



CLIMATE RISK DISCLOSURE BY INSURERS:

Evaluating Insurer Responses to the NAIC Climate Disclosure Survey



A Ceres Report
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Ceres leads a national coalition of investors, environmental organizations and other public interest groups working with companies to address sustainability challenges such as global climate change and water scarcity. Our mission is to integrate sustainability into day-to-day business practices for the health of the planet and its people. Ceres also directs the Investor Network on Climate Risk, a network of 100 investors with collective assets totaling nearly \$10 trillion.

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Foreword

FOREWORD

With its ability to assume and spread risk, the global insurance industry enables productive deployment of trillions of dollars in household, corporate and government capital. And with \$23 trillion in global investments, the industry is a powerful economic driver in its own right.

This report documents this powerful industry's sluggish and uneven response to the ever-increasing ripples from global climate change, which could undermine both its own financial viability and the stability of the larger global economy. With the world still reeling from the devastating impacts of an economic crisis triggered by hidden risks in the banking sector, we can ill afford a new problem triggered by hidden risks in another.

Ceres, a national coalition of investors and public interest groups, has played a key role in elevating insurance industry attention to climate risks. Our 2005 report, *Availability and Affordability of Insurance Under Climate Change*, was the first report of its kind to link insurance and climate change. It helped prompt the National Association of Insurance Commissioners (NAIC) to focus on the issue, and launch an effort to require insurance companies to boost public disclosure on the topic.

In early 2009, the NAIC unanimously approved a mandatory climate risk disclosure standard for insurers. That standard was later weakened, but numerous key states with significant market share, including California, New York and Pennsylvania, moved forward to use it.

This report is the first attempt to utilize the public NAIC disclosure filings from 88 companies to evaluate the extent to which US insurers consider climate change a key risk factor to their business. The findings are illuminating and disillusioning: while the NAIC survey revealed a broad consensus among insurers that climate change will have an effect on extreme weather events, only 11 of the 88 companies reported having formal climate risk management policies in place, and more than 60 percent of the respondents reported having no dedicated management approach for assessing climate risk.

As I write these words in late summer, 2011 is already adding up as one of the costliest years in history for natural disasters around the globe—and that's with this year's Atlantic hurricane season just heating up.¹ A changing climate is driving up insurers' aggregated losses from smaller, non-modeled events such as tornadoes, floods, snowstorms and hailstorms. Larger events such as prolonged droughts have caused huge losses across the planet in the past 18 months. Legal developments related to climate change are driving up many insurers' liability claims.

These developments clearly point to a business model that must change.

Responding to climate risks with innovation can create value for insurers and their shareholders while protecting consumers and causing less loss to society. Action is needed now; regulators and insurers must support mandatory, annual, publicly available climate disclosure. Insurers must do more—as individual companies and collaboratively with their peers—to elevate research efforts on climate-related ripple effects and necessary responses across the industry.

There's irony in issuing a warning of unseen risk to an industry literally built on assessing, modeling and mitigating risk. But climate change is a game-changer no less for insurers than it is for farmers, businesses with global supply chains and residents of the lengthy list of affected regions.

For insurers and the societies they serve, the economic impacts are double-barreled—both to insurers' business models and to a still-fragile global economy that in turn re-amplifies the business threat.

It's time to act on this challenge, turning it into an opportunity that changes insurers' practices to better safeguard both the global economy and the global climate.

Mindy Lubber

President, Ceres

Director, Investor Network on Climate Risk

1 Mary Williams Walsh. 2011. "Irene Adds to a Bad Year for Insurance Industry." *New York Times*, August 28.

Executive Summary



EXECUTIVE SUMMARY: TRENDS, FINDINGS & RECOMMENDATIONS

The insurance industry is a key driver of the global economy, its products and actions stimulating trillions of dollars in private investment and influencing business activity across all sectors. Insurance also deeply affects societal behaviors from driving habits to personal health decisions to corporate investments.

But climate change is altering the industry's global business landscape and the risk models on which it crucially depends. After centuries of operating in a relatively stable global climate, insurers are facing more volatile weather patterns driven by rising temperatures and human activities likely causing them.

As the National Association of Insurance Commissioners (NAIC) itself has noted¹, this fast-emerging threat will have broad impacts across the industry, clouding its ability to price physical perils, creating potentially vast new liabilities and threatening the performance of its huge investment portfolios.

This Ceres report is the first attempt using public disclosure filings to evaluate the extent to which US insurers consider climate change a key risk factor to their business, and if so how they are factoring it into governance practices, management strategies and day-to-day decision making. The analysis is based on responses by 88 insurers to a 2010 survey from the NAIC. The disclosures were filed with insurance regulators in six states: New York, New Jersey, California, Oregon, Pennsylvania and Washington.

The NAIC survey, while incomplete, provides an unprecedented view into climate risk perception and management within the insurance industry. The survey responses paint a picture of an industry that, outside of a handful of the largest insurers, is taking only marginal steps to address an issue that poses clear threats to the industry's financial health, as well as to the availability and affordability of insurance for consumers.

KEY FINDINGS OF CERES' ANALYSIS INCLUDE:

There is a broad consensus among insurers that climate change will have an effect on extreme weather events.

More than three-quarters of insurers responding to the survey name perils that may be affected by climate change. More than half name market segments, such as homeowners

¹ National Association of Insurance Commissioners, 2008, "The Potential Impact of Climate Change on Insurance Regulation," White Paper.

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or marine insurance, which may be affected by climate change. And a third of insurers name climate-affected geographies. Even those insurers with no formal climate policy, no climate risk management structure and a stated belief that the company is not vulnerable to the effects of climate change still name perils that may be affected by climate change 20 percent of the time.

Yet despite widespread recognition of the effects climate change will likely have on extreme events, few insurers were able to articulate a coherent plan to manage the risks and opportunities associated with climate change.

Of 88 companies surveyed, only 11 reported having formal climate change policies, and more than 60 percent of the respondents reported having no dedicated management approach for assessing climate risk. This was not true uniformly across the industry, however.

The survey found that U.S. insurers' perceptions about and responses to climate change vary significantly by segment and size, suggesting the potential for significant market dislocations and potential contraction as insurers with less capacity to identify and manage climate risks experience excessive capital losses.

Some of the largest players in the industry—particularly in property and reinsurance—are investing considerable resources into understanding the risks and developing strategies that may drive more climate-resilient underwriting practices and capital decisions. Seven of the 11 companies that report having formal climate policies are multi-line insurers (those with diverse business, including life & health in addition to property & casualty) and one is a global reinsurer, most with annual premiums well above \$1 billion. Only two life insurers, Prudential Insurance Co. of America and Genworth Life Insurance Co. of New York, report having a formal climate policy.

None of the 18 property & casualty companies surveyed have formal climate change policies or explicit board or executive oversight of this key issue.

Based on these disclosures, there appears to be significant asymmetry between market segments in climate risk management, with broad cross-sections of the market having no apparent system for identifying or addressing climate risks. Of particular concern to regulators, the most vulnerable companies tend to be within the segments of the market that are closest to consumers.

The industry is focusing most of its attention on a narrow set of risks, ignoring issues like non-coastal extreme weather and climate liability, which may prove to be significant.

With some important exceptions, the industry is largely focused on the implications of climate change for hurricanes and other coastal events. While this is understandable given the financial risks associated with major hurricanes, recent years have demonstrated that the climatic effects of rising temperatures are likely driving up aggregated losses from smaller, non-modeled events—including perils such as floods, droughts, snowstorms, hailstorms and tornadoes—in ways that severely cut into insurer profitability.

Climate change has also become the subject of significant litigation in recent years, a trend which is likely to grow as the physical impacts of climate change become more pronounced and affected parties seek redress in the courts.

Litigation risk is conspicuously absent from the disclosure filings of some insurers indemnifying defendants in ongoing litigation. In fact, no insurers name any historic or ongoing litigation in which they are implicated through liability contracts. Given the significant defense costs associated with these cases, and the scale of the potential liability (which many in the industry have likened to losses sustained through asbestos and tobacco liability), the omission of liability risk exposure should be of particular concern to regulators and shareholders.

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There are important exceptions to the overall scant disclosure around the specific risks that insurers face from climate change. For instance, the filing by Harleysville, a relatively small P&C insurer, contains an account of historical changes in tornado events which provides a clearer picture of an insurers' view about changing extreme event trends.

PMA Group's Pennsylvania filing also captures an unusual degree of specificity between discussion of perils and geographies, and provides a window into the uncertainty inherent in risk modeling and emerging liability exposures that may compound insurance losses from more volatile or extreme weather.

The majority of insurers that report using catastrophe models describe them in terms that suggest their company does not have a clear understanding of how the models can or cannot be used to anticipate changing risk.

Most of the industry relies on third-party catastrophe risk models that only marginally integrate changing extreme weather.

Only the largest insurers have the capacity to develop their own internal models; the vast majority of carriers rely on models provided by third-party vendors. The P&C industry's reliance on 'cat' models to set pricing and exposures means its risk view is largely shaped by these vendors.

The vast gulf in scientific expertise between the largest insurers and the average company is evident in insurers' discussions of catastrophe modeling.

In reality, and despite what many insurers seem to believe, catastrophe models shaping pricing across the industry only marginally incorporate changing climate trends.

Of the insurers with property exposures, 23 describe using cat models. Only eight suggest that today's catastrophe models may be insufficient to help their company or the industry at large to manage climate change.

Those companies that describe limitations of the industry's existing risk modeling tools tend to be those with the capacity to develop their own loss models. In contrast, companies that rely solely on third-party models almost uniformly believe those models to include all relevant climate change trends. Given this market asymmetry, regulators should be aware that many of the smaller companies operating within their states are likely setting pricing based on flawed beliefs of how the proprietary models work.

In contrast, larger insurers more readily recognize the inherent limitations of current catastrophe models in light of changing climate than do their smaller competitors. These larger players have a clear competitive advantage in deploying resources to build the latest climate science into their pricing models.

Without explicit education and dialogue between reinsurers, modelers, brokers and primaries, the gulf between the most sophisticated insurers and the rest of the industry in terms of the capacity to anticipate nonlinear climate change trends will persist. This puts consumers and the industry as a whole at risk.

While climate change poses significant financial risk for the industry, few insurers provided meaningful information on the potential financial impacts of more volatile weather losses.

More than 40 percent of insurers that see their company having climate risk exposure provide no information on the potential effects climate change may have on the company's pricing, capital adequacy or reinsurance requirements. Of those that do discuss the potential financial risks from climate change, only 18 percent outline actionable steps being taken to manage those risks.

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This should be of particular concern to regulators and shareholders, as it suggests that most companies may not be adjusting their pricing and capital allocation approaches despite growing evidence of the potential for extreme and volatile losses.

Just as climate change may substantially increase insured losses, it also threatens the performance of the vast investment portfolios insurers rely on to meet their liabilities.

The insurance industry controls more than \$23 trillion in global investments, making it one of the world's largest investors. Investment advisor Mercer calls climate change a systemic risk, estimating in a recent report that it could introduce as much as 10 percent portfolio risk for institutional investors—including those with diversified holdings in sovereign fixed income, equity, credit and agricultural assets. Mercer suggests that traditional asset allocation strategies will not be enough for investors to manage climate risk.

Despite such recommendations, our analysis shows that only a few insurers have explicit investment policies in place for managing climate change. These exceptions include Chartis, AXA Group and Swiss Re, all three of which include climate in broader investment commitments for integrating ESG (environmental, social and governance) factors. In contrast, most companies view climate change as a slow-burning economic risk that will happen in time frames well in excess of their investment horizons.

This report is being published as the industry has begun to recognize the broad implications that climate change poses for insurers. As Allstate's CEO recently told a group of sector analysts, the company is saying goodbye to the "good old days" of less extreme weather and is now "running our business as if this change [in extreme weather] is permanent."²

The NAIC's 2010 inaugural survey—and the results and findings documented in this report—provide an unprecedented view of climate risk perceptions and climate-related management strategies within the insurance industry. Our analysis shows widely varying and generally inadequate responses from US insurers—a shortcoming that limits regulators' ability to oversee how insurers in their states are assessing and managing climate risks.

The experience of this first year suggests a number of ways in which the disclosure process can be made more useful to regulators, consumers, investors and the industry itself in the future. We recommend that regulators consider the following steps:

- **Implement mandatory disclosure annually and make all survey responses public:**

The current approach, with some states requiring responses to the survey and others making participation voluntary and non-public, has resulted in a patchwork of disclosure which does not provide a full sense of how the US industry as a whole is affected by and managing the impacts of climate change.

The information provided through mandatory public disclosure can help other market actors identify market-wide failures in risk management and push for market corrections. In this respect, disclosure results should be used not only by regulators, but also by reinsurers, primaries and brokers to understand the direction the market is moving with respect to a risk factor that will profoundly shape industry performance in the coming years.

- **Clarify disclosure expectations:** The lack of specificity in the current NAIC disclosure survey has led to responses that are frequently vague and unhelpful, with little consistency in how insurers address major trends, including pricing, modeling and governance. Regulators should consider providing more detailed guidance documents in planning future survey responses. A useful model in this regard was disclosure guidance provided in 2009 and 2010 by the California Department of Insurance.

2 Evan Lehmann. 2011. "Inland storms, growing in violence, drive insurers to accept riskier reality." *ClimateWire*, May 20.

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- **Create more shared resources to help insurers analyze and respond to climate-related risks and opportunities:** Relatively few insurers have the ability to produce fundamental research on the ways in which climate change may affect their business. Insurers and regulators would both benefit from more fundamental research in the following areas, which emerged as key areas of weakness in this year's disclosure responses:
 - **Investment Risks and Opportunities:** Regulators could engage with investment consultants and asset managers to better understand insurer portfolio exposure and climate-sensitive asset allocation strategies.
 - **Correlated Risks:** An assessment of the potential for emergent correlated risks between insurers' underwriting and investment portfolios would better inform future examination procedures.
 - **Loss Modeling:** Regulators and carriers would mutually benefit from clarification of how today's loss models incorporate climate parameters.
 - **Health and Life Loss Potential:** Fundamental research on the temperature sensitivity of morbidity/mortality statistics would likely benefit insurers, regulators and public health professionals.

Chapter 1



CLIMATE CHANGE AND INSURANCE: THE IMPORTANCE OF DISCLOSURE

A Changing Business Environment

The insurance industry is a powerful driver of the global economy. It has unique risk exposure to all sectors of the economy and unique power to act on those risks, which can influence both public behavior and private investment.

Yet the industry that underlies every aspect of our modern economy has developed over the past 300 years during a time of relative climate stability. That climate is unequivocally changing, more likely than not as a result of human activities.³ As a result, extreme weather is becoming both more common and less predictable.

This changing climate will profoundly alter insurers' business landscape, affecting the industry's ability to price physical perils, creating potentially vast new liabilities and threatening the performance of insurers' vast investment portfolios.

PHYSICAL PERILS

Some of the world's largest insurers have concluded that climate change is already affecting weather in defiance of historical trends.⁴ In the United States, the climatic effects of higher temperatures are, more likely than not, driving up losses from a wide range of perils, including wildfires, floods, prolonged droughts and hurricanes.⁵

More unpredictable or extreme weather is likely to compound existing challenges to insurance availability and affordability created by the ever-increasing migration of populations and economic assets to risky areas, which itself has already caused insured losses to rise at several times the rate of economic growth.⁶

The increasing unpredictability of extreme events, and the potential for climate change to undermine the industry's diversification models, threatens the industry's long-term financial viability along with the concept of insurability itself in some parts of the world.⁷

This changing climate will profoundly alter insurers' business landscape, affecting the industry's ability to price physical perils, creating potentially vast new liabilities and threatening the performance of insurers' vast investment portfolios.

3 Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.). 2007. "Climate Change 2007: The Physical Science Basis." *Cambridge University Press*, Cambridge, United Kingdom and New York, NY, USA.

4 Munich Re. 2010. "Two Months to Cancun Climate Summit: Large Number of Weather Extremes as Strong Indication of Climate Change." Press Release, September 27, http://www.munichre.com/en/media_relations/press_releases/2010/2010_09_27_press_release.aspx

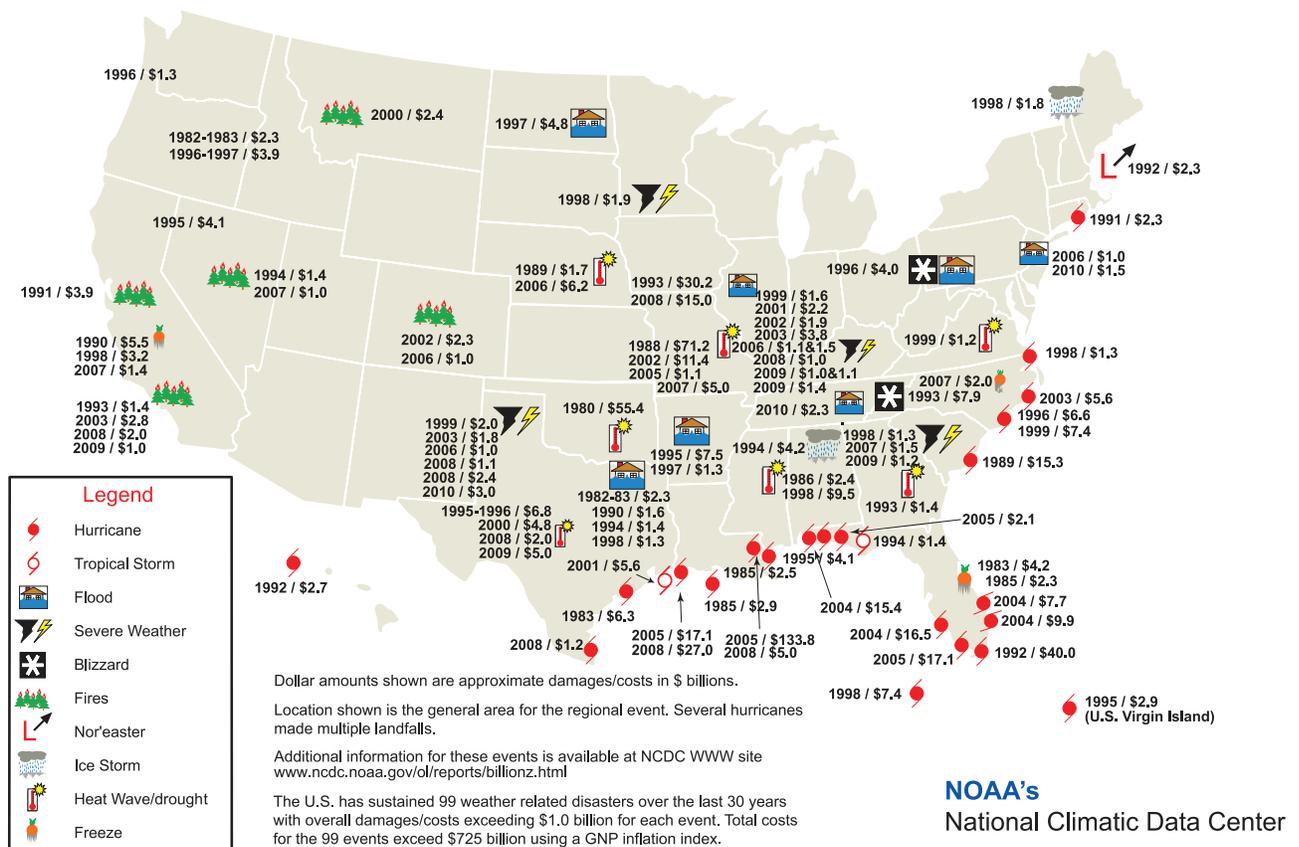
5 Allianz. 2006. "Climate Change and Insurance: An Agenda for Action in the United States." October, www.pewclimate.org/docUploads/Allianz%20WWF%20report.pdf

6 Mills, Evan. 2005. "Availability and Affordability of Insurance Under Climate Change: A Growing Challenge for the U.S." December, <http://216.235.201.250/netcommunity/Document.Doc?id=94>

7 Trevor Maynard. 2008. "Climate Change: Impacts on Insurers and How They Can Help with Adaptation and Mitigation." *The International Association for the Study of Insurance Economics* 1018-5895.

I. Climate Change and Insurance: The Importance of Disclosure

Figure 1: Billion Dollar Weather Disasters 1980-2010 illustrates the types of economic damage caused by weather vulnerability⁸



More extreme weather will likely pose pricing challenges to the life and health insurance segments as well. Rising atmospheric carbon concentrations have been shown to increase pollination and allergen production, which contribute to allergic responses and asthma.⁹ Higher temperatures enable territory expansion for disease vectors like ticks and mosquitoes, and also precipitate longer and more frequent heat waves with the potential to trigger more heat stress disorders.¹⁰ This may be an especially pernicious problem in urban areas. Chicago, for example, could see average annual morbidity from heat waves double before the end of the century.¹¹

CORPORATE LIABILITY

Legal developments related to climate change are driving up liability claims for many insurers in the United States. These cases range from recovering costs of relocating communities away from land inundated by rising seas¹² to restitution for damages from extreme events intensified by greenhouse gas (GHG) emissions.¹³ Some industry experts believe the June 2011 U.S. Supreme Court decision in *Connecticut v. American Electric Power* may leave open the door for future claims against greenhouse gas emitters.¹⁴

8 See National Climatic Data Center, "Billion Dollar U.S. Weather Disasters." Website, <http://www.ncdc.noaa.gov/oa/reports/billionz.html#narrative>

9 United States Environmental Protection Agency. 2008. "Review of the Impacts of Climate Variability and Change on Aeroallergens and Their Associated Effects."

10 Paul Epstein and Dan Ferber. 2011. "Changing Planet, Changing Health: How the Climate Crisis Threatens Our Health and What We Can Do about It." University of California Press.

11 Katharine Hayhoe, Scott Sheridan, Laurence Kalkstein and Scott Greene. 2010. "Climate change, heat waves, and mortality projections for Chicago." *Journal of Great Lakes Research* 36, pp. 65-73.

12 See *Village of Kivalina v. ExxonMobil Corp.*, 08CV1138 (N.D. Cal. Feb. 2008).

13 See *Comer v. Murphy Oil USA, Inc.*, No. 1:05CV436 (S.D. Miss. 2006), dismissed and vacated, 607 F.3d 1049 (5th Cir. 2010).

14 Lindene Patton. 2011. "Why Insurers Should Focus on Climate Risk Issues." The Geneva Association, *Risk Management* SC5 June.

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Since the first suits were filed in 2003, their numbers have rapidly proliferated—more than 120 suits were filed in 2010 alone, nearly two-thirds of them in the U.S.¹⁵ Many of these cases have advanced well beyond the early expectations of observers.¹⁶ The defense costs for such cases are so significant (along with the potential liability) that one insurer, a subsidiary of global giant Zurich, has filed suit against one of its clients, seeking relief of coverage obligations from a lawsuit against major energy producers.¹⁷

INVESTMENT PERFORMANCE

The insurance industry controls more than \$23 trillion in global investments, making it one of the world's largest investors (see Figure 2).¹⁸ As of 2009, insurers in the United States made up more than a quarter of this global total.¹⁹ Premiums paid by policyholders are a source of insurers' invested assets, and a substantial proportion of the revenue generated by insurers is derived from the returns on the premiums they invest.

Yet just as climate change may substantially increase insured losses, it may also affect the performance the investments insurers rely on to meet those liabilities.

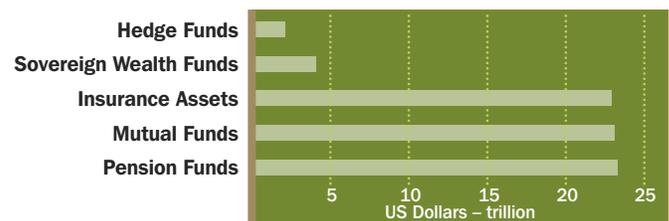
Investment advisor Mercer calls climate change a systemic risk, estimating in a recent report that it could introduce as much as 10 percent portfolio risk for institutional investors, including those with diversified holdings in sovereign fixed income, equity, credit and agricultural assets.²¹ Mercer also notes that opportunities for low-carbon technology investment could be as high as \$5 trillion by 2030.

Mercer suggests that traditional asset allocation strategies will not be enough for investors to manage climate risk. Instead, it recommends that investors develop a dedicated asset allocation approach that reflects the climate sensitivity of different assets and the adoption of an “early warning system” in their risk management process.

Mercer purposely excludes potential risk contributions of climate change's physical effects, citing disagreement among climate models' near-term projections. Yet it also notes that recent experience with extreme events should caution investors not to discount the potential for significant risk from physical climate changes.

Warming temperatures are already playing a significant role in the rising number of extreme events²² that contribute significantly to global economic and market volatility. Droughts and floods that ravaged agricultural lands across Asia, Europe, Australia and North America in 2010 forced agricultural commodity prices up considerably: 80 percent for cotton²³ and 75 percent for wheat.²⁴ The extreme floods and droughts responsible for destroying a significant portion of those crops can be expected to occur more regularly as carbon emissions rise. The increased volatility of a changing climate is expected to exacerbate fundamental tensions between rapidly growing demand for commodities from developing countries and slack gains in productivity across essential commodities.²⁵

Figure 2: Invested assets of major institutional investors, as of year-end 2009²⁰



Sources: Insurers – Swiss Re Economic Research & Consulting estimates; hedge funds – HedgeFund Intelligence; mutual funds – Investment Company Institute; pension funds – Towers Watson; sovereign wealth funds – Sovereign Wealth Funds Institute.

15 Richard Murray. 2011. “The U.S. Supreme Court Speaks on Liability for Climate Change: But What Did It Say and Will It Have Implications Elsewhere?” The Geneva Association, *Risk Management* SC5. June.

16 Munich Re, “Liability for Climate Change? Experts’ Views on a Potential Emerging Risk, 2010, http://www.munichre.com/publications/302-05493_en.pdf

17 Lawrence Hurley. 2011. “Va. Supreme Court to rule on insurance coverage of warming claims.” May 19. <http://www.nytimes.com/cwire/2011/05/19/19climatewire-va-supreme-court-to-rule-on-insurance-coverage-90214.html>

18 Swiss Re, “New Swiss Re Sigma Study Examines the Impact of the Financial Crisis and Changing Regulations on Insurers’ Asset Management.” Press Release, November 23, http://www.swissre.com/media/media_information/New_Swiss_Re_sigma_study_examines_the_impact_of_the_financial_crisis_and_changing_regulations.html

19 Ibid.

20 Ibid.

21 Mercer. 2011. “Climate Change Scenarios—Implications for Strategic Asset Allocation”

22 Munich Re, 2010, “Extreme weather events—signs of climate change?” August 5, http://www.munichre.com/en/media_relations/company_news/2010/2010-08-05_company_news.aspx

23 2010 raw cotton price increase over average price. Source; http://money.cnn.com/2010/09/09/news/economy/cotton_shortage_could_inflate_clothing_prices/index.htm

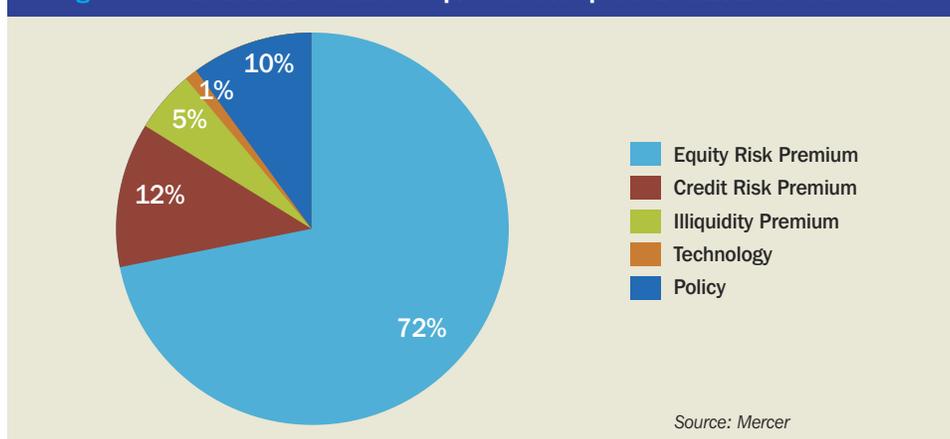
24 As measured between June and December 2010. Source: http://www.worldbank.org/foodcrisis/food_price_watch_report_feb2011.html

25 Jeremy Grantham. 2011. “Time to Wake Up: Days of Abundant Resources and Falling Prices Are Over Forever.” *GIMO Quarterly Letter*, April.

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If the industry fails to appropriately price risk or adjust its own capital decisions to reflect climate risk in its underwriting, the physical risks of climate change could have a more precipitous effect on the global economy to which institutional investors, including insurers, are exposed. Therefore the climate risk insurers face in their underwriting fits hand-in-glove with the economic risks to insurers' investments.

Figure 3: Contribution to risk for representative portfolio mix in 'default' case



A growing number of institutional investors outside the insurance industry are taking affirmative steps to manage these risks in their portfolios. Major asset owners with long-term investment horizons similar to life insurers are requiring their portfolio managers to incorporate these trends. For instance, the California Public Employees' Retirement System (CalPERS), the largest public pension fund in the United States, now requires these risks to be built into portfolio construction decisions across all asset classes. Others, such as the California State Teachers' Retirement System (CalSTRS), are taking similar steps to engage external asset managers on these trends.²⁶ Insurers' investment returns are subject to the same systemic risks as other institutional investors, suggesting that they should also be taking affirmative steps to understand the climate risk exposure of their assets. As a growing number of institutional investors require their asset managers to build climate change into their investment strategies, insurers with significant asset management businesses will also have to develop this expertise to remain competitive.

Insurers' influence on the health of the global economy is more complex than many other institutional investors'. The industry's ability to assume the risk of households and businesses enables more productive deployment of household income, corporate capital and government budgets—all key drivers of the global economy. The industry is also an important determinant of the ability of the global markets to hedge climate risks. If the industry fails to appropriately price risk or adjust its own capital decisions to reflect climate risk in its underwriting, the physical risks of climate change could have a more precipitous effect on the global economy to which institutional investors, including insurers, are exposed. Therefore the climate risk insurers face in their underwriting fits hand-in-glove with the economic risks to insurers' investments.

26 Robert Kropp. 2011. "CalSTRS to Include ESG in Discussions with Asset Managers." *Social Funds*, May 21. <http://www.socialfunds.com/news/article.cgi?sfArticleId=3223>

I. Climate Change and Insurance: The Importance of Disclosure

Climate Action in the Insurance Industry

Despite a decade-long effort by some of the largest global reinsurers to alert the broader industry to the impact of climate change on its profitability and solvency,²⁷ the American industry's response has been relatively sluggish. Yet some positive movement can be seen across the industry, including:

- The Reinsurance Association of America (RAA), which counts among its members Swiss Re and Munich Re, adopted a board-level policy in 2008 to include climate change among its priorities.²⁸
- ClimateWise, a global network of insurance companies designed to enable peer learning and cultivate climate leadership to inform society's response to climate change, counts among its members at least a dozen insurers active in the U.S. market, including the California-based Fireman's Fund Insurance Company.²⁹
- Zurich North America has taken steps to drive increased awareness of climate risk among its customers, including in cooperation with the Professional Risk Managers' International Association to conduct a survey of corporate risk managers' climate risk perception and management practices.³⁰
- Catastrophe ("cat") modelers, who play an integral role in defining the industry's view of risk, have begun to incorporate climate change into some of their models. AIR Worldwide, one of the three largest cat modelers, has produced at least three U.S. event sets incorporating the effects of higher temperatures on hurricanes, thunderstorms and storm surge.³¹

Even as climate change poses a systemic risk to the industry, responding to the risk is driving some innovation and value creation for insurers. New state and national policies in the U.S and abroad designed to reduce carbon emissions from buildings, electric power plants and transportation are multiplying by the year. Insurers have begun to discover that some of the technologies and behaviors which reduce greenhouse gas emissions—like driving less or building using green technologies—actually result in reduced risk of loss. Insurers who identify these trends as opportunities for market creation can deliver value to customers, shareholders and society alike. American insurers are starting to tap into this nascent market. Between 2007 and 2009, insurer activities related to climate change, including product development, had increased by half.³² With their estimated \$5.9 trillion in invested capital,³³ American insurers can help to enable the domestic economy's transition to a secure energy future while meeting investment goals.

Insurers have begun to discover that some of the technologies and behaviors which reduce greenhouse gas emissions—like driving less or building using green technologies—actually result in reduced risk of loss.

27 Namely: The Geneva Association. 2009. "The insurance industry and climate change—Contribution to the global debate." July; Allianz Group and WWF. 2006. "Climate Change and Insurance: An Agenda for Action in the United States." October, http://assets.panda.org/downloads/allianz_wwf_climate_change_and_insurance_embargoed_oct_2006.pdf; Lloyd's. 2006. "Adapt or Bust." <http://www.lloyds.com/~media/Lloyds/Reports/360%20Climate%20reports/FINAL360climatechangereport.pdf>.

28 Reinsurance Association of America. 2008. "Climate Change Policy." September 16, http://www.reinsurance.org/files/public/RAA_Climate_Change_Policy_Statement.pdf

29 ClimateWise. Webpage, <http://www.climatewise.org/uk>

30 Ceres. 2010. "Climate Change Risk Perception and Management: A Survey of Risk Managers." April, <http://www.ceres.org/resources/reports/risk-manager-survey>

31 Peter Dailey. 2011. Personal Communication. March 2.

32 Mills, Evan. 2009. "From Risk to Opportunity 2008: Insurer Responses to Climate Change." Ceres, April, p. 43, <http://www.ceres.org/resources/reports/insurer-responses-to-climate-change-2009>

33 Swiss Re, "New Swiss Re Sigma Study Examines the Impact of the Financial Crisis and Changing Regulations on Insurers' Asset Management." Press Release, November 23, http://www.swissre.com/media/media_information/New_Swiss_Re_sigma_study_examines_the_impact_of_the_financial_crisis_and_changing_regulations.html

I. Climate Change and Insurance: The Importance of Disclosure

History of Disclosure

Even as some of its largest players have suggested that climate change poses a threat to the long-term solvency of the insurance industry, insurers have maintained one of the lowest climate disclosure rates of any sector.

In this vacuum, voluntary reporting mechanisms became the sole source of information for regulators and investors to view and evaluate insurers' climate risk management practices. One significant source of voluntary disclosure is the Carbon Disclosure Project (CDP), a yearly survey of the world's largest global companies requested on behalf of 551 institutional investors, holding \$71 trillion in assets under management.³⁴ While CDP provided an important picture of how the largest global insurers viewed and managed climate risk, the majority of the American market was not included in the survey. Additionally, some of the largest American insurers surveyed by the CDP chose not to respond. For example, Berkshire Hathaway, which owns the third largest reinsurer in the world and significantly shapes pricing and capacity in the American market, has consistently declined to respond to the CDP.

Recognizing the gap between risk potential and disclosure, state insurance regulators at the National Association of Insurance Commissioners (NAIC) issued a white paper in 2008 identifying mandatory disclosure as a primary mechanism for driving improved climate risk management within the American industry. The NAIC was seen as an optimal forum for implementing climate risk disclosure, and indeed preferable to the Securities and Exchange Commission (SEC), which was seen as "at best a blunt instrument for climate risk disclosure," as the ongoing regulator-insurer relationship could more effectively translate disclosure into improved practice.³⁵

As articulated in its 2008 white paper, the NAIC viewed an effective disclosure tool as one that would address the following questions:

- Are insurers adequately including climate risk and climate risk changes in their internal risk assessment process? This set of questions should include information about issues of data collection, use of computer models as advancements occur related to climate change modeling, and policy formation by the insurer.
- Are insurers adequately informing and incentivizing policyholders as to their risks? This set of questions should include issues related to policy coverage [including flood, wind/water etc.], methods of mitigation (in terms of disaster resilience and GHG reductions), and pricing. An informed policyholder can be a great asset to the insurer.
- Are the insurers' governance structures sufficient to keep its board members informed about climate risk? This set of questions should include issues related to board member education, internal transparency and ultimately coverage for liability of directors and officers (D&O).
- Are insurers taking adequate steps to mitigate their own risks and to foster policyholder mitigation? This set of questions should include issues regarding policyholder relations, market conduct, and policyholder education.³⁶

Are insurers' governance structures sufficient to keep their board members informed about climate risk?

34 <https://www.cdproject.net/en-US/WhatWeDo/Pages/overview.aspx>

35 The SEC released its own interpretive guidance on the duty of publicly traded companies to disclose material climate risks in 2010. For a review of climate risk in insurer 10-K filings, see Jim Coburn et al. 2011. "Disclosing Climate Risks: A Guide for Corporate Executives, Attorneys & Directors." Ceres, February. http://www.ceres.org/resources/reports/disclosing-climate-risks-2011/at_download/file

36 National Association of Insurance Commissioners, 2008, "The Potential Impact of Climate Change on Insurance Regulation," White Paper.

*I. Climate Change and Insurance: The Importance of Disclosure***Table 1: Insurer Response Rate by State/Territory**

State/Territory	Disclosure Request	Insurance groups with 2009 direct written premium >\$500 million	Insurance groups responding to disclosure request	Insurance groups not complying with disclosure requirement
Alabama	Voluntary/private	No information provided	No information provided	N/A
California	Mandatory/public	9	17 (13 unique)	1
Colorado	Voluntary/private	No information provided	No information provided	N/A
Connecticut	Mandatory/private	No information provided	No information provided	No information provided
Florida	Voluntary/public	No information provided	No information provided	N/A
Louisiana	Voluntary/private	No information provided	No information provided	N/A
Maryland	Mandatory/private	4	3	1
Mississippi	Voluntary/private	No information provided	No information provided	N/A
Missouri	Voluntary/private	No information provided	No information provided	N/A
Nebraska	Voluntary/private	No information provided	No information provided	N/A
New Hampshire	Voluntary/public	No information provided	No information provided	N/A
New Jersey	Voluntary/public	5	2	N/A
New York	Mandatory/public	21	53 (50 unique)	7
Ohio	Voluntary/private	No information provided	No information provided	N/A
Oklahoma	Voluntary/private	No information provided	No information provided	N/A
Oregon	Voluntary/public	3	3	N/A
Pennsylvania	Mandatory/public	20	21	2
Puerto Rico	Mandatory/private	No information provided	No information provided	No information provided
South Carolina	Voluntary/private	No information provided	No information provided	N/A
Vermont	Mandatory/private	0	N/A	N/A
Washington	Mandatory/public	4	3	1

Chapter 2



DISCLOSURE RESULTS/KEY FINDINGS

Methodology

Insurer responses to the NAIC's Insurer Climate Risk Disclosure Survey provide a first-of-its-kind picture of risk perceptions and management practices for handling climate change across the American insurance industry.

To construct a meaningful analysis of industry trends, Ceres reviewed all available disclosure responses in states that made disclosure results public—in total, 100 insurers reporting in a half-dozen states. Where insurers owned by the same parent company submitted identical responses, responses were counted only once; as a result, statistics in this discussion are out of a set of 88 companies. The complete list of insurers responding to the survey in the six states that ultimately made survey responses public—California, New Jersey, New York, Oregon, Pennsylvania and Washington—is available in Appendix A.

To make our analysis more coherent and useful, the disclosure trends are organized into seven thematic categories:

- A) Risk Perception & Management Structure*
- B) Risk Exposure and Management*
- C) Financial Effects*
- D) Loss Modeling*
- E) Investments*
- F) Emissions Management*
- G) External Engagement*

II. Disclosure Results/Key Findings

A) Risk Perception & Management Structure

KEY FINDINGS:

- Only 11 of 88 insurers have formal climate change policies, with Allianz Group and ACE USA having among the most comprehensive policies;
- None of the 18 property & casualty companies have formal climate change policies or explicit board or executive oversight;
- More than 60 percent of the respondents have no dedicated management approach for assessing climate risk;
- The most diversified insurers tend to have structures in place for monitoring the development of climate risks, while the most vulnerable companies tend to be in segments of the industry closest to consumers.

The presence of a formal climate policy is one measure of a company's ability to identify and manage emerging climate trends.

The NAIC's Insurer Climate Risk Survey asks companies to describe how they account for climate change in their risk management - in particular, whether they have a climate change policy to guide how climate change is integrated into insurance risk management and investment management.

Such a policy would define a company's approach to managing the risks and opportunities of climate change. It is also an indication of how a company's business units, management and board are aligned—or not aligned—on climate change.

The presence of a formal climate policy is one measure of a company's ability to identify and manage emerging climate trends.

Another measure of a company's resilience to emerging climate risks is the presence of a defined climate risk management structure. Having a defined, enterprise-wide structure dedicated to climate risk can position the company to incorporate the best available science and industry opinions into pricing, exposure management, product development and investments.

Companies with formal climate policies

Of 88 unique responses, only 11 companies describe themselves as having a formal climate change policy.³⁷ Seven of those companies are multi-line insurers (those with diverse business, including life & health in addition to property & casualty) and one is a global reinsurer, most with annual premiums well above \$1 billion. Only two life insurers, Prudential Insurance Co. of America and Genworth Life Insurance Co. of New York, report having a formal climate policy. The majority of these companies had prior experience with climate risk disclosure, including more than 70 percent responding to the Carbon Disclosure Project.

Companies reporting a formal climate policy were more likely to also report board or management structures dedicated to managing climate change.

³⁷ Companies reporting a formal climate change policy included ACE USA, Allianz Group/Fireman's Fund Insurance Company, AXA Equitable Life Insurance Company, Chartis, Genworth Life Insurance Company of New York, Mercury Casualty Company, PMA Insurance Group, Prudential Insurance Company of America, QBE the Americas, Swiss Re Group and Zurich North America. Medco Containment Life Insurance Company (domiciled in Pennsylvania) also reported having a climate change policy but submitted only one-word responses to the survey, and was therefore counted as No Risk/No response.

II. Disclosure Results/Key Findings

Table 2: Companies' Climate Risk Management Structures
Among companies with formal climate policies

Board	Cross-Organizational Committee	Enterprise Management Structure	Executive	Individual or Team	No Dedicated Structure
ACE USA Allianz/Fireman's Fund AXA QBE the Americas Swiss Re	ACE USA Allianz/Fireman's Fund AXA PMA Insurance Group Prudential Swiss Re Zurich	ACE USA	ACE USA AXA Chartis QBE the Americas Prudential Swiss Re	AXA Swiss Re Zurich	Genworth Mercury Casualty Company

Allianz Group's New York filing illustrates the kind of comprehensive approach to climate risk management described by many of the largest multiline companies:

Allianz has developed a long-term strategy to address climate change risks and opportunities and to reduce its own environmental impact. This strategy involves strengthening key partnerships, setting goals and targets, and developing new products and services. An 80 point action plan encompasses 17 objectives, among which are reducing the company's carbon emissions, developing products and services geared to address climate change, risk management objectives, leveraging climate change research, and contributing to related public policy development. As part of this comprehensive strategy, a program on emerging risks was integrated into the Allianz Group Risk Policy in 2004 and explicitly includes climate change as a distinct and ongoing topic in the Group Risk Policy. Identifying the impact of, and adequate response to, climate change risks and opportunities across the Allianz companies has become a key focus of the Group's Emerging Risks platform. In addition, the Allianz companies have implemented a Group-wide Catastrophe Risk Policy and are investigating the potential impact of climate change risks in this regard, and in doing so are able to draw on the scientific and analysis capacities of the Allianz Re Cat Management Group where climate risks are also being investigated. As a result, Allianz Group companies are working to assess climate change in their existing risk management and investment management processes. In addition to each businesses independent response to climate change impacts on risk management and investments, global consistency and coordination is ensured through a comprehensive annual review of the broader Allianz Climate strategy, reported to the Allianz Board of Management. Allianz has also developed a stand-alone business unit "Allianz Climate Solutions" that houses significant climate risk related expertise and is helping adjust Group Risk Policies and Standards that govern worldwide businesses, as well as Group investment strategies. This unit also provides technical and other expertise that the U.S. and other worldwide businesses can draw upon as they respond to climate risk issues ranging from responsive product development to risk management and investment considerations.

Two companies—Chartis and Genworth—cite human activities in their climate change policies.

Chartis, a subsidiary of AIG, describes its climate policy in the context of its parent company's engagement on the issue:

AIG was the first U.S.-based insurance company to adopt a public statement on the environment and climate change, recognizing the scientific consensus that climate change is a reality and is in large part the result of human activities that have led to increasing concentrations of greenhouse gases in the earth's atmosphere. Climate change is seen as a serious global environmental problem with risks to the global economy and ecology, and to human health and well being, and AIG supports market-based environmental policies to address the problem. With this public statement, AIG was early to commit resources to addressing the climate change challenge as part of its overall business strategy and planning.

II. Disclosure Results/Key Findings

The majority of insurers do not report having a formal climate change policy. Yet 47 percent of companies without formal climate policies report tracking climate change as a risk factor.

Genworth is the only life company to describe a climate policy:

Genworth recognizes that climate change poses significant potential risks to the environment, the global economy and to human health and well being. We also recognize that human activity contributes to global warming.

Companies without formal climate policies

The majority of insurers do not report having a formal climate change policy. Yet 47 percent of companies without formal climate policies report tracking climate change as a risk factor.

How these companies delegate management of climate change varies widely. More than 60 percent have no dedicated management approach to assessing climate risk. Instead, the majority of companies reporting potential climate change exposures—whether through tort liability, physical exposures or invested assets—cite climate change as one of many risk factors that would be inherently captured through the company's Enterprise Risk Management (ERM) approach or other non-specific risk management structures.

Although ERM is the most widely cited mechanism for tracking climate risk, few companies explain how the ERM structure would differentiate climate change from other risk drivers that may have confounding effects, such as population or economic growth or cyclical climate trends already understood to intensify or abate extreme weather.

CNO Financial Group's New York filing offers an example of the standard ERM-focused response:

The Company does not have formal climate change policies with respect to risk management and investment management. However, climate change is considered along with other risks to the Company through its existing Enterprise Risk Management processes.

ACE USA (a company with a formal climate policy) offers a more helpful view of how the company's ERM structure fits into the company's broader governance structure. Combined with the company's complete filing, there is a clear sense of how the company's approach to modeling, climate science research and product development informs governance decisions:

The risk assessment process for ACE, as is typical of other large, modern insurers, utilizes a formal, companywide Enterprise Risk Management (ERM) framework that encompasses all potential risks including those posed by climate change. Under the direction of the company's chief risk officer, ACE's ERM framework assesses and measures all known and emerging risks that could have a significant impact on the company's capital levels and financial results. Risks are evaluated at least annually at three governance levels, with senior management involvement in each:

- Product boards and credit committees, which assess and identify underwriting and financial risks and have a senior management member on each of their leadership teams;
- The company's Enterprise Risk Management Board, which considers the effect of risk across the company's global operations as well as of risks elevated by the product boards and credit committees, and is entirely composed of most of the company's senior management team including the chief executive officer, the chief executive officers of its major operating divisions, the chief financial officer, the chief risk officer, the chief claims officer, chief investment officer and general counsel; and
- The Risk Committee of the company's Board of Directors, which ensures that there are effective processes for identifying, assessing and mitigating risks across the company.

II. Disclosure Results/Key Findings

Slightly more than half of companies report having no exposure to climate change risk, though only half of those companies provide reasoning in support of their risk perspective.

Phoenix Life Insurance Company’s New York filing provides some insight into the company’s understanding of a life insurer’s potential vulnerability. While Phoenix Life Insurance Company does not view climate change as a risk to its business, the company’s response provides some detail on the company’s approach to assessing risk:

The Company currently sells life and annuity products throughout the United States. A significant increase in average mortality rates in any geographical area of the United States could potentially result in an increase in loss ratios for the Company. We, however, do not believe conclusive data exists that demonstrates climate change currently poses, or is anticipated to pose in the foreseeable future, any risks to the Company that are material to an assessment of the Company’s financial soundness.

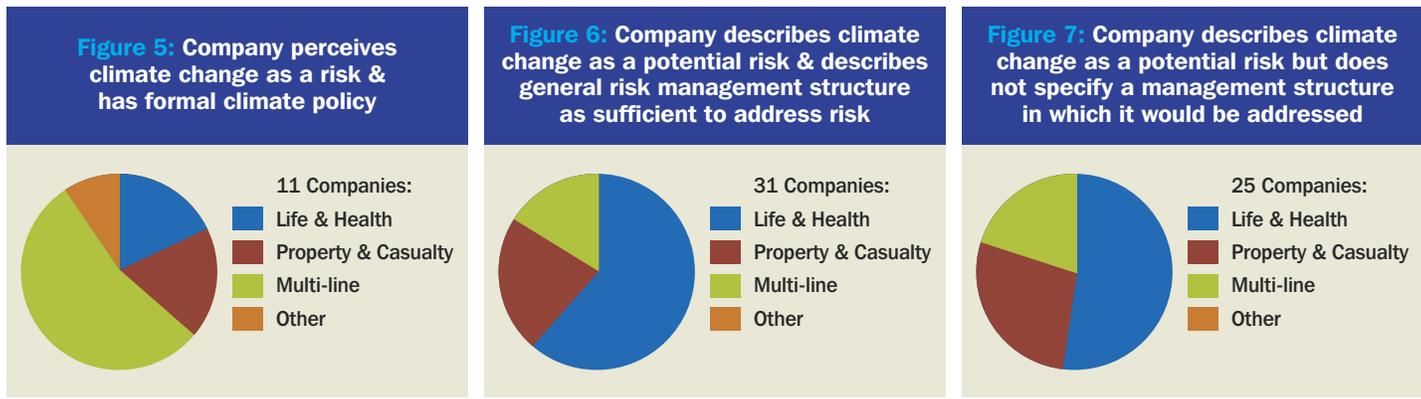
In contrast, financial product insurer MBIA Insurance Corporation’s New York filing provides no insight into the company’s approach to assessing risk:

2. Does the company have a climate change policy with respect to risk management and investment management? If yes, please summarize. If no, how do you account for climate change in your risk management?



Slightly more than half of companies report having no exposure to climate change risk, though only half of those companies provide reasoning in support of their risk perspective.

- Overall, **multiline insurers** were most likely to regard climate change as a potential (10/17) or definite risk to their business (6/17), and to have dedicated business units or governance structures to address the risk (11/17). Multiline insurers most frequently report board-level or executive responsibility for managing climate risk (7/17).
- **Life & health** companies report climate change as a definite (2/46) or possible risk (19/46) to their business, though there is wide variation in management approach. More than 60 percent of life & health companies perceiving some exposure to climate risk have no dedicated climate risk management structure (21/34).



II. Disclosure Results/Key Findings

- Slightly more than half of the 18 **property & casualty** companies report tracking climate risks, though none report having a formal climate change policy, or explicit board or executive oversight. In general, P&C companies rarely provide specific information on how the company’s management approach can differentiate climate change from other dynamic trends.

Based on these disclosures, there appears to be significant asymmetry between market segments in climate risk management. While the largest and most diversified insurers tend to have structures in place for monitoring the development of climate risks, broad cross-sections of the market have no apparent system for identifying or addressing climate risks. If the absence of a formal climate policy and a climate risk management structure are indicators of an insurer’s climate vulnerability, then with few exceptions, the most vulnerable companies tend to be within the segments of the market that are closest to consumers.

B. Risk Exposure and Management

KEY FINDINGS:

- *Insurer responses on weather-related risk exposure are overly general and focus almost entirely on generic “coastal” areas. This narrow focus contradicts recent experience with rising inland weather-related losses and expectations for larger such losses;*
- *Insurers with property exposures tend to provide more detail on exposures and perils than life and health insurers, whose responses gesture broadly to potential changes in morbidity and mortality trends;*
- *Some of the strongest and most explicit weather-related disclosure is provided by smaller property insurers;*
- *Disclosure of liability risk is not necessarily provided by all insurers implicated in ongoing litigation. In fact, no insurers name any historic or ongoing litigation in which they are implicated through liability contracts.*

The survey asks companies to describe their “process for identifying climate change-related risks and assessing the degree that they could affect...business, including financial implications” and to summarize “the current or anticipated risks that climate change poses” to the company, including “identification of the geographical areas affected by these risks.”

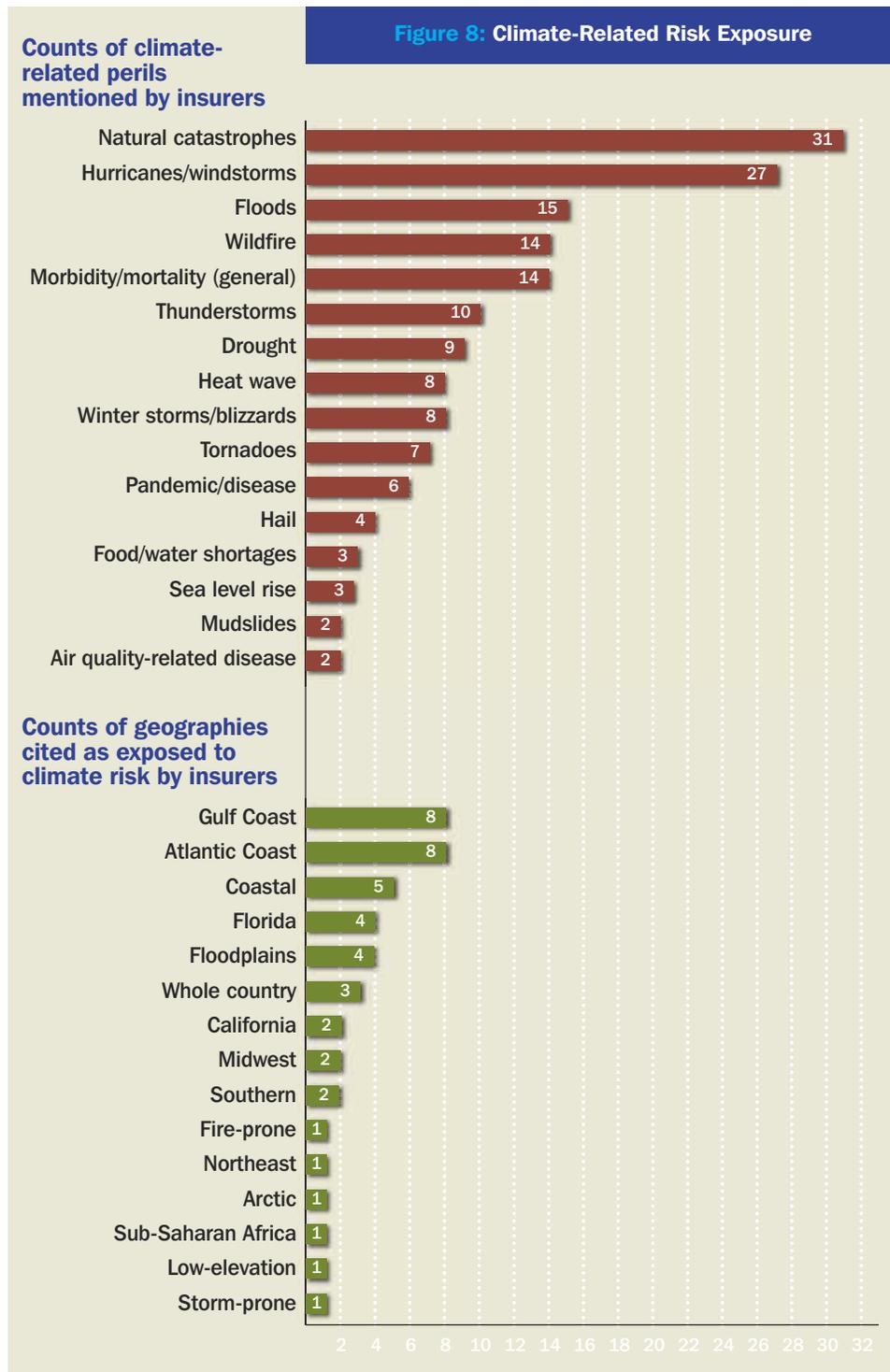
Risk Exposure

Weather-Related Losses

Insurer responses provide a general view of risk characterized by greater frequency or intensity of extreme weather events. Even though the climate-affected perils named by insurers apply to a broad range of geographies, insurers’ explicit discussions of geographies affected by climate risks tend to focus almost exclusively on the coasts (see Figure 8 on page 23). Insurers’ narrow focus on coastal climate risk exposure contradicts recent experience with inland weather-related losses and the scientific community’s expectations of greater potential for catastrophic losses from wildfires, thunderstorms and flooding in addition to other inland perils.³⁸

38 For example, see United States Global Change Research Program. 2009. “Global Climate Change Impacts in the United States.”

II. Disclosure Results/Key Findings



The general nature of disclosure responses do not provide regulators, consumers or investors with sufficient detail to illuminate where the insurer expects to experience greater or more volatile losses in its book of business, and what sort of effect that might have on pricing.

Furthermore, insurers’ discussions of geographic areas that could be affected by climate risks tend to provide little granular information as to where the insurer may limit future exposure; the most frequently cited geography in which insurers cite potential withdrawal are generic “coastal areas.” Just as frequently, insurers cite geographies other than

II. Disclosure Results/Key Findings

A number of insurers, including those writing less than \$1 billion in annual premiums and with business exclusively in the U.S. market, provide a wide-ranging view of their companies' potential exposure to climate change.

those in which they write business as being most exposed to climate risks, often as an illustration of the insurer's relative invulnerability to climate change. The general nature of disclosure responses do not provide regulators, consumers or investors with sufficient detail to illuminate where the insurer expects to experience greater or more volatile losses in its book of business, and what sort of effect that might have on pricing.

The sort of responses elicited by the survey is exemplified by California State Automobile Association Inter-Insurance Bureau:

The degree to which we are affected by climate change risks is minimized by our geographic distribution over 18 states, none of which are Gulf-Coast States. The essential element of insurance is the spreading of risk, and by being geographically-diverse, but without concentration in windstorm-prone states, we have selected against that degree of adverse risk.

Yet a number of insurers, including those writing less than \$1 billion in annual premiums and with business exclusively in the U.S. market, provide a wide-ranging view of their companies' potential exposure to climate change.

Harleysville's account of historical changes in tornado events provides a clearer picture of an insurers' view about changing extreme event trends:

Climate change related risks could result in increased weather-based losses to both Harleysville's insureds as well as its operations and facilities. Such impacts could affect the Company from both increased frequency and severity of losses. By peril and regions potentially affected Harleysville would identify the following: (1) Hurricane: All coastal zones along the eastern seaboard. As the Company experienced during Hurricane Ike, there is an increased recognition that inland damage from hurricanes is also an important consideration. (2) Tornado/Hail: Principally emanating from the Midwest and the Mid-South regions—overtime the Company has witnessed the traditional tornado alley expand causing increased losses further east and toward the southeastern states. (3) Winter Storm: This peril could affect a fairly substantial area consisting of the Northeast (New England and New York), MidAtlantic (the Carolinas up thru (sic) New Jersey and Pennsylvania) and the MidWest. The Southeast, while not as extremely exposed to winter events, is still subject to freeze based loss potential as well.

PMA Group's Pennsylvania filing also captures an unusual degree of specificity between discussion of perils and geographies, and provides a window into the uncertainty inherent in risk modeling and emerging liability exposures that may compound insurance losses from more volatile or extreme weather:

It is firmly believed that climate change has made significant contribution to the creation of extreme weather events directly affecting our insureds in the form of bodily injury or property damage. Over time, climate change appears to be contributing to the frequency and severity of these weather events. Examples of extreme events include, but are not limited to, tornados, blizzard conditions, hail, wild fires, rising sea levels and flooding. As PMA underwrites clients throughout the entire United States, the geographic areas affected by these risks are extremely varied. Hurricane concerns are generally focused on coastal counties from Texas through Virginia; however, history has also taught us that hurricanes can strike the eastern portion of the United States from Virginia through Maine at a lower probability each season. Straight line storms, microburst events, tornados and hail are our concerns generally focused on mid-western and southern states. We have taken efforts to look at the historical record to identify those geographic areas in many states that are exposed to this risk with significant probability each year. Extreme rainfall with ground (sic) water runoff, and flooding, are not isolated to any geographic area and occur with regularity throughout the United States. We spend significant resources to

II. Disclosure Results/Key Findings

identify those areas, and clients that are most susceptible to these exposures; however, incidents such as a storm that delivers many inches of rain in a relatively short period in a condensed area will cause extreme damage difficult to predict. We remain concerned that future events, if climate change, due to global warming, is not reduced, will become so extreme that they stress the insurance industry beyond its financial capacities. There is an additional concept gaining support that climate change is caused by specific industries and companies that should be financially responsible for their actions...thus creating a public liability for these companies that may or may not be addressed under current policies of insurance and may be soon tested in our courts.

In general, insurers with property exposures tend to provide more detail on exposures and perils than life and health insurers, whose responses gesture broadly to potential changes in morbidity and mortality trends.

The level of analysis given by Penn Mutual Group is consistent with most life insurers:

The anticipated risks that climate changes pose to Penn Mutual include future health, mortality, morbidity, and longevity of policyholders and employees. These risks affect our business as they change the mortality and morbidity profile of policyholders, which could potentially have a material impact to our net income. We continue to monitor emerging experience.

Bravo Health's Pennsylvania filing is typical of most health insurers:

Although we currently believe the risk to be remote, a drastic change in climate could cause unforeseen medical costs for our members for which Bravo would ultimately be responsible.

Independence Blue Cross, a Pennsylvania-based health insurer, provides a rare analysis of the possible health effects of climate change and the claims that could result:

Climate change has many broad implications. From a Clinical Services perspective, there are many anticipated effects on health. Warmer temperatures can exacerbate many respiratory and cardiac conditions, as well as increase the prevalence of insect-borne diseases. Varied weather patterns will have other effects, such as increasing allergy-related illnesses. It is likely that these and other effects will increase medical costs for our entire region. To what extent this would occur is unknown. The extent of any climate change related impact to our business will likely be gradual and emerge over years; trends will be identified in our ordinary course of business and will be reflected in our actuarial projections, care management and health promotion efforts and in the operation of our business infrastructure.

Liability Risks

Only eight insurers cite liability exposure in their discussion of climate risks, mainly with respect to suits filed against greenhouse gas emitters to recover costs of climate-related damages or against corporate directors and officers for failure to properly disclose risks.

ACE USA's filing is consistent with the broader discussion of liability exposures posed by litigation:

As companies must respond and adapt to their changing responsibilities and opportunities, the exposure to casualty coverages, such as general liability and directors and officers liability will increase. These increases in exposure may ultimately drive insurance costs higher.

Chartis discusses the vulnerability of its casualty business to judicial interpretation of pollution exclusions with respect to greenhouse gas emissions:

In general, insurers with property exposures tend to provide more detail on exposures and perils than life and health insurers, whose responses gesture broadly to potential changes in morbidity and mortality trends.

II. Disclosure Results/Key Findings

Disclosure of liability risks is not necessarily consistent with liability exposure, and indeed litigation risk is conspicuously absent from the filings of some insurers indemnifying defendants in ongoing litigation.

Climate change and related regulatory initiatives may increase both the frequency and severity of claims or the cost of defending such claims. General Insurance policies are primarily written for periods of 12 months or less providing General Insurance with the ability to modify underwriting practices and pricing procedures; limiting the financial impact to such increase in claims. Each line of business and many individual policyholders may have different exposures to the effects of climate change. While it is not possible to precisely quantify the impact of a policyholder's operations on climate change, underwriters routinely evaluate changes to the above referenced factors and their potential effect on greenhouse gas emissions when considering policy renewals. Property and casualty insurance policies typically exclude or significantly limit coverage for pollution and related environmental damage. While these pollution exclusions have sustained judicial scrutiny and have not been overturned by judicial decisions, there can be no assurance that future court decisions will uphold prior case law precedents.

Disclosure of liability risks is not necessarily consistent with liability exposure, and indeed litigation risk is conspicuously absent from the filings of some insurers indemnifying defendants in ongoing litigation. In fact, no insurers name any historic or ongoing litigation in which they are implicated through liability contracts. Given the significant defense costs associated with these cases, and the scale of the potential liability (which many in the industry have likened to the losses sustained through asbestos and tobacco liability), the omission of liability risk exposure should be of particular concern to regulators and shareholders.

C. Financial Effects

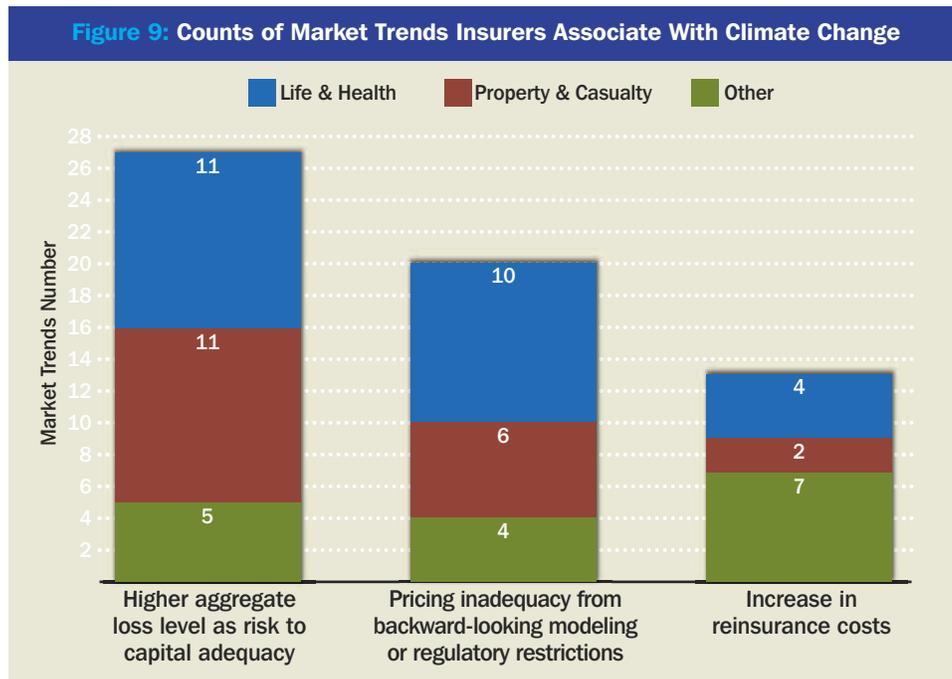
KEY FINDINGS:

- *More than 40 percent of insurers who perceive climate risk exposure provide no information on how such exposure could impact their pricing, capital adequacy or reinsurance requirements;*
- *More than half of insurers discuss potential financial risks from climate change, but only 18 percent outline actionable steps being taken to manage those risks;*
- *Insurers with formal climate change policies were twice as likely to discuss implications for underwriting or profitability and seven times more likely to discuss dedicated actions for managing risks;*
- *Insurer discussions of climate-related pricing risks focus primarily on losses triggering price hikes that will make policies unaffordable and regulatory restrictions that will prevent them from making such adjustments.*

There is a broad consensus among insurers that climate change will have an effect on extreme weather events. More than three-quarters of insurers responding to the survey name perils that may be affected by climate change. More than half name market segments, such as homeowners or marine insurance, which may be affected by climate change. And a third of insurers name climate-affected geographies. Even those insurers with no formal climate policy, no climate risk management structure and a stated belief that the company is not vulnerable to the effects of climate change still name perils that may be affected by climate change 20 percent of the time.

II. Disclosure Results/Key Findings

Yet despite widespread recognition of the effects climate change will likely have on extreme events, many insurers provide no meaningful information on the potential financial impacts of more volatile weather losses. More than 40 percent of insurers who see their company having climate risk exposure provide no information on the potential effects climate change may have on the company’s pricing, capital adequacy or reinsurance requirements. This should be of particular concern to regulators and shareholders, as it suggests that most companies may not be adjusting their pricing and capital allocation approaches despite growing evidence of the potential for extreme and volatile losses.



More than 40 percent of insurers who see their company having climate risk exposure provide no information on the potential effects climate change may have on the company’s pricing, capital adequacy or reinsurance requirements.

Aggregate Loss Level

Just under a third of insurers note the potential for increased volatility or frequency of losses to increase insurers’ total possible loss across all exposures. Some insurers go a step further to acknowledge the implications this may have for capital allocation, such as Aviva, which recognizes the imperative of the company to “regularly update on pricing and capital allocation to reflect the latest scientific evidence in respect of the climate risk prevailing.”

Union Security Life Insurance Company of New York offers a high-level assessment of the impact climate change could have on aggregate loss that is representative of many insurers’ responses:

Based on our research and modeling, the exact impact of the physical effects of climate change is uncertain. It is possible that changes in the global climate may cause long-term increases in the frequency and/or severity of storms, resulting in higher catastrophe losses, which could materially impact our results of operations and financial condition.

United Services Automobile Association offers a similar assessment:

Our risk planning considers the possibility of a high frequency of severe catastrophic events in any given year which would be a possible result of climate change. An increase of these types of events could have an impact to our profitability, cash flows and net worth.

II. Disclosure Results/Key Findings

AXA Group goes into more detail as to the approach the company takes to assessing potential changes to aggregate loss:

Group Risk Management performed a first assessment of the impact of climate change on the AXA Group's activity on the basis of the 2007 European windstorm exposure and assuming a 50% increase in the frequency of extreme storms by 2080 (in line with European Union regional projects published in 2005 and IPCC A2 scenario on temperature increase). The main finding of this long-term sensitivity analysis is the materiality of an increase of the 100-year aggregate loss. However, at such a level, proper business decisions taken to identify which available alternatives can protect the AXA Group would result in an increase in reinsurance premium not significantly impacting its profitability. These findings correspond to a long-term impact (year 2080 approximately), considering an increase in extreme events' frequency only. Changes in flood risks are not accounted for in this study, whether coming from intensified storm surge activity or sea level rise.

No insurers describe sensitivity analyses of this sort within a business cycle timeframe.

Pricing Inadequacy

Insurer discussions of pricing risks tended to center around three themes:

- The potential for increased losses to drive market prices upward, undermining affordability (9),
- The limitations of backward-looking loss models when pricing emerging or non-stationary risk (8), and
- Regulatory restrictions prohibiting insurers from upward pricing adjustments (3).

Zurich Insurance Group discusses the challenges the industry faces in maintaining affordable rates in light of a changing climate:

In general, the insurance sector faces the challenge of maintaining availability and affordability of insurance products while addressing the pressures imposed by potential changes in climate conditions. A deep understanding of the risks posed by climate change, and options for their mitigation, is necessary to adequately underwrite insurance products exposed to those risks.

Farm Family Companies discusses the affordability challenge similarly:

Some scientists believe that in recent years, changing climate conditions have added to the unpredictability, severity and frequency of natural disasters. To the extent that climate change increases the frequency and severity of such weather events, the companies may face increased claims. Climate change may also affect the affordability and availability of property and casualty insurance and the pricing for such products.

ACE USA discusses the thorny nature of pricing changing risk:

Higher losses or higher volatility means higher insurance prices and may impact availability. This balance between policyholder and shareholder will be tested by climate change-driven events, particularly for risks and coverages where it is difficult to ascertain a fair loss cost and risk premium based on historical experience or scientific methods. For example, it is difficult today for insurance carriers to price and assume flood risk; this difficulty will likely increase as climate change makes flood perils more uncertain yet potentially more concerning to our clients. The pricing of casualty-related exposures will be made difficult by the unknown nature of some of the risks and the absence of historical precedent and data.

II. Disclosure Results/Key Findings

Similarly, Berkshire Hathaway discusses the pricing risks built into one of its reinsurers' pricing models:

General Reinsurance believes that its commercial, residential, and marine property classes may be at risk because of climate change. Unanticipated and adverse changes in the frequency or severity of natural catastrophes likely means that actual losses will exceed pricing assumptions. Casualty classes may be at risk due to 'parameter' risk, for example, unanticipated changes in litigation trends or exposures, such as liability claims from persons or groups allegedly harmed by climate change and the potentially responsible parties responsible for that change. It is also conceivable, although not presently anticipated, that acute forms of climate change could result in pandemics or other life/health exposures. All of these factors could impact pricing assumptions relative to actual results.

RiverSource Life Insurance Company of New York offers a similar assessment:

Based on current information, the Company believes that climate change could cause reduced loss predictability and could challenge available models' abilities to predict future loss frequencies and severities. Industry available modeling that cannot anticipate certain climate change risks may result in unforeseeable impacts on industry product offerings and pricing.

Philadelphia Consolidated Holding Company discusses the difficulty for insurers in pricing and allocating capital when actual loss events behave out of line with the historical trends:

Significant changes in the frequency of natural disasters and the scale of damage make it very difficult for insurance companies to calculate appropriate insurance premiums, set up adequate liability reserves, and make proper arrangements for reinsurance.

Group Health Cooperative discusses a lack of evidence for the increased health costs of climate change:

As a health coverage carrier, the financial risk to the Group Health is related to the provision of healthcare services at a level greater than was anticipated when the policies were created, priced and sold. There is not currently information available that explicitly connects climate change to increased health care costs.

ACE USA discusses the regulatory obstacles of risk-based pricing:

The pricing of casualty-related exposures will be made difficult by the unknown nature of some of the risks and the absence of historical precedent and data...ACE is also actively engaged with regulators to ensure that pricing is actuarially sound and can be adapted to meet new and emerging climate change risks such as long-tailed casualty exposures and the capital implications of these risks. For ACE to continue to offer coverage under climate change conditions, pricing must always be set at sound actuarial rates that cover loss costs, expenses and risk margins on exposed capital. Thus, pricing must be flexible over time and by geography. Unfortunately, many regulatory regimes impose the functional equivalent of price controls that are not built to react to developments, and encourage increased, rather than reduced, exposures.

Reinsurance Costs

Insurer discussions center around two drivers for potential increases in the company's reinsurance costs:

- Extreme events driving up the market price for reinsurance or reducing capacity in the global reinsurance market (7);
- The company's own modeling or loss experience supporting the case for increased reinsurance arrangements (6).

II. Disclosure Results/Key Findings

Instead, the vast majority of insurers—82 percent—describe their companies' present diversification, reinsurance coverage and annual contract terms as sufficient for managing the risks of climate change.

A very small number of insurers acknowledge the market-wide pricing effects that may influence their cost of coverage even if they do not view their company as having direct exposure to climate-affected perils or geographies. The California Earthquake Authority is one example:

The CEA annually purchases a large amount of reinsurance on the global reinsurance market. Risks associated with climate change could have direct and indirect impacts on the global reinsurance marketplace if reinsurance is used as a financial mechanism to mitigate firms' financial risk. Global reinsurance capacity could be negatively affected and the resulting effect on the CEA could be reduced reinsurance capacity and/or higher reinsurance costs.

Progressive Insurance:

Finally, extreme global weather volatility could increase risk- financing costs. Risk financing is the process by which a company secures the appropriate funds to cover unexpected financial losses arising from a risk that the company has deliberately retained. Both capacity in the reinsurance market and availability of capital from the catastrophe bond market could, theoretically, become constrained after the occurrence of extreme weather events.

First American Financial Corporation describes the effect that reinsurers could have on driving integration of climate change into insurers' pricing:

The company purchases reinsurance for catastrophic losses that may be related to climate change. The potential impact of climate change would be assessed by these reinsurers as part of their computer modeling and reflected in their rates, retention requirement and/or their terms and conditions.

Risk Management

Although more than half of insurers surveyed discuss potential financial risks posed by climate change, only 18 percent of companies provide actionable steps being taken to manage these risks.

Instead, the vast majority of insurers—82 percent—describe their companies' present diversification, reinsurance coverage and annual contract terms as sufficient for managing the risks of climate change. This assumption that climate change can be addressed through iterative adjustments without significant detriment to the company's profitability or solvency depends on two possible business environments: 1) prices adjusting ever upward to internalize the costs of underwriting in a new risk environment, or 2) shrinking competition within the sector allowing companies to maintain or grow their revenues even while taking on only the most attractive risk. In reality, both of these business environments call into question what role private risk capital would play in a future governed by more volatile or extreme weather events, and the size of the resulting industry. If (under scenario 1), the heightened risk underwritten by reinsurers and primary carriers were passed through to consumers, the challenge to affordability may be so great that existing political tendencies to shift the burden to public insurance pools may significantly shrink the size and profitability of the private market while elevating public taxpayer exposure. If (as in scenario 2), carriers seek to reduce their exposure through geographic or contractual exclusions, the flight of competitors to the less risky markets would reduce the potential revenue across the industry, likely resulting in a smaller set of industry players. If the majority of insurers expect to manage climate change through a series of iterative adjustments to pricing and exposure, the market is likely to shrink significantly, with severe pricing dislocations along the way.

II. Disclosure Results/Key Findings

Bond insurer Assured Guaranty offers a standard assessment of the sufficiency of the company's existing geographic diversification:

To lessen the impact of any one event, we maintain strict single risk limits to any issuer or revenue source. We also maintain a geographically diversified portfolio. Currently, 87.7% of our portfolio is in the United States, with 9.4% in California and no other state representing more than 5.5% of the total.

....

With respect to longer term potential effects of climate change, such as health and food supply issues or potential depopulation of certain vulnerable areas, we have no exposure to vulnerable areas such as the Arctic or sub-Saharan Africa, and we have no expectation of providing financial guaranty insurance in such places. Our credit standards require all issuers to be of investment grade credit quality.

USAA's discussion of the company's capital allocation and reinsurance cover is consistent with many insurers:

USAA purchases enough reinsurance and holds enough capital to cover potential impacts of global warming.

Chartis offers an explanation of the pricing flexibility and exposure adjustment afforded by the company's short contract durations that is representative of many companies:

General Insurance policies are primarily written for periods of 12 months or less providing General Insurance with the ability to modify underwriting practices and pricing procedures, limiting the financial impact to such increase in claims.

The 22 companies that discuss risk management activities specifically designed to address climate risk tend to be those companies with formal climate management structure, such as board or executive responsibility for climate change.

Insurers with a formal climate policy were twice as likely as insurers without a formal climate policy to discuss implications for underwriting or profitability, such as changes in aggregate loss, pricing or reinsurance arrangements. More strikingly, insurers with a formal climate policy were seven times as likely to discuss dedicated actions the company is taking to manage risk through steps such as:

- Modeling changing extremes (8),
- Recalibrating capital allocations, including reinsurance cover or capital market risk transfer, (7) or
- Adjusting exposure by peril or geography (7).

Modeling Changing Extremes

A more complete discussion of insurer modeling is offered in *Loss Modeling*, pages 34-38.

Of the risk management activities that directly address climate change, catastrophe risk modeling is the most frequently cited by insurers. Yet while some insurers actively support the development and integration of climate science into proprietary loss models, the majority of the industry relies on third-party models³⁹ that may only marginally incorporate changing extreme weather patterns. As a result, insurers relying entirely on third-party models may be severely unequipped to adjust pricing to incorporate emerging climate risks.

Nearly a third of insurers describe their company's use of catastrophe models or stress tests to manage catastrophe risk. Yet only eight insurers describe the development or deployment of new models that can help the company anticipate more volatile losses or

Insurers with a formal climate policy were twice as likely as insurers without a formal climate policy to discuss implications for underwriting or profitability, such as changes in aggregate loss, pricing or reinsurance arrangements.

Insurers relying entirely on third-party models may be severely unequipped to adjust pricing to incorporate emerging climate risks.

39 The largest loss model vendors are Risk Management Solutions (RMS), AIR Worldwide, and EQECAT, by market share.

II. Disclosure Results/Key Findings

Insurers' disclosures suggest that the majority of insurers may be setting pricing based on flawed assumptions of how the industry's loss models incorporate changing climate trends.

longer tail risk. Rather, the handful of life insurers that discuss the use of computer models describe their models as being adaptable to incorporate climate change risks. And the majority of P&C companies describe a reliance on reinsurance brokers and model vendors to build the latest climate science into the models their companies use to set rates and adjust exposures. Only a handful of companies report activities consistent with industry best practices, such as long-range forecasting techniques that can anticipate loss trends over a multi-year timeframe.⁴⁰

The difference between the largest players in the industry and the average company is best summarized in ACE USA and Seneca Insurance Company's filings:

Seneca Insurance Company's view of its scientific expertise is consistent with many industry participants:

We predominantly rely on the RMS model for the prediction of windstorm and earthquake events. Accordingly, we defer to the scientific and statistical expertise provided by RMS.

ACE USA:

The earth's climate appears to be changing in ways inconsistent with the historical record upon which catastrophe models draw data ...the catastrophe modeling industry faces a serious challenge to appropriately address the evolving impact of climate change risk.

Insurers' disclosures suggest that the majority of insurers may be setting pricing based on flawed assumptions of how the industry's loss models incorporate changing climate trends. For the most part, the ability to accurately describe the models that underpin companies' pricing and capital decisions appears to be limited to the largest insurers. For regulators and shareholders, this marked asymmetry with respect to proficiency in using one of the industry's most central pricing tools should be a major concern. For a more complete discussion of insurer modeling, see *Loss Modeling*, pages 34-38.

Capital Adjustments

Even fewer insurers discuss the ways that climate-integrated catastrophe modeling or scenario planning influences how the company allocates capital. Only a handful of insurers discuss the ways their approach to establishing reserves, reinsurance coverage or capital market transfers have been adapted to reflect changing risk statistics or future scenarios where historic statistics do not illuminate future risk. Even then, it is rare for insurers to provide information in a way that constructs a picture of how climate change risk perceptions might be influencing pricing today.

While Berkshire Hathaway's response shows that the company considers climate change in its reinsurance decisions, the company provides no insight into how it has or may adjust its contracts or pricing:

The National Indemnity Reinsurance operations consider and discuss the impact of potential climate change with its reinsurance business partners as reinsurance renewals and new placements are considered.

The most often cited approach to adjusting capital allocations in response to climate change is risk transfer through the capital markets. ACE USA is among the companies citing insurance-linked securities as a tool the company has incorporated into its business in response to catastrophe risk, and which the company believes is important for managing climate change:

Beyond modeling and pricing mechanisms, ACE also mitigates its exposure to climate change risk by actively hedging portions of its portfolio of catastrophe risk in both the reinsurance and capital markets. Such hedging increases the amount of protection ACE can make available to its clients and forms a valuable part of the firm's overall

40 Such an approach is described in Lloyd's 360. 2011. "Forecasting Risk: The Value of Long-Range Forecasting for the Insurance Industry."

II. Disclosure Results/Key Findings

risk management strategy. We are also committed to the development of the capital markets, with a broader capital base, as an alternative or complementary mechanism to hedge risks.

Fireman's Fund/Allianz similarly describes the role of catastrophe bonds:

Furthermore, because potential climate change impacts may increase the need for additional inter-temporal risk diversification beyond what traditional reinsurance can offer, and because of peak loss events like the \$144 billion (of which \$49 [billion] were insured) in losses from Hurricane Katrina alone, Allianz has been a leader in developing alternative models for our businesses and customers to transfer risk to the capital markets through special instruments like Catastrophe Bonds. In 2007, Allianz created a dedicated team to investigate and execute transactions that transfer insurance risks, primarily natural catastrophe risks, into the capital markets. Capital markets can play an important role in spreading risks from natural disasters among a large group of capital providers. Since 2007, Allianz has accessed the capital markets repeatedly sourcing protection against peak risks, and this may become another particularly important risk diversification tool in light of projected climate change impacts on the frequency and severity of natural catastrophes.

No doubt insurance-linked securities like catastrophe bonds are a significant innovation for spreading risk across the global economy. However, these innovations come with significant cost and cannot stand alone in securing the availability of insurance.

Adjusting Exposure or Pricing

While many insurers discuss the potential for upward price adjustments or geographic or peril-based exclusions as a way of managing climate risk, few insurers provide the detail that would be needed for a regulator or investor to determine whether this is a viable risk management strategy.

AXA Group indicates an intention to adjust pricing and skepticism that pricing adjustments will be enough to manage the company's exposure to perils with significant loss potential:

Gradual premium rate adjustments will be required to widely reflect these risk factors, but are not likely to be sufficient to cover risks underwritten in the most exposed areas to flood or cyclone.

Similarly, QBE the Americas indicates that the company has begun adjusting its exposure to reflect climate risk, but provides little detail:

One of the operational risks for QBE and the general insurance and reinsurance industry is the potential for increased claims costs due to the impact of climate change. The potential for increased frequency and/or severity of damaging weather related occurrences has, and will continue to, result in changes to the underwriting and retention of insurance risk.

Mercury Casualty Company offers the most specific example of the company's underwriting controls with respect to geographic exposure:

We monitor our accumulations of insured value by zip code, and we shut off new business, when permitted, in areas where our insured value has surpassed our tolerance for loss. We may even terminate policies in order to maintain a prudent exposure to catastrophic losses. This management of insured values is primarily focused on hurricane losses, and thus geographically, occurs in the coastal areas of the eastern United States. Florida is our most heavily managed state in this regard.

Ultimately, the existing state of insurer disclosure gives regulators little foresight into impending dislocations in the insurance market.

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II. Disclosure Results/Key Findings

D. Loss Modeling

➤ KEY FINDINGS:

- *Few insurers have internal expertise on the physical drivers of extreme events or the links between climate patterns and health outcomes;*
- *Most of the industry relies on third-party catastrophe risk models that only marginally integrate changing extreme weather;*
- *While two of the three leading third-party cat modelers (RMS and AIR) are integrating climate change into some of their models, their work to date has largely focused only on hurricanes;*
- *Virtually every P&C company with coastal exposure models hurricane exposure, yet few discuss the use of models for perils beyond hurricanes, such as floods and windstorms;*
- *Only eight insurers describe new models that can help them anticipate more volatile losses or longer tail risks;*
- *The majority of insurers that report using catastrophe models describe them in terms that suggest their company does not have a clear understanding of how the models can or cannot be used to anticipate changing risk.*

Few insurers have internal expertise on the physical drivers of extreme events or the links between climate patterns and health outcomes. Instead, most rely heavily on past statistics to inform their view of future risks. For health and life insurers, this is especially true.

Life and health insurers invest far fewer resources into computer modeling, relying to a greater degree on actuarial data to set pricing and reserves. Empire Fidelity Life Insurance Company of New York describes the role that computer modeling plays:

We have focused our computer modeling efforts to analyze the risks of mortality and longevity (the primary insurance risks underwritten by the company) in addition to expense management counterparty credit risk, among others. As time and resources permit, we would look to expand the breadth of the computer modeling to include risks not yet fully modeled.

The Standard Life Insurance Company of New York:

The Standard stress tests various extreme conditions that could help explore the potential financial impacts of climate change, among other factors. These conditions include but are not limited to dramatic changes in mortality, morbidity and termination rates, and sluggish economic growth. Financial forecasting is accomplished with the use of actuarial modeling software and of modeling tools developed in house.

Property & casualty insurers, on the other hand, tend to invest more resources into catastrophe models capable of illuminating extremes not visible in the historic records. Only the largest insurers have the capacity to develop their own internal models, and so the vast majority of carriers rely on models provided by third-party vendors, most frequently RMS, AIR and EQE by sales volume. The P&C industry's reliance on cat models to set pricing and exposures means its risk view is largely shaped by these vendors.

The vast gulf in scientific expertise between the largest insurers and the average company is evident in insurers' discussions of catastrophe modeling.

II. Disclosure Results/Key Findings

In reality, and despite what many insurers seem to believe, catastrophe models shaping pricing across the industry only marginally incorporate changing climate trends. While two of the three leading cat modelers (RMS and AIR) are integrating climate change into some of the models, their work to date has largely focused on hurricanes, even as climate scientists and reinsurers have indicated that climate change may be driving insured losses across a broader range of perils including wildfires and flood. Cat models are extremely resource intensive to build, however, and resources are invested based on client demand. Today, insurer demand for climate-integrated models remains extremely uneven—among the largest insurers some are actively seeking climate-integrated models, while others are relatively disinterested.⁴¹

Until 2010 few insurers or modelers in the US industry looked beyond hurricanes when considering the effect climate change might have on losses. Yet recent years have demonstrated that climate change may be driving up aggregated losses from smaller events, including perils such as floods, snowstorms and hailstorms, in ways that erode insurer profitability.⁴²

Still to date, many such perils are not modeled, and historic statistics continue to dominate pricing. In addition, perils for which insurers typically do not model catastrophic loss may become more severe as a result of rising temperatures. Tornadoes are an example of such a peril. Tornado formation in April 2011 eclipsed the historical record, with damage from only three days causing as much as \$5 billion in insured losses.⁴³ Yet the climatology of tornadoes—and the effect rising temperatures may have on tornado formation and loss potential—is poorly understood.

Of the insurers with property exposures, 23 describe using cat models. Only eight suggest that today's catastrophe models may be insufficient to help their company or the industry at large to manage climate change.

Those companies who describe limitations of the industry's existing risk modeling tools tend to be those with the capacity to develop their own loss models. In contrast, companies which rely solely on third-party models almost uniformly believe those models to include all relevant climate change trends. Given this market asymmetry, regulators should be aware that many of the smaller companies operating within their states likely are setting pricing based on flawed beliefs of how the proprietary models work.

Several companies appear to conflate decadal climate trends with climate change, as in the case of Seneca Insurance Company:

With respect to windstorm, we rely on the RMS model in the calculation of 250-year PML events and average annual loss. From the various reports we obtain, it is our understanding that frequency and severity of windstorms is most impacted by seasonal conditions (El Nino or La Nina), salinity patterns, and ocean currents. To the extent that these are incorporated into the RMS model, this impacts the costs of our reinsurance and the aggregate exposures that we will underwrite in a particular county.

In addition, few insured perils are modeled by insurers, leaving the possibility for climate-affected perils to be underpriced. Virtually every P&C company with coastal exposure models hurricane exposure; yet even though these companies highlight exposure to other perils, few discuss the use of models for perils beyond hurricanes. One example of this is Pennsylvania National Mutual Casualty Insurance Company:

In reality, and despite what many insurers seem to believe, catastrophe models shaping pricing across the industry only marginally incorporate changing climate trends.

Given this market asymmetry, regulators should be aware that many of the smaller companies operating within their states likely are setting pricing based on flawed beliefs of how the proprietary models work.

41 Based on discussions with a leading catastrophe modeler in March 2011.

42 2010. "Travelers Falls Short of Profit Expectations." CNBC.com, July 22, http://www.cnbc.com/id/38357470/Travelers_Falls_Short_of_Profit_Expectations; Holm, Erik. 2011. "Allstate Executives Draw Fire From Analysts After Profit Falls Short." Dow Jones Newswires. February 10, <http://www.foxbusiness.com/markets/2011/02/10/allstate-executivesdraw-analysts-profit-falls-short>

43 Dunning, Matt. 2011. "Insured losses from tornadoes in South, Midwest may reach \$5B: EQECAT." *Business Insurance*, April 29, <http://www.businessinsurance.com/article/20110429/NEWS/110429907>.

II. Disclosure Results/Key Findings

Through the Enterprise Risk Management (ERM) process, the Company has identified catastrophe risk as one of its top 5 risks. The Company mitigates the risk through the purchase of property catastrophe reinsurance and by managing its aggregate exposure from severe storm-exposed premium and policy counts. The tools used to make decisions in both of these areas are hurricane computer models. These models use the most recent climate science to project the frequency and severity of hurricanes.

New Jersey Manufacturers Insurance Group similarly describes multiple perils that may affect insureds in New Jersey, including hurricanes, floods and windstorms. Yet like many of its peers, the only peril modeled by the company is hurricanes:

Further, on an annual basis, NJM employs an independent consulting firm to perform a Catastrophe Modeling analysis of NJM's entire portfolio of property exposures. This analysis, which is focused on the hurricane peril, is based on comprehensive meteorological and property risk data and provides NJM with projected loss amounts at various event probabilities. The results of this analysis inform NJM's purchase of reinsurance to mitigate the financial implications of catastrophic events.

How the company adjusts underwriting to reflect changing statistics in flooding or windstorms is not clear:

NJM continuously considers changes in climate and weather patterns as part of the underwriting process to measure the potential risk, including but not limited to, sophisticated exposure modeling to determine the potential amount of damage that may result from a catastrophic event and to assist in evaluation of the appropriate amount of external reinsurance that may be appropriate to purchase.

The role of reinsurance brokers in facilitating the use of models to assist clients in understanding changing climate risks is readily evident by the number of companies reporting the role of intermediaries in their use of computer modeling. One such company is Harleysville Insurance, which underwrites a number of perils that may be affected by climate change, and offers insight about its perspectives on changing tornado exposures. Harleysville is among the companies that describe its loss models as incorporating the most up-to-date climate science:

With regard to exposures, from Harleysville's underwriting operations, the Company works closely with its functional units to ensure proper risk diversification and minimal concentrations within its books of business. The Company also employs a number of tools to assist in its efforts. Via a reinsurance broker/intermediary of the Company, Harleysville uses an industry leading software tool to track and manage its weather related exposures. This tool utilizes the latest modeling based technology to produce projected loss estimates based upon various stochastic scenarios to all weather related events.

By use of this tool (available to the Company's underwriting staff), Harleysville monitors its exposures four times a year and models its data twice a year. Two other recently-added desk top tools utilized at the underwriting level are one which grades each commercial lines risk at the time of underwriting for its relative potential exposure to weather related events and one which helps to gauge distance to coast and appropriate pricing relative to natural catastrophic events. These tools all reflect the very latest in weather based technology in terms of evolving climate change. In addition, on an annual basis Harleysville conducts business impact tests for its operational exposure to weather related exposures to ensure minimal disruption to its ability to best service clients and agents.

Similarly, PMA Insurance Group describes the central role of reinsurance brokers in assessing the company's exposure to catastrophe risk:

II. Disclosure Results/Key Findings

PMA has created a multi-disciplinary Catastrophe Committee to help deal with the anticipated risks from climate change which makes use of both computer modeling and Geographic Information Systems (GIS)...Our reinsurance intermediaries provide us with a number of catastrophe modeling software programs that periodically provide a profile analysis of our entire client portfolio as respects perils including hurricane, tornado and hail. Newer software models will be including other weather related geographic areas. PMA continues its pursuit of excellent data from clients as a best practice in the management of natural catastrophe.

Yet without further information on how the company's tools consider the potential for future statistics to deviate significantly from historical norms or extremes, it is impossible to discern whether the models provided by its reinsurance broker are substantially different from the majority of loss models being used in the industry, most of which do not serve insurers well in understanding how losses may be amplified or mitigated by warmer average temperatures.

In contrast, larger insurers more readily recognize the inherent limitations of current catastrophe models in light of changing climate than do their smaller competitors or clients. These players have a clear competitive advantage in deploying resources to build the latest climate science into their pricing models. Many of the global players and top 10 U.S. carriers describe a range of activities—from funding of academic research to catastrophe and scenario modeling—with the objective of designing risk tools to anticipate the potential effects of climate change on their value at risk.

While the smaller carriers (and a few of the very largest) tend to cite their use of near-term hurricane models or warm sea surface temperature hurricane models as standalone evidence of their loss models' incorporation of climate change, ACE USA's filing directly contests the idea that this approach is sufficient for the industry to manage climate change:

The earth's climate appears to be changing in ways inconsistent with the historical record upon which catastrophe models draw data. We have adopted a more short-term view of event frequency that is higher than the long-term historical frequency. Concerning North Atlantic hurricanes, for example, this emphasis on short-term data is founded on the assumption that we may be in a period of heightened severe hurricane activity arising from the multi-decadal cycle, an observable historic phenomenon, rather than changes directly attributable to climate change. While ACE has adopted this change in frequency, the catastrophe modeling industry faces a serious challenge to appropriately address the evolving impact of climate change risk.

The need for better data and better tools is reinforced by a number of other companies, including Fireman's Fund:

For insurers, modeling firms, and policymakers alike, it is critical that resources and dialogue be deployed with the focus of improving climate science accuracy and resolution with respect to the frequency and severity, location timeframe, etc. of related risks, thereby increasing the utility of models.

Others emphasize their active role in shaping the incorporation of climate change into the industry's catastrophe models, such as ACE USA:

In addition to the company's ERM framework, ACE's risk management modeling and underwriting practices continue to adapt to the developing risk exposures attributed to climate change...Our underwriters use state-of-the-art, proprietary catastrophe modeling tools as part of their underwriting process, and we strictly regulated the concentration of those risks we are willing to underwrite. In addition, ACE continually monitors the latest scientific research that would cause any changes in its processes...[and] work[s] with modeling service providers and academicians to identify and implement climate change parameters in catastrophe models.

In contrast, larger insurers more readily recognize the inherent limitations of current catastrophe models in light of changing climate than do their smaller competitors or clients. These players have a clear competitive advantage in deploying resources to build the latest climate science into their pricing models.

ACE USA:

The earth's climate appears to be changing in ways inconsistent with the historical record upon which catastrophe models draw data.

II. Disclosure Results/Key Findings

While these efforts by larger insurers can drive integration of climate change trends into loss models used across the industry, it is also possible that asymmetrical information can be used by individual companies to secure a competitive edge against their peers.

Zurich gives a sense of how the company is adapting the historical weighting and geographic scope of its loss models:

Science related to climate change is developing. As such, the Company's loss exposure assessment strategy continues to develop. Most assessment actions to date have focused on natural catastrophe modeling. The Company is exploring natural catastrophe forecasting models with shorter historical periods and perspective forecasting. Further, the Company is beginning to model losses in parts of the United States not normally exposed to catastrophic losses to look for any increased activity. The Company's work in this regard continues.

Some of the largest companies employ strategic partnerships with academic research institutions to ensure the latest science is incorporated into their risk view. For instance, Swiss Re writes the following:

Our risk and premium calculations are based on probabilistic hazard models, which are based on historic events. To ensure our models and pricing calculations remain accurate going forward in a changing climate, we identify significant future trends in weather patterns, quantify their long term impact on insured losses and include findings into our risk models and underwriting processes. This process is supported by an ongoing program of research with leading universities around the world.

Chartis discusses a convening that in 2007-2008 brought together some of the largest insurers in the US market with climate scientists and catastrophe modeling firms:

Chartis factors in changes in climate and weather patterns as an integral part of our underwriting process—a systematic approach to measuring weather risk that includes sophisticated catastrophe exposure modeling (CAT models). We manage insurance exposures by changing rates and/or limiting coverage based on the output from CAT models. In short, increased weather-related risks may lead to higher rates and limited coverage in the future. To explore these possibilities and potential consequences further, in October 2007 and June 2008, in cooperation with Lloyd's, AIG sponsored two workshops to assess how to incorporate climate change risk into CAT models. Convened by the Center for Health and the Global Environment at Harvard Medical School and the Insurance Information Institute (III), the sessions focused on changing climatic dynamics and catastrophe model projections, and were attended by climate change scientists, CAT modelers, and companies in the insurance industry. Scientific presentations focused on the various perils that impact insurance companies, including tropical cyclones, tornadoes, severe thunderstorms, flooding, droughts, heat waves and forest fires. Participants then discussed ways in which climate change is currently affecting the frequency and severity of these perils and how this may be simulated by and built into CAT models.

While these efforts by larger insurers can drive integration of climate change trends into loss models used across the industry, it is also possible that asymmetrical information can be used by individual companies to secure a competitive edge against their peers.

Without explicit education and dialogue between reinsurers, modelers, brokers and primaries, the gulf between the most sophisticated insurers and the rest of the industry in terms of the capacity to anticipate nonlinear climate change trends will persist. This puts consumers and the industry as a whole at risk.

II. Disclosure Results/Key Findings

E. Investments

KEY FINDINGS:

- *Less than 15 percent of insurance companies think their investments have definite exposure to climate risk;*
- *Property and casualty companies and health companies are least likely to see climate change as a risk to their investments;*
- *Many companies view climate change as a slow burning economic risk that will happen in time frames well in excess of their investment horizons;*
- *Only a small subset of insurers recognize the vast investment opportunities presented by climate change. Only multi-lines and life insurers discuss investments in emerging technologies.*

Just as climate change will likely increase insured losses, it will also affect the performance of the vast investment portfolios insurers rely on to meet those liabilities.

Investment advisor Mercer issued a report in 2011 calling climate change a systemic risk that could introduce as much as 10 percent portfolio risk over the next 20 years.⁴⁴

Mercer suggested that traditional asset allocation strategies are not enough for investors to manage climate risk. Instead, it recommended that investors develop a dedicated asset allocation approach that reflects the climate sensitivity of different asset classes and the adoption of an “early warning system” in their risk management process.

Yet insurers’ described approaches to climate risk management in their investments does not create a picture of institutional investors treating climate change as a systemic economic risk. Rather, the risk perception of insurers appears to be of climate change as a risk factor that will redefine competition in discrete industries or geographies, one that will unfold slowly over decades and which can be managed through iterative portfolio adjustments. If, instead, climate change has the potential to introduce correlated risks across previously uncorrelated assets and to drive market values in ways that cannot be predicted from historical trends, the insurance industry may be poorly positioned to meet its investment objectives.

Yet insurers’ described approaches to climate risk management in their investments do not create a picture of institutional investors treating climate change as a systemic economic risk.

Investment Risk Perception

All considered, less than 15 percent of insurance companies think their investments have definite exposure to climate risk, with multi-line companies leading the pack in risk perception.

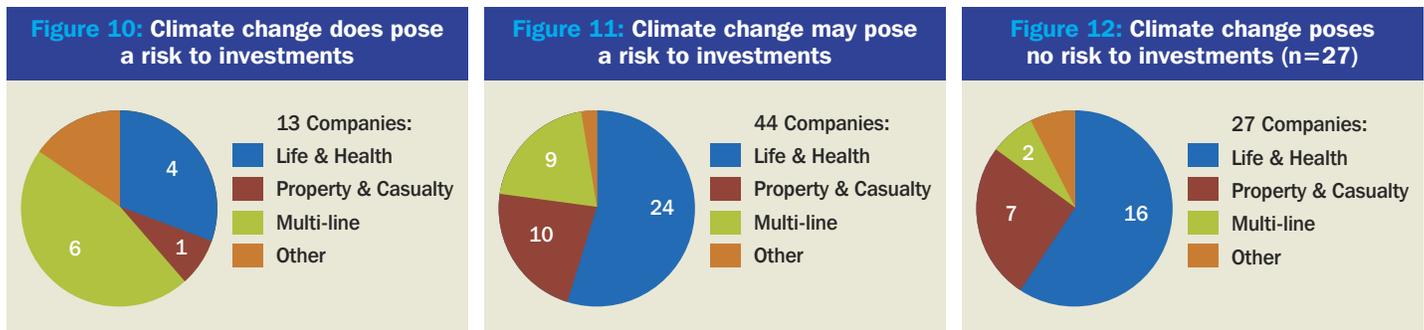
6 multi-lines (35% of multi-lines)
 1 P&C (6% of P&C)
 4 L&H (9% of L&H)

Half of companies believe their portfolio may have some risk exposure:

9 multi-lines (53%)
 24 L&H (52%)
 10 P&C (56%)

44 Mercer. 2011. “Climate Change Scenarios—Implications for Strategic Asset Allocation”

II. Disclosure Results/Key Findings



While just under a third of companies believe climate change poses no risk to their portfolios:

- 2 multi-line (12%)
- 16 L&H (35%)
- 7 P&C (39%)

Investment risk perception is highly correlated to climate risk management structure—roughly 60 percent of the companies with a formal climate policy recognized potential exposure to climate risk in their investments.

Few companies have explicit investment policies with respect to climate change; exceptions to this include Chartis, AXA Group and Swiss Re, which include climate change in broader investment commitments for integrating ESG (environmental, social and governance) risks.

In terms of climate risk management structures, companies' perception of investment risk appears to be driven primarily by the insurer's asset-liability management timeframe. On the whole, P&C companies are more likely to name specific perils that may affect insured losses than climate-influenced economic trends. The opposite is true for life insurers, which have a much longer investment timeframe and more diversified investment portfolio than the typical P&C company.

Investment Risks

Among the climate risks insurers describe in their investment portfolios:

- Carbon regulations (5), physical effects (3) or climate change generally (4) damaging the value of corporate securities
- Government or municipal credit being affected by the physical effects of climate change (2)
- Real estate assets being damaged by extreme events (3) or devalued by climate regulations (2)
- Mortgage-backed securities being impaired by lack of available mortgage insurance from extreme events (1)

While a handful of companies describe active approaches for managing these risks, the majority of companies point to general investment strategies as being sufficient to identify and manage climate risk, including:

- Present enterprise risk management inherently capturing climate change risks (22)
- Diversification of portfolio buffering investments from climate risk (23)
- Credit quality of portfolio buffering investments from climate risk (6)
- Duration of portfolio buffering investments from climate risk (3)

In terms of climate risk management structures, companies' perception of investment risk appears to be driven primarily by the insurer's asset-liability management timeframe.

II. Disclosure Results/Key Findings

Present risk management approach would inherently capture climate change risks

Most companies that recognize potential exposure to climate risk in their investments do not report a formal approach to incorporating climate change into risk management. Rather, most describe climate change as a risk driver that would be inherently captured by portfolio managers' reviews of credit risk. In reality, if insurance portfolio managers behave consistently with portfolio managers of other institutional investors, it is very likely they are not incorporating climate risks into their analyses.⁴⁵

Farm Family Companies is one company that describes climate change risk as being inherent to the company's risk analysis:

The company has not specifically considered the impact of climate change on its investment portfolio. We consider several risks which relate to sectors and specific investments to estimate their impact on our expected returns on a risk-adjusted basis. For investment risk management, risks we face such as credit risk, market risk, liquidity risk, interest rate risk, sector risk, etc. would include any impact of climate change to the extent it impacts these risks for any one investment or the economy as a whole.

While National Integrity Life Insurance Company similarly describes climate change risk analysis as being an inherent part of its traditional investment approach, it offers more detail on the way the company approaches climate risk on a sector-by-by-sector basis:

Climate change has been considered for the investment portfolio only to the extent that it affects traditional credit analysis and portfolio diversification. Portfolio management is guided by investment policy statements. These policy statements are designed, in part, to mitigate the risk of any issuer or industry representing a disproportionate risk to the portfolio. Climate change is potentially of great importance to several industries, and at this time the Company believes it is most effectively evaluated in the context of a particular group. To date no changes to the portfolio have been attributable to climate change.

In comparison, The Standard Life Insurance Company of New York describes specific risk factors that are considered when assessing the value of an investment in a specific asset class:

The Standard's Investment Team manages a diversified investment grade fixed income portfolio. The fixed income portfolio is exposed to risks associated with climate change, including regulatory, litigation, competitiveness and reputational risks that could impact the profitability of a company issuing debt securities. Risks associated with a company are carefully evaluated when analyzing a credit.

Finally, Aviva Life and Annuity Company of New York, describes an active shareholder approach to managing risk in their portfolio:

Aviva Investors, our global asset management business, has supported the Carbon Disclosure Project (CDP) from its beginnings nearly a decade ago and uses the data as one of the factors in buy, sell and hold decisions. Where we have concerns about a company's quality of response to CDP, we have a basis for entering into informal discussions with that company and if necessary making recommendations for change.

Just over a quarter of companies describe their approach to diversification across their investment portfolio as sufficient to manage the effects of climate change. Implicit (and sometimes explicit) in this statement is the assumption that climate change will result mainly in localized economic effects by region, firm or sector.

Diversification of portfolio buffering investments from climate risk

Just over a quarter of companies describe their approach to diversification across their investment portfolio as sufficient to manage the effects of climate change. Implicit (and sometimes explicit) in this statement is the assumption that climate change will result mainly in localized economic effects by region, firm or sector.

45 Kirsten Spalding. 2010. "Investors Analyze Climate Risks and Opportunities: A Survey of Asset Managers' Practices." Ceres, January.

II. Disclosure Results/Key Findings

ACE USA, a company with a highly developed approach to integrating climate science into its underwriting loss modeling, is one such company that views the investment risk of climate change as isolated to discrete events in particular areas:

We believe that proper diversification by issuer and instrument as well as by investment manager effectively insulates the portfolio from any adverse climate change event such as a natural catastrophe striking a particular geographic location.

Pennsylvania National Mutual Casualty Insurance Company echoes this concept:

The Company recognizes that climate change can impact the return of an individual investment and, as such, the Company's investment portfolio is highly diversified by security type, industry, location and duration which, in turn, mitigates the risks posed by the impact of climate change.

CNO Financial Group Inc. goes a step further, recognizing that climate change has the potential to damage value across industries and geographies. Still, it concludes that the company's general approach to diversification is sufficient to manage this risk:

Risks associated with climate change could have an adverse impact on certain industries and/or geographic areas, and the Company recognizes that the concentration of the investment portfolio in any particular industry, group of related industries, asset classes, or geographic area could have an adverse effect on its value and performance and consequently, on the results of operations and financial position. The Company seeks to mitigate this risk by having a broadly diversified portfolio, by sector, asset class and geographically.

Credit quality of portfolio buffers investments from climate risk (6)

The weighting of many insurers' portfolios toward fixed-income securities also shapes their risk view. The few insurers that describe asset allocation note that their weighting toward highly rated government securities buffers their investments from climate risk.

Swiss Reinsurance America Corporation, for example:

As a global reinsurance company we have to adhere to a proper asset liability matching process, to enable a prudent investment approach to meet the outstanding liabilities cash flows. To ensure liquidity and predictable cash flows, we therefore mainly invest in very liquid and secure bond markets, i.e. mainly in government bonds and very secure corporate bonds. Our equity investments are very limited. At the end of 2009 they amounted to CHF 258 million and CHF 3, 124 million private equity (together 2% of total investment portfolio).

Chubb Group of Insurance Companies expands the set of secure credits:

Because Chubb invests primarily in highly rated bonds, principally tax-exempt, corporate, U.S. Treasury and government agency issues, as well as foreign bonds that support our international operations, we do not believe that climate change has the potential to materially impact our investment portfolio.

Duration of portfolio buffers investments from climate risk (2)

P&C and health companies are least likely to see climate change as a risk to their investments. Although companies rarely provide reasoning behind this belief, statements by a few carriers indicate that companies with short duration investments (which describe the majority of P&C and health companies) view their portfolios as highly adaptive to what is viewed as a slow burning economic risk.

II. Disclosure Results/Key Findings

Progressive Insurance discusses the flexibility afforded by the duration of its investment portfolio:

We have considered the impact of climate change on our investment portfolio. However, at this point we do not have a high degree of confidence in the likelihood or investment implications of climate change. However, our investment portfolio is dominated by fixed income securities that currently have a weighted average duration of 2 years. Our investment guidelines prescribe that our duration remains between 1.8 years and 5.0 years. Our view is that potential climate change will happen over a period of time well in excess of our portfolio duration, which will afford us ample flexibility to respond to the consequences of a change in climate as they become more certain.

Harleysville Insurance echoes this view:

The duration of the Company's fixed maturity portfolio and therefore its investment horizon is shorter than the speculation on climate change.

As does Bravo Health:

The Company investment policy is very low risk and excludes any equity or derivative instruments. The Company's bond portfolio is highly-rated and is less than two years in average duration.

Correlated Risks

Insurers accept their clients' risk in exchange for premium dollars which are in turn invested, yielding the lion's share of insurers' profits. Few companies recognize the potential for correlated losses across their enterprise. ACE USA is one exception:

Indirectly, due to the fact that our companies provide clients with insurance and reinsurance protection from the impact of natural catastrophes, including weather events that may become more frequent or severe due to global warming, ACE is exposed to risk through its clients. Among the areas exposed to climate change risk are energy, marine, property and crop coverage, written as either insurance or reinsurance. The commercial risk is that actual losses in a given year may exceed the underlying underwriting and actuarial assumptions used to price products, thereby eroding profitability and, in extreme instances, shareholder capital. In addition, global warming could also affect those enterprises in which we invest.

Excellus Health Plan recognizes the potential affect on underwriting claims and invested assets:

A significant increase in average mortality and morbidity rates in any of our service areas could potentially result in an increase in loss ratios for the Company. If climate change has a significant impact on the economy in general, investment losses or a reduction in sales/revenue could potentially occur.

Investment Opportunities

Only a small subset of insurers recognizes the investment opportunities presented by climate change.

Great American Insurance Company describes a general risk/opportunity approach throughout its investment portfolio:

The company reviews its investments on a case by case basis evaluating in part whether effects of climate change may be a risk or an opportunity. This evaluation is one of many factors used when making investment decisions.

Insurers accept their clients' risk in exchange for premium dollars which are in turn invested, yielding the lion's share of insurers' profits. Few companies recognize the potential for correlated losses across their enterprise.

II. Disclosure Results/Key Findings

Companies that recognize no risks related to climate change are very unlikely to report investment opportunities. Life insurers are an exception and are more likely to see opportunity for their investments even if they do not see risk.

More often, insurers describe opportunities in terms of specific sectors or markets, including:

- Renewable energy (10)
- Energy efficiency/Green real estate (4)
- Agriculture & forestry (2)
- Green retail investment fund (1)

Sun Life Insurance and Annuity Company of New York:

To the extent that climate change results in increased regulation we will comply with such changed regulation as it applies to our investment portfolio. Beyond that, we believe that climate change regulation generally will create investment opportunities for us in energy efficiency and renewable energy.

Companies that recognize no risks related to climate change are very unlikely to report investment opportunities. Life insurers are an exception and are more likely to see opportunity for their investments even if they do not see risk.

Among segments of the industry, only multi-lines and life insurers named emerging technologies or real estate as significant investment opportunities.

No P&C companies described participation in green funds or investments in clean tech sectors. This may be due to the tendency of P&C companies to invest mainly through fixed-income instruments. Or the lack of investment may be the result of heightened risk perception, as evident in Harleysville Insurance's filing:

At this time, the Company does not invest in risky investments that fund alternative energy sources.

Allstate Life Insurance Company of New York is the only company to describe opportunities in the municipal bond market:

Our Investment team also invests in green technology as part of its normal course investing, including municipal utilities that have mandates regarding greenhouse gases. As of December 31, 2009, we have about \$27 million par invested in Clean Renewable Energy Bonds. These bonds were for solar energy, wind power and biomass.

F. Emissions Management

➤ KEY FINDINGS:

- *The vast majority of companies—50 of the 88 unique responses to the survey—have no plan to reduce their operational greenhouse gas (GHG) emissions;*
- *Life and health companies are most apt to be taking no environmental actions such as reducing operational GHG emissions.*
- *Companies that outline future goals and report their progress in this regard typically have the greatest commitment to reducing operational emissions*

Companies' management of their own operational emissions is often the first step taken to address the risks of climate change and is indicative of an overall commitment to sustainability and environmental issues. While insurance is a low-carbon sector compared to manufacturing and other energy-intensive sectors, it is actually fairly carbon-intensive compared to other service industries because of its heavy reliance on data management and resulting energy use.

II. Disclosure Results/Key Findings

NAIC survey responses indicate a wide range of actions with respect to GHG emission reductions, from no action at all to ambitious plans with specific reductions goals and timetables.

The vast majority of companies—50 of the 88 unique responses to the survey—have no plan to reduce their operational emissions and are either taking no action at all or are taking modest steps such as recycling, conservation and paperless billing. Responses such as the following disclosure by Emblem Health show a limited understanding of what actions have a significant effect on reducing a company's GHG emissions:

The company does not currently have a formal plan to assess, reduce or mitigate emissions in its operations. The company's exposure to emissions is almost negligible. The company does actively promote healthy living for its employees and policyholders. The company encourages recycling (i.e. print cartridges) and tries to minimize the use of paper wherever possible. In addition, the company encourages walking and cycling and the use of company provided coffee mugs in lieu of using paper cups.

Roughly one quarter of the survey respondents name no future targets for GHG emissions but are undertaking efforts to lower their carbon footprint. Such actions include lighting efficiency (sensors and more efficient lighting technology), HVAC efficiency, LEED and ENERGY STAR certifications for buildings, limiting airline travel, high fuel efficiency in vehicle fleets, and carbon offsets. For example, Farmer's describes a broad energy efficiency push:

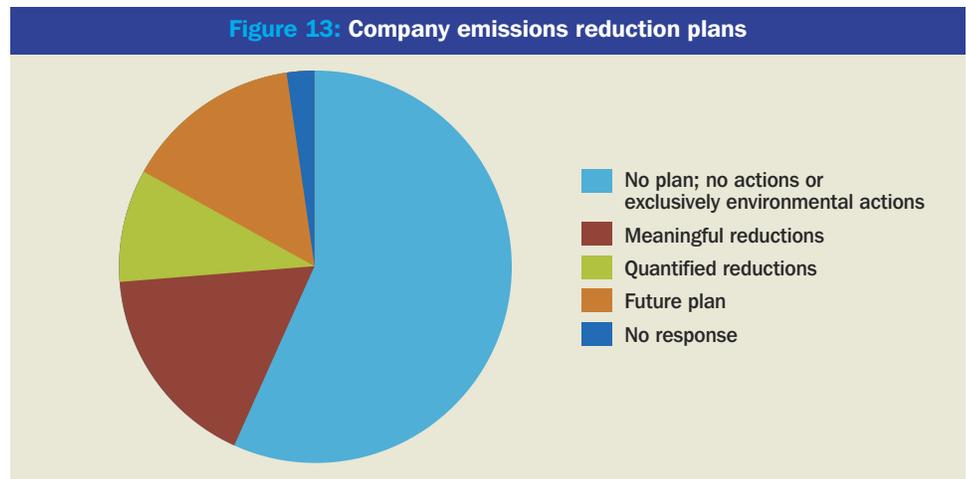
Our goal is to purchase energy in an efficient, cost effective and environmentally responsible manner, and to establish and implement effective energy management programs. We have installed solar panels in two locations, and have implemented electrical power conservation programs in multiple operations. In some locations we have installed motion sensitive light switches and energy saving light bulbs, and have implemented programs to remind employees to power down equipment when it is not in use. Depending on the job assignment, employees may be provided with a company fleet vehicle. In 2009, we reduced the number of fleet vehicles nationwide by 697. In 2010, we are providing employees with the option to order vehicles with lower carbon emissions. As many Farmers employees commute to our business locations, we encourage ridesharing and the use of public transportation. In some locations, we provide incentives, including subsidies for train passes, bus passes and vanpools, free shuttle buses from train stations, and preferred carpool parking spaces. In 2009, we reduced air travel. As an alternative to air travel we have installed telepresence technology and high quality HD video conferencing systems in many operations.

However, Farmer's does not quantify specific reductions from its actions, as eight other companies—including Harleysville Insurance Company—do:

While Harleysville does not have a formal plan in place to assess, reduce or mitigate its emissions, several energy conservation measures have been implemented, which benefit the environment. These measures, which reduce the Company's electric usage and thereby reduce emissions in the environment, include the installation of an ICE storage system, updated controls for the Company's HVAC system, variable speed motors for its air handling units, and a lighting upgrade. As a result, in 2009 the Company reduced its electric energy consumption by 11.7 percent and its peak demand by 18.13 percent. Year to date, the Company's is down 12.25 percent and peak demand is down 12 percent compared to 2009 usage rates.

Companies that outline future goals and report their progress in this regard typically show the greatest commitment to reducing operational emissions. For example, the Prudential Insurance Company of America disclosed that it has reduced its carbon footprint by over 30 percent since 1998 and aims to reduce it by another 10 percent before 2013. As of 2009, half of the goal had already been met.

II. Disclosure Results/Key Findings



The nature of emissions reduction efforts tends to not correlate strongly with company size but does show patterns of interest with respect to insurance segment. Life and health companies are most apt to be taking no environmental actions (two-thirds). Just over half of P&C companies indicate no environmental action. Multi-line insurers, on the other hand, have a fairly even distribution between no action, meaningful action and future plans.

The California Department of Insurance Climate Risk Disclosure Survey Guidance specifies that “Each insurer is encouraged to clarify whether its plan for measuring and management of its emissions in operations and/or its subsidiary organizations’ operations includes emissions related to energy use for data storage or other computing-intensive processes.” There was not a dramatic difference in inclusion of computing between California’s responses and those of other states, but few (15 of 88) mentioned it at all. Many of these responses discuss server virtualization and cloud computing—for example, the following from Progressive Insurance:

Through server virtualization, a “host” server traditionally used for a single job is compartmentalized into 15 to 20 virtual machines. This results in more than 6,000 kilowatts (kWh) in energy savings. In 2008, with more than 5,000 Windows® servers, we started server virtualization. By the end of 2009, 2,545 servers (43.44% of our total server population) were virtual, an energy savings of more than 16 million kWh. Our goal is 100% server virtualization by 2013.

II. Disclosure Results/Key Findings

G. External Engagement

KEY FINDINGS:

- *Insurers play a hugely important role in shaping society's response to emerging risks, yet 70 percent describe no activities they are taking to help customers or society at large understand and manage climate change;*
- *Of all the ways insurers engage their customers on climate trends, resilience to present-day risks is the most common. Roughly 15 percent of insurers describe using premium incentives or direct marketing to engage customers around minimizing damages from extreme events. Many companies are doing this through member associations, not direct engagement;*
- *Few companies (especially those wholly operating in the U.S.) report the development of specialized products designed to facilitate low-carbon behaviors, such as green building, low-mileage driving or renewable energy generation. Several companies with ample "green" product lines in other markets do not offer those products in the U.S.;*
- *Zurich offers an unusually comprehensive approach to addressing climate change through external engagement, including product development, client education, research and policymaker engagement.*

As risk experts, insurers play a hugely important role in shaping society's response to emerging risks. Yet 70 percent of insurers describe no activities their companies are undertaking to help their customers or society at large better understand and manage the risks associated with climate change. The relative inactivity of insurers in engaging clients is of particular concern, as many insurance customers engage in carbon-intensive activities which represent a significant proportion of global emissions and hence, the genesis of insurers' own climate risk.

The range of external engagement activities being undertaken by insurers are often being undertaken by the same small set of companies, and includes:

Climate Change Research

- Technological/Behavioral Responses to Mitigate Climate Change (4)
- Fundamental Research on Extreme Events (7)
- Adaptive Responses to Reduce Social and Economic Impacts (3)

Policymaker Engagement

- Advising on Changing Risks (4)
- Advocating for Insurance Solutions (4)
- Advocating for Low-Carbon Policies (6)
- Advocating for Climate Adaptive Policies (3)

Customer Engagement

- Product or Services Development for Low-Carbon Behaviors/Technologies (7)
- Product or Services for Adaptive Behaviors (5)
- Education on Low-Carbon Behaviors (3)
- Education on Extreme Events (13)

The relative inactivity of insurers in engaging clients is of particular concern, as many insurance customers engage in carbon-intensive activities which represent a significant proportion of global emissions and hence, the genesis of insurers' own climate risk.

II. Disclosure Results/Key Findings

Few insurers describe engagement approaches that touch on each of these ways in which insurers can drive improved climate risk management.

Zurich offers an unusually comprehensive approach to addressing climate change through external engagement, including product development, client education, fundamental research and policymaker engagement:

The Company established its Climate Change Initiative to use its skills in risk identification and management to assist stakeholders in better adapting to and mitigating risks of climate change. To that end, a variety of activities, including formal information sharing, such as congressional testimony, and more informal means, such as customer and broker meetings, have been undertaken to share information and collaborate with policyholders and potential policyholders. The Company has worked with stakeholders to better understand the potential climate change risks that may require risk management solutions to mitigate those risks.

As part of its initiative, the Company continuously strives to identify and respond to the risk management needs arising from existing or upcoming climate change legislation. During the first years of its Climate Initiative, the Company launched several new climate-related products, some of which are, at least in part, driven by this legislation. Examples of these products include: (1) directors & officers liability insurance extended for climate-related claims; (2) political and trade credit risk coverage for carbon credit projects; (3) green, efficient and resilient rebuild insurance, allowing for the rebuilding of damaged property with improvements to green, efficiency or weather-resilience standards; and (4) liability insurance and financial assurance products for Carbon Capture and Sequestration (CCS) facilities.

Climate Change Research

Given their risk expertise and inherent incentives to help society preserve the insurability of risk, insurers should be a significant source of basic research on the science of climate change and economical approaches to minimizing the risks of climate change. Yet while a number of insurers describe investments in climate modeling for their own proprietary research or for the benefit of the industry at large, far fewer describe support of basic research intended for the public at large.

AXA Group is one exception:

AXA has committed \$100 million over 5 years to support academic research institutions and individuals involved in fundamental research programs in five macro societal trends broadly associated with risk prevention. These include climate change. The AXA Research Fund, one of the most significant privately funded fundamental research projects in the world, is AXA's main research initiative. Current endowments and projects can be browsed at <http://researchfund.axa.com/en>.

Swiss Re also describes the company's support for policy-oriented research on adaptive responses to climate change:

Swiss Re's climate experts remain in close contact with the climate research community. Recent initiatives have looked at the effects of climate change on coastal flood damage and storm damage in Europe as well as the economics of climate adaptation based on case studies in 8 locations around the world including Florida.

Preserving insurability will demand that insurers do far more to build adaptive capacity within the economies where they do business.

Preserving insurability will demand that insurers do far more to build adaptive capacity within the economies where they do business.

II. Disclosure Results/Key Findings

Policymaker Engagement

Very few insurers describe direct policy engagement around climate change. While a handful discuss their company's engagement on low-carbon policies such as public transportation or energy efficiency, relatively more describe engagement on policies that directly influence insurability. These sorts of policies include legislation specifically related to the roles of private risk capital versus public risk pools; long-term planning for public assets such as flood protection infrastructure under different climate scenarios; and other types of policies related to adaptation to climate change.

Customer Engagement

Of all the ways insurers engage their customers on climate trends, resilience to present-day risks is the most common. Roughly 15 percent of insurers describe using premium incentives or direct marketing to engage customers around minimizing damages from extreme events. For many companies, educating customers on these issues is achieved not through direct engagement but rather through member associations such as the Institute for Business and Home Safety (IBHS).

In contrast, relatively few companies (especially those wholly operating in the U.S.) report the development of specialized products designed to facilitate low-carbon behaviors, such as green building, low-mileage driving or renewable energy generation. Several companies with ample "green" product lines in other markets do not offer those products in the U.S., perhaps indicating relatively smaller market demand or lack of policy certainty in the expansion of those markets.

Virtually no companies describe customer engagement on climate trends in relation to commercial or industrial clients, where the opportunities to provide risk transfer for emerging low-carbon technologies and risk resilience are greatest.

While a sizeable proportion of the industry sees value in helping their customers and policymakers to manage climate risks, the paucity of activities with respect to product development and external engagement indicate insurers can invest far more resources into this crucial element of risk management.

Chapter 3



KEY RECOMMENDATIONS FOR REGULATORS

Insurance regulators cannot do their job without a fuller understanding of how the companies they oversee will be impacted by climate change, and what plans they have in place to manage those risks. Disclosure is a key component of regulatory oversight, and regular enforcement of disclosure can ensure that both regulators and insurers properly assess and manage climate risk.

The 2010 inaugural climate disclosure survey—and the results and findings documented in this report—provide an unprecedented view into climate risk perception and management within the insurance industry.

The experience of this first year suggests a number of ways in which the disclosure process can be made more useful to regulators, consumers, investors and the industry itself in future iterations. We would recommend that regulators consider the following steps:

➤ **Implement mandatory disclosure annually, and make survey responses publicly available**

Making disclosure mandatory gives regulators a more complete picture of climate activities in their market. The current approach, with some states requiring responses to the survey and others making participation voluntary and non-public, has resulted in a patchwork of disclosure which does not provide a full sense of how the U.S. industry as a whole is affected by and managing the impacts of climate change.

Making the survey mandatory is important for eliciting company responses. Of states implementing mandatory disclosure, 77 percent of companies required to disclose complied. In comparison, only 25 percent of companies submitted filings in states with voluntary climate disclosure.

A lack of universal mandatory disclosure means that states with few domiciled companies have little insight in how the companies operating in their state are managing climate risk. Given the potentially significant impacts of climate change on insurance availability and affordability, as well as on insurer financial health, this lack of information should be troubling to regulators.

Finally, the information provided in mandatory, public disclosure can help other market actors identify market-wide failures in risk management and push for market corrections. In this respect, disclosure results should be used not only by regulators, but also by reinsurers, primaries and brokers to understand the direction the market is moving with respect to a risk factor that will profoundly shape industry performance in the coming years.

III. Key Recommendations for Regulators

➤ **Create shared resources around the implications of climate trends on enterprise risk management**

Relatively few insurers have the ability to produce fundamental research on the ways that climate change may affect their business. Regulators should help to improve market-wide understanding of the ways climate can affect different areas of the insurance enterprise, and incorporate these trends into company examinations to protect market capacity. Insurers and regulators alike would benefit from more fundamental research in the following areas, which emerged as areas of weakness in this year's disclosure responses:

- **Investment Risks and Opportunities**

Investment consultants and asset managers would be helpful to regulators in better understanding insurer portfolio exposure and climate-sensitive asset allocation strategies.

- **Correlated Risks**

An assessment of the potential for emergent correlated risks between investments and underwriting portfolios could inform future examination procedures.

- **Loss Modeling**

Regulators and carriers would mutually benefit from clarification on how today's loss models incorporate climate parameters.

- **Health and Life Loss Potential**

Fundamental research on the temperature sensitivity of morbidity/mortality statistics would likely be beneficial to insurers, regulators and public health professionals.

- **Customer Resilience**

Regulators and insurers have a mutual interest in improving customers' resilience to extreme events, and identifying the most successful methods of driving resilience.

➤ **Clarify disclosure expectations**

Negotiations that produced the final text of the NAIC Insurer Climate Risk Disclosure Survey resulted in the omission of language around specific themes or practices. As a result, there was little consistency in where insurers addressed major trends, including pricing, modeling and governance.

The lack of guidance on differentiating between climate activities at the group and individual company level also led to difficulties in assessing climate activities at the subsidiaries that complied with the survey. For example, Farmers Insurance (a Zurich subsidiary), tended to discuss activities by the parent company, with little information provided on risk management practices at Farmers. By contrast, the distinct activities of Allianz-owned Fireman's Fund tended to stand apart from its parent company. Similarly, Berkshire Hathaway's response was stronger because the activities and risk views of Geico, General Re and National Indemnity were clearly distinct.

Regulators should consider providing more detailed guidance documents to assist companies in preparing survey responses. A useful model for disclosure guidance was provided in 2009 by the California Department of Insurance.⁴⁶

Companies and regulators would also benefit from standardized templates to organize disclosure responses, including contextual information not specifically elicited by the survey, such as direct premiums written. The disclosure survey instrument created by the Pennsylvania Insurance Department offers a useful example for standardizing response formatting. Pennsylvania's climate survey portal⁴⁷ is also a good example of a centralized resource for carriers, consumers and other stakeholders to learn more about climate change and insurance along with the survey's intent and results.

46 The California guidance document is available at http://www.naic.org/documents/committees_ex_climate_ca_guid_ex_survey.pdf

47 The portal is available at http://www.portal.state.pa.us/portal/server.pt/community/industry_activity/9276/climate_risk_survey/717493.

Appendix A: Insurers with Public Disclosure Filings by State

State	Company	Voluntary Submission (*)
California ⁴⁸	Blue Shield of California Life & Health Insurance Company	
	California Earthquake Authority	
	California State Automobile Association Inter-Insurance Bureau	
	The Doctors Company <i>The Doctors Company, an Interinsurance Exchange</i> <i>The Doctors Life Insurance Company</i>	
	Farmers <i>21st Century Insurance Company</i> <i>Farmers Insurance Exchange</i> <i>Fire Insurance Exchange</i> <i>Mid-Century Insurance Company</i>	*
	Fireman's Fund Insurance Company	*
	First American Financial Corporation	
	First American Title Insurance Company	
	Health Net Life Insurance Company	
	Interinsurance Exchange of the Automobile Club	
	Mercury Casualty Company	
	Mercury Insurance Company	
	State Compensation Fund	
	New Jersey (voluntary)	New Jersey Manufacturers Insurance Group
Prudential of America Group		
New York ⁴⁹	Allianz Group	*
	Allstate Life Insurance Company of New York	*
	Assured Guaranty Ltd <i>Assured Guaranty Mortgage Insurance Company</i> <i>Assured Guaranty Municipal Corp</i>	
	Aviva Life and Annuity Company of New York	*
	AXA Group	
	Berkshire Hathaway Group of Insurance Companies	*
	Chartis Inc.	*
	CNO Financial Group	*
	Eastern Vision Service Plan, Inc.	*
	Empire Fidelity Life Insurance Company	*
	Excellus Health Plan, Inc.	
	Farmers <i>21st Century National Insurance Company</i> <i>21st Century North American Insurance Company</i>	*
	Farm Family Companies	*
	First Reliance Standard Life Insurance Company	*
	First Security Benefit Life Insurance & Annuity Company of New York	*
	Genworth Life Insurance Company of New York	*
Great American Insurance Company		
Emblem Health <i>Group Health Incorporated</i> <i>Health Insurance Plan of Greater New York</i>		
Harleysville Insurance Company of New York	*	

48 BankAmerica Corp Group was the only insurer required to comply with disclosure survey but without a documented submission.

49 Insurers required to comply with disclosure survey but without documented submissions include Wellpoint Inc Grp, Guardian Life Group, Preferred Care Group, Tower Group, Navigators Group, Utica Group, Geneve Holdings Inc Grp

Appendix A: Insurers with Public Disclosure Filings by State

State	Company	Voluntary Submission (*)
New York (con't)	HealthNow New York Inc.	*
	Hudson Specialty Insurance Company	*
	ING Life and Annuity Insurance Company	*
	Jackson National Life Insurance Company of New York	*
	John Hancock Life Insurance Company of New York	*
	Lincoln Life & Annuity Company of New York	*
	MBIA Insurance Corporation	
	Medical Liability Mutual Insurance Company	
	Metropolitan Life Insurance Company	
	Mutual of America Life Insurance Company	*
	MVP Health Care	
	National Benefit Life Insurance Company	*
	National Integrity Life Insurance Company	*
	National Security Life & Annuity Company	*
	New York Life Insurance Company	
	Phoenix Life Insurance Company	*
	Progressive Insurance *	
	Prudential Insurance Company of America	*
	RiverSource Life Insurance Company of New York	*
	Seneca Insurance Company	*
	Sun Life Insurance and Annuity Company of New York	*
	Swiss Reinsurance America Corporation	*
	Teachers Insurance & Annuity Association of America	
	The Standard Life Insurance Company of New York	*
	Trustmark Insurance Group, Inc.	*
	Union Security Life Insurance Company of New York	*
	United Services Automobile Association	*
	Unitrin Group	
	UnumProvident Corp Group	*
	William Penn Life Insurance Company of New York	*
Zurich Insurance Group		
Oregon (Voluntary)	Chubb Group of Insurance Companie	
	Mid-Valley IPA Inc.	
	PacificSource Health Plans	
Pennsylvania ⁵⁰	ACE USA	
	Bravo Health	
	Capital Blue Cross	
	Eerie Insurance Group	
	Geisinger Health Plan	

50 Insurers required to comply with disclosure survey but without documented submissions include Pennsylvania National Insurance Group and Universal America Financial Corp Group.

Appendix A: Insurers with Public Disclosure Filings by State

State	Company	Voluntary Submission (*)
Pennsylvania (con't)	Harleysville Insurance	
	Highmark, Inc.	
	Hospital Service Association of Northeastern Pennsylvania	
	Independence Blue Cross	
	Lincoln General Insurance Company	
	Magellan Health Services Inc Group	
	Medco Containment Life Insurance Company	
	Old Republic Insurance Group	
	The Penn Mutual Group	
	Pennsylvania Life Insurance Company	*
	Pennsylvania National Mutual Casualty Insurance Company	*
	Philadelphia Consolidated Holding Group	
	PMA Insurance Group	
	Radian Group Inc	
Washington	Group Health Cooperative	
	Premera	
	Symetra Life Insurance Company	

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