

**“THE IMPACT OF CLIMATE CHANGE ON NON-LIFE INSURANCE”
CLIMATE CHANGE WORKING PARTY – GIRO 2007**

WORKING PARTY MEMBERS

Dr Neil Bruce
Catherine Cernesson
Dr Richenda Connell
Graham Fulcher
Lyndsey Gardner
Daniel Hawellek
De Celine Herweijer
Dr Steve Jewson
Laura Masi
Trevor Maynard (Chair)
Vinay Mistry
David Rochester
Nick Silver
Professor Lenny Smith
Dr Dave Stainforth

The views expressed in this paper are a collective view from the members of the working party and do not necessarily reflect the views of either our respective employers or the UK actuarial Profession.

INTRODUCTION

The Climate Change Working Party's main work can be viewed on our Wiki site.

<http://climatechange.pbwiki.com>

We would encourage interested readers to view that site. Climate Change is a complex and rapidly developing area and the Wiki site enables us both to reference large amounts of material including links to other sites and papers relevant to the effect of Climate Change on insurers, and to ensure that our site reflects the latest research and developments.

This paper is a summary on the topic of "The Implications of Climate Change for Non-Life Insurers" with simple summaries of the main topics.

The Working Party consists of several actuaries but also a number of scientists involved in either academic work or in business relating to insurance or Climate Change. The individual actuaries on the Working Party as well as the work of the Party as a whole have benefited significantly from the exposure to a variety of expert and informed opinions and views.

In our experience academics welcome the opportunity to take part in such collaborations and in particular to use the opportunity to understand the practical uses to which their work can be put. We would encourage other GIRO Working Parties to invite academics onto their groups. Organisations such as the Quantitative Finance Network or the Lighthill Risk Network may be able to help to set up such relationships.

The Wiki gives more details on the members of and objectives of the Working Party.

OVERVIEW OF CLIMATE CHANGE

<http://climatechange.pbwiki.com/KeyFacts>

Climate Change is a broad term that includes past and future changes in the weather experienced on Earth. It does not specifically refer to man-made issues, nor does it necessarily only involve heating effects. The term “Anthropogenic Global Warming” (AGW) is a more specific one referring to the effect of human activity in warming the climate and is used to describe the current scientific consensus which can be summarised as:

- The Earth’s average near-surface atmospheric temperature rose in the 20th Century
- Most of the observed warming is attributable to human activities
- The primary causes of the human-induced component of the warming is the increased concentrations of carbon dioxide and other gases due to the burning of fossil fuels, land clearing and agricultural practices
- These gases increase temperature by the process known as the enhanced greenhouse effect
- The current levels of greenhouse gases exceed any levels observable from geological records over the last million years (at least)
- The result of the above is causing already measurable climate impacts
- Without actions of mitigation, greenhouse gas levels will continue to rise and projections for the 21st Century are for continuing warming and for very significant climate impacts

Our wiki site contains links to a wide variety of sources on Climate Change including:

- Technical reports and in particular: Sir Nicholas Stern’s 2006 report to the UK Prime Minister and the Chancellor of the Exchequer on the “Economics of Climate Change” (the Stern Review) and the 2007 Intergovernmental Panel on Climate Change “Fourth Assessment Report” (IPCC AR4)
- A wide range of papers concentrating on insurance and Climate Change
- Reviews of popular science books which make an excellent introduction to the topic.

CLIMATE CHANGE AND NON-LIFE INSURERS

The Threat of Climate Change

IPCC AR4 showed that future Climate Change is already affecting and will over time significantly affect the incidence of natural conditions such as: tropical cyclones; winter storms; wild-fires; hail storms; lightning strikes; droughts and floods. All of these can be expected to impact significantly on property claims to non-life insurers. In addition the huge economic and social impact of Climate Change will inevitably lead to accusations, claims and lawsuits over attribution of causation which will impact on liability claims. Non-life insurers can expect Climate Change to impact on all lines of their business.

The Stern Review concluded that Climate Change will have a very significant (in terms of both magnitude and time) effect on future GDP and that appropriate action could mitigate and redistribute over time (but not eliminate) this risk. It is unclear that global asset values or property prices have reflected the economic impacts of Climate Change yet, so that there is a significant risk to the assets held by non-life insurers.

Even if a company is initially unaffected by increased claims, Regulators and Rating Agencies will require non-life insurers to make allowance in their increasingly sophisticated capital assessments for the scientific consensus that extreme climate related events are and will continue to become more common due to the impact of Climate Change.

Finally the reputation of our industry may suffer. Recent events in Florida have shown the issues that insurers companies face as they increase insurance prices to economic levels, while the recent UK Flooding has highlighted the sensitivity of insurers choosing to withdraw cover. As actuaries we believe that non-life insurance is a one year business where we can review risk, alter prices and re-write terms and conditions; however our customers, (particularly in personal lines) and politically motivated regulators may have different expectations.

To summarise: Non-life insurers are therefore faced with a “quadruple whammy”:

- Increased liabilities across a range of lines of business;
- Falling asset values;
- Increased capital requirements
- Reputational risk.

Opportunities of Climate Change

Climate Change will change the risks faced by the customers of non-life insurance companies, which gives an opportunity to our industry as our core competency and product offering is the management of risk.

Non-life insurers have a key role to play in the two key (positive) responses to Climate Change:

- **Mitigation:** which involves attempts to slow or reverse the process of Climate Change - normally by lowering the level of greenhouse gases in the atmosphere
- **Adaptation:** which involves development of ways to reduce vulnerability, particularly human vulnerability, to the impact of Climate Change

Climate Change therefore offers huge opportunities and threats to non-life Insurers.

CLIMATE CHANGE AND ACTUARIES

The effect of Climate Change on insurance companies is: likely to have a significant financial impact on assets and liabilities over a long-term; still very uncertain; and complex to evaluate, particularly as the potential impact on extremes of risk is very large.

Non-life insurance actuaries - members of a profession whose self-declared role is to “Make Financial Sense of the Future” are well placed professionals to help their employers or clients non-life insurance companies evaluate the complex future financial risks of Climate Change.

The scientific modelling of Climate Change involves: the complex assessment and compilation of reliable data; detailed assumptions about the past, present and future; and the building of complex predictive models.

These are all issues we are very familiar with from our own work. Although it is not the role of actuaries to second guess the opinions of more qualified professionals, actuaries are surely some of the best placed professionals within the non-life insurance industry to work collaboratively with other scientists to help our industry interpret the scientific output and make appropriate decisions.

As an example of an actuarial perspective on the uncertainty in Climate Change assessment:

The distribution of the likely future effects of Climate Change is, like many of our claims distributions in non-life insurance, a highly skewed, fat-tailed distribution. The main reason is the effect of feedbacks. Although feedback effects can be both positive and negative, current scientific investigations have identified that, in Climate Change, at least initially, positive feedbacks dominate over negative feedbacks. For example melting of ice caps reduces the albedo of the surface - the extent to which it reflects light - and hence increases the heat absorption of the surface leading to further melting. The very rapid, large swings in past global climate between very different stable states gives empirical confirmation of the theoretical view.

The IPCC role is to “assess on a comprehensive, objective, open and transparent basis the best available scientific, technical and socio-economic information on Climate Change from around the world [...] based on information contained in peer-reviewed literature [...] drawing on the work of hundreds of experts from all regions of the world [...] seek[ing] to ensure a balanced reporting of existing viewpoints”.

Even once such a “balanced” report is produced it is subject to three stages of review: expert review of the first draft of the report; Government/expert review of the second draft and draft “Summary for Policymakers” and finally government review of the revised draft “Summary for Policymakers”. At all stages this is primarily a consensus approach, meaning that all parties have to agree to the final output.

The IPCC’s views therefore can be seen as, *at best*, a modal or median view of the possible distribution of scientific views and, if anything, the political dimension and horse-trading required to achieve agreement may reduce the consensus to well below even a median/mode.

Given the highly skewed nature of the distribution an actuary could conclude therefore that the IPCC’s conclusions may be significantly below a mean view.

A standard actuarial “analysis of emerging experience” would seem to confirm this as the IPCC’s past predictions of the future have been shown to be over-optimistic and actual Climate Change has tended to occur quicker than predicted.

This actuarial interpretation of the uncertainty in the IPCC forecasts is in contrast to the view commonly portrayed by sceptics which implies that the IPCC’s conclusions are at the extreme end of a range of valid opinions.

CLIMATE CHANGE AND STRATEGY

<http://climatechange.pbwiki.com/GiRo07StrategY>

Any non-life insurance company considering future strategy needs to consider the impacts of Climate Change in detail.

Based on the above, a standard "SWOT" analysis would identify Climate Change as both a very real Opportunity and a very major Threat to non-life insurers.

Some non-life insurance actuaries may hold one or both of the views that:

- Notwithstanding the Working Party's actuarial perspective on the IPCC process as set out above, the ultimate impact of Climate Change on non-life insurance companies is uncertain and may be much less than the current scientific consensus
- Even if the forecast impacts do occur they are many years off and non-life insurance actuaries managing one year business (unlike life, pensions or investment actuaries) have many years to take the required action

We have already explained that the later view may conflict with the views of regulators and customers.

More importantly Climate Change is having an environmental impact **today**, not just the measurable climate related environmental impacts that the IPCC AR4 identified, but the very real and profound impact it is having on the external macro-environment within which non-life insurance companies operate. Non-life insurance companies need to factor this into their strategy now.

John Browne famously moving BP away from its contrarian viewpoint to a "Beyond Petroleum" strategy in 1996-7 said in a widely reported speech in 1997 (following the IPCC's 2nd assessment report in 1996).

*"There's a lot of noise in the data. It is hard to isolate cause and effect. But there is now an effective consensus among the world's leading scientists and serious and well-informed people outside the scientific community that there is a discernible human influence on the climate and a link between the concentration of carbon dioxide and the increase in temperature. The prediction of the IPCC is that over the next century temperatures might rise by a further 1 to 3.5 degrees centigrade and that sea levels might rise by between 15 and 95 centimetres. Those are wide margins of error, but it would be unwise and potentially dangerous to ignore the mounting concern. **The time to consider the policy dimensions of Climate Change is not when the link between greenhouse gases and Climate Change is conclusively proven, but when the possibility cannot be discounted and is taken seriously by the society of which we are part.**"*

A common tool for strategy evaluation is the: PEST/PESTL/STEEPLE/STEEPLED model which involves setting a company's strategy in the context of the: Socio-cultural; Technological; Economic; Environmental; Political; Legal; Ethics; Demographic situation.

Our Wiki site includes a detailed STEELED analysis showing how the impact of Climate Change on each of these areas of a non-life insurance company's strategic environment has reached or has passed a "Tipping Point".

CLIMATE CHANGE – DEALING WITH THE SCEPTICS VIEWPOINT

<http://climatechange.pbwiki.com/GiRo07RefuteSkeptics>

One of the difficulties in the Climate Change debate has been the tendency for the global media (used to two-sided adversarial politics) to feel required to present a “balanced” viewpoint by countering any reports or representatives of the IPCC process (which as we have seen is already a strong, arguably optimistic, scientific consensus) by giving equal representation to the minority of scientists with a contrarian viewpoint. As a result a number of these contrarian views have taken on a currency of their own and become part of popular knowledge in the area. There are **not** two sides to every argument. In some cases the global press has acted very irresponsibly. Of course we must have freedom of speech; but that does not mean that we have to portray a lively debate between equals when there isn't one. The global scientific consensus is that climate change is happening, it is manmade, it is accelerating, it is very dangerous and it rapidly needs abating.

The Penrose report raised the cultural issue that (quoting from the summary in Section 1.5. of the Morris report) actuaries “in some in some circumstances had tended to operate beyond the scope of their discipline, by for example making decisions which turned on matters of law”. Actuaries need to ensure they understand the current state of expert scientific consensus on Climate Change rather than acting as uninformed amateur scientists.

Some sceptical arguments can be argued from an actuarial standpoint.

Data issues - the temperature readings used to back up Climate Change are incorrect

The "hockey stick" graph showing an exponential rise in temperature since 1990 has been the focus of much debate regarding the accuracy and interpretation of the data underlying it. Effects such as urbanisation, "adjustments" to the data and over-fitting of models to the available data have clouded the underlying issues. The original data has been reanalysed many times, and most of the results lie within the original error bars, with all recalculations showing that the last part of the 20th century has been the warmest over the last 1000 years.

As Non-life insurance actuaries we would rarely find such data that has been so extensively reanalysed, corrected and cross checked against multiple sources.

Modelling issues – the techniques are not reliable, and systems are too complex

The climate is indeed complex, and influenced by many factors in ways that are not well defined, however these models are back-tested to see how well they can predict past Climate Change. In addition it is worth making the distinction between weather and climate. Climate refers to the average conditions over wide areas, and has timescales of around 30 years. It is this mean position that the models are attempting to analyse, and hence localised events and fluctuations, relating to more chaotic elements, become less relevant.

Actuarial modelling is not dissimilar to this scenario, whereby we assess the mean position, and can provide indications of uncertainty within such estimates. Simply because it is difficult to model a particular scenario does not mean that the analysis performed is irrelevant.

Other issues

There are a number of other common sceptical arguments, for example:

- “Human CO2 emissions are too small to matter”;
- “Antarctica, the oceans and the lower atmosphere are cooling”;
- “Its just natural cycles”;
- “No single event is “due” to climate change”;
- “We’ll be richer in the future, lets just wait”

These arguments need to be set against the observed scientific data and consensus. In our Wiki site we give links to a number of objective sources which set out the evidence for and (mainly) against each of these arguments including links to the latest peer-reviewed scientific research. For example:

“Is it just solar activity”: No it isn’t! The sun’s activity has actually decreased marginally since the 1980s so we’d expect that to have a cooling effect; as we all know temperatures have risen. Graphs used by sceptics to make their point stop at the end of the 1980s because prior to this there was an upward trend. There are lies, damn lies, statistics and then work done by climate change sceptics.

CLIMATE CHANGE – THE LATEST SCIENCE

<http://climatechange.pbwiki.com/GiRo07LatestScience>

As we discussed in the introduction, Climate Change is a rapidly developing area of scientific investigation. One of our aims on the Wiki site will be to link to the latest areas of research which could impact on non-life insurance companies.

In contrast to the sceptics viewpoints, much of the latest research highlights the issue described above, which is that the IPCC consensus process may underestimate the extreme/tail risk (which is often the part of the risk curve of most relevance to non-life insurers) which in turn implies that policy makers are making decisions (for example on disaster recovery plans or on mitigation requirement) which underestimate the probability of catastrophes.

As some examples, some of which have involved members of our Working Party:

Ice sheets are melting fast

<http://www.lloyds.com/360>

Jim Hanson and his team at NASA GIS have suggested that “albedo flipping” and non-linear feedbacks make a collapse of the Greenland and West Antarctica Ice sheets more plausible on shorter timescales than the IPCC AR4 suggests; this brings with it the need to consider the risk that by 2100 sea levels might have risen by several meters. This theme was highlighted in an article in the 2007 report by Lloyd’s on “Rapid Climate Change” (which was edited by Trevor Maynard - the Chair of our Working Party).

Models miss extremes

http://www.actuaries.org.uk/files/pdf/library/harrison_climatechange.pdf

The Environmental Research Group, chaired by Nick Silver (a member of our Working Party), commissioned a piece of work by Dr Stephen Harrison which shows that climate models (like actuarial ones) have theoretical limitations and parameter uncertainty. The current models are a great achievement of modern reductionist science but they do not model certain “emergent” features which are fundamental to how the climate works; for instance the timing and structure of El Nino events. As such they may underestimate the risk of extreme behaviour, particularly at a regional level.

Major hurricanes are more likely to make landfall

<http://pubs.giss.nasa.gov/authors/thall.html>

Recent work by Kerry Emanuel suggests that hurricanes will continue to grow in average strength. His model uses General Circulation Models to simulate storms from fundamental physics. The model can therefore generate many pseudo years of storms and is not subject to the data shortages that plague statistical approaches. The models predict an increase in frequency in the North Atlantic, but notably also an increase in frequency of landfalls. The result for frequency is in line with recent breakthroughs in statistical modelling; for example the work of Tim Hall (NASA) and Steve Jewson (RMS) – a member of our Working Party; they have built a storm track model from the historical record that can produce pseudo storms. They conclude that: frequency increases in the North Atlantic; Florida and the Gulf of Mexico appear to bear the brunt of climate change impacts; there is a significant increase in a double event probability; and storm track appear to be different in a warmer world.

Economic losses are multiplied for large scale catastrophes

Work by Stephan Hallegate has used Kerry Emanuel's model, and Pielke/Landsea's renormalized loss data to investigate the economic impacts of major catastrophes. He finds that a 10% increase in Potential Destructiveness increases losses by 54% a highly non linear result. For Small catastrophes the economic responses act to offset losses (so the overall economic impact is dampened). This is because people have savings that they ordinarily don't spend, but a small catastrophe stimulates economic activity. For large catastrophes the economic losses act to magnify overall losses. This is because people's spare funds are used up very quickly and then negative impacts set in (such as crime, lost productivity, lost tax revenue, loss of jobs etc). The impact of social feedbacks is a growing field and it appears can amplify losses.

CLIMATE CHANGE – IMPACT ON LIABILITIES

Our Wiki contains links to a number of very detailed papers considering the impact of Climate Change across a range of insurance classes. In this paper we have attempted to give some examples.

Property Lines

IPCC AR4 showed that future Climate Change is already affecting and will over time significantly affect the incidence of natural conditions. This will impact on property insurance losses (with infrastructure impacts increasing the business interruption component of losses)

- The frequency and intensity of tropical cyclones is expected to increase in line with rising sea surface temperatures. In particular Atlantic Hurricanes are likely to be most impacted by climate change with a number of studies already showing an observable increase in frequency over the last thirty years beyond the medium and short term effects attributable to natural cycles such as AMO and ENSO. Atlantic Hurricanes may be particularly sensitive to Climate Change as during the main Hurricane season the sea surface temperatures are often very close to the minimum temperature required for tropical cyclone formation. As a major source of insurance losses (due to the high insured values on the US East Coast) the insurance impact of this is significant
- Flood events from a variety of causes will change in frequency, with intense rain events likely to be far more frequent in Europe (even as overall summer precipitation decreases), snow-melt late winter floods becoming less frequent and with major storm surges seeing an increase both from an increased frequency of severe winter storms and a rise in sea levels
- Some parts of Europe are likely to suffer from increased droughts leading to increased subsidence claims
- In addition Climate Change is adversely impacting the frequency of wild-fires; hail storms and lightning strikes.

Liability Lines

<http://climatechange.pbwiki.com/GiRo07LiabilitY->

Alongside the more obvious and immediate first party property damage impact of Climate Change, the potential for third party liability claims from Climate Change is less well understood but has even greater potential to effect the industry especially when policies are written on an occurrence basis with the potential for latent claims. The huge economic and social impact of Climate Change will inevitably lead to accusations, claims and lawsuits over attribution of causation which will impact on liability classes

- **D&O:** Directors and Officers could be sued where it can be shown they have not managed their company's contribution to, or exposure to the effects of, Climate Change. There are many benchmarks against which they could now be compared such as the FTSE4Good index and the Carbon Disclosure Project. More disclosure is being called for, for example by some US state treasurers. Some insurers are also asking policyholders to disclose their corporate practices as part of their D&O underwriting
- **E&O/Professional Indemnity:** the construction industry by its very nature can contribute significantly to weather-related risks through bad planning. Bad planning can endanger both the project work and its surrounding environment. The list of professions with potential legal obligations is very long: architects, consulting engineers, designers, surveyors, study bureaux, insurance brokers, risk managers, manufacturers, suppliers, forwarding agents, shippers, hauliers, access contractors, contractors and sub-contractors, owners, developers and financiers.

- **Employer's Liability:** skin cancer litigation and workers' compensation claims are increasing rapidly in Australia, even affecting companies that comply with the health and safety guidelines.
- **Environmental Liability:** corporate liabilities may eventually arise from claims against large emitters of greenhouse gases. Many legal cases are testing this in the US over several states. Flooding often leads to very significant pollution which can often be traced back to a source leaving the door open for legal action.
- **Mortgage Indemnity Guarantee Insurance:** claims may arise both if the property value is individually affected (e.g. because it is in a flood plain and the market starts to factor in flood risk to house prices) or if property values are nationally affected due to a global financial factor (such as a move to high inflation/ high interest rate environment again). In some companies MIG underwriters are not in close contact with property underwriters. If the latter doesn't wish to cover the risk neither should the former we would argue.

Other Lines

Climate Change could also have a significant effect on other lines of business

- **Motor/auto PD:** in the UK for example, losses could increase over time due to increased severe hailstorm events, although reduced severity of cold winters could mitigate losses
- **Motor third party liability:** coverage could theoretically be attacked by injured parties claiming that carbon dioxide emissions from vehicles have led to adverse climatic effects
- **Aviation Hull:** claims may increase over time due to increased hailstorm and lightning strike losses.
- **Airlines and Product Manufacturers:** could potentially face liability suits over the perceived contribution of the Airline industry to Climate Change
- **Marine Insurance:** an interesting implication of Climate Change is that decreasing arctic ice is likely to lead to an opening up of the Northwest Passage leading to new insurance opportunities
- **Political Risk:** a number of political commentators have identified that increasing resource wars over the next 20-30 years, driven by Climate Change, will lead increasingly to violence, political disputes and armed conflict.

CLIMATE CHANGE – ASSETS

<http://climatechange.pbwiki.com/GiRo07WeHaveAssetsToo>

What is the effect of Climate Change likely to be on insurance companies' assets?

Cash/short term bonds

These investments are highly liquid, and therefore their value does not fluctuate much and is not vulnerable to external shocks. Therefore, Climate Change is unlikely to have a large direct impact on the value of these assets.

Long-term bonds

The value of long-term bonds is typically affected by the market's perception of future inflation, interest rates, and governments' or companies' ability to pay, as well as levels of uncertainty over these values (i.e. the higher the uncertainty, the lower are bond values). The direct impact of Climate Change on these variables is difficult to assess. However as a first guess, large climate impacts are likely to increase uncertainty and thus negatively affect bond yields. Therefore by holding bonds, there is a possible mismatch whereby Climate Change has a positive impact on liability values with a negative impact on asset values.

Equity

Climate change has the potential to affect the whole world economy, and this will have an impact on all equity as companies' profits are ultimately linked to economic growth. Notwithstanding this macro effect, within the equity sector, Climate Change will affect different sectors, countries and companies to varying extents. There will be winners as well as losers; climate change will have an asymmetric impact on individual companies in the same sector as well as its impact on the sector as a whole. For example, a study of the effect of climate policy generally on the global automobile industry (Austin et al, 2003), concluded that the effect of carbon constraints on the corporate earnings of individual companies ranged from an increase of 9 percent to a decline of 10 percent. The 2005 US hurricane season provided an example of how Climate Change can have large, uncertain and unknowable effects on equity value. Hurricane Katrina damaged 20 oil rigs and 8 oil refineries. This caused a spike in oil prices to \$71 a barrel, increasing the value of energy companies, but having a negative impact on other shares (the Dow Jones was down 12 points on that day) (Edwards (2005)). However, Hurricane Rita caused oil prices to fall, and hence energy shares to fall, as demand for crude was reduced by the shutdown of refineries (Hoyos et al (2005)).

Property

Like equity, the property sector could suffer from both direct and indirect impacts. Direct impacts include the increased probability of acute events such as storms, sea surges and flooding, as well as long-term impacts such as subsidence, sea level rises or lack of availability of water. Property can also be affected by indirect impacts, for example legislation on carbon emissions from buildings or maximum legal temperature for work. Some properties will become more desirable and their price will rise; we believe the negative effect on pricing will dominate.

Current practice and its flaws

It is standard practice to monitor investment performance over short time periods, for example annually or even quarterly, even when liabilities are long term (Rappaport, 2005). The result is that fund managers concentrate on short-term performance to retain existing business and attract new investments. This feeds back to companies and directors who are encouraged to boost short-term performance. The result is that long-term value drivers can be overlooked as they have little impact on short-term earnings. For example if oil and gas prices increase, an oil company will be faced with a choice between developing ways of

extracting more oil from marginal sources or developing alternative energy sources. The former would be likely to have a quicker pay-off than the latter. Therefore long-term performance is achieved through an accumulation of short-term decisions.

Investor Initiatives

Investors are increasingly becoming interested in how Climate Change might affect their assets and have created various investor initiatives. The Carbon Disclosure Project (CDP) writes annually to the largest companies in the world, requesting information about carbon emissions. The Global Reporting Initiative (GRI) is a non-profit organization which aims to make sustainable reporting by companies as routine as financial reporting. The Climate Risk Disclosure Initiative (CRDI) aims to improve corporate disclosure worldwide to help investors make better informed investment decisions. Institutional Investor Group on Climate Change (IIGCC) is a forum for collaboration between pension funds and other institutional investors and seeks to promote better understanding of the implications of Climate Change. The United Nations Environment Programme Finance Initiative (UNEPFI) is a global partnership between UNEP and the financial sector and aims to understand the impacts of environmental and social considerations on financial performance.

What to do?

Options fall into two categories – passive and active. Active approaches can be further split into two: either to try to actively influence the investments that the insurer holds (the corporate governance or “engagement” approach) or to invest in “climate friendly” funds (aka the SRI approach). This gives three broad approaches which have their inherent advantages and disadvantages. Passive monitoring will have limited impact if the information is not used; investors may only have limited impact on companies' decisions, and even if you do not invest in a climate “unfriendly” company, someone else will. Part of the problem can be addressed by tackling short-termism in the investment decision making process. This could be partly achieved by looking at the investment mandate and reward structure, for example deferred bonuses contingent on extended performance would encourage “long-termism”. The best strategy is probably a combination of the three.

CLIMATE CHANGE – OPPORTUNITIES FOR ADAPTATION

<http://climatechange.pbwiki.com/GiRo07AdaptationOpportunities->

Adaptation in developed countries in partnership with governments

In the UK, the ABI has been commissioning and publishing research over a number of years into the area of flood risk and into the future impact of climate change. In 2003, the ABI set out a Statement of Principles on the Provision of Flood Insurance setting out the UK non-life insurance industry's commitment to provide flood cover (for example in areas with less than 1 in 75 year flood risk, ABI members will provide flood cover as standard but with premiums differentiated to reflect risk) but also the actions it expected of Government (for example the reform of the land-use planning system to ensure sustainability).

This is an example of the non-life insurance industry engaging with local and national government in the area of adaptation. National economies need to be robust to Climate Change and non-life insurance is a key part of maintaining this resilience, but as in the example of flood risk the non-life insurance industry should in turn expect governments to take action to reduce risk. The key debate on public private partnership is discussed in detail on our wiki.

Adaptation in developed countries in partnership with policyholders

The non-life insurance industry needs to convince its policyholders that we are part of the solution to Climate Change not part of the problem. Good communication and education is key here. Some insurers already have links to useful resources from their websites; they could go much further. Some companies are considering early warning systems to policyholders as they learn of incoming natural hazards they can send out emails and text messages alerting policyholders to give them time to prepare their properties and reduce claims costs.

Taking flood risk for example: policyholders can take the twin approaches of resilience and resistance. Resistance is where the building is adapted to prevent the water entering the property; there are already products on the market such as airbrick covers, door guards and skirt systems. However, in some cases water cannot be prevented from entering the property; indeed sometimes allowing water inside can actually reduce the damage to property as large pressure builds up outside from the weight of water. If water has entered a property the objective of Resilience is to reduce the amount of damage it can do. Where appropriate, concrete rather than wooden floors will recover quicker; keeping electric rings away from floor level and simply reducing the amount of contents that is kept on the ground floor; or moving contents upstairs once you know a flood is on the way will all reduce losses. The non-life insurance industry can work with policyholders to encourage this behaviour and reflect it in premiums.

What if a flood has actually occurred? Insurers could insist that properties are rebuilt like for like; but this is missing a great opportunity. Instead the approaches of resistance and resilience can be applied when rebuilding, thus reducing the cost of insurance claims in future floods. In the UK, insurers are very supportive of this idea and have, in partnership with the National Flood Forum, produced literature for policyholders on how to rebuild sustainably after a flood. In many cases the costs are similar. If they are more expensive a small loan may be required. The Association of British Insurers has worked with the Council of Mortgage Lenders who has agreed to look favourably on requests for additional loans to pay for such work. This is a good example of different businesses cooperating with one another and their customers.

Adaptation in developing countries

Insurers are already involved in a number of innovative initiatives, often in partnership with Governments and Non-Governmental Aid Agencies in developing countries designed to assist with adaptation to climate related impacts. Examples include:

- The Caribbean Catastrophe Risk Insurance Facility (CCRIF) which was launched in 2006 (following the impact of Hurricane Ivan two years earlier) through the co-operation of the World Bank and the CARICOM Heads of Government. It provides participating governments with immediate liquidity if hit by a natural disaster, until other sources of financing become available and essentially allows Caribbean countries exposed to natural disasters to pool their risk in order to lower the cost of coverage
- A co-operation between the World Food Programme and Axa Re, funded by the Ethiopian government and a small group of donors including the US Government, which used weather derivatives to cover rural families against drought
- A partnership between an Indian micro-finance institution BASIX, the World Bank and private insurers (including Swiss Re) to provide rainfall insurance to crop growers as well as providing weather hedges to protect BASIX's crop lending portfolio.

Education and Research

We clearly need to encourage and carry out research into this risk so we can protect our shareholders capital; and at the same time help society to manage the risks. Our Working Party's view is that it is in our industry's interest to share our research. Any competitive advantage in this area will be short lived and our reputation would be enhanced if we were more open. As an industry we need to capture better data; only with more accurate data in terms of location; construction of property; the use to which it is put; the building standards that it satisfies and other relevant factors, can we accurately access the risk.

Insurance is adaptation!

We can help with one form of adaptation very easily; one key way to protect yourself from risk is to.....buy insurance! Surprisingly a large number of smaller companies do not have insurance against catastrophic weather loss. The UNEPFI report "Insuring for Sustainability" quotes figures from AXA which suggest that over 50% of businesses with less than £50k turnover are not insured against such events; for companies ten times that size some 25% are still not insured. Yet when small businesses that had been affected by a severe weather event were asked to rank the help they from a range a choices (such as emergency services, local government etc) insurance comes out top. Simply increasing the proportion of business insured will help with adaptation. We can become a lot more efficient with our *existing* insurance systems without even needing to change them. This seems a useful marketing message to us.

CLIMATE CHANGE – OPPORTUNITIES FOR MITIGATION

<http://climatechange.pbwiki.com/GiRo07MitigationOpportunities>

New products

Many non-insurance companies are actively investing in developments and research in areas designed to mitigate climate change. Examples of these are: geo-thermal energy; wind-farms; solar energy; hydro energy; carbon sequestration; hybrid vehicles; biomass. All of these developments will also lead to developing risks which will require insurance solutions.

The Clean Development Mechanism (CDM) was set up under the Kyoto protocol to enable countries to invest in greenhouse gas reduction projects in other countries and use this to offset their own carbon footprint. Such projects run the risk that they will not deliver the greenhouse gas reduction they expected; and if CDM credits have been sold there is a liability to deliver which can discourage capital providers supporting such products. Swiss Re and RNK Capital have worked together to provide insurance against this risk.

Other more “blue-ocean” product examples could be to extend the recently developed insure-as-you-drive policies to include offset-as-you-drive. Our Wiki site includes some detailed commentary on the subject of Carbon Offsetting.

In all these examples non-life insurers can simultaneously open up opportunities for profitable new products and by offering these products facilitate the mitigation of the risks they face from climate change.

Use influence as a major investor

See the section on assets for a more detailed discussion on this. Some non-life insurers can have major influence as investors either as equity owners of the business or as corporate bond holders.

Supply change influence

Insurers have huge purchasing power. After a claim we are involved with rebuilding, and also removal of waste. We can ensure that this is done in a sustainable way. If waste has to be removed, can it be recycled? If not, can it be disposed of in an environmental way. If new products have to be used are low carbon products available that could be chosen in place of others? Can we encourage our policyholders to choose these options?

Lead from the front

Non-life insurance companies can get their own houses in order, for example by looking at areas such as energy efficiency of properties and recycling.

As well as being the right thing to do and playing a part to mitigate the risks from climate change, this can increase a companies reputation with both activist investors and with environmentally conscious customers who are looking at their credentials of their supply chains (i.e. other companies adopting the previous two strategies).

CLIMATE CHANGE – TEN THINGS TO DO

<http://climatechange.pbwiki.com/GiRo07SomeThingsToDo>

1. **If you're on the fence get off it:** There is enough consensus amongst scientists to conclude that climate change is happening, is man made and is a major global problem. The majority of us aren't qualified to argue against the scientists; nor do we have the time. Access our Wiki site as a source of information on the current scientific consensus on Climate Change and on the impact of Climate Change on non-life insurers.
2. **Convince a sceptic** of the importance of Climate Change in an intelligent and informed way using the knowledge you have gained. Sceptics are still out there. Perhaps on your board? Or in your team? They usually haven't followed the debate too closely. Might watch channel 4 a little too often.
3. **Contribute to our Wiki site.** The role of actuaries in helping the non-life insurance industry face the threats and realise the opportunities of climate change will be greater if we speak with one voice and share our views.
4. **Ensure Climate Change is discussed in your company's long-term strategy plans.** In many cases it will be already. If it isn't then is your company missing the boat? There are plenty of opportunities for insurers to be a part of the solution; we believe this will help our industry's reputation but needn't detract from profits.
5. **Make sure that your property pricing is not simply based on long-term averages but allows for the already observable trends** (such as those observable in wildfire and hurricane time series). Regulators in Florida have used the excuse that rates must be based on "actuarial methods" by which they seem to mean a long term average of past data with no adjustment for climate trends. This is not actuarial, it is not correct to perceive our profession in that way.
6. **Find out whether your liability underwriters are considering Climate Change as a source of latent claims.** If you are responsible for capital modelling do you consider the financial impact of a legal judgment that finds that some of the companies responsible of emissions are liable for the damage? Many liability underwriters believe that such claims are excluded; has this been tested?
7. **Ask your Treasury colleagues what they are doing about Climate Change in relation to assets.** In particular; shouldn't all insurance equity portfolios be managed under a responsible engagement mandate? We've given more details in the asset section.
8. **Ensure your company maximises its opportunities from adaptive responses to Climate Change (including in the developing world).** Look to work in partnership with your policyholders to help them manage the risk and keep premiums down.
9. **Lobby within your company for it to be at the forefront of mitigation.** In particular your company is a major procurer of goods; as you are involved with repairs to damage. Point this out to your boards; encourage them to influence your suppliers to recycle where possible; and if they can't, to dispose environmentally. Where new goods have to be purchased give policyholders the choice to choose equally priced sustainable products. Find out who your corporate social responsibility manager is; are they aware of how your company compares to others in terms of carbon footprint and other environmental measures?
10. **Take action to reduce your own carbon footprint.** Our Wiki site has suggestions here including how you can neutralise the effects of your travel to GIRO (particularly in the years it is overseas).