

# Meeting the Low Carbon Skills Challenge – a Government response

December 2010

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# Executive Summary

## Overview

The “Meeting the low carbon skills challenge” consultation was launched on 31 March 2010. It set out the Government’s views on the key skills-related priorities and challenges to be met to:

- Enable British workers and businesses to take advantage of the opportunities in the sectors key to reducing carbon emissions;
- Embed the necessary skills across all sectors to move the UK to a low carbon and resource efficient economy.

We would like to thank all those who responded to the consultation. All the views expressed have been considered carefully, helping to inform current skills policy and will be taken into account in all future work on skills and low carbon and resource efficiency policies where skills are a factor.

## Summary of responses

1. The keys themes raised by consultees include:

- The need for a more flexible and responsive skills delivery system which better reflects current and future business needs. However, it is also noted that new low carbon businesses can be poor at articulating their skills needs, and that we will need to find better ways to inform and stimulate demand if we are to have the skilled workforce we need in the numbers required;
- The need for more flexible qualifications which support work-based learning. It is clear that many see continuous career development as key to a more flexible and productive workforce, particularly where new combinations of skills are needed. Businesses and employees must understand that skills development is a continuous process, requiring co-investment; and
- The need for more support and promotion of STEM skills to improve the STEM skills pipeline, and so that the UK workforce has a greater basic understanding of sciences and mathematics on which to build.

- Insufficient recognition across the supply chain of the need for low carbon or resource efficiency skills, meaning that there was likely to be a case for government intervention.

## Summary of Government response

2. There are huge opportunities for the UK moving towards a low carbon, resource efficient economy. In 2008/09 the global market for low carbon goods and services was worth £3.2 trillion – a £150 billion increase from 2007/08 estimates<sup>1</sup>. This is forecast to grow by approximately 4% per year over the next 5 years.
3. The UK's market share rose to £112 billion in 2008/09 – an annual increase of 4.3% on revised figures for 2007/08. The UK low carbon and environmental goods and services sector is the 6<sup>th</sup> largest market in the world<sup>2</sup>. There are approximately 910,000 people currently employed in this UK sector and this is projected to increase to over a million by the middle of the decade<sup>3</sup>. In addition, new initiatives like the Green Deal – which will open up the market and boost energy efficiency in the UK's homes and businesses – is estimated to require over 250,000 skilled tradespeople by 2030 to deliver our objectives. New nuclear power stations will attract billions of pounds of inward investment into the UK and boost British companies in the supply chain. Up to 30,000 new jobs could be created in and around new build sites and across the country.
4. If we are to maintain this lead and drive further ahead we must ensure that we have the skills base to achieve this. A skilled workforce is essential if we are to meet our carbon targets and realise the significant economic opportunities of the transition to a low carbon and resource efficient world.
5. For businesses to succeed in this green economy they will need people with the technical and managerial and leadership skills to develop and exploit both existing and new markets. A green economy involves maximising economic growth within carbon and environmental constraints; transforming the economy, by decoupling growth from carbon emissions, resource use and wider environmental impacts; and supporting the growth of the UK low carbon and environmental goods and services sector for domestic and export markets.
6. We need to equip people and businesses to return the economy to sustainable growth, increasing employment, raising incomes and supporting an improved

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<sup>1</sup> Innovas (2010) Low Carbon and Environmental Goods and Services: an industry analysis - Update for 2008/09

<sup>2</sup> Innovas (2010) Low Carbon and Environmental Goods and Services: an industry analysis - Update for 2008/09

<sup>3</sup> Innovas (2010) Low Carbon and Environmental Goods and Services: an industry analysis - Update for 2008/09

quality of life. At the same time the necessary transition to a low carbon and resource efficient world offers significant economic opportunities that we must be ready to grasp.

7. We know more needs to be done more quickly in key sectors, and across the economy, if we are fully to realise the economic benefits, understand the social impacts, and achieve a successful transition for all.
8. Many of the skills needed to make the transition to a green economy will not be new. For example, we already know that Science, Technology, Engineering and Mathematics (STEM) skills will be needed at all levels, in key energy and advanced manufacturing sectors and more widely across the economy, to lower carbon emissions and make better use of resources. However, there will be sectors in which completely new skills are needed, some in new combinations, and for which new qualifications will need to be developed.
9. Our skills system needs to be able to respond rapidly and flexibly to these demands. Action will need to be taken, not just by our schools, colleges and universities, but by our industry-led skills partners and most importantly by individuals and by businesses.
10. Even in a decarbonised and resource efficient economy, we will need to continue to adapt to a changing climate, and embed the knowledge and skills to do so across the economy. The need for adaptation will provide opportunities for businesses, both in terms of providing solutions and services in the UK and in exporting their expertise abroad.
11. We need young people and existing employees to be aware of and take an interest in the career opportunities emerging from the transition to a green economy, and provide clear pathways into those careers
12. *Skills for Sustainable Growth* published on 16 November sets out the Government's strategy for radical reform of the skills system, founded on the Coalition principles of fairness, responsibility, and freedom. It sets out how we will build a skills system where responsibility for quality and investment is shared between Government, employers and learners; where those using the system are in the driving seat and can select training and qualifications that are designed and valued by business, prepare them for worthwhile careers, and provide a foundation for further learning.
13. Apprenticeships are at the heart of the system that we will build, and we will expand the number of adult Apprenticeships by up to 75,000 by 2014-15, as well as reshaping the programme so that technician level – Level 3 – becomes the level to which learners and employers aspire. Alongside Apprenticeships there will be a wider and more flexible system of vocational qualifications that meet the needs of the economy. The Qualifications and Credit Framework will allow individuals and employers to access units of training that meet their specific needs. Sector Skills Councils will act for businesses in regularly updating national occupational standards, and we will expect qualification awarding bodies to take

these standards into account as they update and introduce their vocational qualifications.

14. We will also support employers to act together to tackle the skills issues that might otherwise hinder the growth of their sectors. We will work with groups of employers to explore how new professional standards can drive competitiveness in their industry, and establish a new Growth and Innovation Fund to support employers to be more ambitious about raising skills in their sectors and promote better development and deployment of workplace knowledge and skills. This may include co-funding training programmes in new or rapidly changing parts of the economy, for example to meet skills needs arising from the transition to a low-carbon economy.

# Introduction

## Background

1. The “Meeting the low carbon skills challenge” consultation was launched on 31 March 2010. It set out the Government’s views on the key skills-related priorities and challenges to be met to:
  - a. Enable British workers and businesses to take advantage of the opportunities in the sectors key to reducing carbon emissions;
  - b. Embed the necessary skills across all sectors to move the UK to a low carbon and resource efficient economy.
2. The consultation invited views on the priorities, challenges and gaps identified; on how businesses can best be incentivised and encouraged to respond so that they have the skills they need at all levels; and on how the education and skills system can respond so that it is strongly focussed on the needs articulated by businesses.
3. The consultation examined the challenges for a green economy from a number of perspectives. It laid out the overall assumptions about the challenges facing the whole skills delivery framework and sought views on how this could be improved to meet the needs of a low carbon economy. The document then went on to examine skills demand and supply in three key sectors in more detail: power, construction and transport.
4. Beyond these three key sectors, this consultation reviewed the skills needed to decarbonise our entire manufacturing and process industry supply chains and to achieve more efficient use of resources. It set out the opportunities for growth and carbon savings in the food and advanced manufacturing sectors and the skills needed there. A wide range of cross-cutting skills needs were identified, many of which will combine traditional professional disciplines with emerging industrial applications, such as composites. STEM skills will be pivotal, as will some specialist skills.

## Consultation Process

5. The consultation ran for twelve weeks commencing on 31<sup>st</sup> March 2010 and ending on 23<sup>rd</sup> June 2010. The consultation document was sent to key stakeholders such as skills providers, regional development agencies and leading companies and trade organisations. It was also placed on DECC’s website (with links from the Defra, DfT, CLG and BIS websites). DECC is grateful to everyone

who responded. All the views expressed have been considered carefully and will be taken into account in all future work on skills and low carbon and resource efficiency policies where skills are a factor.

6. A total of 114 responses were received to the consultation with the majority of responses being from training providers, Sector Skills Councils and those with an interest in the skills delivery framework (businesses, unions, green groups). There were also responses from professional organisations, trade associations and private individuals. The number of responses to each of the specific questions set out in the consultation are summarised in Annex B.
7. A wide range of views were expressed in response to the consultation. A summary of the responses for each of the specific questions in the consultation together with the Government's responses are set out below from page 9 onwards.

# Responses to specific questions

## Skills across the economy and for key sectors

1. This section of the consultation set out some key overarching challenges that the UK will face as it moves towards a low carbon, resource efficient economy. It sought views on how such a transition would impact our current skills delivery framework and where the key pressure points would be.
2. It also posed the following 6 specific questions to consultees:

Consultation Question	
1.	<b>What more can employers, schools and Government do to promote the take up of STEM subjects by young people, and encourage them to consider careers in low carbon sectors?</b>
Consultation Question	
2.	<b>What more can universities, working with businesses, do to help stimulate demand for the high level STEM skills required in the low carbon economy?</b>
Consultation Question	
3.	<b>How can more colleges and universities be encouraged to respond to the need for specialist skills in emerging low carbon sectors?</b>
Consultation Question	
4.	<b>Is our overall analysis of the skills challenges, as outlined in this document, correct?</b>
Consultation Question	
5.	<b>What are the best ways to replicate the examples of good practice provided throughout this document quickly and effectively?</b>
Consultation Question	
6.	<b>Is stimulating innovation in skills development and delivery the best way forward?</b>

## Summary of responses to Questions 1 to 6

3. Many respondents agreed that the consultation provided a good analysis of the technical skills challenge, however some found that it was too narrowly focussed. These respondents felt that it was a mistake to assume that a low carbon economy would require a fundamentally different skill set. Many argued that it would make more sense to develop and combine existing skill sets into using greener / low carbon practices as they emerge.
4. Many respondents also felt that STEM knowledge and skills at all levels are becoming an increasingly important foundation for acquiring the technical skills that will be needed if people are to prosper in a low carbon economy. However some felt that the STEM analysis in the consultation document was too narrow, and that there was an over reliance on traditional knowledge-based STEM programmes. They suggested that in future new types of STEM programme will be required to develop skills and capabilities in commercialising innovation.

## Government response to Questions 1 to 6

5. We recognise that skills are an important driver of economic growth, raising productivity and enhancing individuals' employment and life chances. Skills give individuals wider options; they climb higher, earn more and get more out of work and skilled people are the foundation of successful businesses. We have achieved much since the Leitch Review of Skills such as improving the basic skills of almost 6 million people and expanding apprenticeships and we are committed to the Leitch ambition of developing a world class skills base.
6. But we now need to go further to ensure continued and sustained economic recovery. The skills system must ensure wider and more flexible access to skills training at every level, but particularly higher level skills. It must focus more on the skills needed for the modern world of work; establish a capable workforce to ensure prosperity; and empower learners to get the skills and confidence they need to enter work and progress in their careers.
7. Government recognises the importance of skills as a driver in creating a low carbon, resource efficient economy. As a consequence this consultation response on the skills aspect of the low carbon economy should be seen in the context of the wider Government reforms to the skills and education systems to drive growth, as set out in *Skills for Sustainable Growth*.
8. *Skills for Sustainable Growth*, sets out the Government's strategy for radical reform of the skills system, founded on the Coalition principles of fairness, responsibility, and freedom. It sets out how we will build a skills system where responsibility for quality and investment is shared between Government, employers and learners; where those using the system are in the driving seat and can select training and qualifications that are designed and valued by business, prepare them for worthwhile careers, and provide a foundation for further learning.

9. The strategy recognises that the supply side needs to respond to learners' demands quickly and flexibly. Central targets will be abolished so that providers will be able to supply the type and volume of training that is needed in their local area, with increasing flexibility to respond to local needs and the demands for quality of learners and employers.
10. In December 2010 the Coalition Government announced its proposals for a more sustainable funding system for higher education which will build on the UK's existing high reputation and safeguard participation. In early New Year we will publish a White paper which will set out a wider programme of reforms for the higher education sector.
11. For the UK to remain at the forefront of scientific discovery and to secure its future in a highly competitive global economy, we need to ensure the next generation of scientists and engineers are properly equipped through opportunities in education, research, commerce and government.
12. Government recognises that STEM knowledge and skills at all levels are becoming an increasingly important foundation for acquiring the technical skills that will be needed if people are to prosper in a low carbon economy. The reforms we are putting in place should ensure that Universities and colleges are better placed to develop skills links with employers and tailor their training courses to the emerging needs of businesses.
13. A number of initiatives are in place to attract more young people to STEM including STEMNET and the STEM Ambassadors, the Big Bang Fair, and the National Science and Engineering Competition. BIS also works with the Department for Education to ensure Government policies to attract students to STEM subjects throughout their educational careers are coherent and consider the needs of both students and future employers.

## Decarbonising Power

1. The consultation document laid out the key challenges in the power sector as the aging of the current workforce, the need for significant new build and new and updated skills for new technologies.
2. Our initial analysis suggested there would be movements towards fewer jobs in the high carbon industries, and towards more jobs in the renewable energy industries. For example, technologies such as wave and tidal are forecast to grow by 4-5% per annum to 2015.
3. Decarbonising the power industry will require a major cross-sector effort to meet escalating demand for skills. The industry will need to recruit apprentices and graduates in large numbers, particularly those with STEM skills.
4. This section posed 4 specific questions to consultees.

Consultation Question	
7.	<b>How should employers and Government plan for the future re-deployment of skilled workers from high carbon industries to low carbon industries, and ensure a just transition?</b>
Consultation Question	
8.	<b>For the power sector skills we have identified, what is the best way to accelerate skills development beyond what is planned?</b>
Consultation Question	
9.	<b>What more can be done, both within the power industry, and through Government energy policy, to promote energy-related careers to young people?</b>
Consultation Question	
10.	<b>How can we stimulate the demand for the skills required to meet the CCS market opportunity, including a range of skills; from advanced R&amp;D skills, to crafts and technical skills?</b>

### Summary of responses to Questions 7 to 10

5. Most respondents were in general agreement with the views set out in the consultation. Many responses focused on the risk employers faced in training new workers. With long lead times through training to competence in the workplace, typically 2-5 years, decisions and commitment need to be made at

an early stage to ensure a supply of future skills. However confidence in the timing of demand for these skills is too low to justify investment. Many respondents said that much more certainty is necessary about the size and timing of future investment programmes.

6. A major theme in the responses was the age profile of the energy workforce. In the power sector, over 80% are set to leave the industry by 2024. Ensuring the replacement of this workforce is, itself, a major challenge. This will require a big step up in recruitment and a near doubling of training capacity. On top of this, at least 12,000 more workers need to be trained for the power sector by 2020 for network investment, renewable generation and smart meters.
7. Several respondents commented that due to the age profile across the whole of the carbon-based energy sector, with the consequent high level of loss to retirement, these industries would not be able to release workers in large numbers. On the other hand, some thought that these industries would be recruiting and, therefore, competing with the low-carbon sector. Recent data from workforce planning by the Engineering Construction Industry Training Board (ECITB) and Sector Skills Councils (SSCs), made available to DECC since the consultation, supported this view, indicating that any fall in employment in fossil fuel power generation, for example, would be a small fraction of the number of new workers required by the wind power industry.
8. This meant that re-deployment from high-carbon to low-carbon within the energy sector would be unlikely to satisfy the demand for skills. Nor could these skills needs be met in full by recruiting apprentices and graduate trainees, as the lead time to competence was too long and the underlying capacity to train was too small. Many respondents thought there would be a high reliance on recruiting and re-training skilled workers from industries outside the energy sector, where these were being released
9. Nevertheless there was strong support for the further promotion of apprenticeships. It was also suggested that these should be centred in bespoke centres and that taster days for school students would provide an effective means of building awareness of the career opportunities and promoting energy jobs.
10. Some commented that microgeneration was not covered adequately in the consultation document. In this area, a programme of house retro-fit would develop the maximum number of job opportunities.
11. The nuclear industry was also faced with an aging workforce, with the majority in the 50+ bracket, and it needed to ensure knowledge transfer in difficult circumstances. Respondents thought that there was a need to promote the sector to a new generation of young people, and rapidly increase apprenticeships across the sector. There was a need for a flexible workforce with transferable skills. Respondents thought that the proposed Nuclear Skills Passport - a record of an individual's nationally recognised skills, training and education - would both improve efficiency and create wider opportunities for workers to develop their skills.

12. Some respondents, notably trade unions, were concerned that the switch to low-carbon energy could disadvantage existing workers. There was particular concern that some high-carbon industries would disappear, leaving their workers unemployed. On the other hand, many respondents believed that the scope and opportunity for employment in the energy sector is climbing towards an all-time high and that those with skills were unlikely to be disadvantaged by the change to low-carbon energy. Some, however, commented that old and new jobs were unlikely to be co-located and that support to help workers re-locate might be necessary.
13. Some concern was expressed that emerging sectors, such as renewable energy, might not be able to compete on wages with the established big industries, such as generation and oil & gas. Concern was also expressed that the training system needed to respond quickly and flexibly to facilitate workers to move from high- to low-carbon sectors.
14. Specifically for carbon capture and storage, respondents commented that the skills were not new and could be found in the chemicals, oil & gas, process design and engineering construction industries, in all of which the UK had existing strengths. The extent to which these industries could divert resource to carbon capture and storage (CCS) would depend on how much competing demand there was at the time.
15. Stimulating demand for skills for CCS posed the same challenges around STEM skills that were described elsewhere in this document. In the long term, skilled workers would be needed to operate power plant with CCS. Operators of today's power plant were not experienced with chemical processes, nor with operating complex systems with multiple unit processes in sequence. However the industry would be able to build on the chemical process training and qualifications being developed by the National Skills Academy for the Process Industries.

### **Government response to Questions 7 to 10**

16. Government recognises that the market has not been working effectively in two ways. Firstly, the ageing of the energy workforce was not signalled or recognised early enough for employers to take action in time to engineer a smooth transition to a balanced age profile. Those employers who did see a looming problem were unable to take early action because their competitors did not. This led to an over-reliance on the labour market and an ageing skills base to supply skilled workers. Secondly, the market is not creating sufficient confidence in the future demand for skills, especially for the emerging sectors, to allow employers to invest in skills today. Given the lead time to train workers, this runs the risk of delay to future investment. Collective strategic purchasing of skills training – where a range of employers brigade their demand – may provide stronger market signals encouraging providers to respond.
17. There was, as might be expected, a high level of demand for more Government funding, especially to support apprentice training and re-skilling for career

change. But there was also a strong plea for the skills system to be made more flexible and responsive, so that it supports what the industry needs to do. The bureaucracy surrounding the skills system was heavily criticised, especially for being hard to approach, slow to respond and rigid in its approach. The restriction of funding to courses giving whole qualifications was criticised as being unhelpful in a sector where add-on training will provide a large proportion of the new skills. To some extent these criticisms were extended across the UK, although there were also instances of greater flexibility in the Devolved Nations.

18. While in the current financial situation significant extra funding is unlikely, many of the other criticisms have been accepted by Government. As discussed above, the Government has now published its new skills strategy, which includes support for expanding apprenticeships and reform to ensure that the skills system responds to learners' demands quickly and flexibly. DECC recognises that market certainty is critical for investment in skills and plant and is addressing this in the delivery plans under development for renewables, carbon capture and nuclear.
19. To improve the energy efficiency of the housing stock, the Government will introduce legislation for the *Green Deal*, by which companies will be able to insulate homes and be paid back from the savings on energy bills. This is expected to employ 100,000 skilled and unskilled workers in 2015 and 250,000 jobs at the peak.
20. For carbon capture and storage, the Government policy is to incentivise four full-scale demonstration projects to prove the technology. This will enable the UK workforce to gain experience of designing, constructing and operating these plants, creating expertise to support the wider introduction of CCS, both here and overseas.
21. Finally, the Government is also aware of energy industry concerns around the recent Home Office announcement that a cap would be placed on economic migration from outside the EEA. The limit aims to be sensitive to these concerns by implementing a new more selective approach; one which brings in more of the brightest and the best who will make a real difference to our economy - such as engineers - while at the same time reducing the overall number of people coming to Britain through the economic routes.

What has been done so far

22. There has been growing awareness of the skills situation in the energy sector over the last few years. In fact the nuclear sector began to analyse its skills situation as early as 2002. More recently, research by the Sector Skills organisations and growing knowledge of future capital investment by the power industry have led to detailed analyses which are under-pinning their developing skills strategy. Employers in collaboration with the SSCs have taken a strong lead and, with support from DECC and BIS, have, in recent years, launched the following initiatives:

- **National Skills Academies** have been set up for **Construction, Manufacturing, Nuclear, the Process Industries** and **Power**.
- An industry-owned **academy** for the **offshore oil and gas sector (called OPITO)** was launched in the spring of 2008.
- The electricity sector, led by EU Skills' **Power Sector Skills Strategy Group (PSSSG)** has developed an industry-wide strategy for ensuring that the necessary skilled workers are trained.
- EU Skills, working with the ECITB and 7 other SSCs have reviewed **skills and training for renewable energy**. This has mapped occupational standards, qualifications and training and has identified priorities for action.
- The wind energy industry, led by RenewableUK (formerly BWEA), is developing a **skills and training strategy for wind and marine renewables**. The first apprentices started turbine technician courses this year.
- A **National Skills Academy for Environmental Technologies** will be launched in early 2011, subject to approval of its business plan by the Skills Funding Agency.

## Decarbonising Buildings and Construction

1. This section of the consultation sought to set out some of the key challenges and issues in the buildings and construction sector.
2. To meet our legally binding Carbon Budgets the UK will need to cut emissions from homes by 29% on 2008 levels by 2020, and from workplaces by 13%. The Coalition's new Green Deal will also set new challenges for the construction and property services sector and could create around 250,000 jobs by 2030
3. Decarbonising buildings and construction will create strong demand for skills to adapt existing housing stock, for renewable building methods and for the construction of zero carbon homes, non-domestic buildings and infrastructure. The required skills will include those at graduate level to develop, manufacture and implement new technologies, and to enhance existing practical construction skills for installing new adaptation and mitigation technologies. The skills system is starting to address this, for example through updating National Occupational Standards. The challenge is to understand whether good models from other industries or countries can be applied to low carbon construction.
4. This section posed 5 specific questions to consultees. Summaries of the responses to the individual questions (11 to 15) together with the Government's responses are set out below.

### Summary of responses to Question 11: Can the Zero Carbon Hub approach be used as a model for identifying skills needs, and stimulating demand for those skills, across the construction sector?

5. Overall, most respondents agreed that the Zero Carbon Hub model is appropriate for identifying skills needs and stimulating demand for those skills. Some respondents felt that the model should go further in reflecting the broad diversity of the industry if sufficient resources were available.

### Government response to Question 11

6. The Zero Carbon Hub is an industry-led delivery body which receives some funding from the Department for Communities and Local Government (DCLG) and is working with DCLG on the development of zero carbon homes policy. DCLG will ensure that the Hub is aware of the outcome of this consultation so that it can take it into account in its on-going work to resolve the practical barriers to the delivery of low and zero carbon homes between now and 2016. However, it is for the Hub to determine its work programme in light of its priorities and budget.
7. On 2 November, the Hub, working with the National House Builders Council and Construction Skills, published a joint report - *Home Building Skills 2020* - which

looks at the future of house building and calls for an urgent up-skilling by the industry to deal with a decade of change<sup>4</sup>.

### **Summary of responses to Question 12: What more could Government do to deliver low carbon and resource efficient skills in all parts of the construction industry?**

8. Respondents offered a range of suggestions for how low carbon and resource efficient skills could be delivered in all parts of the construction industry. These included developing a culture of quality controlled continuous improvement, better collaboration between the industry and training providers, and incentivising low carbon business practices.

### **Government response to Question 12**

9. Government will consult the Zero Carbon Hub, the Sector Skills Councils, industry partners and others in order to build on the work of the Hub so that its approach can be replicated successfully across construction. The Government is also looking at all policy areas relevant to the delivery of low carbon and resource efficient construction.

### **Summary of responses to Question 13: What more should Government and industry do to ensure that those retrofitting existing buildings have the necessary skills?**

10. Common themes addressed by respondents included the need for employers to be incentivised; the need for demand to be stimulated; the need for promotion of continuous professional development (CPD); and a need for accreditation and qualification standards.
11. A recurring theme throughout the responses was the need for accreditation on retrofitting and that accreditation should be agreed by industry and provide national standards. Such a move would professionalise the industry and retrofitting was generally seen as essential.
12. Some respondents considered that the fundamental skills needed for retrofit already existed and all that was required was additional knowledge and add-on skills in some specific areas such as the installation of photovoltaic (PV) panels or solid wall insulation. Others thought there was a need for an accredited training programme, along the lines of the Construction Skills Certification Scheme (CSCS).

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<sup>4</sup> *Home Building Skills 2020 – report and recommendations* is available at: [www.homebuilding-skills.com](http://www.homebuilding-skills.com).

13. Another recurring theme was that adoption of the zero carbon homes model, in conjunction with the relevant Sector Skills Councils, would greatly aid carbon reductions.
14. One respondent asserted that the current energy supplier obligation scheme – the Carbon Emission Reduction Target (CERT) had created uncertainties for employers - leading to peaks and troughs in the industry, making it very difficult for employers to retain and invest in training for staff.

### Government response to Question 13

15. On 29 November, the Government's Chief Construction Adviser – Paul Morrell – published the final report of a low carbon construction Innovation and Growth Team (IGT). The IGT was formed in 2009 to examine the potential for developing a low carbon construction sector. It comprised senior executives from the construction industry, architects, property owners and technology suppliers, as well as a cross-Whitehall group representing wider Governmental interests. The report recommended consideration of greater collaboration and integration within the landscape of skills provisions, and the Government's response to those recommendations will be made in the new year.
16. Government is looking to the industry for innovative solutions. A building can be retrofitted targeting one issue, which does not provide a 'whole solution' to tackle all the challenges. Retrofitting once may be a preferred option, tackling all the relevant issues at the same time e.g. water, energy and adaptation to climate change. Government and industry need to work together to identify the options to tackle these issues and the suitability of these for the individual property and area. Government needs to inform industry of the opportunities and industry needs to ensure the right skills are available or acquired to benefit from this. In addition to technical skills, those carrying out retrofit work might also need support to acquire skills in working with local people and bodies to determine the most appropriate methods of planning and delivering retrofit in particular communities.

#### Example: Green Deal Skills

**By breaking down many of the existing barriers to the uptake of energy efficiency retrofit in the domestic and commercial buildings, the Green Deal will create a significant rise in demand in the retrofit sector. It will be a requirement that those operating within the Green Deal have been certified. This will ensure (among other things) that they have the necessary competence to carry out that work to a high standard – including the provision of energy efficiency advice, and the installation of insulation measures. This means the skills industry must be poised to play a major part in providing the skills needed in the run up to the Green Deal launching in 2012 and beyond. Government will work with industry to ensure that the right training is available, and to help channel funding into the sector so that people are able to access the opportunities that the**

## Green Deal will create.

### Summary of responses to Question 14: What more could be done to improve awareness of low and zero carbon regulations along construction industry supply chains to enable them to take advantage of new low carbon markets?

17. Respondents offered a number of ideas including: working with energy suppliers, builders, merchants, retailers; property investment organisations; Chambers of Commerce; Zero Carbon Hub, Homes and Communities Agency, National Skills Academies. The positive benefit of tool box talks and local networking arrangements were also noted. The wider built environment industry needed to be involved, as clarity was needed for consumers on such things as competency. A concern noted by some respondents was a possible proliferation of accreditation schemes.

### Government response to Question 14

18. Government is one of the largest procurers for construction. It is vital that Government sets an example through being an intelligent client, part of which must include challenging perceptions of regulatory burden, and strengthening regulatory processes to make compliance simpler and cost-effective. Government also works with a lot of other industry representatives and can influence and inform their procurement decisions through ensuring specific low-carbon requirements are set in the procurement process all the way through the supply chain. It is however vital that the construction sector also inform their clients of low / zero carbon options and follow these through, not only as a clause in their document but taking responsibility for their contractors and sub-contractors actual delivery.

### Summary of responses to Question 15: How should we capture and respond to the key skills demand and supply issues in the eco-towns projects and share lessons learnt more widely?

19. Responses were received from a range of bodies including local authorities, colleges and educational bodies, private individuals, trade associations and a major utilities provider.
20. Most of the responses were broadly in favour of some form of monitoring and assessment of the development of eco-towns. A number of different approaches were suggested including the use of collaborative partnerships (e.g. existing private-sector, academic and public bodies). In addition it was suggested that a new body should be established for the purpose. Two respondents specifically cited the Construction Task Force created by Sir John Egan as a good example of an effective sector specific group which has been used as a model for eco-towns. It was also suggested that a University or independent academic

institution would be a suitably transparent means of capturing information about all aspects of the sustainability of eco-town developments.

21. Market forces were also suggested as potential drivers for the up-skilling of the sector, as Government regulation/building standards required more sustainable construction methods which in turn would provide commercial incentives for the development of skills in construction and the creation of training courses in specialist colleges.

### **Government response to Question 15**

22. The Government welcomes these responses and shares the view that there is a need to facilitate learning between local authorities and those involved with the development of eco-towns. DCLG has provided initial start-up funding to the Town & Country Planning Association (TCPA), to establish an Eco Development Group (EDG), which is led and for LAs taking forward eco-developments. This is enabling local authorities leading eco-towns to identify their priorities, share learning, both amongst themselves and more widely, and will include regular meetings, seminars and newsletters on a wide range of eco-development related subject areas.. DCLG has also been working with the Low Carbon Innovation Centre, part of the University of East Anglia and BioRegional to investigate the feasibility of a sustainability monitoring framework for application to eco-developments. Where there is a local enterprise partnership, it will be important for that partnership to engage actively with the networks of colleges, universities and other training organisations in the area to agree how best to meet the priority skills needs for an emerging eco-town.
23. The Government's priority is to see that where a local authority decides to take forward an eco-town that is well supported locally and will achieve genuine improvements in sustainability. The Government want to support communities in their wish to adopt higher standards of sustainability and design and enable them to decide what additional standards are appropriate. The Government also want to see eco-development and zero carbon homes at all levels – the street, the village and across the country.

## Decarbonising the Transport Sector

1. This section of the consultation sought to set out the challenges in decarbonising the transport sector. The building blocks of a strategy in decarbonising the sector are being laid, for example, through the promotion of ultra-low carbon vehicles, more fuel-efficient aircraft, carbon reduction in freight and logistics, and further electrification of the rail network.
2. Transition to ultra low carbon vehicles and the development of new fuel efficient aircraft will require the manufacturing and maintenance workforces to adapt their skill sets to the demands of changing technology. STEM graduates will again be in high demand. We need to understand better how the transport sector should work with the skills system to anticipate and respond to these demands and optimise the UK's share of these expanding domestic and world markets.
3. The section posed 4 specific questions to consultees. Summaries of the responses to the individual questions (16 to 20) together with the Government's responses are set out below.

### **Summary of responses to Question 16: What are the key technical disciplines involved in the transition to ultra-low carbon vehicles? How can we ensure the new skills required are met?**

4. Respondents highlighted a number of areas that will depend on new skill sets. For example, specialist skills will be needed to develop and design advanced new materials and components to produce high strength, low weight composite alloys and storage technologies such as hydrogen fuel cells. Advanced batteries will also play an important part. In addition to the range of new skills required for the design and production of ultra low carbon vehicles, there is a corresponding range of skills required in the maintenance of these new vehicles.
5. It was also clear from the responses that the integration of new components and materials into new generations of vehicles would require new management skills in order to embed new technologies in the manufacturing, maintenance, recovery, and recycling processes. The emphasis was on the right combination of both technological and management skills development in order to improve overall efficiency and sustainability. Skills requirements also included new and existing driver training for new ULCVs to maximise the efficiency gains available.
6. In order to achieve the greatest benefit, the above skills training should be combined with specialist skills sets in, for example, travel and spatial planning for recharging infrastructure; alternative fuels distribution; and Hybrid / Electric Vehicle (EV) vehicle engineers.
7. Alongside these direct skills requirements, respondents also commented that the large scale introduction of ULCVs (notably Electric Vehicles) may have an impact

on broader skills capability requirements in the power sector. The skills required include construction, electrical engineering, and environmental technology skills.

8. For delivery mechanisms, it was suggested that new skills training should focus on courses and degrees for both new workers and the existing workforce to ensure capability is developed in the short and medium term. This might include:
  - Action by Original Equipment Manufacturers (OEMs) to align need with local further education establishments to design suitable courses to up-skill the workforce
  - The fusion of old and new materials in the physical products being reflected by a fusion of skills and expertise in old and new technology, e.g. mechanical to electrical engineering in the ULCV powertrain technology
9. Respondents believed that raising and sustaining confidence amongst employers of the importance of the ULCV sector to UK industry would strengthen the case for investment in up-skilling the workforce. Respondents also highlighted the need for continuing collaboration between industry, research organisations, academic institutions, sector skills councils and industry bodies to address skills deficiencies within the sector. This would help support existing and future schemes to up-skill the workforce and create training courses for students and, in turn, help to create and manage business drivers to take sustainable transport to the market.

### **Government response to Question 16**

10. We welcome the responses received to this consultation. The transition to ultra-low carbon vehicles presents significant business opportunities for the automotive industry and it will be important that companies at every stage of the supply chain value and invest in workforce training and development.
11. The Office for Low Emission Vehicles (OLEV), DfT, and BIS will look to work with the Automotive Council, the broader ULCV industry and higher education institutions to ensure employers can access the provision they need to adapt the current skill sets and meet the requirements associated with a move to ultra-low carbon vehicles. A number of FE colleges are already working with OEMs to understand their evolving staff skill requirements and developing courses to meet these needs.

### **Summary of responses to Question 17: What more do we need to do to ensure that UK companies have the skills they need to capitalise on the transition to lower carbon aviation?**

12. Respondents highlighted a number of areas that will depend on new skill sets. Some of the examples include specialists in propulsion types and systems,

advanced materials such as composites, fibre optics, photo-electric cells, and alternative fuels (including bio-fuels).

13. As in ultra-low carbon vehicles, the future of aviation will require new skills to develop and design advanced new materials and components that are both high strength and low weight.
14. Respondents suggested that mechanisms to deliver these new skills should include further education courses to include low carbon aviation skills so that graduates can introduce / reinforce these skills in their future organisations. Collaborative working across businesses, industry associations and research organisations was also identified as essential to understanding and responding to future skills requirements, and OEMs should ambassador / sponsor programmes to encourage low carbon innovation skills and training in industry.
15. Respondents recommended that the Government could help in a number of ways. These include providing financial structures to incentivise low carbon investment: raising and sustaining confidence of employers to invest in skills for low carbon aircraft; helping bring about Knowledge Transfer Partnerships to ensure that networks exist for sharing existing and new skills; supporting collaborative working across business, industry associations and research organisations as essential to understanding future skills requirements; supporting industry investment and buy-in to the low carbon skills pipeline; and supporting OEMs in their role as ambassadors / programme sponsors to encourage low carbon innovation skills and training in industry.

### **Government response to Question 17**

16. These technologies are likely to feature in future low carbon aircraft as fuel prices rise and market based measures apply ever greater influence on the industry. The UK aerospace industry is well placed to exploit these business opportunities by developing and deploying skills in these technology sectors. If these skill groups are correctly deployed at the right time, this will increase UK competitiveness and support high value jobs. Some will support small specialist sectors whilst others such as materials and propulsion systems will be key to engine manufacturers like Rolls Royce.
17. The operation of aircraft to reduce their emissions and maximise their utilisation are clearly skills which the aviation industry will need and commercial pressure will pull them forward in an organic way.
18. From a medium term view the greatest potential step change technology that will require new skills is likely to relate to the alternative fuels market. This will include research into growing and refining the product through to small and medium scale production facilities. Better skills are likely to result in cheaper more efficient supply chains for these fuels which could create a large, profitable and sustainable new industry.

19. An area for further consideration is the skills associated with energy and materials recovery at the end-of-life of aircraft, but also for the material discarded during the manufacture and operation of the aircraft.
20. Many of the skills identified align with business opportunities which Department for Transport (DfT) policy supports and will facilitate, where we have the relevant levers, as part of our commitment towards decarbonising our transport system.
21. The Government is working closely with the skills network – including businesses, the Sector Skills Council for Science, Engineering and Manufacturing Technologies (SEMTE), and the National Skills Academy for Manufacturing (NSAM) (parented by SEMTE) – to ensure that the skills requirements essential to deliver low carbon technology advances are met.
22. SEMTE's role is to raise skills levels in the workforce, as a key driver of competitiveness. It is taking a leading role in delivery of £100M of funding through a "compact" to support training and skills development. The NSAM exists to provide the sector with the training it needs to stay world-class and has a network of quality assured providers who have the specialist capabilities for the sector.
23. In addition, the trade association for the UK Aerospace, Defence and Security industries (ADS) is developing a Skills Roadmap, which will assist the aerospace sector in acquiring the skills it needs to deliver a low carbon future.
24. The National Composites Network has done some work to identify the current composite skills needs within aerospace manufacturing, which include materials and process structures design, materials and process engineers, design and stress engineers for composite structures and people with large scale processing experience. A cross sector Composite Skills Working Group comprising business, BIS, SEMTE and Cogent representatives continues to assess the composite skills requirements for UK industry including the aerospace sector.

**Summary of responses to Question 18: Are the skills priorities identified for the freight and logistics sector correct? What more do we need to do to ensure employers in the freight sector have the skills they require?**

25. Respondents highlighted a number of skills areas that would be key in developing the freight and logistics sector. These include SAFED (Safe and Fuel Efficient Driving); continuing to develop alternative fuels. The need to bring about a range of new skills in integrated logistics and supply chain systems engineering was emphasised, alongside other management skills such as carbon accounting and data management.
26. Respondents looked to employers to deliver these new skills, pointing to the likely employer motivation to act to up-skill their staff if carbon reduction is conveyed via the language of resource efficiency (fuel savings, lower maintenance costs,

etc). It was also proposed that employers' professionally trained staff could be used to train members of the public through a knowledge transfer initiative.

### **Government response to Question 18**

27. The Freight and Logistics sector is best placed to identify and source the skills development that it needs. The success of the recent bid by Skills for Logistics for National Skills Academy status demonstrates the level of support and commitment from the logistics sector to the identification, development and promotion of the skills it needs to maintain its competitive edge. The National Skills Academy will be submitting its business plan to the Skills Funding Agency for approval in March 2011.
28. Fuel-efficient driving provides immediate benefits to the haulage sector through the savings achieved and can already be taken on a voluntary basis as part of the Driver Certificate of Professional Competence (CPC) qualification.
29. In addition to this, the Department for Transport recently undertook a consultation on how to increase uptake of fuel-efficient, eco-driving across the heavy goods vehicle (HGV) sector. The Government's response to the consultation can be found at <http://www.dft.gov.uk/consultations/closed/2010-11/>. Consistent with the de-regulation agenda the Government has decided not to make eco-driving training a mandatory part of the Driver Certificate of Professional Competence at this time. The Government will instead respond to industry assurances that they will increase uptake of eco-driving training without direct Government intervention, and will encourage and support industry-led initiatives to improve fuel efficiency and tackle carbon emissions. In 2012 the Department will review the level of uptake of eco-driving training and fuel savings resulting both from these industry-led initiatives and from voluntary uptake as part of the Driver CPC and will reconsider the case for Government intervention.

### **Summary of responses to Question 19: What more should Government and employers do to ensure UK companies have the skills they need to capitalise on the electrification of rail and future rail projects?**

30. Respondents highlighted a number of skills areas that would be key in developing the rail sector. These included skills for the design, manufacture, construction and maintenance of electrification infrastructure to support networked upgrades together with the need for advanced skills in power supply technology to provide electricity to the newly electrified lines, as well as the need for skills in new rail signalling and train traffic control systems.
31. Respondents also identified a requirement for management skills to ensure that new skills and technology are effectively integrated across rail businesses and organisations.
32. Respondents identified the need for continuing support for existing schemes such as the Network Rail and Crossrail academies which are viewed as key training schemes. This reflects the fact that railway skills training is largely carried out

within industry. Education institutions should be encouraged to work with international partners, including Japan and France, to share best practice in training and support for these technologies.

33. Respondents supported the up-skilling of those already in work as well as focusing on training graduates in low carbon skills. They were also clear that supporting OEMs in their role as ambassadors and programme sponsors was important to encourage low carbon innovation skills and training in industry. International comparators with tried and tested best practice were seen as an important reference point when developing training courses, and there was emphasis on making qualifications and training paths available to employees in the sector as well as trainees as this would be highly valuable.

### **Government response to Question 19**

34. The railway industry has come together and is developing a National Skills Academy for Railway Engineering to address skills needs in railway engineering. The Government recognises the importance of developing the skill base of rail industry employees so that they are well placed to contribute to future rail projects such as electrification, rolling stock life extension, energy storage systems and high speed rail. The Department for Transport has been working closely with the rail industry through the Technical Strategy Advisory Group to develop a common view of the technologies required to deliver a cost effective, low carbon railway. This is helping the wider industry to understand the potential opportunities for UK suppliers and the need for a workforce with the right skills and qualifications. Together with the Office of Rail Regulation, the Department for Transport has commissioned jointly a study led by Sir Roy McNulty into the value for money of the GB railway. As part of this, the study will consider future requirements for workforce skills and capabilities.

## Decarbonising Supply Chains across the entire economy

1. This section of the consultation sought to set out some of the key challenges in moving towards a low carbon, resource efficient economy. There are many opportunities available in advanced manufacturing, the food sector, service and support sectors. However all of these sectors will require an improvement in their skills base. This applies to new entrants, as well as up-skilling existing workers.
2. For example, across advanced manufacturing there will be development and use of new raw materials, including bio-composites, and the development of new industries such as chemical production through industrial biotechnology. The food sector will need technical staff that can operate and maintain new technologies needed to help achieve sustainable development objectives.
3. The section posed 5 specific questions to consultees. Summaries of the responses received to each question are set out below together with individual Government responses to questions 20 and 24 and a combined Government response to questions 21 to 23.

### **Summary of responses to Question 20: What more should Government and employers do to up-skill existing, and future, workers in the forestry and farming industries, in particular to support the emerging bio-energy, biomass processing and renewable heat sectors?**

4. Responses focussed on identifying skills needs as crucial. Agriculture should be sustainable, but there was a perceived lack of demand for low-carbon skills amongst employers in the sector. Similarly skills demand among forestry employers is perceived to be low and respondents expressed an urgent need to up-skill the current workforce. Increased knowledge transfer and Continuing Professional Development for agriculture and forestry would help tackle skills issues. It would need to take into account the age, profile and typical size of the business, and could be taken forward by bespoke 'seeing is believing' type events and a flexible approach to training. Responses generally favoured a market approach to promote the financial benefits of up-skilling although some stimulus for forestry skills, including biomass, was perceived to be required. Respondents favoured carbon budgets being applied to all sectors of the economy. The Food and Drink sector strongly supported a modular approach to training, and the need for CPD and accreditation rather than gaining full qualifications. They recognise the need for new skills to adapt and respond to challenges and opportunities into the future.

## Government response to Questions 20

5. The Government recognises that it has a role to play in ensuring that farmers and forestry workers possess the skills necessary to move towards low-carbon business practices and ensuring the workforce is in place to support growth and thereby increase the contribution to the green economy. The Government has set up a cross-sector 'Skills Task and Finish Group' to identify and implement actions to tackle forestry skills challenges, and is undertaking further analysis on the current level of skills to meet the needs of a low carbon agricultural sector, through the Agricultural Advisory Services Analysis project. Training events for Anaerobic digestion (AD) are being developed in partnership recognising that this is still an emerging technology and growth area in the waste and agriculture sectors. The Government supports the industry-led Agri-Skills Strategy "Towards a new professionalism", aimed at embedding a culture of CPD within the farming industry.

## Summary of responses to Question 21: What actions should be taken to ensure that individuals working in carbon intensive industries have the skills to make the transition to a low carbon, resource efficient economy?

6. Respondents thought that re-skilling was important, preparing existing employees for low carbon, resource efficient business practices. There was support for extending training support to the over-25s. A strong multi-disciplinary skills basis was considered key to facilitate skills transfer throughout an individual's career. Clear incentives to train would be needed. In addition, public/private investment to develop conversion courses would be needed.
7. Respondents believed that the education and training system need to align more closely to the needs of the economy. There was insufficient recognition across the supply chain of the need for low carbon or resource efficiency skills, meaning that there was likely to be a case for government intervention. Building resource efficiency models into business and management training courses would help. Skills shortages were of strategic economic importance and recognition of this would help funding. Government contracts and procurement could help to stimulate capacity for low carbon and resource efficiency skills. The use of case studies as illustrating best practice was important. Finally, Partnership working between business, professional bodies, civil society, Government and all skills providers was necessary.

## Summary of responses to Question 22: Is our understanding of the skills needs in advanced manufacturing correct? How can these needs best be met in the short, medium and longer terms?

8. The analysis of the skills needs in the consultation document was broadly accepted by respondents. Advanced manufacturing had some specific issues, particularly in extending accessibility to adult apprenticeships, the need to re-skill the existing workforce and the need for industry, government and skills providers to work in partnership. Some respondents thought that raising the

profile of manufacturing sectors, career paths and improving the overall image of associated employment opportunities would help.

9. There was a need for long term commitment from government strategies to give industry the confidence and support necessary for future funding programmes.
10. The Sector Skills Councils and industry reported a good understanding of the skills needed for advanced manufacturing. Core issues focused on the complexity, inflexibility and inaccessibility of skill provision and the need to promote the manufacturing sector to help shake off lingering poor images. A dedicated programme of support for research in advanced manufacturing was needed, which university staff could apply to. The Research Councils' support for advanced manufacturing was hidden.

### **Summary of responses to Question 23: What are the key skills challenges in the service and support sectors to deliver improved resource efficiency and low carbon?**

11. Respondents thought that the understanding of the skills needs in the consultation document was about right. But there was a core challenge to develop acceptance and wider understanding across government, business and skills providers that 'low carbon' was not a sector. Some clusters of skills providers had begun to address some of these issues but they needed to go further and faster. There was a specific challenge for Government in developing a cross-Government 'Low Carbon and Resource Efficient Skills Strategy' which would incorporate national and international examples of how these issues could be addressed. There was also a need to change mindsets of employers and employees to help them recognise the need for changes to business practices. Specific skills shortages were well known to industry and to the SSCs. There was also a need to decrease the complexity of the skills system by decreasing regulatory burdens around training.

### **Government to Questions 21, 22 and 23**

12. The Government acknowledges that it has a shared responsibility to work with employers to provide strategic leadership to overcome barriers to the development of the skills needed in the transition to a low carbon resource efficient economy. Government recognises that there is no low carbon sector, as such, as the skills required apply throughout the economy. Effective resource management skills will be key during the transition, and to this end, Government encourages businesses who are already doing this to help get that message across by spreading awareness of what they have done up and down their supply chain, working in partnership with Sector Skills Councils.
13. Government will work with all key partners as well as employer organisations to support employer action to stimulate learner and employer demand and to tackle skills gaps. In addressing the particular needs of individuals working in

carbon intensive, manufacturing industries and service sectors, Government will seek to extend accessibility to adult apprenticeships and re-skill the existing workforce in this area. Industry can also improve its competitiveness and ensure its skills needs are met by brokering the introduction of clear professional standards or occupational licensing for job roles that have low carbon and resource efficient skills requirements. Within such standards, Government encourages industry to consider how they can put Apprenticeships at the centre of any new proposals.

### **Summary of responses to Question 24: What will the key skills needed be, to build adaptive capacity for climate change, enabling organisations to minimise risks, and capitalise on the opportunities that climate change will bring?**

14. Respondents considered that the adaptation section of the consultation was underplayed and more details/questions were needed to allow a fully considered response. There was a need to raise awareness of the importance of adaptation across the private and public sectors, as well as a need to address barriers to adaptive action within organisations. Many respondents felt that while skills for adapting to climate change were at an early stage of development, they were nevertheless of equal importance to skills for a low carbon and resource efficiency economy. Increasing the skills base needed for adaptation could lead to more opportunities being identified and exploited by all kinds of organisations in the UK, improving general levels of adaptation across the economy.
15. They also felt that climate change will have implications for the UK in terms of future employment and hence skills needs. Respondents highlighted the need to equip individuals with high-level skills that can be applied to a variety of different sectors and enable organisations to minimise risks and capitalise on opportunities that climate change will bring.
16. Respondents also highlighted that there were specific skills in technology, science and risk assessment that would be required into the future. This included increasing the capability to interpret scientific findings and use these to understand potential impacts to business and, as importantly, identify potential opportunities. Respondents had good knowledge of the sectors, and areas within those, which would be key to help businesses to adapt to climate change. The skills associated with these were identifiable and gaps in skill provision could be assessed.

### **Government response to Question 24**

17. The Government has started work to increase our understanding of the skills needed for adaptation. We plan to draw on the expertise of the Sector Skills Councils and other skills bodies in the coming months in order to take the work further.



# Annex A – List of respondents

Crowberry Consulting  
Oil Firing Technical Association  
Stephen Benham  
Health and Safety Executive  
Paul Barnes  
National Skills Academy for Nuclear  
DEA/RSPB/Geographical Association/People and Planet/East Midlands Network  
for Global Perspectives in Schools/Osborne Middle School  
Garth Ratcliffe  
The Smallpiece Trust  
Northumberland County Council  
Matthew Maskell  
WSP Consulting  
Corus  
The Open University, Faculty of Maths Computing and Technology,  
Communication and Systems Development  
Trade Union Congress  
Chwarae Teg: women and workplace innovation  
Professor Doug King  
Transport and Salaried Staff's Association  
Menzies Distribution Ltd  
Unite  
SummitSkills (the Sector Skills Council for Building Services Engineering)  
Wirral Partners  
North East Chamber of Commerce  
Chartered Institute of Building  
National Skills Academy for Nuclear  
SC2 Sustainability Consultancy  
Energy Action Scotland  
Prospect  
Commission for Rural Communities  
National Grid  
Skills - Third Sector  
Food and Drink Federation  
Chartered Institution of Building Services Engineering  
Barnsley College  
Field Studies Council  
Builders Merchants' Federation  
Northumberland County Council and Northumberland College  
Sustainable Futures: Energy Development and the Environment (a group within the  
Liberal Democrat social network ACT)  
Skills for Logistics (the Sector Skills Council for the Logistics Industries)  
e-Skills UK (the Sector Skills Council for IT & Telecoms)  
Semta (the Sector Skills Council for Science, Engineering and Manufacturing  
Technologies)  
Energy Materials Working Group of Materials UK

North West Universities Association  
Loughborough University  
Black Country Chamber of Commerce  
Siemens  
Learning and Skills Improvement Service  
Lantra (the Sector Skills Council for the environmental and land-based industries)  
Design Council  
Policy Studies Institute  
Groundwork  
North East Process Industry Cluster  
E.ON  
Teesside University  
Bedford College  
Society of Motor Manufacturers and Traders  
Energy Institute  
Network Rail  
Education for Engineering  
Association of Colleges East Midlands  
National institute of Adult Continuing Education (NIACE)  
British Ceramic Federation  
Centrica  
Chambers of Commerce North West  
Association of Colleges  
London Development Agency/GLA/ London Skills and Employment Board  
National Union of Students and the Environmental Association for Universities and Colleges  
B&Q  
Pennine Lancashire Employment & Skills Board  
Tees Valley Unlimited  
Proskills (Sector Skills Council for the Process and Manufacturing Industries)  
Cross-RDA network  
Association for the Conservation of Energy  
Alliance of Sector Skills Councils  
Northwest Regional Development Agency  
RenewablesUK  
GMB  
Solihull Council  
Walsall College  
EA Technology  
GoSkills (Sector Skills Council for the Passenger Transport Sector)  
Energy and Utility Skills (Sector Skills Council for the gas, power, waste management and water industries)  
The National Skills Academy for Power  
Consumer Focus  
Youth Climate Coalition  
The Aldersgate Group  
Energy Saving Trust  
Converteam UK Ltd.  
Household Energy Efficiency Skills Group (Energy Efficiency Partnership for Homes)

Saint-Gobain businesses in the UK  
University and College Union  
New Engineering Foundation  
Cogent (Sector Skills Council for the science-based industries)  
National Energy Foundation, Solar Trade Association and Ground Source Heat  
Pump Association  
Local Government Association  
Eaga  
Bill Green, Burton College  
Centre for Low Carbon Futures  
John Fieldhouse  
The City and Guilds Group  
Friends of the Earth  
Scottish and Southern Energy  
Green Gauge  
Carbon Capture and Storage Association  
ConstructionSkills (Sector Skills Council for the construction industry)  
Institute of Environmental Management and Assessment  
Jaguar Land Rover  
Electrical Contractors' Association  
The Rapid Technology Transfer Group  
Renewable Energy Association  
Skills Funding Agency  
Richard Moore  
Royal Society of Chemistry  
Energy Foresight

# Annex B – Number of respondents to each question

Number of respondents to each question

<b>Question Number</b>	<b>Number of Respondents</b>	<b>Question Number</b>	<b>Number of Respondents</b>
<b>1</b>	<b>66 responses</b>	<b>13</b>	<b>45 responses</b>
<b>2</b>	<b>61 responses</b>	<b>14</b>	<b>33 responses</b>
<b>3</b>	<b>61 responses</b>	<b>15</b>	<b>25 responses</b>
<b>4</b>	<b>68 responses</b>	<b>16</b>	<b>27 responses</b>
<b>5</b>	<b>61 responses</b>	<b>17</b>	<b>16 responses</b>
<b>6</b>	<b>60 responses</b>	<b>18</b>	<b>18 responses</b>
<b>7</b>	<b>49 responses</b>	<b>19</b>	<b>15 responses</b>
<b>8</b>	<b>35 responses</b>	<b>20</b>	<b>23 responses</b>
<b>9</b>	<b>37 responses</b>	<b>21</b>	<b>34 responses</b>
<b>10</b>	<b>27 responses</b>	<b>22</b>	<b>26 responses</b>
<b>11</b>	<b>30 responses</b>	<b>23</b>	<b>23 responses</b>
<b>12</b>	<b>37 responses</b>	<b>24</b>	<b>42 responses</b>

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