HM Government

Skills for a green economy

A report on the evidence

Contents

Executive summary

This project on skills in the green economy results from recommendations made in the skills strategy for England, Skills for Sustainable Growth[1][2] (November 2010). The report supplements the information relating to skills published as part of Enabling the Transition to a Green Economy[3] (August 2011).

The aims of the project were to identify skills needed to support the transition to a strong and sustainable green economy; and to assess evidence of employer demand and potential responses from the skills system which will lead to these skills being delivered.

The overarching purpose for this report is to assist businesses and the agencies which support them in the clear articulation of skills needs related to the green economy: a role for the government repeatedly identified from consultation with industry. [4]

The green economy is defined as one in which value and growth are maximised across the whole economy, while natural assets are managed sustainably. Such an economy would be supported and enabled by a thriving low carbon and environmental goods and services sector. Environmental damage would be reduced, while energy security, resource efficiency and resilience to climate change would all be increased.

The transition to a green economy requires a workforce with the right skills. This includes not only skills in the low carbon and environmental goods and services sector, but also those needed to help all businesses use natural resources efficiently and sustainably and to be resilient to climate change. The evidence gathered in the course of the project indicates that in general businesses are currently not certain about their future green skills needs. That said, some sectors do identify specific skills needs, including energy generation, the construction industry and the food and agriculture sectors.

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[1] http://www.bis.gov.uk/news/topstories/2010/Nov/skills-for-sustainable-growth

[2] Skills are a devolved matter. A strategy for the skills system in England has been set out in Skills for Sustainable Growth. Plans for the skills system in Scotland are described in Skills for Scotland.

[3] http://www.businesslink.gov.uk/bdotg/action/detail?itemId=1096705244&type=ONEOFFPAGE

In England, the government will encourage businesses to plan for the future. Supporting actions include:

- Bringing together a new 'skills for a green economy' grouping of Sector Skills Councils (SSCs) in order to understand changing requirements more thoroughly and to communicate this to businesses, skills providers and individuals thinking through their long term career choices. The UK Commission for Employment and Skills (UKCES), which has as a priority to galvanise employer action on skills, will support this

- Improving the quality of information, advice and guidance available on careers in a green economy, together with information on the skills linked to the green economy that will be needed in the future, through the new National Careers Service to be launched in April 2012

- Improving the quality of skills provision in the Further Education (FE) system. The Learning and Skills Improvement Service (LSIS) will work with the sector to develop and improve the quality of green skills provision across the sector, and the Institute for Learning (IfL) will support teachers and trainers to include green skills more in teaching

- Raising awareness and understanding of the green economy through the work of Unionlearn to support lifelong learning among the workforce

- Continuing to support science, technology, engineering and mathematics (STEM) skills as a priority for the green economy at least as much as for the economy as a whole

- Making available funding for up to 1,000 Apprenticeship places for the Green Deal, subject to take-up by businesses.

1. Introduction

This project results from recommendations made in the skills strategy for England, Skills for Sustainable Growth. The work was undertaken with the aims of identifying the skills needed to support the transition to a strong and sustainable green economy; and assessing evidence of employer demand and potential responses from the skills system which will lead to these skills being delivered. The overarching purpose for this report is to assist businesses and the agencies which support them in the clear articulation of skills needs related to the green economy: a role for the government repeatedly identified from consultation with industry.

Enabling the Transition to a Green Economy contains an overview of the support available to business in demonstrating their demand for skills to support the transition. This report expands on that information to set out the detailed recommendations emerging from the evidence and stakeholder consultation. It will be of interest to businesses, professional and trade associations and trade unions, Local Enterprise Partnerships, the Further and Higher Education (HE) sectors and the national agencies which support them.

The green economy is defined as one in which value and growth are maximised across the whole economy, while natural assets are managed sustainably. Such an economy would be supported and enabled by a thriving low carbon and environmental goods and services sector. Environmental damage would be reduced, while energy security, resource efficiency and resilience to climate change would all be increased.

A skilled workforce is necessary if we are fully to realise the opportunities a green economy offers and to support green growth. Clearly this means a focus on skills in environmental and low carbon industries, but that alone is not sufficient. A traditional manufacturing business for example must also be planning the processes and the skills it needs for operating in a more resource-efficient way, minimising carbon emissions and preparing for climate change. In fact, any business today – from a small owner-managed company to a large service business – should be thinking about the generic skills required to use resources efficiently and sustainably.

The government's proposals are made within the context of the skills strategy for England. This is described in more detail in section 3 below, but in brief it is a demand-led model in which businesses, through SSCs, National Skills Academies (NSAs) and others, identify and articulate the skills they need; and FE colleges and training providers supply that need. The proposals set out here do not distort this model or represent a special intervention: rather they deploy the model's key elements to ensure that businesses can articulate and acquire the skills needed. It is also worth noting that it will be for the agencies and other stakeholders in whose remit they lie to refine the proposals. It is not for the government to do this, although it stands by to support the proposals as appropriate.

The proposals have been developed through a short project jointly undertaken between January and June 2011 by BIS, DECC and Defra[5]. Work undertaken included:

- Considering the policies driving the transition to a green economy and consequent implications for skills demand

- Reviewing the evidence and consulting stakeholders to assess the demand for skills[6]

- Assessing the response of the skills system and the capacity to deliver the required skills

- Making recommendations accordingly to ensure green skills needs are met across the skills landscape.

In developing the proposals, BIS, DECC and Defra engaged with a variety of interested organisations and are grateful for their input and support. They include: the UKCES, SSCs, Business in the Community, FE sector agencies, trade unions and others.

The opportunities of a green economy

It is widely acknowledged that the green economy has a huge, long term potential in terms of both environmental stability and financial growth. It is equally acknowledged that seizing these opportunities will present challenges during the transition phase to the government, businesses and all in the UK. One of these challenges is ensuring there is a workforce with the right skills so that business is in the strongest position possible to take advantage of opportunities in the future.

The overarching opportunities of a green economy are set out in more detail in Enabling the Transition to a Green Economy, but it is helpful here to consider them briefly, by way of context for the skills proposals. Opportunities in sectors key to the future green economy indicate the prospect of a growing and thriving skills sector if the demand can be clearly articulated.

- Low carbon energy generation: The UK is fortunate to have 40 per cent of Europe's wind resource[7]. In 2009 the Carbon Trust noted that targets could create many jobs by 2020. The nuclear industry, which currently employs some

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[5] The Departments for Business, Innovation and Skills, Energy and Climate Change and Environment, Food and Rural Affairs.

[6] The assessment of skills needs is not comprehensive but undertaken to give an overview of demand for skills for a green economy and government policies which might drive future requirements.

[7] Renewables UK.

44,000 people either directly or in the immediate supply chain, is equally well-placed to take advantage of the opportunities of increased demand for low carbon energy. In turn, the increased supply of low carbon energy will increase demand for skilled engineers and other professionals

- Low carbon vehicles: The UK leads Europe in the manufacture and development of low emission vehicles, investing over £1.5 billion annually on automotive R&D. The government and industry both recognise the potential economic opportunities arising from the transition to electric and other low emission vehicles. Industry will need to ensure that the workforce is equipped with new combinations of skill sets, such as the application of electronics and chemistry as well as mechanical engineering, in order to take advantage of these opportunities

- Sustainable and secure food: The food and drink manufacturing sector is increasingly automated and more reliant on highly skilled people to maintain and operate new complex technologies. Waste minimisation technologies such as anaerobic digestion and in-vessel composting will require suitably qualified managers and operators and present new opportunities in the industry. Shifts in the skilled workforce including scientific, engineering and management roles, alongside the traditional craft and technical vocations, are necessary if the UK workforce is to be competitive and support the security of the food and drink industry into the future. A new Advanced Training Partnership scheme, promoted by the Biotechnology and Biological Sciences Research Council, aims to help meet industry needs, notably in the areas of food health and environmental sustainability

- Generic business practices: Above all, all businesses will need to respond to the transition to a green economy, as they consider the impact on their goods and services and how they produce these. Increased resource efficiency can increase profits and competitiveness, making UK industries stronger and more resilient. All workers will need the abilities and knowledge to respond effectively to the shift to greener business practices. FE and HE both have a role in embedding skills for a green economy in their courses and ensuring teachers, trainers, lecturers and assessors have the necessary capabilities to undertake this widening role.

2. The demand for skills in a green economy

A review of all economic sectors indicates that there is a growing demand for skills in the context of the green economy. These skills are at all levels and of many types. There is evidence of demand for a workforce with generic green skills across all types of firms and sectors. Similarly, research shows a demand for classic leadership skills to help drive the transition within individual organisations. Some of the skills required to support the transition are relatively new. But many others are not new: they involve doing established actions with a distinctive green economy awareness and understanding.

Table 1 sets out a summary of the project's analysis of skills needs to support growth in a green economy (for further detail see Annex 1). Key issues emerge, such as the need to retain the existing workforce and to replace ageing professionals, particularly in engineering roles. Businesses repeatedly cite a lack of STEM skills in the workforce as a major barrier to the green economy across multiple sectors. In addition, it is worth noting that in the FE sector there are shortages of lecturers, trainers, assessors and learning resources covering subjects and issues related to a green economy[8].

Table 1: Summary of skills needs for a green economy

Skills for a green economy	Skills needs
Skills supporting **resource efficiency**	All businesses need generic or light green skills including: • Strategic business management to build resource-efficient business models leading to bottom line benefits and in preparation for new regulations • Business/financial accounting services around carbon and natural environment accounting • Skills to design and adopt technologies, products and processes increasing resource

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[8] Institute for Learning, Green economy survey (2011).

	efficiency, including lean manufacturing
	• Project management skills with clear understanding of resource efficiency
	• Operator level actions to maximise resource efficiency (e.g. reducing waste in production).
Skills supporting **low carbon industry**	Low carbon industry focuses on energy generation and industry with high energy requirements. Skills include: • Scientists and engineers with training or transferable knowledge for nuclear and renewable energy (including wind and marine) • Technicians with training or transferable knowledge to install energy efficiency measures and retrofit at a household and business premises level • Skills to design and adopt technologies, products and processes to minimise carbon emissions • Operator level actions to minimise carbon emissions (e.g. driving in a fuel efficient manner).
Skills supporting **climate resilience**	Business requires the capacity to adapt to changes in climate. The necessary skills include: • Scientific and technical skills such as modelling and interpreting climate change projections • Risk management such as assessments of future resource availability • Skills to design and adopt technologies, products and processes to improve climate

	• resilience
	• Operator level actions to improve climate resilience (e.g. retrofitting water efficient technologies in households and business premises).
Skills to manage **natural assets**	Natural assets underpin all business practice. Skills to protect and manage them include: • Accounting services for the natural environment • Understanding of environmental impact assessments • Understanding and interpretation of environmental legislation targets, ecosystem services design and management and land use planning • Skills to design and adopt technologies, products and processes to manage natural assets.

3. The skills system in England

In Skills for Sustainable Growth, the government set out its strategy for reforming the skills system in England. The responsibility for quality and investment is shared between the government, employers and learners, with providers freed form unnecessary central control so they can respond directly to the needs of businesses and individual learners. The government's role is to ensure a simple-to-access system, an effective qualifications framework valued by business and financial support where it is most needed.

The system works on the principle of demand. In simple terms, the business-led UKCES and its network of SSCs identify the skills and standards needed within the various industry sectors. FE colleges and training providers develop and supply the right education or training provision.

Although it has not been a focus for this project, the HE sector of course has a role to play in ensuring that we have the skills for a green economy. Many of the skills needs identified here are at a high level and require professional qualifications. The HE White Paper, Students at the Heart of the System[9], announced a review, led by Professor Sir Tim Wilson, former Vice-Chancellor of the University of Hertfordshire, into how we make the UK the best place in the world for university-industry collaboration.

How does an individual business access the training it needs?[10]

Services such as Business Link and Investors in People help a business review its skills needs and plan action across the board. SSCs[11] and NSAs shape skills training by, for example, developing Apprenticeship frameworks, professional standards and licences to practise. To help business make the right choices, data on how colleges and training providers perform are available through the Framework for Excellence service. Businesses of all sizes can take on Apprentices, including for green jobs[12], through the National Apprenticeships Service or though their website www.apprenticeships.org.uk. With the Growth and Innovation Fund – up to £50

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[9] http://www.bis.gov.uk/assets/biscore/higher-education/docs/h/11-944-higher-education-students-at-heart-of-system.pdf

[10] This section is not intended to be a comprehensive account of how businesses invest in skills training but rather to indicate the principal routes and support mechanisms.

[11] For full list see: http://www.ukces.org.uk/ourwork/sector-skills-councils/list

[12] The Deputy Prime Minister has announced that up to 1,000 Apprenticeship places would be made available for the Green Deal, subject to take-up by businesses.

million per year – the government and businesses are working together on genuinely innovative projects to boost skills where they are most needed.

Many – often larger – businesses have a clear view of what they need, both in terms of skills for a green economy and more generally. They have dedicated training departments which manage a wide range of activities for staff (including Apprenticeships). It remains to be seen how such training will incorporate development of greener skills particularly in the absence of accredited courses. In general terms, smaller firms often find it difficult to access the right training for a variety of reasons, and this is likely also to be the case in terms of specific green skills.

Businesses which are uncertain about the skills they need to make the transition to a green economy or how to articulate these needs and to access relevant training, can find help by engaging with a local college or training provider[13] for off-the-shelf courses and qualifications at the appropriate level for specific jobs. They can generally be confident of the programmes on offer, as they will be approved by their sector (it is noted however that in recent IfL research[14] teachers and trainers identified the need for more learning materials. Businesses will also find that the programmes available are flexible and can be tailored to need. For example, rather than whole qualifications, they may prefer to ask for individual units from the Qualifications and Credit Framework or to arrange to have the training delivered at work or online.

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[13] Many businesses also fund staff training through the higher education sector.

[14] Institute for learning, Green economy survey (2011).

4. Securing skills for a green economy

Some evidence of market failure and barriers

The English national skills system is thus designed to respond to businesses of all types and sizes, and to help them grow and prosper. However, given the scale of the transition to a green economy, the particular skills challenge is significant, not just in low carbon and environmental goods and services but in all sectors.

A rapid evidence review (see Annex 2) reveals some evidence of market failure and barriers. Many of these are linked to, and may drive, the overarching finding that the level of economy-wide demand for green skills does not correspond with growth towards a green economy and that there is a mismatch between demand and the skills needs that might be expected[15]. This latent demand is not being clearly articulated by many employers. In addition, there have been few attempts to look at the skills implications of the transition right across the economy. As a result our demand-led skill system may struggle to respond adequately[16].

The evidence suggests:

- Organisational risk aversion is a significant barrier to investment in skilling the workforce. Companies need greater certainty from the government to enable them to invest in the transition to a green economy[17]. For example, with long lead times through training to competence in the power sector, typically two to five years, decisions and commitment need to be made early to ensure a supply of future skills. However, confidence in the timing of demand for these skills is too low to justify investment and much more certainty is needed about the size and timing of future investment programmes[18]

- Imperfect information means businesses don't know they have a skills need and are unaware of the opportunities arising from increased workforce capability. Businesses lack the right level of understanding or awareness of the skills requirements and implications of a green economy and consequently the importance and potential benefits of integration of these skills into their

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[15] Low Carbon Cluster: Sector Skills Assessment Report (2009); Accenture, Planting Green Seeds Today to Grow Tomorrow's Talent (2010).

[16] ProEnviro, Skills for a low carbon and resource efficient economy: A review of evidence (2007). A report commissioned by Defra.

[17] Aldersgate Group, Mind the Gap: Skills for the transition to a low carbon economy (2009).

[18] HM Government, Meeting the low carbon skills challenge – A Government Response (2010).

business[19]. The payback on investment in green skills may mean improved product or service quality, increased productivity or a range of bottom line financial performance measures. For example, research has identified some £22 billion a year of potential savings to UK businesses from using raw materials, energy and water more efficiently, in ways needing no or small scale investment. The payback to businesses would be achieved within only one year, but the workforce needs the capability to deliver these changes. Insufficient information and behavioural and motivational factors are commonly cited as barriers to realising this potential[20]

- Time preference and short termism mean the long term investment in skills for a green economy has not been kick-started in time to ensure the desired workforce is in place now. The long term consequences of downsizing and the availability of state-funded training have led to an over-reliance on the existing workforce (both skills and supply) rather than longer term investment in recruits. In addition, sustainability and green issues were for a long time viewed as barriers to growth by many industrial sectors, meaning that, except for an enlightened few, an investment in skills preparing for these ways of working was viewed as a luxury[21]. As a result, many of the industries that are key to the green economy appear to be reliant on an ageing workforce. This issue is particularly concerning in areas where engineering is a core skill such as conventional, renewable and nuclear power generation and water management. These are forecasting large percentages of their workforce retiring over the course of the next ten to 15 years[22]

- Externalities make business less willing to invest in training in a market where high labour turnover is prevalent, unless it is very specific to their needs. Interviews with large renewable energy generation businesses reveal that wind and marine renewables technologies require new combinations of old skills. These are in short supply, leading to poaching of staff and high levels of labour turnover[23]. In addition, economic theory suggests that employers will be more willing to invest in training that is specific to their firm and therefore less transferable; and more averse to investment in more generic low carbon and resource efficiency training – where benefits will not necessarily accrue to the current employer but could lead to wider social and environmental benefits. A particular example of externalities is STEM skills, with businesses competing for a

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[19] ProEnviro, Skills for a low carbon and resource efficient economy: A review of evidence (2007). A report commissioned by Defra.

[20] BIS, Green Light? A review of regulatory barriers to small businesses' resource and energy efficiency (2010).

[21] Accenture, Planting Green Seeds Today to Grow Tomorrow's Talent (2010).

[22] Low Carbon Cluster, Sector Skills Assessment Report (2009).

[23] Low Carbon Cluster, Sector Skills Assessment Report (2009), p. 21.

scarce, expert workforce. The demand for STEM skills in low carbon and environmental industries is expected to increase greatly over the next decade. In addition, low carbon and environmental sectors will have to compete for these STEM skills with other industries[24] and this will exacerbate the issue

- The skills system's focus on lower level skills and controls on the system are important factors. The skills delivery system and funding have recently focused on lower level skills. This does not support the development of low carbon and resource-efficient skills which have been mainly cited as level 3 and above[25]. In addition, the top-down controls on the skills system, which are now being removed, have hindered colleges and training providers in their attempts to respond to the needs of businesses and learners

- Sectoral characteristics are intensifying problems. Sectors that might be expected to suffer greater problems from market failure are those under intense competitive pressures; having high levels of labour turnover, low returns on investment, constrained wages, skills that are both expensive to develop and transferable; and containing a large number of smaller firms[26]. Many of these characteristics are applicable across a number of new and emerging green industry sectors.

Proposals to secure the necessary skills for a green economy

In supporting Enabling the Transition to a Green Economy, the government undertook to ensure that the skills system responded to the demand for skills created by the shift to the green economy. Linked to this, businesses could help articulate skills demand through involvement in Local Enterprise Partnerships and Sector Skills Councils.

Through the joint BIS/DECC/Defra project, a number of commitments have been agreed to underpin the government's pledge and to facilitate action by business. These are set in the context of the demand-led skills strategy for England, and require partnership between the government, business, trade unions, colleges and training providers and their national agencies. Due to the scope of the project, these commitments do not included HE institutions, but this sector does of course contribute to the supply of skills in a green economy, and this report is expected to be of interest to it.

The commitments are:

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[24] Low Carbon Cluster, Sector Skills Assessment Report (2009); PwC, Strategic Skills Needs in the Low Carbon Energy Generation Sector: a Report for the National Skills Audit for England (2010).

[25] ProEnviro, Skills for a low carbon and resource efficient economy: A review of evidence (2007). A report commissioned by Defra.

[26] SSDA Catalyst – Issue 1 – Market Failure in Skills, p. 4.

- To bring together a new skills for a green economy grouping of SSCs in order to understand changing requirements more thoroughly and to communicate this to businesses, skills providers and individuals thinking through their long term career choices. The UKCES, which has as a priority to galvanise employer action on skills, will support this. This forum will:

    o Bring key SSCs together to exchange knowledge and develop joint funding bids ensuring skills for a green economy are prominent

    o Ensure skills for a green economy are embedded in training material, qualifications and other skills provision

    o Support business articulation of skills for a green economy, demonstrating the importance to growth across all sectors

    o Develop cross-sector standards and qualifications (such as the recent work on standards led by Cogent) to ensure all business practices are underpinned by skills for a green economy

    o Open membership of the new group to partners including Unionlearn, Skills Funding Agency and LSIS

- To improve the quality of information, advice and guidance available on careers in a green economy. In April 2012 the Skills Funding Agency will launch the National Careers Service. A key feature will be the development of enhanced online systems to display and explore up-to-date labour market intelligence, including the green economy. As part of this the quality of information, advice and guidance available on careers in a green economy will be improved, together with information on the skills linked to the green economy that will be needed in the future

- To improve the quality of training for teaching skills in a green economy across the FE system. Over 3,000 teachers and trainers gave their views on green skills, through their professional body the IfL, and said they wanted more professional development support. LSIS will work with the sector to develop and improve the quality of green skills provision across the sector using a range of improvement activities including those with a focus on sustainable construction, renewable energy and other low carbon priority areas; innovation and knowledge transfer activity; support for green skills needs; the promotion and sharing of effective practice through regional STEM activities; and by addressing the issue of sustainability as a leadership and organisational issue. IfL will support teachers and trainers to include green skills more in teaching, and give new opportunities for peer-to-peer exchange of practice on green skills topics. LSIS will develop a green skills portal on its Excellence Gateway to brigade effective practice and information, while IfL will create an online community of practice for its members to discuss issues and share ideas about teaching green skills

- To raise awareness and understanding of the green economy through the work of Unionlearn to support lifelong learning among the workforce. Unionlearn will:

    o Help union members understand the importance in work of sustainability and resource efficiency

- o Raise awareness and understanding of the green economy with employers and across the workforce

- o Build on the work that has been undertaken in conjunction with the TUC and the Trade Union Sustainable Development Committee to develop support for environmental literacy and employment in green jobs and to engage affiliates, learners, employers and other partners with the climate change agenda

- o Mainstream green skills through its activities, for example: publishing guidance for trade unions representatives; increasing the volume of TUC environmental awareness courses delivered; and developing environmental literacy provision such as "green induction packages", including in the Getting on at Work series

- To continue to support STEM skills as a priority for the green economy at least as much as for the economy as a whole

- To make available funding for up to 1,000 Apprenticeship places for the Green Deal, subject to take-up by businesses.

Annex 1: Overview of skills needs by sector

Economic sector	Summary assessment of skills needs
Business generic skills needs	In addition to the sector or job-specific jobs described below (known as dark green skills), all businesses need generic or light green skills. These include: • Business management skills such as lifecycle analysis/costing; carbon literacy for procurement; planning, impact assessment and risk management; leadership and management; sustainable procurement; resource efficiency skills; financial management etc • Scientific and technical skills such as modelling, interpreting, using and disseminating climate change projections and impacts etc.
Building services, engineering and property management	In many cases traditional building skills can be easily adapted to energy efficiency, so in-depth specialist training for installation is not always required. But it has been suggested that the renewables sector would benefit greatly from a general upskilling in construction. More needs to be done to attract high calibre young people, and to refocus current Apprenticeships and certification. There is some practical training available in renewable construction, but more specific training is needed for architects and planners on the impact of new materials on sustainability.

Building products, coatings, extractive and mineral processing etc[27]	Research suggests that re-skilling was important in carbon-intensive industries, to prepare existing employees for low carbon, resource-efficient business practices. There was support for extending training support to the over-25s. Multi-disciplinary skills were considered important in this sector. Clear incentives to train would be needed, along with public/private investment to develop conversion courses. There was insufficient recognition across the supply chain of the need for low carbon or resource efficiency skills. Building resource efficiency models into business and management training courses would help.
Chemicals and pharmaceuticals, oil and gas etc[28]	For civil nuclear and new build nuclear, see Energy Supply and Utilities below. The UK oil and gas industry is mature and expected to decline gradually. But the retention/renewal of existing skills – chemical engineering, economics, finance, HR and broad science qualifications – will be necessary. There is likely to be some limited development in biofuels.
Food and drink manufacturing and processing	There is a recognition in the food industry of the need to adopt new technologies and processes for sustainability, but this has yet to be translated into a demand for specific skills, or prioritised. To some extent, sustainability is being addressed through lean manufacturing training. More broadly, more food scientists, food technologists and engineers are needed.
Construction	Construction is affected by stringent new building standards such as BREEAM and advanced building management systems; new

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[27] Building products, coatings, extractive and mineral processing, furniture, furnishings and interiors, glass and glazing, glazed ceramics, paper and printing industries.

[28] Chemicals and pharmaceuticals, oil and gas, nuclear, petroleum and polymer industries.

	sustainable construction methods; and facilities management and maintenance. The Green Deal alone could see the numbers of people employed in insulation grow from 27,000 now to 100,000 in 2015 and 250,000 by 2025. New skills are needed for: environmental legislation targets; ecosystem services design and management; designing and managing multi-functional spaces; land use planning and development planning; developing and using computer-aided design and GIS; life cycle assessment/costing; carbon and water footprinting etc.
	There will be a need to train new staff and to upskill existing workers. For example, architects will have to: incorporate new products/ innovations in design; interpret and take account of new regulations etc; and design for predicted climatic change impacts. And local planners need to: interpret, implement and enforce legislation; build close relationships with energy suppliers; take account of demographic and economic changes etc.
Renewables	There are significant employment opportunities. For example, the offshore wind supply chain will need up to 70,000 more workers by 2020, from planning and development professionals through engineers and technicians to legal and financial specialists and admin and IT staff. There is an overall shortage of STEM in the next ten years at all levels, which is exacerbated by competition from other sectors. In addition, wind energy needs: postgraduate mechanical, electrical and structural engineers; turbine technicians; geologists; civil and aeronautical engineers; and project managers. In offshore wind, new skills are needed for sub-sea high voltage engineering and for coping with harsh marine environments.
Passenger transport industries	The necessary skill areas include: design, manufacture, construction and maintenance of the electrification infrastructure; advanced skills in power supply technology; new rail signalling

	and train traffic control systems; and management skills to integrate new skills and technology. More generally, skills are needed to support construction, e.g. minimising disruption caused by floods or extreme weather; new technologies; and maintaining and retrofitting existing networks etc.
Biomass/biofuel	The biomass industry could offer 15,300 jobs in the UK economy by 2020. In 2006, the Biomass Task Force identified skills shortages across the whole supply chain from production to the installation of systems. Also in 2006 Energy and Utility Skills UK and others produced an occupational and functional map on renewable energy and updated this in 2007. Areas identified as having further skills and training needs included: architects and builders; systems design; supply chain and production of biomass feedstock; planning; mechanical handling; and efficient fuel delivery and storage.
Anaerobic digestion	Anaerobic digestion is a relatively new area and there are therefore likely to be skills gaps. Energy and Utility Skills UK is identifying the sectors/employers involved and the available job roles, training and standards. An assessment of the requirements for technical competence in this field will also be identified.
Carbon capture and storage	In the longer term, beyond 2020, there might be as many as 30,000 jobs in this sector. The evidence is that the skills needed are not new and can be found in the chemicals, oil and gas, process design and engineering construction industries, in all of which the UK already has strengths. But the extent to which these industries could divert resource is uncertain. Today's operators lack the skills to operate power plant with carbon capture and storage. But overall the industry could build on the chemical process training and qualifications being developed by the National Skills Academy for the Process Industries.

Waste and water	In the water industry, the need is to maintain and manage supply and to increase capacity and resilience (e.g. reducing leakage etc). The industry includes both the regulated water companies (say 20 per cent of the entire industry) and the non-regulated aspects of water company activities and consultants and contractors (perhaps 73,000 people work in these areas). The biggest skills issue is probably the replacement of expert engineers as the current workforce ages, but action to lower energy demand and costs will also require major investment in technologies/processes and the skills to deploy them. In waste, the priority is to minimise and manage waste and to prevent pollution. The sector needs technical competence – which changes as new technical processes such as anaerobic digestion emerge. In fact, skills are needed throughout the hierarchy of waste management. It should be noted too that waste skills cut across numerous sectors including agriculture and land management, processing and construction.
Energy supply and utilities	There are employment opportunities and therefore skills needs in this sector. The civil nuclear industry now employs some 44,000 people and new build nuclear might mean 10,000 jobs a year. The workforce is ageing faster than the UK workforce as a whole and this will create a significant skills gap. New build nuclear will require Apprentices, scientists and engineers and experienced staff are at a premium. In marine energy, skills include: energy efficiency and use of micro-generation; smart meter installation and insulation; increasing generation capacity; retrofitting and increasing resilience; energy conservation and management. Wind energy requires postgraduate mechanical, electrical and structural engineers; turbine technicians; geologists; civil and aeronautical engineers; and project managers with engineering

	qualifications.
Freight logistics industries	Segmentation by supply chain and sub-sector is felt to be the key to understanding how the green economy agenda affects this sector. Jobs calling for green skills have emerged from across the sector but particularly at operative level. Businesses also recognise the need for increased, improved and relevant management skills in the future. Skills needed include: SAFED (safe and efficient driving); alternative fuels development; carbon accounting; data management; efficient equipment design and maintenance; water re-use/recycling; green purchasing; life cycle thinking; and refrigerated storage skills.
Automotive industry (including manufacturing and retail)	Ultra-low carbon vehicles (ULCV): specialist skills will be needed to develop and design advanced new materials and components and to maintain new vehicles. Management skills will be needed to oversee and embed these developments and to improve overall efficiency and sustainability. There is also a need for specialist skill sets in, for example, alternative fuels distribution; and hybrid/electric vehicles. There is evidence that raising employer confidence in the importance of the ULCV sector would strengthen the case for upskilling the workforce.
Land management	The farming industry estimates that it will need 60,000 new people between 2010 and 2020 to replace the current ageing workforce; and that these recruits will need a higher level and more varied skill set than the current workforce and also an understanding of farming in a changing climate. Land management calls on a wide range of skills including: business management; animal husbandry; crop and livestock nutrition; carbon management; climate change adaptation; conservation; flood management; agronomy and soil sciences; plant design, operation and maintenance; crop diversification; carbon capture and storage etc. Currently the

	demand is high for technical skills, but less so for business management.
Other sectors[29]	These sectors understandably have less call for green skills, although there is some specific evidence of need. For example:

• There is a need for lecturers, trainers and assessors to teach in some relevant curriculum areas

• Financial services, accountancy and finance businesses need people with carbon and natural environment accounting skills.

However, it is worth noting that businesses and organisations in all these sectors will need staff with light green skills. |

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[29] The remaining sectors include: creative, media and arts; business and information technology; financial services, accountancy and finance; government; further, higher and work-based education; hospitality; retail; sport and outdoor activities; social care and child support services; health and healthcare; and justice.

Annex 2: Summary of project literature review

Some conclusions

There is evidence of latent demand for green skills, although many employers are not clearly articulating this. As a result the demand-led skills system may not respond as it needs to.

Organisations do not have the right level of awareness or understanding of their green skills requirements and the implications of the green economy. As a result they are unlikely to realise the importance and benefits of incorporating green skills within their business.

Analysis of future demand for employees/skills has already been undertaken in specific low carbon sectors including carbon capture and storage, nuclear and renewable energy. However, there appears to be a lack of analysis in other green industries.

Current and projected shortages of STEM skills may act as a barrier to green growth as low carbon sectors will need to compete for STEM graduates with other industries as a whole.

There is evidence of demand for a light green workforce with more generic green skills across firms and sectors that will give businesses a competitive edge.

There is also evidence of demand for classic leadership skills that will help to drive green transformation throughout organisations.

Many of the skills required to support the transition to a green economy will not be new but will involve doing existing activities with a distinctive green economy awareness and understanding.

Based on the evidence, there are few attempts to look at the skills implications of the transition across the economy. Instead there appears to be a number of sectoral studies looking in detail at conventional low carbon sectors.

Where green skills form a component of existing jobs (light green) rather than the whole job (dark green), there appears to be greater difficulty in articulating demand. This is not surprising as it involves a relatively small change in different ways to a wide range of professions within each organisation. It is uncertain if businesses will ever be able to clearly articulate this kind of need due to the associated complexity, even if CEOs are highlighting sustainability.

UKCES: Review of employment and skills

The findings of the report are based on observations from fieldwork and capture examples of where joint working is effective and has impact. This recent UKCES report[30] identifies four areas of action.

1.   Coherent information to increase awareness of the needs of both individuals and employers to improve outcomes and participation rates in provision.

- Share customer information across services to improve understanding of the needs of individuals, in order to provide a seamless journey and better tailoring of services

- Develop a clearer understanding of employer demand at a local level in order to respond effectively to current and future business needs

- Use performance information as a catalyst to empower individuals, employers and communities to hold local partners to account, enabling informed decision-making and driving performance improvement.

2.   Collaboration between partners through fair and inclusive partnership arrangements that align the goals and resources of local employment and skills systems.

- Reshape existing partnership arrangements to become more inclusive in order to have greater influence and impact

- Identify and work towards common goals that achieve sustainable employment and progression in work. Enabled by an approach that trusts providers and aims to increase their flexibility to collaborate with a wider group of partners operating locally

- Support collaborative approaches by aligning incentives for providers and financial planning cycles.

3.   Customer focus that gives communities a voice to influence and engage with tackling local priorities effectively. Involving individuals and employers directly in design and delivery of provision allows services to be tailored more effectively.

- Understand how to increase customer involvement in design and delivery of employment and skills services

- Explore ways of working that create opportunities for customers and practitioners to design personalised solutions together

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[30] UKCES, Review of Employment and Skills (2011).

- Evaluate performance from the perspective of the customer and the needs of the local community.

  4.   Progression: Once the above enablers are in place then progression in work should be the focus and ultimate collective goal of the employment and skills systems to support individuals to move out of low-paid work.

- Define "progression" in work and measure current levels of progression in the labour market

- Adopt a high-level universal commitment to sustainable employment and progression

- Explore a "career clusters" approach to support individual progression at a local level.

HE Academy: First-year attitudes towards and skills in sustainable development

The National Union of Students was commissioned by the HE Academy (HEA) to research first-year university student attitudes to skills in, and aspirations for, sustainable development in order to ascertain the "sustainability literacy" of today's students[31]. Structured desk research was undertaken to: (a) understand existing policy; (b) gain insight into student attitudes following further education; and (c) inform bespoke empirical research.

Recommended outputs: The contribution of sixth form teaching is apparent in the existing skills and knowledge of first-year HE students. However, those responsible for teaching subject disciplines that are distant from the more obvious education for sustainable development (ESD) content (e.g. mathematics, English, arts and languages) can fail to see how ESD can be included in their teaching. An online resource would serve to improve the baseline skills and knowledge of students. There exist international examples on which to draw in developing such a resource.

There is a need to work on student demand. For sustainable development to gain further foothold within the curriculum, students need to be aware of how it can support their employability. Partnerships with business would help here. A diversion of funds into creating this demand through communication is likely to result in an increase in support from students, HE institutions and employers. Professional organisations may have an important role in this process.

This research additionally indicates that it is essential that future policy focuses on fully incorporating sustainable development principles (as captured by the HEFCE definition) rather than on additional modules that promote skills but are undertaken

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[31] HE Academy, First-year attitudes towards and skills in sustainable development (2011).

only by a minority. To make this point absolutely explicit, it is not that it would be good if engineers, architects, economists, town planners, managers and others were taught more about sustainable development. It is rather that sustainable development is something that any good engineer, architect etc should be expected to know about. There are already professional bodies such as the Royal Academy of Engineering that recognise this. Further to this, it is essential that in incorporating sustainable development principles into the curriculum, an interdisciplinary approach is used, particularly in the context of the funding reduction for non-STEM subjects.

Institute for Learning: Green economy survey

The IfL carried out an online member survey specifically around green skills and the green economy that received over 3,000 responses[32]. The key theme was around the need for more continuing professional development (CPD) in green skills. Members felt that organisations (national and individual colleges and providers) should support CPD opportunities to allow the exchange of good practice, giving teachers and trainers time to do this. Ideally, CPD time and resources should be funded by the government to give extra impetus. CPD opportunities should be subject-specific.

TUSDAC/Unionlearn: report of green skills working group

This short paper[33] strongly suggests the following priorities for trade union activity:

1.   Developing and promoting "environmental literacy" in wider society. At the heart of this is a knowledge set for all workers to advance the adaptation of workplaces and working practices in tackling climate change.

2.   Developing models for the creation of green employment. Models for creating at different levels: national, sectoral and local.

3.   Promoting just transition and equality of access to green careers and professions with regard to creating opportunities for the unemployed and upskilling.

4.   Supporting development of strategic skills for the green economy, building upon the work of UKCES.

A list of public policy interventions TUSDAC have asked trade unions to focus on include: state activity and employer participation; pathways to low carbon skills in the sectors; the role of schools, Further and Higher Education in advancing low carbon

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[32] Institute for learning, Green economy survey (2011).

[33] More information on Unionlearn activities can be found at http://www.unionlearn.org.uk/

skills, particularly STEM skills; advanced awareness of the need for climate adaptation skills; and equality of opportunity and diversity of employment.

HM Government: Meeting the low carbon skills challenge – a government response

This response by a previous government to a consultation[34] found the key themes raised by consultees as follows: the need for a more flexible and responsive skills delivery system; the need for more flexible qualifications which support work-based learning; the need for more support and promotion of STEM skills; 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.

Business in the Community: Leadership skills for a sustainable economy

This report indicated that "classical leadership skills are critical at all levels because of the need to drive transformational change"[35]. There are technical and sector skills shortages and a need for skills in: business planning and carbon accounting skills and the development of new managerial capacities.

Leading companies are already taking action: WSP, EDF Energy, Accenture, Marks and Spencer and Lloyds Banking Group. There is a demand for: more and better executive education; tailored employee engagement activities; and inspirational communication, awareness and understanding.

UN Global Compact – Accenture CEO Study 2010: A new era of sustainability

This report[36] represents the summation of more than 100 in-depth interviews with global leaders, an additional 50 interviews with other senior business executives and an online survey of 766 Global Compact member CEOs. Survey respondents were drawn from nearly 100 countries and across over 25 industry sectors.

One of the most important headline indicators was that 93 per cent of CEOs saw sustainability as important to their company's future business. Sustainability had grown in importance since the previous Global Compact survey in 2007. Strengthening brand, trust and reputation was the strongest motivator for taking

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[34] DECC, Meeting the Low Carbon Skills Challenge – a Government response (2010).

[35] Business in the Community supported by EdF Energy, Leadership Skills for a Sustainable Economy.

[36] UN Global Compact-Accenture, A New Era of Sustainability: CEO Study 2010.

action on sustainability, identified by 72 per cent of CEOs. 58 per cent of respondents selected the consumer among their most important stakeholders, above employees (45 per cent) and governments (39 per cent). 91 per cent of CEOs reported that their company would employ new technology (e.g. renewable energy) to help their sustainability goals over the next five years.

A critical element for CEOs was partnership. 78 per cent believed that their companies should engage in industry collaboration and multi-stakeholder partnerships. However, CEOs believed that the influence of non-governmental organisations (NGOs) was declining for corporate sustainability agendas. Just 15 per cent of CEOs identified NGOs as one of the key stakeholders influencing their approach to sustainability, down 12 per cent from the 2007 survey.

There was widespread agreement among CEOs as to what the new era would look like for sustainability: it was one where sustainability was embedded in the strategic operations of a company. And progress was being made – 81 per cent of CEOs, compared with just 50 per cent in 2007 – thought sustainability issues were fully embedded in their companies' strategies and operations. However, conversations suggested that sustainability had yet to permeate all the core operations of a business – capabilities, processes and systems.

Asked when they expected the majority of companies to fully integrate sustainability, 54 per cent of CEOs believed that the tipping point was only a decade away, and 80 per cent thought it would occur within 15 years. Such optimism would have been unthinkable in 2007. However, in order to accelerate to the tipping point, companies would have to actively shape consumer and customer awareness, attitudes and needs; generate new knowledge, skills and mind-sets for sustainable development; create an investment environment favourable to sustainable business; embed new concepts of value, performance and individual levels; and create a clearer and more positive regulatory environment for sustainability. Two-thirds of the CEOs surveyed were looking to the UN Global Compact to facilitate the sharing of good practice.

Ecorys: Programmes to support environmental skills

This report[37] by Ecorys Research and Consulting for the European Commission, DG Environment, found that there was great variety among Member States in environmental skills programmes. It found that many environmental programmes do not have universal recognition of the qualifications participants receive and that accreditation might help increase the mobility of green-skilled workers. There was potential to promote exchange of best practice, not only between Member States but also between businesses and others involved in the development of green workforce skills.

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[37] Ecorys Research and Consulting, Programmes to promote Environmental Skills: Final Report (2010).

New Engineering Foundation (NEF): Low carbon task force – Project Energise

The report[38] states that to achieve the transition "businesses across all sectors will need to future-proof their strategy, innovate low carbon products and services and equip their workforces with the knowledge and skills they need to ensure their organisations are fit for the future. The ability to articulate the skills required for future success and then attract, develop and retain employees with those skills will be one of the determining factors for business in how they respond to the challenges now and in the future."

In the case of resource efficiency as a driver to engage, organisations will need skills that help them make the move to adopting low carbon operations. A new set of skills will be needed to review and re-engineer existing business practices, together with such skills as sustainable procurement, environmental management and risk management. Skills focusing on full product lifecycle analysis will deliver resource efficiency but may also assist organisations in identifying opportunities for development within a product's life cycle.

In the case of opportunity, organisations will need more specific scientific, technical and engineering-based skills to develop and produce low carbon goods and services. Many of the opportunities will be found through augmentation of an existing product using low carbon technologies and processes.

In the case of sustainability, organisations will need leaders and managers who understand and can apply the concept of sustainable development to inform working practices and to ensure a strong ethical emphasis on corporate social responsibility as a key driver for change. In addition, organisations will need access to talented individuals whose education and training have given them the knowledge and skills to put sustainable development into practice in all aspects of their lives.

The report states that "developing the skills to support the transition to a low carbon economy will necessitate close collaboration between businesses at the forefront of low carbon developments and education and training providers. Such collaboration will ensure that the curriculum offer is re-designed and aligned to regional specialisms and identified need, and that the delivery capability and capacity exist."

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[38] National Engineering Foundation, Low Carbon Task Force – Project Energise (2010).

PwC: Strategic skills needs in the low carbon energy generation sector

This report[39] for the National Strategic Skills Audit for England 2010 by PricewaterhouseCoopers LLP came to a number of conclusions. The sector is currently relatively small-scale in terms of direct jobs, but has a great deal of potential for growth. Current and projected shortages of skills in the sector, particularly in relation to STEM subjects, mean that the low carbon sector will need to compete for STEM graduates with industry as a whole. Wind and nuclear will be the most important sectors in driving growth between now and 2020, but barriers such as access to finance and planning are significant. Marine and carbon capture and storage are unlikely to contribute materially to employment in the period to 2020, and will come to fruition thereafter. The extent to which new jobs will necessarily be generated throughout the value chain in the medium term varies by sub-sector. In the wind and nuclear sectors, it is likely that there will be relatively large numbers of jobs created in construction and installation, given the ambitious plans for installing new capacity in 2020. However, there is less likelihood of significant numbers of manufacturing jobs. There is no clear evidence that technical jobs in the sector will change markedly over the next decade – rather, differences are likely to emerge by degree. There is a lack of official national statistics on the low carbon sector and the ongoing debate over what constitutes a "green job". The government will play a critical role in how it seeks to stimulate demand with incentives, and also in how it can remove barriers that could otherwise hinder growth.

Within selected sectors, the report finds identified shortages in the following:

- Wind energy: mechanical and electrical engineers with a postgraduate qualification; structural engineers with a postgraduate qualification; turbine technicians with the skills and qualifications required to operate inside the nacelle of a wind turbine; geologists; civil engineers; aeronautical engineers; project managers with an engineering qualification

- Marine energy: unlikely to create significant employment by 2020

- Carbon capture and storage: in the period to 2020 jobs created will be for demonstration projects; longer term employment could reach 30,000

- Nuclear: direct employment in the nuclear industry is approximately 24,000 and indirect a further 20,000. A number of units will go offline in this decade, resulting in reductions in direct and indirect employment. The workforce profile is ageing faster than the UK workforce as a whole, which will create a significant skills gap.

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[39] PricewaterhouseCoopers LLP, Strategic Skills Needs in the Low Carbon Energy Generation Sector: a Report for the National Skills Audit for England 2010 (2010).

Cogent: Next generation: skills for new build nuclear

The report[40] analysed the workforce required to build six twin nuclear stations capable of generating 16 GWe (16 billion watts electricity). It stated that the nuclear industry needs 10,000 jobs a year. Employment in the manufacture, construction and generation of a twin-unit station will be 21,200 person-years over six years.

Amongst the capacity issues mentioned were: the supply of Apprentices, scientists and engineers; the age profile of the existing workforce; long induction periods for experience; and competing demand for experienced people from national and international projects.

Plans to improve these areas include a pilot nuclear Apprentice programme, a skills accreditation scheme, skills risk monitoring and regional skills scenarios.

Aldersgate Group: Mind the gap

This report[41] states that:

- In many key jobs there are similarities between the skill sets that already exist and those needed in the low carbon economy

- Education in STEM skills will be very important

- The debate about climate change and the need to de-carbonise the economy has moved quickly and most people have been left behind. Basic concepts are not understood by people at all levels within the UK workforce, including managers in very senior positions.

It highlights that:

- More rapid progress will be made if we develop training programmes to enhance current skills rather than trying to build up new green skill sets from scratch

- Companies will need to ensure that their staff appreciate the reasons for change and are sufficiently knowledgeable to take an active part in the process

- A successful transition requires foresight based on careful research and imagination

- Greater certainty is required from the government to enable companies to invest in transition.

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[40] Cogent, Next Generation: Skills for New Build Nuclear.

[41] Aldersgate Group, Mind the gap (2009).

It recommends that (within the context of the previous administration) the government should:

- Ensure all major environmental policies – such as increased subsidies for offshore wind or the CRC Energy Sufficiency Scheme – are accompanied by a corresponding skills strategy

- Provide sufficient investment and training. Public support is necessary for the development of core skills in targeted sectors. Subsidies should be available for less expensive and time-consuming training to build and transform existing skills. The aim should be to focus on existing skills whenever possible, rather than creating new skills

- Make training institutions fit for purpose. Policy and funding directions should be based on future jobs and skills needs and the government must provide strategic leadership. While certain sectors of the economy will go through more transformation than others, all sectors must have access to skills in resource efficiency, energy efficiency and the dematerialisation of products

- Drive demand for environmental skills. The government should mobilise business engagement by providing initial funding programmes to help alter long-term business practices and support in-house training programmes

- Reform its communication strategy. The current definition of a green job is unclear. The government should engage more actively with the UK workforce about the implications of the shift to low carbon with more practical information.

Accenture: Planting green seeds today to grow tomorrow's talent

This short report[42] points out that "over the next decade, organisations and their employees who are environmentally sensitive are likely to develop an edge over organisations whose workers are less inclined to think or act green". It points out that a cohesive green workforce development programme would transcend the green awareness briefing sessions currently offered by many companies. It indicates the external drivers accelerating the green agenda, such as the European Commission's call for a global carbon trading market; and increased support for sustainability amongst chief executives. There must be light green employees not directly involved in the dark green jobs such as turbine maintenance technician but "who have the training, the latitude and the incentives to match their enthusiasm for environmental issues". The authors think that today's young people are more likely to offer their employment services to employers who exemplify sustainability values. The central challenge, though, is "to tie disparate efforts into a holistic approach to development of a green workforce".

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[42] Accenture, Planting Green Seeds Today to Grow Tomorrow's Talent (2009).

ProEnviro: Skills for a low carbon and resource-efficient economy: a review of evidence

This report[43] was the first attempt to bring together research and stakeholder views on skills for a low carbon and resource-efficient economy. The specific objectives were: to develop overviews of the generic and specific skills requirements and of stakeholder understanding and awareness; and to identify gaps in evidence and recommend priority areas for future research.

The research found that overall the evidence base on low carbon and resource-efficient skills is weak. Research was being conducted into many aspects of the low carbon and resource-efficient economy but not looking at it as a whole.

The study identified a range of both generic (cross-sector) and sector-specific skills as priorities for a successful transition to a green economy. It also highlighted that a lot of the skills were not new. They already existed but not in sufficient quantity or they needed to be applied in new situations or adapted with further training for a low carbon and resource-efficient context.

There was evidence of a latent demand for low carbon and resource-efficient skills. This demand was not being articulated by many employers and as a result the demand-led skills delivery framework was ill-equipped to anticipate and respond. Low carbon and resource-efficient skills needed to be considered by and integrated into the whole of the skills delivery system.

Organisations did not have the right level of understanding or awareness of skills requirements. Nor did they appreciate the implications of a green economy and consequently their importance and potential benefits to their business. Only when these links and a clear business case were made would businesses demand low carbon and resource-efficient training.

The report considered it unlikely that current levels of skills training would be sufficient, if the current latent demand were to be clearly articulated (although further evidence-based work and forecasting were recommended to quantify this).

The skills delivery system and funding had been focused on lower level skills and this did not maximise support for low carbon and resource-efficient skills which were cited as mainly being level 3 and above.

The written evidence gathered in the research did not demonstrate a high level of integration of low carbon and resource-efficient skills needs into organisational

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[43] ProEnviro, Skills for a low carbon and resource efficient economy: A review of evidence (2007). A report commissioned by Defra.

priorities or general management practices. The report stated that doing this was key to mainstreaming understanding, knowledge, skills and thinking.

The report also stated that some low carbon and resource-efficient skills were being integrated into qualifications and National Occupational Standards to a limited extent, but there was still a long way to go.

Department for Business, Innovation and Skills

Department of Energy and Climate Change

Department for Environment, Food and Rural Affairs

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