



COP15 Background Paper of The Geneva Association

Climate change as a major risk management challenge

How to engage the global insurance industry

Prepared by

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Dr. Kai-Uwe Schanz
Walter R. Stahel



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The Geneva Association is the leading international insurance “think tank” for strategically important insurance and risk management issues.

The Geneva Association identifies fundamental trends and strategic issues where insurance plays a substantial role or which influence the insurance sector. Through the development of research programmes, regular publications and the organisation of international meetings, The Geneva Association serves as a catalyst for progress in the understanding of risk and insurance matters and acts as an information creator and disseminator. It is the leading voice of the largest insurance groups worldwide in the dialogue with international institutions. In parallel, it advances—in economic and cultural terms—the development and application of risk management and the understanding of uncertainty in the modern economy.

This background paper is a continuation of the Climate Change and Insurance research project of The Geneva Association and augments the Kyoto Statement of The Geneva Association (29 May 2009) and the Geneva Report No. 2 *The insurance industry and climate change – Contribution to the global debate* (July 2009).

Further research material on climate change and insurance can be downloaded from a special web section on The Geneva Association’s website:

www.genevaassociation.org/Home/Climate_Change.aspx



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ジュネーブ協会 京都宣言

Kyoto Statement of The Geneva Association

The latest climate science strongly indicates that climate change is happening, mankind's influence is very material and the changes are occurring faster than earlier projected. The prospect of extreme climate change and its potentially devastating economic and social consequences are of great concern to the insurance industry. Against this backdrop, we, the leaders of the world's largest insurance and reinsurance companies as assembled in The Geneva Association want to make known our view through the following key messages.

Customers

- We are committed to enhancing our research capabilities in order to provide a better evaluation and management of climate risks.
- We promote mitigation efforts by developing products which incentivise offsetting or reducing greenhouse gas emission levels.
- We are willing to design insurance products to support low-carbon energy development projects and to help attract investments to such projects.
- As a major institutional investor, the insurance industry encourages mitigating and adaptation efforts, such as investing in low-carbon energy projects.

Policy-makers

- The insurance industry is prepared to help counter climate risks through active cooperation in implementing building codes or similar means which encourage the use of sustainable practices
- We offer to work closely with policy-makers on communicating to our customers their climate risk levels, possible strategies of mitigation and adaptation, and in quantifying the financial benefits of those strategies.
- The insurance industry provides innovative solutions for climate risk issues. These include funding relevant research and providing tools to its customers to assess and counter climate risks.
- We recognise the significant benefit of pooling climate risks. We urge policy-makers to collect robust data and make it freely available to allow risk assessment and to facilitate efficient solutions where premiums are risk-based.

United Nations Climate Change Conference (COP15)

- The insurance industry is uniquely positioned to provide specialised services for countries and businesses facing climate risks worldwide.
- Insurers have the expertise to develop a broad range of affordable private insurance solutions for climate risks.
- Insurance mechanisms are an effective tool to promote climate-related risk management and reduction.

- We recognise that no stakeholder can succeed alone in solving the challenges of climate change. Insurance can and should be a strong complementary mechanism in a wider framework of adaptation.

Insurance industry

- We encourage political processes to work towards a better understanding of the potential costs of climate change and the advantages of market-based solutions.
- We continue to work towards further reducing the—relatively moderate—carbon footprint of the insurance industry.
- We are willing to play a major and concerted role in the global efforts to counter climate risks.

The Geneva Association offers a unique platform to pool the knowledge and expertise of the insurance sector. It acts as a hub for expert networking within the industry as well as with external communities. The Geneva Association strives to create opportunities for the insurance industry to join their forces to deal with climate risks where relevant and appropriate.

京都 2009年5月29日

The Geneva Association adheres to the views and commitments as outlined in The Kyoto Statement, an offspring of the association's General Assembly in Kyoto (27-30 May 2009). At COP15, we re-emphasise that the insurance industry is uniquely positioned to provide specialised services for countries, citizens and businesses facing climate risks and, therefore, should be a strong complementary mechanism in any comprehensive framework of adaptation. The Geneva Association continues to act as a hub for expert knowledge and networking within the industry as well as with external communities, with the aim of contributing to constructive intellectual and policy discussions by delivering useful and practical knowledge to the parties involved.

Executive Summary

Five theses on climate change and insurance

1. Accounting for more than 7 per cent of global GDP, the insurance industry is one of the world economy's largest sectors. Its core competency is the assessment and absorption of risk. Therefore, insurers have the potential to make a decisive private sector contribution to managing one of the greatest risks of modern times: climate change.
2. Insurance stabilises the financial situation of individuals and organisations and greatly facilitates commerce, trade and innovation. The industry's annual payments for non-life claims alone exceed US\$ 1 trillion. Without insurance, individuals could face serious financial hardship as a consequence of misfortune. Businesses that incur significant uninsured losses may suffer life-threatening financial difficulties. By providing peace of mind and mitigating the risk of doing business, insurers encourage individuals and companies to think more on the long term, creatively and innovatively, for example when developing and introducing new technologies. Underpinning all sorts of entrepreneurial activity, insurance is a prerequisite to doing business, a "lubricant of commerce" which enables innovation, progress and prosperity.
3. Across its entire value chain the insurance industry has a great potential to promote the successful conversion to a low-carbon economy and resilient society. The spectrum of potential contributions includes conducting and sharing risk research, developing new products, promoting loss prevention, reinforcing risk consulting and adjusting investment policies. The insurance industry is now actively developing and launching products which both help policy-holders adapt to climate change and incentivise them to offset or reduce greenhouse gas (GHG) emissions by establishing risk-based pricing signals and using differentiated premium pricing.
4. The insurance industry is prepared to help counter climate risks through active cooperation in implementing building codes or similar means which encourage the use of sustainable practices. Further, insurers offer to work closely with policy-makers on communicating to customers their climate risk levels, possible strategies of mitigation and adaptation, and in quantifying the financial benefits of those strategies. Insurers also recognise the significant benefit of pooling climate risks and urge policy-makers to collect robust data and make it freely available to allow risk assessment and to facilitate efficient solutions where premiums are risk-based.
5. In order to fully engage the insurance industry, a conducive political, legislative and regulatory framework needs to be established. An efficient international plan to reduce GHG emissions and robust national plans for adaptation are necessary preconditions for the long-term availability and affordability of private-sector insurance solutions. Policy-makers could further increase the insurance industry's contribution by making certain mitigative and adaptive measures mandatory, e.g. building code amendments which require climate-conscious insurance policy extensions. At the same time, policy-makers should resist the temptation to distort market forces. Private incentives to mitigate and adapt to risk should not be undermined by ill-designed public vehicles. Further, legislators and regulators should respect the basic principles of insurability: for an insurer to assume a risk, it must be quantifiable and driven by randomness. Also, the insured must have a demonstrable interest in loss prevention. Any interference with insurers' fundamental underwriting mechanism (e.g. the use of deductibles, contractual liability limits and exclusion clauses) jeopardises the industry's major role in addressing the challenge of climate change.

The fundamental role of insurance—enabling economic growth and social development

The insurance industry is one of the world economy's largest sectors. In 2008, total insurance premiums amounted to about US\$ 4.3 trillion, which is equal to more than 7 per cent of global GDP.¹ This sizeable proportion reflects the industry's crucial role in assessing, transferring and managing insurable risks to human life, health and property. However, there are significant regional differences. Industrialised countries, where insurance solutions are more readily available and uptake by the general population is more widespread, account for the lion's share of global premiums (about 88 per cent). In some of these countries, the insurance penetration (i.e. premiums as a share of GDP) reaches double-digit levels, e.g. 16 and 13 per cent in the U.K. and the Netherlands, respectively. On average, insurance penetration in industrialised countries was close to 9 per cent in 2008. Insurance density, i.e. premiums per capita, stood at an impressive US\$ 3,650. In emerging markets, however, insurance solutions are much less prevalent. Total insurance premiums in this group of countries reached US\$ 513 billion in 2008, which corresponds to a penetration of a mere 2.7 per cent. Insurance density was equally low at less than US\$ 90 per capita.

Insurers have a track record of many centuries in dealing with large, complex and unexpected risks. This record predestines the industry to make a significant, if not decisive private-sector contribution to the mitigation of climate change—arguably the greatest risk challenge of modern times. Before examining the sector's specific potential to help cope with this challenge let us take a step back and set out first the insurance industry's fundamental role in enabling and promoting economic growth and social development.

How insurance works²

Insuring risks in a modern economy is a complex business that interacts with many aspects of our lives. The importance of the insurance industry for an economy can only in part be measured by the number of its employees in a given country, the assets under management, or its contribution to the national GDP. Insurance actually plays a more fundamental role in the workings of a modern society, being a necessary precondition for many activities that would be inconceivable without it.

Insurance can be defined as a social or commercial device which provides financial compensation for the effect of misfortune. Payments are made from the accumulated contributions of all parties participating in the scheme. Once people are insured, they become members of a solidarity group that goes far beyond traditional "safety nets" such as the family or the local community. The scope of such risk-sharing groups was usually limited, both for obvious geographical reasons and the impossibility of knowing and understanding the risk exposure of potential partners outside these circles. Through insurance the risk-sharing group can be extended. People who participate in it need not know everybody else in the group as they delegate the task of organising the group to an expert, the insurer.

The pooling of risks lies at the heart of the insurance mechanism. When aggregating many individual risk exposures, insurers rely on the law of large numbers which allows them to make reasonably accurate estimates as to the risk group's overall expected losses. The larger the number of insureds in its portfolio, the more stable and predictable will be the insurer's loss experience. A reduction in expected loss volatility is likely to translate into lower and more stable risk premiums. Based on this

1 See Swiss Re (2009).

2 See The Geneva Association (2009), p. 10f.

fundamental role of risk pooling and sharing the insurance industry makes an important contribution to boosting societies' risk absorption and diversification capabilities, promoting economic and social development.

The accumulation of financial assets for times of potential misfortune is another major feature of the insurance mechanism. There is a fund in which all insureds will pay an assessed contribution (premium), which is set based on the individual risk profile. In return, all those who contribute are entitled to an appropriate payment, should an insured event occur. The insurer acts as a custodian of the fund, paying out for any claims that meet the pre-established criteria. This obligation, however, also forces the insurer to take into account the legitimate interests of the other members of the scheme who might file claims in the future. Their ability to draw on the available funds must be maintained at any time. The claims of the scheme's members may even exceed the available funds. The resulting shortfall would then have to be absorbed by the insurer's surplus. Claims management, therefore, is a critical part of the insurance value chain, besides underwriting and asset management.

Promoting financial stability and security³

Insurance helps stabilise the financial situation of individuals, families and organisations. It accomplishes this task by indemnifying those who suffer a loss or harm. Without insurance, individuals and families could face serious financial hardship, particularly if they are unable to draw on traditional solidarity groups such as relatives, friends or the government for assistance. Businesses that incur significant uninsured losses may suffer life-threatening financial difficulties and ultimately be forced out of business. Other negative spillovers could include higher unemployment and customers being deprived of the firm's products or services. Besides promoting financial stability, insurance also can reduce anxiety as it enhances peace of mind and provides a sense of financial security.

Insurance grants policy-holders some independence and increases their level of self-reliance. The ability to cope with adverse effects, which are often unexpected and might occur at the least opportune moment, is bolstered. This increased resilience enables people to become and stay active as they do not have to worry about all possible adverse effects that a certain activity might entail. With peace of mind and a sense of financial security the creative and entrepreneurial capabilities of people are more likely to be unlocked—to the benefit of society at large.⁴

Encouraging productive investments and innovation

A sophisticated insurance sector greatly encourages commerce, trade and innovation. Insurance underpins all sorts of entrepreneurial activity. Without liability insurance many products and services would simply not be produced and sold. As new businesses carry a high risk of failure, venture capitalists usually insist on tangible assets and entrepreneurs' lives being adequately insured. Also, insurance enhances the creditworthiness of policy-holders. It helps businesses gain access to loans and/or equity capital. Ultimately, insurance is expected to reduce the cost of capital—all other things being equal.

By mitigating the risk of doing business, insurance also encourages companies to think more on the long term, creatively and innovatively. A lot of investments in new production facilities and newly founded companies would never happen if every company was required to hold the necessary funds to cover every conceivable loss. Therefore, the willingness to take on risk is sometimes being heralded as a factor of production in itself.⁵ Based on this logic, insurance could be viewed as a prerequisite to doing business, as the "lubricant of commerce",⁶ which promotes progress and prosperity.

3 The following sections draw on Skipper (1997), pp. 9ff, and The Geneva Association (2009), pp. 11ff.

4 The counter argument here is the existence of moral hazard: based on insurance coverage individuals may take on excessive risks, to the detriment of the insured collective. Insurance companies have found ways of dealing with the problem of moral hazard by implementing mechanisms (e.g. deductibles) that protect the insurance scheme from abuse.

5 See Sinn (1986).

6 Skipper (1997), p. 10.

Contributing to an efficient use of capital

Insurance is not just about the financial compensation of victims, it is also a central part of the capitalisation process of a modern economy. It amasses huge funds.⁷ In contrast with commercial banks, which often collect short-term deposits and extend short-term credit, insurers usually adopt a more long-term view. This is particularly true for contractual savings institutions such as life insurers, reflecting the long-term nature of their obligations. As such, insurers are ideal sources of long-term finance for both private businesses and governments, underpinning steady and stable economic growth.

In addition, insurance facilitates the mobilisation of savings: firstly, it pushes up the general savings rate, especially through life insurance products. Secondly, it enhances financial intermediation and helps channel savings to the most productive sectors in an economy.⁸ Millions of policy-holders pay relatively small premiums. Insurers then use these accumulated funds for lending and investing. The sector thus creates deeper and more efficient capital markets, allowing for more investments. Thirdly, it decreases the level of unnecessary (individual) precautionary savings, which are often not available to capital markets. The release of unproductive or less productive capital stimulates investment and consumption. Insurance thus contributes to providing more working capital to an economy because people do not have to set aside funds for the eventuality of, for example, their home being destroyed by a fire. They just have to secure adequate cover through a fire insurance policy and be ready to pay a much lower amount of money over a longer period. Ultimately, the insurance mechanism helps transform “dormant” capital into free capital.

Promoting awareness of risk throughout society

Insurance plays an additional role in the economy: that of providing information. Being based on a thorough analysis and assessment of the underlying exposure the level of insurance premiums provides a reliable indication of existing risks and loss probabilities. This helps companies make a comparison of the risk/return profiles of projects, thereby ensuring that the available resources are put to the best possible use. Insurance companies also offer consultancy services, advising on how to improve safety standards and a product’s quality. These services are based on extensive financial and non-financial knowledge: a fire insurer needs to know about building codes and materials, a flood insurer about geographic features and meteorological conditions, a health insurer about medicine and pharmacology, etc. The sale of an insurance product is usually accompanied by a risk assessment exercise, the findings of which can be made available to the (prospective) client.

Insurers also use their expertise to help insureds prevent and reduce losses. They have obvious economic incentives to encourage loss mitigation through various avenues, for example by offering loss control programmes such as on fire prevention, occupational health and safety, industrial loss prevention and reduction in automobile property damage, theft and injury. Society as a whole benefits from the reduction of such losses.

If pricing or availability of insurance cover reflects individual loss experience, insureds have economic incentives to mitigate losses as well. Insurance not only affects *ex ante* behaviour such as more effective loss prevention, but also *ex post* behaviour. For instance, the information and knowledge that exist through insurance allow for speedier reconstruction after natural or man-made disasters.⁹

7 The Amsterdam Circle of Chief Economists (ACCE), which is coordinated by The Geneva Association, estimates the total share of insurance assets in 2007 to be around 11 per cent of all assets worldwide.

8 This argument is based on the fact that insurers gather substantial information on firms, projects and managers before making underwriting and investment decisions.

9 For example, Larry Silverstein, the leaseholder of the destroyed World Trade Centre in New York, made it clear that the availability of the insurance pay-out was directly linked to his reconstruction effort.

Towards a low-carbon and climate-resilient economy—insurance as a catalyst

Climate change is considered one of the most serious risks which could affect the whole socio-economic structure of any country in the world. It has generated a rise in average temperatures, localised torrential rain, drought and water shortage in various parts of the world. These phenomena have caused not only damages to property but have also led to economic losses, such as the deprivation of income opportunities as a result of natural disasters. Furthermore, climate change will also have a serious impact on human life, health, the ecosystem and biodiversity. Therefore, the insurance industry needs to recognise climate change as a major, if not the biggest risk management challenge it is facing. Based on its fundamental role in modern economies and societies, the insurance industry is both able and willing to make a significant contribution to mitigating and adapting to climate change. The following section discusses the insurance sector's potential to facilitate a successful conversion to a lower-carbon and more climate-resilient economy.¹⁰ The spectrum ranges from conducting and sharing risk research, developing new products and services, promoting loss prevention, reinforcing risk consulting to adjusting investment strategies.

Researching and communicating the climate change impact

The frequency of extreme weather events is increasing. Against this backdrop, the insurance industry has been researching the expected impact of climate change on natural disasters and society at large, performing actuarial, statistical, meteorological and engineering analyses.

Insurers and reinsurers do not only use the findings from these research efforts to further enhance their proprietary underwriting practices; they also actively share their knowledge of extreme weather events and related exposures with policy-makers, being well aware that public policies affect their business environment in a variety of ways. This is particularly true for climate change-related issues where wide-ranging initiatives are discussed such as the establishment of natural catastrophe pools, the development of improved building codes, greenhouse gas (GHG) emission regulation including automobile fuel-economy standards, and the creation of emission trading markets. The insurance industry is actively involved in environmental policy-making both nationally and internationally. It makes policy proposals as a member of the financial industry as well as on its own through participation in, for instance, international organisations and environmental groups.

The insurance industry's commitment to research and stakeholder dialogue is of particular importance to emerging and developing countries which are expected to have to take the brunt of climate change. For example, according to the Intergovernmental Panel on Climate Change (IPCC), increasing droughts and floods are likely to have the most serious effects on people's lives in African and Asian countries where agriculture is the backbone of domestic economies. However, disaster-prone countries often lack such financial infrastructure as risk transfer and insurance systems. It is, therefore, essential to transfer the insurance expertise of the industrialised world to the emerging and developing economies. Many insurance companies already offer innovative products such as micro-insurance to help protect low-income societies against extreme weather events.

¹⁰ Section 4 of this paper presents some specific product and corporate examples.

Developing new climate-sensitive products and services

In response to changes in social conditions and lifestyles, insurance products have evolved and improved. Given the emergence of climate change as a major new risk, the insurance industry is now actively developing and launching products which both help policy-holders adapt to climate change and incentivise them to offset or reduce GHG emissions. The former area includes, for example, adaptive loss prevention measures such as the implementation of more resilient building codes. The latter is based on the insurance industry's ability to encourage risk-conscious behaviour by establishing risk-based pricing signals.¹¹ A key tool available to insurers is the use of differentiated premium pricing to incentivise risk reduction. Insurers have wide experience of employing such practices in, for example, auto insurance, one of the most familiar insurance products in our daily lives.¹² While minimising the level of GHG emission, eco-friendly automobile insurance plays an important role as an incentive for consumers to become aware of environmental protection, for instance through providing premium discounts based on fuel efficiency, driving distance, and repairing procedures.

Another example is the provision of insurance solutions for alternative energy development projects and eco-friendly technologies. The business potential looks very attractive given the introduction of solar power, geothermal energy and wind power generation systems in place of classic systems dependent on fossil fuel. It is becoming essential for insurance companies to develop insurance products and derivatives to support those projects.

Capitalising on risk diversification

Climate change is a global threat. Its specific ramifications, however, display significant regional differences. Therefore, insurers and, in particular, reinsurers can effectively deploy the mechanism of risk diversification which enables them to take on climate change-related risks at lower costs of capital. The benefits of global diversification should ultimately benefit policy-holders by making affordable climate change-related coverage more easily available—all other things being equal.

In addition to traditional risk diversification across geographies, there is an increased level of recognition of using capital markets to transfer climate-related risks through the issuance of insurance-linked securities (ILS). These fixed-income instruments are placed with capital market investors. The coupon and—in certain cases—even the repayment of the principal depend on the occurrence of insured events, e.g. hurricanes. With ILS, insurers and reinsurers may contribute effectively to a broader social preparation for peak natural catastrophe events which may increase in both frequency and severity as a result of climate change.¹³

Promoting loss prevention and reinforcing risk consulting

Understanding the nature of risks of climate change-related natural disasters in advance is extremely effective in minimising the impact of a disaster. With heightened public awareness, the insurance industry is working on improving loss prevention and technology development in the area of natural disaster risks, drawing on its vast experience and expertise acquired over the past decades. The spectrum ranges from developing digital hazard maps, hazard-resilient property to supporting public hazard mitigation programmes. Some insurers also offer their clients specific risk engineering services which are relevant to addressing the challenge of climate change, for example property risk assessment and improvement advice, business continuity management, business interruption risk assessment, natural hazards assessments and total risk profiling.

¹¹ See Zurich Financial Services Group (2009), p. 2.

¹² In the area of catastrophe insurance sending such signals is more difficult to achieve in practice. In many countries, insurers are not prepared to charge the full technical rate for properties located in flood plains, fearing that the resulting wide variations in pricing would expose them to political charges of penalising those at highest risk. However, only by charging technical rates for the risk is it possible to use insurance premiums to send out pricing signals and influence behaviours.

¹³ See Zurich Financial Services Group (2009), p. 6.

Adjusting investment policies

Many insurance companies are investing in and financing clean energy projects and offer eco-friendly funds. In this way, the insurance industry, as one of the world's largest institutional investors, supports preventive efforts against climate change. In general, insurers grow increasingly conscious about climate change and mindful of their impact when managing their assets. At the same time, they have to generate an appropriate return on their assets and are subject to the same basic constraints as other major institutional investors. It would therefore be naïve to assume that asset managers in insurance simply stop investing in a certain sector solely because of that sector's negative climate impact. As long as external effects on climate change are not fully internalised by the actors responsible for them, asset managers will respond to the distorted incentive to invest.

Public policy frameworks: what it takes to fully engage insurers

This section provides an overview of the many possibilities for the insurance industry to support governments and authorities in addressing the challenge of climate change. It also highlights the need for joint public-private initiatives and outlines the preconditions that governments should establish to maximise the insurance industry's contribution to a successful conversion to a lower-carbon and more climate-resilient economy.

Political and regulatory preconditions for a maximum engagement of insurers

As pointed out above, there is a strong case for regulatory and public involvement in climate protection, be it through the “carrot” (e.g. subsidies and trading schemes) or the “stick” (e.g. taxes). We have also outlined the wide spectrum of areas where insurers, in collaboration with governments, have a major role to play in both the societal mitigation of, and adaptation to, climate-related risks. In order to fully capture the insurance industry's potential, a conducive political, legislative and regulatory framework needs to be established.

An international agreement on reducing GHG emissions

A well thought-out and efficient international plan to reduce GHG emissions and a robust national plan for adaptation are necessary pre-conditions for the insurance industry to make a meaningful contribution to the management of climate risks. If the economy, businesses and households are not prepared for GHG reductions and adjustments to climate change, insurance as we know it today will be more expensive and, in some cases and areas, may be no longer feasible and available as the foundations of insurability, especially the quantifiability and fortuitous character of risk, would be under threat of erosion.

Promoting prevention and adaptation

National governments should develop a strong regulatory framework for adaptation across various sectors of the economy. In some areas adaptation may simply become a condition for insurance to remain available in the future.

As described above, insurers have the tools to make a significant contribution to climate risk adaptation, for example through property insurance coverage provisions which stipulate the replacement of existing materials with weather-resilient materials following an insured event. Policy-makers could unlock the insurance industry's full potential by, for instance, making resilience mandatory in building code standards. The economic case for mandating certain building code changes is straightforward: after a disastrous event, massive damage to public infrastructure and private businesses is set to cause widespread economic disruption, placing a significant burden on society at large. Due to this “public good” characteristic of post-event damage, climate change adaptive prevention measures should be mandated by policy-makers: the benefits of a general improvement in resilience accrue to both insured individuals and the community as a whole. By encouraging prevention through regulatory

measures policy-makers would act in line with the 2008 European Union waste directive which makes waste prevention its priority number one.¹⁴

Promoting mitigation

As mentioned above, claims management practices are a powerful potential tool for curbing GHG emissions. Based on property insurance extensions, energy efficient appliances and systems can be used for repair, restoration and rebuilding purposes. A public mandate, such as building code amendments which make climate-conscious policy extensions mandatory, would serve as an important catalyst. To date, such extensions remain voluntary in most jurisdictions, taken up by a small minority of policy-holders.¹⁵

Promoting corporate disclosure

Not only investors but society at large would benefit greatly if companies had to disclose (as an annex to their financial statements) specifically what they do to protect their assets and manage potential liabilities relating to climate risks. This information should be of value to the financial markets, entice better risk management and stimulate demand for risk solutions and insurance. Such an extension of disclosure requirements would boost the corporate sector's willingness to address existing and emerging climate-related risk exposures and ultimately contribute to the successful conversion to a lower carbon and more climate-resilient economy.

Respecting the fundamentals of the insurance business model

Insurers set premium rates which are commensurate with the underlying individual or corporate risk profile. By sending out risk-based pricing signals "*insurance has the ability to encourage risk reduction like no other economic tool*".¹⁶ In order to maximise the industry's contribution to climate change mitigation and adaptation policy-makers should resist the temptation to distort market forces. Private incentives to mitigate and adapt to risk must not be undermined by ill-designed public vehicles, e.g. public disaster relief schemes which remove individuals' incentives to manage risk or even encourage moral hazard, i.e. a particularly risky behaviour as a result of pricing signals which are disconnected from underlying risks.

Further, legislators and regulators must respect the three basic principles of insurability: for an insurer to take an underwriting decision the risk must be quantifiable, i.e. a maximum possible loss (MPL) must be calculable. Also, the risk must be fortuitous, i.e. driven by randomness. And finally, the insured must have a demonstrable interest in loss prevention.¹⁷ Any interference with insurers' fundamental underwriting mechanism (e.g.

Is climate change insurable? The "Blue Lines"

The most relevant potential limit to insurability in the context of climate change is quantifiability. A "maximum possible loss" can certainly be calculated with regard to average sea level (a.s.l.) rise, using the IPCC models: the highest a.s.l. will be reached if and when the ice caps of Greenland and Antarctica will have melted. Based on this figure (7 metres above today's level for the Greenland ice shield, 70 metres for all icecaps) we can draw "Blue Lines" on all continents: key infrastructures may have to be considered to be built above the Blue Lines, and territories above the upper Blue Line could be regarded as relatively safe from the threat of a.s.l. rise. This does not mean condemning areas below the Blue Line; buildings and constructions can be adapted accordingly. For example, elevated railways and motorways should be preferred to underground ones in planning.

Time horizons can also be attached to the Blue Lines, using the IPCC models: several hundred to 1,000 years.

¹⁴ See Stahel (2009), p. 2. The author also draws a parallel to the waste directive's second priority, which is re-use, arguing that repairs using second hand parts (e.g. in automotive liability) could prevent a significant amount of carbon emissions and reduce insurers' claims costs by an estimated 10 per cent. In this case, emissions cuts would go hand-in-hand with cost savings which, in competitive insurance markets, would ultimately translate into lower premiums, i.e. direct benefits to customers.

¹⁵ See Zurich Financial Services Group (2009), p. 6f.

¹⁶ *Ibid.*, p. 2.

¹⁷ See Berliner (1982) for an in-depth discussion of the notion of insurability and its limits.

deductibles, coinsurance, contractual liability limits and exclusion causes) jeopardises the industry's major role in addressing the climate change challenge.

The case for public policy incentives and intervention

Assuming that the scientific evidence of man-made global warming is correct,¹⁸ policy-makers face a massive negative externality: firms and individuals who contribute to rising emissions of GHG do not take into account the potentially harmful effects that their actions impose on others. Against this background, Nicholas Stern considers climate change "*the greatest example of market failure we have ever seen.*"¹⁹

There are two principal policy responses to climate change: carbon taxes and tradable permits/allowances such as cap and trade systems. Taxes on emissions would result in firms internalising the negative externalities associated with their carbon-intensive activities by making them more expensive. An alternative, politically less controversial approach is cap and trade systems. Under such systems, governments set an overall limit on annual emissions of GHGs. Specific allowances are then granted to firms or auctioned off to the highest bidder. Companies that hold excess allowances may be able to sell them to those which need more to cover their emissions. Both carbon taxes and cap and trade systems are considered efficient and effective "market-based solutions" resulting in lower levels of emissions, although the transaction costs of cap and trade systems are likely to exceed those associated with carbon taxes. The relative pros and cons of these two main policy options are heavily disputed among politicians, academics and other stakeholders. However, there is a broad consensus that the negative externalities arising from GHG emissions constitute a strong case for government intervention.

Towards meaningful public-private climate initiatives²⁰

The scientific evidence of global climate change and its potentially disastrous consequences has definitely grown stronger. It now seems that there is the political will and leadership to address the causes and consequences of climate change, certainly encouraged by a more sensitised public.

How can the insurance industry—"society's traditional risk management tool"²¹—support governments and authorities in meeting the climate challenges ahead? And what political initiatives, incentives and degrees of freedom are needed to fully engage an industry "*whose core expertise is managing the balance between risk exposure and financial sustainability*"²²?

The main near-term challenge for political decision-makers is to reach a binding international climate agreement at the COP15 (the 15th Conference of the Parties of the United Nations Framework Convention on Climate Change) in December 2009 to curb GHG emissions and thereby mitigate its long-term effects on the climate. Therefore, the mitigation perspective is the dominant one in current political debates. However, the climate challenge offers other highly relevant facets. Scientific evidence suggests that even if an international agreement freezes GHG emissions at year 2000 levels, climate change is an irreversible fact because of past emissions.²³ Therefore, another equally important aspect of the climate change challenge is how to manage the inevitable consequences for our economy, environment and society. This adaptation perspective is particularly relevant to insurers and their short-term climate-related contributions to policy-holders and society at large. At the end of the day, mitigation and adaptation are inextricably linked twin challenges which deserve an equal level of political and commercial attention.

Unlike mitigation issues which have to be negotiated in an international and highly complex context, decision-making on adaptive measures will take place primarily on a national, regional or even local

18 See Intergovernmental Panel on Climate Change (2007).

19 Stern (2007), p. 1.

20 See The Geneva Association (2009), pp. 73ff.

21 Zurich Financial Services Group (2009), p. 2.

22 *Ibid.*, p. 3.

23 See Intergovernmental Panel on Climate Change (2007).

level where insurers' specific risk expertise resides. Therefore, the area of adaptation might be more suitable for an effective climate partnership between the public sector and the insurance industry.

Insurers' main mission is to provide peace of mind for families and communities and encourage businesses to thrive. Governments and the insurance industry therefore have a common interest in preserving the foundations of sustainable economic growth as well as limiting the loss burden on households, companies and societies at large. Climate change poses a serious challenge to these foundations and therefore requires a concerted effort of policy-makers and private-sector risk experts.

Where governments and insurers could join forces²⁴

In a wide variety of areas, market-based insurance solutions have the potential to significantly enhance the efficiency and effectiveness of public policy measures designed to address the climate challenge. Basically all elements of the insurance value chain, ranging from prevention, risk absorption and claims handling to accompanying services are potential contributors to this objective.

Loss prevention

Many sectors will be affected by climate change. Some examples are coastal management, infrastructure, buildings, water and energy supply, land planning, health and rescue preparedness. In buildings and infrastructure, for instance, a plethora of effects has to be taken into account: heavy downpours can flood basements and affect drainage, sewers, roads, tunnels, etc. Warmer summers and wet winters may pose a problem to the indoor climate. More severe storms may affect houses and bridges.

Based on its in-depth risk expertise the insurance industry could play an even stronger role in suggesting and implementing amendments to relevant regulations such as building codes. An encouraging example in this respect is the Association of British Insurers' (ABI) active engagement in supporting the integration of climate risks into future development decisions (e.g. through the publication of a guide which covers specific challenges presented by climate change). New constructions should take into account the evolutionary nature of climate change over time. Existing construction should be adapted and the challenge of climate change should be reflected in maintenance investment plans, e.g. for local drainage and sewer systems.

Another important task for the insurance industry to perform in collaboration with governments is to push for behavioural changes, for example the adoption of a more forward-looking and climate-sensitive approach to land planning rather than simply erecting higher dikes.

Insurance and risk management

The insurance industry and governments should engage in a closer dialogue on specific climate risks based on actuarially sound risk-based premium rates that can influence individual and corporate behaviour. For example, anticipated premium deductions (or, alternatively, the prospect of higher premiums) for a group of home-owners could incentivise political decision-makers in municipalities to improve local drainage systems.

But also on a national scale, risk partnerships between insurers and governments should be carefully considered, particularly as the higher frequency and severity of extreme weather events are expected to make it increasingly difficult for private-sector insurers to fully absorb catastrophe losses linked to climate change. Some climate risks might be non-insurable and call for the insurance industry and governments to join forces in exploring options which offer affordable cover to businesses and individuals whilst maintaining a well-functioning private insurance market and its crucial risk-based signalling role. This is of particular relevance to emerging and developing countries where the risk absorption capacity of private carriers is still very limited and public finances offer little latitude in case of disaster.²⁵

²⁴ See The Geneva Association (2009), pp. 78ff.

²⁵ A recent example is a joint transaction of the World Bank, the Mexican government and Swiss Re. "MultiCat Mexico 2009" is an innovative deal based on insurance-linked securities, i.e. the transfer of catastrophe risk to the capital

Claims management

A significant share of the insurance industry's regular claims payments relates to damaged cars, production facilities and private homes. These pay-outs are directly linked to activities which add to climate change by energy consumption and carbon emissions. Given its substantial claims payments,²⁶ the insurance industry has a powerful lever to take climate-friendly (mitigative) and climate-proof (adaptive) action by guiding and engaging customers and suppliers on climate-conscious claims-handling.

Governments should more actively support climate-conscious claims-handling practices through regulatory measures. An example is the Danish government's decision to mandate specific energy efficiency targets which all new buildings have to meet by 2020.

Services promoting public awareness and preparedness

Another promising component of a comprehensive climate partnership between insurers and authorities is preparedness in the event of major weather-related catastrophes. Promoting preparedness is a core service offered by insurers as well as an important role performed by the national, regional and local authorities' emergency services.

Governments, supported by the insurance industry, should initiate and facilitate an overview of existing national preparedness systems in relation to climate change risk and provide the public with easy access to this information. One example of private-public cooperation in this area is an agreement between the U.K. government and the Association of British Insurers on an extensive action plan to improve the management of flood risks to people and property, with the ultimate objective of ensuring the long-term availability of flood insurance. This specific joint effort was prompted by the most severe weather-related event in decades in the U.K., the floods of summer 2007. The insurance industry covered around £3 billion of losses and received around 180,000 claims.

markets. The transaction offers the Mexican government additional financing options following a major natural catastrophe and helps mitigate the negative impact on public finances. If the catastrophe bonds are triggered capital market investors' funds will be available to cover the costs of emergency and relief efforts as well as subsequent reconstruction of infrastructure. Most governments shoulder the burden of financing after a disaster event, for example by issuing debt, reallocating budget positions or raising taxes. With this transaction, Mexico is diversifying its financing mix with risk transfer instruments. For more information: www.swissre.com

26 There are no figures available on global claims payments but assuming an average claims ratio of 65 per cent would take the global amount of non-life insurance claims payments to about US\$ 1.15 trillion.

The insurance industry's specific contribution: some case studies and product examples

Across its entire value chain, the insurance industry is well-positioned to contribute to mitigating and adapting to climate change. Risk research and assessment, product development and implementation, risk engineering and asset management can be harnessed in a variety of ways to help address the climate challenge. The following section offers some examples and case studies.

Risk research

The insurance industry is actively promoting a better understanding of the climate change impact through dedicated research. Some examples:

- *Swiss Re* was a lead contributor to the September 2009 report *Shaping Climate-Resilient Development, a framework for decision-making* by the Economics of Climate Adaptation (eca) Working Group. The study indicates that climate risks could cost nations up to 19 per cent of their GDP by 2030, with developing countries most affected. The authors conclude, however, that cost effective adaptation measures already exist that can prevent between 40 and 68 per cent of the expected economic loss. The report offers a comprehensive and replicable methodology to determine the risks that climate change imposes on economies. It provides a set of tools for decision-makers to adopt a tailored approach for estimating these costs based on local climate conditions, and for building more resilient economies.
- *Allianz* has funded studies on climate change and works with the World Wide Fund For Nature (WWF) in carrying out research on climate change. One of the main goals of this collaboration is to quantify both the direct and indirect effects of climate change.
- *Munich Re* collaborates with Prof. Nicholas Stern and the London School of Economics and Political Science, and has launched The Centre for Climate Change Economics and Policy to conduct research on political and economic aspects of climate change. Munich Re was also one of the companies launching the Desertec Industrial Initiative in summer 2009.
- *Tokio Marine & Nichido Fire* collaborates with the University of Tokyo (Center for Climate System Research) and Nagoya University through the Global Warming Research Group of The Tokio Marine Research Institute to strengthen its research activities relative to the influence of climate change on natural disasters typified by but not limited to increase in tropical cyclone (i.e. hurricane and typhoon) intensity and frequency.

Insurance products and services

In their core business of risk underwriting, insurers have developed a number of innovative approaches which directly or indirectly help curb GHG emissions, for example:

- *Allianz* offers reduced insurance premiums for customers who insure low-emission vehicles and also offers products that allow customers to offset the emissions of their cars when purchasing insurance.

- *Progressive* offers lower automobile insurance rates on vehicles that are driven in less risky ways. A small wireless device allows the company to track how much and when the car is being used. Cars driven less often and in less risky ways carry lower premiums.
- *Fireman's Fund* offers insurance products for buildings which encourage the replacement of standard systems and materials with specified green alternatives such as energy-efficient lighting systems.
- In partnership with other insurance groups, *AXA* offers carbon offset insurance policies. The system estimates the CO₂ produced by an insured vehicle or the air travel involved in an insured trip, and then enables customers to purchase travel or motor insurance products effectively offsetting the related CO₂ emissions.
- In Germany, *AXA* has developed a comprehensive insurance package for wind farms that covers the setting up of the farms, machine breakage, civil liability and other related elements of cover.

Loss prevention and consulting

Some best practices of insurance companies:

- U.K.-based *Aviva* has launched a digital flood map in the U.K. which helps promote people's awareness of the risks to their properties. The company has also developed a flood-resilient model home, which is projected to dramatically reduce the average cost of a flood claim through flood proofing and flood alarm systems.
- *IAG* (Insurance Australia Group) has developed a partnership with local government planners in New Zealand to determine the most appropriate flood planning levels for the future. IAG has shared its findings on expected changes in extreme rainfall with local governments. This information was then incorporated into its flood mitigation programme, e.g., planning for higher levee banks.
- *Lloyd's* has launched a website to inform customers of hurricane risks and provide advice on how to prepare for a hurricane, as well as provide weather news headlines from Dow Jones.
- *Munich Re* has developed a "Globe of Natural Hazards", which enables its users to easily grasp natural hazards and climate effects and to evaluate natural-hazard risks from a geo-scientific perspective.
- *Swiss Re* has developed "CatNet™", an online natural hazard information and mapping system, which allows its clients to assess natural hazard exposure for any location worldwide.

Asset management

As a major institutional investor the insurance industry can make a significant contribution to channelling funds into climate-conscious projects:

- In 2002, *Munich Re* decided that their investments in shares and bonds had to meet certain sustainability criteria.
- In April 2007, *Swiss Re* announced the launch of a €329 million European Clean Energy Fund, one of the largest funds of its type in Europe.
- *Mitsui Sumitomo* offers an eco-friendly investment trust product that invests in selected companies that demonstrate high environmental awareness and engage in eco-friendly projects. In assessing the companies' environmental credentials, Mitsui Sumitomo also takes into account preventive measures against global warming.

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