

Climate Change & The Financial Services Industry

Module 1 – *Threats and Opportunities*

Prepared for the UNEP Finance Initiatives Climate Change Working Group
by

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Preface

This report constitutes the first part of a major two-phase study on the financial services sector and climate change commissioned by the United Nations Environment Programme Finance Initiatives (UNEP FI) Climate Change Working Group (CCWG).

The second phase report (Module 2, 'A Blueprint For Action') examines in detail the possible future role of the finance sector in dealing with climate change, the prevailing attitudes of financial services companies in responding to the issue, the various barriers to action and the kinds of activities currently being implemented.

Here, we discuss the underlying reasons why climate change is relevant to the financial services industry and the need for long-term, 'beyond-Kyoto' market-based frameworks for fostering finance sector participation. The study presents an overview of the specific threats and opportunities facing the financial services industry and makes a series of strategic recommendations to policymakers and financial institutions for early action on the issue.

UNEP FI CCWG is a group of companies and other bodies associated with the UNEP FIs, which are particularly concerned about the issue of Climate Change. Its aim is to operationalise the principles enunciated in the various UNEP Financial Institutions and Insurance Industry Initiative position papers by research and good practice. Its membership comprises: Andlug Consulting, Aviva, CAF, Citigroup, Dresdner Bank, Gerling Group, LPC, Munich Re, Prudential, SAM Sustainability Group, Swiss Re and UBS.

The report was produced by Innovest Strategic Value Advisors, an internationally recognized investment research and advisory firm. Founded in 1998, the firm currently has over US \$1 billion under direct sub-advisory mandates and provides custom portfolio analysis and research to leading fund managers around the world. Innovest is headquartered in New York City with major offices in Toronto and London.

The UNEP Project Coach was Dr Andrew Dlugolecki, a past chairman of the UNEP Insurance Industry Initiative. He has served the IPCC Assessment process as the chief author of the financial services chapter in the Second Report, and was review editor for that chapter in the Third Report. He has chaired two studies of Climate Change for the UK Chartered Insurance Institute. He retired from senior management in CGNU plc in 2000, and is now an independent researcher and consultant in the field of climate change and financial services.

The authors would like to express particular thanks to James Cameron, of Baker and McKenzie, and to Aon Environmental Solutions for detailed review input, and to Munich Re for supplying recent catastrophe loss data.

Executive Summary

Climate change represents an unprecedented and highly complex threat to long-term economic interests across the spectrum of finance and insurance industry activities. The Intergovernmental Panel on Climate Change has confirmed that the combined effect of increasingly severe climatic events and underlying socio-economic trends (such as population growth and unplanned urbanization) have the potential to undermine the value of business assets, diminish investment viability and stress insurers, reinsurers, and banks to the point of impaired profitability and even insolvency. In the extreme case, whole regions may become unviable for commercial financial services. At present, worldwide economic losses due to natural disasters appear to be doubling every ten years, and have reached almost \$1 trillion over the past 15 years. If current trends persist, the *annual* loss amounts will, within the next decade, come close to US\$150 billion.

At the same time, actions taken to reduce greenhouse gas (GHG) emissions by government policymakers and business leaders are already creating new threats and opportunities across the entire spectrum of the financial services and insurance industry. Intensifying regulatory and competitive pressures on industrial GHG emitters may well have serious implications for credit risk, investment performance and shareholder value creation, particularly in emissions-intensive sectors.

As the potential economic consequences of climate change come into focus, company directors, executives, pension fund trustees, and institutional investors will be increasingly compelled to respond. Financial institutions will need to estimate the full extent of consolidated financial liabilities – throughout all sectors of the economy and in all regions of the world - to fully inform their investment banking, asset management, equity research and portfolio risk management activities.

To date, a major impediment to concerted global action on reducing GHG emissions has been the uncertain politics and economics of climate change. Recently, these uncertainties have begun to fade. *Politically*, government support for mitigative action has been forthcoming and the negotiations around the Kyoto Protocol have begun to accelerate the creation of climate-friendly markets. Looking towards the long-term, the agreement of an international policy framework that addresses the fundamental social, environmental, technological and economic issues at stake, and that is based on the principles of precaution, equity and economic efficiency is clearly critical. *Economically*, there is a growing realization that solutions exist that need not cause the dislocation initially feared by some economists. Indeed, there is strong belief that the right blend of policies, if skillfully introduced, can substantially reduce the direct and indirect costs of mitigation and perhaps even produce a net economic benefit.

Creating the conditions that are conducive to the kind of clean technology futures that bring about substantial GHG emissions reductions is a concrete step that all major market participants – investors, industrial companies, policymakers, consumers – can make together now. Commercially-viable technologies exist *today* whose introduction could go a long way towards reducing GHG emissions in the short term, while more developmental clean technologies are brought to the market. The nascent markets for

catastrophic event (CAT) bonds, weather derivatives and microfinance/microinsurance also hold substantial promise for forward-looking finance and insurance companies.

Several leading insurance and fund management companies have already begun to adapt to these changing business conditions. These companies are developing a range of risk management programs and innovative new solutions that not only promote GHG emissions reductions but also provide new business opportunities. The facilitation of emissions trading markets, and the renewables and clean power technology sectors represent the key strategic theaters. The latter, for example, could generate turnover in the range \$234 to \$625 billion by 2010, and as much as \$1,900 billion by 2020.

In this transition to a cleaner economy, it is becoming increasingly clear that institutional investors have a crucial role to play. With over \$26 trillion in assets under management, these investors wield significant influence over future economic development and industrial management pathways and, therefore, the pattern of future global GHG emissions. Aligning the interests of the political and investment communities to spur corporate GHG mitigation activities and expedite the development and distribution of cleaner technologies would accelerate this process to the benefit of all.

The study's major conclusions are that in order to engage the finance and insurance services sector more fully in addressing the climate change issue, policymakers should

- ❑ *Commit to clear GHG emissions reduction targets via policies and measures consistent with the Kyoto Protocol that establish a clear value on carbon*
- ❑ *Accelerate the introduction of policies and measures that influence the flow of capital, particularly investment capital from institutional investors, so as to encourage sustainable energy production and consumption patterns*
- ❑ *Alert the financial community to the possible economic implications of climate change through awareness raising measures to ensure that adaptation and mitigation programmes are fully effective*
- ❑ *Grasp the urgency of attaining long-term climate stability in accordance with the UN Framework Convention on Climate Change, and reach consensus on a long-term policy framework for achieving this goal based on the principles of precaution, equity and cost-effectiveness.*

And that the wider financial community should

- ❑ *Become better informed on the climate change issue as a whole in order to overcome the fundamental cognitive barriers to action and realize the competitive imperatives associated with the issue.*
- ❑ *Work directly with policymakers at all levels, in public-private partnerships and in other ways, to develop effective strategies for adaptation and mitigation in the respective subsegments of the financial services industry,*
- ❑ *Incorporate climate change considerations into corporate planning, stakeholder communications, product and investment strategy, and operational policy.*

Module 2 of this study provides more detail on the practical implications of implementing these recommendations, in the light of the recent experience of the finance sector, and the various barriers to action that presently exist.

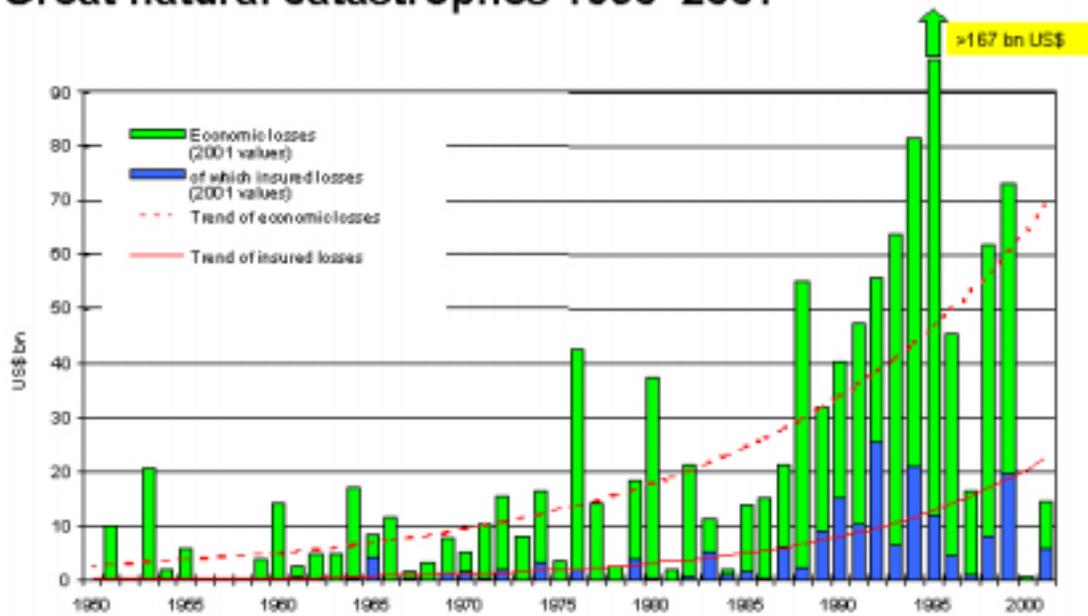
1. Climate Change: A Financial Perspective

The greatest challenge facing the world at the beginning of the 21st Century – and the issue where business could most effectively adopt a leadership role – is climate change

Statement Issued by the World Economic Forum, Davos 2001

The potential for increasingly disruptive and severe weather events, the economic, social and public health issues resulting from these disruptions, and the financial implications of international policy responses aimed at cutting greenhouse gas emissions together represent an unprecedented and highly complex threat to long-term interests across the spectrum of financial and insurance industry activities¹. Worldwide economic losses due to natural disasters appear to be doubling every ten years, and have reached almost \$1 trillion over the past 15 years (Figure 1). Each year now brings 4-times as many weather-related natural disasters as 40 years ago, resulting in 11-times the insurance losses (equivalent to \$10 billion per year over the course of the 1990s) (Figure 2). If current trends persist, the annual loss amounts will, within the next decade, come close to US\$150 billion, of which a significant fraction will be insured².

Great natural catastrophes 1950–2001



As of March 1, 2002

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Figure 1. Trends in Economic and Insured Losses, 1950-2001

Source: Munich Re

¹ See IPCC Third Assessment Report; Presentation of UNEP FI to Marrakech Conference of the Parties, November 2001

² UNEP Finance Initiatives: COP 6b sidebar event; July, 18, 2001. Presentation by Thomas Loster, Munich Re

Great Weather Disasters 1950 - 2001							
Decade comparison							
	Decade 1950 - 1959	Decade 1960 - 1969	Decade 1970 - 1979	Decade 1980 - 1989	Decade 1990 - 1999	last 10 1992 - 2001	Factor last 10:60s
Number	13	16	29	44	72	64	4.0
Economic losses	41.2	54.1	79.4	126.1	426.4	362.0	6.7
Insured losses	-	7.2	11.5	23.0	98.9	79.3	11.0

Losses in US\$ billion - 2001 values MRNatCatSERVICE

As of March 1, 2002 © 2002 GeoRisks Research Dept., Munich Re

Figure 2. Trends in Weather Disasters Since 1950
Source: Munich Re

Although the steady increase in economic and insured losses is more a function of the concentration of economic development in vulnerable regions than climate change per se³, it is clear that climate change will exacerbate these loss trends. Although less developed countries (LDCs) are particularly vulnerable to future climate impacts, there will also be significant effects in developed countries (Annex 1 to the Kyoto Protocol). The latest report of the Intergovernmental Panel on Climate Change (IPCC) underscored the gravity of the situation when it revised upwards the expected temperature changes over the next 100 years, and presented new and stronger evidence that most global warming over the past 50 years is attributable to human activities⁴. The report also confirmed the possibility of “discontinuity scenarios” in which continued greenhouse gas (GHG) emissions exceed critical thresholds, leading to unpredictable, high-impact, abrupt and effectively irreversible changes in the Earth’s physical and biological systems⁵. This has recently been reinforced by a worrying report from the U.S. National Academy of Sciences⁶. The experience of the insurance industry shows that even small changes (<10%) in event severity can generate multiple increases in damage.

At the same time, actions taken to curb GHG emissions by government policymakers and business leaders will have direct competitive implications for the emissions-intensive sectors of

³ For example, Dr. Roger A. Pielke Jr., Associate Professor, Center for Science and Technology Policy Research, University of Colorado, testifying at U.S. Senate hearings on climate change, March 14, 2002.

⁴ Climate Change 2001 Synthesis Report, IPCC, 2001

⁵ IPCC Climate Change 2001: Synthesis Report, 2001

⁶ US National Academy of Sciences, Abrupt Climate Change: Inevitable Surprises, March 2002

the economy, and indirect effects on a wider scale⁷. This will create – indeed, already is creating - new threats and opportunities across the entire spectrum of financial services and insurance. In future, it seems safe to conclude that prudent investors, underwriters and bankers will need to know the full extent of potential financial assets and liabilities created by these mitigation efforts throughout all sectors and in all regions of the world to fully inform their investment banking, asset management, equity research and risk management activities.

In terms of working towards meaningful, effective and enduring solutions to the climate change problem, it is becoming increasingly clear that the full participation of the finance and insurance industry is essential. Institutional investors (that is, pension funds, mutual funds and insurance companies) need to be afforded particular attention in this respect. Because of their size – this group collectively had over \$26 *trillion* in assets under management in 1999 - these investors wield significant influence over future economic development and industrial management pathways and, therefore, the pattern of future global GHG emissions. Moreover, their longer-term investment risk and performance horizons should lend these institutions a natural incentive to incorporate climate-related factors into future underwriting, lending and asset management activities.

At the same time, the scale of current operations in lending and insurance, with over \$4 trillion in annual turnover⁸, shows that they can be an important force for change on a shorter timescale also. Several leading insurance and fund management companies are already closely examining ways to develop risk management programs and innovative new solutions that not only promote greenhouse gas emissions reductions but also provide new business opportunities⁹.

All of this comes at a time when fiduciaries are being increasingly invited to consider – indeed, may have a legal requirement to monitor - environmental and social issues when making investment decisions¹⁰. **The bottom line is that the financial and insurance communities need to better understand why action is needed, what possible actions could be taken, the likelihood of success in controlling climate change, and finally the broader implications of climate change for businesses and society.**

At present, very few of these issues are widely understood in financial circles. Indeed, there is still work to be done dispelling the misapprehension in the minds of many finance and insurance professionals that

- the U.S. government's shunning of the Kyoto Protocol has killed the political negotiations. This is patently not true. As of mid-summer 2002, over 50 Parties have ratified or acceded to the Kyoto Protocol, including the European Union and Japan;
- the implementation of "Kyoto" would have massive negative economic implications¹¹. Recent studies on the economics of mitigation (discussed in Section 3) together with perceptive articles in the mainstream business press indicate that this need not be the case¹².

⁷ See, for example, presentations at the Swiss Re conference *Emissions Reductions: From Main Street to Wall Street*, New York City, July 2002.

⁸ UNEPFI Climate Change Working Group Position Paper, 2001.

⁹ For example, Deutsche Bank Research 'Frankfurt Voice', 7/12/01

¹⁰ See, for example, Baker & McKenzie (Virginia L. Gibson, Bonnie K. Levitt, and Karine H. Cargo), "Overview of Social Investments and Fiduciary Responsibility of County Employee Retirement System Board Members in California," Chicago, 2000

¹¹ Based on Innovest's own experience

¹² See, for example, F. Reinhardt and K. Packard, 'What Every Executive Needs to Know about Global Warming', *Harvard Business Review*, July-August 2000.

Sparking action within the finance sector will require a coordinated effort between finance and insurance companies, industry and of course national and regional governments. Given the chronic need for awareness building, **the dissemination of information relating to the impacts of climate change, the generation of GHG emissions, and future policies and measures to tackle adaptation and mitigation should be made a priority for all policymakers.**

For the financial services industry, the message is clear: the potential impact of climate change is not going to be limited to a few areas where risk can be contained; that it is expected to become a pervasive force throughout the global economy; and that a precautionary stance should be taken in conducting business now and into the future.

Specifically, pension funds and securities legislation should begin requiring greater attention to disclosure on corporate climate-related risk exposures. Likewise, finance and insurance companies can begin to take proactive steps to develop business in mitigation and adaptation projects; carry out awareness raising internally, with clients and through the supply chain (for example, in professional training); include climate change considerations in their statements of investment principles; and make preparations to report progress in these areas on an annual basis.

2. The Wider Context: Looking Beyond Kyoto

Governments around the world have long recognized the critical nature of climate change. Almost without exception, the member states of the U.N. have signed and ratified the Framework Convention on Climate Change (UNFCCC) – including, under George Bush Snr. in 1992, the U.S. Since that time, negotiations around the Kyoto Protocol have made a vital contribution towards managing the problem, not just by creating international processes and structures that move towards solutions, but also by providing an institutional and political context for science, policy and law to interact. It is also worth noting that, regardless of whether the Kyoto Protocol is ever ratified, the very process of negotiation has itself given rise to an array of domestic policy actions that reduce greenhouse gas directly or indirectly and increase capital flow towards clean energy technologies.

The IPCC has advised UNFCCC signatories that “stabilization of atmospheric CO₂ concentrations requires eventual reduction of global net CO₂ emissions to a small fraction of the current emission level”¹³. A precise stabilization concentration has not been specified, as comprehensive, quantitative estimates of the benefits of stabilization at different levels of GHGs do not yet exist.

What is clear, however, is that regardless of which particular target level is selected, sustainable development pathways capable of simultaneously attending to interdependent social, economic *and* environmental challenges need to be adopted if meaningful emissions reductions are to be accomplished¹⁴. In this respect, the Kyoto Protocol should be viewed as simply an important precursor to a more comprehensive and ambitious long-term emission reduction process. After all, even if they were fully implemented, the Kyoto targets would have a negligible effect on

¹³ IPCC *Climate Change 2001: Synthesis Report*

¹⁴ IPCC *Third Assessment Report, September 2001*

atmospheric GHG concentrations¹⁵. Moreover, forecasts estimate that global emission levels in 2010 could be 30% higher than 1990 levels due to increases from countries that are not bound by limitations under the Kyoto Protocol. This point is often missed by many decision-makers, including those within the financial community.

The IPCC's Special Report on Emissions Scenarios (SRES) makes clear the need to situate the Kyoto debate within the context of the more fundamental social, environmental, technological and economic issues that determine global GHG emissions. It describes combinations of future development situations in which emissions of GHGs could be significantly reduced by amounts that would bring us much closer to overall stabilization concentrations¹⁶. Importantly, investment in new technologies during the coming decades was found to have the same order of influence on future emissions as population growth, economic development, and levels of energy consumption taken together¹⁷. Figure 3 shows that the potential range of future emissions is very wide. Many of the trajectories are not consistent with stabilizing the global atmosphere, but there is a large family of pathways which could achieve this, and these are primarily the scenarios which feature government intervention to limit emissions.

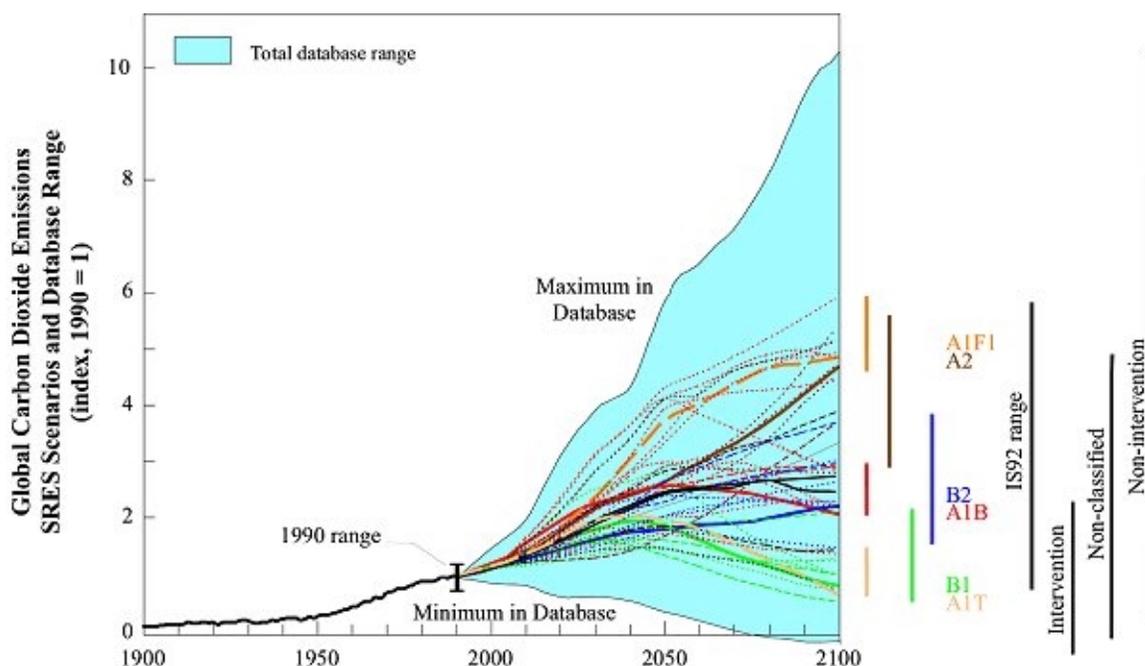


Figure 3. Sample Data From IPCC Scenarios Report (Global CO₂ emissions related to energy and industry)

There are other pressing reasons to see the Kyoto process within the context of a long-term policy development process. From a corporate economic planning standpoint, focusing on policies that can be implemented within a 'short-term' time scale, i.e., within the term of the

¹⁵ Tyndall Centre Working Paper 12, *The climate regime from The Hague to Marrakech: Saving or sinking the Kyoto Protocol?*, Suraje Dessai, December 2001

¹⁶ IPCC Special Report on Emissions Scenarios and Third Assessment Report, September 2001

¹⁷ IPCC Special Report on Emissions Scenarios and Third Assessment Report, September 2001

Kyoto agreement, tends to direct action towards low hanging fruit such as easy fuel switching from coal to gas, and improving energy efficiency. While these are important steps towards achieving climate stability, they risk deflecting attention away from more fundamental structural changes such as the retirement and replacement of existing infrastructure that supports GHG-intensive energy use¹⁸. Moreover, corporate planners investing in large energy infrastructure or industrial plant projects often need to project cost and cash flow assumptions over 20 or 30 years. Indeed, projections by the U.S. Energy Information Administration (EIA) have indicated that by 2000, 77% of 2010's electricity supply and 63% of 2020's supply had already been built¹⁹.

Finally, from a security and geopolitical perspective, the Kyoto Protocol needs to be understood in terms of the extent to which climate change might exacerbate critical socio-environmental pressures - agricultural productivity problems, water shortages, natural resource depletion - that are already being identified as causal factors in the escalation of regional conflicts²⁰, especially in those parts of the world where weak governance, civic strife and poverty already prevail²¹.

In view of the need for long-term clarity on the policy framework question, what possible options exist for limiting global GHG emissions in accordance with the requirements of the various stakeholders and, in particular, the needs of the financial services industry?

The 1992 UNFCCC established that the process of managing the problem of mounting atmospheric concentrations of greenhouse gases should be pursued on the basis of precaution and achieved in a cost-effective manner, and that the burden-sharing between its Parties should be on the basis of equity. These three essential elements - *precaution, equity and economic efficiency* - therefore need to be present in any political framework for long term climate stability.

IPCC has reviewed a vast range of literature on proposals for long-term emissions mitigation and critiqued various organisational frameworks around which the global community might control GHG concentrations²². The subsequent debate has crystallised around three generic propositions, although there are many possible variants.

- The "**historical**" approach (sometimes called the '**Brazilian Proposal**'), which holds that on the basis of equity, each country's responsibilities are proportional to the emissions it has accumulated in the atmosphere since industrialization began²³. Initially only the long-term emitters i.e. Annex 1 (developed) countries formally accept emissions controls. The proposal replaces full international emissions trading with a Clean Development Mechanism, which enables less developed countries to barter emission credits to the value of clean technology provided. The Kyoto Protocol is closest to this approach, but it features the use of emissions trading along with other market mechanisms.

¹⁸ *An Introduction to the economics of climate change policy, prepared for the Pew Center on Global Climate Change by J. P. Weyant, Stanford University, July 2000*

¹⁹ *US Energy Information Administration, Reference Scenario 2000*

²⁰ *IPCC Climate Change 2001: Synthesis Report*

²¹ *Tyndall Centre Working Paper 7, Security and Climate Change, Jon Barnett, October 2001*

²² *IPCC, Cambridge University Press, 2001*

²³ *Technical Note, Ministry of Science and Technology, Federal Republic of Brazil, January 2000*

- ❑ The "**carbon-intensity**" approach, that - on the basis of cost-effectiveness - disregards the past and advocates future voluntary emissions targets indexed to the GDP in each country. Under this approach, for the foreseeable future all countries voluntarily accept the need to limit the growth of their GHG emissions per unit of national economic output (via reduced fossil fuel dependency and greater energy efficiency) while pursuing economic development. This essentially waives the equity argument in favour of efficiency, but it does not guarantee contraction to safe emission concentrations

- ❑ "**Contraction and Convergence**" (C&C) which on the basis of precaution advocates the adoption of a "safe" steady-state level for GHG concentrations in the atmosphere. The approach demands that global emissions will **contract** progressively through a budgeting process to deliver the predetermined "safe" level of GHG concentrations. On the basis of equity, these emission budgets will be distributed so that entitlements **converge** from today's very different national levels to a figure that is equal per capita for all nations by an agreed date. To satisfy the aim of cost-effectiveness, surpluses or deficits in emissions entitlements would be internationally tradable, ideally redeemable for clean technology²⁴.

While the selection and agreement of a strategic framework for emissions control is clearly in the remit of UNFCCC, the finance sector has a valid interest in that decision, since it will affect its operations significantly, and the sector also has expertise that can help policymakers to arrive at more effective solutions.

From UNEP FI's point of view, the main aims of financial institutions with respect to climate change were spelled out in organization's position paper presented at COP-7 in Marrakech (see Appendix 1).

Essentially, **UNEP FI believes that governments should promote domestic adaptation and mitigation, constraining GHG emissions and creating legal provisions for emissions reductions and carbon offsets.**

In this vein, UNEP FI Climate Change Working Group believes that the early establishment of a long-term framework should be a top priority for policymakers aiming to utilize the financial markets towards more rapid climate stability. This framework should

- **balance the need for precautionary measures and economic development in an equitable fashion**
- **adopt as a matter of urgency a global target for the stabilization of atmospheric GHG concentrations at a safe level**
- **recognize the responsibilities of all nations to ensure that the global target is achievable**
- **make full use of market mechanisms, such as emissions trading, to achieve optimal economic effectiveness**
- **become operational from the end of the first commitment period under the Kyoto Protocol (i.e., 2013)**

²⁴ A. Meyer: *The Kyoto Protocol and the Emergence of Contraction and Convergence as a Framework for an International Solution to Greenhouse Gas Emissions Abatement (1999)* in Homeyer and Rennings *Manmade Climate Change-Economic Aspects and Policy Options*, Physica Verlag

- **be agreed in detail by the Conference of the Parties under the UNFCCC no later than 2010, to allow for smooth implementation**
- **be reviewed periodically in the light of new information, to ensure that Climate Change can be held within "safe" limits.**

3. Economic Feasibility of Mitigation

The economics of climate change has been a source of considerable uncertainty and controversy. Several high-profile studies have estimated the costs of mitigation to be extraordinarily high. In the U.S., for example, estimates of the projected annual costs of carbon reductions to 3% below 1990 levels have ranged as high as \$280 billion (in 1992 dollars), or 3% of Gross Domestic Product²⁵. However, these estimates have invariably used worst-case assumptions that necessarily *imply* high costs, for example, highly limited or non-existent emissions trading activity, a need to meet short term targets, or limited use of non-carbon fuels. Other calculations have been based on an overly simplistic analysis of mitigative measures, and ignored or omitted factors such as the costs of impacts from the 'business-as-usual' scenario²⁶.

Some recently released reports present a more balanced perspective on the issue. A U.S. Department of Energy study found that increased research and development, voluntary energy efficiency agreements, utilization of more cogeneration and combined heat and power (CHP) units, a U.S. domestic cap and trade system, and a greater role for renewable and clean power in electricity sector restructuring could bring carbon emissions down by 13-17% below business-as-usual scenarios by 2010 (which equates to an increase of around 30% above 1990 levels) at no cost to the U.S. economy²⁷.

Likewise, the Union of Concerned Scientists issued a report recently which concluded that greater fuel efficiency and market penetration of renewables in vehicles, buildings and industry could save up to 5.9 million barrels of oil per day by 2020, push consumer savings to \$150 billion by 2020 and help the U.S. and Canada surpass their greenhouse gas reduction quotas under the Kyoto Protocol.

Experiences in the U.K. also bear out the assertion that switching to less carbon-intensive sources of energy and power does not bring about large-scale economic and competitive losses. The swing within the U.K. beginning in the 1980s from a predominantly coal-based economy to a natural gas-based one is now widely viewed as efficient modernization backed by market-enabling legislation and supported by investors of all types.

There are also indications that some sources of GHG emissions can be limited at no or negative net cost, for example through correcting market imperfections, including ancillary benefits and recycling carbon-related tax revenues back to companies in the form of tax break incentives connected to greater efficiency or technology utilization. The IPCC estimates that up to 1.3 and 2.5 Gt of carbon equivalent emissions reductions – current global emissions total roughly 8 Gt C - could be realized by 2010 and 2020, respectively, through measures that confer direct net

²⁵ Including, for example, the U.S. DOE/EIA's study on the Impacts of Kyoto on the U.S. Economy

²⁶ G. Berz, *In Our Planet*, UNEP Publications, February 2001

²⁷ 'Scenarios for a Clean Energy Future', Oak Ridge; Argonne; Pacific North West; Lawrence Berkeley; National Renewable Energy Labs, for U.S. Department of Energy, 2001

economic benefits through reduced energy usage²⁸. A September 2000 study by Resources for the Future even indicates that under a carbon tax or permit system, differentiated measures can neutralise the potential adverse impacts on key energy-intensive industries²⁹.

Such studies give grounds for optimism that the right blend of policies, if skillfully introduced³⁰, can substantially reduce the direct and indirect costs of mitigation and perhaps even produce a net economic benefit. Encouraging the development and commercialisation of “climate-friendly” clean technology solutions through policies and measures such as procurement programmes, favourable tax treatment and regulated clean energy production targets may therefore be seen as a natural complement to other, more complex social and economic measures to addressing GHG emissions. Given the necessary focus on institutional investors, particular attention should also be paid to measures capable of directing institutional capital towards supporting organic development of new technology in their established investee companies, in addition to focusing on simply providing venture capital to smaller technology innovators.

This leads to an important point: **whereas society’s ability to collectively ‘choose’ an appropriate development path is problematic, creating the conditions under which the kind of technology futures envisaged in the IPCC Scenarios Report is a concrete step that major market participants – investors, industrial companies, policymakers, etc – certainly *can* make.**

What is more, it is a move that would simultaneously address a range of economic, social and environmental challenges. Increasing the share of zero carbon fuels from 15% to 21% by 2020, for example, has been projected to simultaneously reduce annual fossil fuel CO₂ emissions by 1.2 GtC/year³¹, address localized air quality issues, improve domestic energy security and boost the size of the renewables energy market to roughly \$1,900 *billion*³².

The wider value of renewable energy as a resource for the world’s energy portfolio is made clear in the recent report of the G8 Renewable Energy Task Force³³. Clean power systems will be particularly important in the developing world, where the smaller, discrete off-grid energy sources are often more compelling economically. These emerging markets, while not without risks, are set for significant growth (*see Section 4*).

A final point that is often overlooked is that a prime reason for mitigation is the avoidance or reduction of climate impacts, and that these must be included in any reckoning of the costs and benefits of emissions reductions.

²⁸ IPCC Synthesis Report, 2001

²⁹ L.H. Goulder, “Confronting the Adverse Industry Impacts of CO₂ Abatement Policies: What Does It Cost?” September 2000, Resources For The Future, Climate Issues Brief No. 23

³⁰ Tyndall Centre Working Paper 4, How high are the costs of Kyoto for the US economy?, Terry Barker and Paul Ekins, July 2001

³¹ IPCC Special Report on Emissions Scenarios, 2001

³² Market size by sales, calculated by Innovest based on current market size and forecast growth figures.

³³ Issued July, 2001

4. Threats and Opportunities for Financial and Insurance Institutions

“The insurance business is first in line to be affected by climate change. It is clear that global warming could bankrupt the industry...”

**Franklin Nutter,
President, Reinsurance Association of America**

This discussion is divided between “insurance” and “finance” although there are many similarities between them; additionally, there are also many subdivisions within each of those sub-sectors, and significant interactions between them (see box for brief industry description)³⁴.

The insurance industry is composed of a diverse universe of firms that are involved in any combination of insurance (divided between Property/Casualty, Life, Health and other specialty services), reinsurance, incident management, asset management and assorted other financial service businesses. Worldwide, the industry brings in \$2.2 trillion in premium revenues; in the U.S. alone, life insurers had over \$2.8 trillion in assets, owned real estate worth roughly \$59 billion and accounted for 14% of the total assets and reserves of major pension and retirement programs.

Finance industry subsectors include, inter alia, asset managers, investment banks, deposit/consumer banks (e.g., UK clearing banks), institutional investors, pension funds and project finance and venture capital firms. During the 1990s, global pension fund assets grew, on average, 15% a year, from \$4,600 billion to \$15,900 billion. At the same time the equity holdings of pension funds increased from \$1,600 billion to \$8,000 billion - or from 35% to 51% of total assets. By 1999, pension fund equity holdings represented 22.9% of global equity market capitalisation, up from 17% in 1990. This growth was driven mainly by the big three pension markets - the US, Japan and the UK, which together account for over 80% of global assets under management.

INSURANCE

Growth in population and population density, demographic trends, urbanization, natural climate variations and the expansion of industrial and residential infrastructures in ‘high risk’ areas are all affecting decisions over what is ‘insurable’ and under what terms. The ability to assess company climate change liability on a systematic, consistent basis will likely become a useful tool in helping reinsurers and underwriters alike diversify their portfolios from a carbon risk standpoint. Moreover, opportunities also exist for companies, through their investment activities, to hedge against potential climate change liabilities via the creation of carbon assets; indeed, investing in low carbon technologies would constitute a hedge in itself.

The following table summarizes some of the key threats and opportunities pertaining to the insurance industry.

³⁴ Insurance and finance industry data taken from variety of sources, including *The Economist*; US Insurance Industry Perspectives on Climate Change, Lawrence Berkeley National Laboratory/US Department of Energy, February 2001; and, Pension Reform and Global Equity Markets, Birinyi Associates, 2002.

INSURANCE SUBSECTOR	POTENTIAL THREATS	POTENTIAL OPPORTUNITIES
GENERAL	<ul style="list-style-type: none"> ◆ New and existing markets become unviable as climate change increases regional exposure ◆ Asset management risks; loss of long-term value in securities affected by adaptation/mitigation regulations and measures ◆ Compounding risk across entire portfolio of converging activities (asset management, insurance, reinsurance) 	<ul style="list-style-type: none"> ◆ Use of pre-existing insurance tools (e.g. Errors and Omissions insurance to protect against errors in forward selling of climate-influenced contracts; Business Interruption insurance to be better prepared than competitors) ◆ Technology insurance and/or contingent capital solutions to guard against non-performance of clean energy technologies due to engineering failure
PROPERTY / CASUALTY	<ul style="list-style-type: none"> ◆ Physical damage to insured property from extreme/more frequent weather events unbalancing insurer's assets and liabilities ◆ Liquidity problems due to same ◆ Increases in population and infrastructure densities multiply size of maximum potential losses from extreme weather events ◆ Regulatory change, for example relating to design standards 	<ul style="list-style-type: none"> ◆ Increase in demand for underwriting services as weather risk increases ◆ Insurance of GHG offset and clean energy projects and related financial services eg professional indemnity for carbon credit guarantors and certifiers
LIFE/HEALTH	<ul style="list-style-type: none"> ◆ Increased risks to human health (thermal stress, vector-borne disease, natural disasters) 	<ul style="list-style-type: none"> ◆ Increase in global demand for L/H insurance as human health risk increases
OTHER	<ul style="list-style-type: none"> ◆ Business interruption risks becoming unpredictable and more financially relevant. ◆ Disruptions to construction/transportations sectors ◆ Increased losses in agro-insurance ◆ Political/regulatory risks surrounding mitigation 	<ul style="list-style-type: none"> ◆ Collaboration with others in pooling capital to expedite Kyoto mechanisms ◆ Microinsurance ◆ Weather derivatives ◆ CAT Bonds ◆ Consulting/advisory services

Table 1. Summary of Threats and Opportunities for the Insurance Industry.

Of particular note here is the potential stress to the **property/casualty** (P&C) industry from increases in property damage due to severe weather events and the associated insurance claims. Weather-related losses could stress P&C insurers to the point of impaired profitability, consumer price increases, withdrawal of coverage, and elevated demand for publicly funded compensation and relief³⁵. For **reinsurers** the issue is even more acute, because they focus on writing catastrophic risk³⁶. Insurance analysts have in the past lowered earnings estimates to

³⁵ From IPCC Technical Summary: Impacts, Adaptation, and Vulnerability

³⁶ See US Insurance Industry Perspectives on Global Climate Change, Lawrence Berkeley National Laboratory/US DOE, February 2001

account for higher-than-normal level of catastrophes and there is no reason to suspect this attitude has changed³⁷.

In this respect, climate change may well aggravate existing concerns over weak economic conditions within the insurance industry. The P&C business in particular continues to experience weak premium pricing power and increased losses, with catastrophic event (CAT) losses contributing to poor results. The P&C industry has also been plagued by excess underwriting capacity, the effect of which has been to depress prices, shift product mixes into banking and other financial services, and even cause firms to look at expansion into overseas markets (albeit into regions where climate-related regional impacts may be more acute)³⁸.

The growing concentration of people and business in urban centers and vulnerable regions, coupled with the increase in value of their assets (in the form of information technology, for example), is also exacerbating the situation. P&C insurers are projected to be particularly exposed in Europe, as storms likely intensify over this densely populated area³⁹. The December 1999 windstorm *Lothar* produced insured losses in the region of \$3.9 billion in France alone primarily because it blew across Paris and the Ile de France at windspeeds of over 160 km per hour⁴⁰. Hotter weather - at least in the U.K. - will bring clear negative impacts for buildings insurance providers (in terms of claims for subsidence)⁴¹.

Setting the terms and conditions for insurance coverage will pose another problem. As climate change imposes greater statistical uncertainty concerning maximum potential losses and weakens the connection between present and future climate regimes, P&C insurance companies will be deterred from relying wholly on past actuarial data to set future rates and control risk exposures. This general uncertainty will discourage insurers from providing cover on historical grounds; however, as climate science improves, and specialized knowledge of the presence of certain climate-related risks grows, an 'underclass' of high risk areas may be created within which coverage becomes more expensive or more difficult to obtain.

In addition to growing demand for insurance *per se*, the P&C industry may also be able to gain from providing disaster recovery administration and training on a fee/advisory basis, in much the same way as happens with the National Flood Insurance Program in the U.S.⁴². The Belgian government is reported to be keen on transferring flood compensation from the public Natural Catastrophe Fund to the private sector⁴³.

A key element in providing effective solutions to extreme weather will be closer collaboration between the public and private sectors, probably through the medium of industry umbrella groups. For example, in the UK, the Association of British Insurers has a strategy for weather risks that involves identifying the key hazards, quantifying the risk, specifying the critical aspects of exposure and vulnerability, and providing this information to government in order to improve design standards and flood defence regimes. Likewise, an initiative in the U.S. saw insurers fund the training of government building inspectors to safeguard quality control during construction, because experience showed that damage from hurricanes is exacerbated in substandard buildings.

³⁷ FT.com, April 27, 2001

³⁸ US Business Reporter, P&C Industry Report 2001

³⁹ Tyndall Center "Factsheet: How will changing storm activity influence insurance and forestry?" available at www.tyndall.ac.uk

⁴⁰ FT.com, Reinsurance Industry Survey, September 2001

⁴¹ Climatic Research Unit "Research Areas" available at www.cru.uea.ac.uk

⁴² See the U.S. Federal Emergency Management Agency program, <http://www.fema.gov/nfip/about.htm>

⁴³ FT.com, Reinsurance Industry Survey, September 2001

For insurers and financiers, brokers and traders, alternative risk transfer methods such as **catastrophe bonds**⁴⁴ offer an innovative new market that can be used to support mitigation efforts. Catastrophe bonds, essentially high yield corporate bonds, provide for risk cover that extends beyond the usual one-year insurance contract; moreover, they lend additional diversification to investment portfolios (catastrophe losses tend to be unrelated to the usual cyclical economic risks affecting corporate bonds), allow reinsurance firms to raise funds from outside conventional sources and may even enable insurance companies to expand the limits of insurability by providing more capacity (or capital) for continued activities. However, the market is currently highly illiquid (somewhere in the region of 40 CAT bonds have been issued to date) and has been hampered by high transaction costs⁴⁵.

Although weather risk management is by no means a new thing, the market for **weather derivatives** contracts represents a viable risk management option for hedging non-catastrophic climate-related risks and may allow traditional insurance tools to be extended into new territory. These financial products may also be useful to renewable energy firms dependent on certain weather conditions (e.g., wind and solar companies). Firms may participate in the market either as a vendor of hedging services or a customer of hedge products. The energy trading industry in particular has been an enthusiastic player in the weather contract markets and the London International Financial Futures and Options Exchange (LIFFE) recently created the world's first exchange traded weather derivative products based on daily average temperature. The weather derivatives market has grown exponentially over the past few years, from a handful of deals in winter 1997/98 to over 1,500 in the winter of 2001/02 (with a notional value of several billion dollars)⁴⁶.

Both insurance and finance firms also have an opportunity to develop new risk management tools and services tailored specifically towards good energy and climate policy management, including insurance services geared towards projects of the **Kyoto mechanisms**. The provision of insurance and risk management services is certain to improve the viability of clean development mechanism (CDM) and joint implementation (JI) projects⁴⁷ and make them more attractive and secure for the project finance community.

FINANCE

For the **financial services sector**, threats and opportunities are summarized in the table below. Additionally, it is worth noting that some diversified financial service companies may face a compounding risk effect whereby climate change becomes a risk across their whole portfolio of activities; uninformed companies may find themselves inadvertently at higher risk and be exposed to a 'perfect storm' of climate risks.

The **real estate finance** sector of the banking industry may be particularly vulnerable due to damage arising from extreme weather events. The root of the risk lies in the major mismatch in timescales in the risk instruments. Loans are provided for decades, in the expectation of

⁴⁴ The market functions by investors (the bondholders) providing funds to the insurance company (the bond issuer) for an interest payment and a repayment of principal at the end of the bond term if no previously defined catastrophic loss occurs. If loss occurs, however, the investor loses the interest payments, the principal or both, and the funds are then transferred to the insured.

⁴⁵ 'Why not CAT Bonds?' *Environmental Finance*, March 2002.

⁴⁶ *Risk News*, January 23, 2002.

⁴⁷ The Clean Development Mechanism (CDM) and Joint Implementation (JI) are flexible, market-based provisions included in the Kyoto Protocol.

insurance being available for that period. In fact, most insurance contracts are annually renewable, so the insurer can cancel the cover if there is a material change in risk during the period. This could have major implications for investors in securitised real estate assets, for example, who may not be aware of the risks to those securities. It may also reduce the attractiveness of other project finance and foreign direct investment activities.

FINANCE SUBSECTOR	POTENTIAL THREATS	POTENTIAL OPPORTUNITIES
GENERAL	<ul style="list-style-type: none"> ◆ Macroeconomic downturn hurts business volume ◆ Uneven and unpredictable impacts on global markets ◆ Greater pressure on public purse for disaster relief and infrastructure rebuilding ◆ Compounding risk across entire portfolio of converging activities (asset management, insurance, reinsurance) 	<ul style="list-style-type: none"> ◆ Development of new markets and demand for new products related to greenhouse gas emissions reductions and/or adaptation to climate change creates new momentum for economic expansion ◆ Public/private partnerships in green municipal funds, etc.
CORPORATE & RETAIL BANKING AND PROJECT FINANCE	<ul style="list-style-type: none"> ◆ Property damage risks to project finance and real estate finance ◆ Cancelability of real estate insurance exposes property lender ◆ Unanticipated GHG emissions mitigation costs at project level ◆ Impaired value of GHG-intensive capital stock ◆ Physical damage to corporate assets ◆ Regulatory and political risks 	<ul style="list-style-type: none"> ◆ Financing clean energy technology development ◆ Financing of infrastructure development arising from adaptation ◆ Enhanced project returns from sale of credits ◆ Lending by commercial banks to customers for energy efficiency-related projects ◆ New markets in, e.g., political/regulatory risk transfer
ASSET MANAGEMENT	<ul style="list-style-type: none"> ◆ Macroeconomic disruptions impairs long-term asset appreciation ◆ Hidden carbon liabilities affect market value of securities ◆ Real estate holdings impaired by weather events, increased energy costs 	<ul style="list-style-type: none"> ◆ Outperformance from investing in climate leaders and best-in-sector securities ◆ Hedge funds investing in GHG credits ◆ Innovative climate-related theme funds e.g., new energy
PRIVATE EQUITY	<ul style="list-style-type: none"> ◆ Reduction in competitiveness of GHG-intensive business 	<ul style="list-style-type: none"> ◆ Growing demand for low carbon technologies and related goods and services
OTHER	<ul style="list-style-type: none"> ◆ Compounded carbon risks for diversified fund managers, e.g. hedge funds ◆ Potential deterioration in project economics and investment viability due to national financial policy responses to climate change. 	<ul style="list-style-type: none"> ◆ Hedging services for uninsurable GHG credit and energy price risks ◆ GHG credit brokerage and trading ◆ Consulting & advisory services ◆ Microfinance opportunities in developing countries.

Table 2. Summary of Threats and Opportunities for the Finance Industry.

In **emerging markets**, where total insurance coverage is often low, the exposure of foreign and domestic commercial banks to potential physical damage to buildings and infrastructure from weather extremes will likely grow. The economic impact of a 1-meter sea level rise in Mumbai, for example, has been estimated at US\$ 47.3 billion⁴⁸. Probably little of this would be insured. Moreover, if loan security – to take one example - is threatened on a widespread basis this may precipitate a loss of investor confidence in affected regions and induce a credit crunch⁴⁹.

Foreign direct investment in large infrastructure projects may face particular weather-related risks. Extreme weather events, flooding and other natural disasters have already caused substantial damage to energy production facilities and transportation and distribution networks in less developed countries. For example, two cyclones in 1999 caused US\$7 million in damage to the power grid of India's Southern Electricity Supply Corporation⁵⁰. Precautionary measures such as the recent World Bank project appraisal guidelines may temper this risk going forward.

Project financing of energy- and GHG-intensive activities also faces risks from the potential financial implications of carbon emissions constraints and particularly the cost of reducing emissions to established targets. On the positive side, for clean energy or energy efficiency projects, carbon finance can enhance project viability and improve returns; the World Bank's Prototype Carbon Fund increased estimated internal rates of return by over 5% through selling emissions credits at market prices of up to \$2 per metric ton of CO₂ equivalent⁵¹ (see Figure 4).

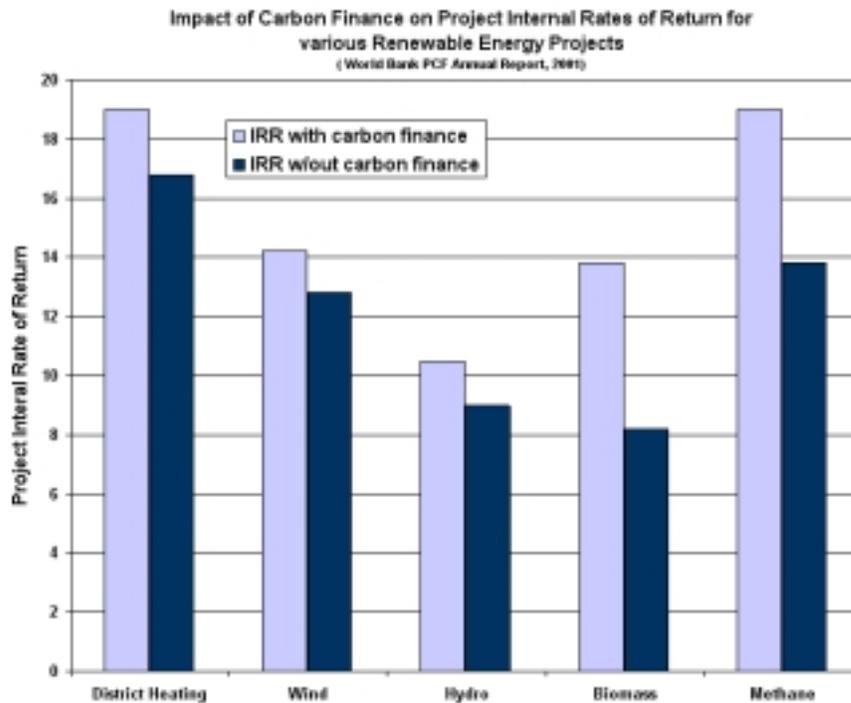


Figure 4. Effect of Carbon Finance at the Project Level
Source: World Bank Prototype Carbon Fund, Annual Report 2001

⁴⁸ Tata Energy Research Institute "India Specific Impacts of Climate Change" available at www.teriin.org/climate/impacts.htm

⁴⁹ IPCC Third Assessment Report "Climate Change 2001: Impacts, Adaptation, and Vulnerability" WG II, p. 438.

⁵⁰ U.S. Agency for International Development "India – Cyclones Fact Sheet #1" Nov. 16, 1999.

⁵¹ World Bank Prototype Carbon Fund, Annual Report 2001

Asset management (including the fund management arms of insurers) is faced with potentially significant threats relating to the impairment of equity valuations or bond issues due to climate-related effects or mitigation policies. As climate change complicates the risk exposure of an investment portfolio in new ways not traditionally considered in financial analysis, insurance and asset management firms will be challenged not only to ensure the viability of their business, but also to ensure the security of their market investments. The differentials in corporate exposure within the same sector, and the magnitude of potential risks to shareholders, are captured in the chart above. Within the U.S. electric utilities sector, Innovest’s own research has indicated that the discounted future costs of meeting ‘softened’ Kyoto targets could amount to 11.5% of total current market value for the most carbon-intensive utility company to 0.2% in the least; and up to 45% of current share value (see Figure 5).

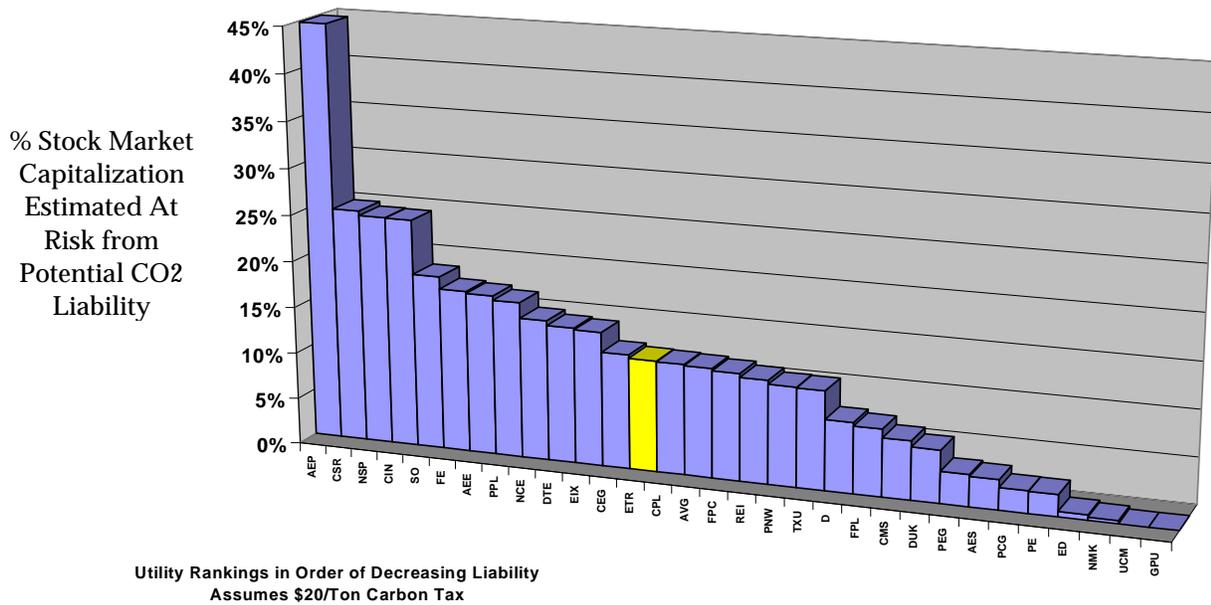


Figure 5. Potential Financial Impact of GHG Emissions Constraints in U.S. Electric Utilities
Source: Innovest

Such concerns were echoed more recently, in a discussion paper published by the Universities Superannuation Scheme (USS), one of the U.K.’s largest pension funds⁵². The report recommended that pension funds see the climate issue as a potential threat to their interests and found that equity valuations are currently lacking in the area of climate-related business risks. At the company level, however, consistent, systematic research on corporate climate change positioning and risk is rare; virtually none of the substantial differentials in companies’ carbon risk exposure are being captured by traditional securities analysis. A broad coalition of global institutional investors is already forming to press management at the world’s largest companies

⁵² “Climate Change – A Risk Management Challenge for Institutional Investors”, USS publications, 2001

on shareholder risks associated with climate change via the 'Carbon Disclosure Project'⁵³. Systematic engagement by fund managers with portfolio companies, both individually and in concert with other major institutional investors (such as under the Carbon Disclosure Project) would help investors understand and be satisfied with company strategies to manage climate change and take advantages of opportunities to enhance returns through “climate-friendly” and clean energy themes.

Specialty funds (including **hedge funds**), **investment banks** and **brokers**, if cognizant of carbon risks to listed stocks, may well be able to augment returns by exploiting synergies between the value of GHG credits and the price of GHG-intensive company issues. For example, stripping carbon credits from projects and forward selling them as GHG emissions 'rights' to major emitters may become viable as regulatory risks surrounding the emissions markets are removed. **Creating provisions for emissions reductions and carbon offsets to classified as registerable 'rights', with appropriate legal status, is a concrete step policymakers could take to help spur this particular aspect of the GHG market.** Forecasts of the size of the future GHG credit trading market vary between \$10 billion by 2005 to over \$2 trillion per year by 2012, the end of the Kyoto Protocol's first commitment period⁵⁴. Similar markets are also emerging for green power certificates, weather derivatives, catastrophe bonds and energy price hedging products.

As climate change gains prominence as a significant issue in the business world, new opportunities will emerge for **corporate banking**, **venture capital** and **strategic investors** in the form of provision of investment capital in clean technology solutions, organization of initial public offerings (IPOs) for companies in the renewable energy sector and financial advice on climate change risk management (*see Figure 6 and box insert at end of section for estimates of clean technology market dimensions*)⁵⁵.

Key countries with respect to both emissions of GHGs and significance of the electric power sector are India and China. With electricity consumption in India reportedly more than doubling in the last decade, the Indian electric power sector is the largest consumer of capital in that country, drawing over one-sixth of all Indian investments. As part of efforts to reduce dependency on coal, India has a significant program to support renewable power, exemplified by wind power capacity that rose from 41 megawatts in 1992 to 1,025 megawatts in 1999⁵⁶.

What is more, the Indian government has already exempted wind turbines from excise duties and sales tax and called for 10% of new power generation capacity to come from renewable sources. India is ranked fifth in world wind power generation, 95% of which has come from commercial projects based on private investments.⁵⁷ Investments in projects facilitated by Kyoto's flexible mechanisms - notably the Clean Development Mechanism - should spur interest in clean technologies; a joint study by Canadian and Indian research institutes identified at least 29 potential areas of CDM engagement in four Asian countries.⁵⁸

⁵³ The CDP is a Special Project within the Philanthropic Collaborative at the Rockefeller Brothers Foundation with the sole purpose of providing a better understanding of risk and opportunities presented to investment portfolios by actions stemming from the perception of climate change. To date, institutions representing over \$2 trillion in assets have already joined the initiative.

⁵⁴ See 'Greenhouse Gas Trading Warms Up', *EuroMoney.com*, January 2002

⁵⁵ *Environmental Capital Network data*, July 2001

⁵⁶ *Pew Center on Global Climate Change, Developing Countries & Global Climate Change: Electric Power Options in India* (November 1999)

⁵⁷ www.eia.doe.gov

⁵⁸ *Pembina Institute/TERI "Clean Development Mechanism Project Opportunities in India, China, Bangladesh and Indonesia"* Nov. 2000.

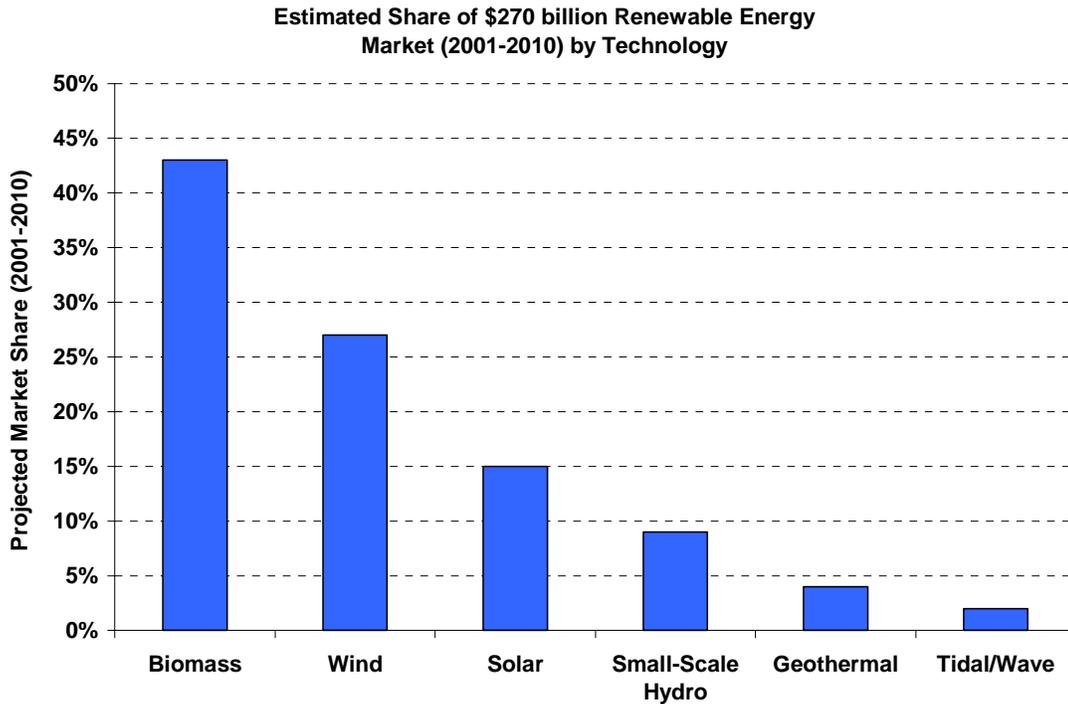


Figure 6. Future Market Share of Renewable Energy Technologies
 Source: 'The World Renewable Energy Report' Douglas-Westwood, 2001

Similarly, in China, which reportedly ranks second in the world in energy consumption and greenhouse gas emissions, power generating capacity and power consumption are expected to nearly triple by 2015 from their values in 1995, requiring some \$449 billion in total costs⁵⁹. Recently, the China Daily reported that Chinese and U.S. trade ministers agreed in Beijing in April 2002 to set up a new consultation mechanism under which U.S. Trade and Development Agency (U.S. TDA) will provide funding for projects in China in the areas of e-commerce, renewable energy and solid waste treatment. According to Chinese government officials, wind power, solar energy, hydropower and other renewable and new energy re-sources will account for 0.7 % of the total annual commercial energy used in China by the end of 2005, and 2 % by 2015.

⁵⁹ Pew Center on Global Climate Change, *Developing Countries & Global Climate Change: Electric Power Options in China (May 2000)*

There is growing interest in **public-private partnerships** such as the Green Municipal Funds, established in the Canadian Federal 2000 budget, which will provide some \$125 million to encourage research and development in innovative municipal-level clean technology initiatives and green infrastructure projects. Such partnerships may also be focused on reducing the risks for foreign direct investment and projects concerned with mitigation activities and the flow of technology in that direction. **This approach may be particularly valuable within the context of targeted programmes aimed at technology transfer and capacity-building to identify and manage adaptation, with strong involvement of the private sector in the host and donor countries.**

Clean Technologies and Renewables: Market Outlook

- The market for renewable energy in terms of sales is likely to be in the range \$234 to \$625 billion by 2010 and \$1,900 billion by 2020. The US renewables market alone is forecast to grow 34% by 2020.
- The World Energy Council and International Energy Agency estimating that between \$1.7 and \$4 trillion will be needed in capital requirements for new power generation in developing countries by 2020.
- According to the G8 Renewable Energy Task Force, roughly \$10-15 billion has been committed to renewable energy investments over the next 2-5 years by major companies, and up to \$1.5 billion is being used to finance renewable energy projects in developing countries each year
- Wind power is the world's fastest growing power source, at 20% annualized growth to 2003. The projected global energy market share for wind is 10% by 2020, or \$150-400 billion
- Europe plans to generate 6% of its energy needs from renewables by 2010 and 50% by 2050. At an average of \$1-\$1.5m per MW to install, this constitutes an investment of some \$90-\$135bn.
- The United Kingdom hopes to increase the share of electricity generated by renewables from the current 2%, to 10% by 2010
- The Bush Administration's recently announced climate change policy proposes to provide \$555 million in 2003, \$4.6 billion over 5 years and \$7.1 billion over 10 years as tax credits to spur investments in clean energy technologies
- Texas' Renewables Portfolio Standard (RPS) has set targets increasing to 2,880MW of renewables to be installed by 2009; projections show that the first year target of 400MW of new capacity to be installed during 2002 and 2003 will be exceeded significantly.
- In 1999, California reported \$400-million in export sales of energy technology and equipment to 29 countries with a further \$2-billion in expected sales from current projects.

5. Recommendations

This report is concerned with climate change issues as they affect financial services companies at a broad, strategic level. The second phase report *Module 2: A Blueprint for Action*, a more detailed study, provides specific recommendations on the potential role of the finance sector in the carbon constrained future and on operational issues for finance, investment and insurance sector companies. Based on the foregoing, recommendations for policymakers and financial institutions are as follows:

FOR POLICYMAKERS

Policymakers need to create greater engagement by financial institutions on the climate change issue. They can accomplish this by increasing awareness of the potential economic impacts of progressive climatological disruptions, by establishing clear greenhouse gas emissions reduction regulations, by establishing emissions trading schemes to assist in the mitigation process, and by creating more favorable market conditions for clean energy technologies. All of this will require policymakers to actively seek the input and advice of financial institutions, on the basis of the threats and opportunities identified in this report.

Policymakers also need to provide the financial community with greater assurances as to their lasting commitment to climate change action. The development of a long-term framework for GHG emissions controls, based on the principles of precaution and equity, and recognising the need for economic development, should therefore be given urgent attention.

ACTION	SPECIFIC RECOMMENDATION
<i>Follow through on commitments to address global GHG emissions</i>	<ul style="list-style-type: none"> - Commit to clear GHG emissions reductions via policies and measures consistent with the Kyoto Protocol that establish a clearer ‘value’ on carbon - Encourage the development and commercialisation of “climate-friendly” clean technologies through policies and measures such as procurement programmes, favourable tax treatment and regulatory production targets. - Promote domestic emissions trading systems, constraining GHG emissions and creating provisions for emissions reductions and carbon offsets to be classified as registerable ‘rights’, with appropriate legal status - Within the next ten years, seek to go beyond the extent of Kyoto commitments for Annex 1 countries, or set domestic goals for limiting the growth of emissions in other countries.
<i>Exploit the resources of the financial sector</i>	<ul style="list-style-type: none"> - Improve the availability of information on the impacts of climate change, the generation of GHG emissions, future policies and measures to tackle adaptation and

	<p>mitigation (particularly natural disaster management) and energy policy</p> <ul style="list-style-type: none"> - Provide a framework that encourages institutional investors to pay greater attention to corporate climate-related risk exposures as part of their fiduciary responsibilities - Accelerate the development of public-private partnerships, particularly in the finance and investment arenas. These partnerships would focus on stimulating the flow of technology into mitigation activities, and reducing the risks to foreign direct investment and projects in those areas
<p><i>Reach consensus on a global, long-term framework for emissions control,</i></p>	<ul style="list-style-type: none"> - Adopt a global target for the stabilization of atmospheric GHG concentrations at a safe level, if necessary on a provisional basis, through the planned reduction of annual emission levels - Review the objective periodically in the light of new information, to ensure that climate change can be held within "safe" limits. - Assign responsibilities to all nations to ensure that the global target is achievable - Use market mechanisms to ensure that a cost-effective path is followed - Establish this framework by the Conference of the Parties under the UNFCCC no later than 2010, to allow for smooth implementation.
<p><i>Coordinate action on a global level to support LDCs</i></p>	<ul style="list-style-type: none"> - Target those regions for specific technology transfer and targeted programmes to identify and manage adaptation, with strong involvement of the private sector in the host and donor countries.

FOR FINANCIAL INSTITUTIONS

For financial institutions, the following general recommendations are offered in order to stimulate greater awareness within the industry and provide for a more active role for financial institutions within policymaking circles.

ACTION	SPECIFIC RECOMMENDATION
<p><i>All financial institutions need to become more familiar with the threats</i></p>	<ul style="list-style-type: none"> - Adopt strategies to deal with impacts in conjunction with other stakeholders, especially those concerned with flexible mechanisms of the Kyoto Protocol.

and opportunities posed by climate change adaptation and mitigation

- Consider the potential for business development in mitigation and adaptation projects
- Carry out awareness raising internally, with clients and through the supply chain e.g., in professional training, in risk assessment procedures and in internal environmental management systems

Insurers should begin to examine more systematically the financial implications of climate change on their business and the need to adjust operations as a result

- Co-operate collectively with governments to provide effective ways of managing natural disasters from extreme events, abnormal weather variations, and sea-level-rise
- Devote resources to quantifying the potential costs of climate change impacts, and the potential risk exposures in their existing coverage portfolios, as well as any new opportunities
- Assess opportunities presented by emerging GHG markets for new insurance products and extension of existing ones

Lending institutions should do the same

- Include climate change systematically in their risk assessment procedures, for example by connecting internal lending rates with carbon intensity
- Consider the potential for involvement in projects concerned with cleaner energy, and in programmes to finance climate-friendly end-consumption

Asset managers should seek to better understand the potential carbon assets and liabilities within their portfolios

- Engage systematically and proactively with their portfolio companies to understand and be satisfied with their strategies to manage climate change.
- Examine product portfolios systematically for opportunities to enhance existing offerings and create new ones driven by “climate-friendly” and clean energy themes and investments.
- Pension funds should specifically address climate change in their statements of investment principles

Support government initiatives on LDCs

- Develop innovative ways of linking the informal economy within LDCs to the financial system, to enhance sustainable development by minimising the effect of disasters, and improving the adoption of cleaner energy.

Investment advisors should also become more informed

- Ensure that due attention and adequate information is provided to FI clients concerning climate change risks and opportunities

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APPENDIX 1

UNEP Finance Initiatives Climate Change Working Group: *Position Paper, November 2001*

UNEP Finance Initiatives
Climate Change Working Group Position Paper

NOVEMBER 2001

1. OVERVIEW

- 1.1. We believe that the precautionary approach is the appropriate way to deal with climate change, in that it is not possible to quantify all the environmental, economic, and social effects before taking action to reduce greenhouse gas emissions. Research can reduce the uncertainty, but never completely eliminate it.ⁱ
- 1.2. The financial services sector is involved in all aspects of economic activity and is affected by environmental and social issues. Owing to its business skills - particularly in innovation - and its size (insurance premiums of USD 2.3 trillionⁱⁱ and operating income for banking of USD 1.7 trillionⁱⁱⁱ annually worldwide) the sector can play an important part in meeting the challenges posed by climate change.
- 1.3. The financial services sector strongly supports the Kyoto Protocol and strongly advocates that efforts be made to strengthen the process towards a long-term and effective framework to tackle climate change.

2. GENERAL POSITION

- 2.1. Climate Change poses major risks to the natural environment, and to society, in terms of damage to economic systems and human health, as reported in the Third Assessment Report of The Intergovernmental Panel on Climate Change (IPCC TAR). It is essential that early action is taken collectively to reduce these risks by:

Awareness raising	across all sectors and countries as the fundamental basis for initiating adaptation and mitigation.
Mitigation	reducing greenhouse gas emissions <i>now</i> .
Adaptation	taking steps to manage the effects of climate change as they impact society and natural systems
Research	defining the effects of climate change more precisely, and refining the technology and tools to deal with it.

- 2.2. The solutions which are adopted must be sustainable and equitable. For example, they should promote both existing and innovative energy solutions which ensure sustainable economic development in the future.
- 2.3. Harnessing the resources and skills of the private and public sectors together will provide the most effective answers to the problem of climate change.

3. FINANCIAL SERVICES AND CLIMATE CHANGE

- 3.1. The finance sector will be affected in several ways by climate change through altered risk profiles from its clients, and through government policy on mitigation and adaptation.
- 3.2. Banking faces considerable changes through the changing financial prospects of its clients, and more positively, from the demand for financial services e.g. project finance, to support mitigation and adaptation activities.
- 3.3. For insurance, the most obvious area of concern involves property losses, where in general risks to clients will become greater, and will be exaggerated by socio-economic trends, which are producing greater concentrations of vulnerable assets in risk prone areas.
- 3.4. Institutional investors, and in particular, life insurance companies and pension funds invest widely and aim to provide a long-term return for their beneficiaries. Since climate change could affect economic and social stability, investments would be affected through unanticipated changes in risk. Also, the financial prospects and risk/return characteristics of certain industries that are large greenhouse gas emitters may be affected and this must be taken into account by investors.
- 3.5. Policies to reduce greenhouse gas concentrations, and to manage the impacts of climate change, will inevitably entail the supply of financial services, in terms of insurance, credit and investment. At present the partial completion of the political framework for market mechanisms is hampering progress, but financial institutions are already participating in pilot schemes.
- 3.6. The sector is a major economic activity in its own right and needs to play its part in adopting sustainable practices internally, e.g. through energy conservation measures in its extensive portfolio of real estate.

4. A MULTIPLE-STRATEGY APPROACH

- 4.1. Governments, singly and collectively through the United Nations Framework Convention on Climate Change (UNFCCC), should adopt four strategies to tackle climate change, and involve all stakeholders in developing and implementing them. The four strategies are:
 - 4.1.1. Implement the Kyoto process as a small but important first step in dealing with the problem of emissions internationally. This will allow all stakeholders to gain practical experience quickly.
 - 4.1.2. Develop a range of policies and measures for implementation in national and regional jurisdictions, using a minimum of regulation to harness market mechanisms.
 - 4.1.3. Construct a long-term framework to reduce emissions globally in order to achieve the necessary transition to sustainability. The approach of *Contraction and*

Convergence, which the IPCC TAR described as "the logical conclusion" of a rights-based approach, provides a possible example of such a basis.

- 4.1.4. Promote a strong code of corporate sustainability, for business and the government sector, underpinned by the availability of key information on environmental, social and economic performance.

5. THE KYOTO PROTOCOL MECHANISMS

- 5.1. The Clean Development Mechanism is a valuable medium for adaptation and mitigation within the wider context of sustainable development. Adaptation has been largely ignored but could be instrumental in giving less-developed countries access to financial services in innovative ways, as suggested by the IPCC TAR. UNFCCC should initiate some pilot activity in the area of hazard management. Mitigation projects are closer to conventional business activity, and UNEP FI members are already active in this area.
- 5.2. Joint Implementation projects also are close to conventional activity, and the financial services sector is already participating in exploratory work here.
- 5.3. Emissions Trading is a useful step in achieving the transition to a sustainable economy. However, there are still major uncertainties in the modalities of the trading system. Once the rules become clear, it could become an attractive market for financial services. Trading systems within nations or trading blocs present much fewer problems, and may be an appropriate way to commence.
- 5.4. It is important that the modalities of the Kyoto Protocol Flexible Mechanisms are sufficiently streamlined and transparent to allow the financial sector – and broader business - to be fully engaged and to play their intended roles in emission reductions.

6. TOWARDS SUSTAINABILITY

- 6.1. Stopping human induced climate change requires a transition to a low carbon economy, with the emphasis on energy efficiency and renewable energy. The financial sector is willing and able to support this change, and is already active in pilot schemes. However, such activities are often placed at a competitive disadvantage by conventional infrastructure, market, fiscal and regulatory systems. Progress would be greatly enhanced by political action to provide more supportive market structures and a long-term plan towards a sustainable energy economy.

7. ACTIONS TO DATE BY UNEP FI MEMBERS

UNEP FI members have:

- 7.1. Developed standards for corporate reporting of CO₂ emissions^{iv}, which are in the process of being adopted by many other bodies.
- 7.2. Participated in pilot projects to refine the modalities of the Kyoto Protocol flexible mechanisms^v.
- 7.3. Advised and supported companies as they assessed and reported their greenhouse gas emissions and encouraged companies to integrate responses to climate change - comprehensively - into their corporate strategy.
- 7.4. Financed alternative energy technology ventures that significantly reduce greenhouse gas emissions.
- 7.5. Developed standards for environmental management systems (EMS) in their sector and taken a leadership position in their implementation.
- 7.6. Traded green electricity certificates in order to achieve CO₂ emission reduction targets^{vi}.
- 7.7. Participated in the IPCC process, notably in the chapters on financial services^{vii}.
- 7.8. Taken part in a large number of events to raise climate change awareness in the sector and among other stakeholders and to commence the process of translating the theory of mitigation and adaptation solutions into accepted practice.
- 7.9. Worked with stakeholders to manage natural hazards - likely to be affected by global climate change - through research, planning and the provision of relevant financial services for operational schemes in the private and public sector.

This paper has been discussed and approved for publication by members of the UNEP Finance Initiatives as a contribution to the climate change debate. It does not claim to represent the unanimous view of all members of the Initiative nor does it represent a UNEP position.

For further information on the UNEP FI's Climate Change Working Group visit Unepfi.net/cc

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- i "...the overwhelming majority of scientific experts, whilst recognizing that scientific uncertainties exist, nonetheless believe that human-induced climate change is already occurring and that future change is inevitable. It is not a question of whether the Earth's climate will change, but rather by how much, how fast and where." Robert T. Watson, Chair, IPCC, 2001.
 - ii Swiss Re, Sigma 9/2000, World insurance in 1999, Soaring life insurance business
 - iii UBS AG, Group Research, Zurich; 2001
 - iv The GHG Indicator: UNEP Guidelines for Calculating Greenhouse Gas Emissions for Businesses and Non-Commercial Organisations, Charles Thomas, Tessa Tennant and Jon Rolls, UNEP 2000
 - v E.g. preparation of financing concepts tailored to the requirements of the customers, creating alternative climate/carbon funds and CDM project financing within CAF's Latin American Carbon Program.
 - vi E.g. Dresdner Bank
 - vii Climate Change 2001: Impacts, Adaptation, and Vulnerability, IPCC Third Assessment Report, Technical Summary, A Report of Working Group 2, K.S. White, et al., chapter. 4.6, and Climate Change 1995: Impacts, Adaptations and Mitigation of Climate Change: Scientific-Technical Analyses, Contribution of Working Group II to the Second Assessment of the Intergovernmental Panel on Climate Change, R.T. Watson, et al.