



## Managing Climate Change Risk: Insurers Can Lead the Way

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## Abstract

Rapid climate change has been occurring for the past few decades (IPCC 2012). These climate changes are predicted to continue and possibly accelerate for many decades to come (IPCC 2012). One of the industries most affected by climate change is the insurance industry; for instance, changing weather patterns could lead to increases in damages from events such as hurricanes, tornadoes, and floods (Mufson 2007). Fortunately, however, the insurance industry is uniquely positioned to lead the way with regard to climate change mitigation and risk management. Insurers can promote a more sustainable future through better risk-based modeling and product pricing; through innovative green products; through partnering with businesses for better environmental governance; through alliances with policy-makers and regulators to ensure voluntary market adjustments for risk; and by championing the enforcement of building code efforts (Lloyd's 2006; Liedtke, Schanz, and Stahel 2009). Finally, while insurers can potentially have a major influence over the management of climate change risk in society, they must first model sustainability in order to be credible advisors to customers and other constituents.

**KEYWORDS:** climate change risk, insurance, sustainability

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## **Introduction**

A preponderance of scientific evidence has documented that rapid climate change has been occurring for the past few decades (NOAA 2011; Aon 2007; Lloyd's 2006). Climate change is predicted to continue and possibly accelerate for many decades to come (IPCC 2012). The most likely cause of rapid climate change is global warming due to greenhouse gases. The major greenhouse gas of concern is carbon dioxide; however, methane is also a known contributor to temperature change. Carbon dioxide levels continued to increase between 2008 and 2011 (NOAA 2011), despite a global economic slump. After a relatively stable period, methane gas levels have also been on the rise, beginning in 2007 (NOAA 2011). Given the high levels of greenhouse gases, it is probably impossible to completely halt global warming, but efforts must be made to mitigate and adapt to the problem. The costs of not reversing or limiting global warming may be extreme and could include increases in damages from hurricanes and flooding, as well as impacts from climbing sea levels and increased land and sea temperatures (IPCC 2012; Mufson 2007).

The insurance industry is uniquely positioned to lead the way with regard to climate change mitigation and risk management. This paper discusses how insurers can help to attain a more sustainable future through better risk-based modeling and product pricing; through innovative green products; through partnering with businesses for better environmental governance; and through alliances with policy-makers and regulators to ensure voluntary market adjustments for risk and the enforcement of building code efforts (Liedtke, Schanz, and Stahel 2009; Aon 2007; Lloyd's 2006).

## **Improved Risk Modeling for the Future**

Climate change is a shift in basic climate patterns away from long-term means (Huber and Gullede 2011). Historical patterns have been less useful in predicting future conditions in recent decades due to rapid changes in the climate that did not occur historically (IPCC 2012). Major economic and social losses are now more likely to occur as a result of shifts in the severity and frequency of extreme events (Huber and Gullede 2011).

Insurers have traditionally modeled climate and weather related risk based on historical patterns, but risk modeling for the future must now take into account the rising incidence of extreme events, and not just historical trends. For example, in the United Kingdom regulators have mandated that insurers must have adequate capital based on the risk associated with prevailing estimations of climate change, and not just based on "an average" over a long period of time

(Lloyd's 2006; Aon 2007). With better risk modeling, insurers should be able to price risk more appropriately. It is important to do so, since some take the view that weather related risk may not be insurable at some point in time due to an unstable pace of change in the climate; however, future-oriented risk modeling will hopefully ensure that weather related risk can remain insurable (Lloyd's 2006).

Three new modeling techniques are being explored for future climate and weather related risk modeling. These include analyses of 1) global micro-correlations; 2) fat tails; and 3) tail dependence (Kousky and Cooke 2009).

### **Global Micro-correlations**

Global micro-correlations are very small correlations between variables (Kousky and Cooke 2009). An example of micro-correlation is El Nino, which brings about correlation between climate events in various parts of the world. With El Nino, precipitation is more likely to be extreme in California, causing flooding and landslides. Nutrient-poor water may be likely in Peru, causing a decline in the fish catch. Also, drier conditions are more likely in Australia, increasing the fire risk (Kousky and Cooke 2009).

### **Fat Tails**

Fat tailed damage distributions are those where the probability of ever more serious damage decreases *slowly* relative to the extent of the damage (Kousky and Cooke 2009). "This characteristic of fat tails means that the most extreme event observed could be orders of magnitude greater than the second-most extreme event, which could be orders of magnitude greater than the third, and so on" (Kousky and Cooke 2010, 2).

An example of a fat tail distribution is damage from natural disasters such as hurricanes.

The most costly hurricane to hit the United States was Hurricane Katrina, which caused more than \$100 billion in damages. The second-costliest hurricane was Hurricane Andrew, which the National Oceanic and Atmospheric Administration (NOAA) estimates cost 'only' \$35.6 billion. The frightening implication of fat tails is that the next hurricane we observe that is *at least as bad* as Katrina could be much, much worse (Kousky and Cooke 2010, 2).

Given recent climate change, it is believed that more extreme natural disasters will be ever more common.

### **Tail Dependence**

Tail dependence is the possibility that bad events happen together, such as a hurricane and then subsequent flooding resulting from the hurricane (Kousky and Cooke 2009). Another example of tail dependence is when two seemingly unrelated events are actually intertwined. For example, when individuals are quarantined at home due to an infectious disease, the risk of computer network failure increases because more people are telecommuting (Kousky and Cooke 2009).

Economic loss due to disaster in 2011 is the highest on record at \$380 billion. The most costly of the 2011 disasters are prime examples of tail dependence. For example, the earthquake in Japan triggered a massive tsunami and then a nuclear reactor disaster (Mitchell, Mechler, and Harris 2012). Additionally, floods in Thailand resulted in a reduction of Japan's industrial output by 2.6% in November 2011 due to disruptions in Japan's electronics just-in-time supply chains (Mitchell, Mechler, and Harris 2012).

### **Improved Estimations**

Analyses of micro-correlations, fat tail distributions, and tail dependence should help with loss estimation as well as with the development of policies that reduce vulnerability to changes in extreme events. An end result would be that these modeling techniques will ensure that natural disaster insurance does not treat risks as independent when they are actually dependent. Thus, the insurer will be able to better price natural disaster insurance and maintain adequate capital in the face of rapid, interdependent changes in risk (Kousky and Cooke 2009).

The leading catastrophe modeling firms have been working diligently to integrate climate change into their modeling. For example, Munich Re has integrated the physical effects of climate change into hurricane models as well as the economic effect of the surge in demand for construction materials following a hurricane (Mills 2009). A surge in demand for construction materials could lead to higher prices for such materials, resulting in higher than anticipated replacements costs. Willis has been developing high resolution climate modeling to assess changing typhoon risks (McLeod 2007; Mills 2009). AIR Worldwide Corporation has been integrating sea surface temperatures into loss models to better understand tropical cyclone activity (AIR Worldwide Corporation 2008; Mills 2009). RMS is a leading catastrophe modeling firm that provides valuable research and information to the insurance industry. RMS provides climate risk

screening services and is heavily involved in climate change liability research (Mills 2009). Further, RMS is a frequent participant in public policy discussions regarding sustainability (Mills 2009).

## **Promoting Sustainability through Consumer Behavior**

More future-oriented risk modeling will allow insurers to better predict losses and to provide consultation to consumers regarding loss prevention. Improved risk models will allow insurers to price products appropriately and in a manner that will encourage consumer behavior that promotes sustainability. Additionally, new “green” product offerings can be developed that further promote environmental stewardship (Liedtke, Schanz, and Stahel 2009).

A major role that insurers play with regard to consumer behavior is to provide information. Insurers have expertise with risk and they can use this expertise to inform consumers about climate change and sustainable behaviors. Insurance companies can offer consulting services and advice (Liedtke, Schanz, and Stahel 2009). For example, Munich Re has developed a tool entitled “Globe of Natural Hazards” that can be used by consumers to evaluate natural-hazard risks (Liedtke, Schanz, and Stahel 2009). Additionally, Swiss Re has designed an online natural hazard information and mapping system that can be used by consumers to assess natural hazard exposure for any location in the world. (Liedtke, Schanz, and Stahel 2009)

Consumer risk assessment is also a key service provided by insurers. When an insurance product is sold, an individual risk assessment is completed. This assessment can be provided to the consumer so that the consumer can be proactive in limiting risks and mitigating losses. If pricing or the availability of insurance reflects individual loss experience, a consumer will have a financial incentive to engage in behaviors that promote sustainability (Liedtke, Schanz, and Stahel 2009).

To encourage consumers to address sustainability issues, it is recommended that insurers underwrite for profit without regard to the impact of investment returns. If investment returns are used to offset the price of products, then the consumer does not feel the full consequences of their risk and loss potential (Lloyd’s 2006).

Lloyd’s (2006) indicates that there are several climate change issues that might require enhanced pricing. For example, the rise in greenhouse gases over the last few years will require future-oriented modeling that can set better pricing for coverage for erratic weather related damages. Sea temperatures are also estimated to be rising quickly with a resultant increase in severe hurricane activity. Models will need to adapt to future sea temperature changes so that loss

coverage for extreme hurricane activity can be more accurately priced. Refer to Table 1 for additional climate change issues that may require pricing modifications.

**Table 1.** The Effects of Climate Change on the Pricing of Insurance Products

Climate Change Issue	Pricing Considerations
Greenhouse gases are at an all-time high and levels are expected to continue to increase in the future.	Pricing and capital allocation models must be modified to reflect the most current scientific information regarding greenhouse gases and associated impacts on climate change. Additional pricing for legal liability for carbon dioxide emissions may also be needed.
Sea temperatures have risen quickly over the last century, contributing to more severe hurricane activity.	Pricing models must reflect current and estimated future sea temperatures so that hurricane coverage can be more accurately priced. Relying on long-term trends is not adequate for the correct pricing of hurricane coverage.
Sea levels have risen greatly in the last century and the pace of the rise is expected to accelerate in the future.	Construction should be deterred in high flood risk areas and pricing incentives must be offered to policyholders to manage flood related risk.
Land and air temperatures have greatly increased over the last two decades and the changes are expected to accelerate in the future.	As land and air temperatures rise, forest fires and droughts may be more common, resulting in supply chain disruptions. Insurers may need to build in additional pricing for business interruption coverage.
Extreme rain and snow-related events have been on the rise in the last decade and are expected to increase in the future.	Insurers must price more appropriately for older properties that may be less structurally sound. Pricing incentives can be provided to policyholders who reside in areas with stricter and more enforced building codes.
Climate change is now believed to occur much more rapidly than previously thought.	An unstable climate can provoke economic and political instability. Additional pricing may be needed for policies covering political and terrorism risks.

*Source:* Adapted from Lloyd's (2006)

Insurers have developed many new “green” products to encourage sustainable consumer behavior. For example, some insurers now offer “pay as you drive” policies that offer consumers discounts of up to 60% for those who drive less than the average driver (Mills 2009). Fewer miles driven will help the environment by reducing emissions. Other insurers are offering policies with

discounts for low energy usage or low emissions vehicles such as hybrids (Mills 2009). Additionally, insurers are now more frequently participating in carbon markets. Carbon markets include carbon trading, and insurance for credit risks and political risks (Mills 2009). Carbon offset projects are also being encouraged (Mills 2009). Other insurers are granting discounts on Workers Compensation and Environmental policies for customers with sustainable practices and products (Mills 2009). Discounts are also frequently available for buildings that are more energy efficient or have “green” roofs. In addition, insurers often encourage a “greener” rebuild of a structure after a loss (Mills 2009).

### **Encouraging Sustainability through Corporate Governance**

Insurers can improve sustainability through relationships with officers and directors of corporations. Insurance executives frequently serve on the boards of other organizations and they can directly impact investments in “green” technologies and sustainability initiatives (Lloyds 2006).

Additionally, many insurers offer products specifically aimed at environmental liability (Aon 2007). This is especially important given that the U.S. Supreme Court has found that greenhouse gases are “air pollutants” that fall under the regulation of the Environmental Protection Agency (EPA) (Aon 2007). This finding by the U.S. Supreme Court may spawn cases seeking liability for the effects of greenhouse gas emissions. These cases may be brought against nations, corporations, or even corporate executives (Aon 2007).

The impact of possible claims of liability for greenhouse gas emissions can spur corporations and their executives to enact “green” initiatives. Such initiatives could include a reduction of greenhouse gas emissions, a reduction in the consumption of nonrenewable resources, and a reduction in energy usage (Aon 2007). Many resolutions have been adopted by shareholders urging corporations to enact policies that encourage sustainability (Aon 2007).

Marsh, one of the world’s largest insurance brokers, has partnered with Yale University and Ceres to educate corporate executives on climate change and the potential for liability (Mills 2009). Ceres is a national coalition of investors, environmental groups, and other public interest groups working with companies to address sustainability issues (Mills 2009). Marsh asks corporations the following questions to assess their preparedness and/or performance regarding risk associated with climate change (Mills 2009):

1. *To assess management accountability and responsibility:* Does the company allocate responsibility for the management of climate-based risk? If so, how?

2. *To assess corporate governance:* Is there a committee of independent board members addressing climate-related issues?
3. *To assess emissions management and reporting:* What progress has the company made in quantifying, disclosing, and reporting its emissions profile?
4. *To assess regulatory anticipation:* How well has the company planned for future regulatory scenarios?

These questions will help corporate officers and directors identify areas in which the corporation needs to improve with regard to sustainability. Directors and officers will also become aware of issues that they may be held liable for.

Some insurers now offer specific insurance products for directors and officers for protection against climate change liability. For example, in 2008 Zurich added extensions to its directors' and officers' coverage for climate change (Mills 2009). Liberty Mutual has introduced liability insurance for "global warming litigation" that includes protection for officers and directors, employment practices liability, fiduciary responsibility, pollution defense, and ISO crime fidelity (National Underwriter 2008; Mills 2009).

## **Partnering with Policy Makers and Regulators for Sustainability**

### **Promotion of Sustainability**

Insurers must work with policy makers and regulators to promote sustainability. One suggestion for achieving sustainability is to make climate change resilience mandatory in building code standards (Liedtke, Schanz, and Stahel 2009). The reasoning for this suggestion is that after a disaster, rebuilding takes on the nature of a "public good" with the costs shared throughout society (Liedtke, Schanz, and Stahel 2009). Therefore, arguably, it is in the best interest of all that buildings be either originally built, or, if necessary, rebuilt, with climate change resilience in mind. Resilient buildings would prevent some disaster damage and limit the damage that does occur (Liedtke, Schanz, and Stahel 2009).

Further, climate change has been considered to be evidence of "market failure" because those emitting greenhouse gases are not taking into account or held accountable for the harmful nature of their actions on others (Liedtke, Schanz, and Stahel 2009). To correct this failure, it has been suggested that policy makers enact carbon taxes and tradable permits such as cap and trade systems. Carbon taxes and tradable permits are considered efficient "market-based" solutions for controlling climate change (Liedtke, Schanz, and Stahel 2009).

## **Climate Risk Disclosures**

Regulators can also assist with sustainability efforts by encouraging corporate disclosure of climate change related risks. For example, the Securities and Exchange Commission (SEC) now requires that publicly traded organizations, including insurance companies, disclose climate change risk if such changes are material, or expected to be material, to the organization's assessment of risk (SEC 2010). Under the SEC guidelines, companies may have to disclose climate change risk information in the following sections of the annual 10-K report: 1) the description of the business; 2) the summary of legal proceedings; 3) the discussion of risk factors; or 4) the Management Discussion and Analysis of Financial Condition and Results of Operations (MD&A) (SEC 2010). Adequate disclosure of climate change related risks can assist investors in knowing which companies are sustainable and worthy of investment.

Insurers must lead the way with climate risk disclosure as well. While publicly traded companies in the U.S. are required by the SEC to disclose climate change risk if such risk is considered material to its operations, not all insurers are publicly traded (SEC 2010). However, insurance regulators in the U.S. are very interested in promoting climate change risk disclosure by insurers. For example, the U.S. National Association of Insurance Commissioners (NAIC) has implemented a mandatory climate disclosure process (National Association of Insurance Commissioners 2008, 2009; Mills 2009). The NAIC is seeking climate risk disclosures from insurers that answer the following questions (NAIC 2008; Mills 2009):

1. Are insurers adequately including climate risk, and climate risk changes, in their internal risk assessment process?
2. Are insurers adequately informing and incentivizing policyholders as to their risks?
3. Are the insurers' governance structures sufficient to keep their board members informed about climate risk?
4. Are insurers taking adequate steps to mitigate their own risks and to foster policyholder mitigation?

It is expected that regulatory oversight of climate risk and other risks will increase for insurers in the U.S. for some time to come (Mills 2009).

## **Insurance Business Model**

Insurers, policy-makers, and regulators can also work together with respect to the fundamentals of the insurance business model (Liedtke, Schanz, and Stahel 2009).

The insurance business model promotes sustainability through risk-based pricing tools (Liedtke, Schanz, and Stahel 2009). These tools are thought to encourage risk reduction like no other economic tool. However, policy makers and regulators must resist the temptation to cap premiums or to mandate coverage levels (Liedtke, Schanz, and Stahel 2009). These actions distort the natural discipline of economic sanctions for having a high-risk profile (Liedtke, Schanz, and Stahel 2009).

In addition, policy makers and regulators must respect three basic principles that underlie insurability. First, a risk must be quantifiable. Second, the risk must be driven by randomness. Lastly, the insured must have an interest in loss prevention (Liedtke, Schanz, and Stahel 2009). If policy makers and regulators interfere with these basic underwriting principles by capping deductibles and coinsurance, or by opposing contract liability limits and exclusion clauses, some argue that insurers will not be able to effectively function (e.g., Liedtke, Schanz, and Stahel 2009). If insurers cannot effectively function, they may have to withdraw coverage altogether for weather-related disasters and other climate based risks. Without insurance coverage, many companies would not be able to stay in business because they could not self-insure climate change related losses. Thus, it is very important that insurers, policy-makers, and regulators work together to promote the insurability of risk associated with climate change.

## **Insurers Must Model Sustainable Behaviors**

While insurers have great influence over the management of climate change risk in society, they must first model sustainability in order to be credible advisors to customers and other constituents. Many insurers have embraced corporate social responsibility reporting (Mills 2009). Some insurers have been reporting corporate social responsibility since the late 1990s; these insurers include Swiss Re, Storebrand, and Aviva (Mills 2009). Other insurers currently participating in corporate social responsibility reporting include AEGON, AIG, Allianz, Allstate, AXA, Chubb, Fortis, Friends Provident, General Insurance Association of Japan, HBOS, Hyundai, ING, Insurance Australia Group, KBC, Marsh and McLennan, Mitsui Sumitomo, Munich Re, RBS Insurance, RSA, Sompo Japan, Tapiola Instrument Group, and Tokio Marine and Nichido (Mills 2009).

Insurers also have a carbon footprint. They generate greenhouse gases and use energy through business travel, real estate holdings, and occupied office buildings. It is estimated that the insurance industry as a whole collectively emits 12 million tons of carbon dioxide a year (Mills 2009). These emissions are roughly equivalent to those emitted by 2.4 million typical American cars, or four large power plants, or 57,000 train cars of coal (Mills 2009). Thus, the carbon

impact of insurers is not insignificant and should be carefully managed and disclosed.

Some insurers have taken steps to reduce energy usage and carbon dioxide emissions. For example, Kaiser Permanente has cut its costs by \$10 million per year through energy saving strategies (Mills 2009). MetLife has also saved \$7 million dollars on their energy costs through energy saving strategies (Panko 2008; Mills 2009). An impressive success story is Sompo Japan Insurance, where 15,000 employees have been trained for corporate social responsibility, resulting in a 22% reduction in carbon dioxide emissions between 2002 and 2004 (Mills 2009).

Other insurers have been focusing their energy reduction efforts on transportation and data centers. For example, Esurance and State Farm have been key players in providing hybrid vehicles to claims personnel (Mills 2009). MetLife has begun to focus on energy savings in their data centers. Data centers are the most energy intensive segment of most insurers' operations (Mills 2009). Allstate has reduced energy demand by 70% in its data centers due to upgrading to more efficient equipment and reconfiguring server racks for better ventilation (Mills 2009).

Seventeen insurers and reinsurers have achieved carbon neutrality (Mills 2009). Many other insurers are working toward that goal. Carbon neutrality is generally defined as no longer adding to the carbon dioxide and other greenhouses gases that are thought to be contributing to climate change (Ball 2008). Methods for achieving carbon neutrality vary. Some companies have shifted to purchasing renewably generated electricity (Mills 2009). For example, HSBC purchases 40% of its electricity from renewable sources and Swiss Re purchases 32% (Mills 2009). The Royal Bank of Scotland purchases 92.2% of its electricity for its U.K. operations from renewable sources (Royal Bank of Scotland 2008; Mills 2009).

Some insurers have purchased carbon emissions offsets to combat climate change. Carbon offsets represent a reduction of carbon dioxide emissions somewhere else to balance out the emissions that an organization cannot reduce (Carbonfund 2011). Entities such as Carbonfund provide offset projects for a fee (Carbonfund 2011). Other insurers have chosen not to purchase carbon emissions offsets but rather to develop their own projects to offset their organizational carbon dioxide emissions. For example, FP Marine has developed wind energy projects in India to offset its emissions (Mills 2009). Additionally, AIG has embarked on a portfolio of agricultural projects in China and the U.S. to offset 630,000 metric tons of carbon dioxide emissions (Mills 2009).

## **Steps to Manage Risk Associated with Climate Change**

Climate change presents many challenges and opportunities. Insurers can take several steps to get started toward managing risk associated with climate change (Mills 2009). The first step to managing climate change risk is to approach it as an enterprise risk management (ERM) activity. An ERM approach would entail the continuous monitoring of climate change risk to protect all stakeholders. Additionally, climate change risk is managed better if a climate change champion is seated on the board of directors. The champion can make sure that climate change risk is managed across all function in the organization. Insurers should also probably develop a written policy on climate change and name a point-person to lead education efforts. Developing better risk modeling is key for insurers to better manage climate change risk, as is partnering with customers, other businesses, policymakers, and regulators. Table 2 offers a more complete list of steps that insurers can undertake to improve climate change risk management.

## **Best Practices**

Additionally, there are several best practices that can be followed by the insurance industry (Mills 2009). For example, the theory and practice of modeling and climate science can be better implemented in scenario analysis and pricing. Additionally, insurers must work to maintain the insurability of extreme weather events by partnering with policymakers and regulators and encouraging the use of market incentives to change environmentally unsustainable behaviors. Insurers may also need to utilize terms and conditions in policies to encourage risk-minimizing behavior by consumers. Green product offerings also need to be developed by insurers to promote and reward sustainable behaviors. Table 3 provides a more complete listing of best practices that can be adopted by insurers to better manage climate change risk.

## **Conclusion**

The insurance industry has a major impact on society due to its size and influence. Insurers can and should promote sustainable environmental behaviors for the long-run. Insurers can serve as models for sustainable practices and they can partner with customers, other businesses, policy makers, and regulators to promote climate-friendly behaviors. Pricing incentives, risk assessment consulting, consumer education, and the development of “green” product

offerings are but a few tools available to the insurance industry to better manage climate change risk.

**Table 2.** Ten Steps to Manage Risk Associated with Climate Change

<b>Step</b>	<b>Factors to Consider</b>
1. Approach climate change as an enterprise-risk management (ERM) issue.	Organizations should assess controls and monitor risks from all sources for the purpose of increasing the organization's value to its stakeholders (Casualty Actuarial Society 2003).
2. Establish a climate champion from the company's Board.	This step will help to keep the issues on the company's radar and enable efforts across functions such as operations, underwriting, asset management, and governance.
3. Appoint a point-person for climate change issues.	This person can develop the organization's position on climate change, assist with education efforts, and serve as a liaison to the Board. This person can also take the lead on voluntary or mandatory climate reporting and disclosure.
4. Develop a written corporate position on climate change.	This document can evolve with the company's strategy. This document will provide a means of ready communication with external stakeholders.
5. Prepare an annual environmental report.	This report can be used to benchmark performance and track progress toward environmental goals.
6. Model better.	Models must include forward-looking climate factors. Models should be continuously improved.
7. Listen to and support customers.	Customers are embracing climate-friendly technologies and techniques. Insurers need to support customers in their efforts to reduce emissions.
8. Set priorities.	Companies must assess their own company-specific risks, interactions with partners, and customers. Companies must focus on doing a few things well rather than adopting a shotgun approach to start with.
9. Forge partnerships.	Insurers cannot operate in a vacuum. They need to work with customers, other businesses, policy-makers, and regulators toward climate change solutions.
10. Walk the talk.	Insurers must lead by example with regard to sustainable behaviors.

*Source:* Adapted from Mills (2009)

**Table 3.** Best Practices for Managing Risk Associated with Climate Change

Best Practice	Factors to Consider
Improve the theory and practice of modeling and climate science.	Scenario analysis and stress tests should be examined.
Make a concerted effort to maintain the insurability of extreme weather events.	This effort may involve partnering with governments for improved land use planning and building codes.
Utilize terms and conditions to encourage the best decisions by customers.	Risk-minimizing behavior should be rewarded and imprudent decisions should incur additional liabilities.
Develop new products, services, and financing to support customers using climate-friendly technologies and practices.	Sustainability efforts should be recommended that are disaster-resilient.
Investment portfolios should be rebalanced to recognize climate change risks to investments.	Opportunities associated with emerging climate change related industries should also be captured.
Actively participate in emerging markets for carbon-free energy and carbon trading.	This should be done both as an investor and risk manager.
Lead by example, especially with regard to achieving carbon-neutrality.	The carbon footprint of both operations and supply chains should be analyzed and disclosed.
Educate customers.	Customers should be informed about climate change related risks and the opportunities associated with mitigating these risks.
Engage in public policy discussions about climate change.	Insurers should collaborate with policy makers and regulators to encourage sustainable practices.
Strive to maintain insurability for climate-change related catastrophes.	Tighten terms and conditions, withdraw from extremely risky markets, or increase insurance prices only when the aforementioned best practices have not been implemented.

Source: Adapted from Mills (2009)

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