

Adapting to Climate Change Business as Usual?

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The members of the London Climate Change Partnership – Finance Group are

- acclimatise
- Association of British Insurers
- Barclays
- Carbon Disclosure Project
- Corporation of London
- Environment Agency
- Financial Services Authority (FSA)
- Government Office for London
- Greater London Authority
- Institutional Investors Group on Climate Change (IIGCC)
- KPMG
- Lloyds
- UK Climate Impacts Programme (UKCIP)
- Universities Superannuation Scheme (USS)

Any recommendations in this report reflect the views of the London Climate Change Partnership and do not necessarily reflect the views of the individual members of the London Climate Change Partnership.

Foreword

Climate change is the great challenge of the twenty first century. We have to focus on two inter-linked tasks: adapting to changes in our climate that are now inevitable (adaptation) and reducing emissions of greenhouse gases to limit further, more dangerous climate change (mitigation).

This report focuses on adaptation and examines how London is financially exposed to global climatic events. It highlights the responsibilities, challenges and opportunities facing London's financial service sectors, and poses a number of key questions that place adaptation to unavoidable climate change at the heart of the decision-making process.



The HM Treasury recently published the Stern Review: The Economics of Climate Change. The Review, which states that "Climate change presents a unique challenge for economics: it is the greatest and widest-ranging market failure ever seen. The economic analysis must therefore be global, deal with long time horizons, have the economics of risk and uncertainty at centre stage, and examine the possibility of major, non-marginal change", and that "the benefits of strong, early action considerably outweigh the costs."



Financial markets and businesses need to grasp the reality we face: that we have to invest now to both reduce our emissions and adapt to unavoidable climate change. There is no choice between mitigation and adaptation – we have to pursue complementary actions on both.

We are asking you to consider how your operations, investments and business interests are affected by extreme weather events, changes in weather patterns, rising temperatures, sea level rise and other related phenomena both now and in the future. We'd like to discuss what actions you are taking to adapt to these risks, and what are the associated financial implications.

Gerry Acher CBE LVO

Chair, London Climate Change Partnership

A handwritten signature of Gerry Acher in black ink.

Ken Livingstone

Mayor of London

A handwritten signature of Ken Livingstone in black ink.

Executive Summary

- This paper poses questions for discussions to be held between London's financial leaders and the Mayor of London. It is our hope that our discussions will begin processes that possibly lead to a memorandum of understanding between the Mayor and the financial services industry in London.
- The management of climate change risk and impact is approached through both *Mitigation* and *Adaptation* measures. Adaptation is action to manage the inevitable effects of climate change. Mitigation focuses on reducing greenhouse gas (GHG) to minimise further climatic impacts.
- Adaptation has historically has a lesser focus than mitigation. However it is the lack of adaptation that exposes financial institutions and the assets in which they invest, insure or fund, to extreme weather events, drought and sea-level rise for at least the next 50 to 100 years.
- Although some financial service sectors (eg. commercial property insurance) seem more exposed than others the interconnectivity of the financial interests and the overarching responsibilities of regulators and policy-makers, highlights the indirect risk to all financial sectors posed by our changing climate. Figure 1 illustrates the basic linkages between the main financial industries, their regulators and policy-makers, and the climate change research providers.

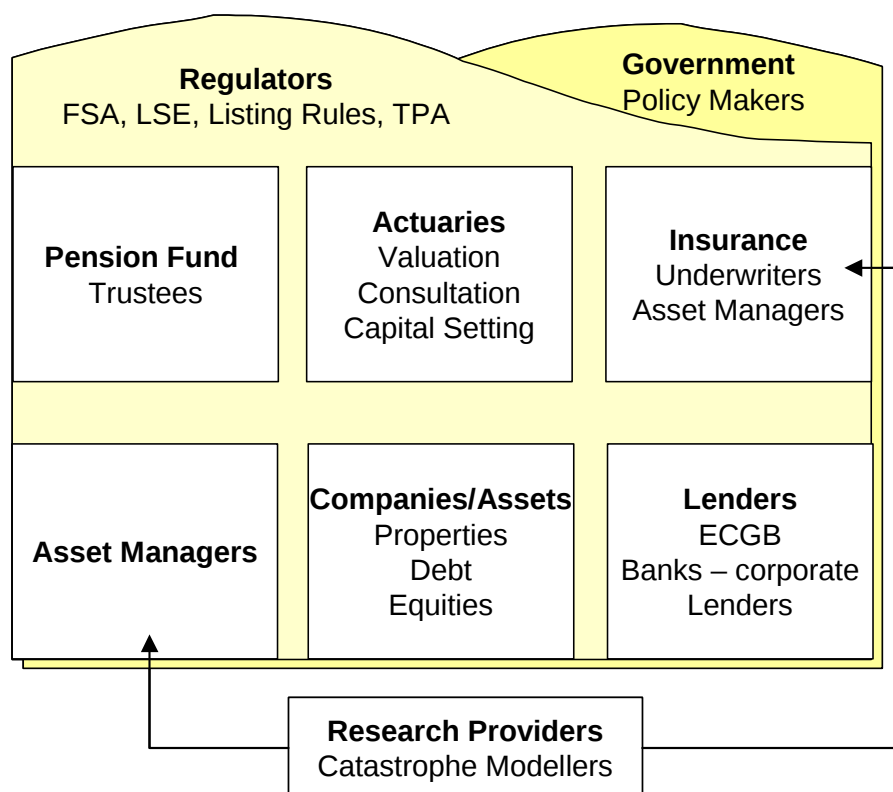


Figure 1. Linkages between financial service sectors.

- The report poses a number of key questions aimed at the Insurance, Banking, Pensions, Fund Management, and Infrastructure and Utility sectors, to raise awareness and initiate discussion about climate change adaptation risks to business and markets. These questions have been developed from within the individual industry sectors. They include;
 - o Should the **Insurance** industry be advising policyholders now of potential uninsurable zones in the future?
 - o How should the **Insurance** industry, as major shareholders, use its influence to help mitigate and adapt to climate change?
 - o How can the **Insurance** industry encourage and reward good practices by policyholders and developers?
 - o To what extent are future scenarios related to climate change considered in credit assessment and lending portfolio planning by the **Banking** industry?
 - o To what extent do **Banks** require borrowers to demonstrate that they have identified and incorporated climate change impacts on their business model, including value chains?
 - o Have **Pension** fund trustees' investment policy been revised to take account of climate change risks and opportunities?
 - o How are the policy and physical implications of climate change being addressed in the investment decision-making processes of **Fund Managers**?
 - o Are **Fund Managers** communicating to government and regulators that policies should support long-term investment decision-making?
 - o Are investors and lenders incorporating resilience to climate change in their investments within **Infrastructure and Utilities**?
- Adaptation to inevitable climate change needs to be embedded within our decision-making processes. This report provides a brief summary of climate change risks for each of the major financial sectors, with reference to key impacts on global and London markets.

Climate Change – overview

The climate is changing. Since the industrial revolution, human activities have increased concentrations of carbon dioxide (CO₂) and other greenhouse gases in the atmosphere, by one-third. By the end of the 21st century, they are expected to be two or three times higher. Even if we were able to make dramatic reductions in emissions immediately, we would still have to deal with rising temperatures, changing rainfall patterns and centuries of sea level rise, because of inertia in the global climate system: what we have already emitted will continue to cause a changing climate for many years.

This is shown in Figure 1, which presents temperature rises to the year 2100 under different greenhouse gas emission scenarios, from a low (B1) emissions scenario to a high (A1FI) scenario¹:

- until about 2040, all the scenarios are 'bunched together' – temperature rises on these timescales are already built in to the climate system, due to emissions that have already been released;
- thereafter, we still have some choice – the amount of climate change we will experience depends on emissions we release in the next couple of decades.

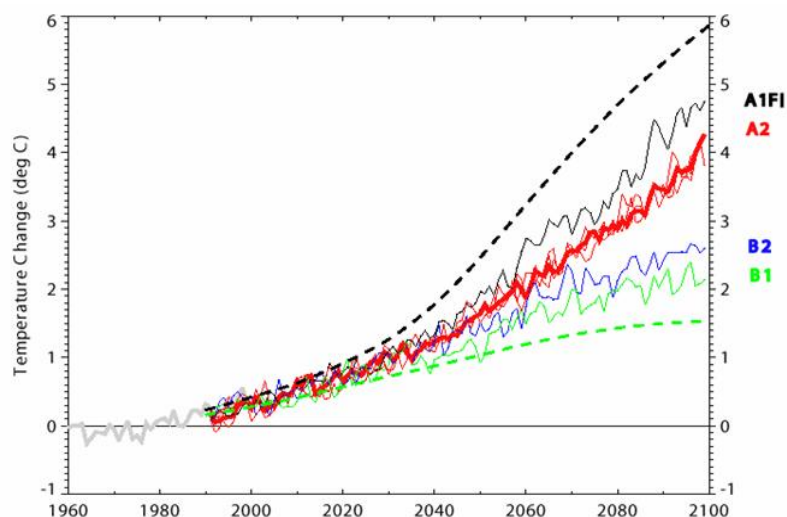


Figure 2. Annual average global temperatures are expected to increase by between 1.5°C (under a low emissions, B1 scenario) to 6°C (under a high emissions, A1FI scenario) by the year 2100. Temperature increases until about 2040 are already built into the climate system¹. (The solid lines show changes simulated by the Hadley Centre model, HadCM3. The dotted green and black lines show the full range, using several climate models).

¹ Hulme, M., Jenkins, G.J. et al. (2002). Climate Change Scenarios for the United Kingdom: The UKCIP02 Scientific Report, Tyndall Centre for Climate Change Research, School of Environmental Sciences, University of East Anglia, Norwich, UK.

We are already beginning to experience increased impacts from climate change. Damaging high temperature extremes are occurring more often. The summer of 2003 was unusually warm over much of Europe and was the hottest in at least 500 years – about 3°C warmer than the historical average (Figure 3)². Across Europe, 30,000 people died and US\$15bn economic losses occurred. It is estimated that the risk of such unusually high European temperatures has already doubled due to man-made emissions³. These extremes will soon become the norm. By the 2040s, temperatures as high as those experienced in the summer of 2003 are expected to occur every other year. By the 2060s, summers like 2003 will be regarded as ‘cool’.

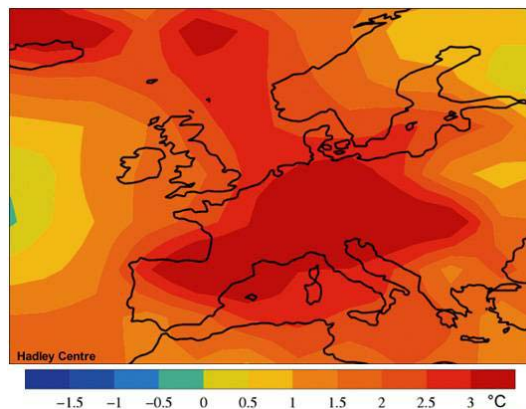


Figure 3. High temperatures over Europe in the summer of 2003 caused 30,000 deaths and US\$15bn economic losses.

Rising temperatures are bringing with them changes in other aspects of our climate:

- Changing rainfall patterns – some areas are getting wetter and others, drier (Figure 4);
- Drought risks are increasing in some areas and at certain times of the year;
- Increasing flood risk – due to heavier winter rainfall and rising sea levels (Figure 5)⁴.

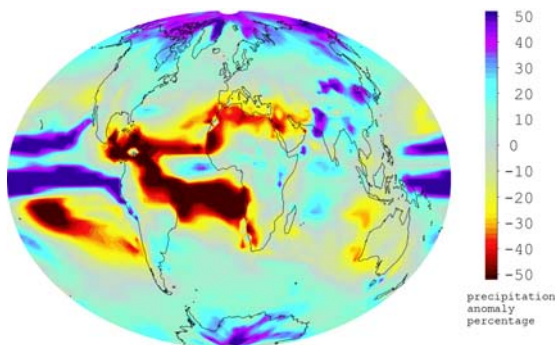


Figure 4. Precipitation patterns are changing. By the 2080s, some areas could receive less than half of current rainfall. Others will get much wetter.

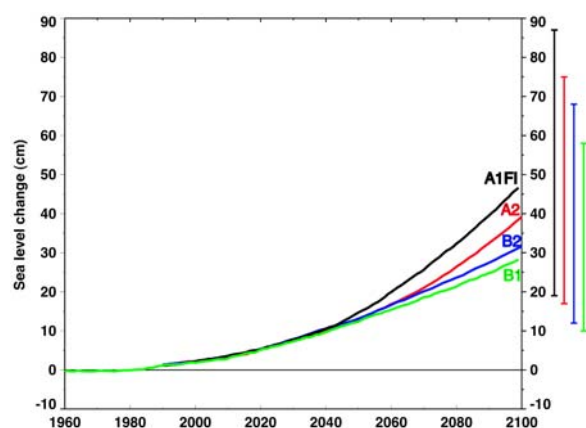


Figure 5. Global sea levels are rising. By 2100, levels could be up to 90cm higher than today. These apparently small rises will dramatically increase flood damages. (The curves show changes simulated by the Hadley Centre model, HadCM3. The range bars to the right show the full IPCC range, based on several climate models.).

² Hadley Centre, Met Office. (2005). Climate change and the greenhouse effect.

³ Stott, P.A., Stone, D.A. and Allen, M.R. (2004). Human contribution to the European heatwave of 2003. *Nature*, 432, 610 – 614.

⁴ Hulme *et al*, as above.



Figure 6. Hurricane Katrina caused 1,836 deaths and insured losses of more than US\$81Bn. Losses amounted to 50 to 100 times the insurer's typical annual profit in the affected states.

There is also mounting evidence that tropical cyclones (also known as hurricanes in the North Atlantic) will become more intense in a warmer world. The devastating impacts of Hurricanes Katrina and Rita in 2005 demonstrate the kinds of risks that could become more common (Figure 6). 2005 saw weather-related catastrophe losses total almost US\$80Bn worldwide, equivalent to four "9/11s". Note that 99.7% of all catastrophe losses in 2005 were due to weather-related events.

These various changes in our climate will create new risks for natural systems, our buildings and our social and economic systems. Risks will be felt across all aspects of business activity:

- natural resources and raw materials;
- supply chains and logistics;
- operations and processes;
- products and services;
- asset design, operation, management and decommissioning;
- asset value;
- workforce;
- markets for goods and services;
- customer requirements.

A recent report has analysed the Carbon Disclosure Project⁵ (CDP) responses of businesses in the UK FTSE350 to explore their understanding of these risks⁶. The report identifies key climate risks for each of the main FTSE350 business sectors, including litigation, brand and reputation, market risks, investor confidence and financial performance. It also considers the actions that can be taken to embed climate risks management into decision-making, to build resilience and 'climate-proof' businesses.

As indicated above, we are already beginning to experience these risks and the costs they bring – the number of weather-related catastrophes is rising year on year, along with insured losses (Figure 7)⁷.

⁵ The Carbon Disclosure Project is a secretariat for the world's largest institutional investor collaboration on the business implications of climate change

⁶ Firth, J., and Colley, M. (2006). The Adaptation Tipping Point: Are UK Businesses Climate Proof? acclimatise and UKCIP, Oxford.

⁷ Association of British Insurers. (2005). The financial risks of climate change.

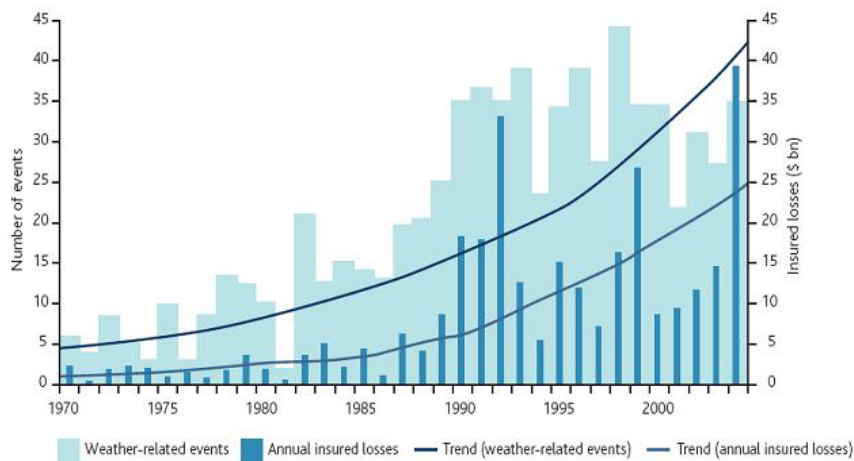


Figure 7. The number of weather-related catastrophes and the value of insured losses are rising.⁶

The good news is that there is now sufficient information available on climate change for organisations to take it into account in strategic and project decisions. Some now argue that the large-scale implications of climate change are reasonably foreseeable⁸; and hence that climate change should be on the radar screens of all businesses in their corporate risk assessment procedures. As such, it should be on the radar screens of those in the financial services sector who provide resources, capital and insurance, etc. to those companies.

Sir Nicholas Stern, Head of the UK Government Economic Service and former World Bank Chief Economist, states in The Stern Review that key elements of future international frameworks which should be implemented to guide a global response should include:

- Emissions trading
- Technology co-operation
- Action to reduce deforestation
- Adaptation

When focusing on adaptation, the Review also states that “studies in climate-sensitive sectors point to many adaptation options that will provide benefits in excess of cost. But at higher temperatures, the costs of adaptation will rise sharply and the residual damages remain large. The additional cost of making new infrastructure and buildings resilient to climate change in the Organisation for Economic Co-operation and Development (OECD) countries could be US\$15-150 billion each year (0.05 – 0.5% of GDP).”

Using the results from formal economic models, the Stern Review estimates that if we don’t act, the overall costs and risks of climate change will be equivalent to losing at least 5% of global GDP each year, now and forever. If a wider range of risks and impacts is taken into account, the estimates of damage could rise to 20% of GDP or more⁹.

⁸ Dowden, M. and Marks, A-C. (16 July 2005.) Come rain or shine. Estates Gazette.

⁹ The Stern Review (2006). The Economics of Climate Change.

Insurance

Background to sector

As the world's largest industry - with US\$3.4 trillion in yearly premium revenue, plus a further trillion in investment income¹⁰ - the insurance industry is uniquely positioned to lead public and private sector's understanding and uptake of climate change adaptation.

The insurance industry is comprised of the life and general sectors. The life sector includes life assurance, annuity, health, pensions savings and mortgage savings. The general sector includes both commercial and residential lines including property and liability covers. The UK industry accounts for almost 20% of the UK economy's total net worth and has net insurance premiums of over £110bn, making it the third largest insurance industry in the world. Assets in the UK amount to £1,488bn of which 45% is invested in equities, 40% in corporate and government bonds, 6% in cash and 6% in property; the remainder is held in other assets (such as derivatives held for hedging purposes).

The London insurance market has significant overseas exposures, so London as a financial centre is exposed to climate change risks around the world. Nearly one quarter of the UK insurance companies' net premium is derived from overseas business, totalling £32 billion¹¹.

What are the impacts?

The balance sheets of the insurance industry may be affected on both sides by climate change. Assets may fall in value suddenly if climate related impacts occur, long-term growth may also be lower than predicted leading to lower returns on certain groups of assets. Liabilities may also rise. In particular, general insurers will, under current policy conditions, pay for damage to property caused by the increase in frequency and severity of floods, storms and subsidence and may also pay for liability as injured parties seek someone to blame. Life insurer liabilities may also be affected, though the impact is less clear in this case, scientists are now forecasting significant effects on pensioner mortality.

As outlined earlier, in the UK we can expect climate change to bring wetter winters, and hotter drier summers. This could lead to flooding and heave in winter and subsidence in summer. The tracks of winter storms, which typically flow north of Scotland, may move further south causing more frequent storms like those in 1987 which materially affected the south coast of England, leading to large aggregations of property losses. In the last 5 years UK insurance sector has paid £22bn in claims for damage to property and £12bn in claims for accident and health.

Another potential risk arises from changes to North Atlantic hurricane cycles. Due to changing conditions, insurers must plan for a higher frequency of more extreme climate events, over a longer storm season (after the official end of the 2005 "hurricane season" at the end of November, there was a hurricane in December and a cyclone in January) and over a wider geographical area (tropical cyclones have recently hit Brazil and Spain for the first time in recorded history and Los Angeles was at risk from Hurricane John in 2006).

Hurricane Katrina contributed to 2005's catastrophic losses of approximately US\$45Bn, out of a total economic loss of US\$216Bn (Figure 8). The loss of 245,000 homes was 10 times that of Hurricane Andrew in 1992 where insured losses totalled US\$45Bn.

¹⁰ Ceres. (2006) From Risk to Opportunity: How Insurers Can Proactively and Profitably Manage Climate Change.

¹¹ Association of British Insurers (2005). UK Insurance – Key Facts

U.S. insurers have experienced growth in weather-related catastrophe losses from levels of about \$1 billion per year in the 1970s to an average of \$17 billion per year over the past decade, far out-stripping growth in premiums, populations, and inflation during the same period. With \$71 billion in weather related losses, 2005 was the single worst year on record¹⁰.

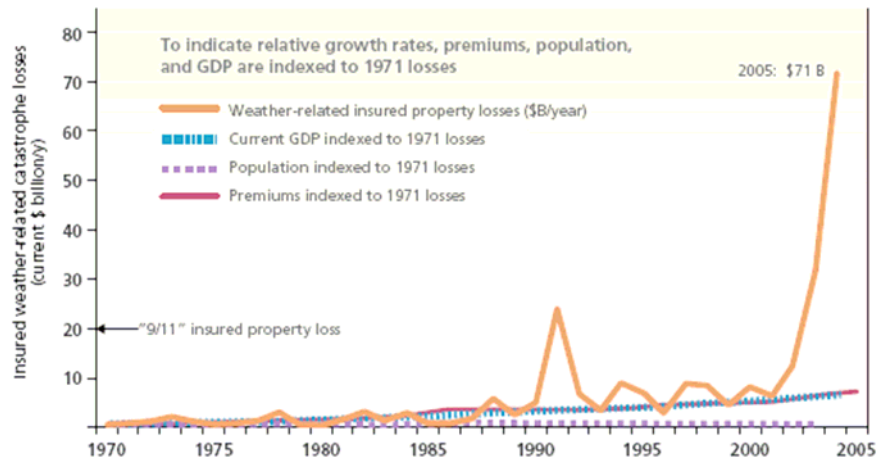


Figure 8. US insured catastrophe losses growing faster than premiums, population, GDP. Source: Mills, Roth, and Lecomte (2005), updated to show 2005 losses by Ceres Report¹.

This destruction of property will cause aggregations of loss for general insurers; but will also adversely affect the finances of their policyholders as they have to pay policy excesses with greater frequency.

Globally, it is possible that climate change will lead to political unrest and even possibly war. Water will become an even more scarce resource in some parts of the world, while in others, rising sea levels may cause mass migrations leading to international tensions. India and China may both be particularly affected as large parts of these countries will be prone to flooding and drought due to the melting of and reduced water flow from Himalayan glaciers. These countries are particularly significant for insurers, as UK insurers have outsourced work to India. Climate change creates operational risks as well. Increasing numbers of UK companies rely on China for manufacturing, hence the value of assets will be adversely affected, and both of these countries are predicted to provide much of the insurance industry's future growth prospects. Therefore climate change is likely to lead to uncertainty within financial markets, which tends to make them perform poorly.

Insurance exists to manage risk. The precise impacts of climate change are not certain and this is a key point. Uncertainty is risk. This risk will lead to higher capital requirements and inevitable increases in premiums for policyholders. It may also lead to increased demand for insurance.

Therefore, while most attention is focused on risks and impacts, climate change also creates considerable business opportunities. The insurance industry leads in risk identification, which then opens opportunity to develop creative loss-prevention products and services to reduce climate-related losses across all investment sectors.

Role of advisers and regulators

The insurance market in the UK is regulated by many regulatory bodies around the world. The Financial Services Authority (FSA) in the UK has clearly stated that climate change should be taken into account in capital modelling. Lloyd's gives guidance to its market and has also stated that it is not acceptable to wait until the detail is clear; climate change adaptation should be on the agenda now.

Advisers for insurers include actuaries, accountants, lawyers and consultants. These groups are relied on by boards and senior managers within companies and they have a duty to consider all relevant factors when framing their advice. The recent tobacco rulings have shown that once a risk is reasonably foreseeable companies should take action to manage it, or they may be held negligent. Since the early 1990s there has been strong evidence that climate change will have significant, generally detrimental impacts. Hence lawyers might argue that damage caused by climate change was reasonably foreseeable, and that advisors should have been taking this into account in framing their advice and directors should have considered the issues. If this has not been happening, the advisors and directors are at risk of litigation. The general insurance industry may pick up part of these costs through Professional Indemnity and Directors and Officers covers; in turn this will inevitably lead to higher premiums for this class of insurance.

Taking actuaries as an example, they:

- advise on investment decisions;
- make assumptions about the rate of future investment returns when pricing products and calculating capital requirements;
- make assumptions on expected future losses when calculating reserves and capital requirements under the FSA's Individual Capital Adequacy Standards (ICAS) regime.

All decisions taken now by directors and professional advisers that do not take climate change into account may be open to future legal challenge. In the future the courts may examine claims for damages and decide that it was reasonable today for us to have foreseen the impacts of climate change and that the defendant business or adviser should have taken this issue into consideration¹².

There are many other advisers to the insurance industry (underwriters, accountants, lawyers and catastrophe modelling companies to name a few); they should all ensure that their advice is appropriately far-sighted.

Key questions

Life and pension products typically lock-in assumptions (on investment returns, mortality, morbidity, policyholder behaviour etc) for very long periods (often 20-30 years and beyond). In uncertain times this may be a more risky strategy as predicting the future becomes more difficult. **Are products that were designed in stable times appropriate in times of change? How do long-term products take account of climate change?**

Policyholders could be seen as risk partners rather than just "customers". There seems to be a widespread misunderstanding by the public of how insurance works to pool risks between the many for the good of the few. **Should the industry invest in communicating the impacts of climate change and the role of insurance to the public? How can the industry encourage and reward good practices by policyholders? How should insurers deal with policy / political exposure arising from a changing climate?**

¹² Firth, J., and Colley, M, (2006). The Adaptation Tipping Point: Are UK Businesses Climate Proof? acclimatise and UKCIP, Oxford..

For general insurers there is a possibility that some areas will become uninsurable. Due to the annual contract nature of this business, insurers will be able to withdraw cover in these regions. This will leave policyholders very exposed unless governments step in to provide cover and could create ill-will amongst the public against insurers. The current availability of insurance in all areas might also be encouraging construction work where it should be discouraged. **Should the insurance industry be advising policyholders *now* of potential uninsurable zones in the future? Should the insurance industry be working with mortgage lenders to identify potential high-risk areas?**

The recent large losses for general insurers in the Gulf of Mexico caused by hurricanes Katrina, Rita and Wilma came as a surprise to the insurance industry. The catastrophe models on which pricing and capital calculations were based had not taken into account trends and cycles in the climate; despite the fact that research had been published several years previously by scientists warning them to do so. Part of the reason for this is political. **How can the insurance industry avoid similar surprises? Should the industry pay for climate research and have closer contact with academics in relevant fields? Do insurers expect their advisors to be considering these risks and keep up-to-date with scientific forecasts?**

The solvency of general insurers was not threatened by the major hurricanes in 2005. This is largely because premium rates had been set at profitable levels in the preceding period. Insurance business often goes in cycles between profits and losses. It is a cautionary thought to consider how the position would have been different had the hurricanes occurred during a loss making period. This makes it even more important for the industry to price risk according to exposure and to underwrite for profit. It might help if regulators gave clearer advice on how climate change should be dealt with, considering that extremes are predicted to become more frequent and intense (Figure 9). **Do you agree that a changing climate makes it more important to price according to risk? If so how can insurers manage the loss making cycles?**

Insurers have vast assets under management. They could instruct their fund managers to engage with the boards of the companies they invest in to encourage and empower them to act in a climate responsible way. There is a growing view that such approaches will lead to long-term value protection; improving for their bottom line as well as the environment. **Should the Insurance industry, as major shareholders, use its influence to help mitigate and adapt to climate change?**



Figure 9. Examples of extreme weather patterns experienced in recent years. Floods in Carlisle and drought in the south east of England during 2005.

Banking

Background to sector

This section includes investment banking, corporate and retail banking and extends into building societies. These institutions provide some or all of a range of financial services including lending, structured finance, leasing, asset management, equity investments and savings. As the banking institutions provide the hub between all other financial sectors, it is vital that banks and their shareholders are aware of the risks and opportunities presented by climate change and the potential impact on their core lending and savings books.

The UK banking industry has loans outstanding of £1,726bn to financial and non-financial sectors, smaller business and large corporations; these constitute a major component of the assets of the bank. Lending to individuals totalled £1,247bn. The UK banking industry has a local focus but also, in many cases, a significant global exposure; banks provide finance to companies around the world. The consolidated worldwide claims of the UK-owned banks totals £2,982bn, at the end of 2006 (Bank of England).

UK financial services (not only banks) account for about 7% of total national output, and about a quarter of total corporation tax receipts.

By providing finance to most of the world's industries, the banking industry is a microcosm of all industries and society as a whole; what affects them will affect banks. As with the other sectors reviewed in this report, banks are also subject the operational risks and costs that climate change will bring.

Credit book - retail

The retail housing market is predicated on a simple assumption: properties have a long lifetime and considerable re-sale value, and as such represent a recognised store of personal wealth for many. Those buying a house now believe that in the future there will be someone to sell it to; the new buyer in turn expects to be able to sell the property later; and so on.

Due to our changing climate we may expect more flooding, storms and possibly more subsidence. Some properties will need considerable upgrading to remain comfortable (eg. retrofitting for hotter summers). Some properties may become uninsurable, for instance due to heightened risk of flood and a subsequent potential buyer may therefore be unable to raise a mortgage. These issues may cause demand for some properties of certain designs or in certain geographies to decline significantly in market value. Climate change impacts would effectively be imposing a finite timescale over which the property would have value for residential purposes, almost as though a freehold were becoming a short or medium term leasehold. Facing significant negative equity, some owners may default on the loan and the bank will be left holding an impaired asset which has decreased significantly in value.

Credit book – commercial

Commercial property is held as a productive asset, making a contribution to the cash generating ability of the business, plus realising a cash value upon disposal (as is the case with residential). Although a climate change induced decline in value may be less marked than with residential, or the decline may not be evidenced so early, banking institutions are exposed to value loss resulting from a lack of adaptation.

Commercial property values are driven by a derived demand, derived from the value of the property as a productive asset. If the commercial process/value chain of which the property is a part, is adversely affected by changing climate then the market value, and investment value will decline. This can impact either owner/occupiers (including a weakening of their balance sheets, potentially increasing their costs of capital) or investors/landlords being unable to sustain high rental income levels, whilst possibly also facing increasing maintenance and insurance costs. This illustrates the interconnectedness of the problem.

Businesses have a product to sell but may need a loan to bring it to market, covering high up front costs. The revenue stream generated by product sales is used to cover the loan repayments. Hence any climate change related impact that adversely affects the future revenue stream will affect their ability to repay the loan (or secure it in the first place).

For example; banks lend money to energy companies around the world. Hotter conditions may cause an increase in demand for air conditioning and this suggests a potential increase in profits. However, many power plants also require water for cooling purposes; if this is scarce, the companies may not be able to meet the increased demand. We saw this in 2003 in France where nuclear power stations reduce their capacity or had to be shut down due to reduced river levels, i.e. coolant, which in itself was a symptom of unusually extended hot, dry weather conditions; perversely this led to more reliance on coal fired power stations and more CO₂ emissions.

Globally, many nuclear power stations are on coastlines. High front-end costs require the business case to assume a long operating life, yet rising sea levels within such lengthy timescales may limit their operating life, requiring earlier decommissioning whilst also reducing the timescale over which an adequate decommissioning fund can be built up.

Energy companies may also find themselves defending lawsuits from those claiming compensation for the impacts of climate change (some are being pursued now). If these legal challenges are successful, the risk profile within these businesses will increase, including a need to provide for further such claims. The credit worthiness of affected businesses may decrease and (within their own balance sheet) the bank may not be able to take credit for full repayment of the loan; leading potentially to an increase in regulatory capital and loss of shareholder value.

The agricultural industry might believe it has the opportunity for a longer growing season, and in some regions this may be true. But the water may not be available for the crops; for example if the local river also feeds the town's water supply, and upstream, say, a power station. This is why supposed "opportunities" need to be scrutinised carefully to avoid double counting resources. However, opportunities will be available and UK banks must be aware of how to spot them.

Businesses in a given geographical area may have to face risks they have not seen before. Consider forestry and agriculture: changing climate may allow non-indigenous populations of pests to become established requiring increased costs through pest control measures (agro-chemicals or pharmaceuticals) and forest fires may also increase in frequency and hence reduce the likelihood the trees will reach maturity for logging. The expected future cash flows from the business may become lower.

Alternative risk transfer products (such as catastrophe bonds) are likely to become more popular. Investment banks may see this as a significant opportunity.

Key questions

Climate change impacts outlined above may have the potential to impair the cash generating ability of the businesses to which banks are lending or in which they are investing. **To what extent are future scenarios related to climate change considered in credit assessment and lending portfolio planning by the Banking industry?**

Climate Change will affect different regions in different ways and to a varying extent. **To what extent are climate change impacts relative to different geographical areas considered by the Banking industry when determining lending and equity portfolio policies?**

Some businesses may benefit from climate change (alternative energy or environment technologies companies for example); some will undoubtedly be very adversely affected. **Should the Banking industry make an assessment of the likely winners and losers on a sector basis and if so provide the results to the British Banking Association for dissemination to customers? Should lending criteria, products and services be adjusted to reflect this changing risk profile?**

Banks have the opportunity to influence covenants and warranties in order to minimise credit risk, operational risk and regulatory risk. In order to protect future profits the companies to which they are lending could be encouraged to plan for climate change (eg. transport and utility supply companies). **To what extent do Banks currently require borrowers to demonstrate that they have identified and reflected climate change impacts in their business model, including value chains?**

Pensions

Background to sector

Pension funds invest on behalf of large numbers of individuals who have their retirement savings invested in these funds. Most pension funds in the UK operate under trust law that places a fiduciary duty on their trustees to act in the best interest of their beneficiaries (Local Authority schemes fall under separate but similar requirements). This duty has been defined as taking “such care as an ordinary prudent man would take if he were minded to make an investment for other people for whom he felt morally obliged to provide” (Freshfields Bruckhaus Deringer, 2004). The obligation is usually interpreted exclusively in financial terms as the optimisation of investment returns. Given the potentially major financial implications of climate change for companies, both directly through the physical impacts of climate change and indirectly through government action to encourage businesses to reduce greenhouse gas emissions, there are significant implications of climate change for pension funds’ assets. It is therefore in line with their fiduciary responsibility to take account of the risks and implications of climate change in their investment policy¹³.

Role of pension funds

At the end of 2004, UK pension funds held £232.6bn or 15.2% of UK ordinary shares quoted on the London Stock Exchange while insurance companies held a further 17.2% (ONS, 2005), much of which relates to pension savings. As we have seen already, the implications of climate change for both companies and the economy could be very significant. As institutional investors together hold shares in many different companies, they are vulnerable to the economic consequences of climate change on the whole economy and not just on individual businesses. Similarly, the decisions and actions taken by institutional investors now could have an impact on global economic growth and society in the future. This concept of the ‘universal investor’ was proposed by Hawley and Williams (2000), who suggest that it may be in large investors’ interest to minimise the damage done by each of their investee companies as this would be outweighed by the benefit to the rest of the companies in the portfolio (UNEP FI, 2005). Therefore, given its potential to impact upon economies as a whole, climate change could potentially have a significant impact on pension funds’ assets. Moreover, the impacts of climate change on mortality and morbidity have now been quantified, and could have a significant impact on pension liabilities.

Whilst a small number of pension funds manage their funds in-house, investment management has largely been outsourced to professional fund managers. This is often done on the advice of specialist investment consultants. Pension fund trustees provide their fund managers with investment guidelines in investment management agreements, which relate to financial, risk and volatility targets, as well as Statement of Investment Principles (SIPs). SIPs set out the principles governing pension funds’ investment strategies and include statements on how pension funds take account of extra financial factors, such as Environmental, Social and Governance (ESG) issues in investment decision-making.

To date, trustees have taken only limited account of climate change in their investment policies. However, asset owners have a crucial role to play in deciding how their assets are invested, and therefore have the power to influence company actions in relation to climate change. Other key parts of the investment chain (consultants and investment managers) are unlikely to integrate climate change risks and opportunities into investment decision-making in the absence of clear external demand. Pension fund trustee demand would overcome many of the barriers traditionally associated with the financial sectors’ consideration of climate-related risks

¹³ Mercer, IIGCC and Carbon Trust. (2005) A climate for change – A trustee’s guide to understanding and addressing climate risk.

and opportunities, notably the short-term nature of assessing stocks and the reward for fund managers based on short-term performance targets.

In order for climate change adaptation to be incorporated into investment decision-making more rapidly, asset owners should take the following steps:

- look at instructing their advisers and consultants to consider the risks and opportunities of climate change in their advice;
- incorporate climate change considerations into the appointment and evaluation of their asset managers;
- require their asset managers to integrate consideration of climate change into their communications with companies and their investment decision-making;
- encourage appropriate research by the investment chain into the implications of climate change for asset values.

Whilst the trustees are ultimately responsible for decisions, they will place a great deal of reliance on their advisors. Actuaries are key advisors to pension trustees. They advise on the setting of pension contribution rates having made assumptions about future mortality, morbidity and returns on assets. They also advise on which asset sectors are deemed to “match” the liabilities (i.e. to provide cashflows which will keep pace as the liabilities change). In many cases investment adviser firms are also made up, in large part, by actuaries.

Key questions

Climate change will have an impact on morbidity and/or mortality¹⁴. This could alter pension costs, for example if life expectancy of pensioners increased due to milder winters, then pension liabilities would increase significantly. **What is the likely impact of climate change on mortality and/or morbidity? How should actuarial advice incorporate a perspective on climate risk?**

The recent report from the IIGCC, Mercer Investment Consulting and the Carbon Trust suggests that consideration of climate change is part of the fiduciary duties of Trustees. **Have Pension trustees’ investment policy or strategy been revised to take account of climate change risks and opportunities?**

Given that Trustees place such a reliance on their advisors it is crucial that the advisors consider these issues in detail. Some advisors may have a more detailed understanding of this issue than others. **How have the processes for appointment and evaluation of asset managers taken consideration of climate change into account?**

If a pension fund is outsourcing its investment management (as most will be), how are we sure that this issue is being addressed. **Have our investment managers got sufficient capacity to assess and integrate climate change risks and opportunities into investment decision-making? What are the implications of climate change regarding the short, medium and long-term performance of financial institutions’ assets?**

Whether it’s passive or active investment, pension fund trustees need to be sure that the invested companies and other assets are addressing climate change risks. **Do our investment managers engage with companies on minimising the risks and maximising the opportunities from climate change?**

When addressing asset selection, Pension fund trustees take advice from a range of different sources. **Are investment consultants providing advice on climate change risks and opportunities? What incentives can be provided to encourage them to?**

¹⁴ Department of Health. (2003) Health Impacts of Climate Change in the UK.

Fund Management

Background to sector

The majority of investment buy/sell decisions are outsourced to professional fund managers. This is true for individual (retail) and pension fund and other asset owners like charitable trust (institutional) investors alike. From an institutional perspective, investment terms and objectives are agreed and fund managers have primary responsibility for day-to-day investment decisions. They are usually measured against an index or benchmark and usually over short periods, quarterly or annually. Fund managers can be active (for example, picking particular companies in which to invest) or passive (simply tracking a particular index, for example the FTSE all share). In both cases, climate change represents potential risks that managers should be both aware of and address.

As at June 2006, the total funds under management of UK based fund managers was £370bn¹⁵. Of the assets managed within these portfolios, approximately 20% of the total are located overseas¹⁶. However, given the extensive global footprint of these firms, this figure understates the total importance of the UK industry's link to foreign investment and the potential risk to global climate change events.

What are the impacts?

Fund managers in arguably all asset classes face potential risks – and opportunities – associated with climate change. This includes equities, debt (both corporate and governmental), real estate, and the broad range of alternative asset classes. These impacts will vary between sectors and companies, and with locations in which particular assets are based.

In the short term some of the largest impacts on companies resulting from climate change are likely to be politically initiated. Policy makers are already putting in place policies that either limit emissions of carbon, e.g. the EU emissions trading scheme or regulations on how assets are built to avoid climate change in the future. Over the longer term, the changing climate itself will also impact upon companies, their infrastructure, and business models. Corporate investment decisions made now should take into account the potential physical impacts of a changing climate potentially adapting to ensure that they are appropriate to the new challenges. Simple examples include:

- Water companies looking at potential increased drainage requirements / potable water shortages;
- Railway infrastructure coping with additional heat stress;
- Electricity utilities and suppliers assessing additional wind stress on pylons;
- Real estate companies designing facia and roofing for more severe storms;
- Changing seasonal patterns affecting retail supply chains.

As climate change will affect shareholder value now and in the future, fund managers should be taking appropriate steps to ensure that the risks and opportunities associated with climate change are actively considered within investment processes.

¹⁵ Institutional Investors Group on Climate Change, Mercer Investment Consulting and the Carbon Trust. (January, 2005). A climate for change: A trustee's guide to understanding and addressing climate risk.

¹⁶ Investment Management Association. (August, 2006). Quarter 2 2006 – Quarterly Investment Funds Statistics.

Fund manager response

Until recently, climate change had been perceived to be a long-term issue by many fund managers. However, recent events (such as the hurricane season of 2005, the European heat wave of 2003, and droughts occurring in many countries) have brought it home to some in the market that the impacts of climate change are already occurring.

Some fund managers are therefore resourcing their teams to assess and respond to the implications of climate change now and in the future. This includes:

- Encouraging appropriate research into the implications of climate change amongst analysts and other research providers;
- Asking appropriate questions of corporate management on how they are responding to climate change;
- Analysing what exposure to climate change and carbon may mean for portfolios.

The end point is one where asset managers are incorporating climate related risk into their investment decisions, to maximise long term performance.

Key questions

Policy responses to a changing climate will have financial implications for the companies and other assets in which fund managers invest. **How are the policy and physical implications of climate change being addressed in the investment decisions making process?**

To guide all investment decisions, fund managers need appropriate analysis of all the factors that could impact an asset's performance. This includes the impacts of a changing climate. **How is appropriate research by analysts being stimulated?**

Understanding the implications of climate change and the policies being implemented to address it (both in terms of mitigation and adaptation) requires specialist knowledge, often lacking in the current investment chain. **Are fund managers building their capacity to assess the investment implications of climate change?**

To obtain information for investment decisions and to encourage management to address the issue, asset managers need to be talking to companies about both climate change implications and how they are responding. **Are fund managers asking appropriate questions of corporate management?**

Public policy sets the context within which companies and markets operate. As such, inappropriate public policy has investment implications. **Are fund managers communicating to government that policies on climate change should support long-term investment decision-making?**

Infrastructure and Utilities

Background

The financial services sector based in London is not only at risk as a result of the activities it undertakes, but is also at risk as a result of the physical implications of climate change: the City thrives and grows only if its infrastructure operates. As we have seen in previous sections of this report, climate change will impact upon that infrastructure. This section will look in more detail at how it will impact on specific parts of the City's infrastructure.

A key point is that London is exposed to far greater potential damage from flooding than any other urban area in the UK, due to the value of its assets within the Thames tidal and fluvial floodplain. It is estimated that £80 billion worth of fixed assets and operational infrastructure are at risk due to its location and lack of adaptation capacity. Approximately 1.25 million people live and work in London's flood risk zone. The following London-based examples set the scene for similar risks that can occur throughout the world's built and utility infrastructure.

Risks to Infrastructure and Operations

Climate change clearly will increase the vulnerability of London's fixed and operational investment to flooding, overheating, water resource risks, subsidence and storm damage. The greatest risk to physical infrastructure and investment in operations is from extreme and catastrophic weather events. A higher risk of extreme events could lead to loss of vital utility capacity in London and impacts on global utility infrastructure/supply that London financial sectors are reliant upon.

Water Utilities - Much of London's water supply is sourced from outside the city, however climate change poses an increased risk to London's water availability. Climate change is considered by London's water utility companies as one of the most important and challenging uncertainties for long-term water supply. Not only will climate change impact on water resource availability and quality, but London's supply infrastructure is also at risk. Wetter winters and hotter drier summers will lead to more leakage/pipe bursts due to subsidence and heave. Thames Water is currently replacing Victorian mains with plastic pipes, which will not be affected in the same way. Flash flooding and sewer overflows will increase with greater rainfall event intensity and frequency, leading to greater property damage and associated cost recovery.

Energy Utilities - Climate risks to the energy industry cover a broad spectrum of operation and transmission infrastructure. These include site management; supply chain and logistics; asset values and revenue costs; compliance and regulation, and market requirements. Adaptation to these risks will be required during design, operation and decommissioning of the site-based and supply infrastructure for gas, coal, nuclear and renewable utility businesses.

With all but one of the UK nuclear power stations located on the coast, future sea level rises and surge events could pose a risk to both current operations and long-term storage of waste.

Offshore resource extraction and power generation infrastructure is at risk of sea level rise and extreme events. Design standards for these facilities are based on analyses of historic extreme weather events, and need to be revised to take account of changing climatic conditions. With US\$10Bn in insured losses – including the destruction of 116 oil platforms and damage to a further 56 – the 2004-2005 hurricanes in the US Gulf Coast caused offshore oil producers insurance costs to increase by up to 500 percent.

Many of UK's coal and gas-fired power stations are river water-cooled. Cooling cycles become less efficient as the abstracted water temperature increases. Climate change conditions imposed by a facility's Integrated Pollution Control (IPC) licence may also become difficult to satisfy.

Changing patterns in subsidence, flooding and storm damage may also pose significant risk to power supply infrastructure. Buried power cables are at higher risk of failure with increasing ground temperatures and variable soil moisture contents. When climate impacts on buried cables are combined with an anticipated increase in demand for electricity in hotter future summers, the existing network capacity may not meet demand. Although improvements in energy efficiency will be made, large-scale infrastructure development may be required to minimise the risk of capacity shortfall.

With long-term GHG mitigation measures now being incorporated into corporate plans, cooling improvements, energy and water usage is also a key adaptation to unavoidable climate change. Power cuts during London's peak demand times in July 2006, significantly impacted on retail and commercial viability. This business risk will increase with climate change unless adaptation becomes embedded within business planning and operation.

Communications - London's telecommunication and internet sector is taking a proactive approach to climate resilience. Mobile phone relay stations are being combined and reduced in numbers, reducing the risk of storm and flood damage. Network and relay infrastructure is still at risk of storm and flood damage, and in some cases overheating of vital equipment. This risk can be addressed through the correct design and location of major business continuity facilities. The value of secure and guaranteed communication lines to London's businesses and markets cannot be overstated. This was highlighted during the emergency services restriction on communications during the July 2005 terrorist events.

Transport Infrastructure - London's transport systems are vulnerable to both gradual and extreme changes in climate. Extreme weather in recent years has brought challenges to keeping London moving. Flooding, heatwaves and storms have all brought about delays and increased costs, affecting London's economy, productivity and well being of Londoners. On the 7th of August 2002, all five of London's mainline train stations were flooded causing delays and cancellations following only a small but intense rainfall event. The economic losses to the London and UK economy were significant. Such an event highlighted just how fragile our vital transport linkages are to business. Future weather predictions show increases in the frequency and intensity of such events.

Key Questions

Some catastrophic flood or storm events may cause major long-term disruption to global and regional infrastructure and utility networks. **Are investors considering the potential risks to unavoidable climate change within their Infrastructure and Utility investments?**

Significant operational downtime and economic losses have been experienced from relatively minor climatic events. **Are investors and lenders incorporating resilience to climate change in their investments within Infrastructure and Utilities?**

The physical risks associated with a changing climate have the potential to significantly impact upon the business infrastructure that permits the financial services sector to operate in London. Some climate change scenarios could bring indefinite disruption to London's communications and data link capacity. **What are the operational and financial loss implications of this?**

Conclusions

- The climate is changing. Reduction in carbon emissions through mitigation is crucial, but significant change will happen despite actions we take now to prevent more extreme change. Therefore adaptation must become part of business as usual for companies.
- London is a major global financial centre. We want it to stay that way. Therefore we need healthy companies that have planned for the future and are aware of the risks and opportunities.
- London's financial services sector is known to be a thought leader worldwide. Climate change is one of the greatest threats ever faced by humanity and we hope London's financial leaders can be a part of the solution. There are many parties involved in Financial Services; each with its area of expertise. There is a danger that each party believes it has delegated responsibility of the climate change problem to another party. This is where we hope to encourage greater clarity. Ultimately business leaders and trustees have responsibility.
- Advisors and consultants play a key role and their terms of engagement need to explicitly require consideration of climate change.
- Climate change has the potential to affect virtually all segments of the insurance business — including those covering damages to property, crops, and livestock; pollution-related liabilities; business interruptions, supply-chain disruptions, or loss of utility service; equipment breakdown arising from extreme temperature events; data loss from power surges or outages; and a spectrum of life and health consequences. The insurance sector should incorporate climate change adaptation as a requirement within all investment decisions.
- Other sectors within financial services are also exposed to the changing climate in multiple ways, from implications for mortgage businesses, to investments in different equity classes. Climate change impacts and adaptation should be embedded in business models and value chains.
- It is crucial that business decisions within all financial industry sectors take the risks into account, yet there will be times when competitive pressures work against this.
- Government and regulators must lead on embedding climate change adaptation into long-term policy development.
- It is important that business processes are aligned with the problem and not working against it. Remuneration packages that are too short term (either for fund managers or business leaders) may encourage short-term behaviours that are not in the long-term interests of companies, investors or institutions.
- We're in this together. Competitive advantage might be possible but a far better strategy is to pool resources and work together to keep London a major financial centre for the foreseeable future.



London Climate Change Partnership

www.london.gov.uk/climatechangepartnership