

MANAGING THE UNAVOIDABLE:

UNDERSTANDING THE INVESTMENT IMPLICATIONS
OF ADAPTING TO CLIMATE CHANGE



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This report is intended as a starting point for a dialogue between institutional investors, companies, and policy-makers about how we may work together to respond to the physical impacts of climate change. We would be delighted to receive input/comment and to work with others to address this issue, which poses such significant investment and societal risks.

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Foreword

Climate change is now recognised as one of the most serious long-term challenges facing the investment community. While considerable effort has rightly been placed on understanding the implications of reducing greenhouse gas emissions, less attention has been given to the investment consequences of the now unavoidable impacts of physical climate change.

To help fill this analytical gap, four institutional investors – Henderson Global Investors, Insight Investment, RAILPEN Investments and the Universities Superannuation Scheme – have initiated a collaborative research project to identify how companies and their investors are likely to be affected by the physical impacts of climate change. This will include identifying, for a number of sectors:

- The major direct, physical climate change and weather-related risks (and associated opportunities) faced by companies in the sector;
- The potential implications for cash flows and balance sheets; and
- The disclosures required by investors to enable them to evaluate corporate exposures to climate change risks.

The project will focus initially on four sectors: electric utilities, oil & gas, real estate and water utilities. Although the focus of the project will be largely on UK-listed companies, the analysis of the potential implications will be transferable to companies in other countries. We also expect that the results will be relevant to investors in asset classes other than equities.

The ultimate aim is to contribute to the generation of better long-term and sustainable investment performance. We see that this will be achieved through:

- Enabling investors to make better informed investment decisions;
- Providing a structured basis for investors to engage with companies to encourage them to respond appropriately to the physical impacts of climate change; and
- Allowing investors to contribute meaningfully to discussions with governments, both nationally and internationally, around the policy and regulatory framework that will be needed to ensure that effective and efficient responses to the physical impacts of climate change are adopted.

The Adaptation Imperative

The world's climate is changing with immense, albeit still poorly understood, implications for investors. The changes – some of which are already starting to be observed – are expected to include changes in prevailing weather patterns as well as changes in extreme weather events:

- Average temperatures are rising and heatwaves are becoming more common;
- Patterns of precipitation are changing, with increased risk of flooding and drought;
- Glaciers are melting;
- Permafrost is thawing;
- Sea levels are rising;
- Storm surge heights are increasing; and
- There is evidence that the intensity of storms is increasing.

A changed world¹

- **Global average temperatures have increased by 0.7°C over the past century and are now rising by 0.2°C a decade.**
- **Eleven of the last twelve years (1995–2006) rank among the twelve warmest years since 1850.**
- **Even if greenhouse gas emissions were held constant at year 2000 levels, the world is committed to further warming of about 0.1°C a decade.**
- **Rising levels of emissions suggest, however, that warming could be much greater, ranging from 1.8°C to 4.0°C by the end of the century according to the latest assessment from the Intergovernmental Panel on Climate Change.**

These changes and their associated impacts, such as the potential for increased erosion and damage to physical assets, are particularly likely to affect investors in sectors dependent on large fixed assets, such as tourism, water, property, construction, energy, and infrastructure, as well as other climate-sensitive sectors, including health care, agriculture, forestry and insurance.

While action to reduce greenhouse gas emissions will help, in the words of the European Union's Environment Commissioner, Stavros Dimas, '*avoid the unmanageable*², the reality is that, as a result of past emissions, the world is sure to experience further warming in the decades ahead. Adaptation is, therefore, essential to, again in the words of Stavros Dimas, '*manage the unavoidable*³. The scale of the threat is clear. For example, the United Nations Environment Programme Finance Initiative has argued "*On one scenario, disaster losses could reach over US \$1 trillion in a single year by 2040.*"⁴, and reinsurers, such as MunichRe and SwissRe, have also demonstrated a rising trend in losses from natural catastrophes. In its Natural Catastrophes 2006 report, Munich Re stated clearly that "*capital markets have not been spared the consequences*

of increasingly frequent and violent natural catastrophes. **On the contrary, results and share prices are affected by resulting raw material shortfalls, damage to production sites and business interruption.** In addition, sectors such as agriculture, tourism, and healthcare are starting to feel the gradual effects of climate change. **Ultimately, economic performance as a whole suffers**⁷⁵ (emphasis added).

Case-Study: Changing Climate in Europe⁶

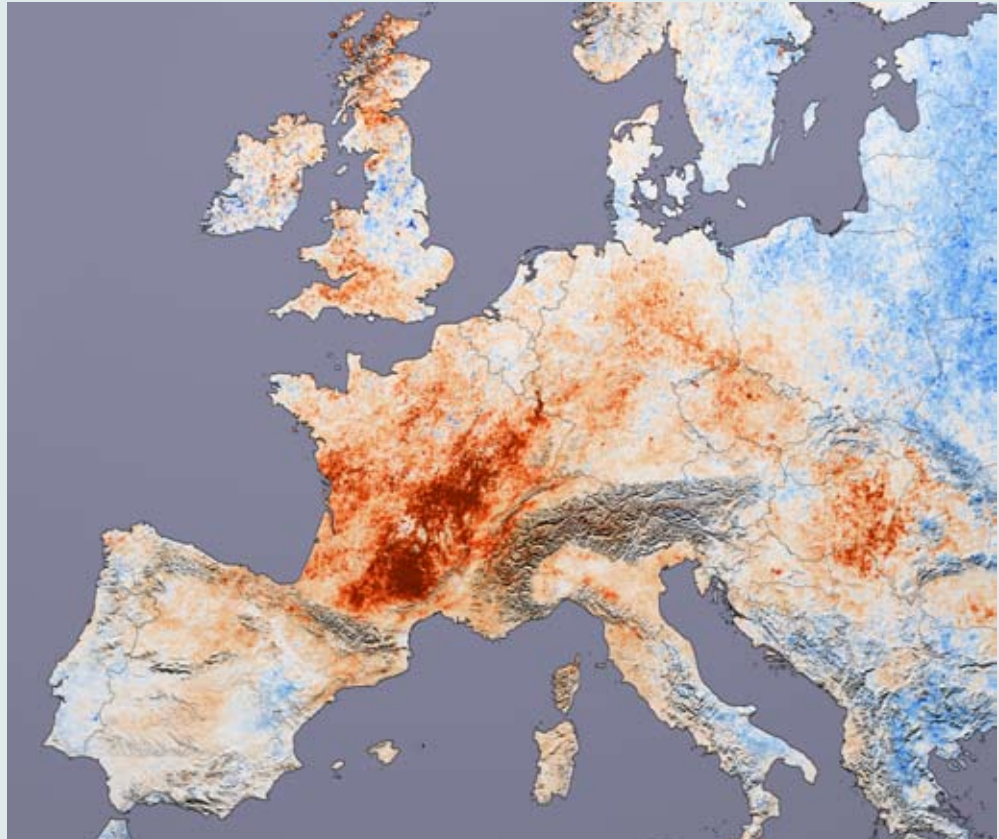


Figure 1: Thermal image of Europe at the height of the 2003 Summer heatwave (Source: NASA)

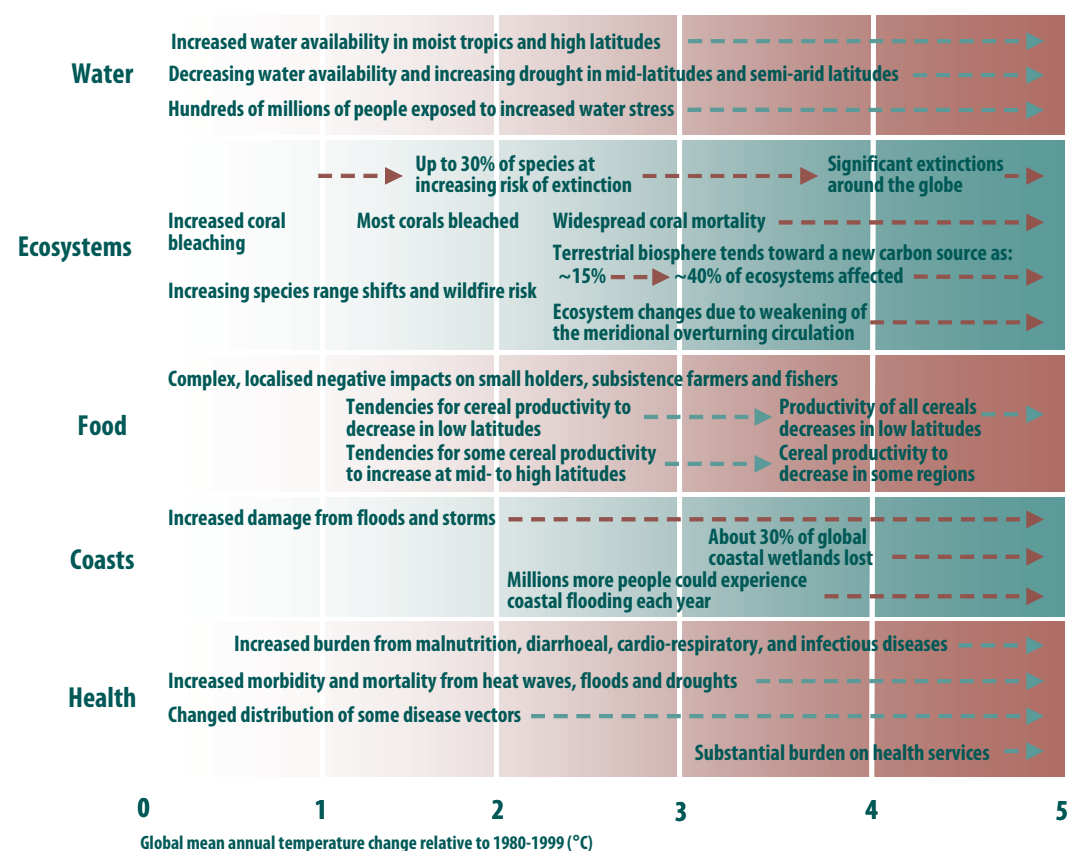
The summer of 2003 was an unusually hot one over large parts of Europe, with August temperatures some 3°C higher than the long-term average. This caused major business disruptions, and around 35,000 excess deaths have been directly attributed to the high temperatures. According to the Intergovernmental Panel on Climate Change (IPCC), these excess deaths are likely to be linked to climate change and the UK Met Office estimates that the risk of such anomalously high European temperatures has already doubled due to the effects of greenhouse gas emissions from human activities.

Figure 1 shows Europe as seen by a thermal imaging satellite at the height of the summer 2003 heatwave. The temperature anomaly against historical records exceeded 10°C in Southern Europe.

In the absence of any human modification of climate, temperatures such as those seen in Europe in 2003 are estimated to be a 1-in-1,000 year event. However, by the 2040s a 2003-type summer is predicted to be about average, and by the 2060s it would typically be the coolest summer of the decade.

Even though the broad consequences of climate change are increasingly well understood – see for example the IPCC’s assessment of the key impacts of rising global temperatures in Figure 2 – there are significant uncertainties around how climate change will impact on specific companies or specific sectors. Table 1 highlights just some of the many potential examples of how climate change may impact on companies and how the knock-on effects may be felt throughout the economy. These changes will leave companies with difficult business decisions; existing business models will need to change and new business opportunities will emerge. Inevitably, some existing businesses will fail.

Figure 2: Key Impacts of Rising Global Temperatures⁷



Public policy is also a key influence on how companies respond. As the profile of climate change rises and as the pressure on governments to take action increases, we can expect to see a range of policy measures adopted⁸. These may include development restrictions, tighter regulations on construction and demands for new or improved infrastructure (e.g., for the future-proofing of water distribution and treatment infrastructure).

The fact that climate change presents such a threat to companies means, in our view, that institutional investors have a clear interest in integrating an evaluation of the likely physical impacts of climate change into their investment analysis as an integral part of generating long-term returns for their clients. However, as Table 1 illustrates, properly understanding these risks is not a trivial matter and it requires that investors consider climate change risk on a sector-by-sector and company-by-company basis.

Table 1: How Might Climate Change Impact on Business?

Potential Climate Change Impact	Potential Questions facing Companies
<p>Increasing temperatures</p>	<ul style="list-style-type: none"> • Will facilities be able to cope with higher temperatures? Will there be a need for more investment in air-conditioning (e.g. for IT equipment and data rooms)? • Will work practices need to change to reduce exposures of staff to higher temperatures? For example, will there be constraints on construction activities during the hottest hours of the day? • Will the Mediterranean continue to be a popular tourist destination? How will this impact on airlines and the travel industry more generally? • Will changing weather patterns lead to changing patterns of consumer demand for items such as hot/cold drinks, clothing, furnishing and fittings, white goods? • Will the nature of agricultural activities change (e.g. will the UK become a significant wine producer)?
<p>Increasing severity of storms and other extreme weather events</p>	<ul style="list-style-type: none"> • Will new building designs and standards need to change to make them more resistant to storm damage? Will existing buildings need to be altered to make them more storm-proof? • Will extreme weather events impact on transportation systems? Will such interruptions impact just-in-time delivery systems (e.g. for retailers)? Do companies need to develop new approaches for product transport and distribution? • Will insurance premiums rise to reflect increased risks of property damage and other losses from extreme weather events such as the UK floods in the Summer of 2007?
<p>Changes in rainfall patterns</p>	<ul style="list-style-type: none"> • Will power companies have sufficient cooling water to operate their plant safely and efficiently? For example, during the 2003 heat wave, French nuclear power generation had to be severely curtailed as river water levels were too low and the water itself was too warm.

It is important to recognise that there will also be significant investment opportunities arising from adaptation. For example, the need to increase expenditure on flood defences such as higher sea walls, increased drainage capacity and new reservoirs will probably benefit companies specialising in the financing, management and engineering of large infrastructure projects⁹. Other adaptation opportunities are likely to be found in financial markets, in particular the insurance sector, and the emerging business of insuring against climate risk. In this sector, the opportunities will not be confined to the obvious area of weather-related insurance products, but may extend into potential new domains of risk such as insurance against rising health problems resulting from global warming¹⁰.

Adaptation as Risk Management

Adaptation can be defined as “*actions taken to cope with a changing climate*”, with the objective of reducing risk and damage, and exploiting potential benefits¹¹. In this frame of reference, public policy and corporate adaptation are trade-offs between the costs incurred in taking action to respond to climate change and the potential costs associated with the residual risks that remain after the adaptation actions have been taken.

Adaptation is crucial for dealing with the unavoidable impacts of climate change, but, to date, has been under-emphasised by the media, policy makers and NGOs. There are various reasons:

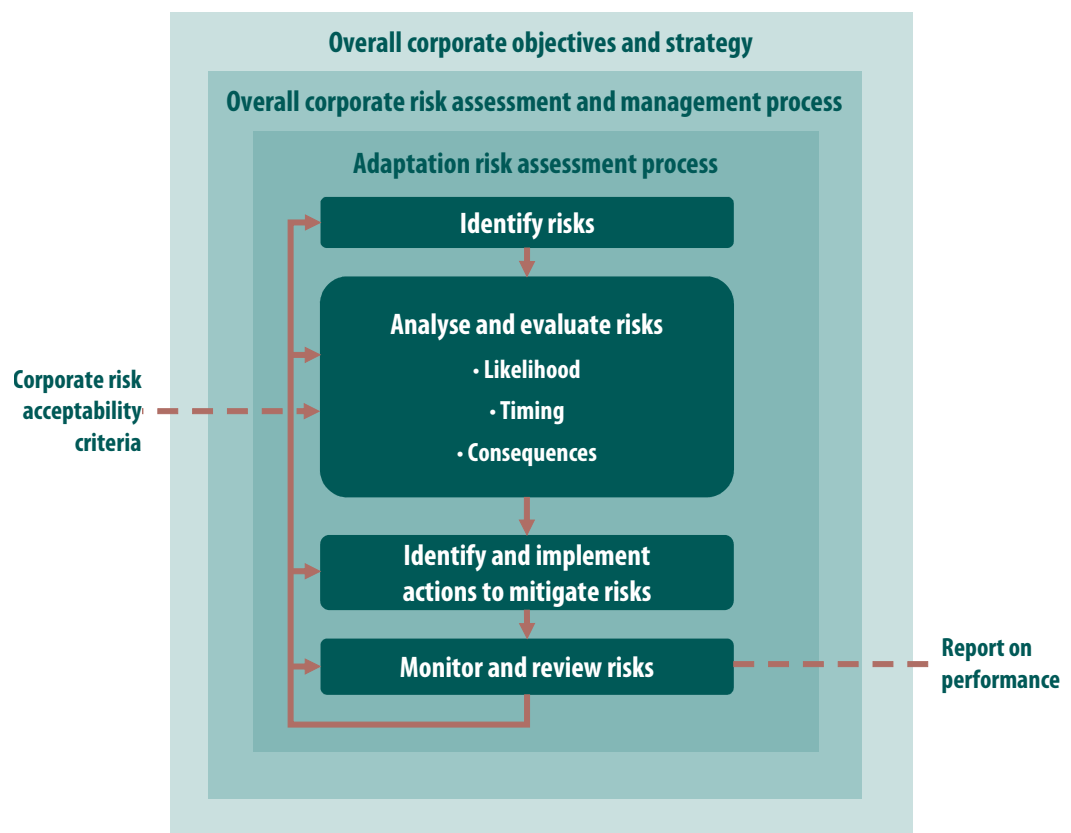
- Adaptation has been seen as ‘throwing in the towel’ or simply accepting the inevitability of climate change;
- Adaptation is not an easy or cost-free option;
- Adaptation cannot reduce the costs of climate change to zero;
- The financial benefits – ‘avoided climate change impacts’ - are not necessarily obvious to companies;
- The benefits do not necessarily accrue to the companies taking action;
- The costs are not necessarily borne by the parties who make or have made the greatest contribution to climate change; and
- There are real limits to adaptation (i.e. the negative impacts of climate change cannot be completely eliminated).

Currently, neither governments nor companies are investing appropriately in adaptation. Effective and appropriate responses are constrained by a number of barriers, notably uncertainty and imperfect information, misaligned markets and financial constraints¹². Hence, just as profound changes to market incentives are essential for reducing greenhouse gases, so governments need to put in place the right framework of regulation and public investment to manage physical climate risks. As the EU Green Paper on adaptation notes, “*Market forces alone are unlikely to lead to efficient adaptation because of a certain degree of uncertainty in the climate projections and lack of financial resources*”¹³.

However, as investors, we believe that the onus is on companies to evaluate the risks and opportunities associated with the need to adapt to climate change, irrespective of the policy framework. The reality is that many climate change risks are already ‘hard-wired’ in and corporate risk management and strategy processes must take account of these risks, in a similar manner to other business risks. It is, therefore, our view that companies should view climate change adaptation as they would any other business risk; the risks and opportunities presented by adaptation should be explicitly identified and integrated into overall corporate risk management and strategic planning processes. Furthermore, companies should be able to explain to their investors how these risks have been identified, assessed, and managed.

In the following sections, we outline the key steps that we expect a company to take when assessing the risks associated with a changing climate and deciding how to both manage and adapt to these risks. This is not prescriptive, but outlines the key steps we believe should be undertaken in an appropriate climate risk assessment and management process. We would emphasise two points about the framework presented. The first is that we do not see climate change as a 'stand-alone risk' for business. Rather, climate change is just one of the risks faced by companies and so should be assessed and managed in a similar manner to other business risks. The second is that the risk assessment process is dynamic. The rapidly changing scientific knowledge about the physical impacts of climate change and the evolving regulatory framework mean that climate change risk assessment is not a one-off activity but needs to be reviewed and updated on a regular basis.

Figure 3: Outline of a climate risk assessment process



1 Identify Risks

Companies need to identify the manner in which the physical impacts of climate change and the knock-on consequences could affect their business. The physical impacts that are of concern will be both sector and geographically determined. In the European energy sector, for example:

- In some areas, rainfall is projected to fall, and summers to get drier. This, in turn, could reduce the availability of cooling water for thermal and nuclear plants and for generating hydroelectricity.
- Whilst there are some uncertainties, the severity of storms is predicted to increase, potentially increasing the frequency and duration of interruptions in supply, with coastal generating capacity and transmission grids particularly vulnerable.
- Summer and winter temperatures are both predicted to increase. This is likely to lead to falls in the demand for heating in winter but increases in the use of air-conditioning in the summer months.

2 Analyse and Evaluate Risks

Once risks have been identified, companies need to assess:

- The rate of change (i.e. how quickly will changes in climate emerge). It is important to recognise that, in many cases, the changes will be gradual and not necessitate immediate changes in strategy and/or operations.
- How often weather-related events, particularly severe events, may occur.
- The magnitude of the likely consequences (financial, impacts on the business model, potential to disrupt the corporate strategy).

Following this assessment, companies will need to compare the predicted levels of risk (which is a function of the likelihood of occurrence and the magnitude of the predicted consequences) against the company's risk acceptability criteria to identify priorities for action. It is important to recognise that risks are not necessarily negative, and the assessment may also identify business opportunities.

3 Identify and Implement Actions

Companies then need to identify options for adaptation, evaluating the costs and benefits of the available strategies. In broad terms, six main risk mitigation options are available:

- **Avoid** the risk, for example, by closing or moving operations.
- **Reduce** the risk, for example, by climate-proofing buildings and infrastructure.
- **Transfer** the risk through, for example, purchasing insurance or outsourcing certain activities to third parties.
- **Accommodate** the risk, for example, through better heatwave and emergency planning.
- **Accept** the risk, where the costs of addressing the risk may be too great relative to the benefits received.
- **Identify opportunities** associated with a changing climate.

4 Monitor and Review Risks

Adapting to climate change is not a static process, but rather needs to be regularly monitored and reviewed to check implementation and take account of new information and developments.

5 Report

Where climate change-related risks impinge on the ability of the company to deliver on its business strategy and/or creates opportunities, this information should be provided to investors. Specifically, companies should explain:

- The process followed to assess climate change-related risks and to assess the significance of the business risks and opportunities.
- The manner in which these risks and opportunities are incorporated into corporate strategy and decision-making.
- The capital and other expenditures that are being incurred to adapt to climate change. If the costs of climate change adaptation are material, companies should also specify the net costs to the business in terms of profit and loss and any impacts on the balance sheet. This should incorporate consideration of residual (i.e. after climate change adaptation measures have been implemented) climate change-related risks.

The Role of Investors

We recognise that adaptation to climate change represents a major challenge for investors and companies. There are significant uncertainties around the physical impacts of climate change and, perhaps more importantly from our perspective as institutional investors, uncertainty over the impacts on individual companies and on the economy as a whole. We recognise that further research to quantify investment risks and opportunities is critical. However, the need for further research should not be used as an excuse for inaction. The scale of the threat posed by climate change means that companies and governments need to take action now, notwithstanding the prevailing uncertainties with which we have to deal.

As investors, we recognise that we have a critical role to play in this process. We see that our contribution is in four main areas:

- Research to understand the risks associated with adaptation. This project is a critical initial step, but it is only a start in the process of developing the necessary tools for investment analysts and fund managers.
- Incorporation of climate change risks and opportunities into our investment analysis and decision-making. This may require pension funds and fund managers to reassess the timeframes over which investment decisions are made and over which investment performance is evaluated.
- Engagement/dialogue with companies to ensure that they recognise climate change adaptation as a risk, that they explain to investors how they have assessed these risks, and that they have established appropriate systems and processes to respond to these risks. The framework outlined in Section 2 above is a starting point in this process.
- Engagement/dialogue with public policy makers to both encourage policy development in this area, and to ensure that the views of long-term investors are taken into account.

Endnotes

- 1 Intergovernmental Panel on Climate Change (IPCC) (2007a), *Climate Change 2007: The Physical Science Basis* (IPCC, Switzerland). For a summary of the IPCC's 2007 reports, see IPCC (2007b), 'Climate Change 2007: Synthesis Report – Summary for Policymakers' (IPCC, Switzerland).
- 2 Dimas, S. (2007), 'Adaptation to Climate Change: It may be a Matter of Survival!'. Presentation to the Adapting to Climate Change Conference: Launching a Public Debate on Options for EU Action, Brussels, 3 July 2007.
- 3 Dimas (2007) (Note 2).
- 4 United Nations Environment Programme Finance Initiative (UNEP FI) (2006), *Adaptation and Vulnerability to Climate Change* (UNEPFI, Geneva).
- 5 MunichRe (2007), *Natural Catastrophes 2006* (MunichRe, Munich).
- 6 Firth, J. & Colley, M. (2006), *The Adaptation Tipping Point: Are UK Businesses Climate-proof?* (Acclimatise and UKCIP (on behalf of the Carbon Disclosure Project), Oxford); IPCC (2007c), *Working Group II: Climate Change Impacts, Adaptation and Vulnerability* (IPCC, Switzerland), Chapter 8: Human Health.
- 7 IPCC (2007c) (Note 6).
- 8 See, for example, the types of measures outlined in the European Commission Green Paper on Adaptation (European Commission (2007), "Adapting to Climate Change: Options for EU Action. SEC (2007)849"). See further the EU website 'Living with Climate Change in Europe', http://ec.europa.eu/environment/climat/adaptation/index_en.htm
- 9 Stern, N. (2006), *Stern Review of the Economics of Climate Change* (HM Treasury, London), Chapter 18: Understanding the Economics of Adaptation.
- 10 See, for example, Mills, E. (2007), *From Risk to Opportunity: Investor Responses to Climate Change* (Ceres, Boston).
- 11 European Commission (2007) (Note 8).
- 12 Stern (2006) (Note 9)
- 13 European Commission (2007) (Note 8).