicly identified as will those companies that agree to divest. Examinations of companies that decline to divest from thermal coal will include examining the risk that coal assets will become 'Stranded Assets'.

Source: Al Gore: The case for optimism on climate change

How does climate change impact (Re)Insurance Industry?

Impact of Climate Change on P&C Insurers



Physical Risks

- Cause disruption in established insurance arrangements and associated risk, and create important issues for public policy (e.g. Flood Re in the UK)
- Tremendous uncertainty in setting insurance companies' capital requirement
- Drastically increase associated indirect risks. (e.g. 2011 Thai floods caused $45 billion of damage, resulting in $12 billion of insured losses arising from supply chain interruption of global manufacturing firms)
- Wastewater treatment systems reduce environmental impacts in the receiving water. Although the 50-year life expectancy of a sewer system is longer than treatment equipment (15 to 20 years), renovation needs of a sewer system can be more costly. If there is no renewal or replacement of existing 600,000 miles of sewer systems, the amount of deteriorated pipe will increase from 10% to 44% of the total network from 1980 to 2020. In 2008, U.S. clean water needs for building new and updating existing wastewater treatment plants, pipe repair and new pipes, and combined sewer overflow correction were $105.2, $72.6, and $63.6billion, respectively.

Source:http://css.snre.umich.edu/css_doc/CSS04-14.pdf

Transition risks

- The global transition to a lower carbon economy could have an impact on insurance firms through their investments in carbon-intensive assets.
- Changes in policy, technology and physical risk could prompt a reassessment of the value of a large range of assets as costs and opportunities become apparent.

Source:http://css.snre.umich.edu/css_doc/CSS04-14.pdf

Liability risks

- It would be simplistic to draw too close a comparison between climate change and asbestos and pollution, but these cases demonstrate how what at the time appear to be low probability risks can transform into large and unforeseen liabilities for insurers. (e.g., the total current estimate of net asbestos losses is estimated at $85 billion in the U.S.)

- It can take time for a new category of liability claim to gain traction in the courts, and climate change-related litigation is still an emerging and evolving area which varies considerably across different jurisdictions.

- Increased lawsuits regarding climate change- e.g. Hurricane Katrina.

Source:http://css.snre.umich.edu/css_doc/CSS04-14.pdf

Can we Change?

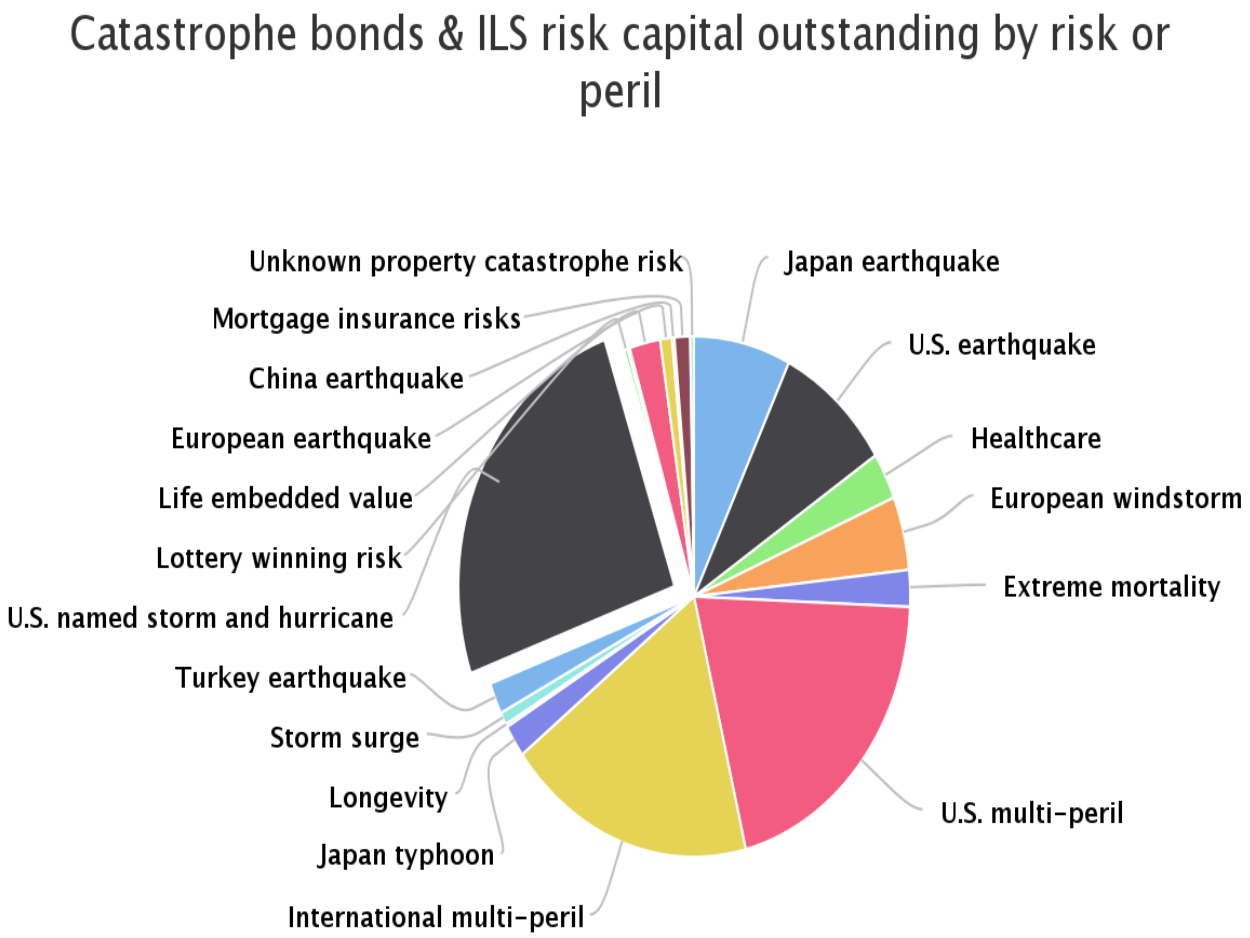

In the 2015 Paris Agreement, virtually every nation in the world agreed to work together to eliminate all greenhouse gas emissions.

Key findings on insurance industry's preparedness in addressing climate-related risks and opportunities

- 9 of the 330 insurers across the world earned a leading rating in strong preparedness in addressing climate-related risks and opportunities. (*Ceres 2014 Insurer Climate Risk Disclosure Survey)
- Top rated (re)insurers are: ACE, Munich Re, Swiss Re, Allianz, Prudential, XL Group, The Hartford, Sompo Japan, Zurich Insurance (*Ceres 2014 Insurer Climate Risk Disclosure Survey)
- Larger insurer showed stronger climate risk management practices than smaller companies
- P&C insurers demonstrated far more advanced understandings of the risks that climate change poses to their business, and are much further along in developing tools needed to manage climate risks when compared to the L&H insurance segments.

Source: Ceres Insurance Program, 2014 Insurer Climate Risk Disclosure Survey

Will Climate Change Give Rise to Innovative alternative bonds and ILS?



Source: www.Artemis.bm Deal Directory

Top 5 outstanding CAT bond &ILS by risk or peril in 2016

1. U.S. named storm and hurricane outstanding: 25.2%, $6,462mn
2. U.S. multi-peril outstanding: 20.5%, $5,262mn
3. International multi-peril outstanding: 18.5%, $4740mn
4. U.S. earthquake outstanding: 8.6%, $2,215mn
5. Japan earthquake: 7.2%, $1,858mn

Source: www.Artemis.bm Deal Directory

Future opportunities?

Engage with Key Stakeholders on Climate Risk

- A UN Climate Resilience Initiative launched at the COP21Paris Climate Conference on November 30th, 2015 was aiming to work with (re)insurance partners to tackle climate risks to vulnerable nations.
  - The target is to ensure that by 2020 more than 30 vulnerable countries have $2bn of coverage against the risk of drought, flood and cyclones.
  - The Insurance Development Forum backed by insurance companies and brokers, United Nations, the World Bank and government agencies, the International Insurance Society, and the International Cooperative and Mutual Insurance Federation will convene 2016 to help make progress on the new climate resilience initiative.

Engage with Key Stakeholders on Climate Risk

- Use of big data to boost the efficiency and specificity of climate-risk information
- More centralizing research and development (R&D) in the market to start tackling more complex and emerging risks.
- Understanding the risk and being able to price the risk at a competitive level.
  - The World Bank Group is working with the WHO and insurance industry on a scheme called the Pandemic Emergency Financing Facility (PEF)

Source: www.Artemis.bm Deal Directory

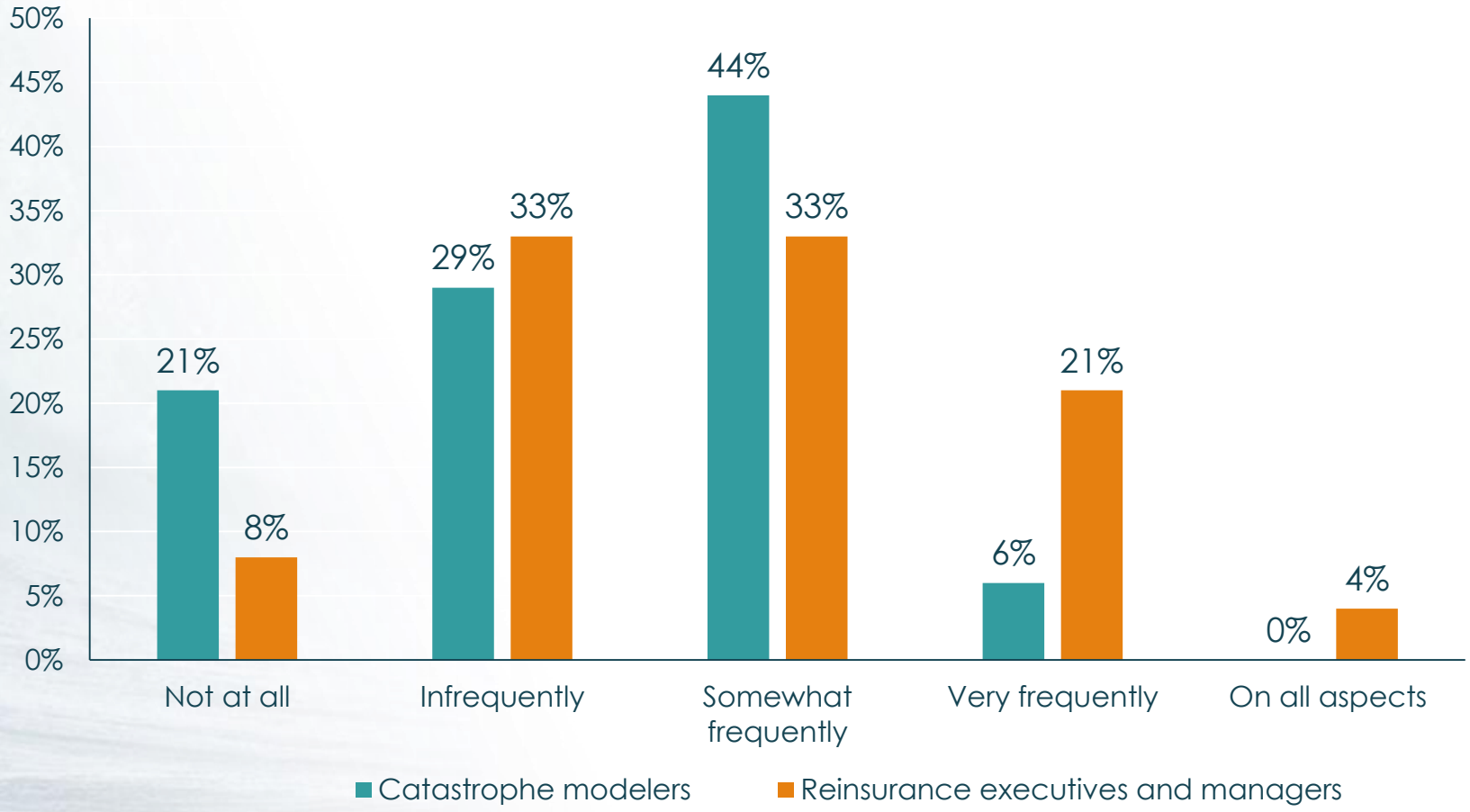
Engage with Key Stakeholders on Climate Risk

- New sources of premium growth
  - Renewable energy project insurance
  - Increasing demand for insurance coverage of design and construction risk as well a performance risk. (e.g. providing cover for income shortfall from solar farms due to changing weather patterns)
  - Products related to public policy risk (e.g. cover for the sudden withdrawal of renewable energy subsidies)
- Support resilience to climate change through risk awareness and risk transfer
- Investment in ‘green bonds’

Challenges?

Survey of 186 Reinsurance Executives and CAT modelers conducted at the RAA Conference

Do you currently consider climate change in your work?



Source: ICF International, survey of 186 reinsurance executives/managers and catastrophe modelers, conducted at the Reinsurance Association of America Conference 2015.

Contact

Steve McElhiney, MBA, CPCU
CEO
EWI Re, Inc.
5430 LBJ Freeway, Suite 1595 Dallas, TX, 75240
972-560-0675
smcelhiney@ewirisk.com

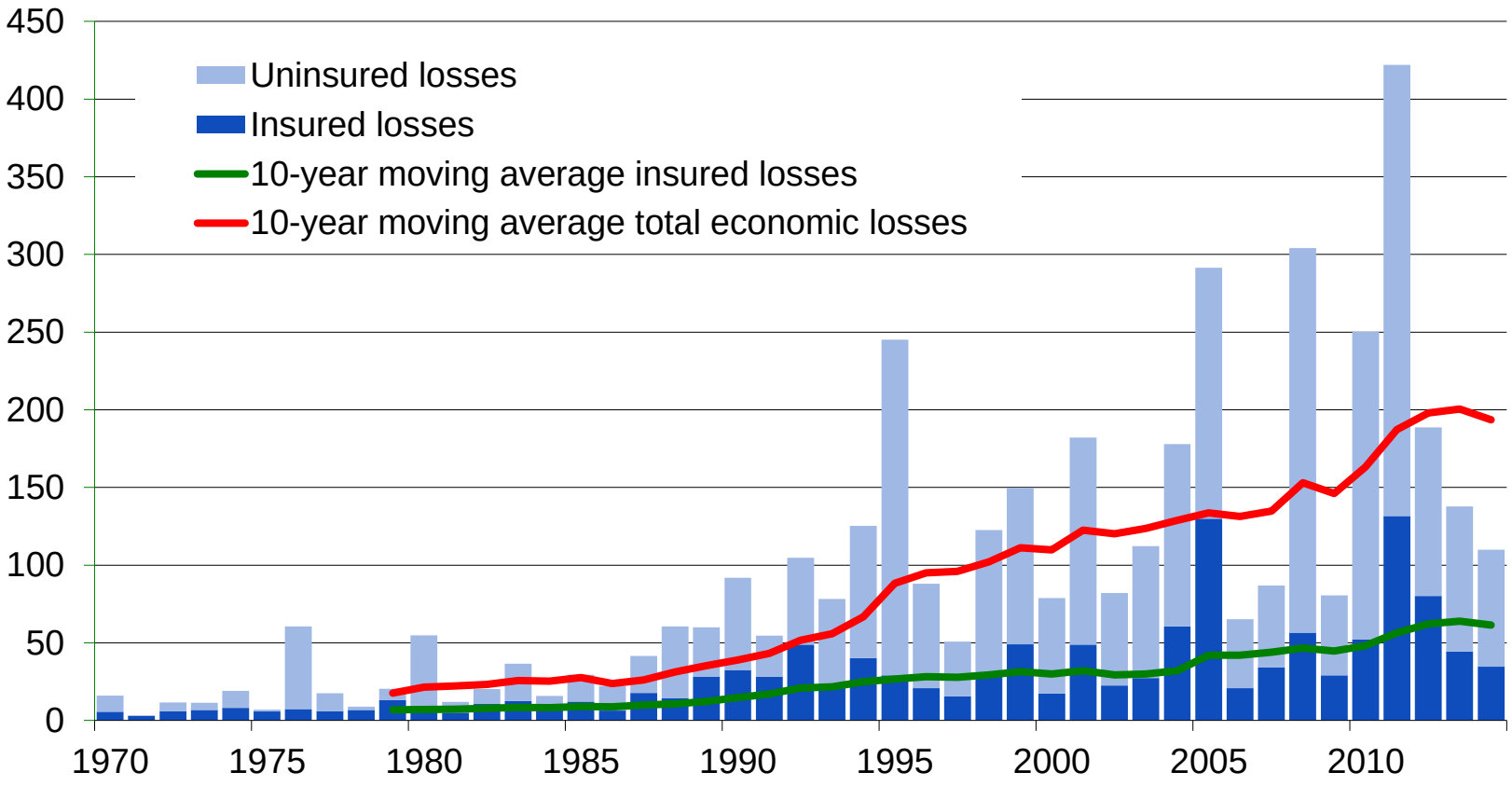
Swiss Re

Resilience and the Economics of Risk

Break in the Ice: Climate Risk and the Insurance Industry
June 2016

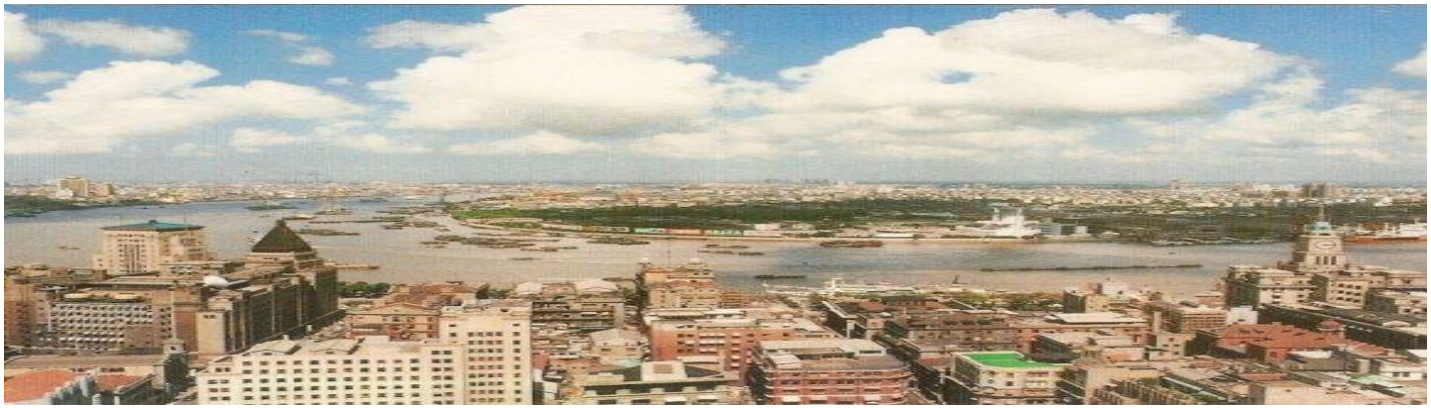
The growing burden of uninsured losses

Natural catastrophe losses 1970 – 2014 (in 2014 USD)



Source: Swiss Re Economic Research & Consulting and Cat Perils.

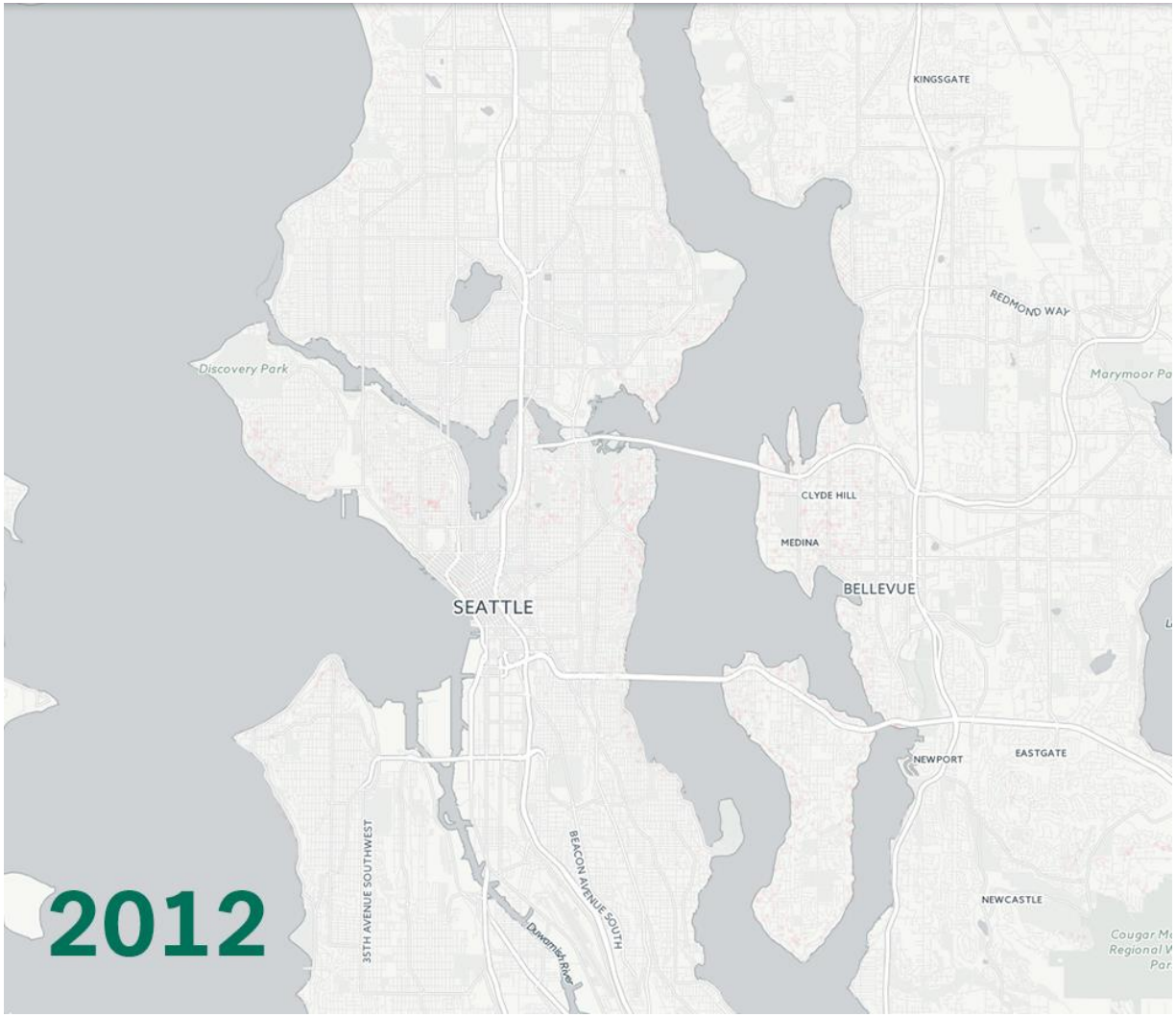
Growing Exposures: Climate change is not the main driver for rising natural catastrophe losses in recent decades



Shanghai: 1990 to 2013

Source: Skyscapercity.com

Million Dollar Homes in Seattle



Source: Trulia

In the US, the price tag is large and growing.

- Since 2005, the US taxpayer has spent over **$300 billion on direct costs** of extreme weather and fire alone.
- Firefighting expenses have **tripled in 20 years**.
- In 1991, firefighting made up **13%** of the Forest Service budget. In 2013, it was **50%**
- Natural catastrophes (earthquake and weather related) cause average economic losses of **$60-100 billion** annually. (Hurricane Sandy = ~$70 billion)
- The US Government spent **$96b** in 2012 to pay for climate-related events
  - If this so-called "Climate Disruption Budget" were included in the actual budget, it would be the largest non-defense discretionary budget item.
  - The Government paid more for climate-related losses than it did for transportation or education.

Swiss Re's commitment
2014 UN Climate Summit in NYC

"By the year 2020, Swiss Re commits to have advised 50 sovereigns and sub-sovereigns on climate risk resilience and to have offered them protection of USD 10bn against this risk."

Swiss Re CEO
Michel Liès
23 September 2014

Swiss Re's climate change strategy

Coping with climate change requires both mitigation and adaptation measures

Swiss Re assesses and manages the risk

- Advance (our) knowledge about climate change risk
- Quantify climate change risk
- Integrate climate change risk into underwriting and risk management framework

Swiss Re seizes business opportunities

- Develop appropriate solutions for adapting to and mitigating climate change
- Traditional catastrophe insurance
- Weather risk solutions

Swiss Re influences the business environment

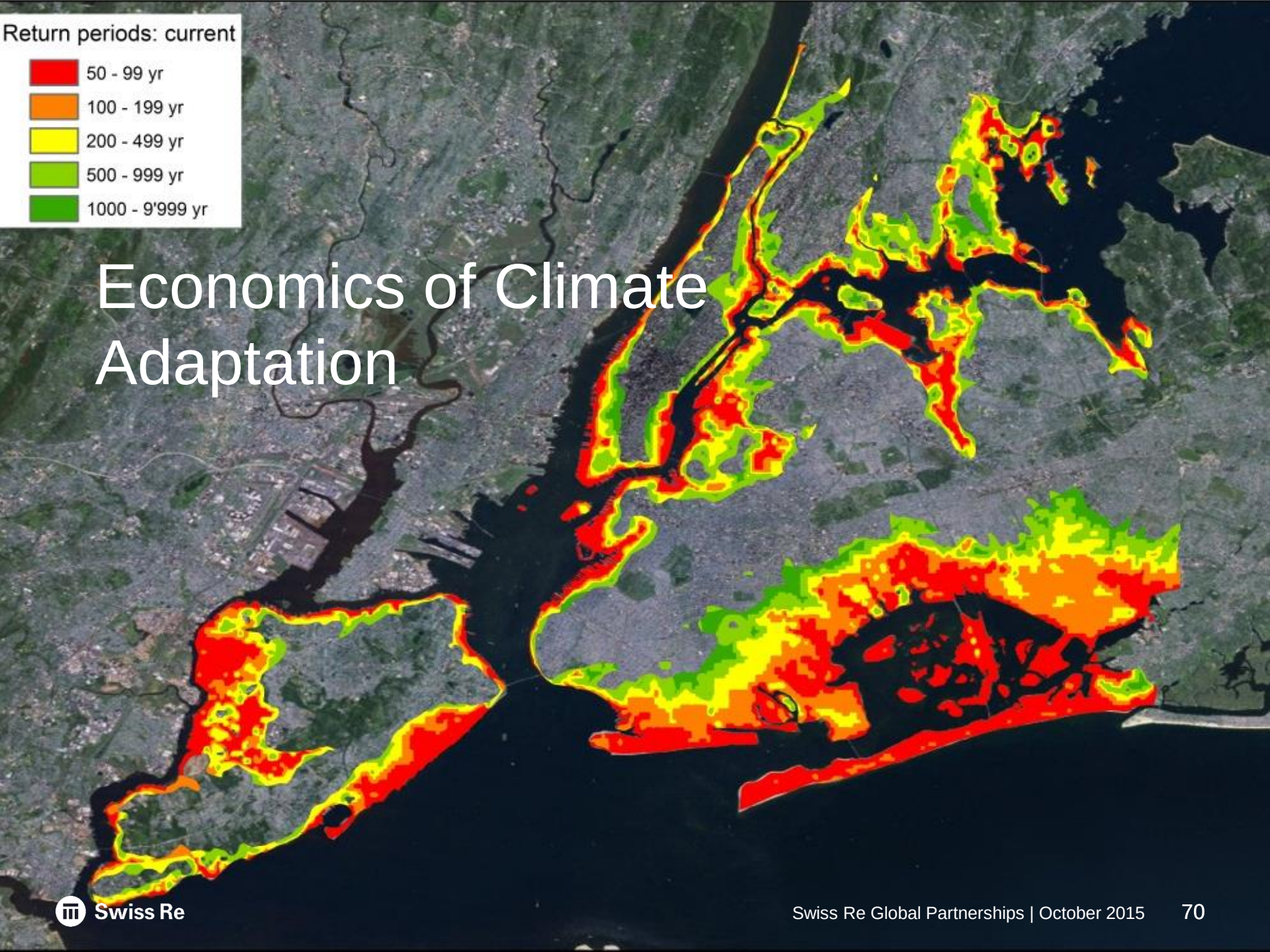
- Raise awareness, actively disseminate knowledge to all stakeholders and advocate a long-term, marked-based policy framework, through
- Publications, platforms (e.g. World Economic Forum), Centre for Global Dialogue, speaking engagements

Swiss Re leads by example

CO You2
Reduce and Gain Programme

- Greenhouse neutral since October 2003
- Reduced emissions per employee by 54.4% by 2013
- CO_{You2} Programme since 2006

Economics of Climate Adaptation



Climate adaptation is an urgent priority

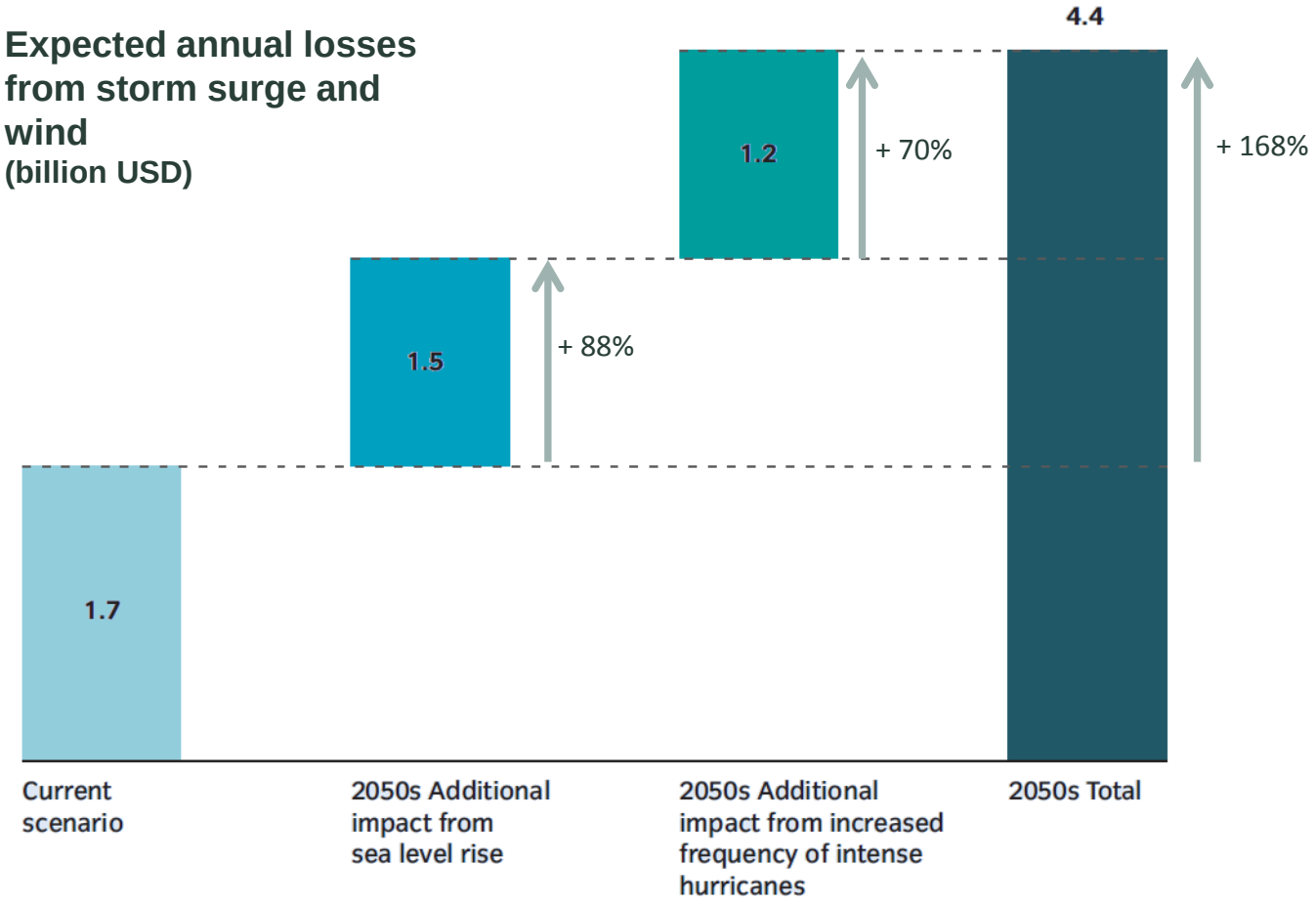
Decision makers ask

- What is the potential climate-related damage over the coming decades?
- How much of that damage can we avert, with what measures?
- What investments will be required to fund those measures and will the benefits of that investment outweigh the costs?

The working group studied 18 regions with diverse climate hazards

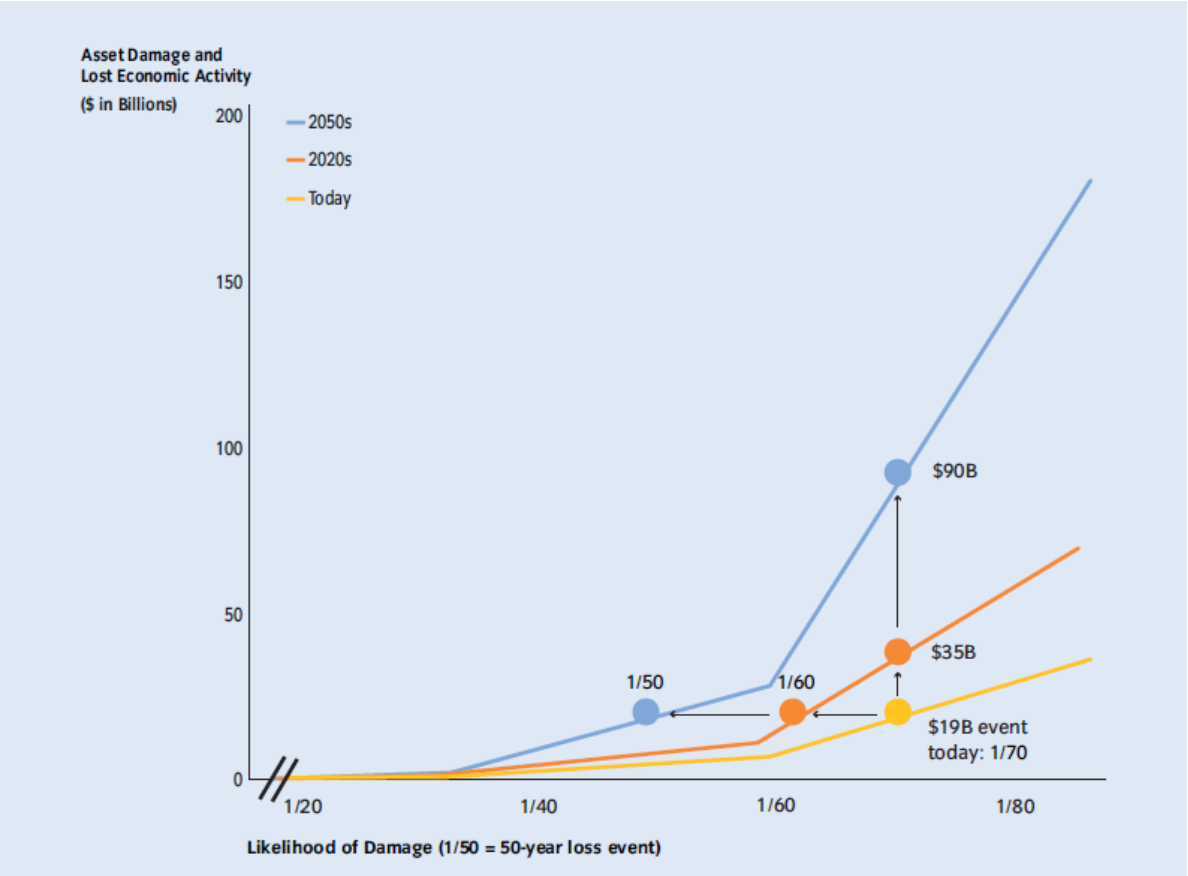
Economics of Climate Adaptation (ECA) Working Group, a partnership between the Global Environment Facility, McKinsey & Company, Swiss Re, the Rockefeller Foundation, ClimateWorks Foundation, the European Commission, and Standard Chartered Bank.

Sea level rise and altered hurricane frequencies significantly increase losses in New York City



Source: www.nyc.gov: A Stronger More Resilient New York

Loss frequency curves
(the frequency of a loss equaling or exceeding a specific value)



Source: www.nyc.gov: A Stronger More Resilient New York

Disaster Risk Financing: Case Studies

Case study Caribbean:
Caribbean Catastrophe Risk Insurance Facility (CCRIF)

Solution features

- The CCRIF offers parametric hurricane and earthquake insurance policies to 16 CARICOM governments
- The policies provide immediate liquidity to participating governments when affected by events with a probability of 1 in 15 years or over
- Member governments choose how much coverage they need up to an aggregate limit of USD 100 m
- The mechanism will be triggered by the intensity of the event (modelled loss triggers)
- The facility responded to events and made payments:

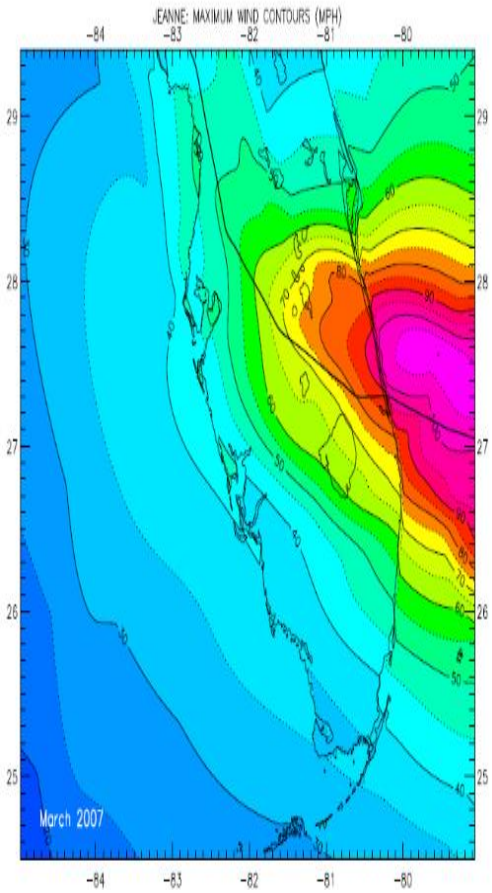
Involved parties

- Reinsurers: Swiss Re and other overseas reinsurers
- Reinsurance program placed by Guy Carpenter
- Derivative placed by World Bank Treasury

Payouts to date

- 2010: Haiti USD7.7m (earthquake), Barbados USD 8.5m (hurricane), St. Lucia USD 3.2m (hurricane), St. Vincent & The Grenadines USD 1.1 (hurricane), Anguilla USD 4.2m (hurricane).
- 2008: Turks & Caicos USD 6.3m (hurricane)
- 2007: St. Lucia USD 418k (hurricane), Dominica USD 528k (hurricane).

Case study: Swiss Re STORM
Large Florida Public Entity–
Index-based Named Windstorm Insurance



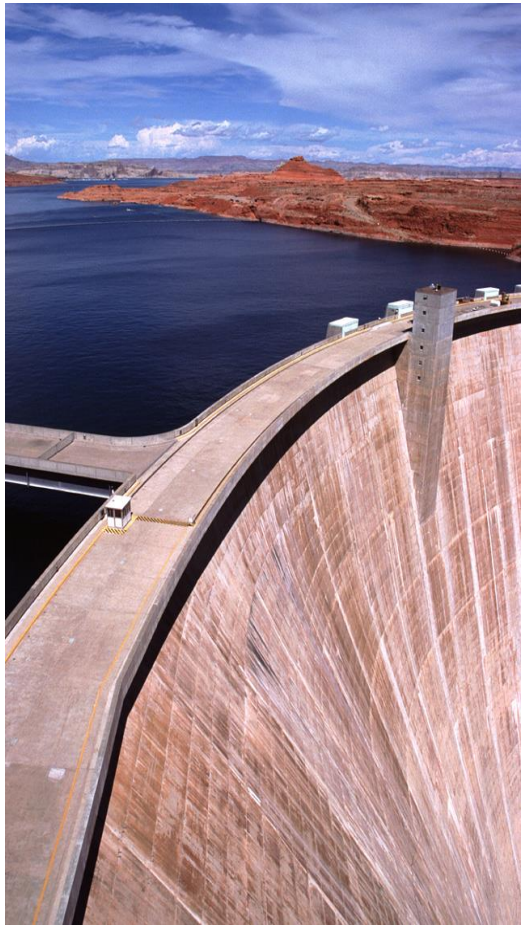
Solution features

- Insured peril: Hurricane
- Payments to offset economic costs of hurricanes
- Trigger type: Parametric Wind Index
- Trigger based on client's exposure at ZIP code resolution and wind speeds across affected area.
- Payout in as little as two weeks
- Time horizon: 2016-2019
- First parametric catastrophe risk transfer for a major public entity in Florida

Involved parties

- Insured: Not disclosed
- Swiss Re: Lead structurer and sole underwriter

Case study Uruguay: Largest Energy Risk Transfer to Protect Against Drought Risk



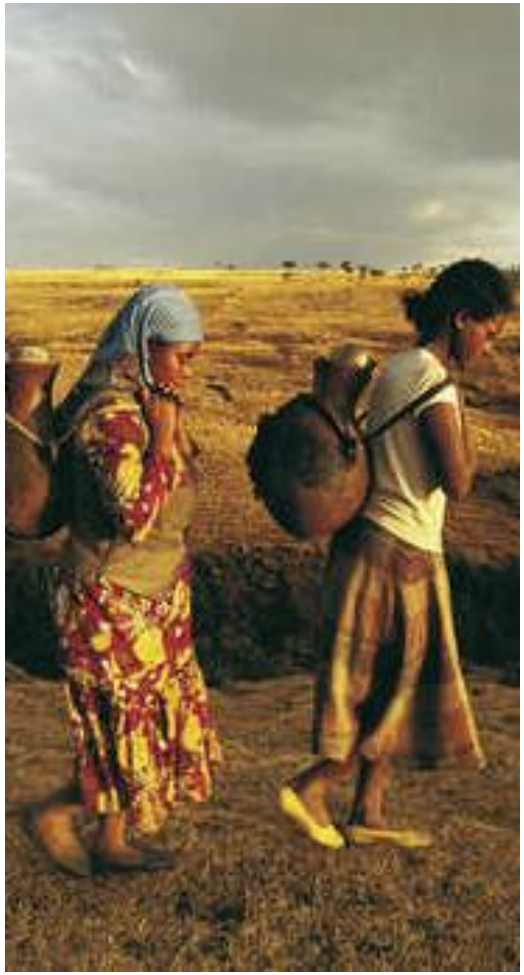
Solution features

- Insured peril: Drought
- Payments to be used to purchase energy from alternative sources when drought conditions cause lack of hydro power
- Derivative contract: between UTE, Uruguayan state-owned hydro-electric power company, and World Bank Treasury. Risk is then placed in the market
- Payment mechanics:
  - Trigger: Level of rainfall monitored at weather stations
  - Settlement: Market price of brent crude oil
- Time horizon: January 2014– July 2015
- Transaction Size: USD 450 m
- Largest of its kind in the weather risk management market

Involved parties

- Client: UTE (Uruguayan state-owned power company)
- Arranger: World Bank Treasury
- Risk Takers: Swiss Re and Allianz

Case study African Risk Capacity: Insuring governments' drought response costs



Solution features

- African Risk Capacity (ARC), through its insurance subsidiary ARC Insurance Ltd., is a sovereign insurance pool, which provides African governments with index-based macro drought cover (in a later stage also flood).
- It incepted in May 2014 with five countries and will expand over the next years to cover more countries. The pool is capitalized with USD 200 million to offer maximum cover of USD 30 million per country.
- To establish the payout rules, ARC has developed a software application, Africa Risk View (ARV), which translates satellite-based rainfall information into near real-time response cost estimates.
- Each country is required to customize and define its own insurance parameters and to submit a contingency plan, addressing the distribution of potential payouts to the affected population to ensure fast response.
- Certificate of good standing issued by ARC agency is a pre-requisite to participate in the insurance pool.

Involved parties

- Set up as Special Agency of the African Union with support from WFP, DfID, SIDA, SDC, Rockefeller Foundation, IFAD;
- Insurance entitiy ARC Insurance Ltd capitalized by DfID and KfW.
- Risk transfer to international insurers and reinsurers through broker.

Payouts to date

For 2014, Niger, Senegal and Mauritania received a combined payout of USD 26m, of which USD 16.5m to Senegal.

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Insurer panel

Moderator: Marcie Frost, Chair, State Investment Board

Panelists:

- Derek Wing, Communications Manager, Pemco
- Dan Dunmoyer, Head of Government & Industry Affairs, Farmers Insurance
- Butch Bacani, Programme Leader, UNEP FI, Principles for Sustainable Insurance Initiative

FARMERS INSURANCE

June 1, 2016 — Dan Dunmoyer, Head of Government and Industry Affairs
Farmers Insurance

Dan Dunmoyer, Head of Government and Industry Affairs, Farmers Insurance

- Office: (818) 965-0432
- Cell: (916) 607-9172
- Email: dan.dunmoyer@farmersinsurance.com
- Address: 6303 Owensmouth Avenue, Woodland Hills, CA 91367

THE IBHS FORTIFIED HOME™ PROGRAM

- IBHS created the FORTIFIED Home™ program to help strengthen homes from hurricanes, high winds, hail, and severe thunderstorms
- FORTIFIED Home™ is a set of engineering and building standards designed to help strengthen new and existing homes through system-specific building upgrades to minimum building code requirements that will reduce damage from specific natural hazards
- Compare to the IIHS TOP SAFETY PICKS rating system used for cars

FARMERS INSURANCE

FARMERS INSURANCE DISASTER RESILIENCE PROJECTS

- Insurance Institute for Business and Home Safety (IBHS)
- Fire Safe Councils
- Rebuild Joplin
- Sea Bright Rising
- NOAA/Weather.com Project
- Team Rubicon Partnership
- Wharton Risk Center

FARMERS INSURANCE

Reflections on global insurers and reinsurers in response to the Paris Call to Action

Mike McGavick

CEO, XL Group

4:15 – 4:45 p.m.

Closing remarks

Dr. Joe Casola, UW CIG

Commissioner Mike Kreidler, OIC

4:45 – 5:00 p.m.

Thank you for coming

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