The Actuarial Profession
making financial sense of the future

BRIEFING NOTE

Climate Change

This paper has been prepared by the General Insurance Communications Committee of the UK Actuarial Profession.

It is now generally agreed by climate scientists that man-made climate change has been and is occurring; this is a view also held strongly by the UK government. In their assessment report in 2007, the Intergovernmental Panel on Climate Change (IPCC), which represents a scientific consensus on the subject, stated that evidence of global warming is now unequivocal. There is also a gathering consensus within the insurance industry that this is a risk to be managed actively.

The world's climate is in a continual state of flux, with long-term cycles and trends, short-term cycles and trends plus random events – accordingly, it is not easy to distinguish between the different elements which give rise to changes in the weather. Long-term cycles and trends are effects that persist over centuries and millennia, whereas short-term cycles and trends manifest themselves over a number of years or decades, such as the El Nino effect. In the context of this note, we define climate change to be of a long-term nature and, more specifically at the present time, a trend towards global warming. Although the effects of climate change are expected to last for a long time this does not mean that the effects will take a long time to emerge. Some effects may happen very suddenly; indeed history tells us that climate change tends to happen in jumps. This is crucial for general insurers who are exposed to catastrophic extremes.

There is a considerable body of historic data with which to compare over preceding centuries and there is now incontrovertible evidence of global warming taking place at least part of which is associated with a rise in carbon dioxide and other greenhouse gases. For example recent analyses of ice cores over the last 650,000 years show carbon dioxide levels were lower over this entire period than recently. In addition, there is geological data going back millions of years which suggest carbon dioxide levels are much higher now. It is virtually certain that the majority of the change is the result of burning of fossil fuels by mankind.

The most obvious of the indicators which may be associated with global warming are:

- Temperatures have risen suddenly; the 1990s was the warmest decade for 1000 years, the rise in temperatures is the fastest for 10,000 years
- Glaciers and other ice masses all around the world are shrinking and this has led to a rise in sea levels which has a knock on impact on storm surge losses.
- Increased concentrations of carbon dioxide (the main greenhouse-effect gas) in the upper atmosphere. Recently published statistics show that the concentration has been monotonically increasing from 316 parts per million (ppm) in 1960 to 381ppm in 2005. The proxy data mentioned above indicate that the recent levels are unprecedented in recent Earth history.

- A high level of North American hurricane activity over the last few years. 2005 was the most extreme season in recorded history and included the lowest pressure hurricane ever recorded. There are significant 40-80 year natural cycles in hurricane activity; but many believe there is a clear climate change signal as well. Economic damage caused by recent hurricanes is magnified by the level of development of the coastal regions of the southern United States; this underlines how financially significant a more active hurricane period could be.

Many organisations, for example Munich Re, Swiss Re, the Association of British Insurers and HM Treasury, have estimated that the cost of climate-related events in the medium-term could be significant, although the magnitude is uncertain. The IPCC report and the UK government's Stern Review both suggest climate change impacts which are:

- Potentially very significant
- Will take place over a long period
- Subject to a high level of uncertainty

Clearly, this has close parallels with the training of actuaries, and the profession could therefore play a significant role in making financial sense of the future changes in climate. In addition, they could support the following suggested actions:

- The need for a post-Kyoto framework – the first hesitating step towards this was recently taken at the United Nations Climate Change Conference in Bali
- An end to the global dependency on carbon-dioxide-producing fuels
- An increased awareness of the factors affecting climate change
- An extension of the economic assessment of the true cost of global warming and the cost-benefit trade-off of mitigation and adaptation strategies, as commenced in the Stern report

In addition, there are a number of other key actions related to climate change which need to take place, in areas with a major general insurance actuarial involvement:

- Updating ICA models (both the catastrophe model inputs and the loss distributions); the catastrophe modelling companies have now got round to doing this and are finding a significant increase in the severity of major hurricanes, although it is less clear whether there is any associated change in frequency; they also find that claims inflation is related to storm size which has a significant effect on capital requirements. Actuaries should ensure that these new models are used in their ICA work; or make appropriate adjustments
- Updating pricing models – these should allow for updated data and also take into account scientific forecasts for the coming season, which are highly predictive, and should help to avoid anti-selection
- Insurer strategists should be considering the impact of climate change - there may be uninsurable regions in future and policy wordings may need to change
- Developing new products, and carrying out other work to assist insurers with adaptation and mitigation strategies.