A Global perspective:

How is the Actuarial Profession getting ready to respond to Environmental Challenges?

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IAA Environment Work Group
Sydney, Australia
Agenda

- International Actuarial Association
- Climate change and insurance
- Challenges and opportunities
- Current developments
- Investors perspective
- Broader environmental issues
- Final thoughts
• Created in 1895 as an association of actuaries, reconstituted in 1998 as an association of local associations

• 63 Full Member Associations and 26 Associate Member Associations, regrouping over 55,000 actuaries in more than 100 countries

• Mission includes to promote professionalism, develop education standards and encourage research, with the active involvement of its Member Associations and Sections, in order to address changing needs
Actuaries – who are we?

Adding value in a time of uncertainty

... AND MANY OTHERS
A truly global profession
IAA structure and resources

17 Committees and 7 Sections plus Working Groups & Task Forces on specific issues

Global actuarial e-Library offers over 1 million selected documents accessible to actuaries from all over the world and searchable in 8 languages

IAA leverages local members contributions by providing leadership and coordination to accelerate the worldwide build up of actuarially relevant knowledge

- IAA Environment Work Group and website set up to facilitate collection and exchange of information
- Make all actuaries aware of multi-dimensionality of challenge and need to recognize future impacts
- Develop infrastructure to support development of data and analyses, methodologies, guidance and best practices in a timely manner to enhance the capacity to serve the public interest and the quality of professional services
A new challenge to the actuarial profession

- Environmental issues include climate change, resource depletion, scarcity or sharply increasing costs of commodities such as oil, food or medicines.

- Environmental factors increase uncertainty and may entail discontinuities rather than incremental adjustments in some of the assumptions that we derive from past experience.

- We need to understand, analyze and draw consequences to adapt our methodologies and assumptions in order to provide high quality advice.

- As a profession we have a higher order duty to help the society and decision makers to become aware of the need for changes and contribute to the optimization of policy options.

- These changes are likely to be pervasive and affect actuaries working in all areas be it life, non-life, pensions and social security, health, Enterprise Risk Management and others.
IPCC – Climate Change Update

Intergovernmental Panel on Climate Change
- 1500 Authors, 1000 reviewers

“Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level.”

Actuarial contributions include impact analysis of extreme weather events on business and local economies.
Tipping elements in the climate system

Climate Change: Multiple challenges and opportunities

- Supply Chain
- Capital & reinsurance
- Asset Management
- Claims Management
- Threat to our existing way of life
- Advocacy
- Staff engagement
- Reputation
- Customers
- Product design
- New product opportunities
- Research & pricing
- Asset Management
- Capital & reinsurance
- Claims Management
- New product opportunities
- Research & pricing
Worldwide weather-related disasters 1950–2010

Great weather catastrophes worldwide 1950 – 2010
Number of events with trend

Number

© 2011 Münchener Rückversicherungs-Gesellschaft, Geo Risks Research, NatCatSERVICE – As at January 2011
Weather and climate core business for insurance

Source: Insurance council of Australia and PWC facts and figures.
UK Actuarial paper - Risk of Ruin

• Applied “Risk of ruin“ analysis framework to climate change

Take most conservative analysis of risks ie high end of climate sensitivity and sea level rise (CO₂ x 2), where irreversible change is thought to become probable and apply framework

• Conclusion

Even current CO₂ levels present unacceptable risk and actions should be taken immediately to lower CO₂ levels and protect against that risk

Source: Risk of ruin: a framework for reviewing greenhouse gas stabilization targets Oliver Bettis , N Silver 2009
Australian climate modeling

Sydney April ‘99 hailstorm (hail size 9cm+) that cost $1.7bn could become twice as frequent

Severe Australian Tropical Cyclones are expected to become more intense & move further south

Source: Insurance Australia Group
North America Actuarial Associations

Research project to develop a climate change index
(Phase 1 Sep 2011)

- Educate actuaries, governments, businesses, and public
- A resource in developing predictive loss models as well as for risk management strategies
- To utilise the data and measures of the indicators and index in evaluating the potential risks of climate related changes

Index would highlight

<table>
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<tr>
<th>Hurricane &amp; Intensity</th>
<th>Arctic Ice Cover</th>
<th>Melting Glaciers</th>
<th>Wild Fires</th>
<th>Floods</th>
<th>Droughts extreme</th>
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**Impact on losses in individual insurance**

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<tr>
<th>Hazards</th>
<th>Timeframe</th>
<th>Property (individual and commercial lines)</th>
<th>Engineering (E&amp;O, CAR*)</th>
<th>Marine</th>
<th>Agricultural (crop and livestock)</th>
<th>Motor own damage</th>
<th>Aviation and space</th>
<th>Contingency risks (cancellation of event)</th>
<th>Life and health</th>
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<td>Melting of polar icecaps</td>
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Source: "Globe of Natural Hazards", Munich Re, 2009
Survey of Hong Kong Actuaries

- Climate change happening
- Major impact on society
- Impact on GI pricing & reserving
- Human race action
- Insurance should act

Source Actuarial Society Hong Kong Newsletter April 2009
30 Jan 2012 Climate Change Summit for Asia’s Insurance Industry, Singapore
Australian National Disaster Insurance Review

-Availability and affordability of insurance

Recommendations

• Govt agency created to manage national coordination of flood risk management and to operate a system of premium discounts and a flood risk reinsurance facility

• All home insurance policies include flood cover

• A system of premium discounts be introduced in order that most purchasers of policies in areas subject to flood risk be eligible for discounts against the full cost of flood insurance.

• Govt guarantee claim payments

Gold Coast, Qld © Google Maps 2008
Australian adaptation: Building codes can help

Cyclone Larry post-event analysis: building codes make *some* difference

**Recommendation:** further enhance building standards to cost effectively protect the property itself and its owner’s financial interest

**Source:** IAG
UK: Assessing risks of climate change

Effects of mitigation and adaptation on economic losses

Radar flood-micro mapping. Cooperations with local government aimed at mitigation of coastal inundations

Source: CEA Adapted from “Financial risks of climate change”, Association of British Insurers, 2005, based on estimates for the UK around the 2080s
## UK: Assessing risks of climate change

<table>
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<tr>
<th>Temperature Change</th>
<th>2°C</th>
<th>4°C</th>
<th>6°C</th>
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<tr>
<td>Increase in average annual insured loss (AAL)</td>
<td>8% £47m</td>
<td>14% £80m</td>
<td>25% £138m</td>
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<tr>
<td>Increase in insured loss from 1-in-100 year events</td>
<td>18% £769m</td>
<td>30% £1240m</td>
<td>56% £2353m</td>
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<tr>
<td>Increase in insured loss from 1-in-200 year events</td>
<td>14% £832m</td>
<td>32% £1920m</td>
<td>73% £4346m</td>
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<tr>
<td>Theoretical Impact on Insurance Pricing* (based on AAL)</td>
<td>16%</td>
<td>27%</td>
<td>47%</td>
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<tr>
<td>Additional minimum capital required for 1-in-200 year flood*</td>
<td>£1,065m</td>
<td>£2,457m</td>
<td>£5,565m</td>
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</tbody>
</table>

Source - Assessing risks of climate change. Association of British Insurers 2009
Impact on Health and Life Insurance

- Mortality and morbidity and population growth will be impacted.
- Elderly, poor and rural populations are expected to be most affected.
- Colder winters and hotter summers especially put the older population at risk.
- In developing countries, impacts of climate change are likely to include reduced water quality and availability, and elevated rates of vector-borne diseases such as malaria.
- Diseases, injuries and deaths are also set to increase due to more frequent natural disasters.
- Impact will ultimately be determined by how societies react, adapt and care for those most exposed to its effects.
2011 Global Investor Statement on Climate Change supported by 285 investors representing US$20 trillion assets

- Major long-term risk to global economy and assets in which we invest
- Well designed and effectively implemented long-term policy will not only present significant opportunities for investors but will also yield substantial economic benefits
- Private investment can and must play a critical role however it will only flow at the scale and pace necessary if it is supported by appropriate policy frameworks that shift the balance in favour of low-carbon investment opportunities.
From risk comes opportunity

New Insurer Business Units

- Allianz: “Climate Solutions”
- AON: “Agri-Fuels Group”
- CHUBB: “Green Energy Team”
- TRAVELERS: “Core Business Climate Change Project”
- ZURICH: “Climate Change Advisory Council”

Expanding actuarial roles

- Strategic advice
- Policy advice
- Product design
- Risk assessment
- Risk mitigation
- Biodiversity banking
- Cleantech investment analysis
Carbon bubble - stranded assets

- 50 yr 2°C global carbon budget – 886 Gt CO2
- Already used 1/3rd in 10 yrs which leaves 565 Gt CO2 (2010 - 2050)
- But proven global carbon reserves (Co's and Govt) are five times that size 2,795 Gt CO2
- This means only 20% can be used leaving 80% of assets technically unburnable and therefore stranded
- Top listed companies represent around 25% of these reserves so what happens to their value if only 20% of their assets can be used?
New risks/ product opportunities arising from carbon

- Green buildings
- Nuclear power
- Renewable energy
- Hydrogen
- Carbon offset/trading
- Geo-engineering
- Adaptation projects
World Ecological Footprint – humanity today needs 1.5 planets to survive

Source GFN Ecological Footprint Atlas 2010
Earth treated as business in liquidation

- Millennium ecosystem assessment report (UN) reviewed current status of global ecosystem services and how past and future changes may affect human wellbeing

- Findings
  - 2/3rds of world’s ecosystems (that we rely on for food, air and water) are either degraded or being used unsustainably
  - Policy development required to ensure that the environment is used sustainably. Expertise required in science, economics, sociology and engineering
  - Earth's balance sheet has to be strong and healthy
The answer - Sustainable Development

“Sustainability is *improving the quality of human life* while living *within* the *carrying capacity* of supporting eco-systems”


“Sustainable development is *development* that meets the *needs of the present* without compromising the ability of *future generation* to meet their *own needs*”


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**Asia Key Facts**

- 60% of world population and fastest growing region
- 70% freshwater withdrawals for irrigation
- Food demand 40%↑ by 2050
- 25% of worlds GDP, consumes 50% of worlds raw materials

Asian Development Bank 2011
In summary

- IAA developing infrastructure to leverage worldwide resources in order to better serve the public interest and enhance the quality of professional services
- Actuaries well equipped to deal with risks, uncertainties and long term effects; can assist in quantifying policy options and optimising responses….. but there is a lot of work to be done
- Climate Change and sustainability are urgent challenges that need to be addressed on a multi-disciplinary basis
- Insurance has to take a leadership role in these issues
  - What part will you play in the solution?
  - What contribution are you expecting from the actuarial profession?
“The subprime risk was something we should have known about, but we ignored it. We know about the risk of climate change. The risk from climate change is substantially larger than the subprime risk. Continuing to ignore it will bring us a crisis much greater than we are dealing with now.”

Mindy Lubber, president of Ceres, a US-based coalition of institutional investors.

“The financial crisis is surely a very powerful lesson that the longer you ignore risk, the more difficult the consequences. People had a cavalier attitude to risk in general for the last 10 years. Let’s hope they start taking all aspects of risk a little bit more seriously – and particularly the risks of postponing action [on emissions].”

Lord Nicholas Stern, Former World Bank Chief Economist

Source: Financial Times, The heat is on by Fiona Harvey 2008
Thank you

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