CLES
Centre for Local
Economic Strategies

August 2009

DEVELOPING NEW SKILLS TO ADDRESS THE CHALLENGE OF CLIMATE CHANGE

Draft final report by

CLES Policy Advice

Presented to

Groundwork UK

CONTENTS PAGE NO.

1 INTRODUCTION 2
1.1 Background to the brief 2
1.2 Research aims 2
1.3 Methodology 2

2 POLICY RESPONSES TO ENVIRONMENTAL CHALLENGES FROM PAST TO PRESENT 4
2.1 Introduction 4
2.2 Sustainable development 5
2.3 Climate change and carbon emissions 5
2.4 Renewable energy 5
2.5 The Stern Review 5
2.6 The Climate Change Act 6
2.7 Towards a low carbon economy 6
2.8 Future policy and the recession 6

3 MAKING THE LINKS: SKILLS AND LOW CARBON ECONOMIES 7
3.1 Literature review 7
3.1.1 A failure to make the connections 7
3.1.2 Creating 'green jobs' 7
3.1.3 The role for innovation and skills 8
3.1.4 A strategy for industry 8
3.2 Architecture and construction 9
3.2.1 About the sector 9
3.2.2 Creating green jobs, driving demand for a newly skilled workforce 9
3.2.3 Making the most of opportunities from a new business climate 10
3.2.4 Complying with legislation and responding to opportunities 11
3.2.5 Meeting demand, outstripping supply 12
3.2.6 Barriers to improving the sector's skill base 14
3.3 The public sector 15
3.3.1 About the public sector 15
3.3.2 Drivers of change 15
3.3.3 Getting the right mix, generic and specialist skills 17
3.3.4 The key barriers to improving the sector's skill base in readiness for a low carbon economy 19
3.4 The science and engineering sector 21
3.4.1 About the sector 21
3.4.2 A high tech 'carbon army' 21
3.4.3 New challenges and new opportunities in manufacturing 21
3.4.4 Skills gaps within the science and engineering sector 22
3.4.5 Greater recruitment and retention within science and engineering 23
3.4.6 Better commercialisation of ideas within science 23
3.4.7 Challenges towards addressing the skills gaps within the sector 23

4 CONCLUSIONS: THE ROLE FOR GROUNDWORK 25
4.1 General opportunities for Groundwork 25
4.2 Positioning Groundwork's role in relation to this agenda 25
4.3 Challenges for the future 26

APPENDICES
1 Summary of specific policy responses
2 Bibliography

1 INTRODUCTION

1.1 Background to the brief

Groundwork UK commissioned CLES to undertake research into the skills required by a low carbon economy. A low carbon economy is a concept that refers to an economy that has a minimal output of greenhouse gas emissions into the atmosphere, but specifically refers to the greenhouse gas carbon dioxide. As such, low carbon economies are proposed as a means to avoid catastrophic climate change and as an element of a comprehensive strategy to manage climate change, alongside better adaptation to the effects already being experienced in many parts of the world.

This agenda is of particular interest to Groundwork UK as they are an environmental charitable trust with a long history in developing and using environmental skills within local communities to affect change. Many Trusts are already engaged in project work which requires high levels of specialist environmental skills, but Groundwork UK are interested in understanding how this skills market may change in the future and how Groundwork UK can be prepared to respond to this change as an organisation.

This work also builds on research undertaken by CLES and Groundwork UK into the links between the environment and the economy, and explores the relationship between new and growing environmental markets and the skills agenda as a route to ensuring more resilient local economies.

It is significant to note that this report comes at a time of economic recession. As noted throughout the report, the economic climate may overshadow industry's efforts to adapt to a low carbon economy. With job losses across all sectors, skills provision is likely to be considered a low priority. However, whilst the recession raises a number of significant challenges, this shouldn't overshadow attempts to take action on climate change. Indeed, failing to do so may lead to severe economic consequences in the future.

1.2 Research aims

Specifically, the research sought to explore the following areas in more detail:

- how the challenge of environmental change will accelerate the demand for specialist skills across a range of sectors;
- activity which is planned or already being undertaken to develop these skills and awareness within different sectors;
- current and future demand for skills within the sector's balance between low and high skills opportunities.

By way of conclusion, the research seeks to make recommendations as to how Groundwork UK may want to play a stronger lobbying or policy role in the future in light of this changing skills context.

1.3 Methodology

Policy review of all current policy documentation pertaining to the links between the skills agenda and the environment.

This section of the report draws out and discusses the key themes of the policy response to environmental challenges, reflecting an evolving green agenda and the reaction (or lack thereof) of the skills agenda to the needs of a new low carbon economy. It also considers the challenges of the current economic context and the implications of this for a low carbon economy and skills development in accordance with this.

Literature review of all relevant documentation in relation to this agenda, including publications by other think tanks and academic institutions, drawing upon both theory and practice.

In recent years, there has been a wealth of literature produced by academics and non-governmental bodies that have sought to raise awareness of climate change issues. Much has been focused on the environmental science of climate change, however, for the purpose of this research we sought literature that focused on the impact that the shift to a low carbon economy will have on different sectors of industry and their various skills demands. It soon became clear that whilst there was some relevant literature available, the issue of skills for a low carbon economy remains an under-researched theme and, as such, makes this research report highly pertinent.

Responses from the Government, industries and environmentalists to the threat of climate change and related environmental concerns have been numerous and diverse over the last half of the 20th century. The most significant of these are summarised and discussed in Appendix 1 of this report. Key thematic areas have emerged from trends in action and policy over the years, with a focus on development of a low carbon economy being a very recent development, yet to become widespread amongst public or private sector organisations.

Semi-structured interviews with representatives from a range of organisations working in three main industrial sectors.

In order to explore the skills needs of a low carbon economy in the UK, it is important to explore the likely adaptations that particular industries are making in light of climate change – both in terms of mitigation and adaptation – and, as such, the likely skills these industries require in their workforces, both now and in the future. In order to do this, given the potentially mammoth task this might pose, we have chosen to concentrate on three broad sectors. The rationale for this decision is explained below.

Although we are keen to explore the broad implications of developing a low carbon economy, in terms of skills needs and skills gaps, the parameters of this project do not allow an investigation that encompasses all the industrial sectors in the UK. As such, we have chosen to focus on sectors which are:

- high energy users and therefore likely to have a big impact on CO_2 emissions;
- in a position to shape how others use energy;
- likely to have a big impact on the UK economy.

This then led us to the following list of industrial sectors:

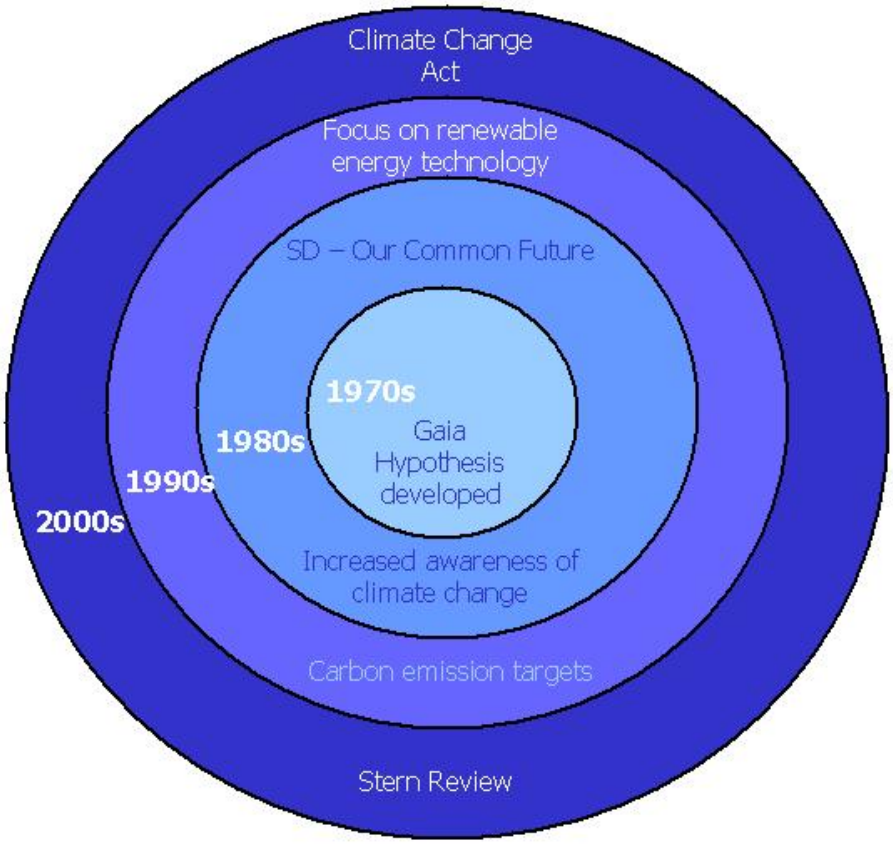
- construction and architecture;
- public sector;
- science and engineering.

2 POLICY RESPONSES TO ENVIRONMENTAL CHALLENGES FROM PAST TO PRESENT

2.1 Introduction

Calls from the environmental lobby have long urged us to look after our environment and live sustainably, reducing resource exploitation and pollution. In the 20th century this was concentrated particularly within the academic world (e.g. James Lovelock's view of the Earth as a self-regulating, closed system that will not be able to support human kind if it keeps growing and polluting, reflected in his Gaia Hypothesis developed throughout the 1960s and 1970s, or Garrett Hardin's rationale that individuals acting out of pure self-interest will exhaust and destroy shared resources, despite this being ultimately harmful to everyone, reflected in his Tragedy of the Commons). However, it was not until the publication of the Brundtland Report in 1987 that the issue really started to gather any large scale popular support or register in government policy, and even then this was still only a small section of international society that was really aware of many of the issues. That said, the environmental argument has slowly gathered mainstream support over the last two decades and the emergence of strong evidence for climate change has increased the sense of urgency with which responses to this challenge have come. Over time, the voices of academics and environmental campaigners have been joined by government policy-makers, local policy-makers, businesses and citizens. A raft of environment focused policy developments have occurred at national and supra-national levels, impacting the way that industries, services and households are run.

The broad developments and drivers of environmental policy over the last 40 years are outlined here, from the Gaia Hypothesis of the 1970s to increased awareness of climate change in the 1980s, and more recently an increasing focus on renewable energy technology and carbon emission targets. These developments are summarised in the diagram below:



2.2 Sustainable development

Greater awareness of the environmental limits of the planet was kick-started with the emergence of the sustainable development agenda in late 1980s and early 1990s. It was this agenda that sought to change policy and practice amongst governments and international actors (initially) and define what was meant by sustainable development, to ensure that development occurs in a way that *'meets the needs of the present without compromising the ability of future generations to meet their own needs'* [1]. Sustainable development marked the beginning of a realisation of the balance between a growing, prosperous economy and achieving a good quality of living, and the strain placed on the environment in order to meet these demands.

2.3 Climate change and carbon emissions

Initially referred to as global warming, the climate change discourse now includes a growing realisation of the wider potential effects of greenhouse gas emissions, such as rising sea levels causing flooding and land loss, erratic weather patterns causing increased incidence of hurricanes and lack of division between seasons, and changing global temperatures affecting farming, food supply and famine.

The signing of the Kyoto Protocol in 1997 was a pivotal step towards reducing global emissions of greenhouse gases in an attempt to prevent climate change. A total of 183 signatories from 178 countries signed up to a legally binding commitment to reduce their emission of the six most dangerous greenhouse gases, and a collective reduction by industrialised nations of 5.2% of their gas emissions at 1990 levels. This has since been reviewed, most significantly with the Washington Declaration of 2007, as the threat of climate change is being increasingly realised by governments and individuals and new targets have been set aiming for even greater reductions. In England, the Nottingham Declaration of 2000 was signed by 270 local authorities, acknowledging the threats of climate change and pledging to actively address this at local level to meet national targets and provide benefits to the community.

2.4 Renewable energy

Renewable energy has been an option in policymakers' toolkits for some time now, but in the UK it has never really developed into a significant energy producer, as has been the case in Germany and Denmark (e.g. only 4% of electricity in the UK comes from renewable energy sources[2]). The Energy White Paper, published in 2007, specified four policy goals around reducing CO_2 emissions, maintaining reliable supplies, promoting competitive markets, and ensuring homes are warm. Renewable energy will feature heavily in the approach to deliver on these goals, and hence is likely to make up a much larger proportion of UK energy supply than it currently does.

2.5 The Stern Review

The Stern Review on the Economics of Climate Change, published in 2006, was the first substantial appraisal of the potential effects of climate change and global warming on the global economy. Going a step further than purely environment focused reports, the review described climate change as *'the greatest market failure the world has ever seen.'* [3] Within this hard-hitting and widely discussed report on climate change, Stern argued that by investing 1% of global GDP into averting further damage to the environment, we will save potential losses of 20% of global GDP that will occur if we do nothing. Amongst suggested actions, Stern advocates the use of environmental taxes as tools to reduce carbon emissions and pollution. As such, it is clear that the Stern Review not only considers the economy a victim of climate change, but also part of the solution.

[1] United Nations (1987) *Report of the World Commission on Environment and Development* (UN)
[2] See http://www.guardian.co.uk/environment/2007/dec/09/renewableenergy.windpower
[3] HM Treasury (2006) *The Stern Review on the Economics of Climate Change* (HMSO: London) p.xviii

2.6 The Climate Change Act

In response to the Stern Review, and the progression of the environmental lobby into mainstream policy and national consciousness, the Climate Change Bill was proposed to Parliament in November 2007 as a government blueprint for tackling climate change and modifying the UK into a low carbon economy. The key points of the bill include:

- ***clear targets –*** for reducing carbon dioxide emissions, including making the UK's targets for a 60% reduction by 2050 and a 26-32% reduction by 2020 legally binding;
- ***legally binding government reports –*** at least every 5 years on current and predicted impacts of climate change and on policy for adapting to climate change (including a new system of five-year carbon budgets, set at least 15 years ahead, to provide clarity on the UK's pathway towards its key targets);
- ***the Committee on Climate Change –*** a new statutory body to provide independent expert advice and guidance on achieving targets and staying within carbon budgets;
- ***new powers –*** to enable the Government to more easily implement policies to cut emissions.

The Bill became law as the Climate Change Act[4] was passed on 26 November 2008, marking the beginning of the legal obligation to *'improve carbon management and help the transition towards a low carbon economy in the UK; and to demonstrate strong UK leadership internationally.'*[5]

The 2009 Budget took advantage of the provisions of the Climate Change Act by creating the world's first carbon budgets and setting the first three carbon budgets at levels that will lead to a 34% reduction in greenhouse gas emissions with respect to 1990 levels by 2020. This is one of several measures in the recent budget to shift the UK towards becoming a low carbon economy.

2.7 Towards a low carbon economy

Since Stern made the connection between environment and economy, there has been a growing discourse advocating the move towards a low carbon economy (i.e. one that causes less carbon emissions whilst remaining profitable and functional via the use of new technologies and practices, and the formation of new 'green' industries and jobs themselves). July 2009 saw the publication of the Government's 'UK Low Carbon Industrial Strategy'[6] which stated *'Tackling climate change is about more than just averting environmental disaster. It can create a better kind of society and a stronger, more sustainable economy'*. The document outlines the government's strategic view of Britain's low carbon strengths and opportunities, and how to act on them. In the strategy, the government recognises that in order to adapt to, and benefit from, the shift to a low carbon economy, it is necessary for industry to acquire new skills in order to access new opportunities and jobs. In the next section we explore in more detail three large sectors within the UK economy, how they are changing to respond to this agenda, including both adaptation to and mitigation of climate change, current and future skills gaps and what this will mean for employees, employers and policy makers.

2.8 Future policy and the recession

In a context of global financial crisis, the Prime Minister has latched onto the concept of 'green jobs' as a way of recovering from the recession in the UK. Speaking in March 2009, Gordon Brown stated that moving to a low-carbon economy will create 400,000 new jobs over the next eight years, in industries such as renewable energy.

[4] A useful summary of the Act's key provisions can be found at: http://www.defra.gov.uk/environment/climatechange/uk/legislation/provisions.htm
[5] Ibid
[6] HM Government (2009) *The UK Low Carbon Industrial Strategy* , accessed at: http://www.berr.gov.uk/files/file52002.pdf

However, whilst we hope that this shift towards an environmentally aware and economically advantageous low carbon economy will continue, there are concerns that the environmental agenda may be abandoned, at least temporarily, during the current period of economic recession. Still popularly perceived as a costly burden, the shift towards low carbon is at risk of being deemed an unfavourable and unviable undertaking during a persistent recession. This would be a real lost opportunity as the recession, rather than being a hindrance to a low carbon economy, could in fact prove a great chance to re-think the way our economic systems run and what we want out of them, as well as a route to greater economic resilience.

3 MAKING THE LINKS: SKILLS AND LOW CARBON ECONOMIES

This research sought to understand how the challenge of environmental change will accelerate the demand for both high and low level skills across a range of sectors, and also to discover what activity is planned or already being carried out in order to meet this demand across different sectors. This section explores the key findings of this research, exploring the skills needs of various sectors based on both our primary research with sector representatives and from our review of relevant literature.

3.1 Literature review

3.1.1 A failure to make the connections

Throughout 2008, increasing attention has been paid to assessing and developing the necessary skills required for a low carbon economy. The underlying impetus behind this has been more than just growth of an environmental conscience and fear or uncertainty around the longer term impacts of climate change; a low carbon economy is now being considered by some sectors and companies as an important potential growth sector. The new opportunities that will come from finding new ways of working and calls for new, greener products and services are increasingly seen as new markets for economic growth. However, on the whole, very little has been discussed about the role of skills in responding to these challenges and the skill demands generated by a shift towards a low carbon economy.

Although the skills agenda has grown in importance over recent years, it has largely failed to link with the need to tackle climate change. While the Egan Review of April 2004 does discuss the skills needed for successful regeneration and creation of truly sustainable communities, little is said about specific, industry-led training and learning. The Review considers that the essential skills for delivering sustainable communities *'are principally generic skills such as leadership, creating and getting buy-in to a vision, communication, engaging with and listening to customers, team working, project and financial management that can be found across a wide range of different occupations and industry sectors.'* Egan goes on to argue that *'these skills need to be underpinned by behaviours and attitudes that are critical to delivery of complex projects, such as a 'can do' approach, being open to change, challenging assumptions and creativity... [this needs] to be supplemented by knowledge of key issues such as environmental best practice, what constitutes good design, crime, an understanding of local democracy, and of development finance.'* Nothing of any further substance was added on the subject of skills for protecting the environment and fostering a low carbon economy.

Discussion of the skills needed for a low carbon economy was also neglected in the Leitch Review of Skills, published in December 2006. There was some discussion of sustainability in the Leitch Implementation Plan, including the positive assertion that *'if the nation is to play its full part in challenging global poverty and combating environmental problems like climate change it is imperative that everyone in this country develops the skills of sustainable living and working, that means placing sustainable development at the heart of skills provision, ensuring that it is a fundamental goal of our economic and social progress.'* The Plan fails to expand upon this further, making no comment about what skills will be specifically needed to increase sustainability or how we can go about up-skilling people for this specific end. However, signs of change are starting to emerge, albeit slowly.

3.1.2 Creating 'green jobs'

Perhaps the most significant report to emerge relating to skills and climate change is A Green New Deal[7] (2008). This report from the new economics foundation (nef) is the first publication of the Green New Deal Group, a group with expertise relating to the current financial, energy and environmental crisis. The report argues that we are facing a triple crunch of financial meltdown, accelerating climate change and soaring energy prices.

[7] new economics foundation (2008) *A Green New Deal* (nef: London) Accessed at: http://www.neweconomics.org/gen/z_sys_publicationdetail.aspx?pid=258

The Green New Deal proposed by the Group has two key strands:

1) it outlines a structural transformation of the regulation of national and international financial systems, and major changes to taxation systems;

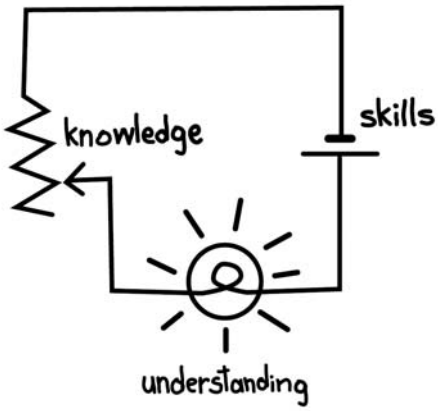
2) it calls for a sustained programme to invest in and deploy energy conservation and renewable energies, coupled with effective demand management[8].

Underpinning the strategy is the belief that we can *'lay the foundations for the emergence of a set of resilient low carbon economies, rich in jobs and based on independent sources of energy supply.'*

Most significantly to this piece of research, the Green New Deal proposes that creating and training a so-called 'carbon army' of workers is necessary in order to *'provide the human resources for a vast environmental reconstruction programme.'* The Green New Deal Group want to see the increase in both higher and lower skilled environmental jobs in the UK, which will form *'part of a wider shift from an economy narrowly focused on financial services and shopping to one that is an engine of environmental transformation.'* [9] They argue that the UK has missed out on the boom in so-called 'green collar' jobs, whilst in contrast Germany already employs 250,000 in renewable energy alone.

More recently, research[10] by the Institute for Public Policy Research (ippr) has argued that low carbon energy production, in particular the offshore wind industry, presents a great opportunity for the UK in terms of creating new, decent 'green' jobs that would be sustainable in the long term. However, ippr argues that in order to capitalise on this opportunity, the government needs to take a more active approach in developing the necessary engineering and manufacturing skills and promoting the career opportunities of the sector.

3.1.3 The role for innovation and skills



In May 2008, Defra and BERR jointly published 'Building a low carbon economy: Unlocking innovation and skills'[11] in response to the report by the Commission on Environmental Markets and Economic Performance (CEMEP) into making the most of potential benefits in the transition towards a low carbon economy. The report emphasises the huge challenges ahead and the necessity of *'unlocking the talents'* of Britain's people and businesses, fostering skills, creativity, entrepreneurialism and capacity to innovate. The Government realise that *'where we can unlock talent, upgrade skills and back innovation, we can create a new role in the global economy and a new economic future for the UK... We can create thousands of new businesses, safeguard millions of jobs by ensuring existing businesses operate in a more sustainable and efficient way, and export our knowledge, expertise and products around the world.'* The rationale that adapting to, and even exploiting, the shift towards a low carbon economy will have clear economic benefits is well argued in this discussion, in that increased energy efficiency will result in:

- increased economic productivity;
- greater demand for environmental goods;
- development of new green technologies, increasing our global exports.

[8] Ibid
[9] Ibid
[10] Bird, J. (2009) *Green Jobs: Prospects for creating jobs from offshore wind in the UK* (ippr: London) Accessed at: http://www.ippr.org.uk/publicationsandreports/publication.asp?id=658
[11] Defra & BERR (2008) *Building a low carbon economy: Unlocking innovation and skills* (Defra: London)

3.1.4 A strategy for industry

In 2009, the Department for Business, Enterprise and Regulatory Reform published a report 'Low Carbon Industrial Strategy: A Vision'[12]. The report acknowledges that *'UK workers across all sectors will need to gain the skills to work with new low carbon technologies and processes, or provide new services that will come with a low carbon economy.'* The Vision, published ahead of the final Low Carbon Industrial Strategy which is expected in summer 2009, suggests that the Strategy will set out how the Government will work with employers and strategic partners, such as Sector Skills Councils, to *'stimulate demand, support business innovation and create the framework for developing low carbon skills in the UK workforce and securing jobs for the future.'* [13]

3.2 Architecture and construction

3.2.1 About the sector

The construction sector, which accounts for close to 10% of the British economy, has become the latest industry to try and play its part in creating an environmentally sustainable future. Indeed, between 2005 and 2006 the manufacturing and construction industries have shown a 4.5% decrease in their emissions intensity, contributing to a reduction since 1990 amounting to 37.3%[14].

The highest impact of the construction sector is the mining/manufacture of building materials and chemicals which account for 10% of the sector's emissions, whilst the cement sector alone accounts for 5% of global man-made CO_2 emissions. In addition, the transport of heavy materials such as cement is energy intensive, but most building materials tend to be sourced from facilities nearby. The chemical processes and use of fuel/electricity account for the major portion of the sector's CO_2 emissions. Onsite construction of buildings is relatively low impact, mainly energy use influenced by choice of building materials, construction techniques, and modes/distances of transportation. However, the maintenance of buildings is higher impact due to significant energy use, especially heating and lighting. Lighting and heating buildings generates 50% of Britain's CO_2[15].

This drive to reduce emissions has in part been affected by government policy (e.g. the Government's eco-town agenda which aims to create new towns that are exemplar of green developments). However, a range of sector specific considerations can also be identified:

- ***weather related impacts –*** flooding, coastal erosion, subsidence and drainage systems require new building techniques and materials to withstand adverse weather conditions, and influence the choice of site;
- ***cost of finance/insurance –*** the insurance sector are beginning to factor impacts of climate change into premiums. The sector has yet to put systems into place to discount climate change related risk mitigation, but could be pushed to do so through building industry initiatives;
- ***business interruption –*** from wetter winters or more extreme weather patterns;
- ***the recession and slow housing market –*** the construction sector needs to ensure that it is building properties that people wish to buy in the current climate, in particular those that are cheaper to run and more energy efficient.

The architecture and construction sectors are significant contributors to the UK's share of carbon emissions, yet they also have considerable scope to adapt, affect change more broadly within society and to benefit from the opportunities it presents, namely through the design and efficiency of buildings, both existing and newly built. In light of this, we spoke to several organisations involved in architecture and construction, seeking their views on how the shift to a low carbon economy will affect the skills demands of their sector.

[12] BERR (2009) *Low Carbon Industrial Strategy: A vision* (HMSO: London) Accessed at:http://www.berr.gov.uk/files/file50373.pdf
[13] Ibid
[14] See http://www.statistics.gov.uk/cci/nugget.asp?id=155
[15] See http://www.guardian.co.uk/business/2007/feb/28/communities.society

3.2.2 Creating green jobs, driving demand for a newly skilled workforce

Research carried out by the London Energy Partnership in their report 'Skills for a Low Carbon London'[16] has found that one in three environmental firms report skills gaps. The shift to a low carbon economy has created demand for new skills within environmental firms, but this is also a trend being recognised across a number of sectors, particularly architecture and construction. This is also a finding echoed by nef in their publication, The 'Green New Deal',[17] which proposes a number of actions, including:

- improving the energy efficiency of tens of millions of properties, as well as the use of renewable energies to generate electricity;
- creating and training a 'carbon army' of workers is necessary in order to *'provide the human resources for a vast environmental reconstruction programme.'*

The concept of 'green jobs' has also been developed by the Local Government Association in their recent report 'Creating green jobs: Developing local low carbon economies'[18]. The report estimates that the potential for new jobs in home efficiency stands at 20,000, whilst there will also be new jobs in managing the risks associated with climate change, such as flood defences. Highlighting the current economic climate, the LGA suggests that we need to promote a *'green pathway out of recession'*. In order to capitalise on this potential, the LGA recommends that the Government devolves the employment and skills budgets, including Train to Gain, to give local partners the flexibility to *'support people to undertake courses that meet the skills needs of the low carbon economy.'* [19] Furthermore, the report calls on local authorities to work with employers and skills providers to *'ensure that skills gaps are identified and new training opportunities provided, including public sector apprenticeships.'*

The Royal Institute of British Architects (RIBA) has published guidance[20], encouraging architects to *'engage with the issue of climate change and deliver low carbon new buildings and low carbon refurbishment of existing buildings.'* In their briefing paper 'Skills for low carbon buildings', RIBA suggest that action to address climate change falls into two main categories[21]:

1) ***mitigation policies –*** designed to reduce greenhouse gas emissions to slow down climate change;

2) ***adaptation policies –*** designed to adjust society to cope with climate changes that are already happening.

The briefing makes the case that buildings should contribute to both these types of activity, and argues that buildings should be low carbon and sustainably designed with consideration of the *'wider, long term environmental, social and economic aspects of sustainability.'* [22] Considering this, RIBA argue that architects need to develop and maintain new skills in order to maintain competitive advantage, and they also suggest that low carbon design offers an opportunity for creative thinking and innovation.

3.2.3 Making the most of opportunities from a new business climate

Our research found a wide recognition within the sector that adapting to climate change will be a central aspect of future business for the architecture and construction sectors. Adapting to climate change was seen as inevitable for the sector representatives we spoke to, and this is not only driven by legislative demands, but also the demands of customers and wider concerns over corporate social

[16] LDA & London Energy Partnership (2007) *Skills for a Low Carbon London* (LEP: London) Accessed at: http://www.lep.org.uk/uploads/070316-LEP%20Skills%20Research%20-%20FINAL%20Summary%20Report%20%20Recommendations.pdf
[17] new economics foundation (2008) *A Green New Deal* (nef: London) Accessed at: http://www.neweconomics.org/gen/z_sys_publicationdetail.aspx?pid=258
[18] LGA (2009) *Creating green jobs: Developing local low-carbon economies* (LGA: London) Accessed at: http://www.lga.gov.uk/lga/aio/1509491
[19] Ibid
[20] RIBA (no date cited) *Skills for Low Carbon Buildings* (RIBA: London) Accessed at: http://www.architecture.com/Files/RIBAHoldings/PolicyAndInternationalRelations/Policy/Environment/SkillsLowCarbNew.pdf
[21] Ibid
[22] Ibid

responsibility. Within the field of architecture, respondents felt that in recent years there has been a significant shift in the number of architecture practices and design agencies that are willing and able to offer specialist green design skills, as indicated by:

- increase in practices;
- marketing their green architecture and design services;
- rebranding themselves as 'eco' or 'green' architects;
- recent explosion of low energy/carbon CPD modules;
- professional conferences and exhibitions addressing the issue.

This re-skilling, re-tooling and re-branding is due to the changing demands and growing awareness of clients. Although it was noted that those practices deemed to be pushing the boundaries were still quite small in number.

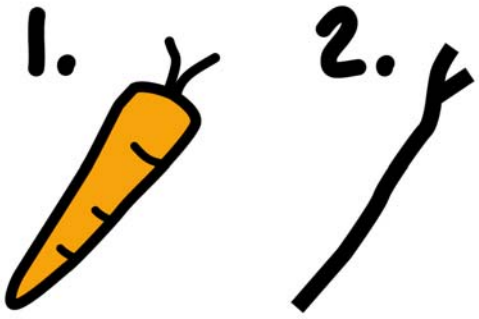
Published by the former Academy for Sustainable Communities, 'Mind the skills gap: The skills we need for sustainable communities'[23], assesses the gaps in supply and demand for skills required to deliver sustainable communities. The report explores the skills shortages of the environmental sector, which refers to environmental and sustainable development specialists. Environmental specialists refer to those working in *'traditionally defined environmental professions'*, such as biodiversity, green spaces and waste management, whilst sustainable development specialists are an emerging profession looking at the wider issues of sustainability.

The report forecasts that a shortage of sustainable development experts *'is likely to steadily increase to more than 70% in the period up to 2012.'* The report also identifies perceived skills in *'project management, stakeholder management, leadership, conflict resolution, inclusive visioning and breakthrough thinking.'* [24] The ASC recommends a need to increase the supply of sustainable development experts and to *'ensure that environmental and sustainable development experts are fully integrated into delivery teams so that environmental and sustainable development issues become opportunities rather than constraints.'*

3.2.4 Complying with legislation and responding to opportunities

The key impetus for the sector's commitment to low carbon issues is perhaps the Government's ambitious targets (e.g. the commitment that by 2016 all new homes will be zero carbon, which means that all homes should generate as much power as they use over the course of a year, resulting in net zero carbon dioxide emissions). Whilst this conversion to zero carbon homes will certainly be gradual (i.e. many homes being built in 2016 will have already submitted planning applications and thus not be required to be zero carbon), the target nevertheless raises significant skills challenges for the sector around energy consumption, water, waste management, the fabric of the house, and decarbonising the source of energy supply.

The plethora of regulations that will surround the mandatory zero carbon targets will, in particular, have significant implications in terms of a demand for knowledge. It was noted by some that at present there is not sufficient knowledge within the architecture and construction sector to manage the increasingly complex planning and regulatory systems. This is in part due to confusion surrounding the definitions and benchmarks used to determine a home's zero carbon credentials (Communities and Local Government are currently consulting on this). One interviewee commented that whilst there is a skills gap in terms of knowledge base, this is difficult to overcome considering that regulations



[23] ASC (2007) *Mind the Skills Gap: The skills we need for sustainable communities* (ASC: London) Accessed at: http://www.hcaacademy.co.uk/sites/default/files/mind_the_skills_gap_full_report.pdf
[24] Ibid

are a moving target.

Whilst the shift towards a low carbon economy undoubtedly poses a number of significant challenges for the sector, we also found that it was viewed as an opportunity by some practitioners and professionals. It was felt that for those companies and individuals willing and able to push boundaries and invest in developing ideas and skills there were economic opportunities (e.g. it was suggested that the 2016 zero carbon homes target may offer the sector the opportunity for creative thinking and innovation, particularly around onsite renewable energy generation).

3.2.5 Meeting demand, outstripping supply

The shift towards a low carbon economy, and particularly the looming deadline of 2016, poses a number of significant demands on the sector, with reports in the trade press noting that the housing sector in particular is being asked to *'run before it can walk'*. The sector representatives we spoke to recognised that building zero carbon homes will demand a paradigm shift in the way that homes are built.

Manual and lower skilled workers

Our interviewees felt there is likely to be a massive demand for specialist, highly skilled employees and contractors. Homes built to a zero carbon standard are likely to require fundamentally different skills to a traditional home. As such, traditional construction techniques may become less important, whilst there will be increased demand for precision engineering skills, urban and building design, and technical assessment.

It was suggested by some of the industry representatives we spoke to that the zero carbon homes of the future may not be built with bricks and mortar, but may be prefabricated. In other words, the structure of the house will be designed and made outside of the local area, or even outside the UK. Whilst this new type of house building will demand high level skills in terms of design and engineering, if we do witness a shift towards a trend of prefabricated homes this may see a reduction in the demand for traditional construction skills. This is potentially worrying as the young people learning construction skills at college today may find that their skills are less in demand in the future. Our research highlighted the importance of ensuring that the issue of adapting to climate change filters down to construction courses in further education colleges and other training providers which, at present, remain very traditional.

However, there was some disagreement amongst the respondents, with others suggesting that the shift to zero carbon homes does not necessarily mean the end for bricks and mortar, and that different home builders will respond in different ways. However, even if the way in which homes are built does not alter dramatically (i.e. change to prefabricated homes), trades people will nevertheless need to adapt and learn the skills demanded to build a zero carbon home. Other skills for which there has been increased demand include:

- environmental modelling;
- ecological foot printing of buildings;
- buildings science practitioners;
- green surveyors;
- sustainable home assessors.

New skills sets for non-technical specialists

As well as the technical and scientific skills that the shift to a low carbon economy poses, it was highlighted by our interviewees that there may also be an increased demand for non-technical skills. It was highlighted that there needs to be a seismic shift in the way in which planners and building regulation inspectors are trained, considering that they will be encountering planning permission applications for solar panels which may not be aesthetically pleasing.

It is anticipated that, considering zero carbon homes are likely to be more expensive to buy, there may also be a demand within the housing sector for marketing skills when it comes to selling zero carbon homes to the consumer. In addition, the consumer will also need to be trained in terms of how to use the new technologies that will be a key feature of the zero carbon homes. Furthermore, it was also recognised in our research that the construction sites of zero carbon developments are

likely to be very different to traditional construction sites and therefore site and project managers will need new training and skills with regard to quality assurance and environmental management systems.

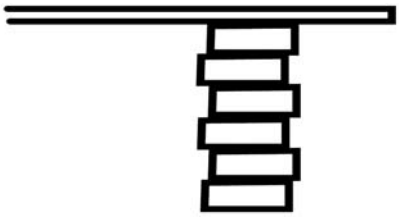
Servicing new technologies

Several contributors felt the sector had worrying skills gaps with regards to installation and maintenance of new technologies. This ranged from knowledge of renewable energy technologies to health and safety issues (e.g. the installation of photovoltaic panels). Other contributors highlighted substantial skills gaps as regards the maintenance and servicing of new technologies.
Zero carbon homes will have a great deal of new technology that will need to be maintained, and at present these skills are not prevalent. Post-occupancy maintenance will be crucial in order to ensure that new technologies remain efficient and effective.

Skills for retrofitting

In terms of the architecture sector in particular, our research highlighted that there are skills and knowledge gaps around refurbishment and retrofitting projects. Traditionally, architects have tended not to have been interested in small scale refurbishment and retrofitting projects (e.g. housing associations). However, there is likely to be more of this type of work being commissioned, considering that the social housing sector is now legally obliged to cut carbon emissions by 25% in all new homes. Similarly, insulation specialists are increasingly in demand and will continue to be as client awareness and standards for public and private sector housing increase, therefore increasing demand for these skills.

Supporting the development of knowledge and skills for a low carbon economy



Whilst our research identified a number of skills deficits in the sector, it was nevertheless encouraging to see that work is being done to address these gaps (e.g. RIBA is working to provide members with practical examples and case studies to enhance knowledge and understanding and are also actively encouraging members to undertake continuing professional development). RIBA are also working with higher education institutions to ensure that the skills needed in order to adapt to a low carbon economy are being taught and illustrated with practical 'real world' examples, focusing on environmental designs as well as integrating green technologies into buildings. This was echoed by the Zero Carbon Hub which suggested that universities are starting to reflect the shift to the low carbon economy in the courses that they offer.

RIBA also provide a useful definition of low carbon skills in the context of architecture, which they refer to as *'knowledge, skills and competencies that support the design and delivery of low carbon new buildings and low carbon refurbishment projects.'* They also outline four key areas of climate change skills for the sector, which are:

1) client skills – knowledge of climate change, communicating the importance of low carbon design, negotiations with clients and organisations;

2) design skills – regulations and standards, thermal characteristics, building services and renewable energy systems, low carbon design, energy assessments;

3) procurement skills – carbon impacts of design and construction, capital and in-use costs, funding mechanisms, economics of low carbon technologies;

4) construction skills – commissioning, ensuring delivery of low carbon design, metering and monitoring.

In addition, the UK Green Building Council's report 'Making the case for a Code for Sustainable Buildings'[25] argues that education, learning, development and training are all *'integral to the success of the code and that there should be training across the [housing] industry to raise awareness of*

[25] UK Green Building Council (2009) *Making the case for a Code for Sustainable Buildings* (UKGBC: London)

sustainability and that this was a key element to ensuring increased sustainability of buildings.' [26] The report also notes that a skills gap in the sector is *'a barrier to delivering sustainable buildings'*, arguing that better training and support is required *'to implement policy and regulation.'* [27]

It was recognised that for the construction and architecture sectors to adapt to the climate change agenda, there must be changes to the way in which training is approached. In light of this, we spoke to the Deputy Head of Construction at a large college in Manchester that has been proactive in engaging with the climate change agenda through the establishment of a sustainability group. Whilst skills for a low carbon economy is not currently covered in the construction courses' curriculum, there is a real appetite amongst students and staff to learn new skills, with a recognition that these are the skills students will need to get ahead in the future. In light of this, the college has invited companies to demonstrate new products and construction techniques, whilst members of staff have been offered training and continued professional development opportunities. At present, there is no statutory obligation for colleges to provide training on sustainable construction. Whilst some colleges are proactively engaging with this agenda, it is important that all colleges recognise the importance of equipping their students and staff with new skills in order to maintain competitive advantage in the labour market.

3.2.6 Barriers to improving the sector's skill base

It would seem that within the architecture and construction sectors, the drive seems to be both increasing the number of people with the skills necessary to service a low carbon construction and architecture sector at the same time as continuing to push the boundaries with design and technology. As such, it is about both new and existing skills, at both high and low levels. Despite this, our research uncovered a number of barriers to improving the sectors' skills base, which this section will now go on to explore.

Economic recession

Unsurprisingly, the overwhelming challenge facing the sector is the economic recession. The impact of the economic downturn on the housing market has been dramatic. This is starkly illustrated by the recent announcement from homebuilders, Barrett Developments plc, of losses of £592m, a striking decline on the £194m profit generated in the previous year. This climate has led to wide spread redundancies across the sector, with few home builders having an opportunity to buy land or build houses. There was a strong feeling amongst those we spoke to that now is the time for battening down the hatches and not investing in skills which are considered a very low priority in comparison. Whilst our research uncovered an appetite for new skills, particularly in terms of building demonstration homes, in the current economic climate this is considered hard to justify.

Overcoming silos and resistance to change

Aside from the barriers that the market presents, a significant challenge to up skilling is the silos that exist between professional bodies. An additional barrier is around attitudes and challenging professionals' and trades peoples' reticence to re-train. As such, the sector needs to coax employees into taking up new roles, learn new skills, and become advocates for wider issues, such as climate change and persuading them to seize the opportunities of the low carbon economy for creative design.

Lack of government funding

One respondent was particularly concerned that government funding has not been made available for the re-training of trade people who may not have formally updated their knowledge base for many years. It was suggested that there was a lack of incentive for trade people to undertake extra training, whilst the cost to the employer for sending employees on training is immense.

Lack of legislation

At present, there is a lack of legislation concerning skills for climate change. Industry is not currently required to address this issue, whilst colleges are under no obligation to introduce construction students to sustainable construction skills. Whilst it is certainly encouraging to see that

[26] Ibid
[27] Ibid

some industry bodies and colleges are proactively engaging with climate change issues, perhaps the introduction of legislation is needed to prompt a wider scale response.

Summary

Our research highlighted a number of significant skills gaps within the architecture and construction sectors. It is envisaged that by and large the skills required within these sectors will be high level technical and engineering skills. However, it was nevertheless recognised that the shift towards a low carbon economy, particularly efforts to meet government targets around zero carbon homes, may have implications for low level construction skills. Whilst it was felt that the shift to a low carbon economy may stimulate the sectors to be innovative, there was an overriding feeling that it presented more challenges than opportunities. However, during a period of economic recession, from our research it soon became clear that addressing skills shortages was a decidedly low priority when compared with the current battering being felt by the sectors.

Opportunities for the architecture and construction sector

- ***Explore Groundwork's potential role in house building/management –*** some Trusts have undertaken work in the development and management of housing stock in their area, even going as far as establishing themselves as a Registered Social Landlord (RSL). In a time of recession, when house prices are low and housing supply expected to slump, their may be a role for some Trusts in supporting the development or redevelopment of low carbon housing options in their area. This could link to training and skills development of unemployed people locally.
- ***Developing new training opportunities in low carbon housing construction techniques –*** this could include insulation, energy production and energy efficiency to meet BREEAM standards.
- ***Work with colleges and schools –*** to develop interest in new types of construction skills and courses.
- ***Ensure that Groundwork Trust headquarters and staff offices meet or are taking steps to raise standards of carbon efficiency and reduction –*** to reduce costs in a time of recession and demonstrate local leadership in this area. This also provides a potential opportunity for demonstration projects/sponsorship.

3.3 The public sector

3.3.1 About the public sector

The public sector is a very significant sector within the UK economy. It generates roughly a fifth of UK Gross Value Added (monetary output), employs a quarter of workers, and produces 5% of CO_2 emissions. Public sector GVA rose by 36% between 1990 and 2006. CO_2 emissions from the sector's energy use and nitrogen oxide (NOx) emissions fell by 31% and 44% respectively.

3.3.2 Drivers of change

As a result of the facilitation role enjoyed by public sector workers, as regards shaping the way local economies, environments and local communities operate, there is significant potential for the public sector to influence the amount of carbon emitted. This includes the carbon dioxide emitted directly as a result of public sector activity and public sector policies and legislation.

Interestingly, our research revealed that a significant number of local authorities are taking steps towards becoming low carbon, although it was felt that some were perhaps not as adventurous as they might be. This section explores the key drivers for new skills in the public sector as we move into a low carbon economy.

Efficiency drive

Since the publication of the Gershon Review of Public Sector Efficiency, there has been increasing attention paid to how public sector bodies and their partners can deliver public services more effectively and efficiently. This has led to changes in procurement practice and the way in which local authorities in particular operate. Combined with the increasing awareness of environmental issues, the efficiency drive in the public sector has encouraged greater recognition of the effect of operations and commissioning services, including:

- energy use;
- waste management and recycling;
- CO_2 emissions;
- building and construction.

The need to show leadership

Our research suggested that the public sector was well placed to engage with the low carbon agenda and, as such, encourage the growth of low carbon skills. The need to show leadership on the issue was considered to be an important driver for change within public sector policy making and delivery of services, which in turn was creating demand for new skills amongst their own employees and contractors or suppliers. There was an awareness amongst public sector respondents that by getting their own house in order, local authorities in particular could encourage businesses and individuals to embrace low carbon lifestyles.

Legislation and compliance

Developed in response to the Stern Review, the Climate Change Act introduced clear targets for reducing carbon dioxide emissions and made legally binding five-yearly reports on current and predicted impacts of climate change and on policy adapting to climate change. Prior to this, the Nottingham Declaration was developed in 2000 and was signed by 270 local authorities in England. The Declaration is a contract to acknowledge the threats of climate change, welcome the challenge of overcoming this, and actively work at local level and in partnership to meet targets and maximise the potential benefits to the community. However, this was a voluntary and nominal measure, whereas the Climate Change Act was the first statutory step towards creating a low carbon economy and has been followed by a gathering momentum of environmental measures since, including the world's first carbon budgets. In addition, the Single Set of 198 National Indicators, published in 2007, also make reference to issues around climate change. The National Indicator Set is the only set of indicators on which central government will performance manage local government, with two related specifically to the low carbon agenda – National Indicator 185 'CO_2 reduction from local authority emissions', and National Indicator 186 'per capita emissions in the local authority area'.

Mitigation and emergency responses

As well as their role as facilitators of change, as regards reducing carbon emissions and therefore the likelihood of devastating climate change and encouraging business to take advantage of new and growing market opportunities arsing from the growth of a low carbon economy, the public sector also has a responsibility to adapt to the demands of the changing climate (e.g. public sector bodies need to ensure that our places are in the best position to adapt to challenges such as flooding, increased temperatures in cities and changes in agriculture). This responsibility is therefore a significant driver for the demand for new skills in the public sector.

Seizing potential opportunities

Like in other sectors, the shift to the low carbon economy raises a number of potential challenges for the public sector. However, our research found that there are a number of potential opportunities to be seized, including:

- stimulating local authorities to undertake better public procurement;
- improving efficiency in the public sector;
- the creation of 'green jobs' in areas such as flood defences and energy efficiency.

Addressing social issues through low carbon skills development

The development of a workforce adept in low carbon skills, or the rise of so-called 'green collar jobs', has, according to some academics, significant social as well as environmental benefits. Research by Raquel Pinderhughes, Professor of Urban Studies at San Francisco State University, explores the potential of 'green collar jobs' in providing a new source of living wage jobs for low income residents, particularly those with barriers to unemployment. Pinderhughes[28] defines 'green collar jobs' as *'blue collar jobs in green businesses – that is, manual labour jobs in businesses whose products and services directly improve environmental quality. Green collar jobs are located in large and small for profit businesses, non-profit organisations, social enterprises, and public sector institutions. What unites these jobs is that all of them are associated with manual labour work that directly improves environmental quality.'*

According to Pinderhughes *'green collar jobs represent an important new category within the work force, and a significant opportunity. This is because they are relatively high quality jobs, with relatively low barriers to entry, in sectors that are poised for dramatic growth.'* [29] From her research in Berkeley, USA, Pinderhughes concludes that *'green collar jobs provide workers with living wages, health benefits, meaningful work, high levels of job satisfaction, and opportunities for occupational mobility'*. The research highlights that whilst responding to climate change will require highly skilled workers, the growing 'green collar job' sectors (e.g. material reuse, bicycle transit and green building) also offer significant opportunities for individuals who have encountered barriers in entering the labour market. Pinderhughes finds that 'green collar jobs' are well suited to these individuals because such jobs often have low barriers to entry, provide on the job training and, in a growing sector, there are often opportunities for progression.

This point is echoed in a working paper[30] by Tim O'Riordan from the Centre for Social and Economic Research on the Global Environment, which sets out the business response to climate change. He argues that *'business has both a commercial and moral responsibility to reduce greenhouse gas emissions... in a cost effective and socially responsive manner'*. Furthermore, climate change may stimulate business to *'discover new business opportunities'*, whilst the challenge of creating a non-carbon based energy future offers potential for *'creative and expanded activity.'* [31]

Citing the World Business Council on Sustainable Development (2000), O'Riordan suggests that businesses work with local social services departments to *'devise packages of skills training so that unemployed and disadvantaged people can create [environmental] enterprises'*, which may include improving the insulation of low income homes. The paper also suggests that businesses *'co-operate with funding agencies for skills training in local technological enterprises (e.g. energy for waste schemes, and social forestry investments for carbon sequestration).'* O'Riordan's paper highlights that responding to climate change ought to be a significant facet of a business' corporate social responsibility portfolio, and that assisting *'local people in skills training and in management'* can be an important aspect of this.

3.3.3 Getting the right mix, generic and specialist skills

Clearly, there are a number of powerful drivers, affecting the public sector's involvement and role in promoting a low carbon economy. However, further investigation into what this means for skills and skills development within the sector, revealed a need for both specialist and technical skills within the public sector and also more generic skills to accompany these technical capabilities.

[28] Pinderhughes, R. (2007) *Green Collar Jobs – an analysis of the capacity of green businesses to provide high quality jobs for men and women with barriers to employment* (not cited) Accessed at: http://bss.sfsu.edu/raquelrp/documents/v13FullReport.pdf
[29] Ibid
[30] O'Riordan, T. (no date cited) *Climate Change and Business Reponse: CSERGE Working Paper GEC 2000-24* (CSERGE, TXU Europe) Accessed at: http://www.uea.ac.uk/env/cserge/pub/wp/gec/gec_2000_24.pdf
[31] Ibid

Leadership skills and policy

From our research it emerged that there may be a demand for new skills in terms of leadership and policy. It was suggested that the sustainability agenda is personality led, and that it will be important to sustain enthusiasm for green issues. This, it was argued, will demand strong leadership. This echoes the findings from 'Mind the Skills Gap: The skills we need for sustainable communities'[32], published by the Academy for Sustainable Communities[33]. It assessed the gaps in supply and demand for skills required to deliver sustainable communities and found that organisations need technically qualified staff with a range of generic skills, such as project management and communication, to deliver sustainable communities. There was however evidence of action being taken to address this gap. At a strategic level, The Commission for Economic Development, Employment and Skills have carried out a mini-Stern[34] analysis to look at climate change, carbon emission and impacts on the sub-regional economy. This led to a £1m fund being created to promote low carbon economic activity.

Managing housing stock

It was suggested that the need to manage housing stock, in terms of energy efficiency and retrofitting, will demand new skills in the public sector. This will require high level, technical skills such as the development and installation of heat mapping technology.

Increased knowledge of procurement

It was suggested amongst our interviewees that procurement will become an increasingly important response to climate change. It was recommended that more awareness is needed about procurement amongst a broad range of people, not just procurement teams but finance staff too.

Energy management

Public sector needs to manage its own energy effectively, including skills for carbon trading from 2010. Energy management will be needed in a range of services and buildings that the local authority is responsible for (e.g. schools, libraries, leisure centres) and, as such, education is needed on how to manage these sustainably. It was encouraging to see that a number of actions were being taken in the public sector in response to the climate change agenda. In particular, it emerged that home insulation has become a popular response to the challenge of climate change. Councils, such as Sheffield and Kirklees, have implemented programmes to offer home insulation to households regardless of their income, and are training staff (increasing semi-skilled jobs) to meet the demand for this.

Lack of qualified planners and building inspectors

Our research also identified skills gaps, in particular local authority departments, namely planning – qualified planners and building inspectors. Many well performing staff are poached by the private sector, leaving capacity issues and skills gaps. Also, there is a demographic cliff in building control as most practitioners are of a similar age. When these retire, there is likely to be a deficit in skills in building control departments therefore action needs to be taken now to attract new blood. This too was found in the publication 'Mind the skills gap: The skills we need for sustainable communities.'[35]

Wanted: Sustainable development practitioners

The 'Mind the skills gap: The skills we need for sustainable communities' report also explores the skills shortages of the environmental sector, which refers to environmental and sustainable development specialists. Environmental specialists refer to those working in traditionally defined environmental professions, such as biodiversity, green spaces and waste management, whilst sustainable development specialists is an emerging profession looking at the wider issues of sustainability.

[32] ASC (2007) *Mind the Skills Gap: The skills we need for sustainable communities* (ASC: London) Accessed at: http://www.hcaacademy.co.uk/sites/default/files/mind_the_skills_gap_full_report.pdf

[33] Now called the Homes and Communities Agency Academy

[34] The Commission for Economic Development, Employment and Skills & Deloitte (2008) *'Mini-Stern' for Manchester* (Deloitte: London) Accessed at: http://www.manchester-enterprises.com/documents/Manchester%20Mini-Stern%20-%20FULL%20FINAL%20REPORT.pdf

[35] ASC (2007) *Mind the Skills Gap: The skills we need for sustainable communities* (ASC: London) Accessed at: http://www.hcaacademy.co.uk/sites/default/files/mind_the_skills_gap_full_report.pdf

In particular, they are seen to *'consider environmental issues alongside economic and social factors.'* The report highlights a shortage of sustainable development experts and forecasts *'a steady increase to more than 70% in the period up to 2012.'* The research also finds perceived skills in *'project management, stakeholder management, leadership, conflict resolution, inclusive visioning and breakthrough thinking.'* [36] The ASC recommends a need to increase the supply of sustainable development experts and to *'ensure that environmental and sustainable development experts are fully integrated into delivery teams so that environmental and sustainable development issues become opportunities rather than constraints.'*

3.3.4 The key barriers to improving the sector's skills base in readiness for a low carbon economy

Having discussed some of the key skills demands facing the public sector, this section will now highlight some of the barriers to improving the sector's skills base, as identified in our research.

Recruitment and workforce planning

From our research, it was suggested that recruitment is not always effective at getting the best people for the job, making it challenging for the public sector to overcome skills gaps. The poor reputation of the public sector as being less credible than the private sector is one barrier; the inability to look at the full pool of talent and advertise jobs more broadly in the private sector is another. Private sector skills are needed, and hence a less inward looking approach would be beneficial. Similarly, workforce development and retention was criticised for not being a reward system as it does not use incentives (or not enough anyway) and the lack of reward management means that potential excellence may be overlooked. These are problems that affect many areas of local authority functions, but will need to be addressed if local authorities are to respond to climate change more effectively.

Perceptions

Our research identified a number of perception related issues that could act as barriers to improving the sector's skills base. These perceptions include people looking at the climate change agenda and thinking of it as costly, rather than looking to the longer term gains. As climate change measures can take a long time to yield visible benefits, a new framework is needed to identify and acknowledge the benefits of taking action now, rather than seeing it as a discretionary measure that won't get rewarded. Consequently, it was recognised that developing different value sets and proving the business case for intervention can be difficult.

Funding constraints

Funding is a key issue and barrier to developing skills for a low carbon economy. While climate change may be important in strategy and policy, there is a lack of funding attached to skills to mitigate this. More flexibility of spending is needed in local authorities to enable them to take calculated risks and act innovatively; at present 95% of local authority funding is ring-fenced.

Economic recession

It is thought that we are yet to see the full impact of the recession on the low carbon and government agendas as the current situation is worsening. Making the business case for low carbon action has changed and it is now more difficult as money is tighter, therefore there is a need to be more innovative and creative to get ideas and measures accepted. Questions remain, and increase in urgency, over where capital investment will come from for measures such as retrofitting and renewable energy. Despite this scepticism, some felt the recession may provide an opportunity to forge new industries around climate change and low carbon. It was also suggested that the recession may stimulate the implementation of a Green New Deal as part of the economic recovery and considerations such as low carbon skills is likely to be part of this.

Lack of specialist training for specific functions

From our research, it appears there is a lack of specialist training for specific functions (e.g. energy audits). It was suggested that higher end skills need to be developed in collaboration with universities and higher education/further education colleges, perhaps using Local Area Agreements to inform local skills development.

[36] Ibid

Summary

Our research identified that there are a number of factors driving the public sector to adapt to a low carbon economy. These include:

- a drive for efficiency in the public sector;
- the need for the sector to show leadership;
- legislation and compliance;
- mitigation and emergency response;
- addressing social issues through low carbon skills development.

It is predicted that the shift to a low carbon economy will require a number of new skills to be developed within the public sector. These include generic skills, such as leadership and management skills, and specialist skills in energy management, and planning and building inspectors. Whilst a number of local authorities appear to be actively engaged with the low carbon agenda, this is not yet widespread. Indeed, our research identified a number of barriers that may be preventing the public sector from improving its skills base, ranging from recruitment and workforce planning issues to the overarching challenge of the recession.

Opportunities for the public sector

- ***New opportunities to develop skills through training –*** there is the opportunity to deliver a range of new training courses which focus on developing medium level skills in relation to the low carbon agenda. This could be targeted on young people, including those who are not currently in education, employment or training (NEETs), and/or newly unemployed people who are keen to retrain in order to gain employment. By working with the public sector, Groundwork UK and Trusts could also broker work placements and on the job training opportunities.

- ***New opportunities to identify skills gaps locally –*** Groundwork Trusts have the opportunity to work closely with public sector organisations to explore the potential impact of climate change and to consider how they might be able to identify the potential skills gaps in relation to climate change for the future. Groundwork Trusts may wish to offer skills audits for climate change.

- ***Highlight Groundwork's contribution to climate change in procurement –*** Groundwork Trusts should work with public sector agencies to reduce the impact their procurement activity has on carbon emissions locally, thereby contributing to the authority's Local Area Agreement targets on carbon reduction. If Trusts were able to quantify this contribution, this would further strengthen Groundwork's position and their offer.

- ***Work with the public sector to offer energy efficiency advice –*** Groundwork Trusts may find there are opportunities to work with the commercial and public sector organisations in providing advice and support to increase energy efficiency and facilitate the development of localised energy supply schemes. This could make an important contribution to the reduction in carbon locally and in reducing issues around fuel poverty. If these local energy schemes were managed effectively and were sound financially, they could become an important source of energy and/or income for the Trust/public sector agencies, in partnership or independently.

3.4 The science and engineering sector

3.4.1 About the sector

The electrical and electronic engineering sector is an engine of economic growth in the EU, accounting for a turnover of €320b a year and employing 2.8m people in 18,000 companies. EU manufacturers account for 21% of the overall worldwide production of electrical and electronic products by value, behind China, which holds a 30% share, and just ahead of the USA and Japan, which each have a 19% share.

The sector's scope covers a broad range of technologies, equipment, systems, software and services, and includes the manufacture of such products as household appliances, electromedical equipment, cabling, wiring, lighting, or complete power plants.

In addition, the electrical and electronic engineering sector plays a significant role as a key driver of innovation in the EU. Its manufacturers are among the most important suppliers to other industry sectors, such as transport, health, chemicals, and information and communications technology.

Manufacturing accounts for 13% of UK Gross Value Added (monetary output), employs 10% of UK workers and is responsible for 28% of UK carbon dioxide (CO_2) emissions.

Manufacturing GVA rose by 7% between 1990 and 2006. However, reductions in emissions of carbon dioxide (CO_2) by 19%, nitrogen oxide (NOx) by 45%, particulates (PM10) by 46% and sulphur dioxide (SO^2) by 66%, were made over the same period.

The science and engineering sectors have significant potential to impact on carbon emissions in the UK, due to the sector's ability to influence how we live, travel, do business and what we buy. This is particularly true for civil engineers. In addition, energy efficient products need to be bought by consumers who are aware of the role they play in a low carbon economy.

3.4.2 A high tech 'carbon army'

The Green New Deal argues that the Government needs to put in place a national plan for a low energy future. This includes, amongst other actions, *'a need for a training, education, research and development programme for the 'carbon army' of workers needed to bring about a low carbon future.'* The Green New Deal Group argue that expertise will be required if we are to reduce carbon dramatically. This includes expertise around *'energy analysis, design and production of hi-tech renewable alternatives, large-scale engineering projects such as combined heat and power, and offshore wind at the high skilled end; though to medium and unskilled work making every building energy tight, and fitting more efficient energy systems in homes, offices and factories.'*

3.4.3 New challenges and new opportunities in manufacturing

In September 2008, BERR and DIUS published a report into the future role of manufacturing in the UK 'New challenges, new opportunities'. The report discusses why manufacturing will be important for the future UK economy and what needs to be done to respond to global changes, such as low carbon manufacturing, supply chains, new technologies, people and skills. 'New challenges, new opportunities' confirms the strong role of British manufacturing in supplying higher value components, goods and services, as world leaders in developing manufacturing solutions for a low carbon economy.

The target of 1m British jobs in the green economy by 2030 is identified, highlighting the need for the right skill mix to create a multi-skilled, flexible workforce. To achieve this, the Government aims to attract high calibre individuals to the sector by enabling businesses the flexibility to innovate, maximising green jobs and updating the image of manufacturing so young people view work in this sector as contributing towards tackling the world's problems, such as climate change and water shortages. Other plans include:

- development of Carbon Abatement Technologies (CATs) and Carbon Capture and Storage (CCS) technologies to reduce emissions as fossil fuels continue to be inevitably burned in the transition;

- the Government will convene a high level forum on low carbon skills in the autumn, to establish a cross-sector panel to align *'the skills system behind the challenges and opportunities of a low carbon, resource efficient economy.*' To do this, they will *'find ways to draw best business practice into the skills system and deliver a rapid supply-side response without weakening existing employer leadership arrangements*';

- the Government is also looking at an expression of interest from Energy and Utility Skills for the power sector in the current round, building on the establishment of National Skills Academies for the nuclear, manufacturing and process industries.

The rising importance of the low carbon agenda has had an important impact on the science and engineering sectors, as regards the expansion of new technologies and the range and depth of skills required to develop these. In particular, the growth in government targets and legislation has required the science and engineering sectors to develop new solutions and expand current products and services to respond to the environmental challenge we face. Our respondents identified a range of services and skills that they felt are becoming increasingly important in addressing the demands of a low carbon economy:

- ***technical support –*** development of specialist products to address issues such as renewable energy, energy efficiency and pollution control;

- ***lifecycle analysis or 'cradle to grave' analysis –*** in depth examination of how resources and products are used, and subsequently a better understanding of how resources can be more efficiently used and managed, both within the sector and with regards to products and services being developed for use outside the sector. Indeed, the respondents felt that this area is becoming more widely used as companies work to improve efficiency and resource management.[37] There are also links between this agenda through industrial symbiosis which aims to bring different business sectors together in order to improve energy efficiency through commercial trading of water, energy and materials[38];

- ***adaptation to climate change impacts –*** a range of work to develop responses to climate change through adaptation to its impacts. This includes improving flood defences along rivers and coastlines, and developing a more sophisticated means of reducing the impact of carbon dioxide after emission (e.g. carbon capture and storage).

3.4.4 Skills gaps within the science and engineering sector

The sector is developing and innovating to create new products and markets for the low carbon economy, now and in the future. The current recession, coupled with the challenge of climate change, has given the sector fresh impetus to explore new products and services to address the low carbon agenda and thus to think about the skills needed to drive the development of these products and services. The majority of opportunities within the sector will be focused on high skilled opportunities to deliver the activities mentioned above. These activities require a high level of technical expertise and competence, and in general there are people within the sector that have developed or are developing these skills. Whilst there are likely to be fewer low skilled opportunities in terms of developing and innovating new products and services, there are skills needs as regards implementation (e.g. installation, sales and marketing, and maintenance skills are all important if the new products are to be successful, both as regards economic value and carbon reduction).

[37] Website of the UK Resource Efficiency Knowledge Transfer Network can be found: http://ren.globalwatchonline.com/epicentric_portal/site/UKREN/menuitem.f0731b6322cbf5a10650d32067d001a0/ This is funded through central government and regional development agencies.

[38] The National forum for industrial symbiosis can be found at National Industrial Symbiosis Partnership (NISP). More details about NISP including case studies can be found at http://www.nisp.org.uk/

Importantly, our respondents also felt this is compounded further by a shortage of general engineering skills within the economy. The main skills gaps will emerge from middle management where there is a real lack of capacity to develop the potential opportunities of the low carbon economy.

3.4.5 Greater recruitment and retention within science and engineering

For several respondents, the development of low carbon skills and indeed the necessary innovation of products and services require more people to study science and engineering subjects to a higher level and to be retained within these areas. In turn, this requires better public communication of science and a greater understanding of the role it plays within society and industry, both of which help to increase the number of people who view science skills as valuable to society and as a fulfilling career as well as the number of young people entering the sector. This can also be furthered by greater understanding and promotion of Continuous Professional Development. Higher education institutions also reported that improvements to levels of basic skills would help to ensure more young people are able to study science and engineering subjects.

3.4.6 Better commercialisation of ideas within science

The CBI's Climate Change Task Force identified a number of low carbon business opportunities for SMEs in areas such as commercial building, renewable electricity and transport fuels, and domestic energy efficiency. Furthermore, opportunities exist for high technology businesses that have developed from higher level research at universities. Exploiting these will be beneficial to local economic growth. By better supporting and incubating these science and engineering businesses, local and national government will help to support the development of low carbon skills.

3.4.7 Challenges towards addressing the skills gaps within the sector

Personal perceptions about climate change issues

There is a fundamental issue around perceptions in the development of the low carbon economy within the sector. Climate change is an emotive issue and people tend to have personal opinions about it, which can impact upon their willingness to address the issue on a professional basis.

Recession

The current recession can make people think that in the short term it is not worth spending money on this issue, as the drive for greater cost savings mean it is not cost effective as the outcomes are relatively long term.

Durability versus cost

The durability of products and services within the engineering sector doesn't tend to be valued and this is reflected in the cost element of these products and services. There needs to be greater involvement from the Government to push this agenda forward, perhaps in a similar way to how health and safety was prioritised in order to encourage customers and professionals to take it seriously.

Summary

Our research identified a number of factors or issues that are important as regards the skills needed within the science and engineering sector, in order to respond to the challenge of low carbon economies. These include:

- a need for a high tech sector with high levels of low carbon skills, including greater understanding of technical products and services, lifecycle or cradle to grave analysis, and how to adapt to the effects of climate change;
- an understanding of the different levels at which skills will be needed – higher levels as well as management and lower level skills;
- the need for the sector to show leadership;
- better recruitment and retention within science and engineering subjects;
- greater commercialisation of ideas within science and engineering subjects.

It is predicted that the shift to a low carbon economy will require a number of new skills to be developed within the science and engineering sector. The majority of opportunities will be focused on high skilled opportunities to deliver the activities mentioned above. These activities require a high level of technical expertise and competence. However, in general, there are people within the sector that have developed or are developing these skills. Whilst there are likely to be fewer low skilled opportunities in terms of developing and innovating new products and services, there are skills needs as regards installation, sales and marketing, and maintenance, all of which are important if the new products are to be successful, both in terms of the economic value they contribute to the economy and in reducing carbon emissions. Importantly, respondents felt the main skills gaps will be in middle management areas, where there is currently a lack of capacity to develop the opportunities within the low carbon economy.

There are a number of different types of role that Groundwork can play in relation to the climate change/low carbon agenda, and it is important that Groundwork consider the blend of roles that are most appropriate.

Opportunities for science and engineering sector

- ***Development of new training courses in science and engineering –*** Groundwork UK and individual Trusts may find it useful to work with businesses and/or membership bodies in this sector to explore how they can provide training/skills development of Continuous Professional Development in this sector, focusing on the development of a low carbon economy. This may include courses on the importance and impact of climate change for employees and employers within the science and engineering sector. In particular, this might be aimed at those with middle management responsibility.
- ***Encouraging young people to develop skills, interest and enthusiasm for the engineering and science sectors –*** Groundwork has an important role to play in working with the sector to raise awareness, interest and enthusiasm for science and engineering at a local level (e.g. through schools and colleges). This could be undertaken in collaboration with national and local business leaders and include opportunities for apprenticeships, mentoring and work experience. It may also be undertaken through raising an interest in the environment, biodiversity and climate – core areas for many Trusts.
- ***Encouraging greater consideration of 'cradle to grave' analysis of Groundwork UK and individual Trust activity –*** Groundwork UK and individual Trusts need to ensure that they lead by example with regard to their own carbon emissions, ensuring they are as efficient as possible in their own activities and that the products and services they provide have been fully costed as regards carbon emissions. Where possible, Trusts should work with partners or indeed other Trusts to share resources and reuse waste.
- ***Raising the level of expertise and skills around science and engineering within Groundwork Trusts –*** in order to capitalise on this agenda within Trusts and to identify low carbon opportunities, Groundwork Trusts should consider recruiting specialists in this field to work with them to develop projects in energy, carbon efficiency, etc. This could be undertaken through formal employment or through volunteering.
- ***Show leadership locally –*** Groundwork should show leadership in their own area by developing and maintaining a high standard of carbon reduction and neutrality.

4 CONCLUSIONS: THE ROLE FOR GROUNDWORK

We have focused our research on three main sectors of the economy where we feel there are important implications of the low carbon economy for the skills agenda. However, our findings are not exhaustive and merely begin the process of exploring the implications of the low carbon economy for the future in starting to understand the implications of climate change for Groundwork UK and Trusts across the UK.

Each of the sectors explored in this report are complex and potentially sub-divisible. Therefore, the report does not try to summarise the implications for the whole of the sector but instead aims to explore some of the key issues for the sector and consider the implications for Groundwork UK and Trusts.

The report has explored the consequences of climate change for three main sectors, drawing on both secondary and primary research data. The research findings outline the skills implications and in particular focus on what is needed for the evolution of a low carbon economy in the UK, and what the role for Groundwork UK and individual Trusts might be within this. This reflects Groundwork UK and individual Trusts' longstanding interest in the environment as a key driver for their activity in local communities. It also reflects CLES' own interest in the challenge of climate change and how economic policy and strategy needs to change to adapt to the threat it poses now and in the future.

From our research, we have identified a number of potential implications for Groundwork's activity in England, Wales and Northern Ireland. These implications include both opportunities and areas for development which will build on Groundwork's existing involvement in project and policy work linked to the climate change agenda, at the national, regional and Trust level.

4.1 The impact of the shift to a low carbon economy on low skilled jobs

Our research found that a shift to a low carbon economy will have a number of impacts on low skilled jobs:

- in the construction sector, it is anticipated that changes in the way in which we build homes in order to meet zero-carbon standards will have an impact on the skills required by manual and lower skilled workers. Whilst the 'jury is still out' as to whether the move to low carbon construction will mark the end of traditional techniques, it nevertheless seems convincing that low level skills such as cavity wall insulation and maintenance will be required. It is therefore important that training providers respond to this challenge;

- the research has found that there is potential to address social issues through low carbon skills development. 'Green collar jobs' in industries such as recycling offer employment opportunities with low barriers to entry and as a potential growth sector, these jobs could offer individuals routes for progression;

- the research found that there are likely to be fewer opportunities for low skilled employment in the science and engineering sector. However, there is likely to be demand for lower level skills in areas such as installation and maintenance.

4.2 General opportunities for Groundwork

There are a number of general opportunities which Groundwork could utilise to develop this agenda within their work:

- using volunteering opportunities to raise awareness of climate change and to encourage innovation, particularly at a time of recession and unemployment;

- using volunteering and training opportunities to promote the development of low level skills for a low carbon economy;

- Groundwork UK could encourage Trusts to keep a record of carbon reduction internally in their central and regional offices as well as at Trust level to link in with existing performance measures. This scheme could be incentivised to award prizes/cash incentives to those who manage to make improvements.

4.3 Positioning Groundwork's role in relation to this agenda

There are a number of different types of role that Groundwork can play in relation to the climate change/low carbon agenda, and it is important that Groundwork consider the blend of roles that are most appropriate.

Lobbying role

There is great potential for Groundwork to take the lead in lobbying for the low carbon skills agenda. As explored below, this may be achieved by raising awareness, lobbying for higher standards and compliance, and leading by example.

- raising awareness: Groundwork may also wish to use their position to raise awareness of skills gaps with colleges, schools and universities in order to develop and adapt existing courses. Groundwork also has the potential to raise awareness of new opportunities with Groundwork clients working on employment and training projects.

- lobbying for higher standards and compliance: Groundwork should continue to lobby for tougher and more stringent carbon reductions in order to catalyse innovation and development in the sector. At a local level, they should encourage leadership at a local level to make progress on ambitious Local Area Agreement targets on carbon reduction, including NI185, NI186 and NI188. At the same time, Groundwork UK nationally, along with regional Trusts, should consider lobbying for a higher standard of carbon reduction targets and resources at central government level, including legislation.

- leading by example: Raising the standard of carbon efficiency and carbon reduction in Groundwork offices and operation. This internal drive could be used to pilot projects, develop skills and publicise the organisation's leadership in this field, e.g. internal carbon currency.

Broker role

Groundwork has long been recognised for their important brokerage role in local communities. The climate change agenda provides Trusts with the opportunity to explore this role further in their work to promote and develop low carbon economies at Trust level. This could be acted upon in the following ways:

- working with local authorities to help them comply with targets, e.g. LAA indicators NI 188, 186. Trusts could also work with local authorities to develop a "local green new deal" and to help fill skills gaps in their work.

- working with local communities and business to help them realise opportunities of lower carbon economy, e.g. maximising income, fuel poverty, energy independence. Trusts could also raise levels of skills through training and volunteers.

- developing a 'critical mass' of environmental organisations, involved in the development of low carbon economies. This would help with the transfer of knowledge, the dissemination of good practice and innovation as regard products and services that could be offered by such organisations to their communities and partners.

Delivery role

Groundwork Trusts play an important delivery role in their communities, often delivering projects where mainstream services have failed. In relation to the development of a low carbon economy, Groundwork has a real opportunity in the following delivery roles:

- exploring how they can build in carbon reduction and neutrality into their project work in order to set a high standard of delivery locally and demonstrate their commitment to this agenda;

- skills development for a low carbon economy, which should focus on those lower level skills such as installation, sales and marketing, and maintenance. This could also be incorporated into existing employment or labour market projects run by Trusts;
- delivering skills training to middle management professionals to help them better understand the impact and effects of climate change and what this will mean for their sectors and roles, which should focus on awareness raising;
- delivering projects to lower carbon in local communities, e.g. community energy, fuel poverty, retrofitting of homes, energy efficiency, local supply chains, and resource management;
- assessment of low carbon delivery skills within Groundwork to meet challenges of low carbon economy, environmental impact assessment, modelling, engineering, technical expertise and leadership;
- highlighting Groundwork's contribution to reducing carbon in delivery through tenders and public service agreements – link with National indicators;
- identifying examples of effective practice within the organisation which demonstrate Groundwork's potential and explore application;
- delivering training in low carbon economy skills areas within existing projects.

4.4 Challenges for the future

Innovation as a driver to future growth of the low carbon economy

One of the key findings of this research has been the importance of innovation within the sector in order to realise the potential benefits of climate change. Further innovation will only be driven through higher legal standards established through central government as this will require suppliers, manufacturers and customers to seek alternative ways of complying with these standards and catalyse innovation within the sector. This is analogous with the health and safety standards, which have been seen to drive innovation and improvements across the UK economy.

The myth of a separate local carbon sector

One of the difficulties faced by practitioners in developing and strengthening a local carbon economy is the perception, reinforced by strategy, that there is a separate and distinct low carbon sector that will emerge in future years to drive future growth and prosperity in the UK economy. Whilst there are specific businesses, skills and products that will be produced in order to respond to the impacts of climate change and to enable adaption, the majority of new opportunities that are emerging in relation to low carbon will be in existing sectors of the economy such as architecture and manufacturing.

Adopting a precautionary approach

As yet, the full impact of climate change is unknown therefore as the impact is unclear it is difficult for the Government and Groundwork to plan in advance of it taking place. This approach has tended to encourage a policy of relative inertia among central, regional and local government. However, should the full impact of climate change be realised, the consequences for the UK in terms of changes in our temperature and sea level may be far reaching. Therefore, it is incumbent upon organisations like Groundwork to show strong leadership by adopting a precautionary approach to dealing with this issue. By forging new ideas and projects around the low carbon economy, they can demonstrate their commitment to the agenda whilst beginning the process of adapting Groundwork as an organisation, and Groundwork's delivery approach to a post-climate change context.

Low carbon economy: A responsibility not simply an opportunity

Although the development of a low carbon economy is undoubtedly an opportunity which Groundwork should explore and exploit, the move towards low carbon economics is also a responsible approach to tackling the very real threats and impacts of climate change now and for the future.

APPENDIX 1

Summary of specific policy responses

Brundtland Report 1987

'Our Common Future', also known as the Brundtland Report, was produced by the United Nations' World Commission on Environment and Development (WCED, or the Brundtland Commission), and published in 1987. The report was one of the earliest calls for action in the environmental cause, having been commissioned to address growing concern *'about the accelerating deterioration of the human environment and natural resources and the consequences of that deterioration for economic and social development*.'[39] The Brundtland Report placed environmental issues firmly on the political agenda for the first time, encouraging multilateralism and emphasising the interdependence of nations in the quest for achieving sustainable development.

Rio Earth Summit 1992

The Earth Summit in Rio de Janeiro in 1992 was a United Nations Conference, the first of its kind to address environmental issues and development together. Governments from 172 countries throughout the world were represented, with major themes of the two-week conference being production, transportation, climate change and the scarcity of water. During the event, participants voted to adopt Agenda 21 – a programme run by the United Nations to promote sustainable development and environmental protection at national and local levels across the world. The Rio Earth Summit in 1992 was a critical point in the environmental agenda, re-shaping the way that governments thought about development through open discussion, re-consideration of the issues and reaching a global agreement about future priorities. The key themes of the Summit were production, transportation, climate change and the scarcity of water, and these were expanded in subsequent reviews by the UN (Rio+5) and a ten-year review at the Johannesburg Summit in 2002, a 10-year follow-up and refresh of the original conference.

Kyoto Protocol 1997

The Kyoto Protocol, an international environmental treaty to achieve the '*stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system'* [40] was signed in December 1997 and has 183 signatories (including 178 countries/states) to date. This legally binding commitment called for reduction of six of the most dangerous greenhouse gases and a collective reduction by industrialised nations of 5.2% of their greenhouse gas emissions at 1990 levels.

Discussion of carbon emissions and climate change has been ongoing since Kyoto, including at the annual UN Climate Change Conference and G8 Summit. Ten years on, the Washington Declaration was signed in February 2007 by Canada, France, Germany, Italy, Japan, Russia, United Kingdom, United States, Brazil, China, India, Mexico and South Africa, agreeing to a global emissions trading system that would apply to both industrialised nations and developing countries, intended from 2009.

The EU Emissions Trading Scheme

To reduce the amount of carbon emissions being ejected into the atmosphere by industry, transport and households, a global carbon market has been developed based on the principles of limiting carbon emissions to acceptable levels and establishing an emissions trading system. This has been functional since the late 1990s, with two primary systems operating within this market:

- compliance markets based on emission reduction developed from the Kyoto Protocol and incorporated in sub-national, national and international policy;
- smaller, but growing voluntary markets, driven by demand of environmentally aware Western markets to purchase offsets.

[39] Report of the WCED to the UN General Assembly, 1987, p.1
[40] Article 2 of the Convention

The largest multi-national emissions trading scheme in the world is the European Union Emissions Trading Scheme (EU ETS). Defined by Defra '*the EU Emissions Trading Scheme is a Europe wide scheme which aims to reduce emissions of carbon dioxide and combat the serious threat of climate change. EU ETS puts a price on carbon that businesses use and creates a market for carbon. It has been in place since 2005 and is the first scheme of its kind in the world.'* [41] The EU ETS is divided into phases for which EU Member States must develop a National Allocation Plan (NAP), a defined carbon account that fulfils the criteria set out in the Emission Trading Directive and must be approved by the European Commission.

As a pioneer of the EU ETS and leader in the developing market of emissions trading, the UK is about to enter into Phase II of its approved National Allocation Plan, covering the period of 2008-12. Phase II lays outs the quantity of carbon allowances for this period, where reductions will come from (principally the Large Electricity Producers), and how much the UK intends to auction over this period (7% of allowances).

Nottingham Declaration 2000

In the UK, the Nottingham Declaration was launched in October 2000 as a public commitment by Council Leaders and Chief Executives to tackle the causes and effects of climate change. Signed by 270 councils in England (together with all Scottish and Welsh councils signing their own versions), the Declaration is a contract to acknowledge the threats of climate change, welcome the challenge of overcoming this, and actively work at local level and in partnership to meet targets and maximise the potential benefits to the community.

Stern Review 2006

The Stern Review of the Economics of Climate Change was released in 2006, and was the first substantial appraisal of the potential effects of climate change and global warming on the global economy. Going a step further than purely environment focused reports, the review described climate change as *'the greatest market failure the world has ever seen*).' Within this most significant and widely discussed report on climate change, Stern argued that by investing 1% of global GDP into averting further damage to the environment, we will save potential losses of 20% of global GDP that will occur if we do nothing. Amongst prescribed actions, Stern advocates the use of environmental taxes as tools to reduce carbon emissions and polluting.

Climate Change Bill 2007

In response to the Stern Review, and progression of the environmental lobby into mainstream policy and national consciousness, the Climate Change Bill 2007 was published as a government blueprint for tackling climate change and modifying the UK into a low carbon economy. The key points of the bill include:

- a series of clear targets for reducing carbon dioxide emissions, including making the UK's targets for a 60% reduction by 2050 and a 26-32% reduction by 2020 legally binding;
- a new system of legally binding five-year 'carbon budgets', set at least 15 years ahead, to provide clarity on the UK's pathway towards its key targets and increase the certainty that businesses and individuals need to invest in low carbon technologies;
- a new statutory body, the Committee on Climate Change, to provide independent expert advice and guidance to the Government on achieving its targets and staying within its carbon budgets;
- new powers to enable the Government to more easily implement policies to cut emissions;
- a new system of annual open and transparent reporting to Parliament. The Committee on Climate Change will provide an independent progress report to which the Government must respond. This will ensure the Government is held to account every year on its progress towards each five year carbon budget and the 2020 and 2050 targets;
- a requirement for the Government to report at least every five years on current and predicted impacts of climate change and on its proposals and policy for adapting to climate change.

[41] www.defra.gov.uk

Energy White Paper 2007

The Energy White Paper 'Meeting the energy challenge' was published in May 2007, proposing a path forward for implementing the measures of the Energy Review Report of 2006 and the Budget for 2007. This sets out the Government's response to international and domestic energy challenges, most significantly climate change and the need to ensure the UK has a secure, clean and affordable energy supply in the future. The paper aims to deliver four energy policy goals:

- to put ourselves on a path to cutting CO_2 emissions by some 60% by about 2050, with real progress by 2020;
- to maintain the reliability of energy supplies;
- to promote competitive markets in the UK and beyond;
- to ensure that every home is adequately and affordably heated.

Some of the measures proposed in the White Paper require further consultation, such as those regarding nuclear power and renewables.

Green jobs: Towards work in a sustainable, low carbon world

The United Nations Environment Programme (UNEP) commissioned and funded a joint report by themselves, the International Labour Organisation (ILO), the International Organisation of Employers (IOE) and the International Trade Union Confederation (ITUC) into green jobs and their role and future in the global economy. Published in September 2008, this is the *'first comprehensive report on the emergence of the green economy and impact on the world of work in the 21st century*).' The report makes the following key points of relevance to the skills agenda:

- new skills will need to be developed in a wide range of sectors and industries. The report covers in depth the quantitative and qualitative change to employment in the sectors with the most scope for fostering more and better green jobs, energy supply alternatives, building, transportation, basic industry (e.g. metals, paper, cement), food and agriculture, and forestry;
- the necessity of adequate training programmes for the new green workforce is clear – there are reported skills gaps in some countries that make them currently unable to meet the needs of burgeoning green industries (e.g. the Confederation of British Industry (CBI) reports that green industries have lacked to date technical specialists, designers, engineers and electricians). There is also a reported management challenge in this field, as managers need new perspectives, awareness and managerial capacity to learn new skills and get the most out of their workers;
- provision of vocational training will be '*essential to ensure that competent people are available to manufacture, install and maintain renewable energy systems*.' Austria, India and Germany are named as examples that are leading the way on training in the renewables sector, and Germany has in fact created 1m green jobs to date;
- trade unions, employer organisations, private businesses and the UN will all need to be involved in retooling and retraining the global workforce to master green production and consumption, supporting workers to maximise these opportunities is central to this;
- energy efficient equipment often requires more skills and training to operate than energy inefficient alternatives, hence the skills levels and pay of workers will increase as we utilise more green technologies;
- as we shift towards a less throw-away society, and consumables become longer lasting and more durable, less employment will be available in production and assembly. Instead, there will be growth of jobs in repairs, maintenance, upgrading and recycling. Also, the jobs that are still available in production and assembly are likely to be more intensive and skilled, hence increasing the status and pay of these jobs;

- for the retail sector, the shift towards a greener economy is likely to include a greater emphasis on quality retail, both in terms of the durability of goods and the services provided to the customer. The focus on increasing customers' utility and satisfaction will include provision of advice regarding the quality, upkeep and maximising use of goods, which will increase the skill and pay levels of retail staff, providing them with more education and training (but ultimately reducing the number of jobs available as less is being consumed).

The general view of the UNEP and its partners in this report is that the challenges of climate change and carbon emission targets will lead to employment patterns shifting towards favouring greener, cleaner and more sustainable occupations. This will mean that not only will investment flows alter to create or reduce jobs in different sectors, but also *'environmental awareness and applied green literacy will become increasingly important in many professions'* as green attitudes rather than brand new green jobs will be generated. The report centres on the belief that more decent jobs can be created within a green economy and hence must be a primary focus as we try to overcome environmental challenges.

Building a low carbon economy: Unlocking innovation and skills

With a determination for Britain to sit at the forefront of environmental industries by harnessing talent and innovation, the Government has pledged to take the following measures:

- there will be considerable investment in universities, building our science base, supporting young people in education and vocational training up to 18 years of age, expanding the Apprenticeship Programme, and supporting adult education and training in these fields. Central to this are the National Skills Academies, including the NSA for environmental industries, as employer-led academies to develop specialised skills for working in their sectors. Also, the UK Commission on Employment and Skills will ensure that the skill needs of sustainable, low carbon economies are met;

- entrepreneurial cultures will be fostered to exploit environmental business opportunities, including a National Enterprise Academy, announced in March 2008 as a joint venture between the Government and entrepreneur, Peter Jones;

- training is being developed for procurement professionals with responsibility for handling global supply chains, as sustainable procurement and management of environmental impact are growing in importance. This will include incorporating sustainability and corporate social responsibility into the skills framework for the Government Procurement Service;

- innovation will be encouraged in public services, with the public sector leading the way in green thinking and acting. Sustainability is to become a key strategic theme in civil service professional skills development, training public officials in environmental awareness and capability building. Also, the National School of Government are to roll out new and innovative green learning products focusing on handling the transition to a low carbon economy.

APPENDIX 2

Bibliography

DEVELOPING NEW SKILLS TO ADDRESS THE CHALLENGE OF CLIMATE CHANGE
APPENDIX 2: BIBLIOGRAPHY

ASC (2007) *Mind the Skills Gap: The skills we need for sustainable communities* (ASC: London)

BERR (2009) *Low Carbon Industrial Strategy: A vision* (HMSO: London)

BERR & DIUS (2008) *Manufacturing: New challenges, new opportunities* (BERR: London)

CLG (2004) *Egan Review: Skills for Sustainable Communities* (CLG: London)

Defra (2007) *EU Emissions Trading Scheme: Approved Phase II National Allocation Plan 2008-2012* (Defra: London)

Defra & BERR (2008) *Building a low carbon economy: Unlocking innovation and skills* (Defra: London)

DIUS (2007) *World class skills: Implementing the Leitch review of skills in England* (DIUS: London)

DTI (2007) *Meeting the Energy Challenge: A White Paper on Energy* (DTI: London)

HM Treasury (2006) *Leitch Review of Skills* (HMSO: London)

HM Treasury (2006) *The Stern Review on the Economics of Climate Change* (HMSO: London)

Local Government Association (2009) *Creating green jobs: Developing local low-carbon economies* (LGA: London)

London Development Agency & London Energy Partnership (2007) *Skills for a Low Carbon London* (LEP: London)

new economics foundation (2008) *A Green New Deal* (nef: London)

Office of Public Sector Information (2008) *Climate change Act* (HMSO: London)

O'Riordan, T. (no date cited) *Climate Change and Business Response: CSERGE Working Paper GEC 2000-24* (CSERGE, TXU Europe) Accessed at: http://www.uea.ac.uk/env/cserge/pub/wp/gec/gec_2000_24.pdf

Pinderhughes, R. (2007) *Green Collar Jobs – an analysis of the capacity of green businesses to provide high quality jobs for men and women with barriers to employment* (not cited) Accessed at: http://bss.sfsu.edu/raquelrp/documents/v13FullReport.pdf

RIBA (no date cited) *Skills for Low Carbon Buildings* (RIBA: London)

The Commission for Economic Development, Employment and Skills & Deloitte (2008) *'Mini-Stern' for Manchester* (Deloitte: London)

UK Green Building Council (2009) *Making the case for a Code for Sustainable Buildings* (UKGBC: London)

UNEP / ILO / IOE / ITUC (2008) *Green jobs: Towards work in a sustainable, low carbon world* (Worldwatch Institute: Washington D.C.)

United Nations (1998) *Kyoto Protocol to the United Nations Framework Convention on Climate Change* (UN)

United Nations (1987) *Report of the World Commission on Environment and Development* (UN)

United Nations' Brundtland Commission (1987) *Our common future* (UN)