

WILL INSURERS BE BURNED BY THE CLIMATE CHANGE PHENOMENON?

EXECUTIVE SUMMARY

Climate change may be one of the greatest scientific challenges of human history. While there has been significant debate about the causes of this phenomenon, there is no doubt that the Earth's climate is undergoing measurable changes. There are numerous risks associated with climate change that may cost billions of dollars to mitigate and reverse, such as risks to life and property. These risks affect insurance companies providing life and health insurance, as well as protection against natural disasters related to climate change, including forest fires, hurricanes, tornados, floods and storm surges.

Global warming is just beginning to be recognized by many insurers as a significant risk factor for past, current and future insurance policies. Risks of loss from higher temperatures, more severe windstorms, floods, storm surges and other climate change phenomenon are significant and are predicted to be more severe in the future. Sophisticated research and modeling capabilities have provided insurers the tools necessary to predict losses, but these tools are not widely or consistently employed by the insurance industry.

Courts have taken notice of global warming as an issue of concern in recent cases. There are a number of lawsuits currently filed that allege storm damage and bodily injury are caused by climate change resulting from emissions of greenhouse gases. A recent ruling by the U.S. Supreme Court has ordered the EPA to regulate CO₂ emissions as air pollutants. This case will likely lead to additional regulatory involvement for such emissions.

Insurance companies and risk managers are uniquely positioned to be agents of change in providing leadership not only in the area of insuring risks associated with global warming but in leading the industry and the general public to embrace the principles of sustainable development.

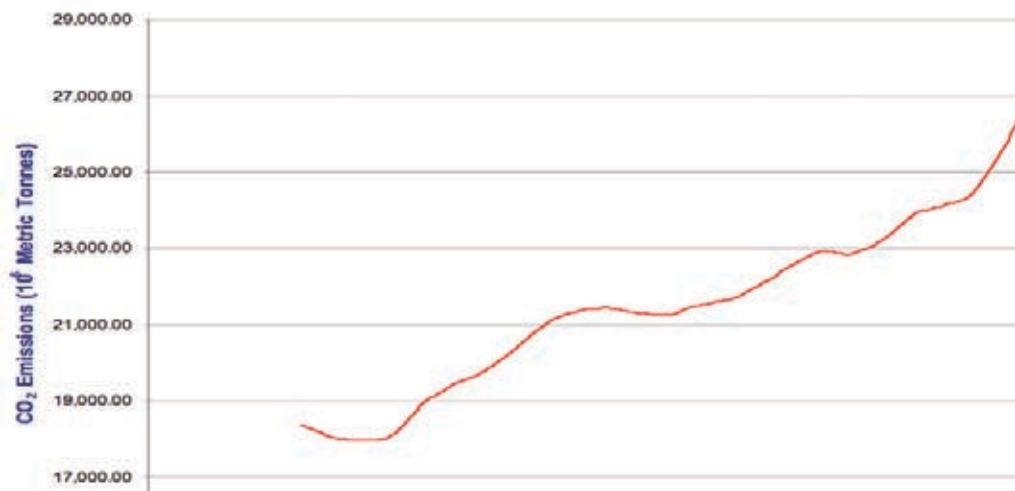
In this report, Aon examines the specific risks associated with climate change, including physical damage and loss of use of assets and bodily injury. The report also explores the rising costs of these risks, and the insurance industry's reaction to global warming, which is focused in four key areas:

- Market-based reactions
- Research and modeling
- Participation in the process of continuous improvement
- Insuring claims arising out of climate change risks

INTRODUCTION

The Earth's climate is undergoing measurable changes. The primary change of concern is global warming, believed to be associated with increasing concentrations of greenhouse gases (GHG) in the atmosphere. This trend is illustrated in Figure 1 below as represented by the global increase in CO₂ emissions for the 25-year period from 1980 through 2005. Global warming is also associated with other changes, including more severe and more frequent tropical storms and hurricanes, more severe forest fires, melting of glaciers and polar sea ice, and rising ocean water levels.

Figure 1 - World Carbon Dioxide Emissions from the Consumption and Flaring of Fossil Fuels¹



There are numerous risks associated with climate change that could cost billions of dollars to mitigate and even more to reverse. Scientists fear that we may also be nearing a balance point beyond which these changes will become irreversible or that the rate of change may accelerate, threatening survival of ecological systems and even human life over a period of a few centuries. There are already immediate risks to life and property that affect insurance companies currently providing life and health insurance, and protection against natural disasters that are related to climate change including more severe and more frequent forest fires, hurricanes, tornados, floods and storm surges.

The insurance industry has kept records that track the historic results of natural disasters. This historical data has now been incorporated into sophisticated models that provide tools to forecast future events and possible loss scenarios. To date, the steps that insurers have taken as a result of substantial increases in insured and uninsured losses have been modest relative to the increasing risks. This may not be the case when the full impact of climate change is better understood.

SPECIFIC RISKS ASSOCIATED WITH CLIMATE CHANGE

Physical damage, loss of use of assets and bodily injury, including death, are risks associated with events related to climate change. Figure 2 below provides a summary of the increase in global natural catastrophes between 1970 and 2006 while Figure 3 shows the costs of global natural catastrophes between 1950 and 2003. The damage, injury and destruction are not evenly distributed around the world or even within the United States. Tropical storms, hurricanes, floods and storm surges are most likely to affect coastal areas.

The resulting damage will depend on a number of factors, including the density of population and concentration of property values within 50 miles of coastal areas. Forest fires are most common in western parts of the United States where the aggregate area destroyed each year has doubled since 1982². Physical damage and loss of life has also increased as a result of construction of homes and commercial structures in areas at higher risk.

Figure 2 - Increase in Global Natural Catastrophes³

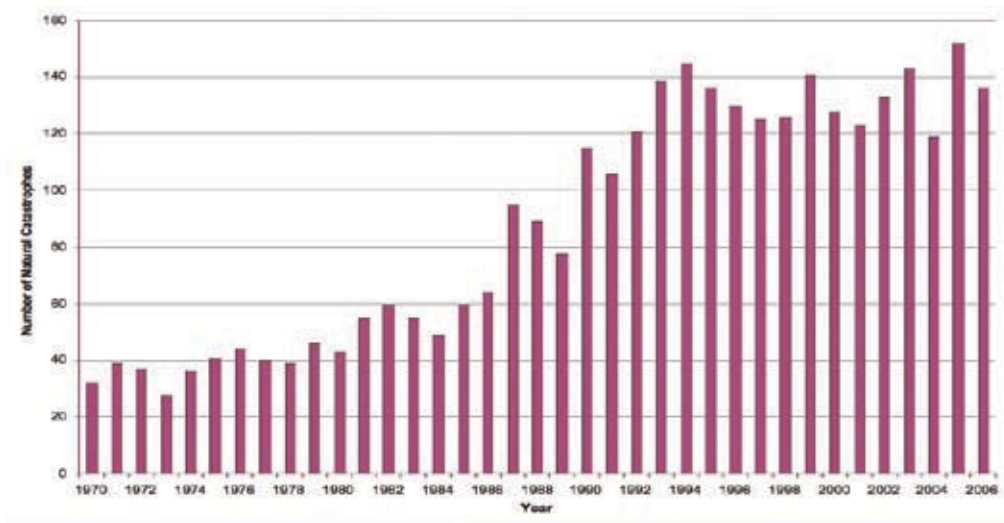
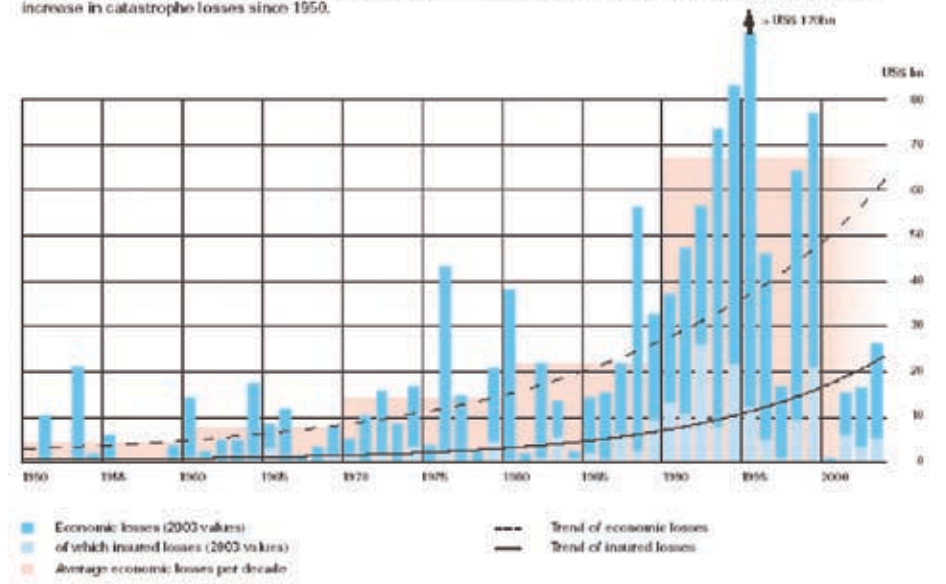


Figure 3 – Costs of Global Natural Catastrophes between 1950 and 2003⁴

The chart presents the economic losses and insured losses – adjusted to present values. The trend curves verify the increase in catastrophe losses since 1950.



There is a possibility that scientific evidence of what causes global warming will reach a point of sophistication that supports allegations of liability for individuals, entities, industries and nations responsible for emissions of GHGs. Emitters that are at risk include electric utilities that operate fossil fuel-fired power plants, oil companies, coal companies, auto manufacturers, transporters, including airlines and other industries that use fossil fuels. Industrialized nations, including the United States, that emit large percentages of total GHGs are also at risk of claims by other countries⁵, including island nations in the Pacific Ocean that are impacted by rising water levels due to climate change.

Cases have already been filed in the United States alleging that damage due to recent hurricanes was caused by global warming related to the operations of oil companies and coal companies⁶. California has filed a claim against automobile manufacturers charging that vehicle emissions have contributed significantly to global warming and harmed the resources, infrastructure and environmental health of the state⁷. There are also claims against U.S. oil companies for pollution damage caused by oil exploration and production operations in other countries⁸. Enforcement of judgments in international tribunals by U.S. courts raises the possibility of similar claims against CO₂ emitters for global warming.

If global warming were treated like asbestos claims or claims for the costs of Superfund cleanups at abandoned landfills, the liability would be retroactive, strict, joint and several. This means the damages would be assessed for the entire period of CO₂ emissions, which for many industries could be decades. A recent U.S. Supreme Court ruling⁹ has found that greenhouse gases are “air pollutants” that are subject to regulation by the Environmental Protection Agency. This case is expected to have broad implications with respect to the future liability of emitters for the impact of the cumulative effect of greenhouse gases in the atmosphere.

In addition to the direct liability of corporations for the damage caused by global warming, there is a risk of liability for corporate executives who do not recognize the importance of environmental issues and fail to make decisions to implement sustainability measures that could reduce GHG emissions, reduce the consumption of nonrenewable resources, cut energy use, and set goals for ecological neutrality. With third-party evaluations of performance available, stakeholders can point to “objective” reviews of a corporation’s sustainability efforts.

Corporations that score well enough to be ranked in formal programs such as the Dow Jones Sustainability Index are less vulnerable to liability than ones that are included in investor’s lists of environmental laggards. There have also been a record number of resolutions introduced by shareholders asking corporations to enact policies that provide protection to the environment¹⁰. In corporations where officers and directors continue to ignore these calls for responsibility, these individuals are opening themselves and their companies to future liability.

The last area of liability related to global warming involves the permanent loss of ecological assets as a result of irreversible changes caused by climate change. This might involve ski resorts in Colorado bringing claims against power generators because there is no longer enough snow to operate on a normal schedule, fishermen filing claims against industrialized nations because species they harvested are no longer present due to warmer ocean temperatures, and Alaskan natives filing claims against automobile manufacturers alleging that global warming due to CO₂ emissions have reduced ice floes making hunting more dangerous.

Beyond these specific examples, there are losses of wetlands that are inundated by rising oceans, draining of underground aquifers by inefficient agricultural activities, incursions of salt water into fresh water resources by tidal actions, loss of species as habitats change or are destroyed and draining of rivers and lakes due to higher temperatures.

Measures of damages for these types of liabilities are enormous. In a study called “Greenhouse Effect and Sea Level Rise: The Cost of Holding Back the Sea¹¹”, a group of scientists estimated that the cost of a one-meter rise in sea levels would be between \$270 and \$475 billion¹² in the United States alone.

Other assessments have estimated the economic damage attributable to air emissions by major pollutants in the United States to be in the range of \$250 billion to \$500 billion annually, even though such pollutants have been regulated for more than 30 years¹³. These estimates are for components of the total costs of damages only in the United States. Extending the losses to other nations would obviously result in much greater potential liability for industries or nations that might be found responsible for material portions of the damage.

A study by the Association of British Insurers published in 2005, estimated the potential impacts of increased CO₂ concentrations on windstorms and flood events. The authors estimated that if the concentration of CO₂ doubled from 480 ppm to 960 ppm (which is predicted by 2080), the wind speeds of hurricanes, windstorms and typhoons could increase by approximately 6% compared to present levels. Under this scenario, estimated average annual damages from hurricanes, windstorms and typhoons could reach \$27,000,000,000 (U.S.) annually, an increase of approximately 65% over today’s average.

The study also estimated the potential impacts of flood events and the expected rise in sea level associated with continued global warming and reported the potential global damages from a one-half meter rise in sea-level could be between \$24,000,000,000 and \$42,000,000,000 (U.S.) per year, and that European flood losses could increase by \$120,000,000,000 – 150,000,000,000 (€).¹⁴

The most comprehensive review of the financial costs of climate change ever conducted was released in London on October 30, 2006. The Stern Review on the Economics of Climate Change was commissioned by the by the British Government and prepared by Sir Nicholas Stern, former Chief Economist of the World Bank. This report calculated that the cost of climate change could be as much as \$9 trillion and warned that there is only a small window (perhaps 10 to 15 years) in which to address the problems or they will become much more expensive to correct and possibly be irreversible.

Components of the economic model that generated this estimate include:

- melting glaciers that would result in increased flood risks and then strong reductions in water supplies
- declining crop yields, especially in Africa, that could leave hundreds of millions without the ability to produce or purchase sufficient food
- increased death rates from both cold and hot temperatures, including malnutrition, heat stress and vector-borne illnesses
- rising water that results in costs to mitigate the consequences or abandon coastal regions and could displace as many as 200 million people
- loss of biodiversity with 15% to 40% of species facing ultimate extinction

The financial and social consequences of global warming are expected to be unevenly distributed with the heaviest burdens falling upon the poorest nations. In order to avoid the disaster predicted by Stern, it is recommended that industrialized nations invest up to 1% of their GNP in technologies that would reduce global emissions of CO₂. If this investment is not made, the future costs could reduce global wealth in the aggregate by as much as 20%.

There are other consequences associated with global warming, including threats to local and national security created by unstable climatic conditions. On August 28, 2005, New Orleans was a prosperous, stable and relatively harmonious city. By the next evening, most of the population had been driven from their homes and lacked access to electricity, food, fresh water and medical services. Within a week, gunmen roamed the streets as law and order broke down, racial and political tensions exploded, and people were killed for basic supplies for survival. This occurred in the richest nation on the face of the earth where we have a stable government and the resources to address nearly any natural disaster.

Imagine the economic and security impacts of extreme climatic events in more vulnerable regions of Africa, South Asia or the Middle East.

China's economy is one of the most vulnerable to changing climate. For example, the government is planning to divert water hundreds of kilometers from the south, where it is currently abundant to the arid regions of the north, which are more populous, in order to create a stable base for the manufacturing regions. This plan will fail if the Himalayan glaciers that feed China's southern rivers continue to melt at the current or an accelerating rate because of rising temperatures. China's wheat yield has already dropped dramatically as a result of the depletion of aquifers used to irrigate crops, necessitating imports where the agricultural operations were previously self sufficient.

EPA REGULATION OF GREENHOUSE GASES

A recent U.S. Supreme Court ruling is likely to change the approach that regulators have taken in the past with respect to emissions of greenhouse gases. In *Massachusetts v. Environmental Protection Agency*,¹⁵ the Court ordered the EPA to comply with its mandate to prescribe standards applicable to the emission of air pollutants from new motor vehicles, and determined that carbon dioxide and other greenhouse gases are physical and chemical substances emitted into ambient air which the EPA is authorized to regulate. While the ruling is narrow, its implications are quite broad.

The EPA argued that its interference would frustrate the efforts of the Department of Transportation, which has prescribed emissions requirements for new vehicles and that its regulations might deter the President's comprehensive approach to reducing greenhouse gas emissions through technological innovation and encouragement of voluntary actions on the part of industry. They also argued that the science linking global warming with concentrations of greenhouse gases in the atmosphere was not convincing. Justice John Paul Stevens, writing for the majority, did not find these arguments persuasive and ruled that the EPA can avoid taking regulatory action with respect to greenhouse gases only if it determines that greenhouse gases do not contribute to climate changes.

While the ruling in this case only applies to new motor vehicles, the same arguments are expected to prevail with respect to the EPA's involvement in regulating automobiles already on the road, other modes of transportation that emit greenhouse gases such as aircraft, ships and trains and to fixed point sources of CO₂ such as power plants and industrial boilers.

Adding regulatory requirements for greenhouse gases is likely to spur interest in alternatives to the internal combustion engine for automobiles and for cleaner sources of power such as combined cycle coal gasification plants and nuclear generators. The fact that greenhouse gases have been declared "pollutants" by the Supreme Court may also have an impact on their status under existing and future insurance policies.

INSURANCE INDUSTRY REACTION TO GLOBAL WARMING

The insurance industry is involved in four types of activities related to climate change/global warming:

1. Market-Based Reactions

Insurers have always reacted to higher loss ratios by raising the rates charged for coverage's where the losses are increasing. In some cases, the correction dictated by the loss ratio involves more than just an increase in the rates. Other reactions can be to limit the coverage that is offered to the insureds in classes that are losing money, to reduce the number of policies issued in geographic regions or to groups of insureds (classes) where losses are most severe, and as an ultimate measure, to withdraw from the market completely.

With respect to claims arising out of climate change risks, Hurricane Andrew in 1992 was a landmark event, especially for the State of Florida. The storm came ashore on the East Coast as a Category 4 and caused more than \$25 billion of damage, of which \$16 billion was insured. In the aftermath of this event, the insurance industry reacted by threatening massive non-renewals and withdrawals from the Florida market. If the legislature and the regulators had not stepped in to prevent the withdrawal of the private market, the blow to the residents and State's economy would have been devastating. On a global basis, the Association of British Insurers have estimated that the annual risk premiums associated with hurricanes, windstorms and typhoons could increase between 15% and 80% by 2080 if CO₂ emissions continue to increase (See Table 1 below).¹⁶

Table 1 - Potential Changes in Estimated Aggregate Risk Premiums for Hurricanes, Typhoons and European Windstorms under Low and High Emissions Scenarios by 2080

Storm Type	Current Estimated Aggregate Risk Premium	Increase in Risk Premium under Low emissions	Increase in Risk Premium under High Emissions
US Hurricanes	\$17,000,000,000	20%	80%
Japanese Typhoons	\$5,000,000,000	20%	80%
European Windstorms	\$7,000,000,000	No Change	15%

Measures that were implemented in Florida after 1992 to keep homeowners and businesses insured included the following:

- a. A moratorium was put in place to prevent insurers from dropping more than 5% of their total policies in the State or more than 10% in any one county.
- b. Rate hikes were approved along with the use of higher deductibles for wind losses. Deductibles of up to 5% of replacement cost values were allowed and they applied to each event so a policyholder could pay more than one deductible during a policy year.
- c. A State-operated insurer was established to write risks that were considered to be uninsurable by commercial underwriters. The rates in the Citizens Property Insurance Corp. were subsidized by taxes charged to all residents of the State.
- d. The State also established a catastrophic windstorm loss facility (a re-insurer) that would pay insurers in the case of large payouts for wind-related losses. The catastrophe fund charged rates that were less than a third of the rates charged by commercial re-insurers, saving insurers more than \$1 billion a year. It was not clear that this saving was passed on to the policyholders.

e. The method of rating for property losses due to hurricanes was changed by the legislature's approval of a more sophisticated model – the selected vendor, Applied Insurance Research, was considered to be closely affiliated with the insurance industry¹⁷. The models they used projected losses by segments of the coastline (referred to as “reaches”) and anticipated damage for various categories of storms. The projections generated by the model are for at least 10,000 years of virtual experience based on hydrological, meteorological, actuarial and other relevant data. The 10,000-year period includes periods of many and very large hurricanes and also periods of time when no landfalls occur.

In the wake of the severe hurricane damage that occurred during 2004 and 2005, it appears that not much has changed in Florida in the post-Andrew period in spite of the measures enacted by the Florida Legislature or approved by insurance regulators to preserve a private insurance market for homeowners and businesses. More than a dozen insurers pulled out of hurricane prone coastal areas by the end of 2005. Companies that remained charged substantially higher rates¹⁸. This has resulted in an insurance availability and affordability crisis for residential, commercial and industrial properties in several parts of the State.

The insurance industry's reaction to the 2004 and 2005 storm seasons was far broader than to change property rates in the State of Florida. The most significant of these changes was to revise the models used for developing windstorm rates, not only in Florida, but in all areas of the country subject to windstorm losses. The modified models incorporate data from the most recent five-year period of losses rather than the data from 1900 through 2005 that was previously used. This will result in increases of more than 40% on average in all Gulf Coast States, Florida and the Southeast, and 25% to 30% in Mid-Atlantic and Northeast coastal areas¹⁹. This is in spite of record profits for Property and Casualty insurers in 2005, even when the Hurricane Katrina losses are included²⁰.

2. Research and Modeling

In the 200-year history of the U.S. insurance industry and the 400-year history of the European industry, there have been natural evolutions in climate and weather events that have been insured by private underwriters. Over recent years, the U.S. insurance industry has become highly skilled in the use of probabilistic catastrophic risk modeling as a tool to predict future losses. This type of modeling has become an integrated risk management tool that has helped insurers digest catastrophic losses, including those associated with the recent storm seasons of 2004 and 2005 that are discussed above.

Insurers have used the results of research and modeling to modify the way they do business in several areas. With a better ability to predict large losses, insurers have limited their exposure to weather-related losses by making changes in the policies they write and in restricting the number of policies issued to insured's in high-risk areas. They have also increased the use of re-insurance to reduce their net losses in the years when claims have run higher than expected. U.S. companies appear to be ahead of their European counterparts in the use of models to understand, analyze and manage their current risks²¹. However, European insurers have begun to use models to proactively assess and manage future risks and trends and incorporate them into long-term risk management strategies.

For U.S. insurers, past events continue to form the basis for catastrophic risk modeling, including the prediction of losses for weather-related risks. However, modeling based on past events ignores the scientific evidence that future events will be significantly different from the past because of climate change. Models will need to be changed and developed to consider new information concerning climate change losses as it becomes available.

Reactions of insurers to new information will have to be more carefully planned than the changes that followed recent hurricane losses. Raising rates in mass markets can be difficult and should not be necessary if the models operate as intended. Long-range planning, the use of re-insurance, stronger building codes and zoning to limit values in high-risk areas can provide a solution that does not require withdrawal from markets and is compatible with the objectives of banks, investors and equity owners of corporate real estate and individual home and business-owners.

3. Participation in the Process of Continuous Improvement

Insurers have become much more involved in public and private affairs that can influence future climate change and the risks associated with it. U.S. and European insurers have been active in the effort to educate the public on the scientific data concerning global warming and the human activities that are contributing to global warming. Starting in the late 1990s, the American Insurance Association began to publish a series of white papers on climate change and its impact on the Property and Casualty insurance business.

The most recent update to this work was completed in 2006 and includes a study on the impact of climate change on insurance accounting²². The Insurance Information Institute has also produced a series of studies on climate change and other sources of catastrophic losses that are available to member insurance companies, brokers and agents, the investment community and the general public.²³

In contrast to the U.S. insurance industry, European insurers have taken a strong interest in climate change over the last decade. Companies such as Swiss Re, Munich Re, Allianz, Storebrand and Aviva have been active in research projects investigating the causes of global warming, publishing papers that update the scientific knowledge related to causes and effects, and working with other insurers, non-governmental organizations and private parties to develop solutions to the problems that climate changes have created.

These insurance companies have also developed overall sustainability strategies that assure they are addressing economic, environmental and social issues that are critical to corporate survival while contributing to the well-being of future generations. They seek to be good corporate citizens and promote these principles among stakeholders, insured accounts and the general public.

4. Insuring Claims Arising Out of Climate Change Risks

Current insurance policies are silent with respect to insuring claims arising out of climate change risks. To the extent that climate changes manifest themselves in natural disasters such as hurricanes, floods and forest fires, existing "All-risk" physical damage policies typically provide coverage for losses arising from such events. While some of these perils may be subject to coverage limitations and/or significant deductibles, losses are generally insured, especially those that could be catastrophic to homeowners and businesses.

The status of general liability claims is less certain. General and excess liability insurance policies written for U.S. accounts include pollution exclusions that may be interpreted as applying to claims alleging liability of the insured for damage caused by climate change. If coverage depends on whether CO₂ is a "pollutant" as that term is used in pollution exclusions, the U.S. Supreme court ruling in *Massachusetts v. Environmental Protection Agency* may weigh in favor of applying the exclusion.

While the case only ruled on the EPA's obligation to regulate emissions from new motor vehicles, it is likely that regulation of greenhouse gases will be broadened by subsequent litigation or changes in the EPA's stance with respect to its mandate to regulate these air emissions.

*California v. General Motors*²⁴ may be a case that is ahead of its time with respect to the greenhouse gas emissions issue. The matter involves a claim by the State of California against six auto makers for contributing to global warming by producing cars and conducting manufacturing operations that released 289 million metric tons of CO₂ each year within the United States, accounting for 30% of the emissions within the State of California. General and excess liability policies which include pollution exclusions may not provide coverage for these claims.

Since the effect of greenhouse gases is cumulative, and the claims for damage would be the result of the releases of CO₂ over the entire period of these companies' operations, general and excess liability policies from earlier periods may provide coverage for the California claims or similar claims that may be brought in other jurisdictions. General liability policies were written without pollution exclusions through the early 1970s, and pollution exclusions from the early 1970s through the mid 1980s typically provided coverage for "sudden and accidental" releases.

The California suit against auto makers does not seek to force the defendants to curtail emissions but seeks damages, including compensation for the State's expenditures for planning, monitoring and infrastructure changes related to global warming. California also seeks a declaration that the defendants are liable for all future damages arising out of the greenhouse gases emitted by their products and operations. While no current estimate of the potential magnitude of these claims is available, it would clearly be in the tens of billions of dollars, even if it is prorated for the defendants' allocated share of global CO₂ emissions.

Pollution exclusions similar to those in general liability policies are also found in Directors & Officers (D&O) Liability forms, raising questions with respect to the coverage provided for global warming cases in current D&O policies. Unlike general liability policies, D&O coverage is only available on claims-made forms, making coverage from earlier periods inapplicable to claims from current events. Corporate executives should not rely on this coverage to provide complete protection against claims arising out of climate change issues.

Environmental Liability insurance is written on forms that provide coverage for claims arising out of pollution conditions. The definition of "Pollution Conditions" is broad enough to encompass CO₂ and other greenhouse gases and most claims allege bodily injury or property damage, both of which should be covered by policies written in the environmental marketplace. Environmental liability policies were obviously not written with claims arising out of climate change in mind and do not include affirmative coverage language for such claims. Coverage forms are expected to evolve as more attention is focused on the growing concern over liability of corporations for global warming.

CONCLUSION

Global warming is just beginning to be recognized by many insurers as a significant risk factor for past, current and future insurance policies. Risks of loss from higher temperatures, more severe windstorms, floods, storm surges and other climate change phenomenon are significant and predicted to be more severe in the future. Sophisticated research and modeling capabilities give insurers the tools necessary to predict losses, but these tools are not widely or consistently used by the insurance industry. Keeping climate change risks insurable is complex and will depend not only on the continued participation of private insurers but also on legislative, regulatory and political action to keep risks at levels that remain insurable.

Insurance companies and risk managers can be agents for change in providing leadership in the area of insuring risks associated with global warming, and in leading industry and the general public to embrace the principles of sustainable development.

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¹ World Carbon Dioxide Emissions from the Consumption and Flaring of Fossil Fuels, Table H.1 CO₂, International Energy Annual 2004, Energy Information Administration, US Department of Energy (July 2006).

² *Climate Change and Insurance: An Agenda for Action in the United States*, Allianz Group and the World Wildlife Fund, Page 17 (October 2006).

³ Natural Catastrophes and Man-made Events 2006 – Number of events 1970-2006, Swiss Re Sigma Chartroom, Swiss Reinsurance Company, Zurich, Switzerland (2007).

⁴ *Natural Catastrophes 2006 - Analyses, Assessments, Positions*, Munich Reinsurance Group, Munich, Germany (2007).

⁵ The United States is the leading emitter of greenhouse gases, producing 25% of the world's CO₂ with only 4% of the world's population.

⁶ *Comer v. Nationwide Mutual Insurance*, 2006 WL 1066645 (S.D. Miss. 2006).

⁷ *California v. General Motors*, No. 3:06CV05755 (N.D. Cal. Filed Sept. 20, 2006).

⁸ ChevronTexaco was sued in the United States by thousands of residents of Ecuador in a U.S. court for damages and bodily injury resulting from its oil production operations in Ecuador from 1964 through 1990. The case has since been moved to the Corte Superior de Justicia in the Amazon town of Lago Agrio, but the court's decision will be enforced by U.S. Second Court of Appeals.

⁹ *Massachusetts v. Environmental Protection Agency*, 127 S.Ct. 1438, 63 ERC 2057, 75 USLW 4129, 20 Fla Weekly Fed.S. 128 (2007).

¹⁰ *U.S. Companies Face Record Number of Global Warming Resolutions*, Ceres List of Climate Watch Companies, Website Posting (February 11, 2007).

¹¹ *Greenhouse Effect and Sea Level Rise: The Cost of Holding Back the Sea*, Titus, J.G., R.A. Park, S.P. Leatherman, J.R. Weggel, M.S. Greene, P.W. Mansel, S. Brown, C. Gaunt, M. Trehan, and G. Yohe, 1991. Coastal Management 19:171-210

¹² Updated for inflation since 1991, this range would be \$394 billion to \$693 billion in 2007 dollars.

¹³ *An Integrated Economic Assessment of U.S. Air Pollution Damage and Abatement Costs*, Nicolas Muller, 2006, Doctoral Dissertation, Yale School of Forestry and Environmental Studies.

¹⁴ *Financial Risk of Climate Change*, Association of British Insurers, London (2005).

¹⁵ 127 S.Ct. 1438, 63 ERC 2057, 75 USLW 4129, 20 Fla Weekly Fed.S. 128 (2007).

¹⁶ *Financial Risk of Climate Change*, Association of British Insurers, London (2005).

¹⁷ *At the Tipping Point: The Homeowner Insurance Mess in Florida and How to Fix It*, J. Doroshov and J. R. Hunter, Americans for Insurance Forum, Page 5 (April 2006).

¹⁸ Rates for homeowners and commercial property policies increased by from 40% to as much as 800%, depending upon the type of property insured, its compliance with building codes and its location.

¹⁹ *At the Tipping Point: The Homeowner Insurance Mess in Florida and How to Fix It*, J. Doroshov and J. R. Hunter, Americans for Insurance Forum, Page 6 (April 2006).

²⁰ Property and Casualty insurers in the United States reported record profits of \$44.8 billion in 2005 and completely paid for the costs of insured losses from Hurricane Katrina by the end of 2006.

²¹ *Climate Change and Insurance: An Agenda for Action in the United States*, Allianz Group and the World Wildlife Fund, Page 28 (October 2006).

²² *Global Climate Change and Extreme Weather: An Explanation of Scientific Uncertainty and the Economics of Insurance*, The American Insurance Association (July 2006).

²³ *Energy Insurance Markets in an Era of Mega-Catastrophes*, July, 2006. A section of this presentation discusses the latest information developed by the IIR concerning climate change and the scientific data concerning causes.

²⁴ *California v. General Motors*, No. 3:06CV05755 (N.D. Cal. Filed Sept. 20, 2006).

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