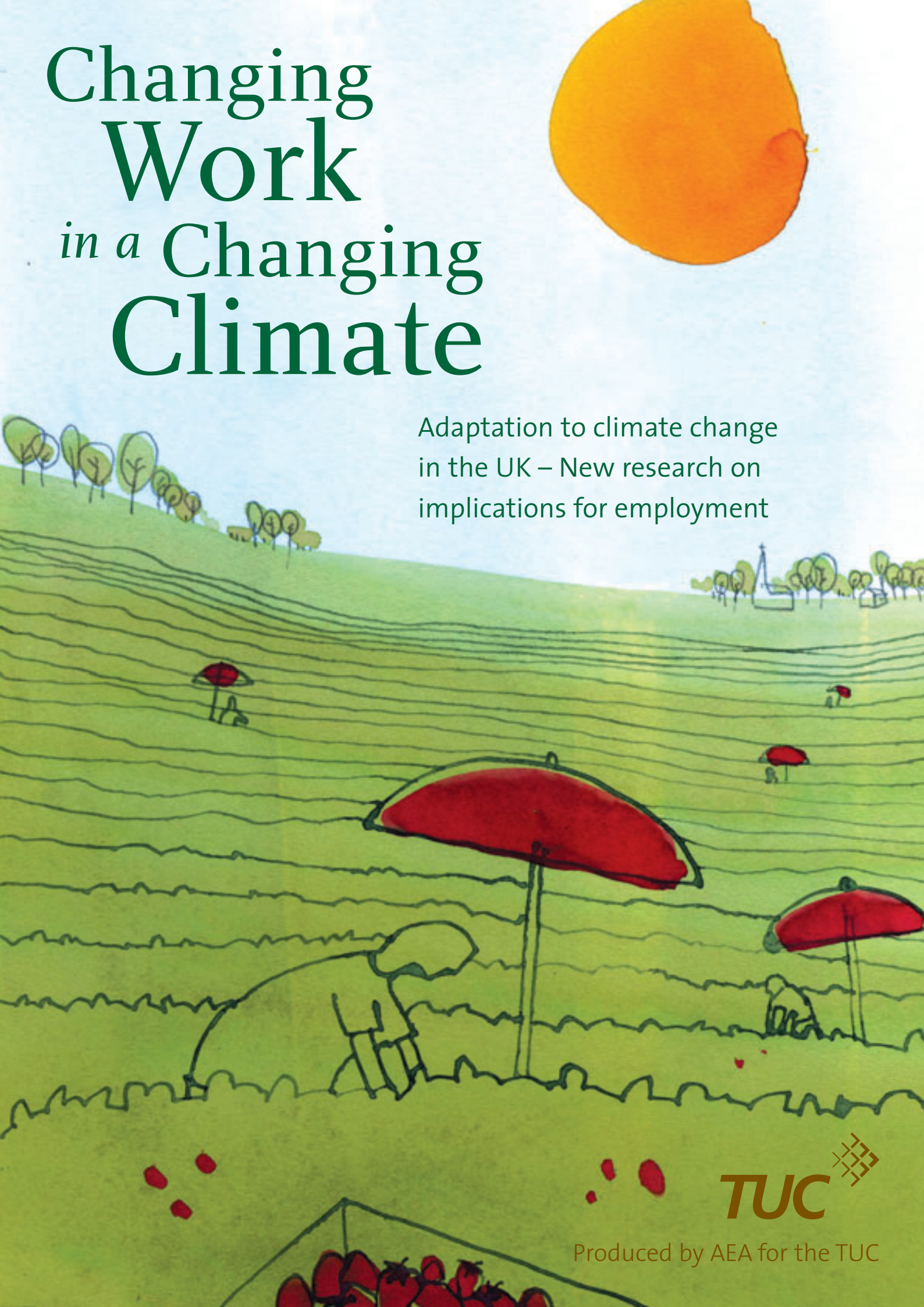
Changing Work *in a* Changing Climate

Adaptation to climate change in the UK – New research on implications for employment



TUC

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Executive summary

Floods, storms and heatwaves in recent years have tested the UK's emergency and local government services, businesses and resilience. These extreme events illustrate the challenges we will face in adapting to climate change. The term 'adaptation' in this context refers to adapting to the effects of the climate change that is already likely to happen as a result of past carbon emissions. While urgent efforts to reduce emissions continue, projections show that a certain amount of climate change in the UK is now inevitable, leading to warmer, wetter winters; hotter, drier summers; and more extreme weather events such as storms and floods.

There is an increasing amount of government and academic activity concerned with climate impacts and adaptation (adaptation is now one of the top priorities for the Department for the Environment, Food and Rural Affairs). But there has been no significant work to date looking at climate change adaptation and people's working lives. This report is therefore timely and aims to influence policy makers, Government, trade unions, employers and the wider adaptation and climate change policy community.

The research and production of this report was conducted for the TUC in 2008 by environmental consultancy AEA. It included a review of the existing literature, interviews with a number of FTSE 100 companies, an online survey of public sector bodies and a workshop with trade union officials drawn from the TUSDAC group (trade union sustainable development advisory committee), as well as officials with health and safety and skills briefs.

KEY FINDINGS INCLUDE:

The impacts of climate change will be felt across all sectors of the UK economy, bringing risks and potential opportunities. The way in which adaptation measures are designed, planned and implemented will impact on workers and the resilience of the UK economy to climate change.

Organisations will have to adapt on two distinct fronts, engaging with both **'inward'** and **'outward'** adaptation. The study found that employers are beginning to assess the impacts of climate change and adaptation on their business planning, markets or services ('outward-facing adaptation'), but very few have looked at the impacts on workers and engaged with them to develop adaptation measures that are workable, fair and sustainable in the long term ('inward-facing adaptation').

The two types of adaptation should reinforce each other and in many areas, such as the emergency services, they are clearly interdependent. But employers in the study did not seem to have fully grasped this. Only one employer out of a total of 134 contacted as part of the project had explicitly considered the employment implications of adaptation.

The study exposed a number of issues in danger of being neglected due to this lack of focus on inward-facing adaptation.

- On **health, safety and dealing with climate hazards at work,** issues arose around statutory responsibilities and funding for dealing with extreme events such as floods; and about indoor and outdoor working conditions including workplace temperatures and equipment, clothing and shift patterns to deal with more gradual changes.
- On **skills,** there is a clear need to invest in training to equip workers for adaptation, both in order to ensure that existing standards, for example in health and safety, are upheld as conditions change, and to help with more technical aspects of people's work, such as assessing risks and opportunities from climate impacts.
- There are issues surrounding **equity and social justice,** both in terms of the unequal distribution of costs and benefits of adaptation in society, and more specifically in some areas of concern such as the lower adaptive capacity of small businesses.

RECOMMENDATIONS

A series of recommendations emerge for Government, employers and trade unions. These include:

Workplace and working practices

New guidance is needed on adapting workplaces to climate change. This could be developed and disseminated by the Health and Safety Executive (HSE) in partnership with the Department for the Environment, Food and Rural Affairs (Defra).

The issue of establishing statutory limits on upper workplace temperatures should be revisited as an urgent priority.

Issues such as dress codes, equipment and shift patterns may need to be renegotiated by employers and trade unions at the local level.

Role of union workplace representatives

An adaptation stream should be built into the TUC's Green Workplaces projects. This has informally started with the development of a section on

adaptation in TUC training for environment reps. Further funding will be required to support unions' efforts in this area.

Skills

Further research is needed to develop a clearer understanding of the skills needs posed by adaptation. This could be led by existing partnerships such as the sector skills councils.

Weather-related civil contingency situations

A clear identification is needed from Government of the responsibilities and statutory obligations of relevant parties in all situations, including the fire and rescue and other emergency services. We recognise that some progress has been made here: in response to the Pitt Review of the 2007 floods, the Government has left open the option of statutory underpinning, but the time horizons for this are long and the need for clarity is urgent.

Fair distribution of the costs of adaptation

Government should consider measures to ensure that low-cost housing is available outside high-risk flooding zones and that insurance is available to low-income households.

Further efforts to engage with small and medium enterprises (SMEs) are needed, given the lower adaptive capacity and higher vulnerability of small employers. The UK Climate Impacts Programme (UKCIP) could develop its existing work in this area with support from Government.

The TUC strongly believes all of this should take place under the umbrella of 'just transition'. This concept has underpinned union work on climate change mitigation but can be equally applied to adaptation, where it means fairly distributing the costs and benefits of adaptation measures, planning ahead, supporting those affected and genuinely involving workers in decision-making.

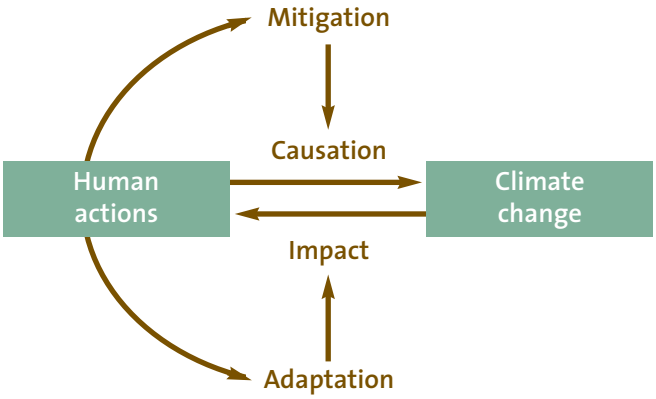
Introduction to this study

The climate is changing, and impacts on the environment, society and economy are already being felt. Projections of future climate change indicate that these impacts will accelerate during this century, with the trends over the next few decades now unavoidable due to past emissions, whatever success there is with reducing future emissions.

In the UK, summers are likely to become hotter and drier, with winters becoming milder and wetter, and we will face more frequent extreme weather, such as intense rainfall and very hot days. These changes and increased climate variability will also affect people at work. The need to adapt, to minimise risks and take advantage of potential opportunities, is becoming increasingly widely recognised. The box below illustrates the difference between adaptation and mitigation as responses to climate change. The two approaches go hand-in-hand, with mitigation essential for reducing future emissions and impacts, and adaptation to tackle the changes already locked into our climate system.

The evidence base for adaptation has been growing rapidly over recent years, with accompanying policy developments both in the UK (for example, the Climate Change Act 2008) and further afield (such as the European Commission's development of a new White Paper on adaptation). However, there has been almost no work on employment and wider labour market issues associated with adapting to climate change.

Mitigation vs. adaptation



Responses to climate change are twofold: the first, *mitigation*, aims to limit the overall extent of climate change by cutting the greenhouse gas (GHG) emissions that cause changes to the earth's climate. The second, *adaptation*, aims to minimise the negative impacts of unavoidable climate change by making changes to the way we live and work.

Source: adapted from West and Gawith (2005)

The impacts of climate change will be felt across all geographical areas and in every sector. People at work may therefore experience significant changes in their working lives, from the location and conditions in which they work to the skills, training and equipment they need to carry out their roles safely and efficiently. There may also be a number of opportunities arising from the need to adapt.

The trade union movement is taking a proactive stance on tackling the challenges of climate change. In efforts to cut greenhouse gas emissions, the TUC and affiliated unions are:

- Encouraging and equipping workers with the tools and knowledge they need to cut their own emissions and to encourage their employers to take appropriate action at the organisational level (*see box below*). Trade unions are especially well placed to do this by mobilising workplace representatives.
- Negotiating with government and other stakeholders to ensure 'green', fair and just mitigation policies that create high quality, secure jobs.[1]

The findings in this report represent original and groundbreaking research, thought to be the first to explicitly address issues around adaptation and work in the UK.

Greening the Workplace

The TUC has initiated a far-reaching programme to cut carbon dioxide emissions in the workplace: the 'Green Workplaces' programme.[2] The programme provides support, guidance and training for trade union workplace representatives and all staff to take certain individual measures, contribute to group initiatives and to negotiate with employers to help reduce energy use and waste. The programme provides information explaining why sustainability is a trade union issue and explaining the background to climate change and emission reductions, and focuses on giving practical advice on measures that can be taken on the ground to improve energy efficiency, moderate user behaviour and measure progress.

There are now green reps in workplaces across the country and in many different sectors and unions. The Green Workplaces programme includes a series of pilot projects where union reps were supported to set up joint environmental committees with management, organise awareness-raising events and negotiate changes to policy and practice. Many of the pilot projects have achieved significant reductions in energy use and emissions.

1 See *A Green and Fair Future* and *Unlocking Green Enterprise*, TUC Touchstone Pamphlets available from: www.tuc.org.uk

2 For further information see: *How to 'green' your workplace: a TUC Guide*, available at www.tuc.org.uk/extras/greenworkplace.pdf; the TUC Handbook *Go green at Work* available at: www.tuc.org.uk/extras/gogreenatwork.pdf

Consultants AEA[3] undertook primary research among public sector organisations and a number of FTSE 100 companies to ask how well employers understood the implications of climate change for their business and employees. Organisations were also asked about their experiences of weather events in the past, their preparedness for future climate change and any current or planned action to adapt. This was carried out through telephone interviews (FTSE 100) and an online survey (public sector). AEA also reviewed relevant literature from Government, academia and the private sector on adaptation in the UK, although very little has so far been written on the precise area covered by this report. Trade union experts were consulted at a workshop hosted by the TUC.

Structure of this report

In Section 1 the potential impacts of climate change on economic sectors in the UK are considered and adaptation is introduced as a way to manage the risks and opportunities brought about by these climate impacts. In Section 2 the consequences of climate change on UK society and people at work are considered, demonstrating that there is an expressly 'social' dimension to climate change. Within this context, the employment implications of adaptation are introduced, and we present a model of adaptation that relates inward-looking adaptation (focusing on the welfare of people at work) to outward-facing adaptation (driven by strategic service or commercial aims).

Section 3 discusses the results of the survey and of interview research into how public and private sector organisations are approaching adaptation. This section offers examples of current adaptation activity. In the light of some initial observations, we provide an analysis of why employment implications are not being considered more widely. Based on our observations of employer-led adaptation in the UK, Section 4 identifies the issues that are in danger of being overlooked and gaps in current practice.

Section 5 summarises the issues raised by this study and looks at the way forward, for Government, trade unions and employers. It is argued that there are clear shortcomings in current adaptation practice with regards to employment conditions. Our analysis suggests that this may be because of the relative weakness of current actors and forces driving employers to adapt. New motives for adapting, particularly in light of the employment implications of climate change, are needed.

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3 AEA Group is a multinational environmental consultancy specialising in climate change and energy: www.aeat.com

Section 1

Our changing climate and the need to adapt

In this chapter, we provide a short overview of climate change in the UK and potential impacts in a range of sectors, before introducing some of the key terms associated with adaptation.

Climate change in the UK

Evidence for the changing climate in the UK, Europe and across the world is now widespread. Global average temperatures have risen by 0.7°C over the past 100 years. Climate records in England[4] indicate that temperatures here have risen by a greater amount.

4 The Central England Temperature Record dates from 1659, and shows that there was around a 1°C annual average temperature rise between 1906 and 2006 (see hadobs.metoffice. com/hadcet).

Official climate change scenarios for the UK were first published in 1998. Revised, improved and updated data[5] was produced in 2002. As indicated in the box below, the scenarios suggest that higher temperatures, combined with changing patterns of precipitation, will lead to hotter, possibly drier summers, and milder, wetter winters. Rising sea levels and changes in storm surge height are expected, as is an increase in extreme weather. Updated climate scenarios are due to be published by the UK Climate Impacts Programme (UKCIP) in 2009.

Overview of climate change in the UK

Examples of climate changes already being felt:

- the growing season for plants in central England has lengthened by about one month in the last century
- heatwaves have become more frequent in summer, while there are now fewer frosts and winter cold spells
- UK winters over the last 200 years have become much wetter relative to summers
- a larger proportion of winter precipitation now falls on heavy rainfall days than was the case half a century ago
- average sea level around the UK is now about 10cm higher than it was in 1900.

In future, based on UKCIP02 data, we may expect:

Higher temperatures, with regional and seasonal variation

- by the 2020s, annual warming of between 0.5°C and 1.5°C, depending on region and scenario
- by the 2050s, annual warming of between 0.5°C and 3°C, depending on region and scenario
- greater summer warming in the south-east than in the north-west of the UK
- greater warming in summer and autumn than in winter and spring.

Changing patterns of precipitation

- wetter winters, by up to 15 per cent by the 2020s (up to 25 per cent by the 2050s) for some regions and scenarios
- possibly drier summers, by up to 20 per cent by the 2020s (up to 40 per cent by the 2050s) for some regions
- significant decreases in snowfall.

Changes in extreme events

- increase in frequency and intensity of extreme weather conditions, such as very high temperatures, or heavy downpours of rain.

Changes in sea level

- rise in global average sea level in the range of 4 to 14cm by the 2020s, and 7 to 36cm by the 2050s, depending on the emissions scenario
- differential trends in vertical land movements will cause significant regional differences in relative (felt) sea level rise around the UK, with much of southern and eastern Britain sinking, while northern Britain is rising relative to the sea
- extremes of sea level (storm surges and large waves) are expected to increase in height and frequency.

Source: Adapted from West and Gawith (2005)

Impacts on sectors

Changes in climate are expected to bring risks and opportunities to virtually all economic sectors in the UK. Some examples are set out in the following pages.

5 Hulme, et al. (2002). The UKCIP02 climate change scenarios for the UK were produced by the Hadley Centre and the Tyndall Centre, with funding from Defra, in 2002. They describe expected climate changes in the UK over the 21st century for four different greenhouse gas emissions scenarios and three time slices centred around the 2020s, 2050s and 2080s.

The **emergency services** will be on the front line in responding to the increased frequency of extreme weather events and will have to deal with an increased demand for emergency, fire and rescue services during floods (rescue) and heatwaves (emergency healthcare, heathland and grassland fires). New equipment will be needed to cope with this higher demand and for different kinds of rescue, as fire fighting protection and equipment is not suitable for use during flooding incidents. Employees themselves will be subject to greater health and safety risks from working in flood or heatwave conditions. There is also a risk that emergency service planners may elect to cut jobs in order to fund investment in equipment to cope with climate change, such as boats for flood rescue. Teams may have to relocate and set up at emergency sites, putting additional strain on the remaining local emergency resources.

The primary **health** impacts of climate change include increased numbers of heat-related illnesses and deaths from average temperature increases and heat waves. This may be countered to some extent by a reduction in the number of cold-related illnesses and deaths. Heat or humidity-sensitive infectious diseases and vector-borne diseases (transmitted via disease-carrying organisms such as insects) have the potential to increase, as do the risks to human and animal health from flooding or wetter weather, and water-borne diseases from higher water temperatures. Climate effects on air quality such as increased ozone formation and dust are likely to increase numbers of people with respiratory illnesses. Indoor air quality will also be affected by changes such as an increased incidence of moulds due to damp weather. Other health impacts include changes in UV radiation and skin cancers, and the seasonality of allergic disorders, as well as increased incidences of depression and mental illness related to the stress of flooding. The health impacts of climate change will be experienced most by vulnerable groups, including the very old, very young and people with disabilities. For staff working in the health sector, there may be a gradual shift in clinical demands (e.g. to cope with higher incidences of heat-related illness and fewer cold weather related problems), requiring some amount of re-skilling and planning to ensure appropriate staffing levels at different times of year. Hospitals and other healthcare facilities could be faced with challenges in terms of ensuring their buildings and facilities are resilient in the face of heatwaves, wetter weather or extreme weather events.

Water companies are already required to consider climate change in their 25-year plans. However, the sector is still likely to face difficulties in meeting increased water demand during periods of drought and hot weather, exacerbated by demand peaks in heatwaves. There is the potential for this to lead to disputes over water allocation. Water treatment and drainage infrastructure is highly vulnerable to flooding and in the past tidal surges along the east coast of England have led to the temporary closure of some water works. Such events are likely to become more frequent. Employees working on site in the water sector may be at greater risk from extreme weather: one major UK utilities supplier, for example, found that access to critical drain facilities and waste treatment works was cut off during winter flooding.

The UK's **agriculture** sector faces a range of direct impacts from climate change. Summer drought, summer heat and winter waterlogging may all contribute to crop failure and stock stress. Increased water demand and periods of water deficit may lead to loss of soil carbon content, increased pesticide requirements, crop damage and reduced farming opportunities in some regions. Climate change could also threaten production of some crops (especially during droughts), while also bringing new opportunities for production of others (such as the ability to grow new crop varieties, and longer growing seasons). Workers in this sector will have to adapt to hotter summer conditions and will potentially be exposed to more floods and storms.

In the **energy** sector, the direct impacts of climate change could include the flooding of power plants due to increased winter rainfall or sea level rise and storm wave surges, which could in turn lead to power cuts, affecting other sectors of the economy. Where rivers provide cooling water, reduced rainfall and lower river levels could impact on electricity generation processes. Increased numbers of storms could bring damage to electricity transmission infrastructure. On the demand side, reductions in energy use for winter heating coupled with increases in energy use for summer cooling are expected, with a transfer of peak demand from winter to summer at some point in the medium term.[6] In terms of infrastructure and buildings, there will be a need to optimise performance under higher temperatures. Outdoor workers and engineers required to fix problems across the network could be placed at higher risk during extreme weather events.

Transport systems will be directly affected by a number of climate change factors, including hot summer temperatures, flash flooding, and coastal flooding. This means that all sectors which rely on transport networks – for transport of goods, for employee travel to work, for business travel and so on – will also be more frequently affected by adverse weather. On the positive side, there may also be some benefits, with fewer problems caused by fog, frost, snow and other cold weather. In terms of infrastructure, road networks, rail lines and airports are particularly vulnerable to flooding and heat impacts (including tarmac melting and rail buckling). People employed in the transport sector could face particularly uncomfortable working conditions during heat waves (for example inside buses, underground carriages and trains), and may be placed at greater risk from more frequent and more intense extreme weather.

In the **construction** sector, direct impacts from climate change include damage to products, tools and equipment from higher temperatures and increased winter rainfall, with consequent delays and increased costs to projects. The predominance of outdoor workers in this sector leaves its employees at higher risk from increased direct-heat stress, dehydration and potentially skin cancer, as well as heavy rainfall and flooding. The changing climate could bring some opportunities for the construction industry, with a demand for new materials and 'adaptive' buildings.

6 See, for instance, Metroeconomica 2006

Climate change will have impacts in virtually every **central government** policy area, from security to health, infrastructure to the environment. This will mean direct consequences for policy makers and delivery bodies. The Government set up UKCIP in 1997 to improve understanding of climate impacts and ways to adapt (*see box facing page*). Both central and **local government** (as large employers) could be hit directly by climate impacts on employee travel to work, and workplace risks of flooding and overheating; decreasing work productivity and service efficiency. This could also mean fewer staff available to deal with increased requests for assistance during extreme events. Local authorities, along with emergency services, are at the frontline in responding to climate change. Increased temperatures and rainfall are expected to affect local service provision ranging from waste collection, to education, to contaminated land management. At the same time, local authorities need to build adaptation strategies into their social care, housing, emergency planning and transport strategies. Increased need for assistance due to flooding and high temperature levels is expected, but so are demands for newer services such as re-housing and advice on health issues.

In the **food and drink** sector, supply, distribution and storage will be affected by climate change, flooding and temperature rise. Direct impacts on supply chains, such as the changing availability or production of some products may present employment and re-skilling issues. One national supermarket chain, for instance, has experienced disruptions in UK supply chains as a result of heavy precipitation damage to salads and soft fruits. Climate variability will require flexible supply chain management; local production may change, creating new opportunities as the demand for products changes with conditions.

Direct impacts on the **tourism** sector include higher temperatures altering both the seasonal distribution of tourism and destination preferences. Demand for tourism in previously quieter places will present opportunities (as well as risks) and a higher demand for new tourism packages (such as eco-tourism). There is likely to be an increased demand for UK summer holidays, but the skiing industry in Scotland may face difficulties due to declining snowfall. For employees working in this sector, working conditions in various outdoor tourism facilities may become unsafe due to heat and UV exposure and flooding. There is a significant risk of job losses in areas where tourism declines, alongside opportunities for new employment in developing tourism destinations.

The **telecommunications and IT** sector's distribution network is vulnerable to wind and flood damage. Large server and data centres are vulnerable to flooding and are expensive to cool during heatwaves. Market changes may increase demand for more flexible working and more home-working will push up demand for telecomms and video-comms services. Maintenance employees working outdoors are vulnerable to heat stress, UV radiation and high winds. Work conditions for employees at call centres could become unsafe and expensive to maintain without retrofitting buildings.

In the **finance** sector, the direct impacts of climate change in other countries could have knock-on consequences for the UK market. Overseas investments are at risk, creating higher exposure to risk from international lenders and investors. Overseas call centres and offices in developing countries are more vulnerable, and the direct impacts on employees being unable to get to work during extreme events and office heat stress will reduce service provision in the UK. At the same time, new opportunities exist for investment in adaptive technologies and in expanding service areas. Risks, especially in insurance markets, will need to be carefully managed in light of climate science. The increase in compensation claims will put additional pressure on insurance companies.

Adaptation

Whatever the speed and success of efforts to cut greenhouse gas emissions, there is now a concurrent need to adapt to the climate change that is already occurring, and which is likely to accelerate over the next few decades. Climate models show that differences in levels of greenhouse gases emitted take around 40 years to have any significant influence on the degree of climate change experienced. This means that the changes we will experience until around 2050 have already been largely determined by our past and present greenhouse gas emissions.

The consequence is that while mitigation efforts by the international community are increasingly urgent, businesses, organisations and society at

UK Climate Impacts Programme (UKCIP)

The UK Climate Impacts Programme (UKCIP) helps organisations assess how they might be affected by climate change so they can prepare for its impacts. Based at the University of Oxford, and set up by the UK Government in 1997, UKCIP is primarily funded by Defra.

From an initial focus on impacts research studies, there has been a progression towards developing stakeholder partnerships that share information, identify research needs and pursue work on climate impacts and adaptation in their regions and sectors. UKCIP connects scientists with policy-makers and decision-makers in Government, business, and other organisations.

A range of tools, resources and support is freely available from the UKCIP website www.ukcip.org.uk. These include a set of climate change scenarios for the UK, the web-based Adaptation Wizard that guides decision-makers through the process of developing an adaptation strategy and the Business Areas Climate Impacts Assessment Tool (BACLIAT).

One tool developed for local authorities is a methodology for compiling a Local Climate Impacts Profile (LCLIP). This resource helps to identify organisations' exposure to weather and climate. It builds evidence of a locality's vulnerability to severe weather events and their impact on the local community as well as the local authority's assets and capacity to deliver services.

UKCIP is soon to publish a new package of climate change information for the UK with more spatial and temporal detail than the existing UKCIP02 dataset (including a new marine element). It will allow users to customise the data for their own needs using maps and graphs as well as numerical data.

large will have to learn to cope with climate change over the medium (and longer) term. The question is, how will this adaptation take place? Will it occur in a planned, proportionate and cost-effective way, looking out for the needs of all groups in society and at work? Or will it occur in a more reactive and incoherent manner, at the expense of the welfare of the least well-off?

Throughout this report, we refer to some basic terms in the discussion of adaptation. These are explained in the box below.

Definitions and useful concepts

Adaptation: addresses the impacts and opportunities resulting from a changing climate. It can take the form of a process (or processes) to reduce harm or risk of harm, or the realisation of benefits associated with climate variability and climate change.

Mitigation: efforts to reduce energy use and emissions of the greenhouse gases that contribute to climate change.

Vulnerability: the degree to which an individual, group or sector is unable to cope with the adverse effects of climate change. Vulnerability is determined by several factors: **exposure, sensitivity** and **adaptive capacity.**

- *Exposure*: the extent to which an individual, group or sector comes into contact with climate-related events, for example high temperatures or flooding.
- *Sensitivity*: the degree to which an individual, group or sector is affected (either negatively or positively) by a change in climate.
- *Adaptive capacity*: the ability of an individual, group or sector to adjust to climatic changes, curb potential damage, cope with the consequences of impacts, or profit from new opportunities.

Building adaptive capacity: a type of adaptation involving some or all of the following kinds of activities: awareness-raising, research, policy development, regulation, institutional reorganisations and partnerships, financial developments.

Implementing adaptation actions: a type of adaptation involving some of the following kinds of activities: technical changes, structural changes, new products and services, relocation, financial commitments.

'Win-win' adaptation: when a measure helps to deliver adaptation, whilst also meeting another goal, such as improving the quality of the environment.

'No-regrets' adaptation: when a measure delivers a wider benefit, irrespective of whether climate change occurs (but which would help to achieve adaptation if the climate does change).

Scale effect: an agent, such as an organisation, experiences an impact differently depending on its size.

Summary

Climate change is now one of the greatest challenges facing the UK. The impacts of climate change will pose significant risks, and some opportunities, to all organisations. Every sector will face its own unique challenges, although some impacts (such as those associated with transport, water quality and availability, and health) will affect all.

Section 2

How will climate change affect society and people at work?

In this chapter, we first explore the potential effects of climate change on UK society at large to set the context for a consideration of the implications for employment. We then identify risks and opportunities under seven business area categories. Finally, we introduce a model of adaptation that distinguishes two dimensions of adaptation.

Impacts on society

The changing climate will likely affect the whole of society. However not all parts of society will experience climate change in the same way. There are

at least four observations to be made here:

- Some groups are more sensitive to climate change than others
- Some groups have a lower capacity to adapt
- There is spatial and social variation in exposure to climate impacts
- There is an injustice in the experience of climate change impacts.

SOME GROUPS ARE MORE SENSITIVE TO CLIMATE CHANGE THAN OTHERS

Climate impacts are not felt equally because some groups are more sensitive to climate change. For example, temperature rise, especially during prolonged periods of extreme heat (heat waves), has a far greater impact on older people and young children than on working-age adults. A study of the impacts of the 2003 heatwave in France, where 35,000 early deaths were attributed to the extreme heat, found that excess mortality was 70 per cent for the 75–94 year age group and 120 per cent for people over 94 years (Pirard et al, 2005). Mortality risk is highest among older people who live alone, which is often an indicator of relative poverty, suggesting that there is also a link between income and sensitivity to climate impacts.

The psychological impacts of weather events such as flooding are much higher than often realised. They are often experienced more widely and more severely by lower income groups (Werritty et al, 2007). Depression can be up to four times higher in flood-affected areas than elsewhere (Reacher et al, 2004). Where households are already under financial (or other psychological) strain, as is more frequent in socially deprived areas, the impact of flooding can be more devastating: in this sense, poorer households are more sensitive to climate change than others.

SOME GROUPS HAVE A LOWER CAPACITY TO ADAPT

Some groups are less able to adapt to climate change than others.

Insurance is one key factor in a household's capacity to adapt to climate change. As the risk of flooding increases, for example, the more important it becomes to insure against it. However, various studies have shown that under- and un-insured assets are more likely to be found in areas of low income and social exclusion.

One study of flood risk and social equality in Scotland found that 91 per cent of people living in flood risk areas had contents insurance, but for social housing tenants this figure dropped to 75 per cent (Werritty et al, 2007). Within social housing only 37 per cent of people knew about the 'pay with rent' contents insurance scheme (where residents can pay premiums on a weekly basis), and it

had an uptake of just 13 per cent. Amongst housing associations, only 43 per cent of households had insurance. These figures indicate that in the UK, where insurance is mostly provided through private markets, low-income groups have a lower capacity to spread risk as an adaptation to climate change.

Information about climate change is another key component of adaptive capacity, and it is likely that certain groups in society are less able to access available information than others. For example, where barriers of language or lack of education exist, people are less able to benefit from public information campaigns on climate change impacts and, as a result, are likely to be less well equipped to adapt their homes, lifestyles or decisions.

THERE IS SPATIAL AND SOCIAL VARIATION IN EXPOSURE TO CLIMATE IMPACTS

Climate change will be felt differently in different parts of Britain because projected climate changes vary geographically, and the local built environment also affects experience of climate events. This in turn interacts with the social factors outlined above. The key determinant of exposure to climate impacts is where people live and work.

Rivers and coasts

Many of the houses most at risk from river floods are occupied by wealthy residents, given the premium value traditionally assigned to waterfront properties. However, the pattern for homes that are at risk from coastal flooding is quite different; nearly 20 per cent of those living on coastal flood plains are in the most deprived 10 per cent of the population, whereas only around two per cent are in the most well off (Walker et al, 2003). Other studies support this trend, concluding that the more excluded social groups are at higher risk from flooding (see Fielding et al, 2005). One Environment Agency report points to the injustice that many deprived areas are sited in flood risk zones (Environment Agency, 2007).

The problem of lower income groups being located in high-risk areas is likely to become compounded by human and economic responses to climate change. As insurance premiums rise to cover the growing risk of climate change impacts, properties may become impossible to insure and therefore lose value. This may act as a perverse incentive for lower-income groups to occupy properties in high-risk areas, for example near rivers on natural flood plains. There is a also a chance that a more general improvement in pricing risk in the housing market (as a result of better flood risk information and higher awareness) will lower the relative cost of housing in high-risk areas (in relation to the value premium that will be 'transferred' to low-risk properties), further contributing to the likelihood that lower-income families will buy or rent property in areas that increase their vulnerability to climate impacts.

Cities

Urban heat islands (UHIs) develop in densely constructed cities where buildings produce and retain heat. Some UHIs can cause a massive 7˚C temperature increase relative to non-urban areas.[7] Poorer access to green spaces compounds the UHI effect and reduces adaptation options, and air quality, already worse in cities than towns and villages, is compounded by high air temperatures, which causes significant health problems. UHIs tend to be found in densely developed inner city areas, which also tend to be the areas with higher levels of deprivation.

THERE IS AN INJUSTICE TO CLIMATE CHANGE

Sensitivity, adaptive capacity and exposure are all related in some way to income, as well as other factors. Other work has explored the relation between peoples' income and carbon emissions, concluding that the more people earn, the more they consume and travel – making their carbon footprint[8] greater. Given the scientific consensus that human emissions drive global climate change, this results in an injustice where:

- people with lower income are inherently more vulnerable to climate impacts, yet they did proportionately less to cause them in the first place; and
- people with higher income have higher greenhouse gas emissions, but are also better able to cope with the climate impacts they have contributed to.

Equity issues are central to the concept of Just Transition.[9] This concept has been promoted by the trade union movement as a framework for planning and managing a fair transition to a low carbon economy. Many of the key principles concerning fair distribution of the costs and benefits of change and support for those affected are equally applicable to adaptation.

Impacts on people at work

Given the context of climate impacts on economic sectors and on wider society, there are also a range of risks and opportunities related to UK workplaces and employment.

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7 GLA (2006) London's Urban Heat Island: a Summary for Decision-Makers, www.london.gov.uk/mayor/environment/climate-change

8 Whilst there may be a point at which peoples' 'green' consumption reduces their relative footprint per pound spent, there is no evidence that greening consumption is enough to break the relationship between income/expenditure and emissions (environmental impact).

9 See TUC Touchstone publication, *A green and fair future*, June 2008, available online via the TUC website.

Just as there are likely to be unequal impacts on society, there will be unequal impacts on different organisations or employees within the same sector, depending largely on the size of the organisation and on individuals' specific roles.

SOME ORGANISATIONS HAVE A LOWER CAPACITY TO ADAPT

The ability of an organisation to adapt to climate change is determined by a number of factors (Yohe and Tol, 2002). These include:

- the range of technological solutions available
- the availability of resources, including financial capital, for investment in adaptation
- the decision-making and employee consultation structure within an organisation
- levels of education and awareness ('human capital')
- relations with other relevant parties, such as Government, banks, scientists and so on ('social capital')
- the ability to spread risk (e.g. through insurance or strong networks)
- the ability of decision-makers to process climate information and make decisions based on their analysis.

These factors mean smaller employers may be less able to adapt than their larger competitors. Indeed the study found that smaller organisations are less likely to have taken steps to consider climate risks and adapt: there is a scale effect to adaptive capacity. For example, the management of small and medium-sized enterprises (SMEs):

- are often limited in their ability to choose new strategies; if the company is specialised it may be difficult to change
- find it difficult to raise capital to invest in new initiatives; small borrowers are often the first to feel the effects of economic downturns
- are sometimes not used to processing scientific information
- do not usually have time to attend conferences or read information on climate change
- do not generally have comprehensive risk management structures and are possibly under-insured against current risks, let alone future climate change; and
- are less likely to invest in private insurance, such as group health insurance packages for employees.

The challenges associated with adapting to climate impacts are numerous and complicated. This complexity makes adaptation difficult. Smaller organisations tend to have lower levels of union membership than larger organisations and are therefore less likely to benefit from the involvement of trade unions in developing workable responses to the challenges. This leaves the employees of such companies more vulnerable to the impacts of climate change.

The impacts of climate change are therefore likely to magnify existing inequalities in employee protection between large and small organisations. A recent government report[10] on business health and safety was criticised by the TUC for failing to address the poor health and safety record of SMEs in the UK. The TUC response[11] showed that more than half of SMEs have not completed statutory risk assessments on health and safety. SMEs are poorly regulated on health and safety, with an average inspection frequency of once every 20 years. As a consequence, employees of SMEs are exposed to greater health and safety risks, even without the added pressure of climate-related risks.

This scale effect to adaptive capacity needs to be more widely recognised. The long-term sustainability of many local economies, communities and jobs is built upon SMEs. It will be important to find ways to increase the adaptive capacity of SMEs in the UK in order to ensure quality jobs and wider social equality in the face of our changing climate.

EXPOSURE AND VULNERABILITY DEPEND ON JOB ROLES

People in some jobs are more exposed to climate change impacts than others. While some sectors are more vulnerable to climate change, even within sectors, differences exist depending on the role and position of specific workers. A general distinction can be made between exposure in 'frontline' and 'management' positions. Some of the most exposed jobs are the least well-paid.

Many frontline employees need to work on specific sites. These differ between indoor and outside workers:

- Indoor staff, who work in manufacturing plants or in restricted spaces such as transport vehicles, often experience hotter and poorly ventilated working conditions. In the 2003 heatwave, for instance, tube drivers in the London underground suffered temperatures as high as 41.5°C.[12] In offices, 'frontline' staff often work in large open plan offices where temperature is difficult to regulate.

10 BERR (2008) *Improving Outcomes from Health and Safety*, available at www.berr.gov.uk/files/file47324.pdf

11 TUC (2008) Press Release, August 5th 2008: 'Government report on business health and safety record falls short', available at www.tuc.org.uk/h_and_s/tuc-15163-fo.cfm

12 Metroeconomica (2006). Report on the Costs of the Hot Summer of 2003, Project E of the Cross-Regional Research Programme for Defra

- Outside workers are more directly exposed to climate conditions. It is extremely difficult to control working conditions for agricultural, construction, maintenance and emergency service employees, in addition to many others. Exposure to high temperatures, direct sunlight, strong winds and floodwaters without proper protection increases the risks of suffering from skin cancers, disease and physical injury.
- By contrast, management positions tend to be more flexible in location and better paid: such employees are less frequently exposed to climate impacts and therefore less vulnerable to climate change.

Impacts across organisations

This section examines climate risks and opportunities facing organisations, arranged under some generic areas of organisational activity. It draws on information from the original research conducted for this study into FTSE 100 organisations and public sector bodies.

BUILDINGS AND INFRASTRUCTURE

Buildings and infrastructure face impacts from both ongoing day-to-day climate change and extreme weather events. Subsidence (caused by drying clay soils) may increase with hotter, drier summers, and can affect the structural integrity of buildings and underground telecommunications cables, while flooding can cause damage to buildings, their contents and to vital transport infrastructure, including critical energy terminals. Heat stress can also affect buildings and the heating or cooling needs of the goods and people within.

Almost half of the FTSE 100 companies surveyed for this report indicated that in their experience, the greatest impacts from weather events were to their buildings and infrastructure. For example, one bank had a regional branch flooded on its opening day. 64 per cent of the public sector organisations surveyed said they had been affected by weather events over the last five years. Of those affected, flooding, storm/wind and high temperatures were, in order, the top three reported events. Two-thirds of employers anticipate risks to buildings and infrastructure from future climate impacts, while one-third anticipate opportunities – mostly in terms of reduced heating needs and subsequent progress towards carbon management objectives.

WORKFORCE

Climate change will affect people at work in many ways, as explored throughout this paper. Transport disruptions as a result of flooding or extreme weather can affect employee travel for work, or to and from work. Working conditions will be

directly affected by changes in climate, the impact on indoor conditions is highly dependent on the quality and age of the building, but heatwaves and floods will have a significant impact. Outdoor working can become unhealthy or dangerous during storms, floods and heatwaves. The movement of people both into and within the UK in response to climate and socio-economic changes will also affect communities and people at work.

This study found that just under half of employers have experienced impacts on their workforce during major weather events, with disrupted travel to work and absenteeism during hot sunny weather being cited, but with an increasing recognition of the health and safety implications of hot weather on people in restricted work areas (e.g. in vehicles) or outdoors. 70 per cent expect further risks to their workforce from future climate change (related to health, travel, absenteeism), while 50 per cent expect climate change to bring improvements in working conditions at some point in the near future. This finding is particularly striking given that, as the report explores, very few employers have actually started to look at ways of addressing these risks to workers.

SUPPLY CHAINS

Even where an organisation itself is relatively resilient to climate impacts, disruption to supply chains can profoundly affect service delivery and profitability; for example, hurricanes in 2005 disrupted the supply of raw materials to a major drinks manufacturer. Outsourced services, such as telecoms and IT support, can also be affected, with potential to disrupt any organisation. In general, outsourcing may increase the vulnerability of an organisation as it loses control of risk management. Some leading employers work with their suppliers in order to re-gain some control of supply chain risks.

Perhaps because of the indirect nature of supply chain risks they tended to be less visible to many survey respondents. Only 24 per cent said they thought supply chains would be substantially affected by future climate change, largely in connection with the supply of raw materials, such as agricultural produce during droughts or unseasonal flooding. Only 16 per cent anticipated opportunities, often by using more local suppliers to shorten the supply chain.

Low awareness of supply chain risks was evident in the most vulnerable sectors too, such as in the food and drink industry, where one FTSE 100 company acknowledged the likelihood of risks from climate change but had not yet considered how these would affect operations.

MARKETS

Demand for certain products, services and raw materials may change in relation to climate conditions: both temporarily (e.g., higher demand for some

tourism services or certain types of food or drink during hot weather), and in response to trends (e.g., growth in demand for air conditioning systems as average temperatures rise, or for materials such as high-tech bitumen for all-weather road construction).

Both public and private sector organisations see more opportunities than threats to markets and the demand for services, with around half of the FTSE 100 companies interviewed having identified strategic opportunities from climate impacts. This is an interesting finding given the overall macro-economic costs that are predicted to result from climate change (Stern 2006). It suggests that the employers surveyed in this study are, for whatever reasons, more optimistic than risk-conscious.[13]

PROCESSES

Changing climate conditions may affect production processes and service delivery in a number of ways, particularly where temperature control is important, or where large quantities of water are required. The cost of maintaining cool storage facilities for food, drink, and pharmaceutical products, for example, as well as cooling large data centres, will rise in high temperatures. The tendency towards 'just in time' production processes may increase vulnerability to climate change, since this approach can lack the headroom to cope with disruptions, particularly further down the supply chain.

More employers see a greater number of opportunities than risks around service delivery and production processes as a result of climate change, with many stating that they hoped warmer winter temperatures would benefit production lines by reducing heating costs and days lost to cold weather.

FINANCE

In addition to changing insurance premiums, climate change may bring investment opportunities in adaptive technologies or climate resilient organisations, and higher investment risk associated with vulnerable companies. Greater uncertainty over future climate variability is hard to factor into investment decisions for large financial corporations: many organisations treat investment risks as insignificant, with only 30 per cent of companies surveyed saying this represented significant risk. Again, opportunities appeared to be more visible to respondents than risks.

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13 The skew towards optimistic responses in our research may also be an effect of the positive bias towards proactive respondents: organisations were more likely to respond to our survey and interview research if they felt they has something positive to say about their current activity on climate impacts.

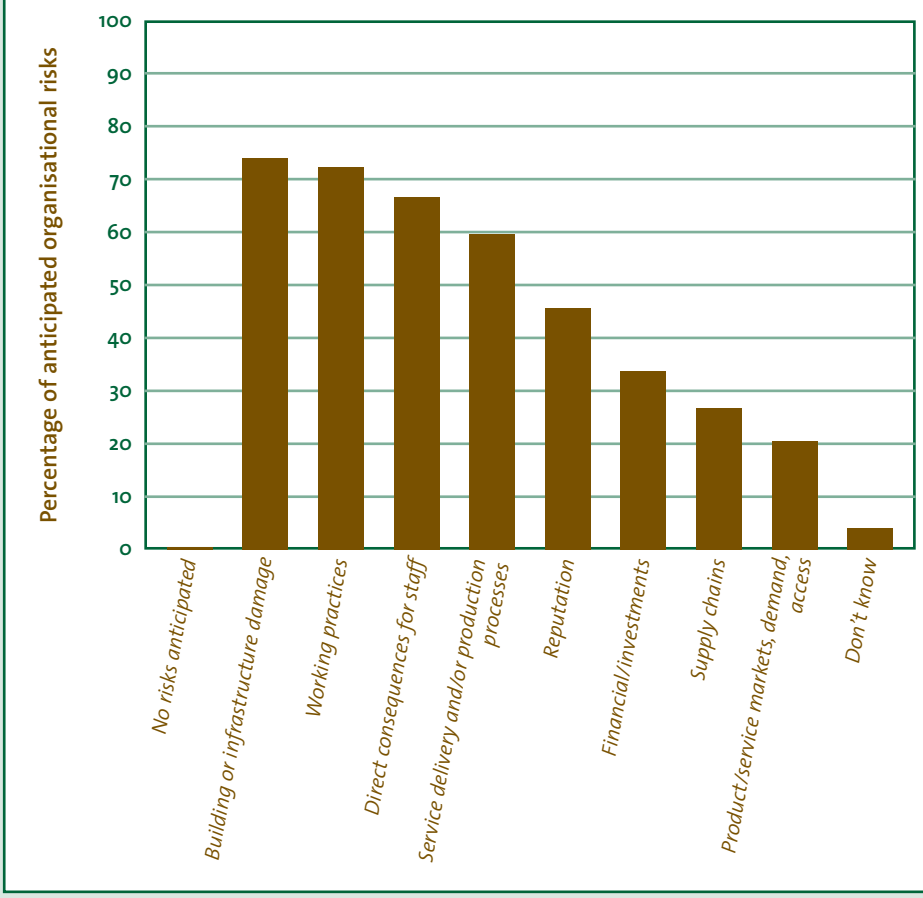
REPUTATION

Disruption caused by climate impacts could affect the brand reputation of some organisations (e.g. failure to deliver services for a local authority; failure to maintain bus routes by a transport corporation during the summer 2007 floods). However, many organisations struggle to identify any reputational risks from climate change impacts. This is perhaps because of the indirect nature of supply chain problems or negative health impacts on workers. Private sector companies on average tend to see three opportunities for every two risks in this area.

ANTICIPATING RISKS: EXAMPLES FROM LOCAL GOVERNMENT

Figure 1 shows the range of risks from climate change anticipated by local authorities, according to our survey. All of the respondents anticipated some risks from climate change, and it is clear that most, if not all, have direct implications for employee welfare.

Figure 1: Risks from climate change anticipated by local authorities



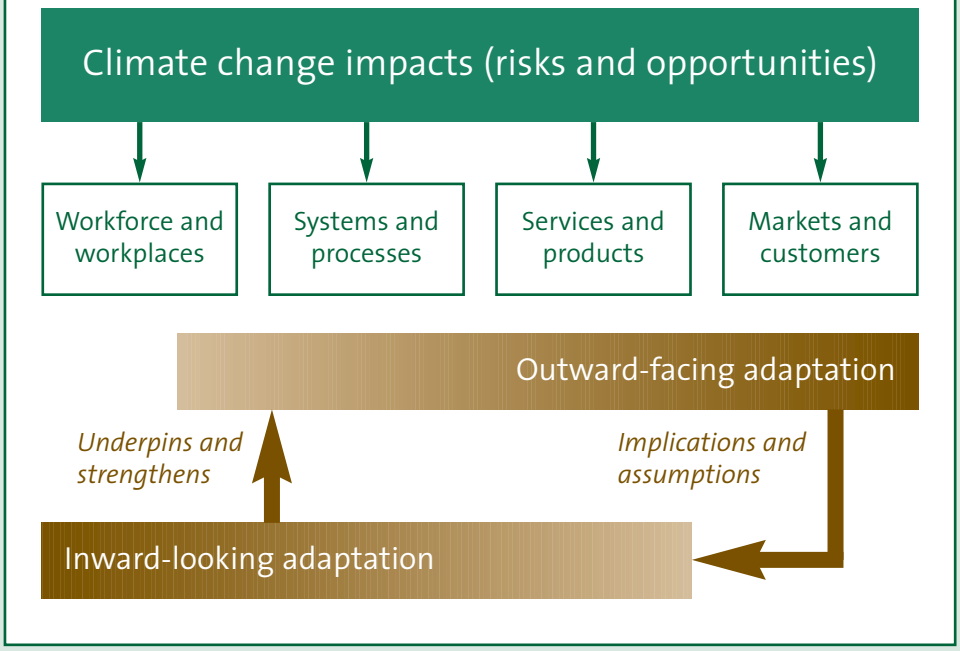
The role of adaptation – two approaches

Given the range of potential impacts from climate change on society and people at work, and on organisations themselves, there is little doubt that adaptation is needed. The question is whether businesses, employers and service planners will take the full range of issues into account as they develop adaptation strategies. Undoubtedly their focus on adaptation will be to minimise potential costs (from damage to assets, disruption of service, or loss of profit) and to take advantage of potential opportunities (from reduced bills, new markets or changes in demand). But will this be at the expense of employee welfare? Will adaptation affect the quality and security of jobs? Will employees be given the skills training and protection they need to carry out their roles safely and efficiently? And will employees be consulted and involved in adaptation decision-making?

Figure 2 illustrates a model of adaptation that helps to distinguish two facets of adaptation.

Outward-facing adaptation is primarily driven by an awareness of the strategic or commercial risks and opportunities facing the organisation. Adaptation options would generally focus on addressing climate risks to markets, products and processes, capitalising on any opportunities and 'climate proofing' products and services. In many cases, outward-facing

Figure 2: The two dimensions to adaptation in organisations



adaptation strategies would be developed using a top-down approach, with decisions made by executives and technical advisors, with a goal to ensure the profitability and sustainability of the organisation under a future climate. It would safeguard job security and could minimise job churn and help create new employment opportunities.

Inward-looking adaptation is primarily driven by an understanding of the wider climate risks to employees and opportunities for creating better quality jobs. Adaptation options would focus particularly on the workforce and the workplace, and its systems and processes. Inward-looking adaptation strategies would address the implications of climate change and adaptation in areas such as working practices and conditions, equipment and skills, and health and safety. They would also involve equipping the workforce with the skills and training they need to perform their roles safely and efficiently in the face of climate change. Inward-looking adaptation strategies require mainstreaming across an organisation and would usually involve a bottom-up approach, consulting employees themselves with a goal of providing stable and good quality jobs under future climate conditions.

These two dimensions probably represent ends of a spectrum. However, it is worth noting that while outward-looking adaptation is the most obvious initial step for an organisation becoming aware of climate risks, it will feedback in either positive or negative ways on employment conditions, and thus reinforce the need for corresponding efforts in inward-looking adaptation. Conversely, progress on inward-looking adaptation will strengthen and underpin an organisation's efforts in outward-facing adaptation, not least through a motivated and well-informed workforce. The ideas and energies of workers can improve outward-facing (as well as inward-looking) adaptation. The organisation that neglects inward-looking adaptation altogether will likely find that its efforts at outward-facing adaptation are stunted.

Summary

The changing climate and its impacts on different sectors will result in specific impacts on an organisation's buildings and infrastructure, people, supply chains, markets, processes, finance and reputation, as well as on groups within wider society. Adaptation strategies are needed and two dimensions can be distinguished: strategies driven by commercial or service delivery risk (outward-facing) and strategies driven by risks to people at work (inward-looking). Section 3 provides evidence of how organisations in the UK are adapting to climate change, and explores the balance between outward-facing and inward-looking adaptation.

Section 3

How are UK organisations adapting to climate change?

This section is based on our original research into what organisations are doing to adapt to climate change. It investigates what drives employers in the UK to adapt, what the current level of preparation is in the UK's public and private sectors and where the responsibility for adaptation within organisations rests.

Process and drivers of adaptation

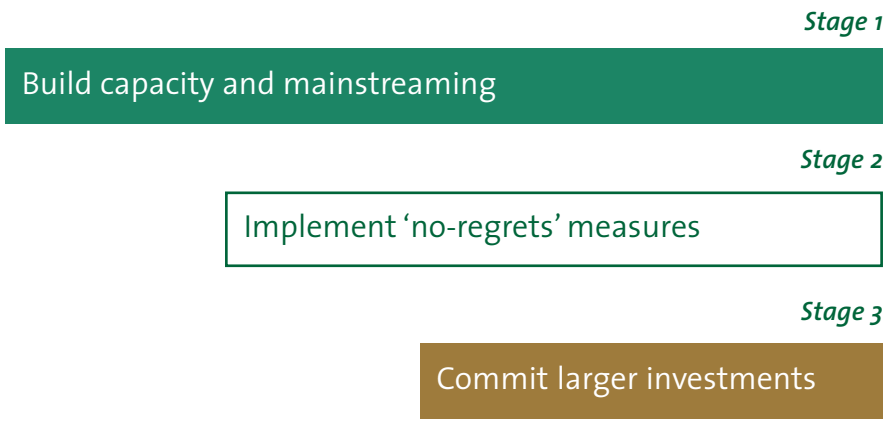
ADAPTATION AS A PROCESS

Adaptation is a process and a way of approaching decision-making rather than a series of individual measures. Adaptation sometimes occurs without

decision-makers consciously deciding to adapt, or without recognising their actions as adaptation to climate change. It is therefore insufficient to simply ask an employer how much they are adapting, as they may not know if they are doing so. Instead it is necessary to assess an organisation's overall awareness and activity on managing risks that are affected by climate.

Previous work has identified that a three-stage approach to adaptation promotes the most successful, and cost-effective, adaptation strategies. This approach[14] is illustrated in Figure 3 below.

Figure 3: A staged approach to adaptation strategies



Stage 1 focuses on **building the capacity to adapt,** including by raising awareness and through research, as well as by strengthening key institutions and systems. Mainstreaming must begin at this early stage in the adaptation process, and continue throughout. Mainstreaming involves building a consideration of climate change risks and opportunities into all aspects of an organisation, so that adaptation becomes part of everyone's job. It is also important to consider early in the process how to deal with irreversible impacts that climate change may bring (e.g., loss of biodiversity) and to identify those (potentially costly) adaptation options that may require very long planning horizons (e.g., introduction of new reservoirs in the water industry). Social dialogue and employee consultation form an important part in all stages of the process but must be built in from the start to ensure that the adaptation measures undertaken are fair and sustainable.

Once capacity building initiatives are underway **Stage 2** can begin, with a focus on **implementing adaptation measures** that will either deliver multiple benefits ('win-win' measures), such as increasing water efficiency (reducing costs and environmental impact) or devising flexible travel planning to cope

14 Adapted from Watkiss and Downing (2005)

with floods (reduce work-related travel and GHG emissions); or that will deliver benefits irrespective of the degree to which the climate changes in future ('no-regrets' measures), such as improving the resilience of buildings to current climate risks.

It is prudent to leave the **largest investments in adaptation** until **Stage 3**. Such investments might include structural changes needed to mitigate significant risks (e.g. site relocation, construction of physical defences, opening up new markets or major retraining staff programmes), and these should only be undertaken after formally appraising costs and benefits using appropriate climate impact data.

DRIVERS OF ADAPTATION

It is important to understand what motivates an organisation to adapt, especially in the context of encouraging inward-looking as well as outward-looking adaptation. This study has identified four key drivers of adaptation:

- **Awareness**: The simple fact that climate change has become a recognised issue is moving people to take steps to adapt. Initial scepticism regarding the uncertainties of climate forecasting have given way to a more pragmatic approach to dealing with the challenges facing business and society. Awareness of the climate change phenomenon has prompted some employers to begin considering existing weather-related risks in the face of potential future changes that will exacerbate existing risks. This trend has been compounded by recent events (which tend to be more tangible and persuasive than science alone), such as Hurricane Katrina, the European heatwave of 2003 and the UK summer floods of 2007. At the same time, employee representatives, including trade unions, have been working to raise awareness of climate change at the workplace level and promote measures to reduce energy use and waste.
- **Legislation**: Public sector bodies in particular are driven by policy and legislative initiatives at national level. Central Government's lead in adaptation, including through the Climate Change Act (*see box overleaf*) and the inclusion of an indicator on adapting to climate change in the new local government performance framework (*see box page 32*) have both signalled progress.
- **Investors**: Investors need to ensure that profits and returns are sustainable under future conditions, including future climate conditions. Organisations such as the Carbon Disclosure Project therefore exist to exert pressure on private sector companies to demonstrate that they are managing all future risks. Climate change is starting to be considered as one of the risks that investors look at when assessing the sustainability of their investments. Major institutional investors such as pension funds are

The Climate Change Act and UK Government action on adaptation

The Climate Change Act[15]

The Climate Change Act received Royal Assent in November 2008. It makes the UK the first country in the world to have a legally binding long-term framework to cut CO_2 emissions and adapt to climate change.

With respect to adaptation, the main elements of the Climate Change Act are:

- A UK-wide climate change risk assessment must be produced every five years (the first by 2011).
- A national adaptation programme must be put in place to address the most pressing risks (the first by 2012).
- The introduction of a power to require public authorities to report on how they have assessed the risks of climate change to their work, and what they are doing to address these risks.
- A strategy must be published outlining how this new power will be used, and identifying the priority organisations that will be covered by it. The Government will also provide statutory guidance on how to undertake a climate risk assessment and draw up an adaptation action plan.
- A Committee on Climate Change has been formed and published its first full report in December 2008. It is an independent, expert body to advise Government and it will submit annual reports to Parliament on the UK's progress towards targets and budgets to which the Government must respond. An adaptation sub-committee will be formed to oversee progress on the Adapting to Climate Change Programme and advise on risk assessment.

The Adapting to Climate Change Programme

A cross-Government Adapting to Climate Change Programme, led by Defra, was set up in January 2008. The Programme aims to bring together the work already being done across Government and the wider public sector on adapting to climate change, and co-ordinate the development of the Government's work on adaptation in the future.

Initial areas of work for the Programme included:

- developing the adaptation clauses of the Climate Change Bill
- working with local authorities, including developing the 'adapting to climate change performance indicator' (NI188) and support package, and
- raising awareness of adaptation, both within Government, the private and third sectors and amongst individuals, using tools such as the Adapting to Climate Change website.

More information on the Programme can be found in the policy document, *Adapting to Climate Change in England: a framework for action*, published in July 2008, and on the Adapting to Climate Change website at www.defra.gov.uk/adaptation

beginning to build considerations of climate risk into their investment decision-making process and surrounding engagement activity.

- **Insurance**: Insurance companies are proactive in researching climate change and adaptation impacts and in subsequent lobbying, given their direct commercial sensitivity to flooding and other weather-related events. Insurers are beginning to work with their clients to identify and mitigate climate risks. Some insurers are actively engaging major clients and 'hand-holding' them through risk assessments. In return they offer reduced insurance premiums.

15 Further information about the Climate Change Act is on Defra's website www.defra.gov.uk/environment/climatechange/uk/legislation

In response to these drivers, organisations across the UK and in different sectors are starting to adapt. In a UKCIP publication, West and Gawith (2005) observed that more progress has been made in building adaptive capacity than in implementing adaptation actions, supporting the model in Figure 3 that indicates the first stage in the process of adaptation involves building capacity. They also identified a number of barriers or problems perceived by organisations seeking to adapt to climate change, including issues around the use of climate data and inherent uncertainties, lack of best practice examples, and the need for senior management leadership on adaptation. Since the report was published, there has been further progress in adaptation on the ground.

By comparison with other countries around the world, the UK is relatively advanced in its preparation for climate impacts. Government has taken a proactive stance, and awareness among employers is increasing. The international and UK trade union movement has developed work on the way climate change will affect employment. However, there is still a lack of understanding in some quarters about the distinction between adaptation and mitigation, which affects the way that employers are developing their responses. To date, the mitigation agenda has had much higher profile and greater public awareness than adaptation.

Adaptation in the public sector

From our online survey of public sector organisations, response from local government made up 92 per cent of the results, and so analysis here focuses on local government. Although a range of organisations were approached with the survey, the disproportionately high response rate from local government as opposed to health, education and so on is likely to be a result of the fact that local authorities have been the subject of focus as co-ordinators of local responses to climate change impacts and contingency planning. In addition there is an explicit requirement for local authorities to consider adaptation as part of the recent introduction of national set of performance indicators including adaptation (*see box overleaf*).

The survey identified that a wide range of adaptation activities are already underway within local government. Figure 4 (*overleaf*) shows that activities related to building capacity are far more common than those that could be considered actual adaptation actions. Internal awareness-raising about climate change was underway in 81 per cent of the organisations surveyed, with climate change featuring in the corporate plan of just over half. Perhaps worryingly, flood response plans have been developed by only around half of the local authorities surveyed. Those local authorities, which are already engaged with UKCIP (e.g. in receipt of the UKCIP e-news bulletin), were much more likely to have carried out an audit of vulnerability or climate change risk

Local Government National Indicator on Planning to Adapt to Climate Change

The Local Government White Paper (October 2006) set out a new performance framework for local government. A single set of 198 national indicators was announced as part of the Comprehensive Spending Review 2007. The national indicators replaced all other existing sets of indicators in Spring 2008.

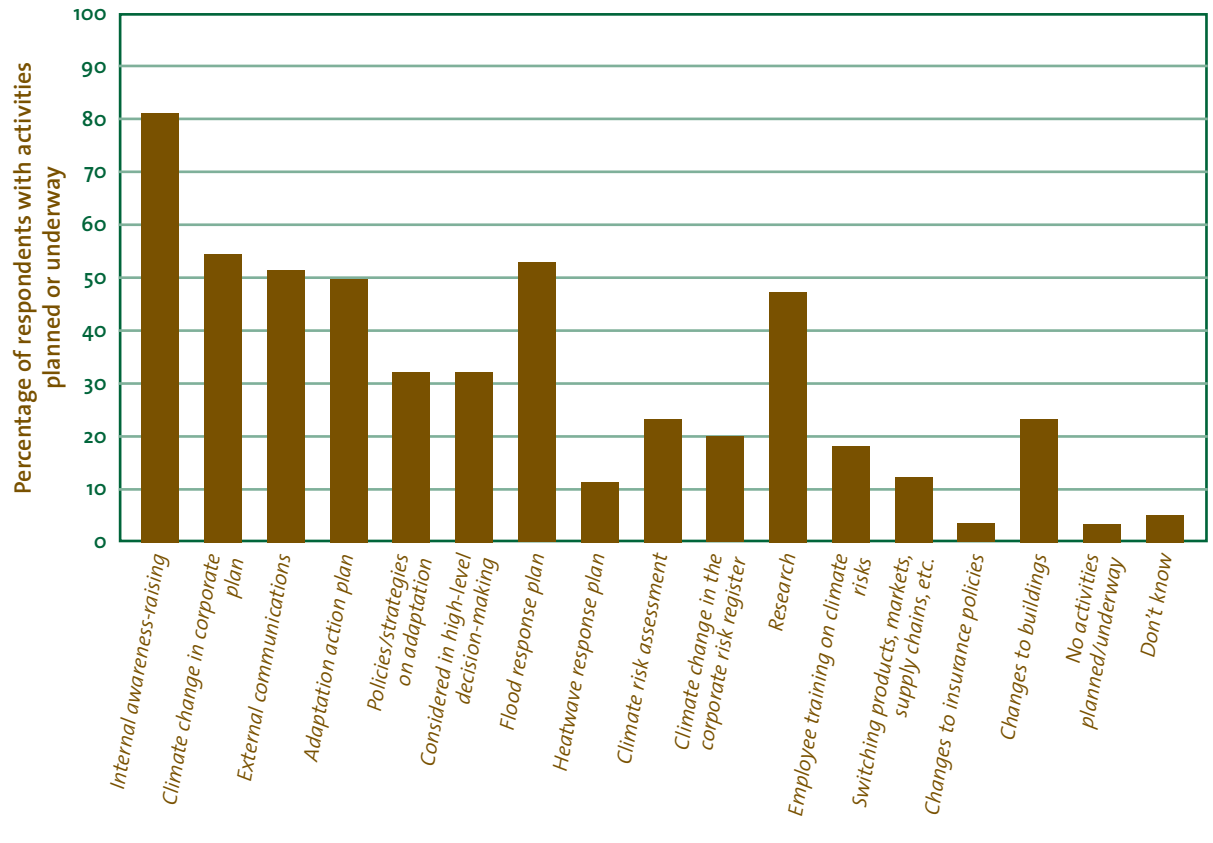
NI188 – Planning to Adapt to Climate Change is a process-based indicator that measures progress in assessing the risks and opportunities from climate change.

The aim of the indicator is to ensure local authority preparedness to manage risks to service delivery, the public, local communities, local infrastructure, businesses and the natural environment from a changing climate, and to make the most of new opportunities. Local authorities will report the level of preparedness they have reached against the five levels of performance, graded 0 to 4.

Level 0 Baseline (Authority has begun the process of assessing)
Level 1 Public commitment and prioritised risk-based assessment
Level 2 Comprehensive risk-based assessment and prioritised action in some areas
Level 3 Comprehensive risk-based assessment and prioritised action in all priority areas
Level 4 Implementation, monitoring and continuous review

The adaptation indicator is designed to measure progress in preparation for climate change; assessing and addressing the risks and opportunities of a changing climate and incorporating appropriate action into local authority and partners' strategic planning.

Figure 4: Adaptation activities planned or underway in local authorities



assessment, and were also more likely to have embarked on external communications on climate change.

Around half of respondents indicated that they had a climate change strategy either in place or in draft, although individual adaptation strategies were rare, the rest being joint mitigation and adaptation strategies or solely mitigation. 12 per cent listed progress towards the local government performance indicator, which includes both risk assessment and employee training in adaptation. Employee working assessments, such as climate impacts on employees, home-working and alternative travel plans were reported to be underway in a small number of local authorities (less than 10 per cent). Climate change adaptation leaders were identified within various departments and at different levels. Some were at environment or sustainable development officer-level, while others were working in technical service areas or as adaptation 'champions'. Some organisations had adaptation leads on their executive boards.

The local government performance indicator stimulates local authorities to consider risks to employees through a risk assessment across all of their responsibilities. According to the UKCIP, the majority of local authorities who have started to address adaptation in preparation for the indicator have, as a first step, completed a local climate impacts profile (LCLIP). Based on past extreme weather events, this process highlights the worst hit service areas for the authority in terms of cost, employee time and failure to deliver the service. The process raises employee awareness and internal communication about climate impacts and has in some cases led to immediate updates and amendments of business continuity and service provision plans.

Overall, however, the research indicates that relatively few local authorities are undertaking activities related to the employment implications of adapting to climate change, for example by amending policies, procedures or plans on working conditions. Therefore, despite the fact that public sector bodies are not motivated by profit maximisation, the strategic outward-facing issues of service delivery still seem to dominate adaptation activity, potentially at the expense of inward-looking adaptation and the experiences of workers.

Adaptation in the private sector

In order to understand the level of private sector adaptation activity in the UK we interviewed a sample of FTSE 100 employers, as well as a handful of non-FTSE organisations that had interesting perspectives on adaptation. Companies were asked a range of questions covering their exposure to current climate impacts, expected future risks and opportunities and information on any current or planned actions to adapt to future climate change.

CASE STUDY

Oxfordshire County Council – early experiences of mainstreaming adaptation

Oxfordshire County Council (OCC) co-ordinates its adaptation strategy in the same area of the council that leads on climate change mitigation – the Future First section of the Environment and Economy Directorate.

OCC started to consider adaptation as a logical addition to its mitigation strategy. Oxfordshire has a vulnerable geography and is particularly at risk of flooding as the events of summer 2007 confirmed.

The Council has responsibility for the local fire authority and emergency planning, and so needs to think about flooding (among other issues) with this in mind.

What are the main stages of the process?

OCC's approach has been to look at the costs of climate impacts and how to avoid them through sound adaptation. The aim is to mainstream the strategy across the council. OCC went through the UKCIP LCLIP process in 2006[16]. During the process, logistics (e.g. transport networks), people (especially vulnerable groups), property (schools, councils buildings etc), and financial impacts (e.g. insurance) were considered.

The focus was on how climate affects the local authority, primarily in terms of delivering services to the public. The impact on council employees was considered in terms of service delivery: for instance, how to ensure service continuity if staff cannot get to work.

Practical solutions to enable workers to continue to do their jobs despite climate impacts were also considered, such as supplying sun cream to prepare people better for work in direct sunlight.

How has adaptation been mainstreamed?

The Local Area Agreement has formed the basis of the approach. Oxfordshire is now working on 'LAA2' in partnership with the district authorities in the county. With respect to the national performance indicator for adaptation, OCC and the Oxfordshire districts are currently at the stage of assessing what level they are at individually, before working to get to the same starting point.

Barriers

Some barriers to adaptation have been discovered by OCC, particularly with regard to how it interacts with their other key climate change strategy: cutting emissions. For example, in terms of mitigation it is better to have diesel cars as part of the council's fleet, but these have higher emissions of particulates, which may lead to air quality problems in high summer temperatures.

There are also impacts on workers that have been raised by the local union rep, for instance around car usage allowances and fuel duty.

OCC has looked at darkening windows in some non-air-conditioned offices in order to reduce temperatures. But this can mean that people switch lights on and therefore increase energy use. There could also be clashes between mitigation and adaptation in terms of air conditioning, particularly in older people's care homes where it is essential to carefully regulate temperature.

More than 60 per cent of private sector employers we spoke to claimed to have taken action to manage climate risks or opportunities from climate impacts. When questioned further, it emerged that two of these had in fact taken steps towards mitigating emissions and confused this with adaptation. Similarly, a small number of companies claimed not to have taken measures to address

16 See LCLIP page on the UKCIP website for details, available at www.ukcip.org.uk/index.php?option=com_content&task=view&id=278&Itemid=377

CASE STUDY

Redhill School – Building Design

Redhill School in Worcestershire is one of the first in England to have had a climate change impact assessment carried out during its design phase.

The UKCIP Adaptation Wizard[17] was used from the start of the design process because the principal architect felt that climate change risk was significant. The school was also un-insured: the County Council had agreed to bear all costs of maintenance and repairs caused by climate impacts. The costs of retrofitting would probably be higher than investment in adaptive construction at the design stage.

The adaptation measures will protect the building and maintain a comfortable and safe teaching environment in current climate conditions, as well as for the building's 60-year design life. Adaptation measures included the following:

In periods of higher rainfall in winter, with more intense driving rain:

- A rainwater-harvesting scheme taking rain from approximately half the roof area is used for flushing toilets. Other parts of the roof area have a planted-roof finish (using sedum) to reduce rainwater run-off.
- A sustainable urban drainage scheme has been implemented on site using swales, ponds and underground box storage.
- Large overhangs on the roof and canopies have been provided to protect level thresholds from heavy rain.
- Windows are not set behind the cladding but instead use a polythene membrane to provide a seal between the window and wall for airtightness.
- The larger roof overhangs help protect areas of cedar boarding and increase the durability of materials.
- Wide gutters with emergency overflow points provide for periods of sudden intense rain. Zinc mesh gutter guards are used to help reduce the risk of blockage from leaves.

In milder winters:

- To avoid problems of mould growth there are no cold spots ('thermal bridges') in the building fabric.
- Proprietary extract vents, powered by small photovoltaic panels, are in use throughout the building to provide good ventilation in vulnerable areas – particularly wet areas, such as toilets and showers.

In hotter, drier summers:

- Due to external noise problems (close proximity of site to roads and railway), acoustically lined ductwork is used for incoming and exhaust ventilation. This provides enough ventilation for normal summer temperatures. In extremes, windows and patio doors can be opened for additional ventilation.
- Overhanging eaves and external canopies to the classrooms provide shade.
- The location of trees was taken into account when designing the raft foundation for the building, which was thickened where clay heave could have caused problems.

In increased wind speeds/extreme storms:

- Roof coverings are made from zinc sheet with standing seams which may be less vulnerable to high winds than roofing tiles.
- The profile of the building is relatively aerodynamic.

The above measures include both no-regret and win-win options and will provide benefits regardless of exactly how the climate changes.

The benefits to the school are mostly in terms of reduced costs under a future climate.

They include, however, fewer disruptions to school timetables (and therefore to pupils' parents and carers) and more comfortable working and learning conditions during extreme climate events and over periods of gradual climate change for both staff and pupils.

17 The Adaptation Wizard is available from the UKCIP website at www.ukcip.org.uk

climate impacts, but on deeper questioning it emerged that they had in fact put in place various measures that will help the company manage climate risks, such as improving water efficiency or upgrading temperature control systems in their premises, which will help to manage the effects of heatwaves on working conditions.

Some FTSE companies are adapting in small, commercially-driven ways: for example a food and drink company was adjusting product mixes in response to warm summer conditions and a food and drink packaging manufacturer was analysing its supply chain to see how it will cope with un-seasonal, weather-related peaks in demand.

Some financial institutions are auditing current investments for climate risks and establishing new divisions to look specifically at climate impacts.[18] For example, two financial companies in our study have created an executive-led sub-group on climate risk, which is also charged with developing new financial products. A number of other companies are auditing their assets with this in mind, particularly building stocks. Another financial sector company is building on the findings of their asset risk audit and relocating ICT databases to areas with lower probability of flooding. The same company has developed a flood plan in response to the findings of the audit after they discovered the sub-structures of two of their major buildings were in danger of flooding.

Several large energy companies have jointly commissioned climate modelling research to look at the risks to energy production and distribution in a future climate. Many energy companies operating off-shore facilities have extremely stringent health and safety standards, some of which require assessment of climate related risks such as wind speed and sea conditions – risks that could change as the climate changes (although climate change is not currently considered in these assessments). Likewise, many business contingency plans consider weather-related incidents, but we found no examples of where these contingency plans acknowledge new or future risks posed by climate change.

A very small number of employers have started to take measures that will enable their workforce to adapt to climate impacts. However, these are rarely acknowledged as such. One large UK employer has set the objective of installing natural ventilation systems into all its offices (excluding temporary lets) instead of using air conditioning. This company has also introduced

18 Financial institutions often define 'climate risk' as including risks posed by climate change mitigation legislation, therefore going beyond the scope of what this project refers to as climate risk (i.e. risks deriving from the physical impacts of climate change). However, even when so defined, financial sub-groups on climate risk also audit physical impact risks.

systems to encourage flexible working by promoting smart travel plans,[19] enhancing video- and tele-conferencing facilities, providing employees with individual travel-reduction targets and reducing pressure on employees to attend face-to-face meetings. The company is inadvertently creating a work structure that is more adaptable to climate events – even though the main objective of their introduction was to reduce carbon emissions from work travel (a 'no-regrets' adaptation measure).

These measures are motivated by efficiency improvements and are underpinned by business cases that stress cost-savings and CO_2 reduction potential. However, the environmental specialist who helped bring about these investments recognises the potential benefits for adaptation. This highlights the extent to which alternative agendas, such as carbon reduction, can drive what might also be termed inward-looking adaptation initiatives, at least within many of the large private sector organisations that we interviewed.

What is particularly striking from our research is the lack of measures aimed directly at addressing the health and safety risks posed to employees by heat stress, flooding and, in the case of outside workers, extreme storm events. Also, none of the employers we interviewed recognised the need for employees to

CASE STUDY

FTSE 100 packing manufacturer – climate risk assessment

The process of systematically assessing and therefore managing climate risks can be fraught with difficulty. We interviewed a Group Risk Manager who had recently started to apply his expertise to climate risk management. He said:

"When risk assessment is done separately by each department within a company there is a danger that climate risks are not recorded accurately. When asked to prioritise risks as part of a Risk Profiling exercise, for example, many departments will rank climate risk around 11th or 12th; there are more classic risks that they consider more important, probably quite rightly. If a central decision maker then chooses to concentrate on each department's top 10 risks, climate change is often forgotten about, even though it is a cross-cutting risk that affects the majority of departments.

"What you need to do is aggregate risks, but this is technically very difficult and requires an expert to oversee the way in which risk values are aggregated for the whole organisation – a mammoth task!

It is also very difficult to quantify climate risks given the uncertainty bound up in climate data. This might not matter so much when comparing different climate risks – but it does when you try and integrate climate risks into an overall corporate risk register."

Given the difficulties associated with assessing climate risks it is no wonder that SMEs and companies within non-risk based industries struggle to measure the scale of the problem.

This also helps to explain why some strategic decision-makers chose not to quantify risks, which if done accurately might show how important inward-looking adaptation is, and instead chose to focus exclusively on the commercial opportunities posed by changing climate conditions: something that they are much more used to dealing with.

19 For example, organising travel itineraries to minimise distance travelled.

CASE STUDY

FTSE 100 food and drink company – Building Management System

One of the largest retailers in the UK has recently installed a Building Management System (BMS). This allows temperature controls, as well as CO_2 and oxygen levels (and other variables) to be controlled remotely using an IT system. Security functions such as fire systems are also controlled by the BMS. The system enables the retailer to maintain a healthy and safe working environment, irrespective of outside climate. During a heatwave, the BMS will control air temperatures in stores and other workplaces to maintain a comfortable working environment. The BMS will also measure CO_2 concentration and if necessary add oxygen to the atmosphere inside a building to ensure comfort. It can do this without losing heat or cool air to the external atmosphere. Overall the system increases energy efficiency relative to less 'intelligent' heating and cooling systems, and is therefore a way of achieving temperature cooling with no net increase in CO_2 emissions. This kind of system is particularly helpful during extreme temperature peaks, especially where stores are located inside urban heat islands.

The decision to install a BMS was not taken explicitly to improve working conditions, but to meet the company's energy reduction goals and save costs. However, the 'intangible' benefits to working conditions and health and safety have been noted by the company's Group Energy Manager.

As a result of the BMS, the retailer's employees are likely to continue to work in a comfortable and healthy workplace environment under predicted future climate conditions.

develop new skills in order for the company to capitalise on market opportunities or manage risks under a future climate.[20]

A clear example of where outward-facing adaptation is being pursued without any accompanying inward-looking adaptation is found in one of the UK's top energy companies. This company is taking a proactive approach to adaptation; it has joined together with its competitors to commission original research on climate impacts in order to assess the risks posed to critical supply and distribution infrastructure. It is factoring future climate conditions into its demand forecasting so that it can make informed decisions when purchasing cheaper electricity on the futures markets. It is also integrating adaptive measures into routine maintenance so that various elements of the distribution infrastructure are replaced at minimal cost in anticipation of future impacts, rather than retrofitting once impacts arrive, at greater cost. However, because of its strategic focus on climate adaptation, the company in question considers itself to be successfully managing climate risks. Consideration has not (yet) been given, for instance, to the health and safety of maintenance workers who are required to work during heatwaves, or to carry out repair work in floodwaters. In fact, no inward-looking adaptation

20 This may also be a reflection of the size of companies we interviewed and the sectors that they represent. Skills issues are important to a number of SMEs, especially those in the construction, tourism and agriculture sectors, as well as public sector employees in health, emergency services and social services.

initiatives have been discussed within the company at all, as far as our interview could establish.

The above analysis is based largely on the UK's largest, market-leading companies, which should be forward-looking, risk-savvy and able to manage change: theoretically these companies have high adaptive capacity. These employers are considered to be leading the way in managing issues such as climate change. We therefore expect that the level of activity recorded by our interview research, despite inadequacies in addressing inward-looking adaptation, is much higher than that of employers more generally in the UK.

Data from the Carbon Disclosure Project (CDP, *see box below*) supports this analysis. A comparison of responses to the CDP from the FTSE 100 compared with those from the FTSE 350 indicated that larger companies are not only more likely to respond to climate change, but the level of awareness of physical and commercial risks from climate change is higher among the FTSE 100 than the FTSE 350 (Trucost, 2007).

A recent research report into SMEs and climate change found that climate risks are a low priority for SME management (Step Ahead Research, 2008). A number of barriers were identified in the report, including lack of awareness and capacity for managing climate risks. A report for AXA Insurance also noted the considerable vulnerability of SMEs to climate change and the low level of awareness and activity among small business employers in managing climate risks (Crichton, 2006).

Carbon Disclosure Project

The Carbon Disclosure Project[21] (CDP) is a non-profit venture set up to manage a dialogue between investors and corporations regarding the implications for shareholder value and commercial operations presented by climate change.

CDP publish the results of an annual questionnaire, which is completed by corporations representing $57tr of assets under management. The most recent questionnaire for which responses are publicly available is the CDP5 survey. This includes questions on commercial risks, physical risks, other risks (e.g. to consumer attitudes) and opportunities posed by climate change to the responding corporation's operations. Awareness of these risks is essential for undertaking adaptation. The CDP therefore aims to expose companies' awareness of climate risks and the need for adaptation for the benefit of investors who want to gauge the sustainability of their investments. The main focus of the questionnaire is to ask corporations about their strategy and targets for reducing greenhouse gas emissions. The CDP is set up to manage relations with private sector organisations only.

21 www.cdproject.net

Responsibility for adaptation

The nature of individual adaptation responses varies between sectors and organisations. The appropriate mix of people to manage climate risks and opportunities is therefore likely to vary between organisations. However there is a common need to mainstream adaptation throughout each organisation. This presents a challenge to employers: adaptation is not solely an environmental matter, nor simply a risk matter, a strategic question or an estates issue. Where, then, should responsibility for adaptation lie?

RESPONSIBILITY FOR ADAPTATION IN PUBLIC SECTOR BODIES

Results from our online survey indicated that responsibility for adaptation usually (over 75 per cent) lies within the environmental or sustainable development teams, followed closely by the corporate team (55 per cent). In some cases, organisations have appointed a dedicated climate change champion, lead or team, or see climate change as purely an estate management issue. Other owners of responsibility identified by local government respondents included emergency planning teams, senior management or sole responsibility resting with one individual responsible for both mitigation and adaptation. While more than a third of respondents identified adaptation as part of everyone's job, only one-fifth felt that their health and safety team would have responsibility for it. On a positive note, very few (6 per cent) said that no-one in their organisation had been delegated responsibility for adaptation, although the high proportion of responses coming from local government mean that this finding cannot necessarily be applied to the rest of the public sector.

RESPONSIBILITY FOR ADAPTATION IN THE PRIVATE SECTOR

The study found that many private sector companies tend to identify more opportunities than risks and focus more on outward-facing than inward-looking adaptation. This may be linked to where decision-making for adaptation occurs in the company. As with the public sector, responsibility for adaptation lies within a wide range of areas in the companies interviewed. Respondents gave a wide range of answers, including (in order, with the most frequent response first):

- Corporate/senior executives (including committees with executive representation)
- Environment/sustainability
- Health and safety
- Corporate social responsibility
- Estates management

- Dedicated climate change lead
- Energy or carbon management
- "It's part of everyone's job"
- Individual project managers
- Marketing and sales
- Some companies also stated that no-one had been given responsibility for climate risks.

For a relatively new issue, it is perhaps surprising that so many companies claim that adaptation is dealt with "at the very top", as one financial sector interviewee put it. Assessing climate risk and integrating it into corporate risk registers is a highly complex task, which many companies have not yet accomplished. Some may even have chosen not to undertake it. The result of this is that the general trends of climate change, rather than measured risks, tend to be considered and are more likely to be acted upon. For example, the role of hot, sunny weather in stimulating demand for sweet canned drinks is a well-recognised phenomenon in the food and drink sector; but the potential health implications of heat-stress to the workforce from an average 3˚C rise in summer temperatures takes a different kind of assessment and is not necessarily something many employers are familiar with.

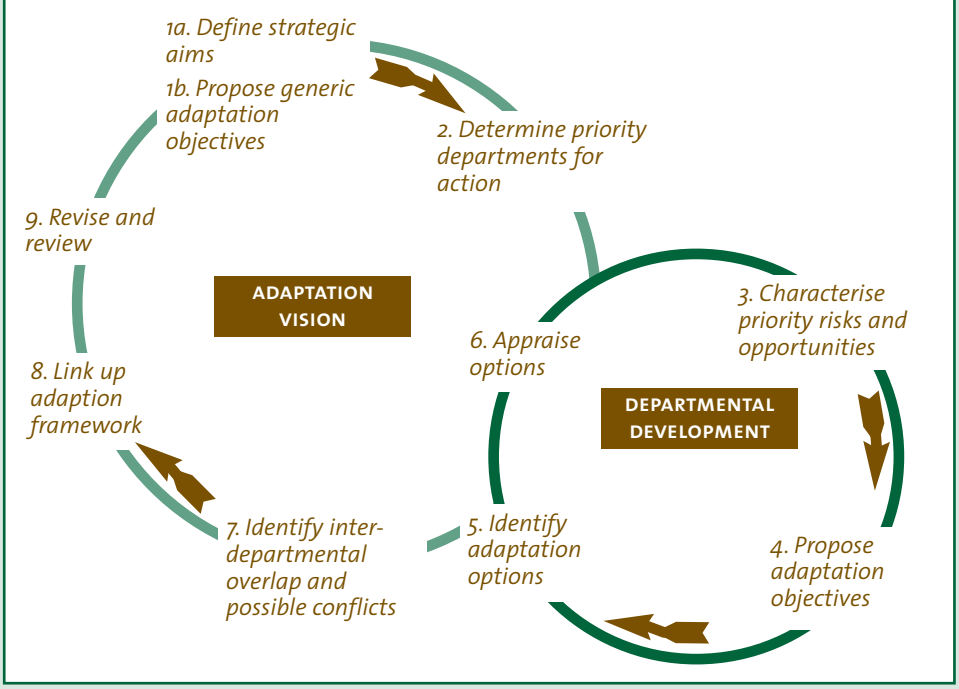
DECISION-MAKING IN ADAPTATION

One model[22] for managing and mainstreaming adaptation within an organisation is suggested in Figure 5. In this model, responsibility for initiating and establishing the adaptation process lies in the centre, either with an appointed climate change lead or in the corporate team so that structures and authorities are in place to access all areas of the organisation (light green circle). Responsibility to manage specific climate-related risks and opportunities can then be delegated out to the various departments that have primary expertise in their areas (dark green circle). This means that adaptation priorities can be judged effectively against the other priorities each department is facing. Once risks and associated adaptation actions have been identified by each department, these can be evaluated by the centralised decision-maker, who can take an overview and identify potential gaps or overlaps between different departments.

Within this model, different groups of stakeholders can be engaged at various stages, as appropriate, during the process. Engagement with employees and

22 Adapted from Horrocks et al. (2005)

Figure 5: Decision-making framework for adaptation



employee representatives would be a critically important part of this stakeholder involvement.

If responsibility for adaptation decision-making starts and finishes within the dark green circle, as appears to be the case among many of the employers we spoke to, then wider implications – especially for people at work – are unlikely to be considered: corporate social responsibility, buildings, or corporate strategic directors are not usually experts in health and safety in the workplace, for example.

Summary

Our research into how employers are adapting to climate change in the UK has highlighted some key points in the debate around employment and climate change:

- Adaptation is a process and a way of approaching decision-making rather than a series of individual measures.
- Some private and public sector employers are beginning to address the risks and opportunities posed by climate change.

PUBLIC SECTOR

- The new local government performance indicator on adaptation appears to have fostered a higher level of interest in adaptation in local government

than in much of the rest of the public sector, with the notable exception of the emergency services.

- Public sector employers are concentrating on raising awareness among service delivery employees and the public, and are beginning to assess the main risks faced by their operations.

PRIVATE SECTOR

- Investors and insurers are pushing private sector employers to recognise and manage the risks and opportunities posed by climate change.
- Private sector employers are managing risks in a variety of ways, most of which can be classed under the heading outward-facing adaptation, aimed at maintaining product and service delivery, protecting vital infrastructure and buildings and taking steps toward developing new products and services.

OVERALL

- Very few public or private sector organisations are looking at the implications of climate change on employees and employment conditions. Fewer still have taken steps to address these issues.
- Adaptation measures that do bring benefit to employee welfare have tended to be unintended consequences rather than primary aims.
- Responsibility for adaptation lies with a range of internal actors, but mostly with corporate executive bodies or technical service delivery departments (such as estates managers), which may in part explain why inward-looking adaptation is not occurring.

The research findings suggest that while investors and insurers can drive outward-facing adaptation (particularly in the private sector), it is unlikely that they can drive inward-looking adaptation. It is possible that increasing awareness of climate change and personal interest from employers and employees could drive inward-looking adaptation, but this was evident in only one organisation among those surveyed.

If employee aspects of adaptation are to be considered by employers, it is likely that new drivers will be needed to motivate action. According to the outward-facing/inward-looking model of adaptation, this pressure is most likely to come from the bottom up: the role of employees and representatives (supported by their trade unions) in driving inward-looking adaptation could be critical, and in some instances, legislation may be needed.

Section 4

What issues are in danger of being overlooked?

This chapter highlights areas relating to employment that current efforts in adaptation are in danger of overlooking. Although it is still a relatively new issue, adaptation has become an important concern for governments and many employers. However, as shown previously, outward-facing adaptation has often been pursued without an accompanying concern for inward-looking adaptation. Many employers are in the early stages of understanding climate risks and have not progressed far with mainstreaming adaptation.

Virtually none of the existing literature on adaptation considers employment implications. Academic studies tend to focus on the costs of adaptation, the role of various parties in delivering adaptation, the sensitivity of systems to impacts or the various methodologies for approaching adaptation decision-making.

Equity issues relating to climate impacts, particularly on the international level, do receive a fair amount of attention. A number of sector-specific studies

on adaptation options exist, which tend to focus on the impacts of climate change on service delivery or production – for example, impacts on agriculture and potential alterations to farming practices and crop selection. A number of studies have investigated the health impacts of climate change, which is as near as the literature comes to considering impacts and adaptation for people at work.

It seems that there are gaps in both current thinking and current practice with regard to the employment implications of adaptation. This study has identified a number of issues that are in danger of being overlooked if that situation continues. There is an opportunity to address this situation through co-ordinated work between employees, employers, trade unions and Government.

Dealing with climate hazards at work

As this study has demonstrated, people face a number of climate hazards at work, both through exposure to extreme weather events and as a result of more gradual change. Some of these hazards have specific implications for employee health and safety whereas others are linked to lines of responsibility and funding for dealing with extreme events.

The experience of the Fire and Rescue Service (FRS) during the floods of 2007 demonstrated some of the particular climate-related risks faced by people whose work directly exposes them to extreme weather events. If climate

CASE STUDY

Fire Brigades Union – the floods of summer 2007[23]

The Fire and Rescue Service (FRS) is on the front line of disaster relief operations. During summer 2007, the FRS led efforts to evacuate homes and workplaces to protect against rising waters and to deal with the aftermath of flooding. Issues raised as a result are relevant to planning for the anticipated increases in flooding that will accompany climate change.

Legislation

There is currently no statutory obligation for the FRS to plan for flooding, but the FRS is a key stakeholder in flood events. The Fire Brigades Union (FBU) conducted their own study into the FRS experience of the 2007 floods and published a detailed report which concluded that it is necessary to:

- update the Fire and Rescue Service Act to clarify responsibility in flood situations
- update FRS funding in light of any change to the Fire and Rescue Service Act
- take account of the resulting implications on skills, job security, budget, etc.

Health and safety

Current equipment and clothing is designed for fire protection, not for working in floods.

continued next page

23 Based on interviews with key representatives of the FBU and the recent publication: FBU (2008) *Lessons of the 2007 floods: The perspective of fire crews*, June 2008, www.fbu.org.uk/newspress/publications/pdf/floods_june_08.pdf

CASE STUDY

Fire Brigades Union – the floods of summer 2007 (continued)

The FBU study found that access to personal protective equipment (waders, light-weight, thermal water proofs) was limited for fire rescue staff, and that it was often shared. Firefighters suffered flood-related illness from contaminated water and hypothermia leading to hospitalisation and extended sick leave. Extended shifts were worked throughout this period and food and rest facilities were ill-equipped and temporary.

Fire Rescue staff based in unflooded areas (South Wales, London and elsewhere) were sent away to work in stressful conditions in flood-hit areas for three to four days at a time with no prior warning. This had knock-on effects on local fire service availability, as well as on fire crews' health and family life.

Integrated Risk Management Plans (IRMPs)

IRMPs in place during the 2007 flooding did not make adequate provision for large-scale flooding events, but there was a high degree of inclusion of flooding and associated requirements (such as water rescue training qualifications) in those plans examined by the FBU report. Since then, some FRSs have updated their IRMPs to make better provisions, but there are some outstanding issues, such as the need for better resourcing.

Funding

To fund future provision of flood rescue services, the FRS in Humber is planning to close four fire stations and cut 10 per cent of firefighter posts to invest in personal equipment for flooding incidents. Cleveland FRS is proposing to close the Marine Fire Station and cut 60 posts. The FBU report found that pension funds in one county had been raided to pay for flood equipment. There is a need to purchase or secure access to boats to aid rescue efforts, as this is currently not standard equipment for Fire Brigades.

Future issues

The FBU predict that plans for regional emergency call control centres will not cope with the traffic experienced during most flood events. More capacity is needed: in Hereford and Worcester alone, 72,000 calls were received in a single 24-hour period at the height of the flooding. Local knowledge and connections aid responses to flooding incidents. If control centre facilities are regionalised, this support will be lost.

Some new development planning and the relocation of existing FRSs involves moving into flood risk areas. Unless planning, funding and training provisions change dramatically, this will hinder the response to future flood events.

Implications

It is important that the FBU is consulted in plans for emergency relief planning (especially flooding) under a future climate. The health, safety, job security and quality of employment for the workforce, and the standard of protection and emergency relief offered to the public depend on having a properly equipped, funded and trained FRS.

projections become a reality, there will need to be significant developments in clarifying lines of statutory responsibility for those on the frontline in responding to extreme events and in providing adequate training and health and safety protection to ensure that employees are not to be placed under undue risk. If statutory responsibilities for responding to climate events are clearly assigned there is a clear case for funding to follow, in order to provide adequate training, clothing and equipment.

EQUIPMENT AND CLOTHING

In order to ensure that employees are not exposed to unacceptable risks from heat, wind or floodwaters, investment in specialised equipment and clothing may be necessary for workers in some job roles. Any employee who works in flood waters - from emergency rescue employees, health workers, maintenance and repair employees to those who are likely to have to pass through flood affected areas, such as transport employees and some agricultural workers - will need to have waterproof protective foot and leg-wear. Employees working in direct sunlight during high temperatures will need to be provided with appropriate clothing, head-wear and sun protection materials. The uniforms provided for a number of workers may need to be adapted so that they are comfortable in future climate conditions.

Alongside clothing, some employees will need specialised equipment in order to ensure their health and safety. This may range from equipment to control temperatures, such as shading or cooling equipment, to more practical equipment such as boats to aid in flood rescues.

WORKPLACE CONDITIONS

Trade unions have battled hard to ensure that people work in conditions which are protected by adequate health and safety legislation. Changes in our climate will put added pressure on conditions in these workplaces.

Indoor working conditions

Many offices, factories and warehouses have poor ventilation and inflexible temperature control systems. There has long been a clear and unambiguous minimum statutory working temperature.[24] However, whilst the Workplace, Health, Safety and Welfare Regulations stipulate that employers must maintain "a reasonable temperature" in working environments, no maximum temperature is specified.[25]

There is evidence from previous research and from our discussions with employee reps in the transport sector that in the past transport workers have faced working conditions of 40˚C and above (Metroeconomica, 2006). Many other workers experience extremely high temperatures in poorly-ventilated workplaces. It is likely these will get hotter, with increased health risks, as the climate changes.

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24 13˚C for strenuous workers and 16˚C for general workers.
25 See the TUC Worksmart website, available at: www.worksmart.org.uk/health/viewquestion.php?eny=608

The absence of an upper limit on workplace temperature has long been a subject of concern for trade unions, with a series of campaigns by unions from different sectors and the TUC calling for a clear upper limit. At a local level some unions have been able to make agreements with employers about what constitutes a 'reasonable' working temperature within the existing duties, but the lack of a statutory maximum can make this difficult. In some cases concerns over workers' health in overheated workplaces has led to industrial action, such as in 2003 when around 40 Unison members at the new Edinburgh Royal Infirmary walked out when temperatures reached 35°C. Their action spurred management into providing more ventilation and a new air cooling system.

Other workplace issues that could result from wetter or warmer weather include respiratory and other health impacts from increased incidences of certain moulds or pathogens.

Outdoor working conditions

It is hard to legislate for outdoor working conditions, given the impossibility of controlling the weather, but there is scope to consider changes to shift patterns, the supply of protective clothing and equipment to deal with greater incidences of extreme storm events or heat. We spoke with a trade union representative for caretakers and street sweepers working under contract to a local authority. This rep's colleagues regularly experience unsafe working conditions during heatwaves and have limited options for adapting to more frequent occurrences of this type of weather event. Changes to shift patterns and flexibility in work requirements during extreme climate events need to be considered in order to ensure that employees are not forced to work in unsafe or unhealthy conditions. Outdoor workers may also be affected by increases in vector borne diseases or vermin due to warmer, wetter weather.

TRAINING

All workers, but particularly those who, by the nature of their jobs, are more exposed to climate risks, will need to be adequately trained to cope with changing working environments. This could include health training to identify symptoms and administer first aid to colleagues suffering from heatstroke or hypothermia, for instance. Employees may also require job-specific training to minimise climate risks to their safety. For instance, the Department of Health and the Heath Protection Agency[26] have identified particular issues around food-borne diseases in warmer weather, which may mean that guidance and

26 HPA and DH report published February 2008 available at: www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_080702

The Health and Safety at Work Act, 1974

The Health and Safety at Work Act requires employers to ensure the health, safety and welfare of all employees and also requires employees to take reasonable care for the health and safety of themselves and others that may be affected.

Recognised trade unions have the right under the Safety Representatives and Safety Committees Regulations 1977 to appoint workplace safety reps. These regulations give various rights to safety reps and require employers to set up a safety committee.

Where a trade union is recognised, employers must consult employees (via their representatives) on any health and safety matters, including:

- any changes that may substantially affect employee health and safety at work
- information on the likely risks and dangers arising from work, including measures to reduce those risks
- training and supervision required to carry out work safely.

Employers must also:

- assess all work-related risks to employees
- set up emergency procedures
- ensure that the workplace satisfies health, safety and welfare requirements, for example in terms of ventilation, temperature, lighting, etc
- provide free any protective clothing or equipment where risks are not adequately controlled by other means.

All of the above requirements could conceivably be affected by the impacts of climate change, although there are no explicit references to climate change in the legislation.

Trade unions play an important role in regulating health and safety through workplace representatives, health and safety committees and by offering legal and other support to employees whose employers have failed to protect their health and safety.

training for those working with food needs to be revised in the future. Other opportunities include the development of new professional roles for highly-trained water rescue experts in the emergency services.

Skills

Most employers approached as part of this study seemed unaware of the implications of adaptation for skills and training. Balancing demand for skills with supply is a traditional challenge and requires careful planning over the long and medium term. The need to adapt to climate change could place an additional pressure on this balance. Attention must be given to how skills will need to evolve under a changing climate. Without the right skill sets employees may face a decline in job quality and security.

TRAINING AND RE-TRAINING

Building adaptive capacity and mainstreaming adaptation usually begins with raising awareness across organisations. Employees will need to receive an appropriate level of training to ensure that behaviour and decision-making processes can be adapted to take into account climate impacts, and to safeguard health and safety. Where relevant, they may also need training and information to identify climate risks and opportunities in technical aspects of their work. This

kind of inward-looking adaptation will help to deliver outward-facing adaptation, and may bring additional benefits of improved working conditions.

The potential increase in demand for skills for adaptation is set against a background of current under-investment in skills. 33 per cent of employers in England offer no training to their staff and around eight million employees are not in receipt of any job-related training (LSC, 2007). Such employers are unlikely to offer adaptive skills training without further outside investment. The two main government programmes aiming to increase the incidence of training among employers are Train to Gain and Apprenticeships. There is therefore a need for these programmes to incorporate key skills priorities from the climate change adaptation agenda.

The UK Commission for Employment and Skills (UKCES) is currently undertaking a review of potential Employer Collective Measures to stimulate investment in training, especially at the sectoral level, including sector training levies and licence to practise schemes. The Department for Innovation, Universities and Skills (DIUS) is currently leading a cross-government review of skills for a low carbon economy. Climate adaptation skills should be included in these reviews. Demographic trends also increase the need for on-the-job re-training. According to DIUS, nearly 75 per cent of the 2020 workforce has already left formal education, therefore more training investment, including 'adaptive skills' training, will be needed for the existing workforce.

INCREASING ADAPTIVE CAPACITY IN SECTORS AND WITHIN THE WIDER ECONOMY

Large-scale skills training in climate change could improve the resilience of the overall UK economy by aggregating the effect of multiple private decisions to adapt (for example, by reducing water use and creating more green spaces around peoples' homes), as well as in the dissemination of best practice throughout and between sectors. Increasing the skills base needed for adaptation could lead to more opportunities being identified and exploited by all kinds of organisations in the UK, improving general levels of adaptation across the economy.

INNOVATION

Climate change presents opportunities for UK organisations to lead the world in adaptive construction, technologies, consultancy, agriculture, conservation, land management and urban planning. These opportunities could form an important part of a 'green jobs' strategy, alongside measures to drive transition to a low carbon economy. Innovative adaptation solutions developed by UK

organisations may be transferable to other locations and markets around the world. Given the long-term nature of skills development, this may require focus on particular areas of adaptation innovation.

A recent report[27] on building a public sector workforce for the future failed to recognise the need for innovation to meet the challenges of climate change (Audit Commission, 2008). Employers will find it more expensive and difficult to adapt unless they take a strategic approach to recruitment and skills management. While the key roles of 'hidden innovation' and wider socio-economic innovation are now acknowledged (e.g. NESTA, 2007[28]), no specific recognition has been given to the need for new skills and solutions to manage climate risks in the UK, nor to the potential for this to help the UK become a world-leading knowledge-based economy, supporting quality and secure jobs.

Equity

SOCIAL EQUITY

Some groups in society will suffer disproportionately from climate impacts. Furthermore, some groups suffer from a 'triple-injustice' of climate change: they contribute proportionally less to greenhouse gas emissions, they are more vulnerable to climate impacts (higher sensitivity and exposure) and they have lower adaptive capacity. The result is that there is likely to be a significant disparity between income groups in terms of their experience of climate impacts and adaptation.

Whilst there is an emerging awareness in Government about the inequalities inherent in climate change, the Government's adaptation programme does not currently address the issue in detail, and there is clearly a need for co-ordinated action across government. There is a danger that climate impacts, and adaptation responses, could deepen inequalities. The trade union movement has promoted the concept of 'just transition', where the costs of the transition to a low carbon economy are equitably distributed, and this principle can be applied to adaptation measures too. It is therefore essential that Government, trade unions and employers work together to ensure that adaptation takes place in a just, equitable and co-ordinated fashion.

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27 *Tomorrow's people: Building a local government workforce for the future*, available at: www.audit-commission.gov.uk/reports/NATIONAL-REPORT.asp?CategoryID=ENGLISH^574&ProdID=DB2DAF5B-EC45-463b-8D0D-B535EDE28A80

28 *Hidden Innovation*, available at: www.nesta.org.uk/assets/Uploads/pdf/ Research-Report/hidden_innovation_report_NESTA.pdf

SCALE EFFECT OF ADAPTIVE CAPACITY IN EMPLOYERS

To date policymakers have tended to try to stimulate autonomous adaptation rather than legislate for adaptation, However some organisations, particularly SMEs, are likely to be less able to adapt than their larger competitors, meaning their employees, and the communities that depend on SME-employment, may become more vulnerable to climate impacts. It is in society's interest to ensure that SMEs adapt to climate impacts. This scale effect of adaptive capacity is not currently considered in the Government's adaptation strategy. This and other studies have shown that information provision is unlikely to be enough to stimulate employers that have a low capacity to adapt (see, for example, Step Ahead Research, 2008).

Virtually no attention has been paid to the likely experiences of self-employed, temporary and voluntary workers under future climate conditions. Adaptive capacity is arguably lower for these groups than for any other. While flexibility can be positive for adaptation, where economic impacts are severe, temporary workers are frequently in vulnerable employment and may be among the first to be affected. Self-employed workers, especially those who work from home, risk losing their house and business if they are devastated by floods, for example. Voluntary workers are rarely afforded the health and safety protection that has been won by organised labour in the workplace and so may be more vulnerable to climate impacts, depending on the nature of their work. Strategies for adaptation need to consider the implications for these vulnerable groups and the potential knock-on effects for wider society.

Summary

Climate change adaptation in the UK has so far been steered by predominantly 'outward-facing' strategic thinking, and has generally failed to address risks to workers. Certain issues relating to health and safety, skills and social equity are in danger of being overlooked. Correcting this will require investment from employers and potentially also from the state, while active engagement and involvement of workers and their representatives will be key to securing adaptation measures that are sustainable in the long term. Employers may initially be reluctant to undertake such investment, but inward-looking adaptation is likely to strengthen and underpin any efforts in outward-facing adaptation. Section 6 explores the way forward for the UK in adapting to climate change.

Section 5

The way forward

This section presents conclusions from the study and examines some possible ways forward. These focus primarily on the areas that have been identified as good practice but that are currently missing from organisations' climate adaptation plans, namely mainstreaming inward-looking adaptation. Recommendations fall into three areas: workplace and working practices; training and communications; and responsibilities and fairness. There are also a number of areas where further research is needed.

Conclusions

Climate change poses a number of significant risks for workers, employers and organisations. In response, many organisations in the UK have started the process of adaptation. In some sectors, organisations have firmly embedded forward-planning for the changing climate into their strategic operations, although the majority are not so far advanced, and many are still at the initial stage of working out how to build their capacity to adapt.

The Government is increasingly championing the need for adaptation as part of a response to climate change. The UK is the first country in the world to legislate for a national adaptation programme through the Climate Change Act. In addition, the Government-funded UK Climate Impacts Programme provides a vast resource of advice, tools and publications to help organisations to understand the potential impacts of climate change and begin the adaptation process.

However, while there are positive signs that organisations in the UK are beginning to address the climate risks and opportunities to the services and business they provide, there is very little evidence that associated issues for people at work are being considered. Progress in outward-facing adaptation, driven by strategic or commercial considerations relating to the service or product that an organisation delivers and its markets, has been considered far more seriously than concerns over inward-looking adaptation, driven primarily by consideration of employee welfare and capacity building. This gap is growing as more organisations recognise the strategic advantages of dealing with climate risks through adaptation, yet fail to address the implications for employees in areas such as health and safety, workplace environment, skills, and social justice. There is a danger that the development of outward facing strategies without concurrent strategies to address workforce issues will lead to a lopsided and unsustainable approach to adaptation. There is also a danger that employee exposure to climate risks, already a concern in some frontline services, will reach a critical level. It is essential that this risk is anticipated and guidance and joint initiatives between Government, unions, employers and workers are initiated.

Some groups in society, specifically older people, lower-income groups and socially-disadvantaged groups, are more sensitive and exposed to climate change and at the same time they have the lowest adaptive capacity. Members of such groups are more likely to work outdoors, in poorer quality buildings or to drive vehicles in potentially unhealthy conditions. They are more likely to live in areas that are vulnerable to flooding or urban areas where high temperatures are problematic. Low-income groups are likely to be highly vulnerable to climate impacts because of cumulative factors based on where they live, where they work and what their job is. Climate impacts and adaptation are therefore social issues, and employment implications should be seen in this social context.

For the most part, the adaptation implications highlighted in this study support (rather than conflict with) a number of improvements for employment conditions that have already been identified in other arenas (for example, ensuring good standards of health and safety in the workplace or taking an employee-centric approach to managing workplaces and developing skills and innovation). In this sense, actions on such issues represent real win-wins, as they will deliver enhancements to working conditions as well as addressing climate change implications. They may well also be ‘no-regret’ actions, since the benefits are justified in themselves, regardless of whether climate impacts are felt.

There are likely to be real advantages to those organisations that address employee interests as they adapt to climate change, not least because they will have a workforce that is well cared for and motivated, which is well equipped

to do the job both today, and also into the future. This is a tangible expression of adaptive capacity and will underpin and strengthen any organisation's further efforts to implement strategic changes to cope with climate risks. Only one employer covered by our research (*see case study below*) had explicitly considered the employment implications of climate change adaptation. This company first approached adaptation as a strategic issue affecting service delivery, but has found that operational benefits (as well as motivational and reputational ones) have developed from their progress in inward-looking adaptation. As such it provides a useful case study to set our conclusions in context.

CASE STUDY

Anglian Water – progress in mainstreaming adaptation

In 2005, climate change was recognised by Anglian Water as a major risk. A climate change team was set up to research what it meant for Anglian Water's services and employees. A risk assessment matrix was produced covering the major business areas that would be affected, main impacts and wider social issues. As a result of the assessment, a board paper was put together, and increased understanding and awareness was developed at board level.

This led to the recruitment of a climate change advisor and the development of a corporate climate change strategy. The adaptation section of the strategy focussed on the key issues identified in the risk assessment: sea level rise (threatening coastal assets), flooding (both inland fluvial and sea level inundation), changes to precipitation (impacts on water supply and demand), and issues relating to temperature rise. Following this, climate change was included in their 25-year Strategic Direction Statement and adaptation elements are being included in the 2010-2015 Business Plan.

Anglian Water's climate change strategy included the following measures for raising employee awareness of the need for adaptation:

- adaptation education campaigns throughout the business
- site-specific lunchtime lectures for all employees, including presentations on the impacts of climate change and a question and answer session
- a climate change leaflet campaign – detailing what the company is doing and what employees can do
- intranet climate change site detailing the background to and effects of climate change, latest news, FAQs, what Anglian Water are doing to address climate change and a forum for communication.

Eighty key internal communicators were briefed on the risk assessment and strategy during a routine director-led meeting and they were asked to investigate how climate change would impact on their teams. The impact of climate change is now the number one risk to Anglian Water on their corporate risk register. An independent climate change committee is to be set up with the main aim of monitoring and reporting back on climate change projects across the business. A director is also now responsible for climate change at board level.

Making progress with inward-looking adaptation:

After the profile of climate change had been raised at board level, a human resources briefing was instigated by the climate change team in order to focus on employees. Monthly updates on climate impacts and employment implications are provided to the group director of HR. The HR department is now taking ownership of adapting employee and workplace policies.

It appears that adaptation in UK organisations (public and private sector) is currently driven by Government policy and legislation, potential (or actual) changes in insurance policies, and concern from investors. In a few cases, the underlying driver has been heightened awareness of the issues and a particularly motivated member of staff. These drivers lead primarily to a focus on outward-facing adaptation, with the risk that issues of employee welfare may be overlooked.

Based on the success of trade union efforts to cut carbon emissions in the workplace, it seems that one driver of real progress with inward-looking adaptation could be trade unions. Workplace representatives can have a particularly important role in facilitating adaptation from the bottom up, but to do this effectively they will need to be given appropriate training and support. The success of the TUC-led Green Workplaces initiative has shown that developing and negotiating green strategies in this way can lead to sustainable change.

Recommendations for action

Closing the gap between outward-facing and inward-looking adaptation will need action from Government, employers, workers and trade unions. Below we identify a number of areas for action and select research priorities.

THE WORKPLACE AND WORKING PRACTICES

Reviewing regulations and incentivising adaptation for the working environment

The direct impact of increasing summer temperatures, more frequent heatwaves, stormier weather and additional flooding on working environments for both indoor and outdoor workers needs to be comprehensively addressed. This will require co-ordinated action from all parties. This report has highlighted a range of workplace health and safety issues arising from climate change adaptation that employers are clearly not addressing on a voluntary basis. This has several implications:

- New guidance is required on adapting workplaces to climate change, building on the current Health and Safety at Work Act framework, with its emphasis on joint consultation. This could be developed and disseminated by the Health and Safety Executive in partnership with Defra.
- The issue of establishing statutory limits on upper workplace temperature should be revisited as an urgent priority.
- Introducing features to improve the climate resilience of buildings is relatively straightforward for new-build, but more difficult when retrofitting existing properties. Given the complexities of achieving improvements in building cooling and ventilation without compromising efforts to reduce GHG emissions, we recommend that the Government should establish a

fund to incentivise employer investment in building improvements that achieve both adaptation and mitigation goals. Well-adapted buildings will be an asset to any organisation, enhancing their green credentials and reducing maintenance bills, but they should also address the health, safety and other conditions of the workforce, over and above offering efficiency savings and improving public image. Programmes of retrofitting and new building also provide job opportunities in technological development, design and construction.

Travel to and for work

- The lowest paid workers, especially the hourly-paid, lose out when weather-related travel disruption affects their work or prevents them from getting to work. Public transport systems and infrastructure must be resilient, safe and reliable under a changing climate. Employers will need to consider climate risks to work-related travel in sustainable company travel plans, providing alternative options suitable to the changing climate. Employees and trade unions should be engaged when developing these plans and should also be involved with negotiations to ensure that appropriate facilities are put in place, such as showers for people who cycle to work. Travel planning should consider both the long-term trends of climate change and extreme weather events.
- Our survey exposed a particular need for attention to conditions for transport workers, both in relation to the physical environment in which they have to work (such as high temperatures for drivers on the London underground) and in relation to their interactions with the travelling public (transport workers have to deal with increased occurrences of aggressive behaviour during hot weather and when transport systems are disrupted). Further attention is needed to develop safe working environments for these workers in the face of climate change.

Reviewing working practices

- Working practices may need to be adapted to cope with more frequent experience of higher temperatures. Dress codes, uniforms and equipment all need to be suitable for workplace conditions under a changing climate and shift patterns and breaks may need to be reconsidered by employers and renegotiated with employee representatives, including recognised trade unions.
- In order to make the transition to well-adapted workplace environments or new working practices fair and just, the process should follow the model of 'just transition' developed in relation to the shift to a low carbon economy. This means actively involving workers and their representatives, particularly trade unions, in the development of adaptation policy and practice and making adequate provision to address lifestyle, social and family implications of changes.

Role of union workplace representatives

- Adaptation is an issue of organisational and personal change, and union workplace representatives have an important role to play in facilitating the process. The TUC / Carbon Trust Green Workplaces[29] project has achieved improvements in the environmental performance of workplaces. These projects have been driven by union reps and employees through discussions with management.
- Union representatives including union learning representatives (ULRs), safety representatives (SRs), and specifically green or environment reps, can act as climate change champions, building the case for inward-looking adaptation, raising awareness within their workplaces and driving change more comprehensively from the bottom-up.

  ULRs could be instrumental in helping members to access the training they require to carry out their jobs safely and efficiently under future climate conditions. The Government is planning to introduce a new 'Right to Request Time to Train', with a target date of 2010. With the support of ULRs, employees could use this to request adaptation skills training.

  SRs are well placed to continue their work in ensuring employees are protected from unsafe and unhealthy working conditions due to current and future climate change.

  Unions are lobbying for the same rights to be granted to green reps as are currently offered to ULRs and SRs.
- In order for workplace reps to incorporate adaptation into their roles, they will need appropriate support from their trade unions, such as training in climate change impacts and adaptation. Statutory provision of time-off for reps to receive this training would help in this regard.

TRAINING AND COMMUNICATIONS

Skills partnerships

- This study has highlighted the potential implications of adaptation for skills in the workplace. There is still relatively little information available about this, so first steps should include stakeholder-led research to identify the issues and skills gaps (*see* Research needs, *page 62*). This should inform the formulation of government skills policies and could be built into the work of the Learning and Skills Council and sector skills councils.
- Individual employers will need to identify skills gaps in their organisation and communicate their requirements through the supply chain. This could provide an opportunity to show leadership and champion innovation,

29 The Green Workplaces guide is available at: www.tuc.org.uk/extras/greeworkplace.pdf

enhancing their corporate reputation. Developing innovative apprenticeship schemes might be one approach to meeting skills needs in a way that is accessible to lower-paid workers.

- Meanwhile, awareness-raising through union and other channels will help individual employees begin to understand the implications of adaptation for their own jobs and identify their individual skills requirements, allowing them to communicate these to employers, perhaps via ULRs or other trade union reps.

Guidance on good practice in adaptation

- The Climate Change Act requires Government to produce statutory guidance for public bodies on how to assess and manage climate risks. This guidance should cover not only outward-facing adaptation, but also inward-looking adaptation. Such guidance should encourage employers to develop heatwave, storm and flooding plans to help workers respond appropriately in their place of work (through training, skills development, and health and safety procedures) and to set out contingency arrangements.
- The UK Climate Impacts Programme has been instrumental in providing adaptation information and support to organisations. Respondents to our survey from local authorities who are already engaged with UKCIP were more aware of what their organisation is doing to adapt to climate change, but at least a quarter of these felt that their organisation was not doing enough to protect itself and its employees from climate risks. It will be essential for Government to maintain funding for UKCIP or a similar support programme to enable continued progress in adaptation by UK organisations.
- In particular, further efforts to engage with SMEs are needed, given the lower adaptive capacity and higher vulnerability of small employers.
- We believe it is now appropriate for a government programme to encourage adaptation at the household level: this should address the inequalities of climate change impacts and adaptation and include specific measures to ensure the most vulnerable groups within society are reached.

Communication about climate change risks and adaptation

Only 20 per cent of public sector survey respondents believed that central government is doing enough to raise awareness of climate change impacts and provide guidance for organisations to adapt. If the implications of adaptation for employee welfare are to be addressed, then there is a need for greater communication about climate change impacts, risks and how to adapt.

- Under the Climate Change Act, Government is committed to producing a national climate change risk assessment every five years. It will be

important to find effective ways to communicate the outcomes of this risk assessment and to ensure that inward-looking aspects of adaptation are not neglected.

- Individual organisations could develop their own workplace-based risk assessments based on these reports.
- Trade unions can be a particularly effective communicator of best practice, and should engage in awareness-raising. This can help individual employees make their own personal adaptations, such as behavioural changes related to clothing and fluid intake during hot weather. A particular focus of communications could be around the health, safety and social implications of changing working practices in response to climate change.
- Employers will need to develop contingency plans for dealing with weather-related emergencies, but will also need to find effective ways to communicate these plans to workers and support them in adhering to them. One focus should be the communication of health and safety implications of climate impacts and information on appropriate ways to deal with these, for example by providing workplace SRs with up-to-date information on changing health risks under future climate conditions. Employees could consider using their organisation's internal reporting systems to raise the profile of climate-related issues that affect them.
- We would also recommend that employers involve their organisation in the Carbon Disclosure Project as a voluntary step to highlighting the climate risks they face. This information can then be used to build adaptation responses and enhance corporate reputation as a climate-resilient organisation.

RESPONSIBILITIES AND FAIRNESS

Weather-related civil contingency situations

More frequent and more severe weather extremes are likely under future climate change scenarios. Despite efforts in adaptation and improvements in climate resilience, these events will sometimes lead to emergency situations and the need for civil contingency operations. Clear co-ordination for these situations is vital, with advanced planning for the greater challenges that may lie ahead. There is overlap between adaptation and civil contingency responsibilities, and a number of specific recommendations have been identified:

- A clear identification is needed from Government of the responsibilities and statutory obligations of relevant parties in all situations, including the fire and rescue services, police, coastguard and so on. This may result in legislative amendments.

- Regional authorities and control centres will need to communicate to wider stakeholders their roles and responsibilities under emergency weather situations. They should develop plans to manage the fair distribution of resources (water, emergency services, etc) across regions during emergencies.
- Trade unions have an important role to play in negotiating with employers to ensure that workplace health and safety provisions are maintained under contingency situations. They are also well positioned to identify new issues, such as skills gaps or equipment needs emerging from the overlap between adaptation and civil contingency.
- All employers have a duty to consider the implications of weather-related contingency situations on the welfare, health and safety of their employees.
- Employers responsible for services required during weather-related contingency situations and in clear-up phases have a particular duty to provide suitable equipment, clothing and training for employees, and to make due provision for the health and safety of rescue workers.
- There is a responsibility on all to ensure that wider social welfare prevails under contingency scenarios.

Fair distribution of the costs of adaptation

A major consideration of this study has been the equity issues involved in adapting to climate change and ways in which change will affect groups in society differently. Trade unions are instrumental in upholding justice for the lowest paid workers. This will be important in the context of adaptation, as it is the most disadvantaged groups who will have greatest need for inward-looking adaptation at work.

- Government should ensure that low-cost housing is available outside high-risk zones (such as away from floodplains and outside of urban heat islands).
- Government should also consider ways of managing equity issues around access to insurance (for instance against flooding and subsidence) for low-income households, as part of their role in facilitating autonomous adaptation.
- As organisations make progress in outward-facing adaptation, and the impacts of climate change are increasingly felt, there will be a need to consider who bears the cost of adaptation decisions, and who feels the brunt of climate change impacts. For example, if organisations choose to relocate to avoid increased climate risks, they should look to compensate their employees who are forced to move or look for alternative work. This may also include ensuring that equivalent jobs are available, or that retraining opportunities are available. Where weather events result in disruption of travel, childcare or other services (if schools close, for

example), resulting in an inability to work, employers should look to provide flexible alternatives to loss of pay. This approach is central to ensuring a 'just transition' approach to adaptation.

Correcting climate change injustice

- This study has highlighted the injustice inherent to climate change: disadvantaged groups contribute less to, but suffer more from, climate change. Trade unions are already taking an active role in promoting a fair and just transition to a climate-resilient economy. The role of global trade union networks is central to addressing the injustice of climate change and sharing ideas and resources about the need for adaptation to protect employees all around the world.

RESEARCH NEEDS

This study has scratched the surface of some important issues, which have been examined rarely, if at all, in available adaptation literature. There is an urgent need for further research in this area. Key topics identified as priorities for research include:

- the impacts of climate change on workers, including outside workers, drivers and workers on-the-move
- options for retrofitting cooling and ventilation systems to all types of workplace buildings, in order to meet both adaptation and mitigation goals
- the distribution of costs of climate impacts and adaptation, including distribution across regions of the UK and within regions, across social groups and communities
- skills gaps anticipated in connection with climate change, and opportunities for new jobs or competitiveness in UK economy.

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