



Climate change and insurance

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"Climate change is seen as the 21st century's great environmental problem. The phenomenon was first raised a little more than two decades ago. At the outset the debate was concerned exclusively with scientific considerations. The financial sector saw it as unlikely to affect either GDP or corporate results. The insurance industry, for its part, is fundamentally a body that adapts itself to circumstances and protects economic wellbeing. As a consequence, changes in the variables that contribute to risk assessment may have repercussions for the sector, and indeed, for society in general."

History

After years of intense debate, a small section of the scientific community still harbours certain doubts about the veracity of climate change. They contend that there is insufficient historical data to support the claim and that it could be an isolated phenomenon without lasting effects.

In the political field, however, the consensus is that urgent measures are required to contain the associated risks, in view of

evidence of increasing average global temperature in the last thirty years, and rising sea levels.

In this context, the appropriate international bodies have tried to encourage governments and the private sector to take action; national governments have set up special offices to study the matter and its related risks, whereas large corporations and business associations are looking at ways of managing the variables that may affect their operations.

It is not easy, however, to reach international political agreement. There has been reluctance on the part of some countries with high greenhouse gas emissions, such as USA and Russia, to ratify the Kyoto Protocol. In Europe, EU member states are faced with the challenge of applying Directive 87/2003, approved in October 2003, under which rules for trading greenhouse gas emission rights were established.

This article maintains that climate change is important for the insurance sector, against a background where, with the recently approved Directive 2004/35 on Environmental Liability, environmental factors have become more relevant for the industry. The article first sets out the key concepts necessary for understanding the subject, and then gives an analysis of potential risks relating to climate change that could have an effect on the insurance sector. The article concludes with some thoughts on the insurance market and climate risks.

The greenhouse effect and climate change

The greenhouse effect is a natural phenomenon by which the planet's temperature remains at about 30°C, a level essential to sustain life as we know it.

The gases which produce this natural greenhouse effect are:

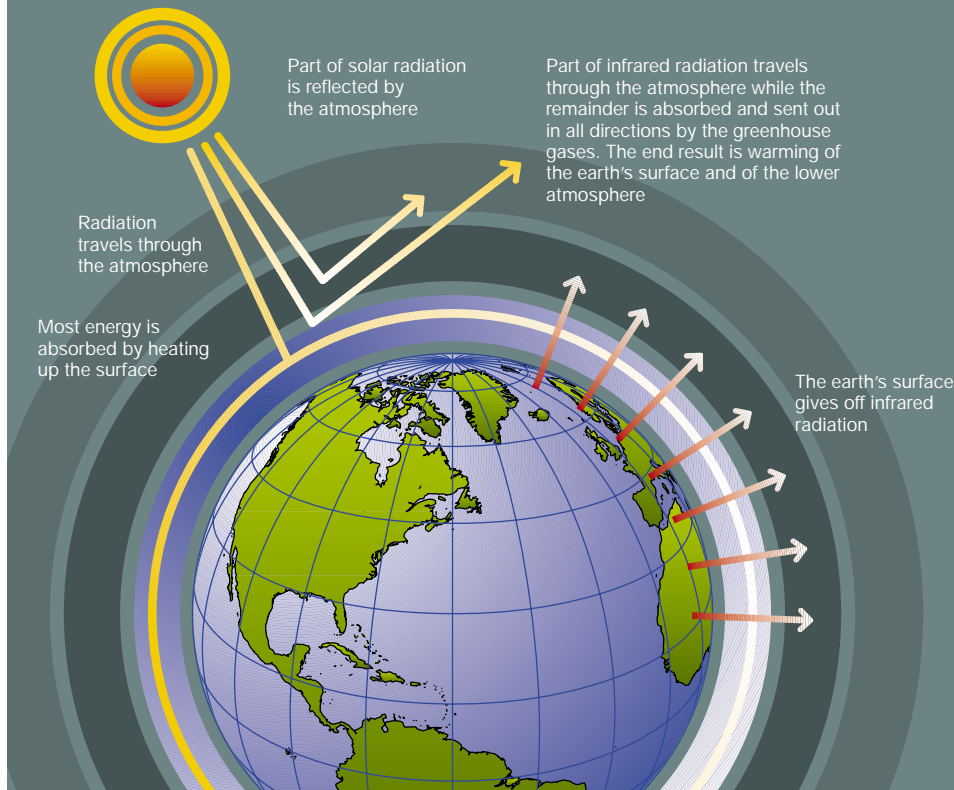
- ▶ water vapour
- ▶ carbon dioxide
- ▶ ozone
- ▶ methane
- ▶ the oxides of nitrogen
- ▶ fluorocarbon compounds, and
- ▶ other industrial gases.

These gases are generated naturally as a result of volcanic eruptions, fires and human activity.

During the last century, concentration of greenhouse gases in the atmosphere increased constantly on account of human activity. At the beginning of the century, the burning of large areas of vegetation to create land for cultivation and, in the latter decades, massive use of fossil fuels such as petroleum, coal and natural gas, were prominent contributory factors.

The increased concentration of these gases boosts the greenhouse effect and drives up the average global temperature, giving rise to what is known as climate change.

THE GREENHOUSE EFFECT what causes it?



The greenhouse effect is caused by the difference in frequency between the energy generated by the sun and that given off by the earth.

The sun's energy, because it emanates from a body with a very high temperature, is made up of high-frequency waves. The energy given off by the earth, however, is composed of low-frequency waves because it comes from a much cooler body.

This energy given off by earth is absorbed by the so-called greenhouse gases, in such a way that the energy is returned more slowly than it is received from the sun. As a consequence energy retention takes place which results in a higher temperature. In normal circumstances however, the amount of energy that reaches the earth is the same as that generated by earth. If it were not for this fact, our planet's temperature would have increased continuously.

Precautionary measures

The existence of climate change has been a source of much controversy in the past decade. The international scientific community warned those responsible for taking policy decisions about such matters as the rising average global temperature of the earth's surface, increased incidence of extreme climatic phenomena, retreating snow lines and glacier shrinkage, and rising sea levels.

The scientific community cannot agree about whether the historical data in our possession enables us to conclude that the change is permanent. The opinion of most, however, is that it is not advisable to wait for further data; measures need to be taken to identify the variables that

indicate the appearance of risks associated with climate change, and to contain the problem.

Risks relating to climate change

Climate change involves:

- ▶ Increase in the average global temperature
- ▶ Rise in sea level
- ▶ Changes in rainfall and wind patterns, and
- ▶ Greater presence of carbon dioxide in the atmosphere.

These factors lead to an increased likelihood that the following natural disasters will occur:

- ▶ Heatwaves
- ▶ Hailstorms
- ▶ Tornadoes
- ▶ Wind/Rain storms
- ▶ Avalanches
- ▶ Flooding of existing coastal areas

All this results in damage to property and insured businesses and changes



in production patterns, such as reduction in fishing activities or variations in the rate of agricultural yields.

The manifestation of these catastrophes, whether individually or collectively, involves a wide range of risks.

Primary sector and related industries

Initially, a rise in temperature and increased availability of water would have a positive effect on agriculture and forestry. This beneficial effect, however, would only be apparent in the northern hemisphere, because in the southern hemisphere the temperature increase could result in water scarcity leading to a fall in crop yields. We would therefore be witnessing a change in yield distribution patterns.

As a result of these catastrophes, associated manufacturing industries, which are normally found close to the raw material production centres, could choose to relocate. The direct effect of this would be to increase raw material transport costs, whereas indirectly it would affect the services sector and the social and demographic characteristics of the areas concerned.

Tourism and leisure

Rising sea levels represent the most serious risk for the tourism and leisure sector, because they involve increasing vulnerability for coastal towns on account of loss of land through erosion or flooding.

The impact of climate change on tourism and leisure will be seen in different ways in accordance with local geological and climatic conditions.

As an example of the relevance of local conditions to Spain and the rest of Europe, we can mention the consequences of an average temperature increase of 1°C which could cause a drop in "sun and sand" tourism in Spain, whereas in northern and central European countries this rise in temperature could increase their tourist appeal.

Human health

Other factors which should not be ignored are the possible effects on health. At the outset, a fall in the number of deaths and illnesses caused by low temperatures could be expected. It could also be, however, that the frequency of epidemics, such as legionnaire's disease, propagated at certain temperatures, or severe heat waves, would increase. Spain has already witnessed this phenomenon and the serious impact it had in the summer of 2003.

Urban areas

In extreme cases, coastal flooding due to rising sea levels could lead to population displacement. In Europe this is an even more serious matter, bearing in mind high demographic density in these areas.

The most serious results will be seen on islands, especially the smaller ones, and in Africa. Islands can lose a significant part of their land area and increase their vulnerability to natural disasters. In the case of Africa, a net rise in sea levels, which would require financing the relocation of its scant infrastructure, would involve an increase in its already large foreign debt.

Some Evidence

- ▶ Global temperature has risen by 0.6° in the past century. Models for forecasting climate behaviour estimate that the global temperature will rise by between 1.4 and 5.8°C by 2100. If this is so, the change will be much greater than the changes seen in the last 10,000 years.
- ▶ Average sea level is expected to rise by between 9 and 88 cm by 2100. At present the rise in sea level has already led to contamination of freshwater resources in Israel and Thailand and in some of the world's most fertile deltas, such as the Yangtze in China and the Mekong in Vietnam.
- ▶ According to the A.M. Best rating agency, global warming could cause disasters costing insurance companies 98,000 million.
- ▶ According to a study prepared by Switzerland's National Research Programme 31 (NFP 31), an increase of 2°C in the next 50 years could mean losses for Switzerland of from CHF 2,300 million (EUR 1.499,65) to CHF 3,200 (EUR 2.086,46 million), equivalent to 1% of GNP.

Ecosystems and biodiversity

An increase in temperature and a rise in sea levels, in addition to changes in rainfall patterns and the presence of carbon dioxide, will have a direct effect on ecosystems, and consequently, on the development and conservation of animal and plant species.

As a primary consequence, should climate change occur, some species would be transferred to higher ground. The least adaptable life forms may die out.

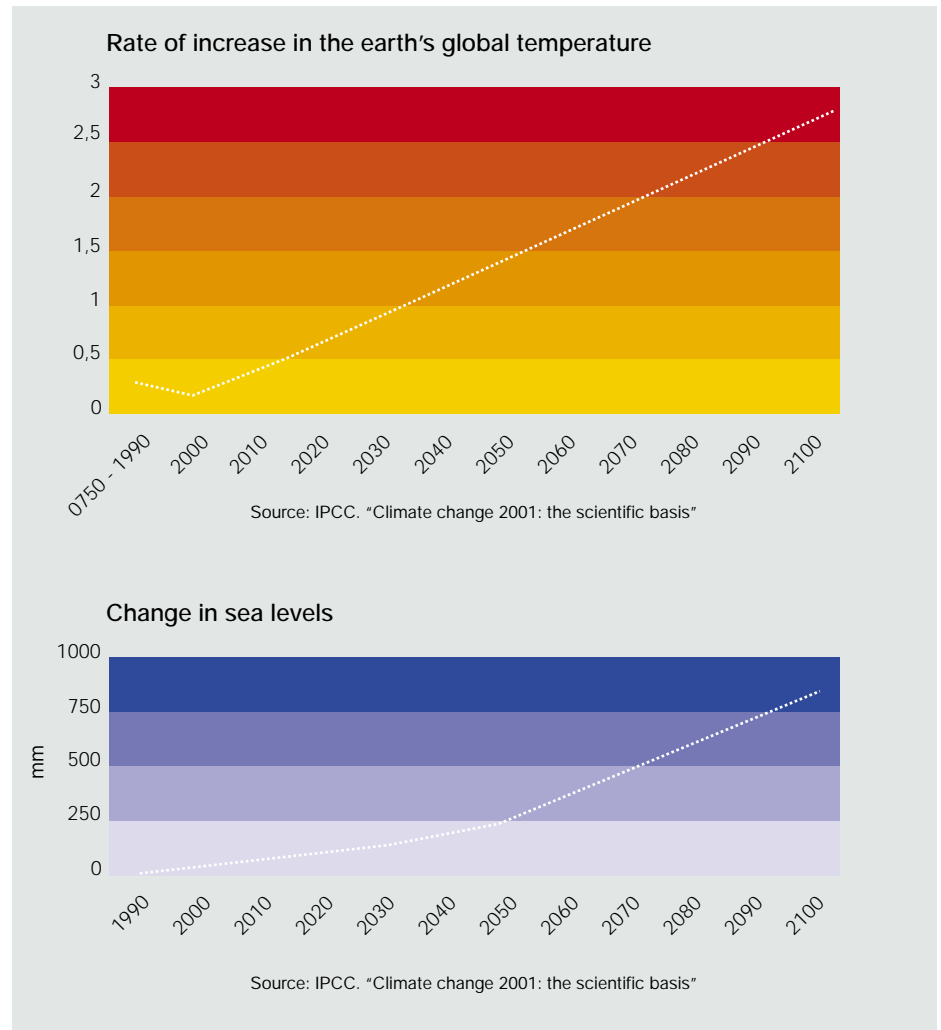
In addition to the effect on natural and cultural assets, the reduction in biodiversity could deprive us of scientific discoveries, provided by, amongst others, the pharmaceutical sector, which could have repercussions on global social welfare.

Risk control guidelines

As the effects are a global problem, risk control depends on the will of the international community to implement effective and corrective precautionary measures.

The Kyoto Protocol represents the framework for governments committed to reducing greenhouse gases. It was signed in the Japanese city in 1997 by 159 countries with the aim that the industrialized nations should reduce, during the 2008-2010 period, greenhouse gas emissions by 5.2%, in relation to 1990 emission levels.

To date, the document has been ratified by 100 countries. Leading countries in terms of their emission of this type of gas, however, such as USA and Russia, have refused ratification.



In USA, it is suggested that what is relevant is not the net quantity of emissions, but the efficiency of those emissions, i.e. the quantity of emissions per unit of GDP. Measured in this way, USA would be the most efficient country, whereas Russia would be the least efficient.

Russia claims that under current conditions, ratification of the Kyoto Protocol would limit its economic growth.

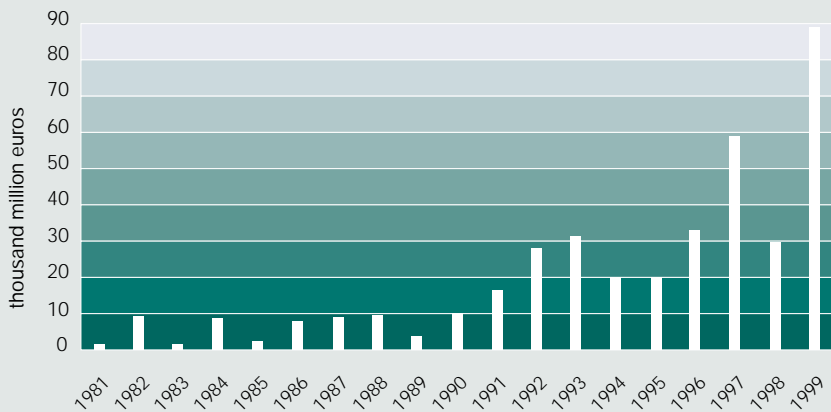
Europe, however, in spite of the differences between member countries and some political disagreements, conveys

the overall impression as an economic unit that it is ready to proceed with its commitments. Amongst other matters, work is now proceeding on Directive 87/2003 relating to trading greenhouse gas emission rights.

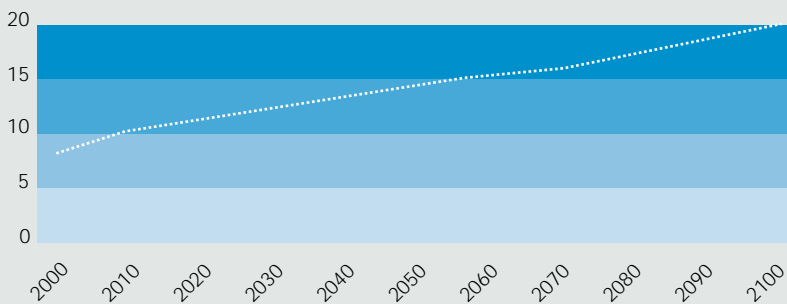
While other European countries have stabilized or begun to reduce their emissions, Spain, according to the European Environmental Agency, is the EU country with the highest increase in emissions since 1990 (23.2%). This figure is even more significant, considering that the target set by the Kyoto Protocol for Spain



Annual losses as a result of climate disasters



Source: US EPA. "Preparing for Global Warming" 2000

Total CO₂ emissions

Source: IPCC. "Climate change 2001: the scientific basis"

was to reduce emissions by 15% of the 1999 level. According to business organizations, in order to comply with this target Spain would be forced to reduce by 40% the emissions per unit of GDP.

The insurance sector and climate risks

These potential effects of climate change affect the economy and at the same time are reflected in the insurance sector.

There is some quantitative evidence of its potential effect. Available data shows that

economic damage caused by climatic events has multiplied 14 times from the 1950s to 2000 (confirm this), in spite of major investments in infrastructure and disaster prevention. The insured portion of these losses increased from an insignificant level to almost EUR 10,000 million.

According to the Intergovernmental Panel of Experts on Climate Change (IPCC), the ratio of world life and property insurance premiums to climate-related losses fell by a factor of three between 1985 and 1999.

In the opinion of IPCC, recent experience

shows that climate-related losses could have an effect on insurance company results. They justify their position because low-probability disasters with high-impact consequences, or frequent multiple catastrophes, are costly.

It should be noted that the sector has not yet decided on the matter and to date there are no indications of any change in the medium-term insurance market, brought about by reserves for potential climate change.

There is no doubt that the sector is an important agent for internalizing the cost of climate change. To the extent that the sector adapts itself to the new situation, it will be possible to spread the risks, and in this way share the cost of climate-related matters between other sectors and throughout society. It seems clear that the insurance sector will be able to withstand the future effects of any potential climate change.

"Should the risks that have been identified in connection with climate change materialize, from a theoretical viewpoint it may be that the sector will be able to tackle the situation by increasing premiums, restricting its cover on certain risks or reclassifying them as uninsurable."

The Insurance Industry Initiative for the Environment, developed by the insurance and banking sectors in association with UNEP (United Nations Environmental Programme) in 2000, stands out amongst the sectorial initiatives in the field of climate change.

Examples of risks applicable to the insurance sector

Factors associated with problem	Insurance risk	EXAMPLES OF RISKS APPLICABLE TO THE INSURANCE SECTOR				
		Examples of risks	Affected sectors	Risk assessment	Insurance branches affected	Possibility of risk control
• Increase of average global temperature	Heat wave	Reduction in fishing catch	Fishing and related industries, urban areas	↑↑↑	Loss of profits, business interruption	☹
	Flooding	Damage to coastal industrial infrastructure	Industry, urban areas, public sector	↑↑	Property, loss of profits, business interruption	☹
	Hailstones	Fall in tourism	Tourism, urban areas	↑	Loss of profits, business interruption	☹
• Rise in sea levels (flooding in coastal areas)	Tornado	Urban displacement	Urban areas	↑	Property	☹
	Tropical storm	Island disappearance	Tourism, industry, urban areas	↑↑	Loss of profits, property, life, health	☹
	Blizzard	Increase in frequency and severity of natural disasters (tsunami, heat waves, flooding, etc)	Urban areas, industry, services, public sector	↑↑↑	Property, life, health, motor, loss of profits, business interruption	☹
• Changes in rainfall patterns	Avalanche	Deterioration of aquifers	Industry, agriculture urban areas	↑↑↑	Loss of profits, business interruption, health	☹
	Coastal flooding	Increase in forest fires	Industry, silviculture urban areas	↑↑	Loss of profits, business interruption	☹
	Disease	Change in ecosystems	Industry, urban areas, fishing, agriculture	↑↑	Loss of profits, business interruption, property	☹
• Increased carbon dioxide presence	Property damage	Propagation of pests	Agriculture, silviculture, urban areas	↑↑	Life, loss of profits, business interruption, sickness	☹
	Business interruption	Species extinction	Industry	↑	Sickness, life, business interruption	☹
	Loss of company profits	Transmission of diseases	Urban areas	↑↑	Sickness, life	☹
• Change in wind patterns	Loss of company profits	Increase in respiratory diseases	Urban areas	↑↑	Sickness, life	☹
		Regional changes in agricultural yields	Agriculture, stockbreeding, silviculture, urban areas	↑↑	Loss of profits	☹

<p>Risk assessment:</p> <p>↑ low risk</p> <p>↑↑ medium risk</p> <p>↑↑↑ high risk</p>	<p>Assessment of ability to control:</p> <p>☹ Difficulty in taking preventative measures. Scarce resources are being allocated to control the risk.</p> <p>☹ Possibility of taking preventative measures. Resources are being allocated to control the risk</p> <p>☺ Easy to take preventative measures. The international community is allocating ample resources to contain the risk.</p>
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Note: The risk is assessed on a combined basis in relation to likelihood/frequency of occurrence, potential number of victims and estimated financial cost.

“The insurance sector has not yet decided on climate change and to date there are no indications of any change in the medium term.”

MAPFRE is one of the bodies that forms part of this initiative, in which more than 20 countries are represented. It is a platform to discuss major environmental

risks, including climate change, and to facilitate an interchange of knowledge and experience on the subject ■