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EMPLOYMENT AND SKILLS

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Sector Skills Assessment for the Energy Production and Utilities Sector

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Views expressed in this Evidence Report are not necessarily those of the UK Commission for Employment and Skills.



Foreword

The UK Commission for Employment and Skills is a social partnership, led by Commissioners from large and small employers, trade unions and the voluntary sector. Our ambition is to transform the UK's approach to investing in the skills of people as an intrinsic part of securing jobs and growth. Our strategic objectives are to:

- Maximise the **impact** of employment and skills policies and employer behaviour to support jobs and growth and secure an internationally competitive skills base;
- Work with businesses to develop the best market solutions which leverage greater **investment** in skills;
- Provide outstanding labour market **intelligence** which helps businesses and people make the best choices for them.

The third objective, relating to intelligence, reflects an increasing outward focus to the UK Commission's research activities, as it seeks to facilitate a better informed labour market, in which decisions about careers and skills are based on sound and accessible evidence. Related, impartial research evidence is used to underpin compelling messages that promote a call to action to increase employers' investment in the skills of their people.

Intelligence is also integral to the two other strategic objectives. In seeking to lever greater investment in skills, the intelligence function serves to identify opportunities where our investments can bring the greatest leverage and economic return. The UK Commission's third strategic objective, to maximise the impact of policy and employer behaviour to achieve an internationally competitive skills base, is supported by the development of an evidence base on best practice: "what works?" in a policy context.

Our research programme provides a robust evidence base for our insights and actions, drawing on good practice and the most innovative thinking. The research programme is underpinned by a number of core principles including the importance of: ensuring '**relevance**' to our most pressing strategic priorities; '**salience**' and effectively translating and sharing the key insights we find; **international benchmarking** and drawing insights from good practice abroad; **high quality** analysis which is leading edge, robust and action orientated; being **responsive** to immediate needs as well as taking a longer term perspective. We also work closely with key partners to ensure a **co-ordinated** approach to research.

Sector Skills Assessments (SSAs) are key sources of authoritative and focused sectoral labour market intelligence (LMI), designed to inform the development of skills policy across the UK. They combine “top-down” analysis of official data with bottom-up intelligence to provide a consistent, comparable and rich understanding of the skills priorities within different sectors of the economy, across the four UK nations.

Sharing the findings of our research and engaging with our audience is important to further develop the evidence on which we base our work. Evidence Reports are our chief means of reporting our detailed analytical work. All of our outputs can be accessed on the UK Commission’s website at www.ukces.org.uk

But these outputs are only the beginning of the process and we are engaged in other mechanisms to share our findings, debate the issues they raise and extend their reach and impact. These mechanisms include our *Changing Behaviour in Skills Investment* seminar series and the use of a range of online media to communicate key research results.

We hope you find this report useful and informative. If you would like to provide any feedback or comments, or have any queries please e-mail info@ukces.org.uk, quoting the report title or series number.

Lesley Giles

Deputy Director

UK Commission for Employment and Skills

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Executive Summary

The aim of this report is to provide authoritative labour market intelligence (LMI) for the energy production and utilities sector to inform the strategic decision making of national governments in the development of employment and skills policy. It is one of 15 UK Sector Skills Assessment (SSA) reports produced by Sector Skills Councils and the UK Commission for Employment and Skills.

For the purposes of this report, the energy production and utilities sector (“the energy sector”) is defined as the activities relating to:

- the extraction of petroleum and natural gas;
- mining and quarrying of coal, lignite and natural ores;
- the generation of electricity from fossil, nuclear and renewable sources;
- the transmission and distribution of electricity, gas and water;
- the collection, treatment and disposal of waste.

It should be noted that, although these activities fall within the remit of Cogent, Energy & Utility Skills and Proskills, they do not represent the entire footprints of those SSCs.

Current performance of the sector

The energy sector employs 473,000 people within the UK, representing 1.6 per cent of total UK employment. 73 per cent of the sector’s employment is located in England. Sector employment is distributed across 13,290 establishments in the UK.

The UK energy sector produced Gross Value Added of £26.3billion in 2008, which is 2.1 per cent of total UK GVA. Given the high value of outputs produced by the energy sector with a relatively modest workforce, it is unsurprising that GVA per person employed is substantially higher than all other sectors of the UK economy at £131,000 per employee (£190,000 when *ex-regio* activity is included).

The importance of the energy sector to Scotland (and the importance of Scotland to the energy sector) is underlined by the fact that Scotland accounts for more than four per cent of UK GVA. The sector generates an estimated £322,000 per employee job in Scotland (when the *ex-regio* component is included), and is the base for 19 per cent of the energy sector’s UK workforce.

Within the energy sector, the largest sub-sector is electricity and gas supply, which employs around 37 per cent of the sector's workforce. This is followed by waste management-related activities, which accounts for 27 per cent of the sector's workforce, and mining and quarrying-related activities, accounting for 22 per cent.

Employment in the energy sector grew steadily between 2003 and 2008. However, in 2009 there was a slight fall, followed by a more significant reduction of 10,000 in 2010. These recent falls in employment numbers are the result of the global recession and a reduction in final demand for the sector's outputs. This is particularly the case in the extractives and mineral processing (EMP) industries, which are impacted heavily by trends in the construction sector.

For every one new business start-up in the energy sector in 2010, just 0.3 businesses closed. This is lowest ratio of closures to start-ups of any sector (however, it should be recognised that within the energy sector, some sub-sectors will have suffered more closures than others; e.g. within the EMP industries). Across all sectors, for every new business start-up that occurred, 1.2 businesses closed.

Almost two-thirds (65 per cent) of all new business start-ups in the energy production and utilities sector in 2009 were created in the waste management industry. This gives an indication of the rapid growth that the waste management industry is currently experiencing as it continues its transformation from an industry based primarily on disposal, into a highly sophisticated value-recovery industry.

The workforce

Overall, 92 per cent of all employees in the energy sector are employed full-time, with only eight per cent employed on a part-time basis. This is the highest proportion of full-time workers of any sector in the UK economy and compares to the all economy average 73 per cent.

As with part-time employment, self-employment is also relatively rare in the energy sector, with just five per cent of the workforce choosing to work for themselves as opposed to being employees (this compares to the all economy average of 14 per cent).

The age profile of the energy sector's total workforce is slightly older than the UK's total workforce. It employs relatively few under 25 year-olds and a relatively high proportion of the workforce is in the 45-59 age group. The proportion aged over 60 years is comparable to the UK average (eight per cent). However, data collected by EU Skills reports that the age profile of the energy sector's technical and engineering workforce is considerably older, with a significant proportion of that workforce retiring over the next decade.

Males account for 81 per cent of total employment in the energy sector, compared to 54 per cent across the whole economy. Over the last decade the proportion of females working in the energy sector has reduced by nearly two percentage points. This, however, hides the real extent of the gender split as it includes the non-technical workforce. Data taken from EU Skills' EUSR schemes (a series of both mandatory and voluntary schemes which allow individuals and companies to track their skills and competencies) show that of the 125,000 workers registered across the electricity, gas and water industries, almost 122,000 (97 per cent) are male.

The energy sector employs the second lowest proportion of people from black or minority ethnic groups of all 15 SSA sectors in the UK at just four per cent (only agriculture, forestry and fishing is less ethnically diverse). This is less than half of the nine per cent all economy average.

Over the past decade the number of managers employed in the energy sector has increased by 27,000; an increase of 47 per cent over 2002 levels. Likewise, employee growth has also been seen in professional (+17,000), skilled trades (+8,000), process, plant and machine operatives (+6,000), and associate professional (+5,000) occupations. Skilled trades and machine operatives remain a significant element of the sector's workforce (31 per cent, compared to 18 per cent across all sectors). Nearly all workers in these occupations are male.

Demand for, and value of, skills

Employers are increasingly looking for qualifications that are multi-utility in nature and standardised across organisations and industries. This ensures that qualifications and proven competencies gained in one organisation are recognised when workers either gain employment in another company within the sector or their current employers win a contract to work in other parts of the sector (e.g. a supply chain contractor wins a contract to operate on another gas distribution network).

Project management and management and leadership skills, particularly when they are combined with high level technical skills, are highly sought after in the energy sector. Amongst lower-level skilled occupations, health and safety, customer service and basic skills are crucial to the sector's success.

Employers in the energy sector are significantly more likely to offer training to their workforce: 69 per cent did so in 2011, compared to 59 per cent across all sectors. In Scotland the figure rises to 81 per cent of energy employers.

Where training is offered to the workforce, it is principally job-specific training (87 per cent) or related to health and safety (84 per cent), which is of greater importance to the energy sector than across the economy as a whole. This is unsurprising given: (i) the nature and environment of much of the sector's activities; and (ii) the regulatory and legislative requirements that need to be met by employees working in many parts of the sector (for example on the electricity, gas and water networks).

The qualification profile of the energy sector's workforce is very similar to that of the entire UK workforce as a whole. While 33 per cent of the sector's workforce hold a level 4 or higher qualification (compared to 37 per cent across the whole economy), six per cent have no qualifications at all (seven per cent across the whole economy). However, this does mask some significant sub-sectoral differences. In the EMP, electricity, gas and water sub-sectors fewer than three per cent of the workforce hold no qualifications, while in the waste management sub-sector the figure is closer to 19 per cent.

Nearly half (49 per cent) of managers and professionals in the UK energy sector do not have a level 4 or higher qualification, which compares rather unfavourably with the all economy average of 39 per cent.

Extent of skills mis-match

Across the nations of the UK, energy sector vacancies are more likely than average to be reported in:

- UK: machine operatives and associate professionals
- England: machine operatives
- Scotland: Professionals, associate professionals, skilled trades and machine operatives

- Wales: Associate professionals, admin/clerical staff and sales and customer services staff

Nine out of ten (89 per cent) of energy and water employers that were recruiting stated that they were seeking scientific and mathematically skilled staff; a significantly higher proportion than the whole economy average of 72 per cent.

Across the whole economy, some 275,000 employers report having vacancies (11 per cent of all employers); 91,000 of these report having hard-to-fill vacancies (four per cent), while 68,000 report having skills shortage vacancies (three per cent). Within the energy sector 1,800 employers have vacancies (14 per cent), with 635 (five per cent) reporting hard-to-fill vacancies and 532 (four per cent) reporting skills shortage vacancies.

Of the 9,400 vacancies reported in the energy sector, 1,600 (17 per cent) are classified as hard-to-fill vacancies and 1,200 (13 per cent) are skills shortage vacancies. These are very slightly less than the proportions seen across the UK economy as a whole (23 per cent and 16 per cent respectively).

Skills gaps within the current workforce also affect the energy sector slightly more than the UK average. One in six (16 per cent, or 2,000) energy sector employers report having skills gaps within their workforce, compared to 13 per cent (301,000) of employers across the whole economy. This equates to 17,250 energy sector employees (five per cent of all employees in the sector) in need of training/ skills development in order to become fully proficient in their role, and nearly 1.5 million people (five per cent) across the whole economy.

Within the energy sector the average hourly wage is £2.02 higher than the national average, at £16.62 per hour. This is an increase of 69 pence, or 4.3 per cent, over 2008 rates (compared to an increase of 4.7 per cent across the whole economy).

Drivers of change and their skills implications

Seven drivers of change have been identified:

- *Regulation and multi-level governance:* Economic and competency regulation is an important influence on the demand for skills in certain parts of the sector.
- *Demographic and population change:* Population change itself can lead to increases or decreases in consumer demand for different kinds of goods and services, leading to expansion and contraction in related job volumes.

- *Environmental change*: Environmental change may lead to skills needs as a result of government policy and investment to tackle climate change through stimulating the development of a low carbon economy and determining the exact make-up of energy generating capacity and waste treatment activities.
- *Economics and globalisation*: The effect of economic growth in other sectors of the UK economy can play an important role in the success, or otherwise, of parts of the energy sector.
- *Technological change* (including new developments and new applications of existing technologies): The energy sector is a very capital intensive industry and the future success of the sector is dependent upon its ability to adapt to new requirements through the continued introduction of new technologies. This is creating demand for skills at higher levels in research and development (R&D); at the intermediate level in terms of operation and maintenance; and at lower levels in manufacturing.
- *Changing values and identities*: Changes in values and identities include attitudes to work, including willingness to work in an often-perceived “heavy” industry or in engineering in general. This can affect the availability of labour through choices made about the type of work sought and working conditions.
- *Changing consumer demand*: The development of consumer preferences for goods and services can influence factors such as energy generation and the management and handling of waste.

Future skills needs

Ensuring security of energy supply and managing the shift towards a low carbon economy are central to determining the UK's energy mix over the coming years. This situation is complicated by the need to ensure planning consent and the availability of private-sector finance. Strong government leadership is central to reducing this uncertainty in the market.

Working Futures data predicts modest growth across the sector over the next decade. However, other sources suggest that growth could be significantly higher (particularly in energy generation). There is agreement, however, that higher level skills (level 4+) will become increasingly in demand from sector employers. Employment in wind and marine generation could increase by 45,000 (in a medium growth scenario), while up to 140,000 workers could be required in order to deliver the nuclear new build programme through to 2025. A minimum of 86,000 new recruits will be required in the gas, electricity and water industries through to 2025 to replace those that leave the workforce.

Priority areas for action

The following have been identified as priority areas for action for the sector:

- Improving the image of the sector in order to attract the skilled employees needed to meet sector ambition.
- Ensuring appropriate Apprenticeship frameworks are in place and promoting these as attractive entry routes into the sector for all ages and abilities.
- Establishing effective mechanisms that ensure, and prove, the competency of the workforce in a way that meets legislative and regulatory requirements and which are consistent and recognised across sector employers (where appropriate).
- Ensuring that mechanisms are in place, and promoted to employers, which ensure that the higher level skills needs of the workforce can be delivered (particularly supporting progression routes from level 3 upwards).
- Ensuring that the skills needed for research, development, installation, operation and maintenance of new technologies are identified and the necessary provision in place to deliver them.
- Promoting the importance of management and leadership skills across the sector and ensuring that appropriate provision is available to the sector.
- Ensuring that education and skills providers operating within the sector are aware of, and capable of meeting, the current and future skills of the sector.

1 Introduction

1.1 Purpose of report

The aim of this report is to provide authoritative labour market intelligence (LMI) for the energy production and utilities sector to inform the strategic decision making of national governments in the development of employment and skills policy. It is one of 15 UK Sector Skills Assessment (SSA) reports produced by Sector Skills Councils and the UK Commission for Employment and Skills.

SSAs combine top-down data from official sources with bottom-up sectoral intelligence to provide a consistent, comparable and rich understanding of the skills priorities within sectors across the four UK nations. The reports have been produced to a common specification (developed by the UK Commission in consultation with the four UK governments) and follow a consistent structure.

Reports have been produced for the following sectors of the economy:

- Agriculture, forestry and fishing
- Energy production and utilities
- Manufacturing
- Construction building services, engineering and planning
- Wholesale and retail trade
- Transportation and storage
- Hospitality, tourism and sport
- Information and communication technologies
- Creative media and entertainment
- Financial, insurance & other professional services
- Real estate and facilities management
- Government
- Education
- Health
- Care.

The reports contain intelligence on sectors and sub-sectors of particular interest to the four UK governments. As each nation has different 'key sectors', that are defined in different ways, it hasn't been possible to define the SSA sectors in a way that matches precisely the key sectors identified by each nation government. Therefore, as far as possible, data has been reported in such a way that it can be aggregated to produce an overall picture for key sectors of interest. In some cases this will involve gathering information from more than one SSA report.

The reports are designed to provide sectoral intelligence at a relatively broad level for strategic decision making purposes. Whilst they do contain some sub-sectoral and occupational intelligence, further intelligence at a more granular level may be available from individual Sector Skills Councils.

In addition to the main UK reports, executive summaries have been produced for Scotland, Wales and Northern Ireland. The UK reports contain information on key regional variations between the four UK nations and within England where appropriate (for example if sectoral employment is focused in a particular geographic area). However, the reports are not designed to provide a comprehensive assessment of sectoral skills issues beyond the national level.

1.2 Defining the sector

The energy production and utilities sector (herein referred to as the energy sector) is defined by the UK Commission as those activities that take place within companies operating in the following two-digit Standard Industrial Classification (SIC) codes:

- 05 Mining of coal and lignite
- 06 Extraction of crude petroleum and natural gas
- 07 Mining of natural ores
- 08 Other mining and quarrying
- 09 Mining support activities
- 35 Electricity, gas, steam and air conditioning supply
- 36 Water collection, treatment and supply
- 37 Sewerage
- 38 Waste collection, treatment and disposal

- 39 Remediation activities and other waste management services

All of the data presented in this report reflects the situation within these SIC codes only. In most cases these SIC codes are combined to form one homogeneous economic sector. Therefore, it must be remembered that the resulting conclusions are only representative of the energy production and utilities sector as a whole.

It is important to note that there are parts of the sector that are not represented within this list of SIC codes but, nevertheless, play a role in activities undertaken within the sector. This includes companies within the supply chain (e.g. contractors, technology developers and manufacturers). Many of the asset owners in the sector (e.g. those companies that own, or have a statutory duty to operate and maintain, the energy infrastructure) contract out various, and substantial, elements of operation. For example, much of the work associated with the operation and maintenance of the UK's electricity, gas and water networks is carried out by supply chain companies, as is a growing proportion of the work carried out in quarries and mines. Supply chain companies are generally specialists in their area of operation (e.g. network construction) and work across the energy production sector and other sectors (for example, telecommunications or logistics). These supply chain companies will not always be included within the list of SIC codes above. Generally they will be coded as engineering or business support companies.

Similarly, in waste management, a substantial part of the industry is still undertaken by local authorities, and this workforce would be included under SIC code 84 Public administration. Within the nuclear industry, employers involved in the processing of nuclear fuel (SIC code 24.46) are not included in the sector definition used in this report.

Therefore, as a result of the sector definition used for this report, it is important to remember that: (i) employment estimates are likely to under-estimate the total number of employees that actually deliver the operations included within this sector definition and (ii) that because the supply chain and some parts of the sector operate in a highly competitive, sometimes global, market, their skills issues can be quite different from those that occur in other areas of the sector.

1.3 Sector Skills Councils

Sector Skills Councils (SSCs) are independent, employer-led, UK-wide organisations. The SSCs and the UK Commission are committed to working in partnership across the four nations to create the conditions for increased employer investment in skills which will drive enterprise and create jobs and sustainable economic growth. We share a belief that the sectoral approach is the most effective way to do this.

The network of licensed Sector Skills Councils provides the employer leadership to address skills needs within and across sectors. The SSC licence is the unique identifier which signals to employers and government that they are a focal point for raising skills in sectors to drive enterprise, jobs and growth.

Through their sectoral reach, SSCs are ideally placed to articulate the voice of employers on skills; to develop innovative skills solutions and to galvanise employer ambition and investment in skills and job creation. In doing so, they are key strategic partners in creating the conditions for increased investment in skills.

Three SSCs were involved in the writing of the SSA report for the energy sector:

- **Cogent:** The industries served by Cogent range from the highly strategic nuclear industry, to the world-leading pharmaceuticals industry. Many parts of the sector are incubators of new technologies, particularly chemicals (the home of industrial biotechnology) and polymers, which is seeing tremendous growth in composites and associated applications.

However, not all of Cogent's footprint is included within the sector definition used for this report. More information about Cogent, including its published labour market intelligence, can be found at: <http://www.cogent-ssc.com>

- **Energy & Utility Skills:** EU Skills' footprint includes the electricity, gas, waste management and water industries, as well as large-scale renewable energy generation. The whole of EU Skills' footprint is included within this report, with the exception of the domestic gas installer/ engineer workforce. This is included within the Construction SSA report.

More information about EU Skills, including its published labour market intelligence, can be found at: <http://www.euskills.co.uk>

- **Proskills** – Proskills represents the interests of the industries that make up the process and manufacturing sector. These include: Building Products & Refractories; Coatings; Ceramics; Extractive & Mineral Processing; Furniture, Furnishings & Interiors; Glass and Related Industries; Paper; Printing; and Wood.

Only the Extractive & mineral processing sub-sector is included within the scope of this SSA report. The remainder of Proskills' footprint is included within the Manufacturing SSA report. More information about Proskills, including its published labour market intelligence, can be found at: <http://www.proskills.co.uk>

1.4 Summary of methodology

This report combines top-down data with bottom-up intelligence to provide a rich assessment of sectoral skills priorities that is consistent and comparable with assessments produced for other sectors of the economy.

Three main types of information have been drawn on in the preparation of this report:

- Economy-wide quantitative data from core labour market information sources (such as the Labour Force Survey and the UK Commission's Employer Skills Survey)
- Sectoral, sub-sectoral and occupational specific quantitative data generated by SSCs/ sector bodies and others (including Government departments and agencies, academics and professional associations)
- Qualitative information collected by SSCs/ sector bodies and other organisations

To ensure consistency and comparability across all 15 SSA reports, data from core labour market information sources was centrally collected, processed and formatted. It was then distributed by the UK Commission to SSCs/ sector bodies for inclusion within the reports. This data was quality assured by contractors, the UK Commission and by Sector Skills Councils.

To meet consistency requirements, sub-sector analysis of data from core sources has primarily been undertaken at a 2-digit Standard Industrial Classification (SIC) code level (or by combining 2-digit SIC codes where appropriate).

Data from core sources has been supplemented within the report with data from sector-specific sources.

Each SSC undertakes a range of specific research activities for their respective sectors. The exact nature and timing of these research activities is determined by each SSC in collaboration with their employers and partners. It is important to note that each SSC produces research to influence the skills activities of their own sectors and not necessarily for the benefit of the whole economy through collaboration and aggregation (although this does happen when there are cross-cutting themes which affect more than one sector).

There are many reasons why SSCs undertake and commission their own sector-specific research. Chief among these are the inability of national research and surveys to provide the kinds of in-depth intelligence needed to determine sector-specific issues on which policy responses can be based. This is particularly the case within each of the devolved administrations, where sample sizes of national surveys can severely limit the available analysis. This is particularly the case in the energy sector where the number of establishments in each nation can be very small.

The report also draws on qualitative research that has been undertaken to explore sectoral skills issues in more detail. Qualitative research with small samples of employers (and others), most commonly through interviews and focus groups, seeks to provide rich and detailed understanding and insight, rather than measurement. Samples tend to be designed to be broadly representative of the wider population, to gather a range of views. In terms of skills research with employers, size and sector tend to be key drivers of demand and therefore these are usually the main characteristics that are taken into account when designing samples.

The report synthesises and contextualises information from the sources identified above and, by undertaking a rigorous analysis of it, turns the information into intelligence.

Further information

Further methodological information is provided within the Technical Appendix of this report. This includes descriptions of the main quantitative and qualitative sources used within the report, including Energy & Utility Skills' Workforce Planning Model, which provides a further source of workforce information from employers operating within a particular part of the sector.

2 Current performance of sector

Chapter Summary

- Energy sector GVA in 2008 was £26.3 billion (2.1 per cent of total UK GVA)
- Estimated GVA per employee job in the energy sector is the highest of all sectors in the UK economy at £131,000 (compared to the all economy average of £46,000)
- The energy sector employs 473,000 employees (1.6 per cent of all UK employees) working in 13,290 establishments
- The ratio of business closures to start-ups in the energy sector is the lowest of all sectors in the economy.

2.1 Economic performance

Data on the economic performance of the mining and quarrying and electricity, gas and water sectors¹, relative to other sectors of the economy, are shown in the table below. Gross Value Added is, broadly speaking, the value of outputs minus the value of inputs.

The total GVA of the energy sector in 2008 was £26,368 million, representing 2.1 per cent of total UK GVA (this is calculated by aggregating the figures for the three highlighted sectors in Table 2.1 below). As with all other sectors of the economy, the vast majority of sector GVA (77 per cent) was generated in England.

Table 2.1 GVA by nation (£m in current basic prices) (2008)

	UK	England	Scotland	Wales	Northern Ireland
	£m	£m	£m	£m	£m
Agriculture, hunting, forestry & fishing	9,715	7,982	1,180	145	407
Mining and quarrying of energy producing materials	2,661	1,298	1,277	60	27
Other mining and quarrying	2,365	1,777	282	134	173
Manufacturing	150,298	124,860	13,555	7,734	4,149
Electricity, gas and water supply	21,342	17,414	2,653	729	545
Construction	80,756	68,247	7,328	2,924	2,256
Wholesale and retail trade (including motor trade)	147,158	127,900	10,441	5,166	3,651
Hotels and restaurants	36,428	30,938	3,297	1,424	770
Transport, storage and communication	91,347	80,262	7,065	2,529	1,491
Financial intermediation	116,801	104,574	8,501	2,305	1,422
Real estate, renting and business activities	303,179	268,770	20,829	8,380	5,200
Public administration and defence	63,281	51,275	6,148	3,275	2,583
Education	76,493	64,478	6,322	3,502	2,191
Health and social work	93,775	76,336	9,851	4,788	2,800
Other services	65,563	57,177	4,804	2,420	1,162
All sectors	1,261,162	1,083,288	103,533	45,515	28,827

Source: Regional Accounts, ONS (2010)

There are some variations across nations as to the relative importance of the energy sector to national GVA. In England the sector produces 1.9 per cent of national GVA, while in Wales it is similar proportion (2.0 per cent) and in Northern Ireland it is slightly higher at 2.6 per cent. However, in Scotland the figure is substantially higher at 4.1 per cent. This is a reflection of the importance to the Scottish economy of the oil, gas and renewable energy aspects of the sector. Variances in GVA across the English regions are presented in Table 2.2 below.

¹ Note that the three highlighted lines in Table 2.1 do not equate to the strict definition of the sector as stated in section 1.2.

Table 2.2 GVA by English Region (£m in current basic prices) (2008)

	North East	North West	Yorkshire and The Humber	East Midlands	West Midlands	East	London	South East	South West
	£m	£m	£m	£m	£m	£m	£m	£m	£m
Agriculture, hunting, forestry & fishing	303	777	966	996	915	1,387	86	1,168	1,383
Mining and quarrying of energy producing materials	81	90	140	130	82	164	280	270	81
Other mining and quarrying	178	142	156	379	84	132	60	202	442
Manufacturing	6,706	19,336	14,332	13,299	13,974	13,518	13,651	18,084	11,961
Electricity, gas and water supply	979	1,622	1,511	1,952	1,920	1,948	1,823	3,061	2,598
Construction	2,990	8,236	6,266	5,835	6,588	8,946	10,262	12,482	6,643
Wholesale and retail trade (including motor trade)	4,424	14,906	11,348	10,850	12,313	15,933	22,016	24,588	11,522
Hotels and restaurants	1,123	3,527	2,383	2,012	2,905	3,041	7,717	5,063	3,166
Transport, storage and communication	2,668	8,846	6,518	5,866	6,596	9,871	17,509	16,218	6,170
Financial intermediation	2,195	8,356	6,641	3,702	5,260	9,352	48,190	13,828	7,050
Real estate, renting and business activities	7,842	26,072	17,146	16,325	20,405	29,769	74,039	55,440	21,733
Public administration and defence	2,623	5,843	4,753	3,919	4,376	5,634	7,642	10,218	6,267
Education	3,156	8,008	6,302	4,877	6,541	6,725	11,972	10,861	6,036
Health and social work	4,004	10,080	7,552	5,894	7,215	8,201	13,719	11,975	7,696
Other services	1,715	5,174	3,459	3,314	4,583	5,577	18,190	10,551	4,615
All sectors	40,987	121,015	89,473	79,350	93,757	120,198	247,156	194,009	97,343

Source: *Regional Accounts, ONS (2010)*

As noted above, across the whole of England the energy sector accounts for 1.9 per cent of total GVA. In the South West region, where the extractive and mineral processing (EMP) industries have a large number of sites, the sector accounts for 3.2 per cent of total GVA, while in the North West region the figure is only slightly lower at 3.0 per cent. The region where the sector contributes the lowest proportion to GVA is London, where just 0.9 per cent of the region's GVA comes from the energy sector. This is unsurprising given the bias of London's economy towards finance and business sectors.

Over the previous decade, the proportion of total GVA that comes from the energy sector has fallen from 2.41 per cent in 1999 to 2.09 per cent in 2008 (although this still represents a recovery from a low of 1.87 per cent in 2004) (see Table 2.3).

Table 2.3 UK GVA (£m in current basic prices) (1999 – 2008)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
	£m	£m	£m	£m	£m	£m	£m	£m	£m	£m
Agriculture, hunting, forestry & fishing	9,022	8,532	8,333	9,007	9,807	10,670	7,530	7,792	8,632	9,715
Mining and quarrying of energy producing materials	2,059	1,998	1,874	1,661	1,456	1,643	2,055	2,297	1,861	2,661
Other mining and quarrying	1,700	1,784	1,750	1,469	1,519	1,848	2,115	2,145	2,291	2,365
Manufacturing	151,157	150,009	149,223	146,308	144,845	145,689	148,110	151,455	154,726	150,298
Electricity, gas and water supply	15,703	15,798	15,660	16,052	16,405	16,106	16,685	20,279	21,884	21,342
Construction	42,236	45,626	50,526	54,684	59,522	66,029	69,868	74,619	80,675	80,756
Wholesale and retail trade (including motor trade)	99,509	103,410	110,249	113,777	120,520	127,367	129,810	135,366	141,735	147,158
Hotels and restaurants	24,146	25,605	26,928	28,639	30,120	31,870	32,902	34,594	35,962	36,428
Transport, storage and communication	64,961	69,201	70,502	73,064	76,587	79,020	80,889	83,655	88,280	91,347
Financial intermediation	48,545	44,989	48,202	63,367	71,530	75,117	79,553	90,807	103,731	116,801
Real estate, renting and business activities	173,329	188,361	204,041	214,849	232,204	248,677	260,116	276,108	296,955	303,179
Public administration and defence	39,891	41,645	43,855	46,212	49,768	53,779	58,229	60,385	61,503	63,281
Education	44,914	48,111	51,675	55,099	58,328	61,934	65,739	68,926	72,766	76,493
Health and social work	51,577	55,282	59,549	64,492	70,593	75,154	79,965	85,965	89,381	93,775
Other services	39,821	42,085	44,560	48,311	51,804	54,947	57,961	60,166	62,824	65,563
All sectors	808,570	842,436	886,927	936,991	995,008	1,049,850	1,091,527	1,154,559	1,223,206	1,261,162

Source: *Regional Accounts, ONS (2010)*

Over this period, the electricity, gas and water supply aspect of the sector has stayed on a relatively steady upward trend. However, GVA output from the EMP industries reduced by around 25 per cent between 1999 and 2003, before recovering the ground lost in the first half of the 2000s. The growth seen in the period up to 2008 was due, largely, to public sector investment in construction. However, since 2008, the recession has resulted in lower levels of product demand from the EMP industries.

Over the decade, total GVA in the energy sector grew by 36 per cent. This is somewhat below the whole economy GVA growth of 56 per cent.

At £131,000, GVA per employee job in the energy sector is by far the highest of all sectors within the UK economy; this is also the case in each of the four nations.

Under National Statistics accounting practices GVA from the offshore oil and gas sector operating in the UK Continental Shelf (UKCS) is not allocated to specific geographic regions within the UK mainland. Instead, the convention is for the UKCS to be included as a (notional) separate region of the UK (the extra- regio territory) in the Office for National Statistics Regional Accounts. Table 2.4 follows this convention. However, when this extra-regio component is added in, GVA per employee in the energy production and utilities sector increases to £190,000 per employee job.

Under the Annual Business Survey (ABS) industrial sectors are allocated to UK nations and regions according to the address at which the business is registered, meaning that we can make an estimate of the distribution of extra-regio component by nation. This results in an increase in the energy sector's GVA per employee job in all four nations. The most notable differences are an increase in the figure for England to £163,000 and an increase in the figure for Scotland to £322,000. Wales' figure increases to £135,000 and Northern Ireland's to £117,000.

Table 2.4 Estimated workplace gross value added (GVA) per employee job at current basic prices, 2009

SSA Sector	UK	England	Wales	Scotland	Northern Ireland
	£000s	£000s	£000s	£000s	£000s
Agriculture, forestry and fishing	35	41	11	21	25
Energy production and utilities	131	134	118	127	107
Manufacturing	52	51	49	61	53
Construction, building services, engineering and planning	65	66	54	60	56
Wholesale and retail trade	33	33	27	29	27
Transportation and storage	50	51	44	50	41
Hospitality, tourism and sport	23	23	21	22	20
Information and communication technologies	83	84	72	77	63
Creative media and entertainment	45	49	30	12	38
Financial, insurance & other professional services	86	89	57	69	63
Real estate and facilities management	85	86	103	67	98
Government services	39	40	33	35	40
Education	33	33	32	36	33
Health	27	27	26	25	23
Care	30	30	28	31	26
Not within scope	32	33	27	35	30
All sectors	46	47	38	43	38

Source: UK Commission estimates based on Regional Accounts; Annual Business Survey; Business Register and Employment Survey (BRES). See technical appendix for basis for estimates.

Notes: Figures for Real estate and facilities management sector include contribution from owner-occupier imputed rental. All figures exclude Extra-Regio element. Estimates will tend to overstate the level of GVA per job in those sectors with high levels of self-employment.

Given the high value of outputs produced by the energy sector with a relatively modest workforce (see section 2.2 below) it is unsurprising that GVA per person employed is substantially higher than all other sectors. This is particularly the case in the oil and gas, electricity generation, transmission and distribution, and gas distribution sub-sectors. The exceptionally high figure for Scotland is a reflection of the important role that oil and gas plays in the Scottish economy.

GVA per person employed is lower in Wales and Northern Ireland. This is primarily a reflection of the lower levels of large-scale oil and gas extraction, energy generation and utilities distribution activities in these nations. However, there are signs that both these nations, particularly Wales, are beginning to prioritise the energy and environmental sectors in their investment plans as they look to rebalance the economy and target growth areas.

The *Working Futures* model (Wilson and Homenidou, 2011) provides historic estimates of productivity (output per job) by sector on a constant price (chained volume measure) basis. This analysis indicates an average rate of productivity growth for the UK Energy production and utilities sector for the first half of the last decade (2000-2005) of 3.3 per cent per annum.

This is much higher than the average rate for the wider UK economy of 1.4 per cent. However, in the second half of the decade the sector's performance went into reverse as the recession hit, falling by an estimated annual average of 6.6 per cent. In contrast, the wider UK economy is estimated to have seen average growth in productivity of 0.7 per cent per annum.

2.2 Employment

Total employment in the UK energy sector stands at 473,000 employees. This represents 1.6 per cent of all UK employees. Almost three-quarters (73 per cent) of the energy sector's workforce is located in England, with 19 per cent in Scotland (Table 2.5).

Table 2.5 Total employment by sector and nation (2010) (000s)

	UK		England		Scotland		Wales		Northern Ireland	
	000s	%	000s	%	000s	%	000s	%	000s	%
Agriculture, forestry and fishing	406	100	296	73	51	13	31	8	27	7
Energy production and utilities	473	100	346	73	88	19	25	5	14	3
Manufacturing	2,970	100	2,542	86	199	7	138	5	91	3
Construction, building services, engineering and planning	2,697	100	2,270	84	244	9	113	4	71	3
Wholesale and retail trade	4,140	100	3,471	84	353	9	205	5	112	3
Transportation and storage	1,448	100	1,252	86	117	8	46	3	33	2
Hospitality, tourism and sport	2,046	100	1,704	83	198	10	100	5	44	2
Information and communication technologies	761	100	675	89	56	7	18	2	13	2
Creative media and entertainment	987	100	876	89	65	7	32	3	14	1
Financial, insurance & other professional services	2,001	100	1,768	88	138	7	53	3	41	2
Real estate and facilities management	978	100	848	87	75	8	38	4	18	2
Government services	2,209	100	1,835	83	173	8	111	5	89	4
Education	3,088	100	2,625	85	235	8	154	5	75	2
Health	2,087	100	1,713	82	199	10	111	5	64	3
Care	1,729	100	1,409	81	183	11	97	6	40	2
Whole Economy	28,855	100	24,331	84	2,446	8	1,312	5	766	3
<i>Unweighted bases</i>	194	100	162	83	17	9	9	4	7	4

Source: Labour Force Survey 2010, ONS (2010a)

Note: The 'all sectors' total is a total of all SSA sectors. It does not include the few sectors 'not in scope' of the SSA work

The proportion of each nation's total workforce employed in the energy sector varies quite considerably. In Scotland 3.6 per cent of all employees work in the energy sector, while in Wales and Northern Ireland the figure stands at 1.9 per cent and 1.8 per cent respectively. In England the figure is slightly lower at 1.4 per cent.

In terms of the energy sector's share of regional employment across England, most regions cluster around the England average of 1.4 per cent. There are, however, two out-lying regions. As expected, the lowest share of regional employment can be found in London, where just less than one per cent of the total workforce is employed in the energy sector. The largest share of regional employment can be found in the North East region, where 2.1 per cent are employed in the energy sector (principally in the offshore oil and gas industry) (Table 2.6).

Table 2.6 Total employment by sector and English region, % share within region (2010)

	London	South East	East of England	South West	West Midlands	East Midlands	Yorkshire and the Humber	North West	North East
Agriculture, forestry and fishing	*	1	1	3	2	2	1	1	1
Energy production and utilities	1	2	1	2	2	2	1	2	2
Manufacturing	4	9	11	11	14	15	12	12	11
Construction, building services, engineering and planning	9	10	10	9	9	9	9	9	9
Wholesale and retail trade	12	14	14	14	14	16	16	16	15
Transportation and storage	5	5	5	4	5	6	5	5	4
Hospitality, tourism and sport	8	7	6	7	7	7	7	7	7
Information and communication technologies	3	4	3	3	2	2	2	2	2
Creative media and entertainment	8	4	3	3	2	2	2	2	2
Financial, insurance & other professional services	13	8	8	6	6	5	6	6	4
Real estate and facilities management	5	4	3	4	3	3	3	4	3
Government services	8	8	7	7	7	7	8	8	9
Education	10	11	11	11	11	11	11	10	11
Health	6	7	6	7	7	7	8	8	8
Care	5	5	5	6	6	5	6	6	8
Whole Economy	100	100	100	100	100	100	100	100	100
Weighted base	3,726	4,147	2,779	2,515	2,413	2,099	2,382	3,126	1,145
Unweighted bases	18,925	26,614	18,998	17,015	16,534	15,044	17,467	22,418	8,486

Source: Labour Force Survey 2010, ONS (2012a)

* Sample size too small for reliable estimate

Note: The 'all sectors' total is a total of all SSA sectors. It does not include the few sectors 'not in scope' of the SSA work

Employment in the energy sector grew steadily between 2003 and 2008. However, in 2009 there was a slight fall in the number of employees, following a more significant reduction of 10,000 employees in 2010 (Table 2.7). These recent falls in employment numbers are the result of the global recession and a reduction in final demand for the sector's outputs. This is particularly the case in the EMP industries, which are impacted heavily by trends in the construction sector. As a result of these difficulties, many employers in the sector continue to strive hard for efficiency savings where they can, including headcount reductions where possible.

Table 2.7 Total employment by sector 2002-2010 (UK)

	2002	2003	2004	2005	2006	2007	2008	2009	2010
	000s	000s	000s	000s	000s	000s	000s	000s	000s
Agriculture, forestry and fishing	394	389	396	421	417	422	448	364	406
Energy production and utilities	434	389	407	422	436	479	486	483	473
Manufacturing	4,153	3,870	3,687	3,615	3,562	3,575	3,368	2,915	2,970
Construction, building services, engineering and planning	2,223	2,333	2,434	2,500	2,560	2,615	2,639	2,875	2,697
Wholesale and retail trade	4,368	4,545	4,536	4,489	4,404	4,349	4,446	4,143	4,140
Transportation and storage	1,486	1,485	1,461	1,511	1,501	1,490	1,517	1,489	1,448
Hospitality, tourism and sport	1,718	1,720	1,730	1,714	1,773	1,807	1,799	1,991	2,046
Information and communication technologies	813	813	839	832	835	851	871	784	761
Creative media and entertainment	1,102	1,139	1,108	1,111	1,138	1,142	1,156	975	987
Financial, insurance & other professional services	1,671	1,662	1,623	1,677	1,696	1,744	1,736	2,038	2,001
Real estate and facilities management	898	869	924	946	984	1,036	1,028	948	978
Government services	2,115	2,166	2,194	2,251	2,282	2,285	2,323	2,265	2,209
Education	2,295	2,414	2,543	2,580	2,642	2,636	2,664	2,939	3,088
Health	1,811	1,881	1,980	2,048	2,079	2,033	2,118	2,038	2,087
Care	1,288	1,338	1,408	1,456	1,479	1,446	1,506	1,721	1,729
Whole Economy	27,908	28,172	28,456	28,740	28,987	29,164	29,382	28,811	28,855
Unweighted base	247,273	238,005	230,951	227,794	222,196	221,046	217,000	203,221	194,448

Source: Labour Force Survey 2010, ONS (2010a)

Note: The 'all sectors' total is a total of all SSA sectors. It does not include the few sectors 'not in scope' of the SSA work.

The early 2000s saw increased product demand in the EMP industries, thanks to the growth in public and private investment in housing and infrastructure and this resulted in the maintenance of a steady workforce and growth in productivity per head. Since 2008, however, this wider trend has been reversed; product demand has faltered and the output and the size of the workforce have both suffered as a result.

Within the energy sector, the largest sub-sector is electricity and gas supply, which employed around 37 per cent of the sector's workforce. This is followed by waste management-related activities, which accounts for 27 per cent of the sector's workforce, and mining and quarrying-related activities account for 22 per cent.

However, as discussed in section 1.2 above, it is worth highlighting that this SIC-based definition of the energy production and utilities sector does not include the sector's supply chain, which provides specialist engineering and support services, and local authority employees in waste management.

The IDBR shows that there are 13,290 energy production and utilities companies operating in the UK, representing one per cent of all UK businesses; 78 per cent of these were based in England, 11 per cent in Scotland, seven per cent in Wales and four per cent in Northern Ireland (Table 2.8).

Table 2.8 Number of establishments by sector and nation (2010)

	UK		England		Scotland		Wales		Northern Ireland	
	Number	%	Number	%	Number	%	Number	%	Number	%
Agriculture, forestry and fishing	144,895	6%	96,770	4%	17,625	9%	14,210	13%	16,290	19%
Energy production and utilities	13,290	1%	10,365	0%	1,495	1%	865	1%	565	1%
Manufacturing	144,115	6%	124,235	6%	9,395	5%	6,040	5%	4,445	5%
Construction, building services, engineering and planning	358,455	14%	303,300	14%	27,845	14%	14,280	13%	13,030	15%
Wholesale and retail trade	509,215	20%	431,330	20%	38,165	20%	23,000	20%	16,720	20%
Transportation and storage	83,825	3%	70,685	3%	6,370	3%	3,925	3%	2,845	3%
Hospitality, tourism and sport	223,370	9%	185,390	8%	20,515	11%	11,580	10%	5,885	7%
Information and communication technologies	131,065	5%	120,095	5%	6,610	3%	3,130	3%	1,230	1%
Creative media and entertainment	134,115	5%	121,900	6%	6,830	4%	3,640	3%	1,745	2%
Financial, insurance & other professional services	255,000	10%	228,725	10%	14,770	8%	7,160	6%	4,345	5%
Real estate and facilities management	149,325	6%	129,340	6%	10,610	5%	5,730	5%	3,645	4%
Government services	52,210	2%	40,870	2%	5,625	3%	2,985	3%	2,730	3%
Education	67,125	3%	55,020	3%	5,535	3%	3,250	3%	3,320	4%
Health	55,135	2%	46,925	2%	3,895	2%	2,515	2%	1,800	2%
Care	85,935	3%	70,460	3%	7,810	4%	4,710	4%	2,955	4%
All economy	2,574,230	100%	2,183,845	100%	193,305	100%	112,810	100%	84,270	100%

Source: Inter-departmental Business Register (IDBR), ONS (2010b)

More than half of these establishments (54 per cent) operate in the waste management industry. Other mining and quarrying, electricity and gas supply, and water sewerage each account for 10 per cent of establishments.

The number of energy sector establishments within each English region is fairly similar. The exception to this is the North East region, which contains significantly fewer energy sector establishments than the English regional average (Table 2.9).

Table 2.9 Number of establishments by sector and English region (2010)

	North East	North West	Yorkshire and The Humber	East Midlands	West Midlands	East	London	South East	South West
Agriculture, forestry and fishing	3,870	11,305	11,205	10,770	11,880	12,170	935	11,785	22,850
Energy production and utilities	475	1,460	1,155	1,025	1,065	1,320	950	1,605	1,310
Manufacturing	4,650	15,950	13,100	12,915	15,930	15,235	13,350	20,025	13,080
Construction, building services, engineering and planning	10,845	35,520	26,035	24,975	28,750	41,485	42,520	58,785	34,385
Wholesale and retail trade	16,630	55,955	41,975	36,895	45,695	48,635	67,620	71,850	46,075
Transportation and storage	2,610	8,775	7,270	6,830	7,930	9,305	9,190	11,570	7,205
Hospitality, tourism and sport	8,395	23,095	17,600	14,030	16,700	19,290	32,470	31,885	21,925
Information and communication technologies	2,325	10,885	6,685	6,900	9,260	14,735	29,655	28,805	10,845
Creative media and entertainment	2,660	10,035	6,735	6,215	7,425	12,210	43,255	22,760	10,605
Financial, insurance & other professional services	5,440	23,475	14,900	14,950	18,300	23,850	61,915	45,495	20,400
Real estate and facilities management	4,185	14,800	10,225	9,390	11,925	15,045	27,475	22,980	13,315
Government services	1,815	4,810	4,260	4,270	4,040	4,215	6,495	6,340	4,625
Education	2,495	6,890	4,965	4,810	5,465	6,330	8,215	9,925	5,925
Health	2,010	6,255	4,265	3,830	4,570	4,850	8,045	8,280	4,820
Care	3,575	9,340	6,950	6,110	6,940	7,210	10,725	11,700	7,910
All economy	75,975	255,705	187,810	174,700	210,065	253,120	392,540	394,505	239,425

Source: Inter-departmental Business Register (IDBR), ONS (2010b)

IDBR data suggests that, even though employment levels have increased by 8 per cent since 2006, the number of establishments operating in the sector has reduced by more than 27 per cent over the same period. Accepting that data pre-2008 is based on estimates, there was a steep decline in the number of establishments between 2007 and 2008. The recession, though still in its early stages in 2008, had a significant impact upon parts of the energy sector. Additionally, some restructuring occurred through mergers and acquisitions and the letting of contracts. In the EMP industries, there has also been notable consolidation and rationalisation. However, it is still surprising that 37 per cent of the energy sector's establishments "disappeared" between 2007 and 2008. Since 2008, the number of establishments has returned to its upwards trajectory, increasing by 16 per cent in three years (Table 2.10).

Table 2.10 Number of establishments by sector (2006 – 2010) (UK)

	2006	2007	2008	2009	2010	% Change 2006-2010
Agriculture, forestry and fishing	146,485	158,080	163,715	146,620	144,895	-1%
Energy production and utilities	18,170	18,260	11,435	12,980	13,290	-27%
Manufacturing	165,675	163,525	167,335	151,165	144,115	-13%
Construction, building services, engineering and planning	230,610	240,535	258,055	374,320	358,455	55%
Wholesale and retail trade	533,105	532,905	532,060	520,070	509,215	-4%
Transportation and storage	70,425	70,750	71,665	86,680	83,825	19%
Hospitality, tourism and sport	219,770	222,920	227,430	229,690	223,370	2%
Information and communication technologies	136,395	140,505	144,080	134,805	131,065	-4%
Creative media and entertainment	125,100	130,185	131,180	132,225	134,115	7%
Financial, insurance & other professional services	271,310	283,920	287,015	256,915	255,000	-6%
Real estate and facilities management	180,305	191,195	201,915	155,855	149,325	-17%
Government services	159,395	164,690	54,875	52,060	52,210	-67%
Education	28,935	28,880	66,055	66,725	67,125	132%
Health	25,860	25,810	53,300	53,900	55,135	113%
Care	40,150	40,075	82,755	83,675	85,935	114%
All economy	2,533,855	2,600,065	2,643,215	2,634,790	2,574,230	2%

Source: Inter-departmental Business Register (IDBR), ONS (2010b)

Note: Data for 2006-2008 is based on SIC 2003 whereas data beyond this use SIC 2007. Some of the data for 2006-2008 is based on estimates. For full details please see technical appendix.

The data suggests that the breakdown of all establishments by size is very similar in each nation to that of the UK as a whole, with around three-quarters of all establishments in each nation employing fewer than 10 people and between four and six per cent of establishments employing more than 50 employees (Table 2.11).

Table 2.11 Size of establishments, whole economy, by nation (2010)

	England		Scotland		Wales		Northern Ireland	
	Number	%	Number	%	Number	%	Number	%
2-4	767,415	52	66,560	48	44,675	54	30,175	52
5-9	323,815	22	33,775	24	18,005	22	13,395	23
10-24	215,295	15	23,090	17	11,910	14	9,175	16
25-49	82,055	6	8,330	6	4,170	5	3,265	6
50-250	63,865	4	6,405	5	3,130	4	2,145	4
251+	9,915	1	1,030	1	505	1	270	0
Total	1,462,360	100	139,190	100	82,395	100	58,425	100

Source: Inter-departmental Business Register (IDBR), ONS (2010b)

Within the energy sector the size distribution of establishments differs from the UK average primarily in the proportion of micro-sized business (employing fewer than 10 people). Within the energy sector, 58 per cent of establishments fall into this sizeband, compared to 74 per cent across all establishments. Equally, the proportion of establishments in the energy sector that employ more than 50 people is 12 per cent, compared to five per cent across the whole economy (Table 2.12).

Table 2.12 Size of establishments by sector (UK) (2010)

	Number of employees						
	2-4	5-9	10-24	25-49	50-250	251+	All
	%	%	%	%	%	%	Number
Agriculture, forestry and fishing	80	14	5	1	**	**	97,910
Energy production and utilities	36	22	20	10	10	2	10,265
Manufacturing	43	22	18	8	8	1	108,050
Construction	67	18	10	3	2	**	211,710
Wholesale and retail trade	49	27	16	4	3	1	385,760
Transportation and storage	48	20	16	7	8	1	52,620
Hospitality, tourism and sport	42	30	19	6	3	**	198,630
Information and communication technologies	68	15	10	4	3	1	56,710
Creative media and entertainment	66	17	10	4	3	**	62,305
Financial, insurance & other professional services	57	21	14	4	3	1	134,900
Real estate and facilities management	62	21	11	3	3	1	95,270
Government services	34	21	20	10	12	4	41,505
Education	20	14	20	23	21	2	56,740
Health	31	24	25	10	7	2	47,570
Care	26	24	28	13	8	**	75,725
All economy	52	22	15	6	4	1	1,742,370

Source: Inter-departmental Business Register (IDBR), ONS (2010b)

** denotes a figure greater than 0% but less than 0.5%

Therefore, within the energy sector, there is slight bias towards larger establishments. This is a reflection of the nature of the work undertaken (e.g. oil and gas extraction, electricity generation, quarrying, etc.) and the associated high barriers to entry in many parts of the sector (although there are some exceptions, principally within certain aspects of the waste management industry). The EMP industries also are dominated by a small number of large companies (who between them employ more than half of the total workforce).

Almost 54 per cent of establishments that employ fewer than 10 people operate in the waste management industry. The EMP industries and water sewerage have more micro establishments than the sector average. Almost 70 per cent of establishments that employ more than 200 people operate in the electricity and gas supply industry (36 per cent) or waste management industry (33 per cent).

The distribution of establishments across the four nations is shown in Table 2.13 below. While there is very little variation in the distribution of medium-sized establishments around the nations of the UK, there are differences in the distribution of micro and large establishments.

In Northern Ireland only five per cent of establishments employ 50 or more employees, while there are no establishments with over 250 employees. This is likely to be a reflection of the size of the market and the population being served. In Wales the proportion of establishments with at least 50 workers at nine per cent; in England it is 12 per cent; and in Scotland 18 per cent. This is the result of Scotland's high concentration of oil and gas extraction and electricity and gas supply establishments.

Table 2.13 Size of establishments within energy sector by nation (2010)

	England		Scotland		Wales		Northern Ireland	
	Number	%	Number	%	Number	%	Number	%
2-4	2,895	36	400	35	250	37	170	36
5-9	1,735	22	210	18	165	25	110	23
10-24	1,590	20	230	20	135	20	95	20
25-49	815	10	105	9	55	8	70	15
50-250	795	10	155	14	55	8	25	5
251+	155	2	40	4	10	1	0	0
Total	7,985	100	1,140	100	670	100	470	100

Source: *Inter-departmental Business Register (IDBR), ONS (2010b)*

In 2009 there were 1,270 new business start-ups in the energy sector. This represents 0.5 per cent of all start-ups across the UK economy in that year. However, the energy sector accounted for only 0.1 per cent of all business closures in that year and is one of six sectors (out of 16) that was a net creator of businesses (Table 2.14).

The dominance of a small number of large companies in the EMP industries means that there are relatively few start-ups or closures in comparison to other areas of the economy.

Table 2.14 Business (enterprise) start-ups and closures (2009)

Sector	Start-ups	Closures
	Number	Number
Agriculture, forestry and fishing (SIC 75 only)	285	190
Energy production and utilities	1,270	408
Manufacturing	10,570	15,445
Construction, building services, engineering and planning	35,835	51,040
Wholesale and retail trade	38,760	47,090
Transportation and storage	6,980	10,805
Hospitality, tourism and sport	23,345	28,030
Information and communication technologies	16,120	19,935
Creative media and entertainment	24,290	20,805
Financial, insurance & other professional services	25,640	25,765
Real estate and facilities management	12,805	16,275
Government services (SIC 94 only)	1,010	1,260
Education	3,485	3,160
Health	4,135	3,110
Care	2,745	2,165
Other sectors	28,750	32,135
All economy	236,025	277,618

Source: *Business Demography - Enterprise Births, Deaths and Survivals (ONS, 2009a)*

For every one new business start-up in the energy sector in 2010, just 0.3 businesses closed. This is lowest ratio of closures to start-ups of any sector (however, it should be recognised that within the energy sector, some sub-sectors will have suffered more closures than others; e.g. within the EMP industries). Across all sectors, for every new business start-up that occurred, 1.2 businesses closed.

Almost two-thirds (65 per cent) of all new business start-ups in 2009 were created in the waste management industry. This gives an indication of the rapid growth that the waste management industry is currently experiencing as it continues its transformation from a disposal-based industry, which sent much of its waste to landfill, into a highly sophisticated value-recovery industry which is driven by a whole range of environmental, societal, political and legislative factors. This is discussed in more detail in Chapter Six below.

3 The workforce

Chapter Summary

- Nine in ten (92 per cent) employees in the energy sector are employed full-time, the highest proportion of all sectors (compared to 72 per cent across all sectors)
- Just five per cent of the workforce is self-employed, compared to 14 per cent across all sectors
- The proportion of under-25s employed in the energy sector (seven per cent) is half the all sector figure (13 per cent)
- The rate of growth in the proportion of 45-59 year-olds in the energy sector is double that seen across all sectors.
- Four-fifths (81 per cent) of the energy sector's workforce is male; compared to 54 per cent across all sectors.
- Four per cent of the energy sector's workforce is from a black or minority ethnic background (less than half of the all sector figure of nine per cent)
- Two-fifths (44 per cent) of the workforce holds a level 4 qualification or above, whilst 31 per cent are worked in skilled trades occupations or as plant and process operatives (compared to 18 per cent across all sectors)

3.1 Working patterns

Nine in ten (92 per cent) energy sector employees are employed full-time, with only 8 per cent employed on a part-time basis. This is the highest proportion of full-time workers of any sector in the UK economy and significantly higher than the all economy average of 73 per cent (Table 3.1).

Table 3.1 Working hours by sector, 2010 (UK)

	Full-time	Part-time	Full-time	Part-time	Weighted	Unweighted
	000s	000s	%	%	base	base
					000s	000s
Agriculture, forestry and fishing	326	79	80	19	406	3
Energy production and utilities	435	38	92	8	473	3
Manufacturing	2,688	281	91	9	2,969	20
Construction, building services, engineering and planning	2,435	260	90	11	2,695	18
Wholesale and retail trade	2,549	1,590	62	39	4,139	28
Transportation and storage	1,218	229	84	16	1,447	10
Hospitality, tourism and sport	1,127	920	55	44	2,046	13
Information and communication technologies	682	79	90	10	761	5
Creative media and entertainment	737	249	75	25	986	6
Financial, insurance & other professional services	1,623	377	81	18	2,001	13
Real estate and facilities management	643	334	66	35	977	7
Government services	1,800	408	82	19	2,208	15
Education	1,872	1,215	61	40	3,087	22
Health	1,344	742	64	34	2,086	15
Care	1,056	672	61	37	1,728	12
All economy	21,083	7,760	73	27	28,843	194

Source: Labour Force Survey 2010, ONS (2010a)

Historically, part-time employment has not been significant in the energy sector, with an overwhelmingly male workforce and widely held perceptions as to the nature of “heavy” industry doing little to undermine this trend. Electricity and gas supply is the only sub-sector where part-time employment plays a major role, mainly due to the importance that customer service roles play in trading and retail activities, where the expectation for part-time working is greater. In reality, the shift nature of much work in the sector, where continuity of operations is required despite staff changeovers, could lend itself to more flexible ways of working. This pattern is reflected across all four nations of the UK, with full-time employment in the Welsh energy sector being even higher than the UK average (96 per cent) (Table 3.2)

Table 3.2 Working hours by sector and nation, 2010 (%)

	England				Scotland				Wales				Northern Ireland			
	Full-time	Part-time	Weighted base	Unweighted base	Full-time	Part-time	Weighted base	Unweighted base	Full-time	Part-time	Weighted base	Unweighted base	Full-time	Part-time	Weighted base	Unweighted base
	%	%	000s	000s	%	%	000s	000s	%	%	000s	000s	%	%	000s	000s
Agriculture, forestry and fishing	79	21	296	2	83	17	51	0	85	*	31	0	88	*	27	0
Energy production and utilities	92	8	346	2	91	9	88	1	96	*	25	0	92	*	14	0
Manufacturing	90	10	2,541	17	92	8	199	1	93	7	138	1	93	*	91	1
Construction, building services, engineering and planning	90	10	2,268	15	93	7	244	2	93	7	112	1	93	*	71	1
Wholesale and retail trade	62	38	3,469	23	58	42	352	2	57	42	205	1	63	37	112	1
Transportation and storage	84	16	1,251	8	83	17	117	1	80	23	46	0	87	*	33	0
Hospitality, tourism and sport	55	45	1,704	11	52	48	198	1	51	49	100	1	62	38	44	0
Information and communication technologies	90	10	675	4	89	11	56	0	88	*	18	0	88	*	13	0
Creative media and entertainment	75	25	875	5	68	32	64	0	70	23	32	0	72	*	14	0
Financial, insurance & other professional services	82	18	1,768	11	78	22	138	1	77	22	53	0	81	19	41	0
Real estate and facilities management	65	35	847	6	73	27	75	1	63	35	38	0	74	*	18	0
Government services	81	19	1,835	12	84	16	173	1	81	23	111	1	84	16	89	1
Education	60	40	2,624	18	64	36	234	2	66	32	154	1	67	33	75	1
Health	64	36	1,712	12	65	35	198	1	67	31	111	1	71	29	64	1
Care	61	39	1,409	10	60	40	183	1	61	40	97	1	62	38	40	0
All economy	73	27	24,321	161	73	27	2,444	17	72	27	1,311	9	77	23	766	7

Source: Labour Force Survey 2010, ONS (2010a)

* Sample size too small for reliable estimate.

In absolute terms, part-time employment in the energy sector has increased by 22 per cent (approximately 7,000 workers) since 2002. However, in terms of its proportion of all workers in the sector, it has remained unchanged.

As with part-time employment, self-employment is also relatively rare in the energy sector; with just five per cent of the workforce choosing to work for themselves (Table 3.3).

Table 3.3 Employment status by sector, UK, 2010 (000s)

	Employee 000s	Self- employed 000s	Employee %	Self- employed %	Weighted base 000s	Unweighted base 000s
Agriculture, forestry and fishing	189	202	47	50	405	3
Energy production and utilities	446	25	95	5	472	3
Manufacturing	2,776	184	94	6	2,968	20
Construction, building services, engineering and planning	1,716	964	64	36	2,692	18
Wholesale and retail trade	3,731	390	90	9	4,133	28
Transportation and storage	1,194	250	83	17	1,447	10
Hospitality, tourism and sport	1,817	219	89	11	2,044	13
Information and communication technologies	635	124	84	16	761	5
Creative media and entertainment	672	310	68	31	987	6
Financial, insurance & other professional services	1,706	291	85	15	2,001	13
Real estate and facilities management	744	229	76	23	977	7
Government services	2,145	58	97	3	2,207	15
Education	2,891	188	94	6	3,082	22
Health	1,928	155	92	7	2,085	15
Care	1,577	140	92	8	1,723	12
All economy	24,774	3,952	86	14	28,817	194

Source: Labour Force Survey 2010, ONS (2010a)

Note: Weighted & unweighted bases also include unpaid family workers

There are no sub-sectors of the energy sector where self-employment approaches the all economy average of 14 per cent. However, within extraction of petroleum and gas and mining support activities, the self-employed make up 10 per cent of the workforce; double the energy sector average of five per cent.

This is primarily due to the nature of operations and the structure of the sector. High barriers to entry in the shape of significant capital investment and economic regulation which supports certain monopolies, limit the opportunities for self-employment in most parts of the sector. Having said that, self-employment plays an important role in terms of providing certain specialist activities (such as specialist scientific services or tree-cutting).

Self-employment is also on the increase. Since 2002 the number of self-employed workers in the energy sector has almost doubled, to around 25,000 people (five per cent of the workforce). This is a result of the continued restructuring across the sector which has seen many specialist activities being outsourced in order to reduce headcounts and increase efficiencies. Again, the Welsh energy sector is more reliant on full-time employees (as opposed to part-time workers and the self-employed) than the other nations of the UK.

Table 3.4 Employment status by sector and nation, 2010 (%)

	England				Scotland				Wales				Northern Ireland			
	Employee %	Self- employed %	Weighted base 000s	Unweighted base 000s	Employee %	Self- employed %	Weighted base 000s	Unweighted base 000s	Employee %	Self- employed %	Weighted base 000s	Unweighted base 000s	Employee %	Self- employed %	Weighted base 000s	Unweighted base 000s
Agriculture, forestry and fishing	50	46	295	2.110	49	50	51	0.385	33	62	31	0.197	*	75	27	0.281
Energy production and utilities	94	6	346	2.334	95	*	87	0.619	99	*	25	0.157	95	*	14	0.130
Manufacturing	93	6	2,540	17.229	95	5	199	1.432	94	6	138	0.905	93	7	91	0.831
Construction, building services, engineering and planning	63	37	2,266	14.822	77	23	244	1.701	65	35	112	0.717	55	45	70	0.657
Wholesale and retail trade	91	9	3,466	22.800	91	9	351	2.359	86	14	204	1.323	84	16	112	1.052
Transportation and storage	83	17	1,252	8.294	85	15	117	0.820	76	23	46	0.308	77	23	33	0.307
Hospitality, tourism and sport	89	10	1,702	10.836	89	11	198	1.295	87	12	100	0.634	82	17	44	0.403
Information and communication technologies	84	16	674	4.266	82	18	56	0.377	77	*	18	0.113	87	*	13	0.115
Creative media and entertainment	68	32	875	5.409	76	24	65	0.438	60	39	32	0.214	75	*	14	0.130
Financial, insurance & other professional services	85	15	1,768	11.122	90	10	138	0.948	81	19	53	0.359	92	*	41	0.375
Real estate and facilities management	75	24	847	5.624	85	15	75	0.520	78	21	37	0.252	67	*	18	0.165
Government services	97	3	1,834	12.298	97	3	173	1.209	97	*	111	0.742	99	*	89	0.842
Education	94	6	2,619	18.049	95	5	234	1.676	96	4	153	1.056	95	*	75	0.726
Health	92	8	1,712	11.930	94	6	199	1.410	92	8	111	0.769	95	*	64	0.631
Care	91	9	1,404	9.601	93	6	183	1.306	95	*	97	0.665	90	*	40	0.399
All economy	86	14	24,301	161.314	89	11	2,442	16.995	85	14	1,309	8.674	84	16	765	7.217

Source: Labour Force Survey 2010, ONS (2010a)

* Sample size too small for reliable estimate.

Weighted & unweighted bases also include unpaid family workers

Almost all (96 per cent) of the energy sector's workforce is employed on permanent contracts of employment. This is not dissimilar to the all economy average of 94 per cent.

Table 3.5 Permanent and temporary employees by sector, UK, 2010 (000s and %)

	Permanent 000s	Temporary 000s	Permanent %	Temporary %	Weighted base 000s	Unweighted base 000s
Agriculture, forestry and fishing	181	8	96	4	189	1.306
Energy production and utilities	430	16	96	4	446	3.060
Manufacturing	2,652	123	96	4	2,775	18.984
Construction, building services, engineering and planning	1,648	66	96	4	1,714	11.317
Wholesale and retail trade	3,573	156	96	4	3,728	24.614
Transportation and storage	1,132	62	95	5	1,194	7.970
Hospitality, tourism and sport	1,631	183	90	10	1,814	11.563
Information and communication technologies	612	22	97	3	635	4.048
Creative media and entertainment	615	56	92	8	671	4.181
Financial, insurance & other professional services	1,651	55	97	3	1,706	10.835
Real estate and facilities management	704	39	95	5	743	4.957
Government services	2,028	117	95	5	2,145	14.642
Education	2,563	327	89	11	2,890	20.195
Health	1,825	103	95	5	1,928	13.639
Care	1,474	103	93	7	1,576	10.953
All economy	23,247	1,513	94	6	24,760	166.200

Source: Labour Force Survey 2010, ONS (2010a)

Over the last decade the number of temporary workers has reduced by 29 per cent, or 7,000 workers. This trend can be associated with the increasing number of self-employed workers in the sector. Skills which are seasonal in nature, or are only required for short periods of time, are now increasingly being sought from specialist contractors as opposed to employing those individuals on a short-term basis. This has the advantages of keeping headcounts low and allowing the contracting organisation more flexibility in how they manage their operations.

However, this operating model has a significant impact upon how employees can demonstrate/ prove their skills and competencies (particularly in areas such as health and safety) as they move from one area of work to another or from one contract to another. This is particularly the case where contractors have not always been expected to adhere to the same voluntary standards as the contracting companies. This situation affects much of the energy sector, where specifically designed "skills passports" are being introduced, either on a voluntary or regulatory basis for both the directly employed, and contractor, workforce.

3.2 Workforce characteristics

The age profile of the workforce across the UK and in each of the four nations is presented in Table 3.6 below. There is very little difference between the four nations in terms of the proportion of the workforce within each of the age bands.

Table 3.6 Age profile of workforce, whole economy, by nation (2010)

	UK		England		Scotland		Wales		Northern Ireland	
	Number	%	Number	%	Number	%	Number	%	Number	%
16-18	673	2	569	2	58	2	35	3	10	1
19-24	3,037	11	2,541	10	274	11	136	10	85	11
25-34	6,324	22	5,365	22	500	20	267	20	192	25
35-44	7,029	24	5,932	24	589	24	311	24	197	26
45-59	9,331	32	7,826	32	834	34	434	33	236	31
60-64	1,631	6	1,394	6	129	5	79	6	30	4
65+	831	3	702	3	62	3	49	4	17	2
Total	28,855	100	24,331	100	2,446	100	1,312	100	766	100
<i>Unweighted base</i>	<i>194.448</i>		<i>161.501</i>		<i>17.022</i>		<i>8.693</i>		<i>7.232</i>	

Source: Labour Force Survey 2010, ONS (2010a)

The age profile of the energy sector's total workforce is slightly older than the whole UK, or national, workforces, with a greater proportion of the workforce in the 45-59 age group. The proportion aged over 60 years is comparable to the UK average (eight per cent) (Table 3.7)

Table 3.7 Age profile within energy production sector (by nation)

	UK		England		Scotland		Wales		Northern Ireland	
	000s	%	000s	%	000s	%	000s	%	000s	%
Under 25	34	7	24	7	6	7	2	8	1	8
25-34	100	21	74	21	20	23	4	17	2	16
35-44	125	27	89	26	27	30	6	23	4	31
45-59	177	37	129	37	30	35	12	47	6	42
60+	36	8	31	9	4	5	1	5	0	3
Total	473	100	346	100	88	100	25	100	14	100
<i>Unweighted base (000s)</i>	<i>3.244</i>		<i>2.336</i>		<i>0.620</i>		<i>0.157</i>		<i>0.131</i>	

Source: Labour Force Survey 2010, ONS (2010a)

* Sample size too small for reliable estimate.

Almost half (45 per cent) of the UK's energy sector workforce is aged over 45 years, compared to 41 per cent across all sectors. Scotland is the only nation where the proportion of the energy sector's workforce aged over 45 years is lower than their national average for all sectors, 40 per cent compared to 42 per cent.

Moreover, the energy sector across each nation employs around half the proportion of under-25s (just seven per cent of its workforce) compared to 13 per cent of the entire workforce in each nation. This is largely a reflection of restrictions placed on employers with regards to young people operating plant and machinery (this applies across most aspects of the energy sector, particularly EMP industries and waste management). Within the energy sector there are only slight differences between the age profiles of the various sub-sectors.

Since 2002 the age profile of the UK workforce has been getting slightly older. In 2002, 14.4 per cent of the workforce was aged under 25. In 2010 this had fallen to 12.9 per cent. Conversely, the proportion of workers aged over 60 years was six per cent in 2002 and nine per cent in 2010 (Table 3.8).

Table 3.8 Age profile of workforce 2002-2010 (UK)

	2002	2003	2004	2005	2006	2007	2008	2009	2010
	000s	000s	000s	000s	000s	000s	000s	000s	000s
Under 18	1,078	1,076	1,077	1,028	976	938	925	765	673
19-24	2,948	2,973	3,072	3,097	3,179	3,224	3,221	3,048	3,037
25-34	6,505	6,361	6,279	6,289	6,250	6,242	6,279	6,186	6,324
35-44	7,317	7,416	7,490	7,525	7,533	7,528	7,442	7,241	7,029
45-59	8,474	8,638	8,748	8,915	9,017	9,046	9,171	9,182	9,331
60-64	1,107	1,186	1,252	1,306	1,405	1,545	1,652	1,650	1,631
65 +	479	522	538	580	625	641	693	739	831
Total	27,908	28,172	28,456	28,740	28,987	29,164	29,382	28,811	28,855
<i>Unweighted base</i>	247.273	238.005	230.951	227.794	222.196	221.046	217.000	203.221	194.448

Source: Labour Force Survey 2010, ONS (2010a)

A similar trend has occurred in the energy sector, with the proportion of under 25s in the workforce falling by three percentage points over the past decade (to seven per cent), while the proportion of over 60s has increased by two percentage points (to eight per cent) (Table 3.9).

Table 3.9 Age profile within energy production sector, UK (2002-2010)

	2002	2003	2004	2005	2006	2007	2008	2009	2010
	000s	000s	000s	000s	000s	000s	000s	000s	000s
Under 25	46	36	41	43	49	55	52	44	34
25-34	97	84	85	99	92	103	108	108	100
35-44	121	108	116	115	113	124	129	120	125
45-59	146	142	147	140	155	169	162	173	177
60+	24	19	18	24	27	28	35	38	36
Total	434	389	407	422	436	479	486	483	473
<i>Unweighted base (000s)</i>	3.688	3.499	3.445	3.528	3.340	3.395	3.508	2.809	2.978

Source: Labour Force Survey 2010, ONS (2010a)

The proportion of the energy sector's workforce aged 45-59 years has increased by four percentage points since 2002. This is double the rate of growth seen across all sectors of the economy and is a situation that will need close monitoring over the coming years in order to avoid a "cliff edge" scenario where a high proportion of the workforce could retire within a short timeframe.

It should be noted that the age profile analysis presented above covers all occupations employed in the sector, including “back office” functions such as administrative, customer service, finance and HR. These occupations tend to have a younger-than-average age profile compared to the technical and engineering-type roles that are the backbone of the energy sector and the main contributors to the sector’s economic success.

Energy & Utility Skills’ experience of implementing its Workforce Planning Model (Energy & Utility Skills, 2010) across the electricity, gas, waste management and water industries found that most employers report a relatively aged technical workforce when compared to their whole workforce.

For example, where 45 per cent of the whole energy sector’s workforce is aged over 45 years (41 per cent across the whole economy), in the gas transmission and distribution industry the figure is 58 per cent, while in the water, power and waste management industries the figures are 54 per cent, 52 per cent and 49 per cent respectively. Employers also report that their technical and engineering employees tend to retire, on average, slightly earlier than 65, at around 63 years of age. With such a relatively high proportion of workers expected to retire over the next 15 years, the aging workforce is a significant issue for the energy and utilities industries.

Across the whole UK economy 54 per cent of those in employment are male. There is a similar proportion of male employees across the four nations, although Scotland has a more equal male/female split of 51 per cent/ 49 per cent (Table 3.10).

Table 3.10 Total employment by gender and nation (2010)

	Male	Female	Total	Male	Female	Total	Unweighted base
	000s	000s	000s	%	%	%	000s
UK	15,439	13,416	28,855	54	46	100	194.448
England	13,081	11,250	24,331	54	46	100	161.501
Scotland	1,257	1,189	2,446	51	49	100	17.022
Wales	692	620	1,312	53	47	100	8.693
Northern Ireland	409	358	766	53	47	100	7.232

Source: Labour Force Survey 2010, ONS (2010a)

Within the energy sector there is a more exaggerated gender split, with 81 per cent of the workforce being male. Once again, Scotland employs relatively more females (Table 3.11).

Table 3.11 Employment in the energy sector by gender and nation (2010)

	Male	Female	Total	Male	Female	Total	<i>Unweighted base</i>
	000s	000s	000s	%	%	%	000s
UK	381	92	473	81	19	100	3.244
England	279	67	346	81	19	100	2.336
Scotland	67	20	88	77	23	100	0.62
Wales	22	*	25	87	*	100	0.157
Northern Ireland	12	*	14	89	*	100	0.131

Source: Labour Force Survey 2010, ONS (2010a)

The gender divide appears to be more pronounced within the EMP industry's workforce than in the energy sector as a whole. However, the electricity, gas and water industries are more likely to employ females than the sector average (24 per cent compared to 19 per cent). This is due to there being proportionately more customer service and related occupations within the utilities industries, which are roles more usually taken by women than those in direct production/ technical/ engineering roles. Further analysis of this issue is presented in section 3.3 below.

Over the past decade the proportion of female workers across the economy has risen by 0.5 per cent. However, in the energy sector the proportion of females has decreased from 21.2 per cent in 2002 to 19.4 per cent in 2010. It should be noted again, however, that these data represent the whole of the sector's workforce, including "back office" and non-technical employees. Evidence of the extent of the gender bias within the technical and engineering workforce of the electricity, gas and water industries is available from EU Skills' EUSR schemes, which are a collection of "skills passport"-type schemes on which employees are able to record their skills and competencies in a manner that is consistent and transparent. Data from these schemes show that of the 125,000 workers that are registered almost 122,000 of them are them male; representing 97 per cent of all those registered.

Nine per cent of UK's entire workforce is from a black and minority ethnic (BAME) group. This figure is much lower in the devolved administrations (between two per cent and three per cent), and higher in England (11 per cent) (Table 3.12)

Table 3.12 Ethnicity of workforce across whole economy, four nations (2010)

	White	BAME	Total	White	BAME	Total	<i>Unweighted base</i>
	000s	000s	000s	%	%	%	000s
UK	26,151	2,686	28,837	91	9	100	194.336
England	21,755	2,558	24,313	89	11	100	161.395
Scotland	2,370	76	2,445	97	3	100	17.019
Wales	1,272	40	1,312	97	3	100	8.691
Northern Ireland	754	12	766	98	2	100	7.231

Source: Labour Force Survey 2010, ONS (2010a)

These figures are a reflection of ethnic diversity across nations. Northern Ireland, Scotland and Wales have lower proportions of BAME residents, and this is reflected in the working population. However, the energy sector employs the second lowest proportion of people from BAME groups of all sectors in the UK, at just four per cent (only agriculture, forestry and fishing is less ethnically diverse). This is less than half of the nine per cent all economy average (see Table 3.13).

Table 3.13 Ethnicity of workforce within sectors, UK (2010)

	White	BAME	Total	White	BAME	Total
	'000	'000	'000	%	%	%
Agriculture, forestry and fishing	402	*	402	100	*	100
Energy production and utilities	453	20	472	96	4	100
Manufacturing	2,769	199	2,968	93	7	100
Construction, building services, engineering and planning	2,567	130	2,697	95	5	100
Wholesale and retail trade	3,722	416	4,139	90	10	100
Transportation and storage	1,266	180	1,445	88	12	100
Hospitality, tourism and sport	1,766	280	2,045	86	14	100
Information and communication technologies	660	100	760	87	13	100
Creative media and entertainment	913	73	986	93	7	100
Financial, insurance & other professional services	1,776	224	2,000	89	11	100
Real estate and facilities management	852	125	977	87	13	100
Government services	2,037	171	2,208	92	8	100
Education	2,875	210	3,085	93	7	100
Health	1,814	272	2,086	87	13	100
Care	1,526	200	1,726	88	12	100
All economy	26,151	2,686	28,837	91	9	100

Source: Labour Force Survey 2010, ONS (2010a)

* Sample size too small for reliable estimate.

As the above data on gender and ethnicity shows, the energy sector is much less diverse than the economy as a whole and there appears to have been little progress made on this front over the past decade (people from BAME groups accounted for three per cent of the energy sector's workforce in 2002).

A slightly different way of looking at where the UK's workforce comes from is to consider country of birth. Across the whole economy, 87 per cent of the workforce was born within the UK, with five per cent born within the European Union (EU) and nine per cent from outside the EU (Table 3.14).

Table 3.14 Total employment by country of birth and nation, 2010

	UK		England		Scotland		Wales		Northern Ireland	
	000s	%	000s	%	000s	%	000s	%	000s	%
UK	25,054	87	20,856	86	2,264	93	1,228	94	706	92
Rest of Europe (EU 27)	1,340	5	1,176	5	85	3	37	3	42	5
Rest of world	2,457	9	2,295	9	96	4	47	4	18	2
Total	28,851	100	24,327	100	2,446	100	1,312	100	766	100
<i>Unweighted base</i>	194.426		161.480		17.022		8.693		7.231	

Source: Labour Force Survey 2010, ONS (2010a)

Note: figures may not add up to 100% because of rounding

As with ethnicity, there are differences by nation. Northern Ireland employs the same proportion of European workers as the UK average, but far fewer from outside of Europe (just two per cent). Meanwhile, in both Scotland and Wales, three per cent of the workforce is from Europe and four per cent from the rest of the world.

Within the energy sector, just nine per cent of the workforce was born outside of the UK, compared to the all sector average of 13 per cent (three per cent from within Europe and six per cent from the rest of the world) (Table 3.15).

Table 3.15 Employment by country of birth and sector, UK (2010)

	UK	Rest of Europe (EU 27)	Rest of world	Total	UK	Rest of Europe (EU 27)	Rest of world	Total
	'000	'000	'000	'000	%	%	%	%
Agriculture, forestry and fishing	377	21	8	406	93	5	2	100
Energy production and utilities	431	15	26	472	91	3	6	100
Manufacturing	2,567	210	193	2,969	86	7	6	100
Construction, building services, engineering and planning	2,446	124	126	2,696	91	5	5	100
Wholesale and retail trade	3,644	177	318	4,140	88	4	8	100
Transportation and storage	1,213	77	158	1,448	84	5	11	100
Hospitality, tourism and sport	1,630	156	260	2,046	80	8	13	100
Information and communication technologies	640	33	88	761	84	4	12	100
Creative media and entertainment	850	51	87	987	86	5	9	100
Financial, insurance & other professional services	1,719	79	202	2,001	86	4	10	100
Real estate and facilities management	808	55	114	978	83	6	12	100
Government services	2,011	46	152	2,208	91	2	7	100
Education	2,769	106	213	3,088	90	3	7	100
Health	1,737	83	266	2,086	83	4	13	100
Care	1,490	65	174	1,729	86	4	10	100
Other sectors	722	43	71	836	86	5	9	100
All economy	25,054	1,340	2,457	28,851	87	5	9	100

Source: Labour Force Survey 2010, ONS (2010a)

Over the past decade the proportion of the energy sector workforce that was born outside of the UK has increased from six per cent in 2002 to the current level of nine per cent. Across all sectors of the economy the rate of increase has been slightly higher. Nine per cent of the workforce was born outside of the UK in 2002, and this rose to 13 per cent in 2010.

The EMP industries employ relatively more workers that were born outside of the UK, and the majority of these were born outside of Europe. The buying of UK sites by large multinational companies has had a significant effect as employees move from abroad. There are also specific skills shortages in some technical and engineering roles where recruiting from the global labour market is the only short-term solution open to employers if they are to fill crucial vacancies. For example, mining geotechnical engineer and rock mechanics engineer are currently on the UK's Shortage Occupation List (Home Office, 2011).

Similarly, a number of key occupations in the electricity transmission and distribution industry have been placed on the UK's Shortage Occupation List. Research by Energy & Utility Skills (Energy & Utility Skills, 2011) has shown that particular skills shortages within the UK resident labour market are forcing some employers to seek skilled labour from outside of the European Economic Area. As with the occupations in the EMP industries, these tend to be highly skilled and experienced project managers, engineers (e.g. power systems, design, electrical, protection and commissioning) and overhead lines workers. Although the numbers sought to carry out these roles within the UK are small, it can prove very difficult for employers to recruit and retain these workers given the global expansion of electricity generation, transmission and distribution and consequent international competition for skills.

3.3 The jobs people do

The most prevalent occupational groups across the UK economy as a whole are managers and associate professionals, both accounting for 15 per cent of the workforce, and professionals, who account for 14 per cent (Table 3.16).

Table 3.16 Employment by occupation (by nation)

	UK		England		Scotland		Wales		Northern Ireland	
	000s	%	000s	%	000s	%	000s	%	000s	%
Managers and Senior Officials	4,455	15	3,866	16	331	14	173	13	85	11
Professional Occupations	4,028	14	3,454	14	299	12	176	13	100	13
Associate Professional and Technical	4,265	15	3,638	15	353	14	186	14	88	12
Administrative and Secretarial	3,181	11	2,670	11	270	11	135	10	106	14
Skilled Trades Occupations	3,061	11	2,502	10	285	12	149	11	125	16
Personal Service Occupations	2,544	9	2,123	9	226	9	131	10	64	8
Sales and Customer Service Occupations	2,146	7	1,772	7	209	9	111	8	54	7
Process, Plant and Machine Operatives	1,907	7	1,570	6	174	7	99	8	63	8
Elementary Occupations	3,257	11	2,724	11	300	12	153	12	81	11
All occupations	28,842	100	24,319	100	2,446	100	1,311	100	765	100
Unweighted base	194.372		161.438		17.020		8.690		7.224	

Source: Labour Force Survey 2010, ONS (2010a)

Elementary level occupations continue to play an important role in the modern economy and have remained at a steady 11-12 per cent over the past 10 years. The occupational group that has grown the most over the past decade is professional occupations. This is closely followed by managers, and then associate professionals.

The largest occupation within the UK workforce is sales and retail assistants, accounting for 1.2million employees, or four per cent of the total workforce (Table 3.17).

Table 3.17 Largest occupational groups, UK (2010)

Rank	Occupation	000s	% workforce
1	7111 Sales and retail assistants	1,233	4
2	6115 Care assistants and home carers	741	3
3	4150 General office assistants or clerks	656	2
4	9233 Cleaners, domestics	588	2
5	1132 Marketing and sales managers	532	2
6	4122 Acnts wages clerk, bookkeeper	523	2
7	6124 Educational assistants	513	2
8	3211 Nurses	509	2
9	2314 Secondary eductn teaching prfnals	445	2
10	2315 Prim & nurs eductn teaching profs	432	1
11	1121 Prod. works & maintenance managers	414	1
12	9223 Kitchen and catering assistants	411	1
13	1163 Retail and wholesale managers	394	1
14	9149 Oth good hndlng & storage occup nec	382	1
15	2132 Software professionals	327	1
	Other occupations	20742	72
	Total workforce	28,842	100
	Unweighted base (000s)	194.372	

Source: Labour Force Survey 2010, ONS(2010a)

None of the occupations employed within the energy sector make it into the list of the 15 largest occupations. This is not surprising given that the total workforce of the energy sector is only 472,000.

The energy sector employs a much higher proportion of “technical” workers (e.g. process, plant and machine operatives and skilled trades) than the UK economy as a whole (31 per cent compared to 18 per cent across all sectors) (see Table 3.18). These roles, which typically require level 2 or 3 equivalent qualifications, are critical to the delivery of the investment and infrastructure plans of the sector. Ensuring sufficiency of supply and maintaining competence of this significant element of the sector’s workforce is a top priority.

Table 3.18 Employment by occupation and sector, 2010 (UK)

	Energy and utilities production		All economy	
	000s	%	000s	%
Managers and Senior Officials	84	18	4,455	15
Professional Occupations	67	14	4,028	14
Associate Professional and Technical	59	12	4,265	15
Administrative and Secretarial	46	10	3,181	11
Skilled Trades Occupations	64	14	3,061	11
Personal Service Occupations	*	*	2,544	9
Sales and Customer Service Occupations	27	6	2,146	7
Process, Plant and Machine Operatives	80	17	1,907	7
Elementary Occupations	45	10	3,257	11
All occupations	472	100	28,842	100
<i>Unweighted base</i>	3.242		194.372	

Source: Labour Force Survey 2010, ONS (2010a)

Note: * Sample size too small for reliable estimate.

While elementary occupations are at similar levels to the UK economy as a whole, and have decreased by 7,000 jobs over the past decade, they remain of particular importance in the waste management and recycling industries, where they are principally involved in the collection and sorting of waste and recyclables.

Over the past decade the number of managers employed in the energy sector has increased by 27,000; an increase of 47 per cent over 2002 levels. Likewise, employee growth has also been seen in professional (+17,000), skilled trades (+8,000), process, plant and machine operatives (+6,000), and associate professional (+5,000) occupations. However, during this same period, and in addition to the employee reductions in elementary occupations noted above, the number of administrative and secretarial employees has decreased by almost 10,000.

The occupation which employs the most people in the energy sector is heavy goods vehicle drivers, which employs 27,000 workers (accounting for six per cent of the workforce) (Table 3.19). On the face of it, this may seem surprising, but drivers make up a significant proportion of the waste management industry in particular, where around 30 per cent of the workforce perform some form of driving task (Energy & Utility Skills, 2011).

Table 3.19 Largest occupational groups within the energy sector, UK (2010)

Rank	Occupation	000s	% workforce
1	8211 Heavy goods vehicle drivers	27	6
2	9235 Refuse and salvage occupations	25	5
3	4150 General office assistants or clerks	18	4
4	1121 Prod. works & maintenance managers	16	3
5	7212 Customer care occupations	15	3
6	5314 Plumb, hea & ventilating engineers	14	3
7	1132 Marketing and sales managers	14	3
8	2129 Engineering professionals n.e.c.	11	2
9	3113 Engineering technicians	11	2
10	2123 Electrical engineers	11	2
11	5241 Electricians, electrical fitters	10	2
12	1123 Managers in mining and energy	10	2
13	4122 Acnts wages clerk, bookkeeper	9	2
14	8126 Water and sewerage plant operatives	8	2
15	2121 Civil engineers	8	2
	Other occupations	264	56
	Total workforce	472	100
	Unweighted base (000s)	3,242	

Source: Labour Force Survey 2010, ONS (2010a)

Eleven of the 15 largest occupations in the energy sector are technical or engineering related. Clearly “back office” functions are important in all sectors and within the energy sector office assistants, customer care, marketing and sales and book-keepers are all substantial areas of employment.

As discussed above in section 3.2, there is a clear gender bias within the energy sector towards male employees. This picture does, however, vary quite considerably by occupational level (see Table 3.20).

Mirroring the UK economy as a whole, female employees in the energy sector are most prevalent in administrative and secretarial roles and customer services role. However, even in these occupations females are under-represented in the sector when compared to UK workforce.

In the machine operatives, skilled trades and professional occupations, the lack of gender diversity is particularly apparent; with less than 10 per cent of these employees being female. This lack of females in the key technical and engineering roles is caused by a number of factors, some of which are outside of the sector’s control. There is undoubtedly an image problem with both the energy sector and technical/engineering careers in general in terms of their ability to attract female employees.

Table 3.20 Gender profile by broad occupational group within the energy sector (UK)

	Energy production & utilities			All economy		
	Male	Female	Total	Male	Female	Total
	%	%	000s	%	%	000s
1 Managers and Senior Officials	83	17	84	65	35	4,455
2 Professional occupations	90	10	67	56	44	4,028
3 Associate Professional and Technical	66	34	59	50	50	4,265
4 Administrative and Secretarial	31	69	46	22	78	3,181
5 Skilled Trades Occupations	99	*	64	92	8	3,061
6 Personal Service Occupations	*	*	*	17	83	2,544
7 Sales and Customer Service Occupations	49	51	27	35	65	2,146
8 Process, Plant and Machine Operatives	98	*	80	88	12	1,907
9 Elementary Occupations	92	*	45	55	45	3,257
All occupations	81	19	472	54	46	28,842

Source: Labour Force Survey 2010, ONS (2010a)

* Sample size too small for reliable estimate

The next chapter considers the demand for and value of skills across the sector.

4 Demand for, and value of, skills

Chapter Summary

- Multi-utility and standardisation of skills/ competencies across employers (and sub-sectors) are becoming increasingly important
- Level 3 qualifications (for skilled trades) continue to be important for the energy sector, as are level 4 - 6 qualifications (associate professional and professional grades)
- STEM-related qualifications will be crucial to the further development of much of the sector, particularly where new technologies are required (e.g. wind and marine energy and waste management)
- A number of specific engineering disciplines are in short supply, as are project management and management and leadership skills. Although the scale demand for these skills may be small when compared to other sectors of the UK economy, the impact could be significant (e.g. delays in infrastructure installation/ maintenance) which may have further knock-on effects in other parts of the economy (including jeopardising the achievement of national carbon reduction and renewable energy targets)
- High levels of training takes place in the energy sector; mostly technical/ job-specific and relating to health and safety
- The growth rate in the proportion of the workforce with a level 4+ qualification within the energy sector is half that seen across the whole economy
- Half of all managers and professionals in the energy sector do not have a level 4 or higher qualification (compared to 39 per cent across the whole economy)

4.1 Nature of skills used

Across the energy sector, restructuring and cost rationalisation have generally resulted in fewer people managing larger workloads. As a consequence of this, job boundaries have widened and work roles, across all occupations, now involve greater autonomy and responsibility. Each individual now needs to draw on a wider set of skills.

There appears to be a growing desire from employers for qualifications that are multi-utility in nature and standardised across organisations and industries. This would ensure that qualifications and proven competencies gained in one organisation are equally valid when employees either gains employment in another company within the sector or their current employers win a contract to work in other parts of the sector (e.g. a supply chain contractor wins a contract to operate on another gas distribution network).

Project management and management and leadership skills, particularly when they are combined with high level technical skills, are always highly sought after in the energy sector. Amongst the lower-level skilled occupations, health and safety, customer service and basic/essential skills are crucial to the sector's success.

Specific technical and engineering skills are required at both level 3 (skilled trades) and levels 4-6 (associate professional and professional). Degree and HND qualifications are particularly important not only for the utility industries, where STEM-related skills are integral to the planning, construction and maintenance of infrastructure, but also in the development of the wind and marine energy industry. They are also important in the waste management industry as it continues its drive towards value recovery rather than waste disposal. They will also be crucial for a successful transition to a low carbon economy.

Energy & Utility Skills notes that within the waste management industry on-going changes have produced a significant shift in the skills used (Energy & Utility Skills, 2011). For example, in the face of increased automation and the advent of more advanced technologies such as anaerobic digestion, pyrolysis and advanced incineration, additional skills needs are becoming evident, particularly in engineering roles.

The following tables summarise, within each sub-sector, the principal job roles and types of skills being utilised in the energy sector. The list is presented as an example of the types of roles performed in each sub-sector and is not a complete list of all roles.

Oil and gas

Broad occupational group	Sector occupations	Predominate level of skill required	Predominate type of skill required	Minimum qualification level typically required
Managers and Senior Officials	HSE Director Offshore Installation Manager Rig Audit Manager Supply Chain Manager Procurement Manager	Higher level	Transferable managerial skills Project management Industry-specific knowledge Management and leadership Commercial Knowledge	Level 7-8 Higher Degree
Professional occupations	Senior Integrity Engineer Senior Metallurgist Physicist Hydraulics Engineer Principal Structural Engineer Reservoir Engineer Subsea Engineer Instrument Engineer Marine Engineer Chemical Process Engineer Geophysicist Drilling Engineer Senior Protection Engineer Control Engineer Commissioning Engineer Power System Engineer	Higher level	Project management Planning Management and leadership Degree-level engineering/ physics / Materials Science/ Mechanical Engineering disciplines Design systems and procedures Understanding of Oil and Gas industry Knowledge of HSE practices applicable to job role Health and Safety qualification (NEBOSH/COSHH)	Level 4-6 Degree

Broad occupational group	Sector occupations	Predominate level of skill required	Predominate type of skill required	Minimum qualification level typically required
Associate Professional and Technical	Project Manager Mechanical Engineers Geologists Subsea Controls Engineer Pipeline Engineer Resource Manager Chemists Instrument Technicians Well Site Supervisor Environmental engineer Technical Dredge Specialist Rig Superintendent Corrosion Engineers Maintenance Technician	Higher level	HND engineering/ science disciplines Job-specific technical skills Degree-level engineering/ physics / Materials Science/ Mechanical/Electrical Engineering disciplines Project management Supervisory Monitoring Health and safety Team Working IT Skills Communication skills Corrosion Awareness and Technical Skills Health and Safety qualification (NEBOSH/ COSSH)	Level 4-6 Degree HNC/HND

Broad occupational group	Sector occupations	Predominate level of skill required	Predominate type of skill required	Minimum qualification level typically required
Skilled Trades	Overhead Lines Worker Cable Joiner Scaffolder Rigger Plater Draughter Painter/ Coater Sheet Metal Worker/ Fabricator Offshore steward	Intermediate level Basic skills	Job-specific technical skills Supervisory skills Health and safety Customer service Basic/ Essential skills IT Skills Communication skills	Level 3 A Levels BTEC National
Process, Plant and Machine Operatives	Excavator Drivers Welder Crane Operator Driller Workshop Tool Dresser Electrical Fitter Overhead Lines Worker		Job-specific technical skills Communication skills Team Working Health and safety	Level 2 GCSEs

Extractive and mineral processing industries

Broad occupational group	Sector occupations	Predominate level of skill required	Predominate type of skill required	Minimum qualification level typically required
Managers and Senior Officials	Engineering Manager Quality Manager Site Manager	Higher level	Job Specific Health and Safety Management and Leadership Commercial Knowledge Communications	Level 7-8 Higher Degree
Professional occupations	Blast Designer Explosives Supervisor Technical Manager	Higher Level	Job Specific Health and Safety Management and Leadership Engineering/ Science IT skills Communications	Level 4-6 Degree
Associate Professional and Technical	Electrical/ Mechanical Technician Lab/Field Technician	Intermediate level	Job Specific Health and Safety Supervisory Engineering/ Science Project management and control Team working Communications	Level 4-6 Degree HNC/HND

Broad occupational group	Sector occupations	Predominate level of skill required	Predominate type of skill required	Minimum qualification level typically required
Skilled Trades	Face Profiler Laboratory/Field Technician Shot Firer	Intermediate level	Job Specific Health and Safety IT Skills Science/ Engineering Communication Team working	Level 3 A Levels BTEC National
Process, Plant and Machine Operatives	Plant Operator Drill Rig Operator Weighbridge Operator	Basic/ Intermediate level	Job Specific Health and Safety Communication Team working Driving/Plant licenses	Level 2 GCSEs

Electricity generation (gas and coal), transmission and distribution

Broad occupational group	Sector occupations	Predominate level of skill required	Predominate type of skill required	Minimum qualification level typically required
Managers and Senior Officials	Delivery Centre Manager Area Manager	Higher level	Transferable managerial skills Project management Industry-specific knowledge Management and leadership Commercial Knowledge	Level 7-8 Higher Degree

Broad occupational group	Sector occupations	Predominate level of skill required	Predominate type of skill required	Minimum qualification level typically required
Professional occupations	Project Manager Senior Protection Engineer Control Engineer Control Room Engineer Commissioning Engineer Power System Engineer	Higher level	Project management Planning Management and leadership Degree-level engineering/ science disciplines Design systems and procedures	Level 4-6 Degree HNC/HND
Associate Professional and Technical	Designer Project Manager Protection Engineer Project Engineer Resource Manager Chemists	Higher level	HND engineering/ science disciplines Job-specific technical skills Project management Supervisory Monitoring Health and safety Team Working IT Skills Communication skills	Level 4-6 Degree HNC/HND
Skilled Trades	Overhead Lines Worker Cable Jointer Resource Team Leader Estimators Unit Operator	Intermediate level Basic skills	Job-specific technical skills Supervisory skills Health and safety Customer service Basic/ Essential skills IT Skills Communication skills	Level 3 A levels BTEC Nationals

Broad occupational group	Sector occupations	Predominate level of skill required	Predominate type of skill required	Minimum qualification level typically required
Process, Plant and Machine Operatives	Assistant Unit Controller	Intermediate level	Health and safety	Level 2
	Cable Joiner	Basic skills	Customer service	GCSEs
	Electrical Fitter		Basic/ Essential skills	
	Overhead Lines Worker			

Nuclear power generation

Broad occupational group	Sector occupations	Predominate level of skill required	Predominate type of skill required	Minimum qualification level typically required
Managers and Senior Officials	Power Station Director	Higher level	Transferable managerial skills	Level 7-8
	Plant Manager		Risk Management	Higher Degree
	Shift Manager		Outage management/ engineering knowledge	
	Contract Manager		Plant/ Contract/ Asset Management	
	Supply Chain Manager		Nuclear International Guidelines and Regulations	
	Strategic Risk Manager		Problem analysis and decision making	
	Safety Case Manager		Safety Case Management	
	Reactor Manager		Project Management	
	Maintenance Manager		Management and leadership	
	Safety and Security Manager		Commercial Knowledge	
	Operations Manager		Health and Environmental knowledge	

Broad occupational group	Sector occupations	Predominate level of skill required	Predominate type of skill required	Minimum qualification level typically required
Professional occupations	Nuclear Senior Project Manager Senior Reactor Operator Safety Case Lead Author Fuel Handling Engineer Nuclear Process Operations Engineer Nuclear Decommissioning Site Engineer Plant Chemistry Manager Plant Waste Engineer Electrical Engineer Mechanical Engineer Control & Instrumentation Engineer Radiation Protection Advisor	Higher level	Project management Planning Control Room Supervisor License Management and leadership Physics/ engineering/ science disciplines Design systems and procedures Radiation principles, protection Knowledge of nuclear structures, systems and equipment Risk Assessment Safety, health and environment. Compliance (Construction, Engineering, Nuclear)	Level 4-6 Degree HNC/HND

Broad occupational group	Sector occupations	Predominate level of skill required	Predominate type of skill required	Minimum qualification level typically required
Associate Professional and Technical	Design Engineer Nuclear Project Manager Control Room Supervisor Radiation Protection Supervisor /Team Leader Chemists Nuclear Plant Testing Engineer Nuclear Plant Maintenance Engineer Chemistry Technician Waste Process Technician Engineering Construction Technician Control & Instrumentation Maintenance Technicians Environmental Surveyor Nuclear Decommissioning Supervisor/ Team Leader	Higher level	Job-specific technical skills Project management Supervisory Degree in Engineering or related Science HND engineering/ science disciplines Control Room Supervisor License Health and safety IT Skills Communication skills Radiation principles, protection Safety, health and environmental Knowledge of nuclear structures, systems and equipment Compliance (Construction, Engineering, Nuclear)	Level 4-6 Degree HNC/HND

Broad occupational group	Sector occupations	Predominate level of skill required	Predominate type of skill required	Minimum qualification level typically required
Skilled Trades	Nuclear Maintenance Fitter Nuclear Decommissioning Operative Reactor Operator/Unit Desk Operator Radiation Monitor/ Surveyor Resource Team Member Radiation Records Clerk	Intermediate level Basic skills	Job-specific technical skills Health and safety Basic/ Essential skills IT Skills Communication skills Safety, health and environmental (essentials) Basic nuclear industry induction, contexts, behaviours Radiation principles, protection	Level 3 A levels BTEC Nationals
Process, Plant and Machine Operatives	Plant Maintenance Fitter – Mechanical Crafts Fitter Reactor Operator Plant Maintenance Fitter-Electrical Waste Operator Nuclear Process Operator Radiation Protection Health Physics Monitor	Intermediate level Basic skills	Basic nuclear industry induction, contexts, behaviours Safety, health and environmental (essentials) Vocational courses as appropriate Radiation principles, protection	Level 2 GCSEs

Wind and marine energy generation

Broad occupational group	Sector occupations	Predominate level of skill required	Predominate type of skill required	Minimum qualification level typically required
Managers and Senior Officials	Construction Manager Commercial Manager Contracts Manager IT Project Manager	Higher level	Transferable managerial skills Project management Industry-specific knowledge Management and leadership Commercial Knowledge	Level 7-8 Higher Degree
Professional occupations	Electrical Engineer Structural Design Engineer Environmental Consultant Geophysical Surveyor Off-shore Structural Engineer Aerodynamics-Mechanical Engineer	Higher level	Project management Planning Management and leadership Degree-level engineering/ science disciplines Design systems and procedures	Level 4-6 Degree HNC/HND
Associate Professional and Technical	Electrical Engineer Environmental Impact Assessor Ecologist Ornithologist	Higher level	HND engineering/ science disciplines Job-specific technical skills Project management Supervisory Monitoring Health and safety Team Working IT Skills Communication skills	Level 4-6 Degree HNC/HND

Broad occupational group	Sector occupations	Predominate level of skill required	Predominate type of skill required	Minimum qualification level typically required
Skilled Trades	Wind Turbine Technician	Intermediate level Basic skills	Job-specific technical skills Supervisory skills Health and safety Customer service Basic/ Essential skills IT Skills Communication skills	Level 3 A Levels BTEC National

Gas distribution

Broad occupational group	Sector occupations	Predominate level of skill required	Predominate type of skill required	Minimum qualification level typically required
Managers and Senior Officials	Network manager Regulation/ Compliance Manager Regulatory Asset manager Operations/ Technical director Operations Manager	Higher level	Transferable managerial skills Project management Industry-specific knowledge Management and leadership Commercial Knowledge	Level 7-8 Higher Degree
Professional occupations	Gas Research Engineer ICT Systems manager Design engineer Electrical engineer Field service engineer LPG engineer Installation engineer	Higher level	Project management Planning Management and leadership Degree-level engineering/ science disciplines Design systems and procedures	Level 4-6 Degree HNC/HND

Broad occupational group	Sector occupations	Predominate level of skill required	Predominate type of skill required	Minimum qualification level typically required
Associate Professional and Technical	Market analyst Network analyst Network technician Network emergency co-ordinator System Balancer Wayleave negotiator HP storage technician Field service technician Safety manager	Higher level Intermediate level	HND engineering/ science disciplines Project management Management and leadership Monitoring Team Working	Level 4-6 Degree HNC/HND
Skilled Trades	Leakage team operative Gas distribution operative Mains layer Service Layer Re-installment officer Gas installer Engineering Assistant	Intermediate level Basic skills	Job-specific technical skills Supervisory skills Health and safety Customer service Basic/ Essential skills IT Skills Communication skills	Level 3 A Levels BTEC National
Process, Plant and Machine Operatives	Emergency response operative Plant operative Meter fitter	Intermediate level Basic skills	Health and safety Customer service Basic/ Essential skills	Level 2 GCSEs
Elementary occupations	Admin assistants Meter reader Gas installation assistant Transmission operations assistant	Basic skills	Health and safety Customer service Basic/ Essential skills Carrying out tasks under supervision	Level 1

Waste management and recycling

Broad occupational group	Sector occupations	Predominate level of skill required	Predominate type of skill required	Minimum qualification level typically required
Managers and Senior Officials	Project managers Plant Managers Recycling Operations Managers Shift/ Group leaders	Higher level	Transferable managerial skills Project management Industry-specific knowledge Management and leadership	Level 7-8 Higher Degree
Professional occupations	Technical Specialists in Composting, Mechanical Biological Treatment, etc. Environmental scientists	Higher level	Planning Management and leadership Qualification in scientific discipline at degree level	Level 4-6 Degree HNC/HND
Associate Professional and Technical	Team leaders Engineering technicians Science technicians Rate of burn technologists	Higher level Intermediate level	HND engineering/ science disciplines Project management Management and leadership	Level 4-6 Degree HNC/HND
Skilled Trades	Team leaders Site supervisors Process controllers Laboratory Technicians	Intermediate level Basic skills	Job-specific technical skills Supervisory skills Health and safety Customer service Basic/ Essential skills	Level 3 A Levels BTEC National
Process, Plant and Machine Operatives	Hand Pickers Domestic Recycling Drivers Composting Operatives Refuse collectors	Intermediate level Basic skills	Health and safety Customer service Basic/ Essential skills	Level 2 GCSEs

Broad occupational group	Sector occupations	Predominate level of skill required	Predominate type of skill required	Minimum qualification level typically required
Elementary occupations	Recycling operatives Kerbside operatives Plant cleaners	Basic skills	Health and safety Customer service Basic/ Essential skills	Level 1

Water and sewerage (supply, collection and treatment)

Broad occupational group	Sector occupations	Predominate level of skill required	Predominate type of skill required	Minimum qualification level typically required
Managers and Senior Officials	Project managers Site managers Owner managers Group leaders Planning Manager Sewerage Manager	Higher level	Transferable managerial skills Project management Industry-specific knowledge Management and leadership	Level 7-8 Degree
Professional occupations	Environmental scientists Quantity Surveyor	Higher level	Project management Planning Management and leadership Degree-level engineering/ science disciplines	Level 4-6 Degree HNC/HND
Associate Professional and Technical	Team leaders Engineering technicians Ecologist Hydrologists Chemists Network Modeller	Higher level Intermediate level	HND engineering/ science disciplines Project management Management and leadership	Level 4-6 Degree HNC/HND

Broad occupational group	Sector occupations	Predominate level of skill required	Predominate type of skill required	Minimum qualification level typically required
Skilled Trades	Team leaders Plant supervisors Fitter Network service technician Sampling technician Sewerage technicians	Intermediate level Basic skills	Job-specific technical skills Supervisory skills Health and safety Customer service Basic/ Essential skills	Level 3 A Levels BTEC National
Process, Plant and Machine Operatives	Water and sewerage plant operatives Drivers Mains service layer Lab assistant Pipefitter Machine operators	Intermediate level Basic skills	Health and safety Customer service Basic/ Essential skills	Level 2 GCSEs
Elementary occupations	Lab attendant Sampler Trainee	Basic skills	Health and safety Customer service Basic/ Essential skills	Level 1

More detailed information about occupations in the energy sector can be found in the careers section of EU Skills', Cogent's and Proskills' websites.

4.2 Value of skills

A significantly higher proportion of employers in the energy sector report having a training plan compared to employers across the whole economy (49 per cent, compared to 38 per cent). However, Northern Ireland falls well short of the UK energy sector average, at 38 per cent, although this is on a par with the Northern Ireland average of 37 per cent (see Table 4.1).

Many employers in the energy sector (either through regulation or voluntarily) have standards of competence driven by the desire to maximise their health and safety performance. The need to continually demonstrate performance against these standards through assessment and CPD results in a comparatively large proportion of the workforce employed in companies that have detailed training plans.

Table 4.1 Employers with a training plan by sector and nation

	UK		England		Scotland		Wales		Northern Ireland	
	Number	%	Number	%	Number	%	Number	%	Number	%
Agriculture, forestry and fishing	28,388	26	20,580	26	†4,477	†34	1,243	12	2,087	29
Energy production and utilities	6,140	49	4,860	49	655	51	424	51	201	38
Manufacturing	38,568	30	31,191	28	4,415	47	1,940	36	1,022	27
Construction	84,115	27	67,305	26	9,885	46	3,996	30	2,930	27
Wholesale and retail trade	178,673	38	150,280	38	15,096	43	8,396	40	4,900	35
Transportation and storage	34,005	28	28,993	27	2,929	37	1,362	32	721	32
Accommodation, food and tourism activities	91,460	42	74,110	41	11,037	50	3,997	35	2,316	40
Information and communication	16,895	23	15,419	23	†550	†15	632	32	294	27
Creative media and entertainment	32,800	23	28,824	23	†1,975	†18	1,064	23	937	46
Financial, insurance & other professional services	77,091	45	68,380	45	4,263	51	2,779	49	1,668	49
Real estate and facilities management	66,124	40	59,648	40	†4,566	†38	1,158	38	752	41
Government	30,270	55	24,097	54	3,715	67	1,455	54	1,003	49
Education	42,196	65	34,120	64	3,472	78	2,414	76	2,189	67
Health	33,941	65	28,543	64	2,653	82	1,791	64	954	64
Care	60,643	69	50,342	70	4,822	57	3,311	76	2,168	67
All economy	863,494	38	721,499	37	79,173	45	37,719	38	25,099	37
<i>Weighted base</i>	2,299,921		1,960,298		175,115		98,952		65,558	
<i>Unweighted base</i>	87,572		75,053		2,503		6,012		4,004	

Source: Davies et al. (2012). Base: All establishments

† Treat figures with caution due to small base size of 50-99 establishments in Scotland

Similarly, the proportion of employers with a training budget is higher in the energy sector 36 per cent) than it is across the whole economy (29 per cent). Energy sector employers in Wales are far more likely report having a training budget than their peers in the other nations, particularly those in Northern Ireland, where just over one-quarter (27 per cent) of employers report having such a budget (Table 4.2).

Table 4.2 Employers with a training budget by sector and nation

	UK		England		Scotland		Wales		Northern Ireland	
	Number	%	Number	%	Number	%	Number	%	Number	%
Agriculture, forestry and fishing	23,169	21	16,302	21	†3,969	†30	647	6	2,250	32
Energy production and utilities	4,538	36	3,604	36	434	34	353	43	147	27
Manufacturing	27,468	21	23,265	21	2,161	23	1,323	25	720	19
Construction	59,489	19	49,098	19	6,428	30	2,230	17	1,733	16
Wholesale and retail trade	113,516	24	97,068	24	9,142	26	4,534	22	2,773	20
Transportation and storage	23,228	19	19,317	18	2,846	36	549	13	516	23
Accommodation, food and tourism activities	61,752	28	50,474	28	7,274	33	2,519	22	1,484	26
Information and communication	17,700	24	14,936	23	†1,918	†54	560	29	285	26
Creative media and entertainment	32,018	22	28,351	22	†1,756	†16	961	21	950	46
Financial, insurance & other professional services	60,256	35	55,617	36	1,607	19	1,924	34	1,108	33
Real estate and facilities management	53,538	32	46,838	31	†4,955	†41	1,077	36	668	36
Government	30,711	56	25,025	56	2,957	53	1,554	58	1,175	58
Education	43,136	67	35,825	67	2,950	66	2,382	75	1,979	60
Health	22,570	43	19,100	43	1,952	60	943	34	574	39
Care	51,869	59	43,591	61	3,377	40	2,884	66	2,017	62
All economy	657,040	29	554,765	28	57,270	33	25,624	26	19,380	30
<i>Weighted base</i>	<i>2,299,921</i>		<i>1,960,298</i>		<i>175,115</i>		<i>98,952</i>		<i>65,558</i>	
<i>Unweighted base</i>	<i>87,572</i>		<i>75,053</i>		<i>2,503</i>		<i>6,012</i>		<i>4,004</i>	

Source: Davies et al. (2012) Base: All establishments.

† Treat figures with caution due to small base size of 50-99 establishments in Scotland

Many national skills surveys, including the UK Commission's Employer Skills Survey, have found that the likelihood of a company having a training plan and/or budget is in direct correlation with the number of employees that they have: the larger the establishment, the more likely they are to have a training plan and budget. Within the EMP industries this is supported by research carried out by Proskills (Proskills UK, 2010).

It is therefore unsurprising that the proportion of energy sector employers who have provided training to their employees is higher than the whole economy average: 69 per cent of energy sector employers have provided training, 10 percentage points higher than the whole economy average (see Table 4.3). However, company size is not the only determinant of training propensity. The energy sector requires its employees to hold and maintain a minimum level of competency in order to be able to operate. These often have to be proven on a regular basis, which means that training levels across the sector are consistently higher than across the whole economy. The exception to this is the energy sector in Northern Ireland. This is the result of: (i) fewer large companies operating within that economy; and (ii) relatively fewer employees operating in areas where competency is needed to be proven on a regular basis.

Table 4.3 Employers providing training by sector and nation

	UK		England		Scotland		Wales		Northern Ireland	
	Number	%	Number	%	Number	%	Number	%	Number	%
Agriculture, forestry and fishing	58,869	53	42,577	54	†7,737	†58	3,536	34	5,019	71
Energy production and utilities	8,743	69	6,858	69	1,040	81	554	67	291	54
Manufacturing	73,972	57	61,935	55	6,629	71	3,464	64	1,944	51
Construction	163,641	53	137,473	53	13,506	63	7,193	55	5,469	51
Wholesale and retail trade	261,948	56	218,681	55	23,692	67	11,347	54	8,228	58
Transportation and storage	55,004	45	46,106	43	5,633	70	2,103	50	1,161	52
Accommodation, food and tourism activities	134,314	61	108,618	60	15,665	71	6,570	58	3,461	59
Information and communication	39,090	54	34,418	52	†2,974	†83	1,215	62	483	44
Creative media and entertainment	74,069	52	63,945	51	†5,976	†54	2,690	57	1,457	71
Financial, insurance & other professional services	114,074	67	101,640	66	5,354	64	4,605	80	2,474	73
Real estate and facilities management	95,068	57	85,826	57	†6,652	†55	1,340	44	1,249	67
Government	41,608	76	32,980	74	4,715	85	2,343	87	1,571	77
Education	55,629	86	45,309	85	4,348	97	2,941	92	3,031	92
Health	44,797	86	38,133	85	3,208	99	2,216	79	1,239	84
Care	73,669	84	60,516	84	6,798	81	3,562	81	2,793	86
All economy	1,361,250	59	1,141,560	58	119,847	68	58,171	59	41,668	64
<i>Weighted base</i>	2,299,921		1,960,298		175,115		98,952		65,558	
<i>Unweighted base</i>	87,572		75,053		2,503		6,012		4,004	

Source: Davies et al. (2012). Base: All establishments.

† Treat figures with caution due to small base size of 50-99 establishments in Scotland

Scotland has by far the highest proportion of employers providing training in the sector (81 per cent), whereas Northern Ireland has the lowest (54 per cent). As a result of this reported training activity by employers, it is perhaps surprising that the proportion of sector employees in Scotland that received training (55 per cent) is slightly lower than the whole economy average for Scotland (56 per cent) (Table 4.4).

Table 4.4 Employees receiving training by sector and nation

	UK		England		Scotland		Wales		Northern Ireland	
	Number	%	Number	%	Number	%	Number	%	Number	%
Agriculture, forestry and fishing	198,736	43	152,352	43	†25,724	†47	8,993	29	11,667	51
Energy production and utilities	167,507	50	120,687	49	32,976	55	11,072	66	2,772	38
Manufacturing	1,146,654	45	934,516	44	93,562	48	74,719	54	43,857	52
Construction	1,072,552	48	884,923	48	116,140	47	39,666	44	31,826	46
Wholesale and retail trade	2,340,353	50	1,960,109	49	201,879	55	109,603	55	68,761	48
Transportation and storage	538,494	41	448,580	39	49,954	44	22,489	58	17,468	63
Accommodation, food and tourism activities	1,221,736	53	1,017,791	53	124,328	55	48,807	49	30,809	50
Information and communication	233,240	38	205,944	37	†15,377	†51	5,255	28	6,663	65
Creative media and entertainment	524,081	48	451,335	47	†30,017	†43	24,215	69	18,513	69
Financial, insurance & other professional services	1,109,888	54	949,712	52	101,444	73	32,505	60	26,224	69
Real estate and facilities management	560,354	47	492,799	47	†36,284	†49	19,985	60	11,286	50
Government	1,004,866	56	835,514	58	82,550	47	49,901	53	36,901	59
Education	1,598,280	63	1,354,826	63	116,696	62	84,527	72	42,231	58
Health	1,300,684	65	1,032,851	64	187,638	81	58,505	49	21,690	52
Care	969,487	64	780,108	64	89,130	63	52,831	84	47,414	64
All economy	14,476,138	53	12,050,111	52	1,337,833	56	661,045	56	427,137	54
<i>Weighted base</i>	27,547,123		23,198,475		2,381,601		1,182,314		784,732	
<i>Unweighted base</i>	2,816,693		2,345,213		201,868		178,922		90,690	

Source: Davies et al. (2012). Base: All employment.

† Treat figures with caution due to small base size of 50-99 establishments in Scotland

This suggests that training activity is not evenly distributed across the whole workforce. Indeed, just 45 per cent of UK energy sector employers arranged training for all categories of staff (seven percentage points below the all economy average). Employers in the energy sector, as with employers across the whole economy, were most likely to provide training to managers, directors and senior officials (58 per cent and 61 per cent respectively) (Table 4.5)

Table 4.5 Employers providing training to employees by occupational group, energy production sector (UK)

	Energy production and utilities		All economy	
	Number	%	Number	%
Managers, Directors and senior officials occupations	5,105	58	825,928	61
Professional occupations	809	9	152,106	11
Associate professional and technical occupations	1,194	14	124,610	9
Administrative and secretarial occupations	3,096	35	372,218	27
Skilled trades occupations	2,077	24	192,480	14
Personal service occupations	*	*	129,265	9
Sales and customer service occupations	884	10	261,082	19
Process, plant and machine operatives	3,594	41	96,592	7
Elementary occupations	1,805	21	217,981	16
Other	*	*	35,410	3
Don't know	*	*	20,638	2
Arrange training for all categories of staff employed	3,974	45	714,095	52
Arrange training for some categories of staff employed	4,769	55	647,154	48
<i>Weighted base</i>	8,743		1,361,249	
<i>Unweighted base</i>	1,220		66,916	

Base: All establishments providing training.

* suppressed due to unweighted establishment base size <25

Source: Davies et al. (2012)

The high proportions of employers who report providing training to process, plant and machine operatives, skilled trades, elementary occupations and associate professional and technical occupations reflect the importance of these roles to the energy sector. The proportion of employees in each occupational group who receive training from their employers is shown in Table 4.6 below. Skilled trades occupations stand out as the occupational group where most sector employees receive training (74 per cent).

Table 4.6 Employees receiving training by occupational group, energy sector (UK)

	Energy production and utilities		All economy	
	Number	%	Number	%
Managers, Directors and senior officials occupations	25,326	47	2,413,145	45
Professional occupations	10,090	43	1,904,780	61
Associate professional and technical occupations	17,355	53	1,022,510	56
Administrative and secretarial occupations	16,611	44	1,607,984	45
Skilled trades occupations	26,028	74	1,041,373	55
Personal service occupations	*	*	1,606,254	70
Sales and customer service occupations	5,343	40	1,937,670	55
Process, plant and machine operatives	44,199	53	902,782	47
Elementary occupations	22,295	41	1,938,793	48
Other	*	*	100,845	n/a
All occupations	167,507		14,476,137	
<i>Weighted base</i>	167,507		14,476,137	
<i>Unweighted base</i>	29,041		1,517,802	

Base: All employees receiving training.

* suppressed due to unweighted establishment base size <25

Source: Davies et al. (2012)

To supplement this data from the UK Commission's Employer Skills Survey, we can gain a deeper understanding of levels of training activity from the Labour Force Survey, a long-standing survey of employees carried out on a quarterly basis.

LFS data show that 12 per cent of energy sector's employees received training in the last four weeks (prior to the survey taking place) in 2010; down slightly on 2002 levels (15 per cent). These are very similar proportions to those seen across the whole economy (13 per cent in 2010 compared to 15 per cent in 2002) (see Table 4.7).

Table 4.7 % of employees receiving training in last 4 weeks, 2002-2010 (UK)

	2002	2003	2004	2005	2006	2007	2008	2009	2010
	%	%	%	%	%	%	%	%	%
Agriculture, forestry and fishing	7	7	6	6	6	6	6	6	6
Energy production and utilities	15	14	13	13	13	13	12	11	12
Manufacturing	10	9	9	10	9	9	9	9	9
Construction, building services, engineering and planning	10	9	10	9	9	9	9	9	8
Wholesale and retail trade	11	10	10	10	10	10	9	8	8
Transportation and storage	10	10	9	9	8	8	8	7	7
Hospitality, tourism and sport	13	12	12	11	11	10	10	10	11
Information and communication technologies	13	12	12	11	11	10	10	10	10
Creative media and entertainment	13	12	12	12	11	11	10	9	8
Financial, insurance & other professional services	18	17	17	16	15	15	15	14	15
Real estate and facilities management	14	13	14	12	13	12	12	7	8
Government services	20	20	20	20	19	18	19	19	17
Education	22	21	21	21	20	20	20	20	18
Health	24	25	25	25	24	23	22	24	24
Care	24	25	25	25	24	23	22	21	20
All economy	15	14	14	14	14	13	13	13	13
Weighted base (000s)	4,095	3,987	4,074	4,061	3,949	3,863	3,834	3,685	3,642
Unweighted base (000s)	35,781	33,324	32,626	31,674	29,781	28,888	27,829	25,468	24,012

Source: Labour Force Survey 2010, ONS (2010a)

A similar trend has occurred in the proportion of employees receiving training in the last 13 weeks (again, prior to the survey taking place). In 2010, 27 per cent of the energy sector's employees received training within the last 13 weeks, down five percentage points on 2002 levels (see Table 4.8). This reduction in training activity is slightly greater than that seen across the whole economy, which fell by just two percentage points over the same period (down to 26 per cent).

Table 4.8 % of employees receiving training in last 13 weeks, 2002-2010 (UK)

	2002	2003	2004	2005	2006	2007	2008	2009	2010
	%	%	%	%	%	%	%	%	%
Agriculture, forestry and fishing	15	13	14	13	13	12	13	13	13
Energy production and utilities	33	31	30	28	28	28	26	25	27
Manufacturing	21	20	19	20	19	20	19	18	18
Construction, building services, engineering and planning	19	19	20	19	19	19	19	19	18
Wholesale and retail trade	20	20	20	20	18	18	18	16	16
Transportation and storage	21	21	20	19	19	18	18	17	18
Hospitality, tourism and sport	24	22	22	21	21	20	19	19	19
Information and communication technologies	27	25	24	23	23	22	21	21	20
Creative media and entertainment	24	24	23	23	23	21	21	18	17
Financial, insurance & other professional services	35	33	32	33	30	30	29	29	29
Real estate and facilities management	27	26	27	26	26	25	24	15	16
Government services	40	41	40	39	38	37	36	37	35
Education	44	42	42	42	40	39	40	39	38
Health	45	46	46	47	46	44	44	47	46
Care	45	46	46	47	46	44	44	41	40
All economy	28	28	28	28	27	26	26	26	26
Weighted base (000s)	7,952	7,873	7,917	8,037	7,883	7,681	7,669	7,382	7,359
Unweighted base (000s)	69,767	65,973	63,658	63,118	59,87	57,81	56,008	51,497	48,93

Source: Labour Force Survey 2010, ONS (2010a)

The reduction in training over both the last four and 13 weeks has occurred steadily, albeit very slowly, since 2002 and does not appear particularly tied to the recession of 2008. When such economic difficulties begin to be felt by employers, it can often have a severe impact on levels of training activity. However, there are no particular signs that this occurred during the recent recession, over and above the general trend in reduced training activity.

Within the energy sector, there are certain sub-sectors that are particularly active in training their employees. Employees in the extraction of petroleum and natural gas, EMP industries, electricity and gas supply and remediation and other waste management services are all more likely to have received training over the last four and 13 weeks than the sector average. This is largely as a result of health and safety and proof of competency requirements. However, employees in the waste collection, treatment and disposal industry, as well as those in mining and quarrying activities, are less likely to have received training during these timeframes.

Training levels in the last four weeks do not vary much across England, Scotland and Wales. However, across the whole economy, training activity is significantly lower in Northern Ireland (Table 4.9)

Table 4.9 % of employees receiving training in last 4 weeks, 2010 (all nations)

	UK	England	Scotland	Wales	Northern Ireland
	%	%	%	%	%
Agriculture, forestry and fishing	6	7	*	*	*
Energy production and utilities	12	12	13	*	*
Manufacturing	9	9	9	11	8
Construction, building services, engineering and planning	8	8	9	10	*
Wholesale and retail trade	8	8	9	9	6
Transportation and storage	7	7	8	*	*
Hospitality, tourism and sport	11	11	12	15	*
Information and communication technologies	10	10	*	*	*
Creative media and entertainment	8	8	*	*	*
Financial, insurance & other professional services	15	15	17	19	*
Real estate and facilities management	8	8	11	*	*
Government services	17	17	18	16	8
Education	18	19	17	19	*
Health	24	25	21	22	11
Care	20	20	19	26	*
All economy	13	13	13	14	7
Weighted base (000s)	3,642	3,085	317	188	52
Unweighted base (000s)	24.012	20.155	2.164	1.215	0.478

Source: Labour Force Survey 2010, ONS (2010a)

*Sample size too small for reliable estimate

As for training received over the last 13 week, Scotland performs slightly better than England and Wales. Northern Ireland, once again, is below the UK average (see Table 4.10).

Table 4.10 % of employees receiving training in last 13 weeks, 2010 (all nations)

	UK	England	Scotland	Wales	Northern Ireland
	%	%	%	%	%
Agriculture, forestry and fishing	13	15	12	*	*
Energy production and utilities	27	27	30	*	*
Manufacturing	18	18	18	20	18
Construction, building services, engineering and planning	18	18	21	18	12
Wholesale and retail trade	16	17	17	15	13
Transportation and storage	18	18	19	16	*
Hospitality, tourism and sport	19	19	20	21	*
Information and communication technologies	20	20	22	*	*
Creative media and entertainment	17	17	18	20	*
Financial, insurance & other professional services	29	29	28	32	17
Real estate and facilities management	16	16	23	18	*
Government services	35	35	35	34	24
Education	38	39	34	38	26
Health	46	47	42	44	32
Care	40	40	40	46	27
All economy	25	25	27	24	18
Weighted base (000s)	7,181	6,065	668	312	137
Unweighted base (000s)	48.93	40.947	4.41	2.282	1.291

Source: Labour Force Survey 2010, ONS (2010a)

*Sample size too small for reliable estimate

Where training is offered to the workforce, it is principally job specific training or related to health and safety, which is of greater importance to the energy sector than across the economy as whole (Table 4.11). This is unsurprising given: (i) the nature and environment of much of the sector's activities; and (ii) the regulatory and legislative requirements that need to be met by employees working in many parts of the sector (for example on electricity power lines and water mains). Within the EMP industries, health and safety is a key driver, and there are agreed schemes of competence and qualifications that ensure that standards are maintained significantly above the regulatory requirements, with the aim of “zero harm” to the workforce.

Table 4.11 Types of training funded or arranged for employees, whole economy

	Energy production and utilities		All economy	
	Number	%	Number	%
Job specific training	7,568	87	1,149,860	84
Health and safety/first aid training	7,337	84	970,183	71
Induction training	5,740	66	702,846	52
Training in new technology	3,843	44	641,023	47
Management training	3,074	35	457,763	34
Supervisory training	3,529	40	437,577	32
Personal Development Training*	243	3	45,451	3
Other	15	**	4,101	**
None of these	31	**	8,809	1
Don't know	6	**	2,412	**
<i>Weighted base</i>	<i>8,743</i>		<i>1,361,249</i>	
<i>Unweighted base</i>	<i>1,220</i>		<i>66,916</i>	

Base: All establishments providing training.

*** Denotes a figure of greater than 0% but less than 0.5%.*

Source: Davies et al. (2012)

Where employers do not provide training, the most frequently cited cause is that staff are already fully proficient and therefore had no need for training (identified by 71 per cent of energy sector employers, compared to 64 per cent of all companies in the UK) (Table 4.12).

Table 4.12 Barriers to training within energy production sector by nation

	UK		England		Scotland		Wales		Northern Ireland	
	Number	%	Number	%	Number	%	Number	%	Number	%
All our staff are fully proficient / no need for training	2,690	71	2,185	72	*	*	225	84	*	*
No money available for training	319	8	210	7	*	*	9	3	*	*
Training is not considered to be a priority for the establishment	318	8	254	8	*	*	3	0	*	*
No training available in relevant subject area	236	6	228	8	*	*	4	1	*	*
Managers have lacked the time to organise training	63	2	57	2	*	*	6	2	*	*
Learn by experience/Learn as you go	8	**	0	0	*	*	0	0	*	*
External courses are too expensive	90	2	71	2	*	*	10	4	*	*
Small firm/training not needed due to size of establishment	47	1	47	2	*	*	0	0	*	*
Employees are too busy to undertake training and development	87	2	43	1	*	*	0	0	*	*
Employees are too busy to give training	34	1	29	1	*	*	6	2	*	*
Business not operating long enough/New business (inc. takeover transition)	26	1	21	1	*	*	0	0	*	*
Trained staff will be poached by other employers	31	1	27	1	*	*	0	0	*	*
I Don't know what provision is available locally	24	0	24	1	*	*	0	0	*	*
The start dates or times of the courses are inconvenient	6	**	6	**	*	*	0	0	*	*
The courses interested in are not available locally	11	**	11	**	*	*	0	0	*	*
No new staff (only train new staff)	18	**	18	1	*	*	0	0	*	*
The quality of the courses or providers locally is not satisfactory	0	0	0	0	*	*	0	0	*	*
Difficult to get information about the courses available locally	6	**	6	**	*	*	0	0	*	*
Other	70	2	64	2	*	*	0	0	*	*
No particular reason	199	5	144	5	*	*	21	8	*	*
Don't know	27	1	17	1	*	*	0	0	*	*
Weighted base	3,770		3,016		*	*	269		*	*
Unweighted base	380		308		*	*	30		*	*

Base: All establishments that do not provide training

*Data suppressed as unweighted establishment base < 25 (<50 in Scotland)

** Denotes a figures of greater than 0% but less than 0.5%

NB Column percentages sum to more than 100 since multiple responses were allowed.

Source: Davies et al. (2012)

Fewer than one-in-ten (eight per cent) respondents reported that no money was available for training, while the same proportion indicated that training was not considered a priority for the establishment. Just six per cent of employers reported that no training was available in a relevant subject area.

Turning now to the qualification profile of the workforce, nearly half of all managers and professionals in the UK's energy sector do not hold a level 4 or higher qualification; ten percentage points higher than the all economy average. Six per cent of the energy sector's workforce currently have no qualifications, a figure comparable with the all economy average of seven per cent (Table 4.13).

Table 4.13 Qualification profile of workforces within sectors, UK (2010)

	No qualifications	Level 1	Level 2	Level 3	Level 4 +	Total	Unweighted base
	%	%	%	%	%	'000s	'000s
Agriculture, forestry and fishing	18	21	22	15	24	406	3
Energy production and utilities	6	16	22	22	33	473	3
Manufacturing	9	19	21	22	29	2,969	20
Construction, building services, engineering and planning	7	16	23	28	27	2,697	18
Wholesale and retail trade	11	22	26	22	19	4,140	28
Transportation and storage	11	26	29	19	16	1,447	10
Hospitality, tourism and sport	10	20	27	22	20	2,046	13
Information and communication technologies	2	10	15	18	55	761	5
Creative media and entertainment	3	10	14	14	59	987	6
Financial, insurance & other professional services	2	12	18	17	52	2,001	13
Real estate and facilities management	14	23	22	17	23	978	7
Government services	2	12	19	20	46	2,209	15
Education	3	9	12	13	63	3,088	22
Health	3	10	14	12	61	2,087	15
Care	5	12	23	24	36	1,729	12
All economy	7	16	21	20	37	28,854	194.437

Source: Labour Force Survey 2010, ONS (2010a)

The vast majority of those with no qualifications work in the waste management industry: nearly one-in-five of this workforce (18 per cent) has no qualifications. The sewerage industry also employs a relatively high proportion of workers with no qualification, at approximately one-in-eight of the workforce.

Within the waste management industry, more than two-thirds (69 per cent) of the workforce has a level 2 as their highest qualification, compared to 44 per cent across the energy sector and economy as a whole. However, as the waste management industry continues to move away from waste disposal activities and more towards activities that gain value out of it (e.g. recycling, energy from waste, and anaerobic digestion) it is likely that the qualification profile of its workforce over the coming years will shift towards the average for the sector. Level 3 qualifications are much more prevalent within the sewerage, extraction of petroleum and natural gas and electricity and gas industries.

Across the sector the proportion of the workforce that holds a level 4 qualification is 33 per cent, slightly lower than the all economy average of 37 per cent. However, once again this masks sub-sectoral differences. EMP industries employ significantly more level 4 qualified workers than the all economy average. On the other hand, employers in the sewerage and other mining and quarrying industries employ relatively few highly qualified workers. Therefore, although the qualification profile of the sector's workforce does not differ much from the all economy average, it is clear that there are some aspects of the sector that have a very different qualification profile.

The qualification profile of all sectors within each nation of the UK is shown in Table 4.14 below.

Table 4.14 Qualification profile, whole economy, by nation (2010)

	UK	England	Scotland	Wales	Northern Ireland
	%	%	%	%	%
Level 4 +	37	37	40	37	35
Level 3	20	20	22	19	19
Level 2	21	21	18	22	20
Level 1 and below	23	23	20	22	25
Total	100	100	100	100	100
<i>Weighted base</i>	1,729	1,409	183	97	40
<i>Unweighted base</i>	194.437	161.490	17.022	8.693	7.232

Source: Labour Force Survey 2010, ONS (2010a)

The main variances from the UK average occur in Scotland, where proportionately more level 4+ workers are employed (and relatively fewer low/no skilled workers) and in Northern Ireland where the opposite situation applies – relatively few higher skilled workers and more low/no skilled workers.

This situation is replicated within each nation's energy sector, with Scotland's energy sector employing a higher proportion of level 4+ qualified workers (Table 4.15).

Table 4.15 Qualification profile within energy production sector workforce by nation (2010)

	UK	England	Scotland	Wales	Northern Ireland
	%	%	%	%	%
Level 4 +	33	31	45	*	*
Level 3	22	22	25	*	*
Level 2	22	25	15	*	*
Level 1 and below	22	22	16	33	*
Total	100	100	100	100	100
<i>Weighted base (000s)</i>	473	346	88	25	14
<i>Unweighted base (000s)</i>	3.244	2.336	0.620	0.157	0.131

Source: Labour Force Survey 2010, ONS (2010a)

* Sample size too small for reliable estimate.

The proportion of the whole economy workforce that holds a level 4+ qualification has been steadily rising since 2002, from 28 per cent up to 37 per cent in 2010. The proportion of workers qualified to levels 2 and 3 has remained stable at circa 20- 21 per cent (Table 4.16). Meanwhile, the proportion of workers holding a level 1 qualification and below has decreased by seven percentage points.

Table 4.16 Qualification levels, whole economy, UK (2002 – 2010)

	2002	2003	2004	2005	2006	2007	2008	2009	2010
	%	%	%	%	%	%	%	%	%
Level 4 +	28	29	30	31	32	33	33	35	37
Level 3	20	20	20	20	19	19	20	19	20
Level 2	22	22	21	20	22	22	21	21	21
Level 1 and below	30	29	29	29	27	27	26	24	23
Total	100	100	100	100	100	100	100	100	100
<i>Weighted base</i>	27,905	28,165	28,455	28,741	28,986	29,163	29,380	28,810	28,854
<i>Unweighted base</i>	247.232	237.919	172.402	210.643	222.190	221.039	216.986	203.217	194.437

Source: Labour Force Survey 2010, ONS (2010a)

Similar trends have occurred within the energy sector over the same period. The proportion of level 4 qualified workers have risen, although not to the same extent as across the whole economy: in 2002 the same proportion of the sector's workforce was qualified to level 4+ as across the whole economy (28 per cent); however, in 2010 the sector was four percentage points below the whole economy average (Table 4.17).

Table 4.17 Qualification levels within energy production sector, UK (2002 – 2010)

	2002	2003	2004	2005	2006	2007	2008	2009	2010
	%	%	%	%	%	%	%	%	%
Level 4 +	28	29	32	29	29	34	33	30	33
Level 3	23	21	22	23	22	21	19	21	22
Level 2	21	22	20	18	21	18	19	23	22
Level 1 and below	28	27	26	30	27	27	28	26	22
Total	100	100	100	100	100	100	100	100	100
<i>Weighted base (000s)</i>	434	389	407	422	436	479	486	483	473
<i>Unweighted base (000s)</i>	3.882	3.335	2.537	3.112	3.346	3.596	3.574	3.444	3.244

Source: Labour Force Survey 2010, ONS (2010a)

The proportion of sector workers that are qualified to level 1 and below has reduced by six percentage points, similar to seven percentage point reduction seen across the whole economy.

It is important to note when considering the qualifications profile of a sector's workforce that the holding of a qualification does not, in itself, mean that an individual is a fully competent and productive member of the workforce. Within the energy sector the proving of competency to perform a specific role or undertake a certain task is paramount, particularly where the safety of that worker, their co-workers and members of the public is at stake. Proof of competency can be demonstrated in a number of ways, in addition to the successful gaining of a qualification.

Nearly half (49 per cent) of managers and professionals in the UK energy sector do not have a level 4 or higher qualification, which compares rather unfavourably with the all economy average of 39 per cent (Table 4.18).

Table 4.18 Managers and professionals without Level 4 or higher qualifications (% of all managers and professionals)

	UK	England	Scotland	Wales	Northern Ireland
	%	%	%	%	%
Agriculture, forestry and fishing	45	43	*	*	*
Energy production and utilities	49	51	41	*	*
Manufacturing	51	51	51	59	35
Construction	50	51	41	40	*
Wholesale and retail trade	64	64	67	60	50
Transportation and storage	61	59	67	*	*
Hospitality, tourism and sport	66	66	61	70	*
Information and communication technologies	40	40	37	*	*
Creative media and entertainment	38	38	*	*	*
Financial, insurance & other professional services	36	36	38	35	*
Real estate and facilities management	58	59	63	*	*
Government services	31	32	36	29	*
Education	10	11	8	*	*
Health	15	15	*	*	*
Care	30	30	33	*	*
All economy	39	39	37	36	27

Source: Labour Force Survey 2010, ONS (2010a)

*Sample size too small for reliable estimate

This situation seems to be slightly less pronounced in Scotland than in other parts of the UK and is particularly prevalent within the other mining and quarrying and sewerage industries (and, to a lesser extent, in the electricity and gas supply industry).

As noted above, it is important to note that the absence of a level 4+ qualification from a manager's or professional's CV may not, in itself, be an issue which requires to be addressed. Many highly skilled and competent workers work their way up their career ladder by proving themselves "on the job". However, in these circumstances, where a highly competent "technician" is promoted into higher level roles, it is essential that they receive appropriate training and development in order to fulfil the requirements of their new role, which may involve the managing and planning of human, financial and capital resources. In order to gain the knowledge and understanding required to perform these high level activities, the acquisition of an appropriate recognised formal qualification can be the best and quickest route to competency.

Across the whole economy this situation has been improving steadily since 2002, when 45 per cent of managers and professionals were without a level 4 or higher qualification (see Table 4.19).

Table 4.19 Managers and professionals without Level 4 or higher qualifications 2002-2010 (UK)

		2002	2003	2004	2005	2006	2007	2008	2009	2010
Managers or professionals without L4 or higher qualifications	000s	3,194	3,290	2,517	3,027	3,335	3,401	3,381	3,248	3,177
	%	45	44	33	39	42	42	41	39	39
<i>Weighted base (number of managers and professionals)</i>	<i>000s</i>	<i>7,091</i>	<i>7,400</i>	<i>7,686</i>	<i>7,859</i>	<i>7,912</i>	<i>8,053</i>	<i>8,168</i>	<i>8,283</i>	<i>8,208</i>

Source: Labour Force Survey 2010, ONS (2010a)

This rate of improvement, a six percentage point reduction in eight years, has not quite been replicated in the energy sector where the proportion of managers and professionals that do not hold a level 4 or higher qualification has reduced by a more modest four percentage points (Table 4.20).

Table 4.20 Managers and professionals within the energy sector without Level 4 or higher qualifications 2002-2010 (UK)

		2002	2003	2004	2005	2006	2007	2008	2009	2010
Managers or professionals without L4 or higher qualifications	000s	59	53	39	49	62	67	69	71	63
	%	54	53	38	45	52	45	47	47	50
<i>Weighted base (number of managers and professionals)</i>	<i>000s</i>	<i>111</i>	<i>100</i>	<i>101</i>	<i>108</i>	<i>120</i>	<i>147</i>	<i>147</i>	<i>151</i>	<i>126</i>

Source: Labour Force Survey 2010, ONS (2010a)

The gap between the energy sector and the whole economy average in terms of the proportion of managers and senior officials without a level 4 or higher qualification was nine percentage points in 2002, but now stands at 11 percentage points. However, there have been significant fluctuations in the reported figures in the intervening years, which make identifying a general trend difficult.

Exactly the same proportions of employers in the energy sector and across the economy as a whole (65 per cent) formally assess the performance of employees who have received training (Table 4.21).

Table 4.21 Employers who formally assess the performance of employees who have received training, by sector

	Formally assesses performance of employees receiving training						Unweighted base	Weighted base
	Yes		No		Don't know			
Agriculture, forestry and fishing	28,724	49	29,389	50	756	1	1,116	58,869
Energy production and utilities	5,689	65	2,920	33	133	2	1,220	8,743
Manufacturing	44,101	60	28,412	38	1,459	2	5,394	73,972
Construction	87,580	54	73,252	45	2,808	2	6,250	163,641
Wholesale and retail trade	187,796	72	70,368	27	3,783	1	11,690	261,948
Transportation and storage	35,176	64	18,967	34	861	2	3,098	55,004
Accommodation, food and tourism activities	93,084	69	39,315	29	1,916	1	8,532	134,314
Information and communication	19,950	51	18,718	48	422	1	1,848	39,090
Creative media and entertainment	40,438	55	32,357	44	1,274	2	2,738	74,069
Financial, insurance & other professional services	75,092	66	37,647	33	1,335	1	4,364	114,074
Real estate and facilities management	66,488	70	26,541	28	2,039	2	2,620	95,068
Government	27,365	66	13,717	33	527	1	2,263	41,608
Education	43,282	78	11,788	21	559	1	5,129	55,629
Health	32,689	73	11,264	25	844	2	3,125	44,797
Care	56,495	77	16,232	22	942	1	4,411	73,669
All economy	890,621	65	449,685	33	20,943	2	66,916	1,361,249

Base: All establishments providing training.

Source: Davies et al. (2012)

Two-fifths (17 per cent) of establishments within the energy sector have formally documented processes in place to identify "high potential" individuals in their workforce. This is slightly higher than all economy average of 14 per cent (Table 4.22).

Table 4.22 Whether establishment has formal processes in place to identify 'high potential' or talented individuals

	Formal process for identifying 'high potential' individuals								Unweighted base	Weighted base
	Yes, formally documented		Yes, informally		No		Don't know			
Agriculture, forestry and fishing	5,652	5	30,105	27	72,671	64	4,348	4	820	112,776
Energy production and utilities	2,191	17	4,077	31	6,385	49	486	4	866	13,138
Manufacturing	15,955	12	41,908	31	72,179	54	3,456	3	4,001	133,498
Construction	21,136	7	89,742	29	185,426	61	8,056	3	4,570	304,360
Wholesale and retail trade	79,322	17	144,464	31	229,455	49	18,075	4	8,093	471,317
Transportation and storage	12,217	10	30,841	26	73,328	61	4,419	4	2,400	120,805
Accommodation, food and tourism activities	32,190	15	69,719	32	109,728	50	7,234	3	5,819	218,871
Information and communication	5,976	8	23,608	32	42,403	58	1,136	2	1,261	73,123
Creative media and entertainment	11,873	8	48,322	33	83,861	57	3,495	2	1,959	147,551
Financial, insurance & other professional services	31,220	18	56,823	33	80,911	47	3,669	2	2,680	172,623
Real estate and facilities management	20,259	13	48,382	30	83,504	52	9,000	6	1,745	161,145
Government	11,426	21	16,967	31	25,307	46	1,600	3	1,379	55,300
Education	18,653	32	20,236	34	18,789	32	1,231	2	2,780	58,909
Health	10,508	20	15,684	30	24,879	47	1,427	3	1,739	52,498
Care	25,788	28	26,675	29	32,817	36	6,485	7	2,455	91,765
All economy	320,952	14	702,866	31	1,198,876	52	77,227	3	44,691	2,299,921

Base: All establishments in Module 1 and Scotland.

Source: Davies et al. (2012)

In addition, 31 per cent of employers in the sector have an informal process in place for identifying such employees, in line with the all economy average. Overall, around half of energy sector employers have any kind of process in place to identify high potential individuals.

Four-fifths (82 per cent) of employers in the energy sector report that their employees have variety in their work at least 'to some extent', compared to 87 per cent across the economy. Only 3 per cent of employers state that employees have no variety in their work at all (Table 4.23).

Table 4.23 Extent to which employees have variety in their work

	Extent to which employees have variety in their work										Unweighted base	Weighted base
	To a large extent		To some extent		Not much		Not at all		Don't know			
	Number	%	Number	%	Number	%	Number	%	Number	%		
Agriculture, forestry and fishing	76,675	68	24,469	22	7,742	7	2,816	2	1,074	1	820	112,776
Energy production and utilities	5,929	45	4,909	37	1,795	14	406	3	100	1	866	13,138
Manufacturing	67,095	50	48,484	36	12,899	10	3,756	3	1,262	1	4,001	133,498
Construction	179,144	59	88,851	29	24,047	8	9,313	3	3,003	1	4,570	304,360
Wholesale and retail trade	238,562	51	168,884	36	48,318	10	11,692	2	3,861	1	8,093	471,317
Transportation and storage	53,146	44	35,613	29	17,947	15	13,259	11	840	1	2,400	120,805
Accommodation, food and tourism activities	86,140	39	83,543	38	37,117	17	9,289	4	2,782	1	5,819	218,871
Information and communication	46,346	63	21,687	30	3,293	5	417	1	1,381	2	1,261	73,123
Creative media and entertainment	99,587	67	37,290	25	7,267	5	2,237	2	1,170	1	1,959	147,551
Financial, insurance & other professional services	94,803	55	60,363	35	12,493	7	3,148	2	1,816	1	2,680	172,623
Real estate and facilities management	92,156	57	51,012	32	15,579	10	1,561	1	837	1	1,745	161,145
Government	33,925	61	17,273	31	2,855	5	391	1	856	2	1,379	55,300
Education	38,306	65	17,346	29	2,187	4	619	1	452	1	2,780	58,909
Health	26,622	51	19,718	38	5,203	10	694	1	260	**	1,739	52,498
Care	54,001	59	31,224	34	4,410	5	972	1	1,159	1	2,455	91,765
All economy	1,256,316	55	745,134	32	212,192	9	64,300	3	21,979	1	44,691	2,299,921

Base: All establishments in Module 1 and Scotland.

** denotes a figure greater than 0% but less than 0.5%

Source: Davies et al. (2012)

A very similar proportion of employers state that their employees have at least some discretion over how they do their work: 82 per cent within the energy sector compared to 87 per cent across the whole economy (Table 4.24).

Table 4.24 Extent to which employees have discretion over how they do their work

	Extent to which employees have discretion over how they do their work										Unweighted base	Weighted base
	To a large extent		To some extent		Not much		Not at all		Don't know			
	Number	%	Number	%	Number	%	Number	%	Number	%		
Agriculture, forestry and fishing	61,757	55	39,087	35	6,625	6	2,485	2	2,821	3	820	112,776
Energy production and utilities	5,809	44	4,957	38	1,467	11	557	4	348	3	866	13,138
Manufacturing	63,859	48	49,442	37	11,926	9	5,326	4	2,945	2	4,001	133,498
Construction	167,066	55	103,337	34	18,624	6	10,627	3	4,706	2	4,570	304,360
Wholesale and retail trade	222,298	47	182,574	39	44,174	9	13,608	3	8,663	2	8,093	471,317
Transportation and storage	60,073	50	38,390	32	12,736	11	8,160	7	1,446	1	2,400	120,805
Accommodation, food and tourism activities	88,190	40	87,712	40	28,331	13	9,926	5	4,712	2	5,819	218,871
Information and communication	48,851	67	20,130	28	3,082	4	614	1	446	1	1,261	73,123
Creative media and entertainment	94,306	64	39,623	27	5,912	4	3,212	2	4,498	3	1,959	147,551
Financial, insurance & other professional services	88,150	51	62,426	36	15,688	9	5,292	3	1,068	1	2,680	172,623
Real estate and facilities management	95,298	59	48,171	30	11,255	7	4,656	3	1,765	1	1,745	161,145
Government	32,235	58	17,718	32	3,674	7	810	1	863	2	1,379	55,300
Education	27,530	47	26,592	45	3,231	5	660	1	897	2	2,780	58,909
Health	22,195	42	21,678	41	6,472	12	1,544	3	608	1	1,739	52,498
Care	48,843	53	36,123	39	3,779	4	1,532	2	1,488	2	2,455	91,765
All economy	1,188,767	52	814,655	35	185,638	8	71,823	3	39,037	2	44,691	2,299,921

Base: All establishments in Module 1 and Scotland.

Source: Davies et al. (2012)

Seven in ten (70 per cent) of establishments across the energy sector allow their employees access to flexible working. This is eight percentage points lower than the all economy average and may, in part, be as a result of the type of work being undertaken and its environment/location which could preclude flexible working options from any realistic working patterns (Table 4.25).

Table 4.25 Extent to which employees at establishment have access to flexible working

	Employees have access to flexible working										Unweighted base	Weighted base
	To a large extent		To some extent		Not much		Not at all		Don't know			
Agriculture, forestry and fishing	48,869	43	41,468	37	12,485	11	8,004	7	1,950	2	820	112,776
Energy production and utilities	4,781	36	4,419	34	2,431	19	1,450	11	58	**	866	13,138
Manufacturing	52,687	39	44,362	33	17,955	13	16,667	12	1,827	1	4,001	133,498
Construction	139,674	46	101,224	33	33,585	11	26,266	9	3,610	1	4,570	304,360
Wholesale and retail trade	176,251	37	168,909	36	64,843	14	56,324	12	4,991	1	8,093	471,317
Transportation and storage	44,233	37	38,327	32	16,329	14	20,683	17	1,233	1	2,400	120,805
Accommodation, food and tourism activities	99,272	45	77,239	35	22,537	10	17,703	8	2,120	1	5,819	218,871
Information and communication	42,992	59	20,273	28	5,342	7	4,226	6	289	**	1,261	73,123
Creative media and entertainment	83,200	56	44,734	30	10,011	7	7,602	5	2,004	1	1,959	147,551
Financial, insurance & other professional services	89,019	52	55,484	32	15,828	9	11,747	7	546	**	2,680	172,623
Real estate and facilities management	77,691	48	52,389	33	16,393	10	13,861	9	811	1	1,745	161,145
Government	34,229	62	15,040	27	3,343	6	1,865	3	823	1	1,379	55,300
Education	14,445	25	21,754	37	12,772	22	9,545	16	393	1	2,780	58,909
Health	14,407	27	23,130	44	9,761	19	5,025	10	174	**	1,739	52,498
Care	38,920	42	35,210	38	9,701	11	6,858	7	1,075	1	2,455	91,765
All economy	1,012,366	44	783,411	34	264,071	11	216,701	9	23,372	1	44,691	2,299,921

Base: All establishments in Module 1 and Scotland.

** denotes a figure greater than 0% but less than 0.5%

Source: Davies et al. (2012)

5 Extent of skills mis-match

Chapter Summary

- Energy sector employers are reporting vacancies in associate professional (level 4), operative (level 2) and skilled trades (level 3) roles
- Staff retention problems affect five per cent of energy sector employers
- There are around 1,200 skills shortage vacancies in the energy sector, representing 13 per cent of all vacancies in the sector
- Three –fifths (57%) of vacancies in the skilled trades are skills shortages
- A number of energy sector occupations are recognised on the UK’s Shortage Occupation List
- Around 2,000 employers (16 per cent) report having a skills gap in their existing workforce; this equates to five per cent (just over 17,000 people) of the sector’s workforce
- Average wages in the energy sector are £2 per hour higher than the national average, although they increased at a slightly slower over the past two years when compared to the UK average (four per cent compared to five per cent).

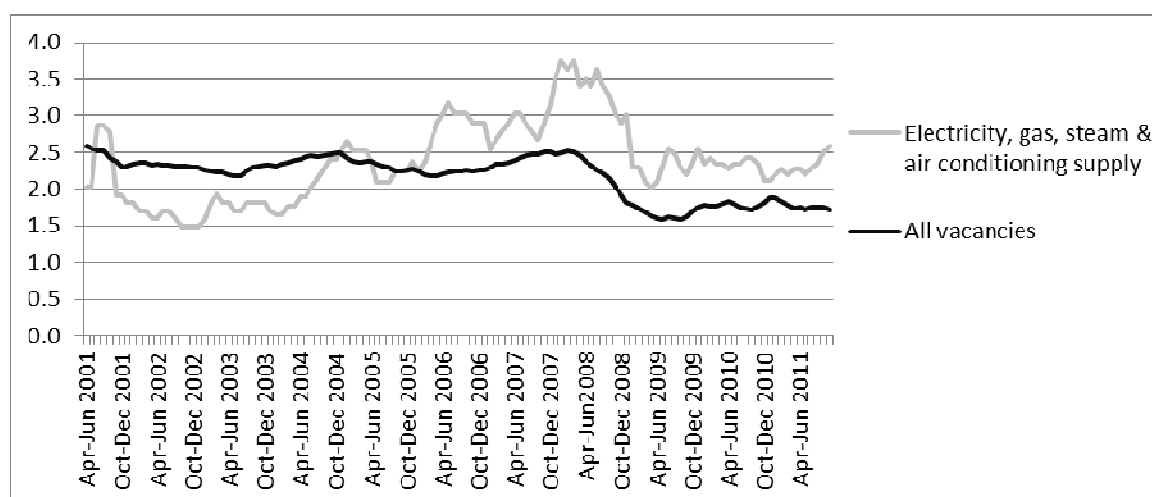
5.1 Extent and nature of vacancies

Vacancies can be caused by a number of factors. The three primary causes are:

- Retirements
- Staff turnover (workers leaving to go to other jobs)
- Expansion demand (new jobs).

ONS Vacancy Survey data show that 2.6 vacancies were reported per 100 employee jobs within the electricity, gas, steam & air conditioning sector in the quarter Sept-Nov 2011, compared to a whole economy average of 1.7 (Table 5.1). Although this data does not cover the entire energy sector, it does give an indication that recruitment activities in the electricity and gas sub-sectors are relatively buoyant compared to the economy as a whole.

Figure 5.1 Vacancies per 100 employee jobs within the Electricity, gas, steam & air conditioning sub-sector



Source: Vacancy Survey, January 2012, ONS

Between the second half of 2002 and summer 2008, there was a steady increase in the ratio of vacancies to employees; culminating in a high of 3.7 during April 2008. In contrast, the All Vacancies ratio remained fairly constant at around 2.5 per 100 jobs over the same period. The chart clearly shows the impact that the recent recession had on the wider economy. Since the recession started, the All Vacancies ratio has fallen to under 2, while within the Electricity, gas, steam & air conditioning sub-sector it has fluctuated at between 2 and 2.5. Over the second half of 2011 there has been a significant increase in the ratio of vacancies to jobs in the sub-sector, rising to 2.6 in November 2011 (compared to 1.7 across the whole economy).

The UK Commission's Employer Skills Survey reports that between one and two per cent of employers across the UK economy, and within the nations, are reporting vacancies in each of the nine occupational groups (Table 5.1)

Table 5.1 Employers reporting vacancies by occupation, whole economy, by geography

	UK		England		Scotland		Wales		Northern Ireland	
	Number	%	Number	%	Number	%	Number	%	Number	%
Managers	18,783	1	16,372	1	1,262	1	814	1	338	1
Professionals	37,601	2	33,069	2	2,197	1	1,426	1	908	1
Associate professionals	51,880	2	46,687	2	2,903	2	1,485	2	806	1
Administrative/clerical staff	45,285	2	39,641	2	2,509	1	2,091	2	1,043	2
Skilled trades occupations	35,607	2	30,336	2	2,901	2	1,715	2	652	1
Caring, leisure and other services staff	31,635	1	27,636	1	1,997	1	1,254	1	746	1
Sales and customer services staff	37,961	2	32,188	2	3,060	2	1,730	2	983	1
Machine operatives	18,684	1	15,970	1	1,511	1	832	1	371	1
Elementary staff	41,164	2	33,885	2	4,596	3	1,937	2	750	1
Unclassified staff	3,023	**	2,655	0	174	0	49	0	144	0
Weighted base	2,299,921		1,960,298		175,115		98,952		65,558	
Unweighted base	87,572		75,053		2,503		6,012		4,004	

Base: All UK establishments

** Denotes a figures of greater than 0% but less than 0.5%

Source: Davies et al. (2012)

Across the nations of the UK, energy sector vacancies are more likely than average to be reported in:

- UK: machine operatives and associate professionals
- England: machine operatives
- Scotland: Professionals, associate professionals, skilled trades and machine operatives
- Wales: Associate professionals, admin/clerical staff and sales and customer services staff

In other research (CBI, 2010), 89 per cent of energy and water employers that were recruiting stated that they were seeking scientific and mathematically skilled staff: a significantly higher proportion than the whole economy average of 72 per cent.

Within Northern Ireland's energy sector there appear to be lower levels of vacancies across nearly all occupational groups, although vacancies in elementary roles are just as prevalent as they are in the rest of the UK (Table 5.2)

Table 5.2 Employers reporting vacancies by occupation, energy production sector, by geography

	UK		England		Scotland		Wales		Northern Ireland	
	Number	%	Number	%	Number	%	Number	%	Number	%
Managers	116	1	91	1	11	1	9	1	5	1
Professionals	232	2	138	1	82	6	13	2	0	0
Associate professionals	360	3	228	2	103	8	30	4	0	0
Administrative/clerical staff	252	2	200	2	15	1	37	4	0	0
Skilled trades occupations	299	2	222	2	59	5	17	2	0	0
Caring, leisure and other services staff	0	0	0	0	0	0	0	0	0	0
Sales and customer services staff	99	1	65	1	7	1	21	3	5	1
Machine operatives	591	5	458	5	103	8	26	3	5	1
Elementary staff	278	2	213	2	32	3	20	2	13	2
Unclassified staff	68	1	45	**	23	2	0	0	0	0
Weighted base	12,610		9,967		1,279		828		536	
Unweighted base	1,614		1,306		106		133		69	

Base: All UK establishments in sector

** Denotes a figures of greater than 0% but less than 0.5%

Source: Davies et al. (2012)

Across the UK (excluding Scotland, where this question was not asked), five per cent of employers report that they have problems retaining workers. An equivalent proportion of energy sector employers also report such problems. However, energy sector employers in Wales do appear to be particularly affected by staff retention issues, with eight per cent of employers reporting such problems (Table 5.3).

Table 5.3 Employers with retention problems, by sector and geography

	UK (excl. Scotland)		England		Wales		Northern Ireland	
	Number	%	Number	%	Number	%	Number	%
Agriculture, Forestry & Fishing	4,954	5	4,236	5	360	3	358	5
Energy Production & Utilities	555	5	484	5	62	8	9	2
Manufacturing	6,493	5	5,883	5	433	8	177	5
Construction, Building Services Engineering and Planning	10,569	4	9,710	4	722	5	138	1
Wholesale & Retail Trade	18,192	4	16,682	4	891	4	619	4
Transportation and Storage	5,676	5	5,240	5	321	8	115	5
Hospitality, Tourism and Sport	18,345	9	16,670	9	1,126	10	548	9
Information and Communication Technologies	3,084	4	2,948	4	57	3	79	7
Creative Media & Entertainment	5,303	4	4,891	4	306	7	106	5
Financial, Insurance & other Professional Services	6,271	4	5,876	4	339	6	55	2
Real Estate & Facilities Management	5,826	4	5,649	4	139	5	38	2
Government Services	2,496	5	2,200	5	208	8	88	4
Education	2,925	5	2,493	5	267	8	165	5
Health	3,297	7	2,961	7	249	9	87	6
Care	5,134	6	4,615	6	327	7	191	6
Not within scope	6,810	6	6,476	6	247	6	87	3
Whole Economy	105,929	5	97,014	5	6,054	6	2,860	4
Weighted base	2,124,807		1,960,298		98,952		65,558	
Unweighted base	85,069		75,053		6,012		4,004	

Base: All establishments in England, Northern Ireland, Wales (question not asked in Scotland)

Source: Davies et al. (2012)

Although the proportion of energy sector companies that report staff retention problems is in line with the whole economy average, staff turnover within the public utilities aspects of the energy sector tends to be relatively low. Employer input into Energy & Utility Skills' Workforce Planning Model for the electricity, gas and water industries suggests that staff turnover rates of around 3-3.5 per cent of the workforce per year are the norm. This compares very favourably to around 7.3 per cent reported across the whole of the economy (CIPD, 2011). The reasons behind low staff turnover in the utilities are, in part, a legacy of the days when they were nationalised industries which offered very attractive terms and conditions to its employees, including final salary pensions. This has meant that many employees are reluctant to leave their current employer until they are able to take their pensions.

While such low staff turnover is welcomed by some employers, it has meant that much of the sector's workforce was recruited more than a decade ago, which has resulted in the skewed age profile presented in section 3.2 above.

Davies et al (2012) shows that, where employers did report retention problems, 51 per cent of all employers cited the main cause not enough people being interested in doing that type of work; in the energy sector 63 per cent cited this as the main cause. Unfortunately, there are no data available that explain why employers in the Welsh energy sector seem particularly vulnerable to staff retention issues. This scarcity of people interested in doing the type of work is likely to have the effect of driving up wage rates.

Other common causes of staff retention problems within the energy sector include:

- Long/unsocial hours (41 per cent of employers);
- Wages offered are lower than those offered by other firms (35 per cent);
- Unattractive conditions of employment (33 per cent);
- Lack of career progression (within their current employer) (32 per cent).

The principal methods of combating staff retention problems are introducing further training/development opportunities and by offering higher pay or more incentives than normal – these are cited by 25 per cent and 22 per cent respectively of employers from across the whole economy that find it difficult to retain staff. Similar proportions of energy sector employers report using these same measures to combat this issue (Davies et al, 2012).

In addition, 23 per cent of energy sector employers are using altered/ improved recruitment methods; compared to 15 per cent of employers across the whole economy. While no more detail is available in terms of which altered/improved recruitment methods they are actually using, it does perhaps highlight an acceptance within the energy sector of the need to change their recruitment activities given their changing needs and changes in the availability (i.e. supply) and characteristics (e.g. gender, ethnicity, etc.) of suitable skilled labour.

One way of filling vacancies is to recruit young people straight out of school, college or university into their first jobs. A quarter (24 per cent) of all employers across the UK have recruited one or more young person over the last three years, while within the energy sector, 21 per cent report doing so (Table 5.4). As stated previously, however, there are legal restrictions placed on employers in some parts of the energy sector in terms of the operations and machinery that young people (younger than 21) can work on.

It is interesting to note that although the proportion of all employers in Northern Ireland that have recruited one or more young people over the last three years is three percentage points higher than the UK average (at 27 per cent), the proportion of energy sector employers doing so is just 11 per cent, almost half of the sector average.

Table 5.4 Employers recruiting one or more young person over the last 3 years, by sector and nation

	UK		England		Scotland		Wales		Northern Ireland	
	Number	%	Number	%	Number	%	Number	%	Number	%
Agriculture, Forestry & Fishing	21,769	20	14,815	19	2,725	20	1,183	11	3,046	43
Energy Production & Utilities	2,660	21	2,080	21	322	25	197	24	61	11
Manufacturing	31,047	24	26,304	23	2,442	26	1,437	27	863	23
Construction, Building Services Engineering and Planning	66,741	22	55,108	21	6,498	30	2,973	23	2,161	20
Wholesale & Retail Trade	120,702	26	101,878	25	9,862	28	5,297	25	3,665	26
Transportation and Storage	18,432	15	16,069	15	1,496	19	476	11	391	17
Hospitality, Tourism and Sport	70,608	32	59,071	33	6,164	28	3,583	32	1,789	31
Information and Communication Technologies	14,960	21	13,659	21	794	22	241	12	266	24
Creative Media & Entertainment	31,843	22	28,704	23	1,573	14	1,082	23	484	24
Financial, Insurance & other Professional Services	37,955	22	34,274	22	1,679	20	1,230	21	773	23
Real Estate & Facilities Management	23,229	14	21,827	15	699	6	475	16	229	12
Government Services	10,268	19	8,375	19	1,084	20	378	14	431	21
Education	28,641	44	24,132	45	1,812	41	1,450	45	1,247	38
Health	13,817	26	11,547	26	938	29	822	29	510	34
Care	26,557	30	22,175	31	1,955	23	1,481	34	947	29
All economy	552,385	24	467,925	24	43,211	25	23,664	24	17,584	27
Weighted base	2,299,921		1,960,298		175,115		98,952		65,558	
Unweighted base	87,572		75,053		2,503		6,012		4,004	

Base: all employers who have recruited a person to their first job on leaving school, college or university in the last 2-3 years.

NB: Scottish employers were asked a slightly different question; results cannot be compared directly to UK, England, Wales, or Northern Ireland figures. Scottish employers have not been included in the UK base.

Source: Davies et al. (2012)

This is perhaps an area worthy of further investigation as it indicates issues around the unsuitability of young people, who are entering the labour market for the first time, to meet the requirements of Northern Irish energy sector employers.

The most significant impact that staff retention problems is having on employers is the additional strain on existing staff in covering staff shortages – this is cited by 79 per cent of all employers and by 83 per cent of energy sector employers (who find it difficult to retain staff)². Other significant impacts on energy sector employers include increased running costs (53 per cent), restrictions to business development activities (50 per cent) and increased recruitment costs and having difficulties with quality (both cited by 48 per cent of employers) (Davies et al, 2012).

5.2 Extent and nature of skills issues

Within the energy sector, almost 1,800 employers (14 per cent) report having a vacancy. Five per cent of all sector employers report having a hard-to-fill vacancy (635 employers) and four per cent report having skills shortage vacancies (532 employers) (Table 5.5)

Table 5.5 Employers with vacancies, hard-to-fill vacancies and skills shortage vacancies (UK)

	Vacancies		HTF vacancies		SSV		Weighted base	Unweighted base
	Number	%	Number	%	Number	%		
Agriculture, Forestry & Fishing	8,285	3	4,141	5	2,660	4	110,220	1,547
Energy Production & Utilities	1,783	1	635	1	532	1	12,610	1,614
Manufacturing	17,423	6	7,684	8	6,040	9	130,709	7,776
Construction, Building Services Engineering and Planning	22,972	8	11,596	13	9,607	14	306,403	8,961
Wholesale & Retail Trade	50,681	18	13,499	15	9,778	14	470,200	16,150
Transportation and Storage	13,036	5	4,127	5	2,662	4	122,058	4,735
Hospitality, Tourism and Sport	32,674	12	11,656	13	7,435	11	220,055	11,318
Information and Communication Technologies	9,146	3	3,596	4	3,386	5	72,281	2,510
Creative Media & Entertainment	16,182	6	5,506	6	4,746	7	143,772	3,762
Financial, Insurance & other Professional Services	21,794	8	5,310	6	4,556	7	170,887	5,343
Real Estate & Facilities Management	17,403	6	4,651	5	3,956	6	166,486	3,424
Government Services	8,185	3	1,877	2	1,204	2	54,687	2,605
Education	14,466	5	3,220	4	2,386	4	64,540	5,439
Health	9,577	3	2,820	3	1,842	3	52,370	3,398
Care	15,589	6	3,956	4	2,054	3	87,899	4,763
Not in scope	15,583	6	6,497	7	5,121	8	114,744	4,227
Total	274,779	100	90,771	100	67,965	100	2,299,921	87,572

Bases: All establishments.

Source: Davies et al. (2012)

Across the whole of the UK economy, almost 636,000 vacancies were reported in 2011, representing two per cent of total employment. In the energy sector, almost 9,400 vacancies were reported, which account for three of total employment (Table 5.6).

² These percentages exclude employers in Scotland, where this particular question was not asked in 2011.

Table 5.6 Profile of vacancies by sector (UK)

	Volume			%			Weighted base	Unweighted base
	Vacancies	HTF vacancies	SSV (prompted and unprompted)	Vacancies as a % employment	HTF vacancies as a % vacancies	SSV as a % vacancies		
Agriculture, Forestry & Fishing	14,641	5,785	4,238	3	40	29	466,870	19,506
Energy Production & Utilities	9,343	1,590	1,236	3	17	13	333,050	47,228
Manufacturing	40,252	11,834	9,711	2	29	24	2,541,188	291,593
Construction, Building Services Engineering and Planning	47,241	19,103	12,394	2	40	26	2,235,270	150,111
Wholesale & Retail Trade	95,390	17,441	12,619	2	18	13	4,674,684	514,820
Transportation and Storage	25,734	4,739	3,182	2	18	12	1,320,126	114,658
Hospitality, Tourism and Sport	73,886	18,245	11,179	3	25	15	2,313,487	258,524
Information and Communication Technologies	29,361	5,449	4,937	5	19	17	614,641	53,681
Creative Media & Entertainment	37,885	6,824	5,502	3	18	15	1,086,978	87,953
Financial, Insurance & other Professional Services	58,847	11,732	10,623	3	20	18	2,052,039	112,945
Real Estate & Facilities Management	31,155	5,773	4,252	3	19	14	1,183,601	91,204
Government Services	35,917	9,330	5,938	2	26	17	1,780,058	223,796
Education	34,684	4,984	3,729	1	14	11	2,538,545	387,221
Health	27,811	5,281	3,330	1	19	12	2,004,436	219,765
Care	37,494	5,924	3,335	2	16	9	1,504,729	157,681
Not Within Scope	36,266	9,533	7,248	4	26	20	897,422	86,007
Total	635,907	143,564	103,453	2	23	16	27,547,123	2,816,693

Bases: Vacancies as a % of employment based on all employment.

Hard-to-fill vacancies as a % of vacancies based on all vacancies.

SSVs as a % of vacancies based on all vacancies.

Source: Davies et al. (2012)

Within the energy sector, there are currently close to 1,600 hard-to-fill vacancies, representing 17 per cent of all vacancies. Across the whole economy, the 143,500 hard-to-fill vacancies account for 23 per cent of all vacancies. In the energy sector, 13 per cent of vacancies (approximately 1,200 vacancies) are classified as skills shortages vacancies (i.e. caused by a lack of applicants with the required skills, qualifications or experience). This is a slightly lower proportion than the UK average of 16 per cent (approximately 103,500 vacancies).

Although these data may suggest that the energy sector is less affected by recruitment difficulties than the economy as a whole, this does not mean that specific difficulties are not present or that the scale of the problem does not represent a significant challenge to the energy sector. In addition, the impact of these shortages may be significant, both for the sector and the UK as a whole. Energy & Utility Skills has provided evidence to the Migration Advisory Committee on skills shortages affecting the UK's electricity generation (Energy & Utility Skills, 2009) and transmission and distribution industries (Energy & Utility Skills, 2011). Within these reports, 23 occupations were identified as being in shortage within the UK's resident labour market which means that employers have to resort to recruiting from global labour market, particularly from the USA, Australia, Philippines and South Africa amongst other places.

Job roles that are reported as being in shortage in the UK's electricity generation industry are:

Standard Occupation Classification (2000 code)	Job title
SOC 1121 – Production, Works and Maintenance Managers	Project Manager
SOC 1123 – Managers in Mining and Energy	Station Manager Shift/Group Leader
SOC 2121 – Civil Engineers	Project Civil Engineer
SOC 2122 – Mechanical Engineer	Mechanical Engineer
SOC 2123 – Electrical Engineers	Electrical Engineer Project Control Engineer Control & Instrumentation Engineer Assistant Engineer
SOC 2127 – Production and Process Engineers	Plant Process Engineer
SOC 3119 – Science and Engineering Technicians nec	Production Controller

Job roles that are reported as being in shortage in the UK's electricity transmission and distribution industry are:

Standard Occupation Classification (2000 code)	Job title
SOC 1121 – Production, Works and Maintenance managers	Project Manager
SOC 1123 – Managers in Mining and Energy	Site Manager
SOC 2123 – Electrical Engineers	Power System Engineer Control Engineer Protection Engineer
SOC 2126 – Design and Development Engineers	Design Engineer
SOC 2128 – Planning and Quality Control Engineers	Planning/ Development Engineer Quality, Health, Safety and Environment (QHSE) Engineer
SOC 2129 – Engineering Professional nec	Project Engineer Proposals Engineer
SOC 3113 – Engineering Technicians	Commissioning Engineer Substation Electrical Engineer

Standard Occupation Classification (2000 code)	Job title
SOC 5243 – Lines Repairers and Cable Joiners	Overhead Linesworker (high voltage only)

As an indication of the number of vacancies currently being advertised for these skills shortage roles across the whole, in January 2012 the recruitment website *Total Jobs* listed 1,547 UK-based vacancies for commissioning engineers and 1,204 for design engineers. Although not all these vacancies will be within energy sector companies, it gives an indication of the scale of demand for these specialist skills across all sectors of the economy – within which the energy sector has to compete.

Within the UK's wind and marine energy industry, research conducted by RenewableUK and Energy & Utility Skills (RenewableUK and Energy & Utility Skills, 2011) has found that employers are reporting hard-to-fill vacancies within the following technical and generic occupations:

Technical occupations	Generic occupations
Construction Manager	Commercial Manager
Ecologist	Contract Manager
Electrical Engineer	Health and Safety Manager
Environmental Consultant	IT Project Manager
Environmental Impact Assessor	Project Manager
Geophysical Surveyor	QSHE Manager
Hydro-Dynamic Surveyor	Software Engineer
Noise Assessor	Supervisor
Off-shore Structural Engineer	Sales
Ornithologist	
Technical Planner	
Power Systems Engineer	
Project Engineer	
Structural Design Engineer	
Operations and Maintenance Technician	

Research carried out by Cogent (Cogent, 2010) reports that the skill areas at risk of being in short supply in nuclear new build include:

- Safety case authoring
- High integrity welding
- Planning and estimating

- Control and instrumentation
- Geotechnical engineering

Across the nations of the UK, vacancies are particularly prevalent in Scotland's energy sector, where they represent seven per cent of employment in the sector. Nearly one-half (49 per cent) of energy sector vacancies in Northern Ireland are reported as hard-to-fill; and one-third (32 per cent) of such vacancies in Wales are also proving hard-to-fill. Northern Ireland and Wales are also more prone to skills shortages than the rest of the UK (Table 5.7).

Table 5.7 Profile of vacancies by sector and nation

	Vacancies as a % employment				HTF vacancies as a % vacancies				SSV as a % vacancies			
	England	Scotland	Wales	NI	England	Scotland	Wales	NI	England	Scotland	Wales	NI
Agriculture, forestry & fishing	3	†4	2	0	36	†45	87	0	28	†22	85	0
Energy production & utilities	2	7	4	1	11	22	32	49	9	17	22	25
Manufacturing	2	1	2	2	28	39	30	33	23	36	27	29
Construction, Building Services Engineering and Planning	2	2	2	1	42	29	41	27	26	24	34	16
Wholesale & retail trade	2	2	2	2	18	17	23	32	13	10	12	18
Transportation and Storage	2	2	3	1	17	6	48	60	12	3	29	11
Hospitality, Tourism and Sport	3	3	4	2	23	25	56	29	13	17	41	23
Information and Communication Technologies	5	†5	3	3	18	†35	19	13	16	†28	17	13
Creative media & entertainment	3	†2	5	11	20	†1	18	7	16	†0	16	4
Financial, Insurance & other Professional Services	3	2	2	11	19	7	12	44	17	6	12	44
Real estate & facilities management	3	†1	2	1	18	†29	17	0	14	†22	12	0
Government services	2	1	2	2	25	10	46	43	17	5	4	36
Education	1	2	1	1	16	6	6	16	12	2	5	11
Health	2	1	1	1	19	19	17	27	12	9	13	27
Care	3	1	3	3	16	19	20	13	9	16	13	3
Total	2	2	2	2	22	20	36	44	16	14	22	22
<i>Weighted base</i>	23,198,476	2,381,601	1,182,314	784,732	545,064	45,749	25,542	19,552	545,064	45,749	25,542	19,552
<i>Unweighted base</i>	2,345,213	201,868	178,922	90,690	43,960	3,186	2,999	1,759	43,960	3,186	2,999	1,759

Source: Davies et al. (2012). Bases vary. Vacancies as a % of employment based on all employment. Hard-to-fill vacancies as a % of vacancies based on all vacancies. SSVs as a % of vacancies based on all vacancies. † Treat figures with caution due to small establishment base size of 50-99 in Scotland.

Within the energy sector, hard-to-fill vacancies are particularly prevalent in the professional and skilled trades occupations (Table 5.8). As these two occupations employ 28 per cent of the sector's workforce, the presence of significant levels of hard-to-fill vacancies is of concern and needs to be addressed.

Table 5.8 Profile of vacancies within energy sector (UK)

	Volume			HTF vacancies as a % of vacancies	SSV as a % of vacancies	Weighted base (number of vacancies)	Unweighted base (number of vacancies)	Weighted base (establishments reporting vacancies)	Unweighted base (establishments reporting vacancies)
	Vacancies	HTF vacancies	SSV						
Managers	*	*	*	*	*	*	*	*	*
Professionals	805	340	123	42	15	805	85	232	27
Associate professionals	1,098	142	126	13	11	1,098	127	360	51
Administrative/clerical staff	455	16	10	4	2	455	56	252	41
Skilled trades occupations	686	417	394	61	57	686	81	299	47
Caring, leisure and other services staff	0	0	0	0	0	0	0	0	0
Sales and customer services staff	*	*	*	*	*	*	*	*	*
Machine operatives	2,840	491	446	17	16	2,840	162	591	67
Elementary staff	877	39	20	4	2	877	123	278	40
Unclassified staff	*	*	*	*	*	*	*	*	*
Total vacancies followed up***	8,426	1,588	1,236	19	15	8,426	770	2295	312

Bases: All vacancies followed up.

***Please note, employers were asked follow up questions (including occupational information) for up to 6 vacancies. If they had more than 6 vacancies, they were not questioned about the additional vacancies.

Therefore, the total figures presented in this table are slightly lower than the overall totals presented in table 67.

*Data suppressed as unweighted establishment base < 25

Establishment bases provided for suppression reasons.

Source: Davies et al. (2012)

For the nuclear industry, however, concern centres far more around future skills issues rather than current ones, with the last civil nuclear reactor in the UK being completed 17 years ago. For example, three private consortia of utility operators and reactor vendors currently propose the construction of 16GWe of new capacity (replacing around 10GWe of the existing ageing fleet) by 2025. This will require between 110,000 and 140,000 person-years of work (Cogent, 2010).

Action is already being taken to address this issue in both the short and longer-term. As mentioned previously, there are a number of professional and skilled occupations currently on the UK's Shortage Occupation List which apply directly to skills shortages within the energy sector – many of them are STEM-related. In the longer-term, the SSCs and National Skills Academies are working with employers, stakeholders and the providers of skills to develop solutions.

Employers who reported having vacancies that were proving hard-to-fill stated that the main causes were:

- Low number of applicants with the required skills (51 per cent of employers)

- Lack of work experience the company demands (28 per cent)
- Lack of qualifications the company demands (19 per cent)
- Not enough people interested in doing this type of job (19 per cent).

The lack of skills, experience or qualifications in applicants is a major factor affecting recruitment into the energy sector; more so than across the economy as a whole, where 40 per cent, 21 per cent and 11 per cent of employers respectively report these as difficulties. In addition, the overall lack of applicants is also a major inhibitor to recruiting.

The effects of hard-to-fill vacancies can be significant and far-reaching for those employers that are affected. The single largest impact is that of increasing the workload for other staff, with 76 per cent of employers with hard-to-fill vacancies stating this as an effect. Having difficulties meeting customer service objectives (53 per cent) and the loss of business (51 per cent) also result from hard-to-fill vacancies (Table 5.9).

Table 5.9 Impact of hard-to-fill vacancies, energy production sector, by nation

	UK		England		Scotland		Wales		Northern Ireland	
	Number	%	Number	%	Number	%	Number	%	Number	%
Increase workload for other staff	482	76	317	69	*	*	*	*	*	*
Have difficulties meeting customer services objectives	334	53	277	60	*	*	*	*	*	*
Lose business or orders to competitors	327	51	256	55	*	*	*	*	*	*
Delay developing new products or services	170	27	113	24	*	*	*	*	*	*
Experience increased operating costs	307	48	206	45	*	*	*	*	*	*
Have difficulties meeting quality standards	110	17	98	21	*	*	*	*	*	*
Have difficulties introducing new working practices	157	25	115	25	*	*	*	*	*	*
Outsource work	295	46	187	40	*	*	*	*	*	*
Withdraw from offering certain products or services altogether	214	34	185	40	*	*	*	*	*	*
Have difficulties introducing technological change	133	21	89	19	*	*	*	*	*	*
None	7	1	7	1	*	*	*	*	*	*
Don't know	0	0	0	0	*	*	*	*	*	*
Weighted base	635		462		*		*		*	
Unweighted base	82		60		*		*		*	

Bases: All establishments with hard-to-fill vacancies.

*Data suppressed as unweighted establishment base < 25 (<50 in Scotland)

NB Column percentages sum to more than 100 since multiple responses were allowed.

Source: Davies et al. (2012)

The effects of skills shortages on employers in the electricity generation and transmission and distribution industries can have an impact on the company's performance and ability to meet its contractual and statutory obligations (Energy & Utility Skills, 2011). In the electricity industry this includes being able to meet infrastructure delivery deadlines. Ultimately, this could lead to contracts going to overseas competitors with a subsequent impact on UK jobs.

In order to avoid such impacts, employers in the energy sector primarily increase their advertising/recruitment spend: 41 per cent of employers with hard-to-fill vacancies employed this particular strategy in 2011. In addition, 31 per cent employed new recruitment methods or used new channels. This could include the recruitment of skilled workers from the global labour market where the UK cannot meet its needs. These figures are comparable with the all economy averages of 39 per cent and 30 per cent respectively (Table 5.10).

Table 5.10 Measures taken by employers to overcome hard-to-fill vacancies, energy production sector, by nation

	UK		England		Scotland		Wales		Northern Ireland	
	Number	%	Number	%	Number	%	Number	%	Number	%
Increasing advertising / recruitment spend	264	41	225	49	*	*	*	*	*	*
Using NEW recruitment methods or channels	196	31	148	32	*	*	*	*	*	*
Redefining existing jobs	39	6	30	7	*	*	*	*	*	*
Increasing the training given to your existing workforce	36	6	27	6	*	*	*	*	*	*
Increasing / expanding trainee programmes	68	11	50	11	*	*	*	*	*	*
Being prepared to offer training to less well qualified recruits	60	10	57	12	*	*	*	*	*	*
Bringing in contractors to do the work, or contracting it out	54	8	18	4	*	*	*	*	*	*
Increasing salaries	22	3	17	4	*	*	*	*	*	*
Recruiting workers who are non-UK nationals	39	6	18	4	*	*	*	*	*	*
Making the job more attractive e.g. recruitment incentives, enhanced T&Cs, working hours	8	1	8	2	*	*	*	*	*	*
Other	17	3	17	4	*	*	*	*	*	*
Nothing	70	11	37	8	*	*	*	*	*	*
Don't know	21	3	21	5	*	*	*	*	*	*
Weighted base	635		462		*		*		*	
Unweighted base	82		60		*		*		*	

Bases: All establishments with hard-to-fill vacancies.

*Data suppressed as unweighted establishment base < 25 (<50 in Scotland)

** Denotes a figures of greater than 0% but less than 0.5%

NB Column percentages sum to more than 100 since multiple responses were allowed.

Source: Davies et al. (2012)

It is interesting to note that just 11 per cent of employers stated that, in order to avoid the impact of hard-to-fill vacancies, they would increase or expand their trainee programmes. This is the same proportion of employers that would do nothing (although it is almost double the six per cent of employers from across all sectors of the economy that stated they would also increase their trainee programmes). This may be because many employers are not in a position to increase or expand their trainee programmes. The impact on productivity, as well as bottom line costs, that increasing trainee in-takes can have on employers can be significant.

Pressure on keeping employee numbers/costs down can often be an issue that employers have to deal with, as is the uncertainty around exactly what skills will be required and when. In addition, those industries that were privatised in the late 1980s and early 1990s have had to deal with years of restructuring, cost-rationalisation and out-sourcing. One side effect was the loss of significant elements of the training infrastructure, only now beginning to be replaced.

Where skills shortages do exist across within the economy, in two-thirds of cases (66 per cent of such vacancies), it is job-specific skills that are lacking. This rises to 78 per cent in both Scotland and Wales. Technical and practical skills (46 per cent) and planning and organisation (41 per cent) skills also appear to be in short supply (Table 5.11).

Table 5.11 Skills lacking in Skills Shortage Vacancies, whole economy, by nation

	UK		England		Scotland		Wales		Northern Ireland	
	Number	%	Number	%	Number	%	Number	%	Number	%
Basic computer literacy / using IT	16,832	16	13,842	16	514	8	2,001	35	476	11
Advanced IT or software skills	21,988	21	18,190	21	1,160	18	1,976	35	661	15
Oral communication skills	39,113	38	33,997	39	1,910	30	1,993	35	1,213	28
Written communication skills	33,859	33	28,515	33	2,659	41	1,381	24	1,305	30
Customer handling skills	41,349	40	33,863	39	3,056	47	2,977	53	1,453	33
Team working skills	33,728	33	27,092	31	1,877	29	3,315	59	1,444	33
Written Welsh language skills	1,574	2	0	0	0	0	1,574	28	0	0
Oral Welsh language skills	1,680	2	0	0	0	0	1,680	30	0	0
Foreign language skills	16,773	16	14,601	17	1,451	22	385	7	336	8
Problem solving skills	37,882	37	32,338	37	2,453	38	2,209	39	882	20
Planning and Organisation skills	42,431	41	35,377	41	2,867	44	2,372	42	1,815	41
Strategic Management skills	29,853	29	24,828	29	2,122	33	1,564	28	1,340	31
Numeracy skills	26,775	26	23,194	27	1,866	29	1,149	20	567	13
Literacy skills	30,151	29	25,002	29	1,674	26	2,490	44	985	22
Office admin skills	17,559	17	15,320	18	967	15	797	14	475	11
Technical or practical skills	47,992	46	40,313	46	3,711	57	2,571	46	1,397	32
Job specific skills	68,385	66	56,716	65	5,064	78	4,401	78	2,204	50
Experience/lack of product knowledge	1,668	2	1,523	2	135	2	9	0	0	0
Personal attributes (e.g. motivation, work ethos, common sense, initiative, reliability, commitment, punctuality, flexibility)	2,743	3	2,385	3	314	5	17	0	26	1
Other	911	1	835	1	0	0	13	0	62	1
No particular skills difficulties	7,129	7	5,588	6	148	2	135	2	1,258	29
Don't know	3,777	4	3,459	4	102	2	124	2	93	2
Weighted base	103,453		86,950		6,463		5,650		4,390	
Unweighted base	7,197		5,959		367		482		369	

Bases: All skills shortage vacancies.

NB Column percentages sum to more than 100 since multiple responses were allowed. Employment weight.

Source: Davies et al. (2012)

Within the energy sector, job specific and technical or practical skills are in even more short supply than average. For example, 84 per cent of skills shortage vacancies are caused by a lack of job specific skills in the applicant, while 76 per cent are caused by a lack of technical or practical skills (Table 5.12).

Table 5.12 Skills lacking in Skills Shortage Vacancies, energy production sector, by nation

	UK		England		Scotland		Wales		Northern Ireland	
	Number	%	Number	%	Number	%	Number	%	Number	%
Basic computer literacy / using IT	187	15	155	39	*	*	*	*	*	*
Advanced IT or software skills	158	13	97	24	*	*	*	*	*	*
Oral communication skills	245	20	171	43	*	*	*	*	*	*
Written communication skills	247	20	141	35	*	*	*	*	*	*
Customer handling skills	160	13	85	21	*	*	*	*	*	*
Team working skills	133	11	50	13	*	*	*	*	*	*
Written Welsh language skills	0	0	0	0	*	*	*	*	*	*
Oral Welsh language skills	0	0	0	0	*	*	*	*	*	*
Foreign language skills	87	7	40	10	*	*	*	*	*	*
Problem solving skills	197	16	110	28	*	*	*	*	*	*
Planning and Organisation skills	219	18	136	34	*	*	*	*	*	*
Strategic Management skills	160	13	108	27	*	*	*	*	*	*
Numeracy skills	130	11	91	23	*	*	*	*	*	*
Literacy skills	205	17	117	29	*	*	*	*	*	*
Office admin skills	94	8	31	8	*	*	*	*	*	*
Technical or practical skills	941	76	170	43	*	*	*	*	*	*
Job specific skills	1,037	84	234	59	*	*	*	*	*	*
Experience/lack of product knowledge	0	0	0	0	*	*	*	*	*	*
Personal attributes e.g. motivation, work ethos, common	3		3	1	*	*	*	*	*	*
Other	0	0	0	0	*	*	*	*	*	*
No particular skills difficulties	10	1	10	2	*	*	*	*	*	*
Don't know	23	2	2	1	*	*	*	*	*	*
Weighted base	1,236		399		*	*	*	*	*	*
Unweighted base	110		61		*	*	*	*	*	*

Bases: All skills shortage vacancies.

*Data suppressed as unweighted establishment base < 25 (<50 in Scotland)

** Denotes a figures of greater than 0% but less than 0.5%

NB Column percentages sum to more than 100 since multiple responses were allowed.

Source: Davies et al. (2012)

It is not clear from these data what specific skills are in short supply by sub-sector. The job specific/technical skills being demanded in the offshore oil and gas industry will vary significantly from those being sought in the waste management industry. For an indication of the likely skills being demanded from employers in each sub-sector of the energy sector, see section 4.1 above (further evidence of the skills being sought within the sector can also be found on EU Skills', Cogent's and Proskills' websites).

One issue that may be contributing to the skills shortages at higher levels (associate professional and above), is the lack of graduates from engineering disciplines that enter employment in the energy sector. Just 26 per cent of the 870 graduates that entered employment in the energy sector in 2008/09 studied engineering and technology-related subjects (HESA, 2011). This falls somewhat short of EU Skills' estimate of level 4+ demand based on its own research, which suggests that demand for this skill level is approximately 1,000 in the regulated aspects of the industry alone³ (EU Skills' Workforce Planning Model, 2011 (unpublished)).

³ These are gas and electricity transmission and distribution and water and waste water companies.

Given that skills shortages already exist in a number of engineering disciplines (as discussed above in terms of occupations recognised by the Migration Advisory Committee as being in shortage in the UK) and that demand for higher level skills is forecast to increase over the coming decade (especially in electricity generation – from nuclear, fossil and renewable sources (see section 7 below)), the number of engineering-related graduates entering the energy sector may need to increase if these skills shortages are not to increase in number.

Turning now to the skills deficiencies within the existing workforce, 16 per cent (2,000) of energy sector employers report having skills gaps within their workforce, compared to 13 per cent (301,000) of employers across the whole economy. This equates to 17,250 energy sector employees (five per cent of all employees in the sector) in need of training/ skills development in order to become fully proficient in their role; and nearly 1.5million people (five per cent) across the whole economy (Table 5.13)

Table 5.13 Employers and employees with skills gaps by sector (UK)

	Employers with skills gaps				Employees with skills gaps			
	Number	%	Weighted base	Unweighted base	Number	%	Weighted base	Unweighted base
Agriculture, Forestry & Fishing	10,665	10	110,220	1,547	20,149	4	466,870	19,506
Energy Production & Utilities	2,000	16	12,610	1,614	17,250	5	333,050	47,228
Manufacturing	21,520	16	130,709	7,776	148,007	6	2,541,188	291,593
Construction, Building Services Engineering and Planning	31,925	10	306,403	8,961	99,184	4	2,235,270	150,111
Wholesale & Retail Trade	72,233	15	470,200	16,150	300,344	6	4,674,684	514,820
Transportation and Storage	11,540	9	122,058	4,735	55,391	4	1,320,126	114,658
Hospitality, Tourism and Sport	43,000	20	220,055	11,318	193,549	8	2,313,487	258,524
Information and Communication Technologies	6,647	9	72,281	2,510	34,775	6	614,641	53,681
Creative Media & Entertainment	9,155	6	143,772	3,762	41,091	4	1,086,978	87,953
Financial, Insurance & other Professional Services	20,954	12	170,887	5,343	92,599	5	2,052,039	112,945
Real Estate & Facilities Management	13,185	8	166,486	3,424	64,302	5	1,183,601	91,204
Government Services	7,980	15	54,687	2,605	94,735	5	1,780,058	223,796
Education	12,304	19	64,540	5,439	94,884	4	2,538,545	387,221
Health	9,776	19	52,370	3,398	101,986	5	2,004,436	219,765
Care	14,886	17	87,899	4,763	78,458	5	1,504,729	157,681
Whole economy	300,941	13	2,299,921	87,572	1,489,540	5	27,547,123	2,816,693

Base: All establishments, all employees

Source: Davies et al. (2012)

However, the proportion of employees reported as having skills gaps is equal with the whole economy average, at five per cent.

Across the nations of the UK, the prevalence of skills gaps does not vary much; other than in Northern Ireland, where just one per cent of energy sector employers report having skills gaps (Table 5.14).

Table 5.14 Employers and employees with skills gaps within energy production, by nation

	UK		England		Scotland		Wales		Northern Ireland	
	Number	%	Number	%	Number	%	Number	%	Number	%
Employers with skills gaps	2,000	16	1,608	16	233	18	111	13	100	1
Employees with skills gaps	17,250	5	14,372	6	1,752	3	1,027	6	348	5
<i>Employer weighted base</i>	12,610		9,967		1,279		828		7,097	
<i>Employer unweighted base</i>	1,614		1,306		106		133		45	
<i>Employment weighted base</i>	333,050		248,701		60,199		16,821		7,329	
<i>Employment unweighted base</i>	47,228		39,310		4,710		2,400		808	

Base: All establishments, all employees

Source: Davies et al. (2012)

Skills gaps occur in similar proportions across the majority of occupational groups within the energy sector (except professional occupations). This may be due to the high levels of training that they have already received (Table 5.15).

Table 5.15 Skills gaps by occupation within energy production (UK)

	Total employment	Number with skills gaps	% with skills gaps
Managers	53,714	2,023	4
Professionals	*	*	*
Associate professionals	32,461	1,486	5
Administrative/clerical staff	37,561	2,240	6
Skilled trades occupations	35,182	1,685	5
Caring, leisure and other services staff	*	*	*
Sales and customer services staff	13,479	1,516	11
Machine operatives	82,638	2,579	3
Elementary staff	54,404	2,871	5
Weighted base	333,050	14,400	4
Unweighted base	47,228	2,139	

Base: All employees

* Suppressed due to unweighted establishment base <25

Source: Davies et al. (2012)

The cause of these skills gaps do not particularly vary from the all economy average. The most prevalent causes are that training is currently only partially completed (49 per cent) and that they are new to the role (48 per cent). The proportion of skills gaps caused by a lack of motivation (25 per cent) and where employees have been on training but their performance has not improved sufficiently (16 per cent) are both significantly lower than those reported across the whole economy (Table 5.16).

Table 5.16 Causes of skills gaps by sector (UK)

	Energy Production & Utilities	All economy
They are new to the role	48	47
Their training is currently only partially completed	49	46
Staff lack motivation	25	32
They have been on training but their performance has not improved sufficiently	16	29
The introduction of new working practices	25	23
They have not received the appropriate training	15	23
Unable to recruit staff with the required skills	22	18
The introduction of new technology	14	17
The development of new products and service	9	15
Problems retaining staff	7	10
Lack of other skills e.g. communication, interpersonal	*	1
Lack of aptitude to do job/reached maximum potential	1	1
Non-work related problems e.g. health or personal problems	*	1
Language barrier - English not first language	*	1
Staff are too old to carry out the work required	*	*
Other	2	2
No particular cause	*	1
Don't know	27	19
Weighted base	17,250	1,489,540
Unweighted base	2,139	166,795

Base: All skills gaps followed up

* Denotes a figure of greater of 0% but less than 0.5%

Source: Davies et al. (2012)

As with skills shortages, skills gaps in the existing workforce are mainly job-specific and technical or practical in nature. However, it is interesting to note that planning and organisation, problem solving and communication skills are much more likely to be reported as lacking in the existing workforce than in new applicants (Table 5.17).

Table 5.17 Skills lacking by sector (UK)

	Energy Production & Utilities	All economy
Basic computer literacy / using IT	14	17
Advanced IT or software skills	21	15
Oral communication skills	26	34
Written communication skills	29	28
Customer handling skills	26	38
Team working skills	26	38
Written Welsh language skills	0	*
Oral Welsh language skills	*	*
Foreign language skills	9	9
Problem solving skills	29	35
Planning and Organisation skills	34	39
Strategic Management skills	18	19
Numeracy skills	11	15
Literacy skills	15	19
Office admin skills	11	16
Technical or practical skills	32	27
Job specific skills	44	48
Personal attributes (e.g. motivation, work ethos, common sense, initiative, reliability, commitment, punctuality, flexibility)	*	1
Experience/lack of product knowledge	1	1
Other	0	*
No particular skills difficulties	*	3
Don't know	26	19
Weighted base	17,250	1,489,540
Unweighted base	2,139	166,795

Base: All skills gaps followed up

* Denotes a figure of greater of 0% but less than 0.5%

Source: Davies et al. (2012)

In terms of the technical and job-specific skills required to decarbonise the energy sector, and the wider economy of the UK, there are a number of core skills that are necessary (Strietska-Illina et al, 2011). These include:

- Adaptability and transferability skills (to enable workers to learn and apply new technologies and processes);
- Environmental and sustainability awareness;
- Systems and risk analysis skills;
- Entrepreneurial skills;
- Innovation skills (to identify opportunities and create new strategies);
- Communication and negotiation skills;
- Marketing skills (to promote products and services);

- Consulting skills (to advise consumers about green solutions and to spread the use of green technologies); and
- Networking, IT and language skills (to perform in global markets).

These skills are becoming increasingly important within the energy sector, especially for SMEs operating in the renewable energy/ low carbon sector. This is particularly the case within technology developing firms, where the majority of the workforce is often employed in higher level technical and engineering roles related to the actual design and manufacture of the technology, as opposed to roles whose primary focus is market and business development.

Four-fifths (78 per cent) of employers who reported skills gaps stated that they had caused an increased workload for other staff. Increased operating times (45 per cent) and having difficulties in meeting quality standards (40 per cent) were also significant consequences of skills gaps (Table 5.18)

Table 5.18 Consequences of skills gaps, whole economy, by nation

	UK		England		Scotland		Wales		Northern Ireland	
	Number	%	Number	%	Number	%	Number	%	Number	%
Increase workload for other staff	144,234	78	120,873	78	13,091	80	6,475	81	3,794	80
Increase operating costs	82,833	45	68,918	44	7,615	46	3,984	50	2,314	49
Have difficulties meeting quality standards	74,405	40	63,415	41	6,121	37	3,286	41	1,584	33
Have difficulties introducing new working practices	70,317	38	57,368	37	7,637	47	3,326	42	1,985	42
Lose business or orders to competitors	59,139	32	50,038	32	4,865	30	2,810	35	1,425	30
Delay developing new products or services	46,767	25	39,469	25	3,542	22	2,470	31	1,286	27
Outsource work	28,173	15	24,449	16	1,549	9	1,442	18	733	15
No particular problems / None of the above	14,285	8	12,183	8	1,297	8	394	5	412	9
Don't know	344	**	332	0	11	**	0	**	0	**
Weighted base	184,733		155,600		16,389		8,012		4,732	
Unweighted base	12,943		11,100		527		876		440	

Base: All employers with skills gaps that have impact on establishment performance

** Denotes a figures of greater than 0% but less than 0.5%

NB Column percentages sum to more than 100 since multiple responses were allowed.

Source: Davies et al. (2012)

Within the energy sector, a much higher proportion of employers who report skills gaps state that this has resulted in an increased workload for other staff (84 per cent). Increased operating costs are also reported by more than half of employers (52 per cent) (Table 5.19)

Table 5.19 Consequences of skills gaps, energy production, by nation

	UK		England		Scotland		Wales		Northern Ireland	
	Number	%	Number	%	Number	%	Number	%	Number	%
Increase workload for other staff	1,052	84	818	85	*	*	*	*	*	*
Increase operating costs	655	52	485	51	*	*	*	*	*	*
Have difficulties meeting quality standards	339	27	284	30	*	*	*	*	*	*
Have difficulties introducing new working practices	468	37	359	37	*	*	*	*	*	*
Lose business or orders to competitors	332	26	282	29	*	*	*	*	*	*
Delay developing new products or services	327	26	225	23	*	*	*	*	*	*
Outsource work	229	18	172	18	*	*	*	*	*	*
No particular problems / None of the above	83	7	57	6	*	*	*	*	*	*
Don't know	0	0	0	0	*	*	*	*	*	*
Weighted base	1,257		960		*		*		*	
Unweighted base	182		144		*		*		*	

Base: All employers with skills gaps that have impact on establishment performance

*Data suppressed as unweighted establishment base < 25 (<50 in Scotland)

NB Column percentages sum to more than 100 since multiple responses were allowed.

Source: Davies et al. (2012)

Increased training activity is by far the most common reaction to address skills gaps in the workforce, reported by 82 per cent of employers. More supervision, performance/ appraisals and mentoring are also common tactics (Table 5.20)

Table 5.20 Steps employers have taken to overcome skills gaps, whole economy, by nation

	UK		England		Scotland		Wales		Northern Ireland	
	Number	%	Number	%	Number	%	Number	%	Number	%
Increase training activity / spend or increase/expand trainee programmes	185,527	82	155,451	82	3,822	79	18,002	83	8,253	86
More supervision of staff	139,442	62	116,865	62	3,186	66	13,381	62	6,009	62
More staff appraisals / performance reviews	123,245	55	103,336	55	2,939	61	12,001	55	4,968	51
Implementation of mentoring / buddying scheme	113,645	50	94,041	50	2,350	49	12,376	57	4,878	51
Reallocating work	76,053	34	62,381	33	1,952	41	7,876	36	3,844	40
Changing working practices	69,850	31	59,408	31	1,499	31	6,406	29	2,537	26
Increase recruitment activity / spend	33,319	15	28,747	15	762	16	2,386	11	1,424	15
Recruiting workers who are non-UK nationals	21,589	10	18,782	10	572	12	1,373	6	862	9
Other	3,156	1	2,742	1	125	3	221	1	69	1
Nothing	3,541	2	2,736	1	36	1	617	3	152	2
Don't know	348	**	322	0	0	0	0	0	25	0
Weighted base	225,379		189,191		21,730		9,650		4,807	
Unweighted base	16,506		14,313		655		1,074		464	

Base: All employers with skills gaps who have taken steps to improve the proficiency or skills of these staff, or have plans to do so

NB Column percentages sum to more than 100 since multiple responses were allowed.

** Denotes a figures of greater than 0% but less than 0.5%

Source: Davies et al. (2012)

Employers within the energy sector react to skills gaps in very similar ways, as shown in Table 5.21 below. Most companies in the energy sector increase training activity and/or spend in an attempt to overcome skills gaps (83 per cent, compared to 82 per cent of all UK employers). Around half of employer in the sector employ more supervision of staff, undertake more appraisals/performance reviews and implement mentoring/buddying schemes (53 per cent, 50 per cent and 46 per cent respectively; in line with the UK averages).

Table 5.21 Steps employers have taken to overcome skills gaps, energy production, by nation

	UK		England		Scotland		Wales		Northern Ireland	
	Number	%	Number	%	Number	%	Number	%	Number	%
Increase training activity / spend or increase/expand trainee programmes	1,199	83	940	82	*	*	*	*	*	*
More supervision of staff	765	53	594	52	*	*	*	*	*	*
More staff appraisals / performance reviews	719	50	552	48	*	*	*	*	*	*
Implementation of mentoring / buddying scheme	666	46	525	46	*	*	*	*	*	*
Reallocating work	550	38	405	35	*	*	*	*	*	*
Changing working practices	513	36	368	32	*	*	*	*	*	*
Increase recruitment activity / spend	360	25	221	19	*	*	*	*	*	*
Recruiting workers who are non-UK nationals	151	10	91	8	*	*	*	*	*	*
Other	21	1	21	2	*	*	*	*	*	*
Nothing	23	2	23	2	*	*	*	*	*	*
Don't know	0	0	0	0	*	*	*	*	*	*
Weighted base	1,441		1,152		*	*	*	*	*	*
Unweighted base	204		168		*	*	*	*	*	*

Base: All employers with skills gaps who have taken steps to improve the proficiency or skills of these staff, or have plans to do so

*Data suppressed as unweighted establishment base < 25 (<50 in Scotland)

NB Column percentages sum to more than 100 since multiple responses were allowed.

Source: Davies et al. (2012)

5.3 Extent of under-employment

Across the whole of the UK economy, nearly half of all employers (49 per cent) state that they have employees who are over-qualified or over-skilled for the roles that they perform. Within the energy sector, 43 per cent of employers report having such employees (Table 5.22).

Table 5.22 Extent to which workforce is 'over qualified' and 'over skilled' by sector (UK)

	Employers with employees who are over qualified and over skilled				Employees who are over qualified and over skilled			
	Number	%	Weighted base	Unweighted base	Number	%	Weighted base	Unweighted base
Agriculture, Forestry & Fishing	42,111	38	110,220	1,547	88,613	19	466,870	19,506
Energy Production & Utilities	5,458	43	12,610	1,614	43,319	13	333,050	47,228
Manufacturing	56,009	43	130,709	7,776	252,633	10	2,541,188	291,593
Construction, Building Services Engineering and Planning	129,922	42	306,403	8,961	369,923	17	2,235,270	150,111
Wholesale & Retail Trade	241,146	51	470,200	16,150	846,216	18	4,674,684	514,820
Transportation and Storage	61,038	50	122,058	4,735	202,809	15	1,320,126	114,658
Hospitality, Tourism and Sport	131,526	60	220,055	11,318	566,562	24	2,313,487	258,524
Information and Communication Technologies	33,764	47	72,281	2,510	93,637	15	614,641	53,681
Creative Media & Entertainment	66,845	46	143,772	3,762	205,573	19	1,086,978	87,953
Financial, Insurance & other Professional Services	76,826	45	170,887	5,343	312,906	15	2,052,039	112,945
Real Estate & Facilities Management	81,744	49	166,486	3,424	217,791	18	1,183,601	91,204
Government Services	29,384	54	54,687	2,605	256,006	14	1,780,058	223,796
Education	34,623	54	64,540	5,439	341,455	13	2,538,545	387,221
Health	23,566	45	52,370	3,398	225,183	11	2,004,436	219,765
Care	47,114	54	87,899	4,763	258,385	17	1,504,729	157,681
Whole economy	1,118,691	49	2,299,921	87,572	4,456,192	16	27,547,123	2,816,693
Weighted base	2,299,921				27,547,123			
Unweighted base	87,572				2,816,693			

Base: Vary.

"Employers" columns based on all establishments

"Employees" columns based on all employment.

Source: Davies et al. (2012)

On average, in the UK, 16 per cent of employees are reported as being over-qualified or over-skilled, and 13 per cent of the energy sector's workforce is reported as being such. .

5.4 Impact of mis-matches on wages

The average hourly wage paid across the UK in 2010 was £14.60, an increase of 66 pence over 2008 wage rates (Table 5.23). Within the energy sector the average hourly wage is £2.02 higher than the national average, at £16.62 per hour; this is an increase of 69 pence, or 4.3 per cent, over 2008 rates (compared to an increase of 4.7 per cent across the whole economy).

Table 5.23 Average hourly wage by sector (£) (UK)

	2008	2009	2010
	£	£	£
Agriculture, forestry and fishing	10.42	11.18	10.38
Energy production and utilities	15.93	16.41	16.62
Manufacturing	13.86	14.28	14.37
Construction, building services, engineering and planning	14.66	15.29	15.39
Wholesale and retail trade	11.00	11.27	11.36
Transportation and storage	12.44	13.16	13.21
Hospitality, tourism and sport	9.14	9.35	9.52
Information and communication technologies	20.05	20.26	20.40
Creative media and entertainment	17.14	17.29	17.50
Financial, insurance & other professional services	21.06	21.45	21.99
Real estate and facilities management	11.36	11.64	11.71
Government services	14.40	14.87	15.62
Education	14.67	15.39	15.71
Health	14.97	15.79	16.45
Care	10.21	10.30	10.49
All economy	13.94	14.39	14.60

Source: Annual Survey of Hours and Earnings, ONS (2010c)

The higher wage returns in the energy sector can, in part, be attributed to a higher proportion of manager and senior officials employed in the sector – four percentage points higher than the all sector average.

However, this is only part of the story. In order to attract the skills they need, employers in the energy sector often have to pay slightly higher wage rates. This is due to both the nature of work undertaken and the location and context in which it is undertaken. As the sector covers activities such as oil and gas extraction, mining and quarrying, and electricity, gas and water distribution, the higher wages rates in these industries are an attempt to overcome the sector attractiveness problem where skilled workers and new entrants to the labour market may not see these industries as their preferred career option.

5.5 Impact of mis-matches on migration

As reported in section 5.2 above, skills shortages have an impact on the UK's energy sector, with a number of job roles officially recognised as being in shortage within the resident UK labour market by being placed on Shortage Occupation List (Home Office, 2011).

As a result of these skills shortages, employers within the electricity industry have to seek out skilled workers from the global labour market to meet their short-term skills requirements. At the same time, these employers are collaborating with their Sector Skills Councils to ensure that the UK labour market returns to self-sufficiency in terms of these skills over the medium-term. Although the actual number of skilled workers being sought in all these occupations may be small in absolute terms, they play an important role in the sector.

6 Drivers of change and their skills implications

Chapter Summary

Seven drivers of change have been identified that will impact upon the skills demands of the energy sector:

- **Regulation and multi-level governance:** economic, skills and quality-based regulation are all significant drivers of skills across the sector, as are European-level directives
- **Demographic and population change:** fewer young people entering the labour market and an aged technical workforce
- **Environmental change:** development of the low carbon economy and concentrated centres of population growth
- **Economics and globalisation:** demand for oil and gas will remain strong, although demand from the construction sector is reliant upon the economic cycle and government policy
- **Technological change:** the development of new technologies and of new markets, expansion of distributed energy generation and new civil nuclear
- **Changing values and identities:** impacting on the attractiveness of STEM-related studies and careers
- **Changing consumer demand:** meeting demand for energy from a growing population

6.1 Drivers of change

This chapter provides a summary of the main drivers of change that impact upon the supply and demand for skills, both at the moment and in the coming years.

Davies (2001) identified seven drivers of change that could impact upon the supply and demand for skills and labour within the economy. These are shown in Figure 6.1 below and discussed in further detail throughout this section.

Figure 6.1 The major drivers of change



Source: National Strategic Skills Audit 2010, UKCES

Regulation and multi-level governance: Regulation is a significant driver of change across the whole of the energy sector. Minimum levels of competency apply to significant aspects of the workforce, requiring them and their employer to prove they have the appropriate skills and competencies to operate within certain environments (many of which can be very dangerous). Quality standards and efficiency are also driven through regulatory bodies.

In the absence of an open market in some sub-sectors (e.g. in the gas, electricity and water transmission and distribution industries), economic regulation acts in the interest of consumers to maintain appropriate quality and price levels (effectively acting as artificial competition).

European and national-level governance are a significant determining factor in the structure (and therefore skills) of the sector. EU directives on large combustion plants will mean that significant levels of power generating capacity will be shut over the coming decade which will need to be replaced with ever-more efficient and greener systems.

On the skills supply-side, educational policy varies across the national borders within the UK. This can lead to different solutions being applicable to different aspects of the sector's workforce dependent upon their location (this can be a difficult landscape for employers to navigate).

A strong lead from government is crucial to establishing and maintaining certainty in the market, particularly in terms of attracting investment. Returns and/or incentives need to be guaranteed in order to attract the required levels of private sector investment.

Demographic and population change: Demographic change can be an important influence on skills needs as it affects labour supply through population change and the location of different sources of labour. The number of young people entering the labour will decrease slowly over the next decade, so all sectors of the economy will be fighting for a smaller number of new entrants. The technical and engineering workforce in the energy sector, and across the economy as a whole, is older than average and this will result in high levels of replacement demand.

Population increases will undoubtedly increase demand for the sector's products and service. Demand for energy, clean water and waste management services will increase in line with the number of people requiring them (although advances in energy and water efficiency will have some effect), while higher demand for housing will increase the demand coming from the construction sector.

Environmental change: This includes climate change, pollution, changes in demand levels for different types of energy (nuclear/ fossil fuel/ renewables), carbon capture and storage, development of greener fuels, and the availability and use of water. Environmental change may lead to changing skills needs as government policy and investment to tackle climate change stimulates the development of a low carbon economy and determines the exact make-up of energy generating capacity and waste treatment activities.

The use of recovered and recycled materials is playing an increasingly important role as a way of both re-using waste products and conserving valuable raw materials. Future developments will include more efficient use of materials and improved production processes to reduce and conserve energy, as well as taking advantage of expertise to improve carbon capture and storage techniques.

Economics and globalisation: This includes the rate of overall economic growth, management practices and structure of organisations, the nature of the workforce and international trade.

The effect of economic growth in other sectors of the UK economy plays an important role in the success, or otherwise, of parts of the energy sector. The EMP industries, for example, are very reliant upon public investment in construction for much of product demand. Increased demand may result from future infrastructure projects, but this will remain unclear until the Government makes firm commitments on spending patterns. Similarly, global energy and fuel prices have an impact on domestic prices and, therefore, demand.

The cost and availability of gas and oil will play an important role in determining the energy mix of the UK.

Technological change (including new developments and new applications of existing technologies): Technological developments around smart grids, wind and marine energy, electric vehicles, carbon capture and storage and power storage will drive higher levels of demand for scientists and engineers. In addition, new civil nuclear generating capacity will also begin construction over coming decade.

The energy sector is a very capital intensive industry and the future success of the sector is dependent upon its ability to adapt to new requirements through the continued introduction of new technologies; and to get the most out of existing technologies, adapted for new situations. This is creating demand for skills at higher levels in research and development (R&D); at the intermediate level in terms of operation and maintenance; and at lower levels in its manufacturing. There may also be skills needs requirements in supporting consumers to use new technologies.

Significant investment in the expansion and renewal of the transmission and distribution infrastructure will be required to handle the greater proportions of distributed, potentially intermittent generating technologies.

Changing values and identities: This includes family structures, attitudes towards government, citizenship, and education. Changes in values and identities include attitudes to work, including willingness to work in an often-perceived “heavy” industry or in engineering in general. This can affect the availability of labour through choices made about the type of work sought and working conditions. This is particularly relevant to young people and those who influence their studying and career choices (e.g. parents, teachers, and information, advice and guidance (IAG) providers)

Changing consumer demand: covering changing consumer choices and expectations about type and quality of products and services. The development of consumer preferences for goods and services can influence factors such as energy generation and the management and handling of waste. Similarly, consumer demands can be influenced by the actions of the sector (coupled with government influence); for example, increased recycling rates and of energy efficiency.

Strietska-Illina et al (2011) identified four similar drivers as being of prime importance to the creation a low carbon economy. These were:

- environmental changes
- policy and regulation
- green technology and innovation
- markets and consumer habits.

The implications of these drivers of change on the supply and demand for skills in the energy sector are discussed in more detail in table 6.1 below.

Table 6.1 Implications of the drivers of skills in the energy sector

Nature of driver	Current, on-going or new driver	Increase or decrease in: a) Scale b) Impact	Impact on supply or demand for labour	Impact on skills
Regulation and multi-level governance				
Regulation of the energy sector to increase efficiency and maintain quality and standards	Current and on-going	The scale of regulation in future years is uncertain and variable Impact is likely to increase	Demand	Will increase demand for skills and for proven technical/ on-the-job competencies
Increased regulation to ensure health and safety and environmental safeguards will increase demand for skills in these areas	New and on-going	While the impact will increase, the scale may be more limited	Demand	Ensuring good health and safety practice and mitigating environmental risks are becoming of increasing importance and will raise demand for skills and experience in these areas in most aspects of the energy sector; particularly in offshore activities
Increased emphasis on ensuring a skilled and competent workforce when procuring contractors	Current and on-going	Scale is likely to increase, while impact is uncertain	Demand	Asset owners may increasingly request assurances and proof of a contractor's workforce ahead of awarding contracts
The Large Combustion Plant Directive and Industrial Emissions (Integrated Pollution Prevention and Control) Directive will result in higher skills demand in energy generation	New	Both the scale and impact will increase	Demand	These directives will result in around 22GW of generating capacity needing to be replaced before 2020 Will result in high demand for engineering construction, energy generation and nuclear skills This is in addition to energy generation expansion plans
Devolved energy and education policies will have a strong influence on the supply and demand for labour and skills	Current and on-going	Both scale and impact will remain stable	Supply and demand	Differences in both energy and education policies within the devolved administrations will often require bespoke national solutions which cannot be adopted across the UK

Nature of driver	Current, on-going or new driver	Increase or decrease in: a) Scale b) Impact	Impact on supply or demand for labour	Impact on skills
Uncertainty of returns to private sector investment will limit short-term investment in technologies and skills	Current	Both scale and impact of uncertainties should diminish over time as policies become apparent	Demand	These uncertainties around the likely timing and scale of returns to private investment will limit the speed at which new products and markets are developed and the timing of skills investments
Demographic and population change				
Increasing population leads to additional demands for the sector's products and service (particularly for energy, petroleum, water and waste management services)	Current and on-going	Both scale and impact are likely to increase	Demand	Likely to result in increased demand for labour overall, particularly in energy generation and waste management Associated technical requirements may result in additional demand for skilled labour
Fewer young people entering the labour market over the medium-term	Current	Scale will increase while impact is likely to increase	Supply	This, coupled with higher school leaving age, could reduce the supply of young people entering the labour market; resulting in a tighter labour market for the under 25s
Increased life expectancy, reduced pension provision and flexible retirement age	New	Both scale and impact will increase	Supply and demand	Flexible retirement ages and the likelihood that working lives will lengthen, bring uncertainties around workforce planning and succession planning Also has the advantage of retaining skilled and experienced labour for longer (assuming physical capabilities remain within manual occupations)
Immigration policy could affect the supply of skilled labour into the UK	On-going	Scale and impact is uncertain (dependent upon government policy)	Supply	The supply of skilled labour from overseas is crucial to avoiding skills shortages caused by short-term investment plans – enabling employers to adjust over the medium-term

Nature of driver	Current, on-going or new driver	Increase or decrease in: a) Scale b) Impact	Impact on supply or demand for labour	Impact on skills
Relatively aged technical and engineering workforce will result in a high proportion of retirements over the medium-term	Current	Both the scale and impact will increase through to the mid-2020s	Demand	A number of factors have resulted in a technical and engineering workforce within the sector which is relatively aged Retirements will increase year-on-year for the next decade
Growth in city regions could concentrate the supply of labour and the demand for goods and services from the energy sector	On-going	Both scale and impact will increase	Supply and demand	Supply of skills and labour could become very localised which impact upon supply for energy generation This localisation of the population will concentrate demand for the sector's goods and services, bringing with it both labour and technical issues to address
Environmental change				
Development of a low carbon economy will raise needs for STEM skills	Current and on-going	Impact will increase Scale is likely to increase, but uncertain	Demand	Affects all parts of the energy sector, requiring additional labour and higher skills levels
As offshore platforms pass peak production, opportunities are created for carbon capture and storage	Current and on-going	Both scale and impact are impact at this stage	Supply and demand	Demand for oil and gas is not expected to decrease rapidly, however, opportunities for carbon storage could arise as the many of the necessary skills are already present in the offshore industry Timing of any carbon capture and storage policy is crucial, as skilled and experienced labour could be lost if delays are excessive

Nature of driver	Current, on-going or new driver	Increase or decrease in: a) Scale b) Impact	Impact on supply or demand for labour	Impact on skills
Strict environmental considerations and the development of greener fuels	Current and on-going	Both the scale and impact will increase over the long-term	Demand	<p>Air quality, climate change and CO2 reduction are just some of the environmental factors that the industry takes into consideration</p> <p>Ensuring that the correct skills mix of qualifications and standards are achieved is essential</p> <p>The industry is creating “greener” fuels such as biodiesel and bioethanol - the introduction of biofuels into the fuel mix is one of the most significant changes in road fuels in decades</p> <p>The Algae Biofuels research and development programme is a long-term investment with a number of significant benefits</p>
The roll-out of 50million smart meters by 2019	Current	Both the scale and impact will increase over the first half of the decade and will diminish towards the end of the decade	Demand	<p>The changing of 50million domestic and commercial electricity and gas meters is a very significant programme of work</p> <p>Many of the skills required are at level 3; however, higher levels skills may be required to handle the increased number of emergency call-outs that are likely to occur</p>
Economics and globalisation				
Demand for products from the EMP industries is heavily reliant upon the state of the construction sector	Current and on-going	Both the scale and impact are likely to increase as the economy returns to positive growth and the housing market picks up	Demand	As the economy and housing market recovers, demand for labour from employers in the EMP industries will increase

Nature of driver	Current, on-going or new driver	Increase or decrease in: a) Scale b) Impact	Impact on supply or demand for labour	Impact on skills
Demand for oil and gas (and its processed outputs) will remain strong	Current and on-go	Both scale and impact will remain stable	Supply and demand	Investment by the industry has been, and will continue to be, significant Some localities depend significantly on its direct and indirect employment opportunities Demand for skills will remain at current levels for some years to come
Technological change				
Exploiting new technologies will require entrepreneurship, management and leadership skills	On-going	Both scale and impact will increase	Demand	Particularly affecting renewable energy technologies, the ability of innovative SMEs to development new technologies into commercial models will create demand for these business skills

Nature of driver	Current, on-going or new driver	Increase or decrease in: a) Scale b) Impact	Impact on supply or demand for labour	Impact on skills
<p>Within the electricity industry the following technologies will have a key role to play:</p> <ul style="list-style-type: none"> • Smart grids • Small-scale local generation and networks • Power storage • Wind energy – onshore • Marine energy • Wind energy – offshore • Electric vehicles (impact on energy generation and distribution) • Carbon capture and storage, and clean coal 	Current and on-going	Both scale and impact will increase	Demand	<p>STEM skills, at both technician and engineer levels, will become increasingly in demand</p> <p>Some of these technologies are still in their R&D phase; skills demands are likely to increase when/ if a particular technology is adopted on a commercial scale</p>
Connection to the national grid of a greater number of energy producers	New	Both scale and impact will increase	Demand	<p>The workforce requirements placed on transmission and distribution companies, and their suppliers and contractors, will increase as more and more “distributed” energy is generated</p> <p>The skills needs will be at technician and engineer level, with higher levels skills required in the design and planning functions</p>
New technology will increasingly focus on improving productivity from existing wells and improving the accessibility of previously uneconomic wells	Current	Both the scale and impact are likely to be limited	Demand	There is an increasing need for the offshore oil and gas industry to ensure maximum output from existing wells; the research and development of these new and advanced technologies will result in continued demand for higher level STEM skills

Nature of driver	Current, on-going or new driver	Increase or decrease in: a) Scale b) Impact	Impact on supply or demand for labour	Impact on skills
Nuclear will remain an important part of the UK's energy mix	Current and on-going	Given replacement and new build plans, both the scale and impact will increase	Demand	<p>It is estimated that the 70 per cent of components for the first new build plant could be sourced from within the UK</p> <p>Proposed new reactors are evolutionary in their technologies and their performance is well understood; as is the decommissioning of existing capacity</p> <p>The demands of nuclear fission are currently being considered and will form the basis of a UK Nuclear Fission Technology Road Map due in February 2012</p>
Changing values and identities				
Avoidance of technical and engineering careers may result in continued STEM skills shortages	Current and on-going	While the impact is high, the scale is uncertain	Supply	<p>The demise of manufacturing has led to a severe reduction in labour market entrants wishing to enter technical/ engineering occupations</p> <p>Could affect all parts of the energy sector, particularly waste management</p>
Changing consumer demand				
The ability of the energy sector to ensure that consumer demand for heat, energy and manufactured goods and services are met	Current and on-going	Both the scale and impact are likely to increase	Demand	<p>With a growing population, increased energy demand, replacement of existing generating capacity and decarbonisation of the energy sector, the labour requirements are likely to remain significant for some time</p> <p>Demand is expected to increase as the UK economy recovers and demand from the construction and manufacturing industries increase</p>

6.2 Differences in drivers across the four nations

The drivers of change generally apply in each of the devolved administrations as much as they do across the UK as a whole.

There are four areas of significance where drivers of change differ across the four nations:

- Regulation
- Energy policy
- Waste policy
- Education (supply-side) policy

Regulation

The electricity and gas sub-sectors within Great Britain are subject to economic regulation by Ofgem, in which their costs, prices and investment levels are set for price control periods that last up to eight years. Within Northern Ireland, these sub-sectors, along with the water and sewerage industries, are regulated by the Utility Regulator. These economic regulators enforce artificial competition on the monopoly companies, promoting the short and long-term interests of the consumer.

The water and sewerage industries in England and Wales are subject to economic regulation by Ofwat, while in Scotland this role is performed by the Water Industry Commission for Scotland.

Each of these economic regulators plays a slightly different role and may apply different price control periods to their respective industries. However, they all exist to protect the interests of the consumer given the regional monopolies that the companies enjoy.

Energy policy

Though energy policy is an area reserved for the UK government, the Scottish Government has a separate energy policy for Scotland. Each devolved administration also has an energy strategy that sets out its plans for energy production and efficiency. This does not apply to nuclear energy, which remains wholly within the remit of the UK government.

Waste policy

Each nation of the UK has a separate waste management strategy which has been devised, and will be implemented, by the national governments. Taken as a whole, these strategies will ensure that the UK's targets for waste reduction in relation to the Landfill Directive are met.

Education (supply-side) policy

Education policy within each nation of UK has diverged since devolution in the late 1990s. Because certain aspects of education policy can be quite different across borders (e.g. state funding), this may lead to difficulties when trying to address supply-side issues on a UK level. The same situation applies to employers who work across borders within the UK.

7 Future skills needs

Chapter Summary

- Ensuring energy supplies while managing the shift towards a low carbon economy is central to determining the UK's energy mix over the coming years
- Planning consents and the availability of private-sector finance will be key determinants
- Strong government leadership is central to reducing uncertainty in the market
- Nearly one-quarter of current generation capacity will need to be replaced over the next five to eight years
- Higher level skills (level 4+) will become increasingly in demand from sector employers
- Employment in wind and marine generation could increase by 45,000 (in a medium growth scenario)
- Up to 140,000 workers could be required in order to deliver the nuclear new build programme through to 2025
- A minimum of 86,000 new recruits will be required in the gas, electricity and water industries through to 2025

7.1 Future trends

The future of the energy sector and the trends that result not set in stone. However, there are a number of trends which are more likely to occur than others.

The continuing transition towards a low carbon economy will be the central plank of the majority of future trends. These will be driven by political, legislative, social and environment factors, and will have a significant impact on how the sector is structured, its rate of development of new technologies and, consequently, of the skills it will need in order to function effectively.

However, there may be other influencing factors, including:

- Achieving planning consents and ensuring access to multi-billion pound financing packages for nuclear new build
- The efficacy of wind farms, and the potential location and size of new installations, particularly on-shore
- Complaints and demonstrations from local residents regarding the location of new energy from waste facilities

In terms of power generation, the Royal Academy of Engineering (2010) notes that:

In order to achieve the scale of change needed, industry will require strong direction from government. Current market forces and fiscal incentives will not be adequate to deliver the shareholder value in the short-term and to guarantee the scale of investment necessary in this timescale.

Oil and gas refinery

The Refinery sector is, and will continue to be, a strategically and politically important part of the UK manufacturing sector, without which imports of refined fuel would increase significantly. This sub-sector is undergoing structural change. Of the nine oil refineries, four are on the market for prospective buyers, with both Murco and Total scaling back their interests in the UK retail market. Meanwhile BP has prompted speculation as to the future of its downstream assets following their intention to sell up to \$30billion of assets in the wake of the Gulf of Mexico oil spill.

Nuclear

Since 2006 Government energy policy has been based on a mix of renewables, clean fossil fuel technology and nuclear power. The existing nuclear estate accounts for around ten GWe of generating capacity and is responsible for a reduction of between seven and 14 per cent of national carbon emissions (DECC, 2011). However, the age of existing plants means that an on-going decommissioning programme will reduce the fleet to a single pressurised water reactor by 2025, in the absence of any replacement programme.

The Government has put no upper limit on the amount of privately-funded nuclear new build that could be supported and eight sites have now been identified as potentially suitable within the National Policy Statement for nuclear power generation (DECC, 2011). In response, three consortia, Horizon Nuclear Power, NuGeneration and EDF/ Areva, have announced plans for new nuclear construction which, if fully realised, would produce a total of around 16 GWe.

Importantly, the interim report by the Chief Nuclear Inspector, Dr Mike Weightman (Weightman, 2011), found no fundamental problems with the UK nuclear safety regime. It did however note that decommissioning should be pursued with all vigour and that developing the notion and practice of 'nuclear professionalism' was an important safety element. This is a central part of Cogent and the National Skills Academy for Nuclear's skills supply development.

Electricity generation (non-nuclear)

Central to the government's energy strategy is the need to diversify and decarbonise the energy sector, particularly electricity generation. The Government is committed to increasing the amount of renewable generation capacity and in the short to medium term, much of this new capacity is likely to be onshore and offshore wind; but increasingly it may include plant powered by the combustion of biomass and waste and the generation of electricity from wave and tidal power.

The increasing number of "distributed" energy generation facilities is necessitating the upgrading and expansion of the transmission and distribution networks around the UK. Moving away from a system that only had to accommodate a relatively small number of generating plants, to one where many hundreds of smaller and micro-generation facilities (some of them generating energy intermittently) are all feeding directly on the grid system is a considerable engineering challenge, the labour and skills requirements of which are likely to be substantial.

Also, as a result of the Large Combustion Plant Directive and Industrial Emissions (Integrated Pollution Prevention and Control) Directive, around 22GW of existing generation capacity (of the current 85GW capacity) will need to be replaced in the coming years, particularly to 2020, in order to meet tightening regulation and to replace aging power stations (Department for Energy and Climate Change, 2011).

Overall, demand for electricity is likely to increase, even in the face of a continued drive for greater energy efficiency; mainly caused by significant demand for energy from such sectors as industry, heating and transport as they switch from being powered by fossil fuels to using electricity. As a result of this increased demand, total electricity consumption (measured in terawatt hours over a year) could double by 2050.

Depending on how electricity is supplied, the total capacity of electricity generation (measured in GW) may need to more than double to be robust enough to handle all weather conditions. In some, more extreme, circumstances, for example if there was very strong energy demand and a high level of dependence on intermittent electricity generation, then the generating capacity may need to triple.

There will be a significant increase in the amount renewable energy generated by offshore wind farms with the implementation of Round 3 offshore wind zones by The Crown Estate. Nine development partners have been appointed, who are now undertaking environmental and engineering studies and liaising closely with stakeholders to define individual projects within the zones. The first offshore wind farm projects are expected to be submitted to the Infrastructure Planning Commission (IPC) for consent in 2012. Construction of the first Round 3 projects is expected to start in the middle of this decade (Crown Estate, 2012).

Trends in technology development continue apace, but can take several years, if not decades, to become commercially viable products. Much work is going on at the moment in the area of marine energy generation, yet there is still no dominant technology and no commercial facility. However, current government policy is set on reducing carbon emissions and increasing the proportion of energy that is produced using renewable sources. Therefore, the future trends that are likely to impact most on the energy sector relate to achieving these dual ambitions.

Gas supply and distribution

In the short-term, new technologies and methods of mains and service-laying, including new pipeline materials, are changing the way that work is carried out. The integrity of networks must also be maintained to keep incidents and leakage to an absolute minimum. Any decline in either the security of supply or the safety record of the industry could have a significant impact on consumer perception of gas as a fuel of choice.

Potential reserves of onshore shale gas are being investigated in various parts of the. However, a number of technical and environmental barriers need to be overcome before this becomes viable on a commercial level. In particular, if shale gas is to be injected into the national transmission system it must meet certain quality criteria. It may be that rather than injecting gas into the network, it can be used to produce energy at the point of extraction. This would be much simpler than multiple small-scale gas connections to the grid.

The emergence of the BRIMICS countries (Brazil, Russia, Indonesia, Mexico, India, China, and South Africa) could change the dynamics of the energy market. Also the scale of investment in countries such as China and India, including in Higher education, may result in their labour market moving up the value chain.

Smart meters

The roll-out of around 50million “smart meters” across the UK by 2019 will be a significant challenge for the metering industry and the distribution network operators. At the time of writing the industry is considering various roll-out scenarios and their associated implications for workforce recruitment and training. As well as the need for meter installers, the majority of which operate at level 2, there is likely to be implications on the wider distribution workforce as the incidence of emergency call-outs increases as meters are replaced. The final workforce planning for the smart meter roll-out will be completed by the Spring of 2012.

The implementation of a ‘smart grid’ over the next decade is also likely to require significant levels of skilled labour, with potentially new combinations of skills. Moreover, the upgrades required to the grid in order to handle the greater volume, and intermittent nature, of renewable energy will themselves add to the demand for electrical engineering skills and occupations.

Waste management

The majority of current and future changes in the waste management and recycling industries are driven by legislation, with increasing regulation governing the handling, treatment and transport of specific waste streams.

There is particularly strong growth in the use of anaerobic digestion, driven by political pressure and interest from industry operators, with several major waste management companies placing particular emphasis on developing their anaerobic digestion capabilities. Both incineration with energy recovery and anaerobic digestion are likely to be the most extensively used in the foreseeable future given that they have been adopted successfully and been proven as reliable and commercially viable options both in the UK and elsewhere in Europe.

The use of technology has now become fundamental to the future of waste management in the UK, and there will be a significant impact on the skills required by the industry. This is particularly evident in relation to the design, development, installation, operation and maintenance of process plant.

Water and wastewater

It is likely that an increasingly competitive environment is being developed for the water industry. It is anticipated that this will lead to an increase in investment in innovative technological solutions which will enable the industry operate more efficiently, as it is currently a very significant user of energy.

Customer service skills, throughout the supply chain, will also become more important as competition replaces monopoly in certain aspects of its operation.

7.2 Impact on employment and skills

The impact that these trends will have on employment levels and skills requirements within the energy sector is, to a certain extent subject to debate

Working Futures employment forecasts, commissioned by the UK Commission and produced by Warwick Institute for Employment Research and Cambridge Econometrics, predict that the number of jobs in the UK economy is forecast to rise by approximately 1.5 million between 2010 and 2020. The prospect for jobs growth in the first half of the decade will be dampened somewhat by the prevailing economic conditions; although growth of around 500,000 jobs will still occur. It is forecast that the second half of the decade will see the UK break out of the economic difficulties and head back towards usual economic growth levels, with over 1.1million jobs being created between 2015 and 2020 (Wilson and Homenidou, 2012).

The effects of this jobs growth will not be felt evenly across all occupational groups. Higher level occupations, such as professionals, associate professionals and managers, will see the largest growth, with nearly two million jobs being created across the UK over the course of the decade (Table 7.1).

Table 7.1 Workplace job growth by occupation within the Whole Economy (UK)

Employment growth	2010	2015	2020	2010	2015	2020	2010-2020
	Numbers (000s)			% shares			Net change (000s)
Managers, directors and senior officials	3,016	3,279	3,560	10	11	11	544
Professional occupations	5,843	6,189	6,712	19	20	21	869
Associate professional and technical	3,926	4,138	4,476	13	13	14	551
Administrative and secretarial	3,698	3,466	3,312	12	11	10	-387
Skilled trades occupations	3,526	3,389	3,295	12	11	10	-230
Caring, leisure and other service	2,719	2,801	3,032	9	9	9	313
Sales and customer service	2,608	2,555	2,610	9	8	8	2
Process, plant and machine operatives	1,950	1,829	1,737	6	6	5	-213
Elementary occupations	3,173	3,209	3,274	10	10	10	101
All occupations	30,458	30,855	32,008	100	100	100	1,550

Source: Wilson and Homenidou. 2011

Conversely, nearly one million jobs will be lost within administrative and secretarial, skilled trades and process, plant and machine operatives. The bulk of job losses in administrative and secretarial jobs will occur in the public sector, while around one half of the losses in skilled trades and operative jobs are expected to occur within the manufacturing sector.

Within the energy sector, job numbers are expected to grow slightly over the decade, resulting in an additional 12,000 jobs over the period. As with the economy as a whole, higher level occupations are expected to fare better than skilled trades and operative level jobs (Table 7.2).

Table 7.2 Workplace job growth by occupation within Energy production and utilities (UK)

Employment growth	2010	2015	2020	2010	2015	2020	2010-2020
	Numbers (000s)			% shares			Net change (000s)
Managers, directors and senior officials	34	39	40	10.8	11.8	12.4	6
Professional occupations	47	52	52	15.1	15.7	15.9	4
Associate professional and technical	42	46	48	13.3	14.0	14.8	6
Administrative and secretarial	30	30	30	9.6	9.2	9.0	-1
Skilled trades occupations	50	50	46	15.8	15.1	13.9	-4
Caring, leisure and other service	5	6	7	1.7	1.9	2.2	2
Sales and customer service	20	21	19	6.2	6.2	5.9	0
Process, plant and machine operatives	55	53	50	17.4	16.1	15.4	-4
Elementary occupations	32	33	34	10.1	10.0	10.5	2
All occupations	315	330	327	100.0	100.0	100.0	12

Source: Wilson and Homenidou. 2011

The share of energy sector jobs that are categorised at QCF level 4 or above (associate professionals, professionals and managers) is forecast to increase from 39.2 per cent in 2010 to 43.1 per cent in 2020. This reflects the impact on occupational employment of the future pathway for the sector, with greater deployment of new technologies and an increased requirement for scientists, technicians, engineers, planners and project managers.

As the sector's workforce is predominantly based in England, this nation's growth patterns are very similar to that of the UK as a whole (Table 7.3). In England, overall workforce numbers are expected to increase by 16,000; with growth expected mainly in associate professional and above occupations, while skilled trades and operative occupations are forecast to decline (by 5,000 jobs).

Table 7.3 Workplace job growth by occupation within Energy production and utilities (England)

Employment growth	2010	2015	2020	2010	2015	2020	2010-2020
	Numbers (000s)			% shares			Net change (000s)
Managers, directors and senior officials	27	31	33	11.3	12.4	12.9	6
Professional occupations	34	37	38	14.4	14.8	14.9	4
Associate professional and technical	33	37	39	13.8	14.5	15.4	6
Administrative and secretarial	22	23	23	9.4	9.1	9.1	1
Skilled trades occupations	38	38	35	15.8	15.0	13.7	-3
Caring, leisure and other service	4	5	6	1.7	1.9	2.3	2
Sales and customer service	15	16	15	6.5	6.4	6.1	0
Process, plant and machine operatives	40	39	38	16.7	15.5	15.0	-2
Elementary occupations	25	26	27	10.4	10.4	10.7	3
All occupations	238	253	254	100.0	100.0	100.0	16

Source: Wilson and Homenidou. 2011

In Northern Ireland employment levels are expected to remain fairly stable over the next decade at around 8,000-9,000 employees.

In Scotland, the total number of jobs in the energy sector is expected to fall by around 5,000 jobs (from 53,000 to 48,000).

However, given the emphasis on renewable energy in Scotland, it is interesting to compare this general forecast for the energy sector against that presented in the Skills Investment Plan for the Energy Sector (Skills Development Scotland, 2011). This plan estimates the skills need for the energy sector in Scotland through to 2020 and identifies the potential for up to 95,000 job opportunities over this period (including replacement demand), including at least 40,000 opportunities in the renewables sector.

These different forecasts for future employment growth highlight the different trajectory that the energy sector in Scotland (and, more generally, across the UK) could take if planned and confirmed investment plans for the sector are implemented.

As with Northern Ireland, the number of jobs in the sector in Wales is expected to remain at current levels of around 16,000. Once again, as these forecasts are based on low numbers, caution should be taken when interpreting their meaning.

The Working Futures employment forecasts are based on extrapolating historical data to predict the future. However, as the sector is currently in the early stages of a period of substantial investment, they may under-play the impact of this investment on workforce demands. Other sources look to quantify the impact of new investment and growth plans (particularly in the area of renewables).

Within public utilities (electricity generation and the distribution of gas, electricity, and water) skilled trades and operatives are the backbone of the “technical” workforce which delivers the infrastructure operation, maintenance/renewal and new build within the sector. Given the priorities of the National Infrastructure Plan (HM Treasury and Infrastructure UK, 2011) and associated investment in infrastructure activities which could reach £250billion over the next decade, skilled trades and operative occupations will remain a crucial element of the sector’s delivery and recruitment strategies over the coming years.

In the waste industry, the mix of occupations and skills required is changing as the industry evolves from one of collection and disposal to highly technological treatment techniques and sophisticated recycling collection systems. However, there will continue to be a substantial proportion of the workforce employed in “manual” roles, with still a heavy emphasis on drivers, plant and machine operatives and labourers.

There are also likely to be more specialists required for the management of new plant such as waste to energy, or other materials recovery plant. Thus, although the overall skills profile of the industry is likely to remain much as it is, there will be a higher level of new craft related skills in areas such as plant managers, plant maintenance, process engineering and technical level staff such as chemists and lab technicians involved in analysing hazardous waste and processed waste to ensure they meet product standards or to monitor plant emissions (Forward Scotland, 2005).

Research undertaken by Energy & Utility Skills and RenewableUK (RenewableUK and Energy & Utility Skills, 2011), which looks at the growth potential of the UK's wind and marine energy generation industry, reports that, given a medium growth scenario (deployed capacity increases to around 41.5GW by 2021), as many as 45,000 new jobs could be created directly within the sector and a further 22,000 could be created within the supporting supply chain. The majority of these potential job gains would be created in the off-shore wind industry.

The research also notes that as the wind and marine energy industry matures its skills requirements will change. Currently, much of the activity in this sub-sector is connected to research and development of the technologies, which brings with it a need for high science and engineering skills, but as the technologies are deployed and commercial operations begin, it is likely that skilled trades will become increasingly in demand in order to operate and maintain the equipment on-site.

These findings are supported by an ILO report into the skills needs of the green economy, synthesising studies conducted in 21 countries (Strietska-Illina et al, 2011), which found that UK could expect to see employment gains across the renewable energies which would require skills upgrading in management and entrepreneurship (including project management), and in the development and deployment of energy efficient solutions. It found that retraining from manufacturing could result in engineers, installers, technicians and operations and maintenance specialists being sourced.

The report also found skills upgrading in methane and energy recovery would be required in the waste management and recycling industry; while in the water industry greater demand for skills in water resource management, efficient use and wastewater treatment would be required.

In its 2010 report *Next Generation* (Cogent, 2010), Cogent analysed the projected new build workforce demand over the period from 2012 to 2025. This identified the need for between 110,000 and 140,000 workers (full time equivalents) across the range of occupations and skill levels. This amounts to a workforce three times the size required for construction for the 2012 Olympics and with a higher overall skill demand. In addition to 1,000 new entrants required to maintain support for existing operations and decommissioning, Cogent additionally identifies a demand for 400 graduates and 1,000 Apprentices to be associated with a 16 GWe new build programme. Under the auspices of the Nuclear Energy Skills Alliance, Cogent is now developing a dynamic workforce planning model to react to the emergent construction programme and to test the sensitivity of the workforce supply and demand to programme changes.

Replacement demand

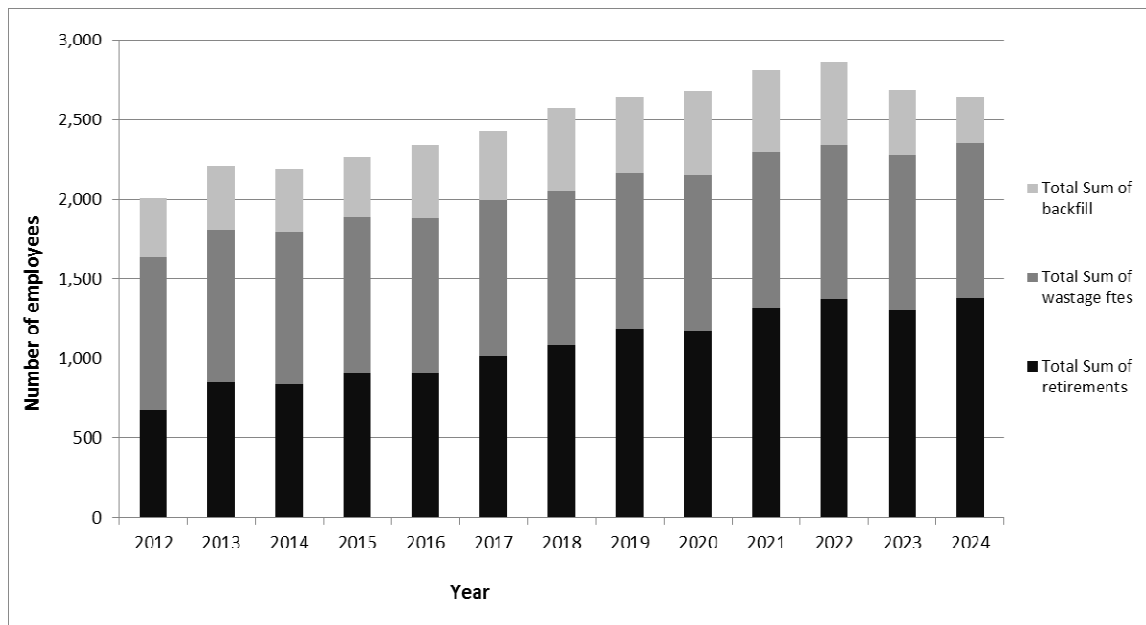
Wilson and Homenidou (2012) predict that, in addition to the 12,000 new jobs that are forecast to be created through to 2020, a further 118,000 recruits will be needed to replace those that leave the sector (for whatever reason) and need to be replaced. This gives a net requirement for 130,000 new recruits into the sector by 2020.

There are some substantial differences in replacement demand at the occupational level. Although plant operatives are forecast to lose 4,000 jobs over the period, this is more than outweighed by the need for 21,000 new recruits to replace other leavers; leaving a net requirement for 17,000 operatives by 2020. A similar situation exists within skilled trades, where 4,000 jobs are expected to go but 19,000 new recruits are needed to replace other leavers; leaving a net requirement for 15,000 by 2020.

A different source of data on this issue is Energy & Utility Skills' Workforce Planning Model. This takes workforce data from individual employers and applies a set of simple assumptions to predict the creation of vacancies, thus enabling companies to develop appropriate recruitment strategy(ies). There are two important points to note in using this data: (i) it is not meant to be wholly representative of a sub-sector (although some sub-sectors do have near-100% coverage), it is merely an aggregation of individual employer data; and (ii) the focus of the model is entirely on the technical and engineering workforce. Therefore, comparisons with other data sources contained in this report should be treated with extreme caution. The Workforce Planning Model does enable EU Skills to gain accurate demand data at a sub-sector level, something which can be almost impossible to obtain from other sources.

Within the model, there are details of around 35,000 technical and engineering workers from across the electricity industry. Figure 7.2 below shows how many vacancies will be created across the industry each year over the next 13 years.

Figure 7.2 Number of leavers each year – Electricity industry (Great Britain)

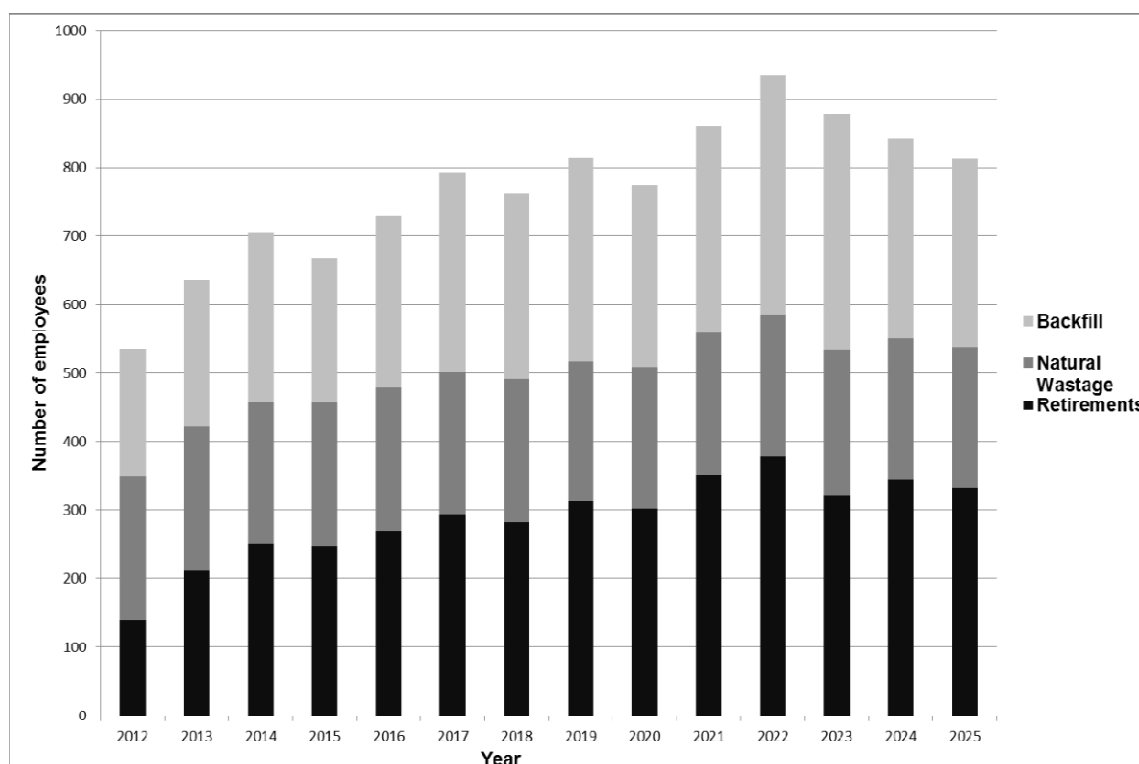


Source: EU Skills' Workforce Planning Model, 2011.

The total number of vacancies that are estimated to be created due to retirements, natural wastage and by replacing internal promotions over this period (32,500) is equivalent to 93 per cent of current workforce numbers. This is made up of 14,000 retirements, 13,000 leavers due to natural wastage and nearly 6,000 caused by existing workers being promoted. The number of leavers per year peaks at nearly 3,000 by the year 2022.

Similar data is held within the model for Great Britain's gas distribution networks, where the technical and engineering workforce employs around 8,200 workers. Figure 7.3 below shows the estimated number of vacancies that will be created in this workforce through to 2025.

Figure 7.3 Number of leavers each year – Gas distribution industry (Great Britain)



Source: EU Skills' Workforce Planning Model, 2011.

The model reports that, between 2012 and 2025, just over 4,000 workers will retire from this workforce, 3,000 will leave through natural wastage and a further 3,800 vacancies will be created by existing workers being promoted. Therefore, the number of vacancies that will need to be filled (10,800) is equivalent to 130 per cent of the current workforce.

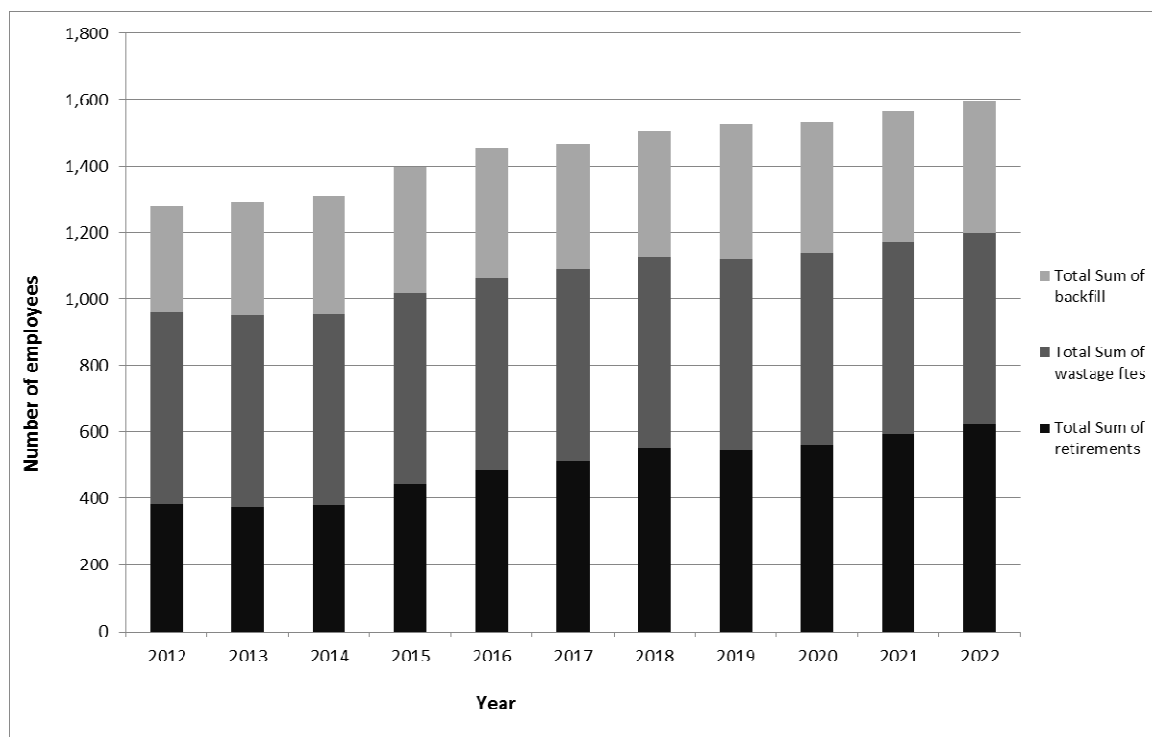
As part of the provisional analysis of EU Skills' Workforce Planning Model for the waste management industry, three scenarios have been developed in order to determine the potential number of vacancies that could be created within the 22,200-strong technical and engineering workforce that is currently within the model.

Based on an average retirement age of 63 and in a low growth/low natural wastage scenario the number of vacancies that could be created over the next 15 years are equivalent to 122 per cent of current workforce levels (approximately 27,000).

It should be noted, however, this is a conservative estimate for the industry as a whole as it is based on only the 22,000 individuals that are currently contained within the model. Through the summer of 2012 additional work will take place with the waste management industry to ensure a wider coverage of the industry. These data are presented only as an indication of the potential scale of the challenge facing the waste management industry over the coming years. The waste management industry is in the midst of a technological revolution as it continues its drive to recover value from waste rather than simply landfilling it. Growth in the number of energy from waste and anaerobic digestion facilities difficult to predict as it relies on a number of factors, including those discussed above; particularly planning consents and the availability of finance and subsidies. However, it is highly likely that any future trend will include a significant element of workforce growth and upskilling within technical and engineering occupations, and an increase in competition for these skills; not only within the sub-sector, but also from the wider economy.

Within Great Britain’s water industry, EU Skills’ Workforce Planning Model contains a technical and engineering workforce of 16,500 employees. Figure 7.4 shows the number of vacancies expected in this workforce between 2012 and 2022 as a result of retirements, natural wastage and having to replace internal promotions (backfill).

Figure 7.4 Number of leavers each year – Water industry (Great Britain)



Source: EU Skills’ Workforce Planning Model, 2009.

While the number of natural wastage and backfill vacancies is forecast to remain fairly constant year-on-year, retirements over the next 11 years are expected to increase from just under 400 per year to over 600 per year by 2022. This scenario will create around 16,000 vacancies within the technical and engineering workforce over the period – a number almost equivalent to 100 per cent of the current workforce. Increasing numbers of retirement year-on-year are the principal cause in the estimated growth in vacancies over the next decade. These increase from 400 in 2012 to more than 600 in 2022.

EU Skills' Workforce Planning Model now contains data on almost 82,000 technical and engineering employees in the gas distribution, power, waste management and water sub-sectors and predicts that over the next 13 years, through to 2025, over 86,300 vacancies will be created – a figure equivalent to 105 per cent of the current workforce (an average of 6,600 vacancies per year). With the exception of a low growth scenario within the waste management data, these vacancies are created solely by replacement demand – retirements, natural wastage and the resulting vacancies that are created when existing workers are promoted (to replace some of those who retired or otherwise left the workforce).

8 Priority areas for action

Chapter Summary

The following have been identified as priority areas for action for the sector:

- Improving the image of the sector in order to attract the skilled employees needed to meet sector ambition.
- Ensuring appropriate Apprenticeship frameworks are in place and promoting these as attractive entry routes into the sector for all ages and abilities.
- Establishing effective mechanisms that ensure, and prove, the competency of the workforce in a way that meets legislative and regulatory requirements and which are consistent and recognised across sector employers (where appropriate).
- Ensuring that mechanisms are in place, and promoted to employers, which ensure that the higher level skills needs of the workforce can be delivered (particularly supporting progression routes from level 3 upwards).
- Ensuring that the skills needed for research, development, installation, operation and maintenance of new technologies are identified and the necessary provision in place to deliver them.
- Promoting the importance of management and leadership skills across the sector and ensuring that appropriate provision is available to the sector.
- Ensuring that education and skills providers operating within the sector are aware of, and capable of meeting, the current and future skills of the sector.

Based on the data and intelligence contained within this report, a number of priority areas for action for the energy production and utilities sector emerge. These are presented by occupational group below.

Managers and Senior Officials

Skills/Occupational Priority	Degree of Certainty (definite, likely, possible, unknown)	Magnitude (large, medium, small – current and future)	Lead time (short, medium, long)	Criticality
Skills shortages with increasing demand for managers of all types and levels with questions over current/future capability	<p>Definite</p> <p>Skills shortages already exist in various management roles, including project managers and site managers</p> <p>High degree of technological change required over next decade – in a highly complex operating/ political/ environmental landscape</p>	<p>Medium</p> <p>Half of all current managers do not have a level 4 or higher qualification</p> <p>Growth in the number of managers in the energy sector is set to increase by 18% by 2020</p>	<p>Medium</p> <p>Takes time to build management capability through mix of on- and off-the-job training</p>	<p>Critical to raising innovation and productivity levels</p> <p>Entrepreneurial, commercial and business skills are crucial to the development of many renewable energy businesses, particularly SMEs</p> <p>Important for job creation and product/ market development</p>

Professional occupations

Skills/Occupational Priority	Degree of Certainty (definite, likely, possible, unknown)	Magnitude (large, medium, small – current and future)	Lead time (short, medium, long)	Criticality
<p>Improving the attractiveness of the energy sector as a career option for highly skilled individuals</p>	<p>Definite</p> <p>Over the past two decades the reduced importance of manufacturing and engineering to the UK economy has led to fewer young people actively looking to work in it</p> <p>Research conducted by EU Skills and National Skills Academy for Power (EU Skills, 2010) suggests that many young people are unaware of the many attractive career options that are open to them in the energy sector</p>	<p>Currently – Medium</p> <p>Future – Large</p> <p>As all aspects of the energy sector evolve to meet the requirements of the low carbon economy, demand for high level skills will continue to grow (in numbers and importance)</p>	<p>Medium to long</p> <p>To alter a generation’s perception of engineering in certain aspects of the energy sector (e.g. fossil fuel-based generation and waste management) will take time</p> <p>Requires level 4 or above qualifications</p> <p>The “mainstreaming” of new technologies into engineering provision could play an important role in increasing the supply of such skills into the sector; along with ensuring that employers play a central role in the development (and delivery) of such provision.</p>	<p>This lack of fresh talent entering the sector is reflected in the age profile of the current workforce, which is high compared to the UK’s workforce as a whole</p> <p>An important element is the attraction of new talent from non-traditional elements of the labour market (e.g. females and those from BAME backgrounds)</p> <p>Entry routes and career pathways need to be developed and clearly communicated</p>
<p>Demand for training and development of professionals in niche areas could be substantial if “critical mass” is obtained through employer collaboration</p>	<p>Definite</p> <p>Can be difficult for education and skills providers to maintain provision in niche areas where demand from individual firms can be very small (e.g. off-shore structural engineer, control & instrumentation engineer, power systems engineer)</p>	<p>Small</p> <p>Overall numbers will be sufficient to maintain low levels of provision</p>	<p>Short to medium</p> <p>Facilitated employer collaboration would quickly identify niche occupations/ skills that could be bought collectively</p> <p>Requires level 4 or above qualifications</p>	<p>Although low in numbers, the roles that certain niche areas of engineering play in the development, planning and deployment of technologies is crucial to the sector’s success</p>

Skills/Occupational Priority	Degree of Certainty (definite, likely, possible, unknown)	Magnitude (large, medium, small – current and future)	Lead time (short, medium, long)	Criticality
<p>Current skills shortages with increasing demand for professionals of all types and levels with questions over current/future capability</p>	<p>Definite</p> <p>Skills shortages already exist in various professional roles, including electrical, mechanical and civil engineering</p> <p>High degree of technological change required over next decade – in a highly complex operating/political/environmental landscape</p>	<p>Medium</p> <p>Growth in the number of professionals in the energy sector is set to increase by 11% by 2020</p>	<p>Medium</p> <p>Takes time to build management capability through mix of on- and off-the-job training</p>	<p>Critical to raising entrepreneurial, innovation and productivity levels</p>
<p>Specific skills related to high level STEM occupations</p>	<p>Definite</p> <p>A number of high-level occupations that require STEM skills (and qualifications as their base) are already on the UK's Shortage Occupation List</p> <p>Principal skills needed are maths, chemistry, physics and electrical and mechanical engineering</p>	<p>Currently – Medium</p> <p>Future – Large (dependent upon government policies)</p> <p>High level STEM skills are, and will continue to be in, demand from all aspects of the energy sector; particularly in the nuclear/renewable energy/ low carbon industry</p> <p>As energy generation from renewable and low carbon sources develops and new technologies are deployed in increasing numbers (especially in wind and marine), demand will increase</p>	<p>Long</p> <p>Requires greater participation in relevant school, further education and higher education provision</p> <p>The capacity and capability to deliver this learning needs to be ensured within providers</p> <p>Requires level 4 or above qualifications</p>	<p>These skills are critical to raising innovation and productivity levels and to the UK meeting EU carbon emission targets</p> <p>Important for job creation and product/market development, particularly in energy generation (from all fuel types)</p>

Skills/Occupational Priority	Degree of Certainty (definite, likely, possible, unknown)	Magnitude (large, medium, small – current and future)	Lead time (short, medium, long)	Criticality
Teaching and research professionals in education and skills providers	<p>Definite</p> <p>Providers of learning and skills to the energy sector need to recruit similar skills as employers – exacerbated by impact of uncertain demand and higher wage rates within industry</p>	<p>Small to medium</p> <p>Demand for skills from providers will be constant as new trainers are often leavers/ retirees from industry or are tempted back into industry by higher wage rates</p>	<p>Medium to long</p> <p>Certainty around the consistency of demand for skills from the energy sector will take time to materialise</p>	<p>Attracting new talent into providers, ideally with industry experience, is paramount</p> <p>The availability of teachers and trainers with up-to-date knowledge on the environment and green technologies is crucial</p>

Associate Professional and Technical

Skills/Occupational Priority	Degree of Certainty (definite, likely, possible, unknown)	Magnitude (large, medium, small – current and future)	Lead time (short, medium, long)	Criticality
<p>Gaining, maintaining (and proving) a competent workforce</p>	<p>Definite</p> <p>Many aspects of the energy sector are required by law to prove the competency of those individuals undertaking certain activities (separately from gaining a qualification)</p> <p>As a result, many individual employers have different mechanisms of proving the competent of their workforce which are not aligned with those of either their competitors or their contractors</p>	<p>Large</p> <p>There are currently 125,000 individuals registered on EU Skills' EUSR schemes, with 253,000 separate endorsements (predominantly in the gas, power and water industries)</p> <p>The potential for expansion across the sector (and into telecommunications and other related activities) is substantial</p>	<p>Medium</p> <p>Gaining consensus of standards in competency requires significant employer collaboration and can take time to achieve</p> <p>Incorporating these standards into legislative and regulatory regimes can also take time, depending upon when reviews take place</p>	<p>The lack of transferability of proven competence across employers (and the lack of planning of regulatory and legislative requirements) means that there are substantial areas of duplicated cost and effort and inconsistency in standards.</p> <p>Greater accreditation and recognition across the sector of competency could have significant benefits from employers, individuals and regulators alike.</p>
<p>Demand for training and development of associate professionals in niche areas could be substantial if "critical mass" is obtained through employer collaboration</p>	<p>Definite</p> <p>Can be difficult for education and skills providers to maintain provision in niche areas where demand from individual firms can be very small (e.g. commissioning engineer, substation electrical engineer)</p>	<p>Small</p> <p>By aggregating demand across a number of firms and employing innovative delivery methods, provision can be economically viable for providers</p> <p>Overall numbers will be sufficient to maintain low levels of provision</p>	<p>Short</p> <p>Facilitated employer collaboration would quickly identify niche occupations/ skills that could be bought collectively</p>	<p>Although low in numbers, the roles that certain niche areas of engineering play in the development, planning and deployment of technologies is crucial to the sector's success</p>

Skills/Occupational Priority	Degree of Certainty (definite, likely, possible, unknown)	Magnitude (large, medium, small – current and future)	Lead time (short, medium, long)	Criticality
<p>Demand for level 4 recruits in the energy sector could be equivalent to the size of the current technical workforce at that level over the next 12 years</p>	<p>Likely to definite Analysis of EU Skills' Workforce Planning Model suggests that, due to retirements, staff turnover and "backfill", the number of leavers from level 4+ technical/ engineering occupations within the sector could be equal to 100% of current workforce levels</p>	<p>Large Across the energy sector, around 25% of the technical/engineering workforce operates at, or above, level 4 Due to the higher than average age profile of this element of the workforce, and the size of the sector's investment plans, demand is set to be substantial for the next 10-15 years</p>	<p>Medium to long Requires greater participation in relevant school, further education and higher education provision The capacity and capability to deliver this learning needs to be ensured within providers Requires level 4 or above qualifications Entry routes from other sectors of the economy need to be developed</p>	<p>These skill levels are critical to the sector, and the UK as a whole, delivering its national infrastructure plans over the next 10-15 years</p>

Skills/Occupational Priority	Degree of Certainty (definite, likely, possible, unknown)	Magnitude (large, medium, small – current and future)	Lead time (short, medium, long)	Criticality
<p>Progression routes from technician to engineer-level occupations</p>	<p>Definite</p> <p>With greater research, development and deployment of new technologies right across the sector, the skills requirements of employers are increasing</p> <p>Many of these skills are/ will be required at higher levels; therefore, a greater emphasis is needed on enabling the current and new workforce achieve these higher level skills</p>	<p>Medium</p> <p>Analysis of EU Skills' Workforce Planning Model suggests that around 35% of vacancies within the gas, power and water industries will be filled by promoting existing employees</p>	<p>Medium</p> <p>The identification of appropriate pathway, and their actual development, can take time to complete</p>	<p>With levels of UK-domiciled electrical engineering graduates remaining, at best, stable over recent years, there is a greater need than ever for entry routes and career pathways to be available which allow those that enter the sector at QCF level 3 to develop their skills up to higher levels (these include higher level Apprenticeships). It is highly unlikely that graduates alone will meet the higher skills demands of the sector over the coming decades.</p>

Skills/Occupational Priority	Degree of Certainty (definite, likely, possible, unknown)	Magnitude (large, medium, small – current and future)	Lead time (short, medium, long)	Criticality
Specific skills related to STEM occupations	<p>Definite</p> <p>The supply of skills from further and higher education that are needed to research, develop and deploy new technologies is likely to be insufficient to meet the demands of the whole energy sector</p>	<p>Currently – Medium</p> <p>Future – Large (dependent upon government policies)</p> <p>STEM skills are, and will continue to be in, demand from all aspects of the energy sector; particularly in the renewable energy/ low carbon industry</p> <p>As energy generation from renewable and low carbon sources develops and new technologies are deployed in increasing numbers (especially in wind and marine), demand will increase</p>	<p>Long</p> <p>Requires greater participation in relevant school, further education and higher education provision</p> <p>The capacity and capability to deliver this learning needs to be ensured within providers</p> <p>Requires level 4 or above qualifications</p>	<p>These skills are critical to raising innovation and productivity levels and to the UK meeting EU carbon emission targets</p> <p>Important for product/market development, particularly in energy generation (from all fuel types)</p>
Current skills shortages with increasing demand for associate professionals of all types and levels with questions over current/future capability	<p>Definite</p> <p>Skills shortages already exist in various professional roles, including electrical, mechanical and civil engineering</p> <p>High degree of technological change required over next decade – in a highly complex operating/political/environmental landscape</p>	<p>Medium</p> <p>Growth in the number of associate professionals in the energy sector is set to increase by 14% by 2020</p>	<p>Medium</p> <p>Takes time to build management capability through mix of on- and off-the-job training</p>	<p>Critical to raising entrepreneurial, innovation and productivity levels</p>

Skills/Occupational Priority	Degree of Certainty (definite, likely, possible, unknown)	Magnitude (large, medium, small – current and future)	Lead time (short, medium, long)	Criticality
<p>Improving the attractiveness of the energy sector as a career option for highly skilled individuals</p>	<p>Definite</p> <p>Over the past two decades the reduced importance of manufacturing and engineering to the UK economy has led to fewer young people actively looking to work in it</p> <p>Many young people are unaware of the many attractive career options that are open to them in the energy sector</p>	<p>Currently – Medium</p> <p>Future – Large</p> <p>As all aspects of the energy sector evolve to meet the requirements of the low carbon economy, demand for high level skills will continue to grow (in numbers and importance)</p>	<p>Medium to long</p> <p>To alter a generation’s perception of engineering in certain aspects of the energy sector (e.g. fossil fuel-based generation and waste management) will take time</p> <p>Requires level 4 or above qualifications</p> <p>The “mainstreaming” of new technologies into engineering provision could play an important role in increasing the supply of such skills into the sector; along with ensuring that employers play a central role in the development (and delivery) of such provision.</p>	<p>This lack of fresh talent entering the sector is reflected in the age profile of the current workforce, which is high compared to the UK’s workforce as a whole</p> <p>An important element is the attraction of new talent from non-traditional elements of the labour market (e.g. females and those from BAME backgrounds)</p> <p>Entry routes and career pathways need to be developed and clearly communicated</p>
<p>Teaching and research professionals in education and skills providers</p>	<p>Definite</p> <p>Providers of learning and skills to the energy sector need to recruit similar skills as employers – exacerbated by impact of uncertain demand and higher wage rates within industry</p>	<p>Small to medium</p> <p>Demand for skills from providers will be constant as new trainers are often leavers/ retirees from industry or are tempted back into industry by higher wage rates</p>	<p>Medium to long</p> <p>Certainty around the consistency of demand for skills from the energy sector will take time to materialise</p>	<p>Attracting new talent into providers, ideally with industry experience, is paramount</p> <p>The availability of teachers and trainers with up-to-date knowledge on the environment and green technologies is crucial</p>

Skilled Trades

Skills/Occupational Priority	Degree of Certainty (definite, likely, possible, unknown)	Magnitude (large, medium, small – current and future)	Lead time (short, medium, long)	Criticality (to the sector)
<p>Gaining, maintaining (and proving) a competent workforce</p>	<p>Definite</p> <p>Many aspects of the energy sector are required by law to prove the competency of those individuals undertaking certain activities (separately from gaining a qualification)</p> <p>As a result, many individual employers have different mechanisms of proving the competent of their workforce which are not aligned with those of either their competitors or their contractors</p>	<p>Large</p> <p>There are currently 125,000 individuals registered on EU Skills' EUSR schemes, with 253,000 separate endorsements (predominantly in the gas, power and water industries)</p> <p>The potential for expansion across the sector (and into telecommunications and other related activities) is substantial</p>	<p>Medium</p> <p>Gaining consensus of standards in competency requires significant employer collaboration and can take time to achieve</p> <p>Incorporating these standards into legislative and regulatory regimes can also take time, depending upon when reviews take place</p>	<p>The lack of transferability of proven competence across employers (and the lack of planning of regulatory and legislative requirements) means that there are substantial areas of duplicated cost and effort and inconsistency in standards.</p> <p>Greater accreditation and recognition across the sector of competency could have significant benefits from employers, individuals and regulators alike.</p>

Skills/Occupational Priority	Degree of Certainty (definite, likely, possible, unknown)	Magnitude (large, medium, small – current and future)	Lead time (short, medium, long)	Criticality (to the sector)
Demand for level 3 Apprenticeships will increase	Likely May be dependent upon the availability of funding to support the activities of employers	Medium to large Although it is difficult to gain a consensus on whether employment levels of skilled trades will increase or decrease over the coming years, the high age profile suggests that replacement demand over the medium-term will remain a significant issue for the sector	Short to medium Strong collaboration is needed to ensure that Apprenticeship frameworks are available in all occupations where they may be needed to deliver the workforce of the future; particularly where growth in employment numbers is predicted (e.g. renewable energy, waste management and recycling).	Skilled trades (at level 3) are a very significant part of the sector's workforce, without which delivery of investment and capital plans cannot happen; particularly in the gas, power, waste management and water industries Employers need to be mindful of the necessity to increase their trainee in-take given that demand for the best talent will become more intense as the economic recovery gathers pace over the next couple of years

Skills/Occupational Priority	Degree of Certainty (definite, likely, possible, unknown)	Magnitude (large, medium, small – current and future)	Lead time (short, medium, long)	Criticality (to the sector)
<p>Improving the attractiveness of the energy sector as a career option</p>	<p>Definite</p> <p>Over the past two decades the reduced importance of manufacturing and engineering to the UK economy has led to fewer young people actively looking to work in it</p> <p>Many young people are unaware of the many attractive career options that are open to them in the energy sector</p>	<p>Currently – Medium</p> <p>Future – Large</p> <p>As all aspects of the energy sector evolve to meet the requirements of the low carbon economy, demand for high level skills will continue to grow (in numbers and importance)</p>	<p>Medium to long</p> <p>To alter a generation’s perception of engineering in certain aspects of the energy sector (e.g. fossil fuel-based generation and waste management) will take time</p>	<p>This lack of fresh talent entering the sector is reflected in the age profile of the current workforce, which is high compared to the UK’s workforce as a whole</p> <p>An important element is the attraction of new talent from non-traditional elements of the labour market (e.g. females and those from BAME backgrounds)</p> <p>Entry routes and career pathways need to be developed and clearly communicated</p>

Skills/Occupational Priority	Degree of Certainty (definite, likely, possible, unknown)	Magnitude (large, medium, small – current and future)	Lead time (short, medium, long)	Criticality (to the sector)
Progression routes from technician to engineer-level occupations	<p>Definite</p> <p>With greater research, development and deployment of new technologies right across the sector, the skills requirements of employers are increasing</p> <p>Many of these skills are/ will be required at higher levels; therefore, a greater emphasis is needed on enabling the current and new workforce to achieve these higher level skills</p>	<p>Medium</p> <p>Analysis of EU Skills' Workforce Planning Model suggests that around 35% of vacancies within the gas, power and water industries will be filled by promoting existing employees</p>	<p>Medium</p> <p>The identification of appropriate pathways, and their actual development, can take time to complete</p>	<p>Technicians will continue to make up a significant proportion of the energy sector's workforce for years to come and ensuring that they are able to progress as their abilities develop is crucial to meeting skills deficiencies throughout the entire workforce – relying on the recruitment of already-competent workers from the labour market is not sustainable</p>
Specific sector-related skills shortages	<p>Likely</p> <p>Although it is difficult to gain a consensus on whether employment levels of skilled trades (e.g. power overhead lines workers) will increase or decrease over the coming years, the high age profile suggests that replacement demand over the medium-term will remain a significant issue for the sector</p>	<p>Currently – Medium</p> <p>Future – Medium to large (dependent upon government policies)</p> <p>Skilled trades are, and, we predict, will continue to be in demand from all aspects of the energy sector</p> <p>As investment plans are implemented and new technologies are deployed in increasing numbers (especially in wind and marine), demand will increase</p>	<p>Long</p> <p>Requires greater participation in relevant school, further education and higher education provision</p> <p>The capacity and capability to deliver this learning needs to be ensured within providers</p> <p>Requires level 3 or above qualifications</p>	<p>Skilled trades (at level 3) are a very significant part of the sector's workforce, without which delivery of investment and capital plans cannot happen; particularly in the gas, power, waste management and water industries</p>

Process, Plant and Machine Operatives

Skills/Occupational Priority	Degree of Certainty (definite, likely, possible, unknown)	Magnitude (large, medium, small – current and future)	Lead time (short, medium, long)	Criticality
<p>Gaining, maintaining (and proving) a competent workforce</p>	<p>Definite</p> <p>Many aspects of the energy sector are required by law to prove the competency of those individuals undertaking certain activities (separately from gaining a qualification)</p> <p>As a result, many individual employers have different mechanisms of proving the competency of their workforce which are not aligned with those of either their competitors or their contractors</p>	<p>Large</p> <p>There are currently 125,000 individuals registered on EU Skills' EUSR schemes, with 253,000 separate endorsements (predominantly in the gas, power and water industries)</p> <p>The potential for expansion across the sector (and into telecommunications and other related activities) is substantial</p>	<p>Medium</p> <p>Gaining consensus of standards in competency requires significant employer collaboration and can take time to achieve</p> <p>Incorporating these standards into legislative and regulatory regimes can also take time, depending upon when reviews take place</p>	<p>The lack of transferability of proven competence across employers (and the lack of planning of regulatory and legislative requirements) means that there are substantial areas of duplicated cost and effort and inconsistency in standards.</p> <p>Greater accreditation and recognition across the sector of competency could have significant benefits from employers, individuals and regulators alike.</p>

Skills/Occupational Priority	Degree of Certainty (definite, likely, possible, unknown)	Magnitude (large, medium, small – current and future)	Lead time (short, medium, long)	Criticality
<p>Progression routes from operative to technician-level occupations</p>	<p>Definite</p> <p>With greater levels of investment and deployment of new technologies, the skills requirements of the sector are increasing</p> <p>Many of these skills are/ will be required at technician level; therefore, increased emphasis is needed on enabling the current and new workforce to achieve these higher level skills</p>	<p>Large</p> <p>Analysis of EU Skills' Workforce Planning Model suggests that around 35% of vacancies within the gas, power and water industries will be filled by promoting existing employees</p>	<p>Medium</p> <p>The identification of appropriate pathways, and their actual development, can take time to complete</p>	<p>Operatives will continue to make up a significant proportion of the energy sector's workforce for years to come and ensuring that they are able to progress as their abilities develop is crucial to meeting skills deficiencies throughout the entire workforce – relying on the recruitment of already-competent workers from the labour market is not sustainable</p> <p>Therefore, there is a greater need than ever for entry routes and career pathways to be available which allow those that enter the sector at level 2 to develop their skills up to higher levels</p>

Skills/Occupational Priority	Degree of Certainty (definite, likely, possible, unknown)	Magnitude (large, medium, small – current and future)	Lead time (short, medium, long)	Criticality
Demand for level 2 Apprenticeships will double current levels	Likely Analysis of EU Skills' Workforce Planning Model suggests that the recruitment of level 2 Apprenticeships will have to double current numbers over the next 15 years	Medium to large Although it is difficult to gain a consensus on whether employment levels of operatives will increase or decrease over the coming years, the high age profile suggests that replacement demand over the medium-term will remain a significant issue for the sector	Short to medium New Apprenticeship frameworks may need to be developed in order to achieve full coverage; particularly in renewable energy/ low carbon/ energy efficiency and waste management	Operatives (at level 2) are a very significant part of the sector's workforce, without which delivery of investment and capital plans cannot happen; particularly in the gas, power, waste management and water industries Employers need to be mindful of the necessity to increase their trainee in-take given that demand for the best talent will become more intense as the economic recovery gathers pace over the next couple of years

Skills/Occupational Priority	Degree of Certainty (definite, likely, possible, unknown)	Magnitude (large, medium, small – current and future)	Lead time (short, medium, long)	Criticality
<p>Improving the attractiveness of the energy sector as a career option</p>	<p>Definite</p> <p>Over the past two decades the reduced importance of manufacturing and engineering to the UK economy has led to fewer young people actively looking to work in it</p> <p>Many young people are unaware of the many attractive career options that are open to them in the energy sector</p>	<p>Currently – Medium</p> <p>Future – Large</p> <p>As all aspects of the energy sector evolve to meet the requirements of the low carbon economy, demand for high level skills will continue to grow (in numbers and importance)</p>	<p>Short</p> <p>Most of the necessary entry routes into the sector at this level are already in operation; although some new entry routes and Apprenticeship frameworks may need to be developed in certain areas (e.g. renewable energy/low carbon, waste management and recycling)</p> <p>Greater links need to be created with “non-traditional”/ particular elements of the labour market</p>	<p>This lack of fresh talent entering the sector is reflected in the age profile of the current workforce, which is high compared to the UK’s workforce as a whole</p> <p>An important element is the attraction of new talent from non-traditional elements of the labour market (e.g. females and those from BAME backgrounds)</p> <p>Entry routes and career pathways need to be developed and clearly communicated</p>

Elementary occupations

Skills/Occupational Priority	Degree of Certainty (definite, likely, possible, unknown)	Magnitude (large, medium, small – current and future)	Lead time (short, medium, long)	Criticality (to the sector)
<p>Gaining, maintaining (and proving) a competent workforce</p>	<p>Definite</p> <p>Many aspects of the energy sector are required by law to prove the competency of those individuals undertaking certain activities (separately from gaining a qualification)</p> <p>As a result, many individual employers have different mechanisms of proving the competency of their workforce which are not aligned with those of either their competitors or their contractors</p>	<p>Large</p> <p>There are currently 125,000 individuals registered on EU Skills' EUSR schemes, with 253,000 separate endorsements (predominantly in the gas, power and water industries)</p> <p>The potential for expansion across the sector (and into telecommunications and other related activities) is substantial</p>	<p>Medium</p> <p>Gaining consensus of standards in competency requires significant employer collaboration and can take time to achieve</p> <p>Incorporating these standards into legislative and regulatory regimes can also take time, depending upon when reviews take place</p>	<p>The lack of transferability of proven competence across employers (and the lack of planning of regulatory and legislative requirements) means that there are substantial areas of duplicated cost and effort and inconsistency in standards.</p> <p>Greater accreditation and recognition across the sector of competency could have significant benefits from employers, individuals and regulators alike.</p>

Skills/Occupational Priority	Degree of Certainty (definite, likely, possible, unknown)	Magnitude (large, medium, small – current and future)	Lead time (short, medium, long)	Criticality (to the sector)
<p>Improving the attractiveness of the energy sector as a career option</p>	<p>Likely</p> <p>Although it is difficult to gain a consensus on whether employment levels at elementary level will increase or decrease over the coming years, the high age profile suggests that replacement demand over the medium-term will remain a significant issue for the sector</p>	<p>Currently – Medium</p> <p>Future – Medium</p> <p>As the waste management and recycling industries mature, it is likely that significant numbers of elementary-level workers will continue to be in demand; especially the current age profile</p>	<p>Short</p> <p>Most of the necessary entry routes into the sector at this level are already in operation</p> <p>Greater links need to be created with “non-traditional” elements of the labour market</p>	<p>The lack of new recruits entering the sector at this level is reflected in the age profile of the current workforce, which is high compared to the UK’s workforce as a whole</p> <p>An important element is the attraction of new talent from non-traditional elements of the labour market (e.g. females, those from BAME backgrounds, ex-offenders, etc.)</p> <p>Entry routes and career pathways need to be developed and clearly communicated</p>

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Glossary

BAME	Black and minority ethnic
EMP	Extractive and Mineral Processing
EU Skills	Energy & Utility Skills
GVA	Gross Value Added
SSC	Sector Skills Council
UKCES	UK Commission for Employment and Skills

Technical appendix

The provision of core data

To ensure consistency and comparability across all 15 SSA reports, data from core labour market information sources was centrally collected, processed and formatted. It was then distributed by the UK Commission to Sector Skills Councils for inclusion within the reports.

Core data was centrally produced from the following sources:

- The Labour Force Survey
- The UK Commission's Employer Skills Survey 2011
- Working Futures 2010-2020
- Regional Accounts (information on Gross Value Added)
- Mid-Year Population Estimates
- European Continuing Vocational Training Survey
- Business Demography Statistics

Data from the Labour Force Survey, regional accounts and mid-year population estimates was collated, processed and formatted by Cambridge Econometrics and the Institute for Employment Research (IER), Warwick.

Data from the UK Commission's Employer Skills Survey 2011 was collated and processed by IFF Research and formatted by the UK Commission.

Data from Working Futures was collated, processed and formatted by IER.

Data from the European Continuing Vocational Training Survey and Business Demography Statistics was collated, processed and formatted by the UK Commission.

All data was quality assured by contractors, the UK Commission and by Sector Skills Councils.

It has been necessary to suppress some data within the reports to adhere to official guidelines regarding data quality. The details of suppression strategies applied to data from specific sources are described in more detail below. Data for Scotland, Wales and Northern Ireland for the three smallest SSA sectors is most likely to be suppressed. These are:

- Agriculture, forestry and fishing

- Energy production and utilities
- Information and communication technologies

Methodological information for core labour market information sources

Method used to derive estimates of gross value added (GVA) per employee job by SSA sector and nation

No official estimates are currently available for the level of productivity by sector and UK nation. The figures presented in this report have therefore been estimated by the UK Commission using the following process.

Levels of workplace gross value added at current basic prices by SIC 2007 Section were derived from the official estimates published by the Office for National Statistics as part of its Regional Accounts series. Levels of employee jobs were taken from the Business Register and Employment Survey for 2009.

The sectoral “footprint” definitions used as the basis for the SSA reports are not coterminous with SIC Sections, however, and in some cases draw on 2-digit SIC divisions. At present the official GVA estimates for nations and regions are only available at a SIC section level.

To overcome this an approach was adopted which has been developed by Welsh Government to derive gross value added estimates for its priority sectors. This approach was applied to the UK and all four nations. Approximate estimates of GVA at 2-digit level are available for much of the economy from the Annual Business Survey (ABS). These were used to allocate GVA at the 2-digit level with the results being constrained to the official GVA totals by SIC section taken from the Regional Accounts. For those areas of the economy not covered by the ABS, shares of employment at the 2-digit level were used instead, taken from the Annual Population Survey.

Labour Force Survey

About the survey

One of the key data sources used within this report is the Office for National Statistics’ (ONS) Labour Force Survey (LFS). The LFS is a survey of households living at private addresses (plus in NHS accommodation and student halls of residence) in the UK.

The survey is carried on a quarterly basis. The sample is made up of around 41,000 responding (or imputed) households in Great Britain every quarter, and around 1,600 households in Northern Ireland. The LFS uses a rotational sampling design which means that, once selected, a household⁴ is kept in the sample for a total of five consecutive quarters.

Interviewers can take answers to questions by proxy if a respondent is unavailable. This is usually from another related adult who is a member of the same household. About a third of LFS responses are collected by proxy. Information on individuals aged 16 – 19 most likely to be obtained by proxy.

Full user guidance can be accessed here: <http://www.ons.gov.uk/ons/guide-method/user-guidance/labour-market-statistics/index.html>.

Preparation of LFS data for this report

The UK Commission provided report authors with a core set of tables based on LFS data for mandatory inclusion within Sector Skills Assessment reports. The data within these tables was prepared by two contractors: Cambridge Econometrics (CE) and Warwick Institute for Employer Research (IER).

Data was prepared in three stages:

1. The original survey data was gathered and coded by IER to the categories and classifications required for the SSA tables. This was then sent to CE
2. CE used the data prepared by IER and derived the indicators and aggregated the data to the dimensions required for the tables
3. The UK Commission checked tables and distributed to report authors

Annual data presented within this report is based on an average of four consecutive quarters of data. Data prior to 2009 is based on SIC2003 and data for 2009 and 2010 is based on SIC2007 codes.

Reporting of LFS data

⁴ Note: it is the address that is selected and not necessarily the particular people who live there.

In line with ONS convention, annual LFS data presented within this report has been suppressed if individual cell sizes fall below 6,000. This is because cell sizes of fewer than 6,000 are deemed to be low quality estimates.

Analysis of employment uses all four categories of employments status within the LFS: employee, self-employed, government scheme & unpaid family worker.

Please note, some tables present a total for All sectors while others present a total for Whole economy. The values for these totals are different because the Whole economy total includes the 'Not within scope' category (i.e. sectors that don't fall within an SSA sector), whereas All sectors is the total for just the 15 SSA sectors.

UK Commission's Employer Skills Survey 2011

The UK Commission's Employer Skills Survey 2011 (UK Commission's ESS 11) was the first large-scale economy-wide employer skills survey to be conducted across the whole of the UK. The survey was managed by the UK Commission for Employment and Skills and was conducted by three contractors: IFF Research, BMG Research and Ipsos Mori (Davies et al, 2012). The project steering group included representatives from all four nation governments, the Alliance of Sector Skills Councils, the Department for Work and Pensions and the Skills Funding Agency.

Fieldwork was carried out from March to July 2011. Two waves of interviews were conducted. The main survey involved telephone interviews with approximately 87,600 employers and a follow-up survey focusing on investment in training was undertaken with over 11,000 respondents. The data presented within this report draws only on information gathered from the main survey.

The table below provides information on the number of employers interviewed by sector and nation for the main survey.

SSA sector	England	Scotland	Wales	NI	UK
Agriculture, forestry and fishing	1,270	99	133	45	1,547
Energy production and utilities	1,306	106	133	69	1,614
Manufacturing	6,774	182	470	350	7,776
Construction	7,538	300	660	463	8,961
Wholesale and retail trade	13,919	333	1,129	769	16,150
Transportation and storage	4,078	152	300	205	4,735
Accommodation, food and tourism activities	9,630	324	909	455	11,318
Information and communication	2,262	56	111	81	2,510
Creative media and entertainment	3,301	99	227	135	3,762
Financial, insurance & other professional services	4,525	146	391	281	5,343
Real estate and facilities management	3,113	85	133	93	3,424
Government	2,078	163	188	176	2,605
Education	4,597	164	391	287	5,439
Health	2,912	107	242	137	3,398
Care	4,028	101	338	296	4,763
Not within scope	3,722	86	257	162	4,227
Total	75,053	2,503	6,012	4,004	87,572

UK Commission's ESS 11 is a quota survey. Quotas were set on a size by sector within nation / English region basis. In Northern Ireland and Wales, where more interviews were carried out than the required minimum to get national representation, they were predominately distributed in proportion to the population.

In order to include the maximum number of questions without extending the overall length of the interview, the sample was randomly split in half for some sections, and one set of employers were asked one module of questions, and the other half of the sample different questions.

The survey is a local unit (establishment) survey. This means that for large multi-site organisations several branches/ locations may have been interviewed. The establishment level sampling reflects that the survey asks employers about issues that need to be answered by people with day-to-day contact with employees rather than head office.

Respondents are those who have the best overview of HR and training within the establishment. This will tend to be HR or training managers in large establishments and owner/managers or senior managers within small establishments.

The valid population of establishments being used in UK Commission's ESS 11 is all establishments with the exception of sole traders (this means that establishments with one employee and no working proprietors (for e.g. flower stall at a station, where there is one person working but they don't own it themselves) are included). In addition, establishments with multiple working proprietors but no employees are also included.

Sampling error for the survey results overall and for different sub-groups by which analysis is presented in the report is shown in the table below. Sectoral figures are presented for the 14 SIC 2007 sections which were used for the survey sampling approach.

Figures have been based on a survey result of 50 per cent (the 'worst' case in terms of statistical reliability), and have used a 95 per cent confidence level. Where the table indicates that a survey result based on all respondents has a sampling error of +/- 0.32 per cent, this should be interpreted as follows: 'for a question asked of all respondents where the survey result is 50 per cent, we are 95 per cent confident that the true figure lies within the range 49.68 per cent to 50.32 per cent'.

As a note, the calculation of sampling error has taken into account the finite population correction factor to account for cases where we are measuring a significant portion of the population universe (i.e. even if two sample sizes are the same, the sampling error will be lower if in one case a far higher proportion of the population was covered).

These confidence intervals are based on the assumption of a normal distribution of responses.

Sampling error (at the confidence 95 per cent level) associated with findings of 50 per cent

	Population	Number of interviews	(Maximum) Sampling Error
Overall	2,299,921	87,572	+/-0.32
By country			
England	1,960,298	75,053	+/-0.35
Northern Ireland	65,559	4,004	+/-1.5
Scotland	175,114	2,503	+/-1.94
Wales	98,950	6,012	+/-1.22
By size of establishment			
1-4	1,466,397	18,955	+/-0.99
5-24	648,446	47,770	+/-0.61
25-99	147,319	15,951	+/-1.03
100-249	25,945	3,270	+/-2.27
250+	11,814	1,626	+/-3.12
By sector			
Agriculture	98,458	939	+/-3.18
Mining & Quarrying	2,222	188	+/-6.84
Manufacturing	128,255	7,704	+/-1.08
Electricity, Gas and Water	10,583	1,426	+/-3.35
Construction	241,429	6,654	+/-1.18
Wholesale and Retail	441,365	15,340	+/-0.78
Hotels & Restaurants	167,215	8,471	+/-1.04
Transport and Communications	210,801	7,885	+/-1.08
Financial Services	52,381	1,881	+/-2.22
Business Services	551,612	14,488	+/-0.80

	Population	Number of interviews	(Maximum) Sampling Error
Public Administration	26,058	1,617	+/-2.36
Education	65,499	5,439	+/-1.27
Health and Social Work	140,269	8,161	+/-1.05
Community, Social and Personal Services	163,774	7,379	+/-1.11

Looking specifically at sampling error for SSA sectors at national level, Agriculture in Scotland provides an illustrative example. 99 interviews were completed for this sub-group. Applying the assumptions outlined above this gives a maximum sampling error of around +/- 10 percentage points. This demonstrates the indicative nature of the detailed survey estimates for smaller sectors.

Within the report, data based on unweighted bases of less than 25 have therefore been suppressed for quality reasons. In addition, data based on unweighted bases of between 25 and 50 have been marked as indicative. More stringent thresholds have been applied in Scotland because of the lower total number of interviews that were conducted. Estimates based on unweighted bases of fewer than 50 have been suppressed, whilst estimates based on bases of 50-99 are marked as indicative in the relevant tables.

Finally, occupations within the survey are defined by 2010 Standard Occupational Classification codes and sectors are defined by 2007 Standard Industrial Classification codes.

Please visit the UK Commission's Employer Surveys website for further information including the full survey report and questionnaire. <https://ness.ukces.org.uk/default.aspx>

Working Futures

Working Futures 2010-2020 is the latest in a series of detailed projections of UK employment, productivity, labour supply and skills. The projections have been prepared by the Institute for Employment Research (IER) and Cambridge Econometrics (CE) on behalf of the UK Commission for Employment and Skills (UKCES).

The projections are calculated from a number of different data sources, including the Annual Business Inquiry, the Business Register and Employment Survey, and the Labour Force Survey. The results provide a picture of employment prospects up to 2020 by industry, occupation, qualification level, gender and employment status for the UK as a whole, the four nations, and English regions.

As with all projections and forecasts, the results presented in Working Futures should be regarded as indicative of likely trends and orders of magnitude given a continuation of past patterns of behaviour and performance, rather than precise forecasts of the future. At a time of great uncertainty about the short to medium term prospects for the economy, it is important to stress the value of Working Futures in aiding understanding of likely prospects for employment in the longer term (i.e. in 2020). Readers should therefore focus on the relative position of sectors, and occupations in 2020 and treat the projected values as broad indicators of scale rather than exact predictions.

Further methodological details can be found on the UK Commission's website - <http://www.ukces.org.uk/publications/working-futures-technical-report>.

The provision of additional data

Energy & Utility Skills' Workforce Planning Model

EU Skills' Workforce Planning Model is a web-based tool which helps individual employers identify and plan for their medium to long-term technical and engineering-related labour and skills needs.

Using an employer's own data about their workforce, including their age and skills profiles, the model allows them to assess the impact of retirements, natural wastage and workforce growth on their workforce numbers over the next 15 years. The model then helps each company to develop any number of possible recruitment strategies that they may employ to meet their future workforce and skills requirements. By planning their recruitment strategies in this way, employers can reduce the impact of unsustainable recruitment practices and skills shortages, which can have cost benefits to the company in terms of reducing inefficiencies and limiting the wage increasing effects of insufficient numbers of skills workers.

To date, more than 60 companies with over 80,000 employees from across the gas, power, waste management and water industries have made use of the model for their own workforce planning exercises.

Depending upon how many companies use the model within a particular sub-sector, EU Skills is able to aggregate the outputs and produce sub-sector-based analyses which are unique assessments of the age profile of that sub-sector's technical and engineering workforce, the impact of predicted vacancies on this workforce, and how the sub-sector plans to recruit in order to gain the skills needed by their future workforce.

The extent to which these aggregated analyses are representative of the whole sub-sector varies considerably. For instance, there is near 100% coverage of the *regulated* employers within the electricity, gas and water industries, and the resulting data played an important role in these companies' discussions with Ofgem, which ultimately secured almost £300million of skills investment funds. However, in unregulated aspects of the sector coverage is not as comprehensive. In the waste management industry, for example, data is currently based on five of the top ten companies (equating to an estimated 13% of the total workforce).

In their aggregated form, these analyses allow EU Skills to forecast the number of recruits needed in each occupational group per year; be they trainees, direct from the labour market, or internal promotions. These data are an important tool in EU Skills' lobbying activities on behalf of employers and in our work in ensuring that the providers of education and skills are aware and prepared to meet employer demands for skills over the coming years.

It is important to note that as the purpose of the model isn't to develop market intelligence, but to aid employers in their workforce planning, the data contained within this report is used only to aid understanding of the issues affecting the sector.

Over the next two years EU Skills will be looking to expand the coverage of the model, particularly throughout the supply chain (which delivers a substantial proportion of EU Skills' sector operations) and the renewable energy industry.

List of previous publications

Executive summaries and full versions of all these reports are available from www.ukces.org.uk

Evidence Report 1

Skills for the Workplace: Employer Perspectives

Evidence Report 2

Working Futures 2007-2017

Evidence Report 3

Employee Demand for Skills: A Review of Evidence & Policy

Evidence Report 4

High Performance Working: A Synthesis of Key Literature

Evidence Report 5

High Performance Working: Developing a Survey Tool

Evidence Report 6

Review of Employer Collective Measures: A Conceptual Review from a Public Policy Perspective

Evidence Report 7

Review of Employer Collective Measures: Empirical Review

Evidence Report 8

Review of Employer Collective Measures: Policy Review

Evidence Report 9

Review of Employer Collective Measures: Policy Prioritisation

Evidence Report 10

Review of Employer Collective Measures: Final Report

Evidence Report 11

The Economic Value of Intermediate Vocational Education and Qualifications

Evidence Report 12

UK Employment and Skills Almanac 2009

Evidence Report 13

National Employer Skills Survey 2009: Key Findings

Evidence Report 14

Strategic Skills Needs in the Biomedical Sector: A Report for the National Strategic Skills Audit for England, 2010

Evidence Report 15

Strategic Skills Needs in the Financial Services Sector: A Report for the National Strategic Skills Audit for England, 2010

Evidence Report 16

Strategic Skills Needs in the Low carbon Energy generation Sector: A Report for the National Strategic Skills Audit for England, 2010

Evidence Report 17

Horizon Scanning and Scenario Building: Scenarios for Skills 2020

Evidence Report 18

High Performance Working: A Policy Review

Evidence Report 19

High Performance Working: Employer Case Studies

Evidence Report 20

A Theoretical Review of Skill Shortages and Skill Needs

Evidence Report 21

High Performance Working: Case Studies Analytical Report

Evidence Report 22

The Value of Skills: An Evidence Review

Evidence Report 23

National Employer Skills Survey for England 2009: Main Report

Evidence Report 24

Perspectives and Performance of Investors in People: A Literature Review

Evidence Report 25

UK Employer Perspectives Survey 2010

Evidence Report 26

UK Employment and Skills Almanac 2010

Evidence Report 27

Exploring Employer Behaviour in relation to Investors in People

Evidence Report 28

Investors in People - Research on the New Choices Approach

Evidence Report 29

Defining and Measuring Training Activity

Evidence Report 30

Product strategies, skills shortages and skill updating needs in England: New evidence from the National Employer Skills Survey, 2009

Evidence Report 31

Skills for Self-employment

Evidence Report 32

The impact of student and migrant employment on opportunities for low skilled people

Evidence Report 33

Rebalancing the Economy Sectorally and Spatially: An Evidence Review

Evidence Report 34

Maximising Employment and Skills in the Offshore Wind Supply Chain

Evidence Report 35

The Role of Career Adaptability in Skills Supply

Evidence Report 36

The Impact of Higher Education for Part-Time Students

Evidence Report 37

International approaches to high performance working

Evidence Report 38

The Role of Skills from Worklessness to Sustainable Employment with Progression

Evidence Report 39

Skills and Economic Performance: The Impact of Intangible Assets on UK Productivity Growth

Evidence Report 40

A Review of Occupational Regulation and its Impact

Evidence Report 41

Working Futures 2010-2020

Evidence Report 42

International Approaches to the Development of Intermediate Level Skills and Apprenticeships

Evidence Report 43

Engaging low skilled employees in workplace learning

Evidence Report 44

Developing Occupational Skills Profiles for the UK

Evidence Report 45

UK Commission's Employer Skills Survey 2011: UK Results

Evidence Report 46

UK Commission's Employer Skills Survey 2011: England Results

Evidence Report 47

Understanding Training Levies

Evidence Report 48

Sector Skills Insights: Advanced Manufacturing

Evidence Report 49

Sector Skills Insights: Digital and Creative

Evidence Report 50

Sector Skills Insights: Construction

Evidence Report 51

Sector Skills Insights: Energy

Evidence Report 52

Sector Skills Insights: Health and Social Care

Evidence Report 53

Sector Skills Insights: Retail

Evidence Report 54

Research to support the evaluation of Investors in People: Employer Survey

Evidence Report 55

Sector Skills Insights: Tourism

Evidence Report 56

Sector Skills Insights: Professional and Business Services

Evidence Report 57

Sector Skills Insights: Education

Evidence Report 58

Agriculture, Forestry & Fishing: Sector Skills Assessment 2012

Evidence Report 59

Evaluation of Investors in People: Employer Case Studies

Evidence Report 60

An Initial Formative Evaluation of Best Market Solutions

Evidence Report 61

Employer Skills Survey 2011: Northern Ireland Report

Evidence Reports present detailed findings of the research produced by the UK Commission for Employment and Skills. The reports contribute to the accumulation of knowledge and intelligence on skills and employment issues through the review of existing evidence or through primary research.

Produced by Energy & Utility Skills,
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Commission for Employment and Skills

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